ENERGY FOR ALL®

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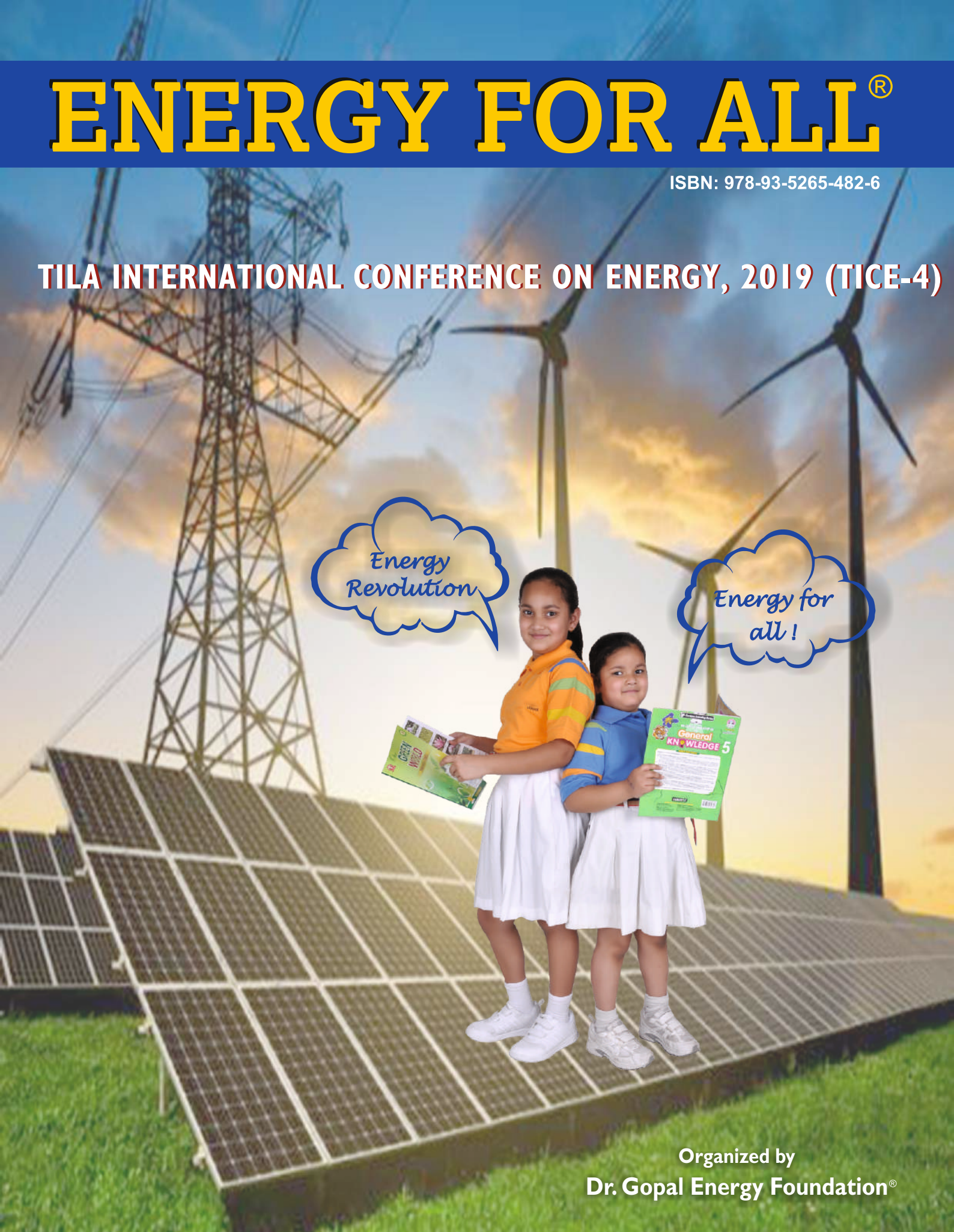
TILA INTERNATIONAL CONFERENCE ON ENERGY, 2019 (TICE-4)



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Sh. Raj Singh Niranjan

Advocate - Supreme Court & Appellate Tribunal of Electricity, Legal Adviser, International Solar Alliance.

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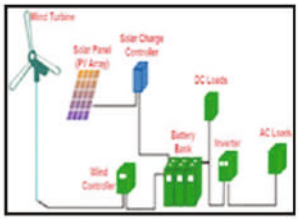

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DR. GOPAL ENERGY FOUNDATION
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Ref No. D-GEF/A/63A

ABOUT D-GEF

- Dr. Gopal Energy Foundation (D-GEF) is a non-profit premier organization enabling energy Revolution by serving the International Community in the disciplines of power, Petroleum, Gas, Coal, Nuclear and Renewable Energy Sector, with motto of "Energy for all" founded on 15th April 2015 with its corporate office at New Delhi, INDIA.

D-GEF INITIATIVES

TILA International Conference on Energy (TICE)

- International Conference on Energy (ICE) is a flagship, annual event of D-GEF. The Energy conference organized by D-GEF on its foundation day (15th April) was attended by 500 plus delegates from across the world.

Skill Development & Capacity Development in Energy Regulations

- **Electricity Laws- Online Certificate Course** – D-GEF Certificate Courses on Electricity Laws is highly recommended for Law/Management/Engineering Students, Professionals (Lawyers/CA/CS), Professors, Experts Managers/Engineers who are working in Energy PSU's and Private Energy Companies or anyone who wants to excel in Electricity Laws. This course is primarily based on Electricity Act – 2003.
- Certificate course on Energy Arbitration, Environment Laws, Contract Management in Energy Sector, Solar Policy & Law in India, Petroleum Laws, Coal Laws, Nuclear Energy Laws shall be shortly started.

D-GEF Services to Energy Companies for doing business in India & CSR for Energy Companies

- D-GEF is your partner in all stages of business development , from formulating entry strategies to setting up local offices and communicating your expansion to core markets. Services at a glance are (1) Business Partner Search (2) Market Research (3) Credit Checks (4) Investment in India (5) Recruitment Services (6) PAN Card application & support for Tax returns (7) GST application and support for returns (8) Business Delegation Services (9) B2B Match making services (10)Corporate & Cultural Events (11) Special business events in India and abroad (12) media and Public relations (13) value added services such as Legal Services, Translation services , Marketing & Advertising, trade fair services , Visas, Clean technologies, environment, renewable energies, CSR, Senior Expert Services, Publications, Training.
- A data base of Independent directors/Women Directors with expertise in Energy sector to enable energy companies to appoint Independent/Women Director in compliance of companies Act – 2013.
- D-GEF is willing to take over the CSR activities of Energy Companies for better monitoring & implementation of projects.

TILA International Moot Court Competition on Energy (TIMCCE) @ Banasthali University, JAIPUR, INDIA

- It is proposed to organize Energy Moot Court Competition every year on 2nd October to bring in awareness about Energy Laws amongst the Law candidates across the World.

Training/Workshop for capacity building in Energy Sector

- In house Training/Workshop in the corporate office/on site is provided by expert faculty.
- Many customized courses are conducted for capacity building

Publications of Technical Documents & Journal

- **"*Energy for all*"** ® ISBN Registered, conference book is published annually containing articles & research papers from Leading Experts, faculty and researchers from premier Management / Law and Engineering Institutions like IITs/National Law Schools/IIMs etc.
- **Conference outcome book** is published every year recommending reforms in Energy Sector to achieve the goal of Energy for all.
- **Guide to Electricity Laws in India** authored by Sh. Raj Singh Niranjan, Energy Law Expert is available through D-GEF.
- **Energy Law Journal (ELJ)** containing all Acts/Rules/Regulations/important notifications and
- **Energy Law Reporter (ELR)** containing all judgments of SERC/JERC/CERC/APTEL/Sec 125 Appeal in Supreme Court is proposed to be published.

International Energy Arbitration Centre (IEAC) New Delhi

- IEAC, New Delhi aims to become world largest Institutional Arbitration Centre for energy companies.
- Negotiation, Mediation, Conciliation, & Arbitration facility is provided through experts in energy sector.

For more information, visit www.dgef.in

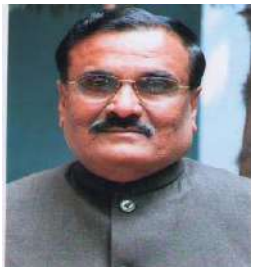
Look forward to hearing from you.

Sh. Raj Singh Niranjan,Convener 9810070075 rsn@dgef.in	Dr. Rajni Patel,Co-Convener 9818043057 rajni@dgef.in	Dr. Vijay Singh, President, Ex- IAS, Former Commissioner & Principal Secretary president@dgef.in	Sh. R.K.Tiwary Secretary General 08860635075 sg@dgef.in

ORGANIZING COMMITTEE, TILA INTERNATIONAL CONFERENCES ON ENERGY

Mr. Raj Singh Niranjan
Convener
4th TILA International Conference on Energy 2019
Counsel for Govt. of India-Supreme Court

Dr. Rajni Patel
Co-Convener
4th TILA International Conference on Energy 2019



Dr. Vijay Singh, IAS (Retired)
Co-Convener
4th TILA International Conference on Energy 2019

- **Dr. (Col.) S.N.Katiyar, Co-Convener [Across India]**
  Coordinator –Govt. of India & State Government
- **Ms. Anjali Chauhan Co-Convener [Mumbai]**
  Coordinator –Petroleum & Energy Gas
- **Mr. Myron Yeo, Co-Convener[Singapore]**
  Director of woods and prints
- **Mr. Sibongakonke Dawn Keswa(South Africa)**
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- **Mr. Nusrat Malik Munir (Mauritious)**
  Founder/Director, Regenesis Ltd.
- **Charlie Martial NGOUNOU (Uaounde, Cameroon)**
  Founder, XUXXEX Group Consulting (ltd)
- **Mr. Eligbelo Begakoma Felix, Co-Convener [Kinshasa, Kongo]**
  CEO Administrative, Gerant, Fonderie Durable DU Kongo
- **Sh. Sh. Prasidh Kumar, Co- Convener**
  Co-Founder & CEO, Soreva
- **Sh. Himanshu Pathak, Co-Convener [Bhopal]**
  Coordinator – New & Renewable Energy

- **Sh. Viren Mehta, Co-Convener, Dubai [UAE]**
  Director, Mideast Engineering FZC
- **Sh. Amit Parikh, Co-Convener, Ahmedabad [Gujarat]**
  International Trade Advisor, Harmony FinEx Pvt.Ltd.
- **Ms. Vaishali Deshmukh, Director of External Affairs, DGEF [Pune]**
- **Ms. Alphiya Bharmal, Co-Convener [Gurgaon]**
  Director, Vaikalpik Engineering Services.
- **Sh. Ashok Aneja, Co-Convener Partner(**Banking & Finance), Trans India Law Associates
- **Sh. Ramesh Tiwari,** Secretary General, Dr. Gopal Energy Foundation and Secretary to the Organizing Committee.
- **Ms. Anum Hussain,** Organizing Secretary

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ENERGY FOR ALL

4th TILA INTERNATIONAL CONFERENCE ON ENERGY, 2019

Convener
Mr. Raj Singh Niranjan
Energy Law Expert

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TICE-4

4th TILA INTERNATIONAL CONFERENCE ON ENERGY 2019

Venue – Silver Oak, India Habitat Centre, New Delhi-110 003, INDIA
Date –Monday, 15th April 2019
Time 8.30 Hrs to 16.30 Hrs

Tentative/Invited /Confirmed

CONFERENCE AGENDA

Theme- "Energy Revolution in India"- The way Forward

8:30 hrs - 9:30hrs	**Registration of Delegates & Exhibiters**
Open house Multilateral Dialogue with representative of BRICS Youth Energy Association/India-Africa Youth Energy Forum/ South Korea/ Brazil/Cameroon/Russia/ Nigeria/ India and other countries. The Dialogue will aim at bringing into perspective the energy challenges across the Globe and to develop a constructive strategy to make "Right to Energy" and "Energy Revolution" possible to the maximum extent.	
Panelist	**Dr. Ki-hae Yang**, Chairman, Segi Solar, South Korea
	Mr. Charlie Martial NGOUNOU, Founder, XUXXEX Group consulting (Ltd) Camroon
	Mr. Ezeugo Nnamdi, Director, African Affairs, IIGL Nigeria
	Ms. Jouslin Khairallah, Managing Partner, Khairallah and Associates, Dubai/Abu Dhabi, UAE
	Mr. Sarmad Dilshad, 2nd Secretary, Iraq Embassy, Delhi
	Mr. Daniel MFUMU MAWONZI, Director, Access Construction, Congo
Moderator	**Mr. Subrahmanyam Pulipaka**, CEO, NSEFI & Chairman, India Africa Youth Energy Forum

9:30 hrs - 10:30hrs	**Inaugural Session**
Session 1	Inauguration by Chief Guest-Art Exhibition on Energy Revolution prepared under guidance of Dr. Amrit Kapoor, PhD Arts
	Presenting of Right to Energy Badge to the Hon'ble Chief Guest and Guest of Honors & Lighting of the Lamp
	National Anthem

Welcome Address & Annual Report of Dr. Gopal Energy Foundation (www.dgef.in)	**Dr Rajni Patel** on behalf of Dr. Vijay Singh, IAS & President of DGEF
Annual Report of Trans India Law Associates (www.tila.in)	**Mr. Raj Singh Niranjan**, Managing Partner, TILA; Legal Adviser, ISA; Interim President, International Energy Arbitration Centre (IEAC)
	• *Release of Conference book/Knowledge Papers "Energy for all"*® • Release of Right to Energy Declaration by the Chief Guest and to declare 15th April as "International Right to Energy Day".
Key note address by Guest of Honour	**Mr. K.S.Popli,** CMD (Former)**,** Indian Renewable Energy Development Agency (IREDA)
Key note address by Guest of Honour	**Ms. Surbhi Goyal,** Senior Energy Specialist, Energy and Extractives, World Bank Group
Key note address by Guest of Honour	**Mr. Pawan Singh** Managing Director, PTC Financial Services
Key note address by Guest of Honour	**Sh. Jatindra Nath Swain** Managing Director**,** Solar Energy Corporation of India
Key note address by Guest of Honour	**Mr. Ramesh Kumar Choudhary**, Hon'ble Member, Bihar Electricity Regulatory Commission
Key note address by Guest of Honour	**Anjuli Chandra,** Hon'ble Member, Punjab State Electricity Regulatory Commission
Key note address by Chief Guest	**H.E. Upendra Tripathi,** Director General, International Solar Alliance

10:30 hrs - 1:00hrs	**Networking High Tea (*Tea with TILA*)**

11:00 hrs - 3:00hrs	**Land Acquisition for Energy Projects (Solar/ Wind/Hydro/waste to Energy/Biomass & others)**
	• Invitation for nomination for "Dr Gopal Energy Prize 2020- Release of White paper on selection procedure. • Signing of MOU between Dr. Gopal Energy Foundation and India- Africa Youth Energy Forum (IA-YEF)/BRICS Youth Energy Association
Session 2	Background - Goal of the Government for 2022 is Solar 113.49 GW Wind 66.65 GW

	<table><tr><td>Small Hydro</td><td>5.98 GW</td></tr><tr><td>Biomass</td><td>10.5 GW</td></tr></table> Hence as a thumb rule if we take 4 acres Land requirement for One MW of renewable Projects, the sector needs to acquire land approximately to the tune of 7,86,480 Acres before 2022. *Discussion:* 1. *Ways to de-risk renewable projects by simplifying Land acquisition or Alternative methods like allocating Govt. Land on long term lease for projects.* 2. *Comparative analysis of Solar Policies of various State Governments and the implication or benefits in Land conversions/ exemption from Stamp duties/ Registration fees etc* 3. *Steps for time-bound permissions required under Land Revenue Code and Land Reforms Act or the respective State Governments.* 4. *Best Practices for minimising future Litigation.*
Panelist	**Sh. JatindraNath Swain** Managing Director**,** Solar Energy Corporation of India
	Mr. A.B.Kiran Head (Legal) , IREDA
	Mr. Anoop Khatri General Counsel, Suzlon Group
	Mr. Prafulla Pathak President, Solar Energy Society of India
	Ms. Shrikanti Nilange Director,Sunergize Energy Solutions
	Prof (Dr) Sushma Sharma National law University, Bhopal
Moderator	**Mr. Ashish Swaroop** Consultant, Sprung Energy
Co-Moderator	**Mr. Prasidh Kumar** CEO, Soreva Energy

11:00 hrs - 3:00hrs	**CEO Round Table**
	• *Release of Brochure of TICE V 2020 to be held on 15th April 2020 at New Delhi with the theme Right to Energy.* • Release of revised Electricity Law – Online Course book. • Release of "Energy Law Model Course"for Law schools across India.
Session 3 Parallel Session	Background - As India's Power market entered growth phase, the CEOs of key companies in Indian ecosystem will come together and discuss the challenges faced by

	the industry and possible ways to address them *Discussion:* 1. *How achievable is the 175 GW renewable target in the current policy atmosphere* 2. *What are the key challenges for IPPs today* 3. *PPA Revision and instability in the market* 4. *Is Indian solar/Renewable market completely risk free?* 5. *Suggestions for a comprehensive policy that makes 175 GW renewable achievable* 6. *Challenges & Opportunities in Hydro/ Thermal companies in next five years keeping in view introduction of Insolvency and Bankruptcy Code and other regulatory challenges.*
Moderator	**Ms. Preeti Patel,** Director, Patel Engineering
Panelist	**Mr. Manoj Kohli,** Executive Chairman, SB Energy
	Mr. Rabindra Satapathy, COO, Solar Business, Jakson Group
	Mr. Sudhir Kumar Aggarwal, Executive Director Patanjali Renewable Energy Pvt. Ltd
	Mr. Shashi Kiran, CEO, Aarushi Green
	Sh Gaurav Seth, CEO, Sprang Energy
	Mr. Sumant Sinha, CEO,Renew Power
Co- Moderator	**Mr. Subrahmanyam Pulipaka,** CEO, National Solar Energy Federation of India

13:00 hrs - 3:30hrs	**Networking Lunch (*Dine with DGEF*)**

13:30 hrs - 5:00hrs	**Insolvency and Bankruptcy Code 2016- Implication on Energy Companies**
Session 4	Background –Nearly 1500 CDs have been admitted into CIRP. Of these, 142 have been closed on appeal or review or settled; 63 have been withdrawn; 302 have ended in liquidation and 79 have ended in approval of resolution plan. This panel will discuss the means for solving the issues and challenges faced by the Energy Sector Companies and Lender Banks under the Insolvency And Bankruptcy Code, 2016. *Discussion:*

	1.What are the issues faced by the Cash Rich Companies in Energy Sector, trying to take over and resolve insolvency of a Company through Insolvency and Bankruptcy Code, 2016 and how the same can be achieved? *2. What are the issues faced by lender banks like PFC/REC/PFS/IREDA etcin filing a case under Insolvency and Bankruptcy Code, 2016 and how the same can be solved?* *3. Issues faced by the Cash deficit Companies in energy sector for going in voluntary liquidation under Insolvency and Bankruptcy Code, 2016, and how the same can be solved?* *4. What are Responsibility and Obligations of Resolution Professional under Insolvency and Bankruptcy Board?* *5. Best practices for the Resolution Professional to prepare the Information Memorandum for a Energy Company?* *6. How the Committee of Creditors is formed and who must be the members of the same.* *7. What is the chronological order and in what priority to pay to the creditors.* *8. Approval from Competition Commission of India is required prior to the filing of a Resolution Plan or after approval of a Resolution Plan? How relevant is combination application in CCI keeping in view the fact the Power sector is a Natural monopoly and involvement of PSUs.*
Chair of the Session	**Dr. Ashok Haldia,** Ex Secretary, ICAI & MD PFS
Panelist	**Mr. Ashish Nandan,** Head-Regulatory affairs, Enel BLP India
	Mr. Pankaj, Sun systems USA
	Mr. Romesh Kapoor, Chief General Manager (BD) SJVN Ltd.
	CA. Prakash Sinha, Managing Partner, Prakash Sachin & Co.
	Ms. Chhavi Bahal, Sr. Associate Advocate, Trans India Law Associates

13:30 hrs - 5:00hrs	**Sovereign Funds/Lending to infrastructure Projects especially power sector - Round Table**
Session 5 Parallel Session	Background-De-risking investment in Energy Sector. Reducing the risk of investment in renewable energy projects is an important step of de-carbonizing energy systems to prevent dangerous climate change, with three major components- technology risk, development risk and pricing risk. The panel will address each of these risk profiles which will help the investors-utilities, banks and other institutions to find the necessary will to invest in renewable projects. *Discussion:* *1. How can power and energy sector companies involve, contribute or be engaged in de-risking of investment in renewable energy sector?* *2. Abundant renewable energy sources but poor access to energy-why?* *3. What's the way forward to mobilize resources and funds for energy revolution?*
Chair of the Session	**Mr Pawan Singh,** MD, PTC Financial Services
Moderator	**Dr. Ashok Das,** CEO,SUNMOKSHA
Panelist	**Mr. Ashok Aneja**, Partner (Banking and Finance), Trans India law Associates
	Mr. Vikas Bansal, Director, Yes Bank
	Mr. Abhilakh Singh, General Manager, IREDA
	Mr. Sunil Grover, AGM, Punjab National Bank
	Mr. Mark A White, Mission Director USAID India
	K. YOKOYAMA, Country Director, India Asian Development Bank

15:00 hrs - 16:30hrs	**Contract Management with focus on PPAs and Alternative Dispute Resolution with discussion on future of International Energy Arbitration centre**
	• Release of revised Rules of *International Energy Arbitration Centre*

Session 6	Background – *Provide a foundation of commercial contracts management, managing legal risk associated with breach of contracts and Address legal issues by providing a comprehensive understanding of the commercial dispute settlement techniques such as adjudication, arbitration and alternative dispute resolution creating a platform for delegates to give insight on using it as conflict resolution tool in energy sector.* *Discussion:* *1. Whether under the contractual frame work, there is any scope for revision in tariff?* *2. What are Fore Majeure events; can they be interpreted differently in the country of the service provider and the buyer?* *3. Where there is scope of specialized International Arbitration Centers for Public Sector undertakings in energy sector?* *4. The UNICITRAL Model Law on International Commercial Arbitration Vis-à-vis Arbitration & Conciliation Act, 1996* *5. Panel Discussion On Analysis Of Following Land Mark Judgment's:* *Gujrat Urja Vikas Nigam Limited v. Solar Semiconductor Power Company (India) Private Limited and others (AIR 2017 SC 5372)* *Nabha Power Ltd V. Punjab State Corporation ltd and Ors (2017 (12) SCALE 241)*
Panelist	**Mr. K.S.Popli,** Former CMD IREDA & Invited to be Chairperson, Board of Governor of International Energy Arbitration Centre
	Mr A B Aggarwal Former Chairman, BBMB
	Mr. P K Agarwal, Director, POSOCO
	Mr. Kanwar Singh, Director, SJVN Ltd
	Mr. R Venkataramani, Sr. Advocate, Supreme Court of India Former Member, Law Commission of India
	Mr. Rajib Routray, Company Secretary & Legal Head, Jakson Group
	Sh Purusharth Singh, Legal Department, Suzlon Energy
	Mr. Rajiv Agarwal, Secretary, Indian Captive Power Producers Association

15:00 hrs - 16:30hrs	**Pitching Session & Paper Presentation**
Session 7 Parallel Session	Background- As a continuation of the Sovereign Fund Round Table a pitching session will be organized followed with Paper Presentation on Energy issues.
Pitching Session	
Paper Presentation	1. Procurement of Renewable Energy Through Open Access – Experience / Challenges Thereof by Mr. Manuj Singhal, Mr. Satish Moza and Mr. Harsh
	2. Dr. Ki-hae Yang, Chairman, Segi Solar, South Korea
	3. Lalit Ambastha, Managing Partner, Patent Wire
	4. Mr. Yatin Khaturia, Research Scholar, Punjab University, Chandigarh TOPIC – Renewable Energy Regulation in India: Barriers and Challenges.
	5. Mr. Abhishek Sharma, student, UPES, Dehradun TOPIC – Global Energy Research: Guide for a beginner.
	6. Ms. Archana Anil, student, Mewar University TOPIC – A Disquisition on Energy Law

16:30hrs -16:45 hrs	**Valedictory Address & Presentation of Awards to TICE organizing Team**
	• *Award to Meritorious Candidates of Electricity Laws-online Certificate Course.*
Valedictory Session	Dr. Vijay Singh, IAS (Retd), Former Principal Secretary , Govt. of Madhya Pradesh. Dr. G.P. Patel, Director, CBIP, Former Executive Director, NHPC Ltd Former MD of UJVNL Govt. of Uttarakhand & CED of NHDC Ltd
Vote of Thanks	Sh. Ashok Aneja, Partner (Banking & Finance), Trans India Law Associates Announcement of venue/theme and date of Next Conference. DGEF & TILA Team members – Group Photograph

16:45 hrs onward	**Networking Tea with TICE V Team – See you on next Right to Energy Day i.e. 15th April 2020 at India Habitat Centre, New Delhi**

ORGANIZING COMMITTEE, TILA INTERNATIONAL CONFERENCE ON ENERGY (TICE 4)

1. Sh. Raj Singh Niranjan, Convener @ 91 9810070075, rsn@dgef.inCoordinator – Power
2. Dr.(Ms.) Rajni Patel, Co- Convener [New Delhi]
   Coordinator – Conference Administration
3. Dr. Vijay Singh IAS (R), Co-Convener [Across India]
   Coordinator – Public Sector Undertaking
4. Dr (Col.) S.N.Katiyar, Co-Convener [South Asia]
   Coordinator –Govt. of India & State Government
5. Ms. Anjali Chauhan Co-Convener [Mumbai]
   Coordinator –Petroleum & Energy Gas
6. Mr. Myron Yeo, Co-Convener [Singapore]
   Director of woods and prints
7. Mr. Sibongakonke Dawn Keswa (South Africa)
   Youth Influencer & Motivational Speaker, Johansburg
8. Nusrat Malik Munir (Mauritious)
   Founder/Director, Regenesis Ltd.
9. Charlie Martial NGOUNOU (Uaounde, Cameroon)
   Founder, XUXXEX Group Consulting (ltd)
10. Sh. Eligbelo Begakoma Felix, Co-Convener [Kinshasa, Kongo]
    CEO Administrative, Gerant, Fonderie Durable DU Kongo
11. Sh. Prasidh Kumar, Co- Convener
    Co-Founder & CEO, Soreva
12. Sh. Himanshu Pathak, Co-Convener [Bhopal]
    Coordinator – New & Renewable Energy
13. Sh. Viren Mehta, Co-Convener, Dubai [UAE]
    Director, Mideast Engineering FZC
14. Sh. Amit Parikh, Co-Convener, Ahmedabad [Gujarat]
    International Trade Advisor, Harmony Fin Ex Pvt. Ltd.
15. Ms. Vaishali Deshmukh, Director of External Affairs, DGEF [Pune]
16. Ms. Alphiya Bharmal, Co-Convener [Gurgaon]
    Director, Vaikalpik Engineering Services.
17. Sh. Ashok Aneja, Co-Convenery]
    Partner (Banking & Finance), Trans India Law Associates
18. Sh. Ramesh Tiwari, Secretary General, Dr. Gopal Energy Foundation and Secretary to the Organizing Committee. Mobile No. 91 8860635075, sg@dgef.in
19. Ms. Anum Hussain, Organizing Secretary General, TICE 4

Master of Ceremony

SESSION	MASTER OF CEREMONY
Session 1	Ms. Mrinalini, Associate advocate, TILA
Session 2	Ms. Payal, Sr. Associate Advocate, TILA
Session 3	Mr. Subramaniam Pulipaka, CEO NSEFI
Session 4	Ms. Chhavi, Sr.Associate Advocate, TILA
Session 5	Mr. Ashok Aneja, Partner (Banking and Finance), TILA
Session 6	Ms. Shraddha Sr.Associate Advocate, TILA
Session 7 Pitching Session	Mr. Karan Verma, FAAD & Mr. Prasidh, CEO Soreva Energy
Session 7 Paper Presentation	Mr. Karan Verma, FAAD & Mr. Prasidh, CEO Soreva Energy
Valedictory Session, Appreciation of the Team and Vote of Thanks	Mr. Ashok Aneja, Partner (Banking and Finance), Trans India law Associates

****

ENERGY DELEGATES AT TILA INTERNATIONAL CONFERENCE ON ENERGY 2019

Dear Professional Colleagues

We thank you for your support and Best Wishes for the International Conference 2019. As desired, we are glad to share with you the first list of Confirmed/Invited Delegates.

LIST OF DELEGATES 4TH TILA INTERNATIONAL CONFERNCE ON ENERGY, 2019

1. Ms. Saima Khan, **Sr. Business Dev Executive, Shuraa Business Mgt & Consultancy LLC**
2. Sh. Jatindra Nath Swain**, Managing Director, Solar Energy Corporation of India**
3. Mr. A.B.Kiran, **Head (Legal) , IREDA**
4. Mr. Kanwar Singh**, Director, SJVN Ltd**
5. Mr. Ramesh Kumar Choudhary, **Hon'ble Member, Bihar Electricity Regulatory Commission**
6. Mr Pawan Singh**, MD, PTC Financial Services**
7. Mr. Myron Yeo, **Co-Convener [Singapore], Director of woods and prints**
8. Mr. VK Sahu, **Sr. Manager (tech.), NHDC Ltd**
9. Nusrat Malik Munir (Mauritious), **Founder/Director, Regenesis Ltd.**
10. Mr. BK Shome, **General Manager, Patel Engineering Ltd**
11. Mr. Sibatosh Debnath, **Design Head, Patel Engineering Ltd**
12. Sh. Amit Parikh, **Ahmedabad [Gujarat], International Trade Advisor, Harmony Fin Ex Pvt. Ltd.**
13. Mr. Rajib Routray**, Company Secretary & Legal Head, Jakson Group**
14. Ms. Jouslin Khairallah, **Managing Partner, Khairallah and Associates, Dubai/Abu Dhabi, UAE**
15. Sh Purusharth Singh**, Legal Department, Suzlon Energy**
16. Mr. P K Agarwal, **Director, POSOCO**
17. Mr. Rajiv Agarwal, **Secretary, Indian Captive Power Producers Association**
18. Mr A B Aggarwal**, Former Chairman, BBMB**
19. K. YOKOYAMA**, Country Director, India, Asian Development Bank**
20. Mr. Anoop Khatri , **General Counsel, Suzlon Group**
21. Mr. Mark A White,**Mission Director, USAID India**
22. Mr. Syed Nadeem Akhtar, **Engg, REMCL**
23. Mr. Alok Nath Mathur, **General Manager, REMCL**
24. Mr. Sanjeev Mehta, **General Manager/Traction, GMRCL**
25. Mr. Shivanchal Singh Deonia, **Asstt. Manager (Mech), CVPPPL**

26. Mr. Arif Aslam, Asstt. **Manager (Mech), CVPPPL**
27. Mr. Chandrakant Mani, **Sr. Manager (Civil), CVPPPL**
28. Mr. Sudhir Kumar Aggarwal, **Executive Director**
29. Dr. Ashok Haldia, **Ex Secretary, ICAI & MD PFS**
30. Patanjali Renewable Energy Pvt. Ltd
31. Mr. R Venkataramani, **Sr. Advocate, Supreme Court of India**
32. Former Member, Law Commission of India
33. Mr. Ashish Nandan**, Head-Regulatory affairs, Enel BLP India**
34. Mr. Romesh Kapoor, **Chief General Manager (BD) SJVN Ltd.**
35. Sh Gaurav Seth, **CEO, Sprang Energy**
36. Mr. Pankaj**, Sun systems USA**
37. Mr. Sumant Sinha, **CEO,Renew Power**
38. Mr. Shashi Kiran, **CEO, Aarushi Green**
39. Mr. Manoj Kohli, **Executive Chairman, SB Energy**
40. Mr. Rabindra Satapathy**, COO, Solar Business, Jakson Group**
41. Mr. Pandey Bhupendra, **CEO, Maga Link Chain**
42. Mr. Pandey Janardan, **CEO, Maga Link Chain**
43. Dr. Ashok Das**, CEO,SUNMOKSHA**
44. Ms. Pooja Srivastav, **CEO, Sheen International Consultancy**
45. Ms. Elizabeth Percy, **Representative, Sheen International Consultancy**
46. Mr. Satosh Jacob**, Representative, Sheen International Consultancy**
47. Mr. Anil George, **Director Sales, Granteq**
48. Ms. Preeti Patel, **Director, Patel Engineering**
49. Mr. M.C. Chauhan, **Ministry of Railways, General Manager**
50. Ms. Archana Dutta, **Dy Director, FICCI**
51. Mr. Vikas Bansal**, Director, Yes Bank**
52. Adv. Raksha Jain, **Member, BNI Champaion**
53. Ms. Shrikanti Nilange, **Director,Sunergize Energy Solutions**
54. Ms. Sushma Sharma, **Professor, Bhopal National Law University**
55. Sh. Eligbelo Begakoma Felix, **[Kinshasa, Kongo], CEO Administrative, Gerant, Fonderie Durable DU Kongo**
56. Ms. Surbhi Goyal, **Senior Energy Specialist, Energy and Extractives, World Bank Group**
57. Sh. Prasidh Kumar, **Co-Founder & CEO, Soreva**
58. Mr. Ezeugo Nnamdi, **Director, African Affairs, IIGL Nigeria**
59. Sh. Viren Mehta, **Dubai [UAE],Director, Mideast Engineering FZC**
60. Ms. Alphiya Bharmal**, Co-Convener [Gurgaon]**
61. Ms. Sheetal Chandok, **Member, Turin**
62. Mr. Viraj, **Member, Gogla**
63. Mr. Yatin Kathuria, **Research Scholar, Punjab University, Chandigarh**
64. Mr. Shreshth Shrivastava, **Student, U.P.E.S College, Dehradun**
65. Mr. Abhishek Sharma, **Student, U.P.E.S College, Dehradun**
66. Mr. S.Gopalakrishnan, Placement Officer, **Banasthali University**
67. Ms. Asha Rani Rawat, Asst. Professor, **Banasthali University**

68. Ms. Alka Kumari, Student, **Banasthali University**
69. Ms. Vatsala Bhushan, Student, **Banasthali University**
70. Ms. Sristi Singhal, Student, **Banasthali University**
71. Ms. Simran Gupta, Student, **Banasthali University**
72. Ms. Simran Tulsyan, Student, **Banasthali University**
73. Prof (Dr) Aditya Tomer, Faculty, **Amity University**
74. Dr. Sumitra Singh, Faculty 2, **Amity University**
75. Ms. Damini Mathur, Student, **Amity University**
76. Mr. Utkarsh Chauhan, Student, **Amity University**
77. Mr. Abhishekaran Roy, Student, **Amity University**
78. Mr. Ashutosh Srivastava, Student, **Amity University**
79. Mr. Palak Agrawal, Student, **Amity University**
80. Mrs. Anjuli Chandra, **Member, Punjab State Electricity Regulation Commission**
81. Mrs. Priti Patel, **Director, Patel Engineering**
82. Mr. A.K Kaul, **Director General, ITMA**
83. Sanjana Kumble, **Solar Quarter Business Magazine**
84. Mr. Ashok Aneja, Director (Co-convenor), Director, **Dr. Gopal Energy Foundation.**
85. Mr. Himanshu Pathak, Co-convener, Coordinator – New & Renewable Energy, **Bhopal**
86. Mr. Subrahmanyam Pulipaka, Co-convener, Convener, Co-Founder & CEO, **Soreva**
87. Mr. Eligbelo Begakoma Felix, Co-convenor, [Kinshasa, **Kango**], CEO Administrative, Getant, **Fonderie Durable DU, Kong**
88. Mr. Charlie Martial NGOUNOU, (Uaounde, **Cameroon, Africa),** Founder, XUXXEX Group Consulting (ltd)
89. H.E. Upendra Tripathi, **Director General, International Solar Alliance**
90. Ms. Anjali Chauhan, **CEO, Maxima Steel Services**
91. Dr. (Col) S.N. Katiyar, Co-Convener [Across India], **Coordinator – Govt. of India & State Government.**
92. Jacob Mathew, **Shuraa Business Mgt & Consultancy LLC**
93. Mr. Rajesh Kumar Chaubey, **Executive engineer, PTCUL**
94. Mr. Sushil Kumar, **Executive Engineer, PTCUL**
95. Mr. Abhishek Kumar, **Asstt. Engineer (training), PTCUL**
96. Mr. Ashish Swaroop, **Consultant, Sprung Energy**
97. Ms. Neha Nirala, **Asstt. Engineer (training), PTCUL**
98. NGOMA NSIMBA YVES, **Service National Des Energies Nouvelles**
99. Ms. Samanvi Narang, **Student, UPES, Dehradun**
100. Mr. Sarmad Dilshad, **2nd Secretary, Iraq Embassy, Delhi**
101. Thomas Mathew, **Investment Banker**
102. Daniel MFUMU MAWONZI, **ACCESS CONSTRUCTION**
103. Madam Neliotte NSEKUKILA NKETANI MFUMU, **CEO, ACCESS CONSTRUCTION**

104. Mr. Karan Verma, **Investment Banking, Faad Network Pvt. Ltd**
105. Mr. Manu Goel, **Commercial Interior Design, The Novarch**
106. Ms. Rashie Sinha, **Corporate Trainer, The Yellow Car Company**
107. Mr. Rajib Banerjee, **Business Consultant, RRPSS Business Consulting LLP**
108. Ms. Sonal Sehgal, **Internet Marketing, Global Honey Bee**
109. Mr. Saurabh Dev Karan Singh, **Civil Litigation Lawyer**
110. Mr. Anshul Garg, **CCTV, Thinking Technologies**
111. Mr. Vasudev Gupta, **Metal Fabrication, B.A Fabricators & Engineers Pvt Ltd**
112. Mr. Mukesh C. Verma, **Dy. Director (IT), UERC**
113. Mr. Yashwardhan Dimri, **Dy. Director (Technical), UERC**
114. Mr. Vikas Arya, **GM Sales & Marketing, Jakson**
115. Mr. Hemant Sapra, **Sr. Engineer Design & Costing, Jakson**
116. Mr. Chetan Phakatkar, **Luxra International AG**
117. Mr. Sanjay Durgan, **AbuDanze Wealth Mgt LLP**
118. Mr. H P Rajan, **Director (Retd.), United Nations**
119. Ms. Swati Jindal, **Sr. Manager, Teestaurja**
120. Mr. Aman, Asstt. **Manager (Mech), Teestaurja**
121. Dr. Arup Kumar Mishra, **Director, AEDA (Assam)**
122. Mr. Kailash Saini, **Manager, POSOCO**
123. Archana Anil, **Student, Mewar University**
124. CA. Prakash Sinha, **Managing Partner, Prakash Sachin & Co**.
125. Anil Kumar P.T, **Indian Space Research Organization(ISRO)**
126. Kumari Gayatri Vaishnav, **Student, Mewar University**
127. Mr. Sanjeev S. Bhaunt, **Asstt. Chief (Engg.), CERC**
128. Mr. Varun Anand, **Asstt. Chief (Engg.), CERC**
129. Mr. Sanjay Darbari, **General Manager (Civil), NHPC Ltd**
130. Mr. J.S.P Kashri, **Deputy General Manager (Civil), NHPC Ltd**
131. Mr. Yogendra Prakash, **Deputy General Manager (Technical), NHPC Ltd**
132. Mr. Rajesh Choudhary, **Sr. Manager (tech.), NHPC Ltd**
133. Mr. Abhishek Niranjan, **Business Dev. Manager, Sun India Pharmacy (P) Ltd.**
134. Mr. Ajay Prakash Shrivastava, **Chancellor, Maharishi University of Information Technology**
135. Mr. Farhan Vohra, **Managing Director**
136. Mr. Suraj Kumar, **GM-technology, Simpa Networks**
137. Mr. Sibongakonke Dawn Keswa (South Africa), **Youth Influencer & Motivational Speaker, Johansburg**
138. Ms. Vaishali Deshmukh**, Director of External Affairs, DGEF [Pune]**
139. Mr. Lalit Ambastha, **Managing Partner, Patent Wire**
140. Mr. Frank Le, **First Secretary, High Commission of Canada**
141. **Mr. K.S.Popli,** CMD (Former)**,** Indian Renewable Energy Development Agency (IREDA)
142. Mr. Prafulla Pathak, **President, Solar Energy Society of India**

TABLE OF CONTENTS

I- TENTATIVE CONCLAVE AGENDA

II-CONFIRMED/ INVITED DELEGATES

****

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PART - A

MESSAGES

"The measure of our success will be the condition on which we leave the world for the next generation"

-Robert Redford

Sarbananda Sonowal

Chief Minister, Assam
Guwahati

सत्यमेव जयते

Dispur
02.01.2019

MESSAGE

I am happy to know that Dr. Gopal Energy Foundation is organising the 4th TILA International Conference on Energy (TICE 4) at New Delhi on 15th April, 2019 and the annual rolling conference will be held on the theme of "Energy Revolution in India (Urja Kranti)".

As the conference seeks to deliberate on ways to provide affordable, clean and reliable energy to the underprivileged sections of society; it is imperative for all stakeholders to pave way for sustainable energy solutions with minimal negative impact on the environment while meeting the energy requirement of a fast developing country like India.

I extend my best wishes to the organisers for the success of the event and hope that TICE 4 will bring a huge positive change to energy industries.

(SARBANANDA SONOWAL)

Vijay Rupani

Chief Minister, Gujarat State

Apro/Jm/2019/02/13/vj

Dt: 13-02-2019

MESSAGE

I feel happy to know **that 4th TILA International Moot Court Competition on Energy** is being organized at New Delhi on **15th April 2019. "Urja Kranti"** being its theme, the conference will be focusing on **"Energy for all."**

As the entire universe is governed by the eternal energy, emerging through almighty nature, its use for essential activities for mankind is more crucial to be conservative. The sources and resources, from the leap of Mother Earth, are now scanty and scare, the only option is to look for renewable and reusable way, with the prudence and prospective policies being enacted in law and rules towards reality.

I appreciate the efforts by **Dr. Gopal Energy Foundation,** for inviting the states to become partner, for achieving the goal of Energy Revolution in India.

Wishing the conference every success I, convey my complements to the organizers and the participants of partner states.

(Vijay Rupani)

To,
Dr. Gopal, *President,*
Dr. Gopal Energy Foundation,
DGEF Secretariat, JA-120, DLF Tower,
A-Jasola District Center, New Delhi- 110 025.
Email: info@dgef.in / president@dgef.in

Prithvi Raj
Member

Rajasthan Electricity Regulatory Commission
Vidyut Viniyamak Bhawan, Near State Motor Garage,
Sahakar Marg, Jaipur-302001
Phone : (O) 0141-2741091 Fax : 0141-2741018
(R) 0141-2751143 Mobile No. : 9414019143
Email : rercjpr@yahoo.co.in

Dear Sh. Patel

I am glad to note that Dr. Gopal Energy foundation is organizing TILA International Energy Conference (TICE-4) on 15th April 2019. The foundation is continuously working to make 'Right to Energy' a fundamental right in all constitutions of the world and to include it as basic Human Right in the Universal Declaration of Human Rights. As the constitution of a nation and Universal Declaration of Human Rights are most pious and dignified documents for a citizen of a nation, so inclusion of 'Right to Energy in it will give great boast to energy sector.

This conference is also encouraging investment in power sector especially in new and renewable sources of energy; energy security; energy conservation; discussion on crucial issues related to power sector and encouraging start ups in energy sector in India.

I hope that this conference will perform a significant role in attaining goal of 'Energy for all' and sharing of expert knowledge on contemporary issues.

I congratulate the foundation for conducting such conference and wish them all success to achieve their goals.

(PRITHVI RAJ)
MEMBER

Dr. Rajiv Patel,
President D-GEF,
JA-120, DLF Tower-A,
JASOLA,
NEW DELHI-110028

बिहार विद्युत विनियामक आयोग
Bihar Electricity Regulatory Commission

S.K. Negi, IAS (Retd)
Chairman

234 dated:- 13/02/2019

MESSAGE

I am delighted to know that Dr. Gopal Energy Foundation (DGEF) is organizing TILA International Energy Conference (TICE-4) on 15th April, 2019, at New Delhi, India. The Conference will deliberate on Energy for All and other related issues.

Energy is a basic necessity for human development. It is a matter of concern for all of us that despite notable progress in achieving energy security, a large chunk of people in many parts of the world are still deprived of this basic human need. DGEF's campaign across the globe on "Right to Energy" is loudable. This International Conference will provide an ideal platform for exchange of ideas, sharing of experiences and chalking a strategy for accomplishing the goal of Energy for All.

I am also glad to know that the Organisation will bring out a Knowledge Paper on this occasion.

I extend my good wishes for the success of the Conference.

(S.K. Negi)

Place : Patna
Date :13th Feb. 2019

Vidyut Bhawan-II, Bailey Road, Patna (Bihar) 800 021 (India) Tel. No. : +91-612-2504187 Fax : 2504488
Website : berc.co.in, Email : chairman@berc.co.in

Global Solar Council

Pranav R Mehta
Chairman

I am very happy that Dr. Gopal Energy Foundation is organizing 4th Edition of TILA International Conference on Energy(TICE). As the world is increasingly understanding the importance of renewable energy and is witnessing intensified proliferation, it becomes important to address critical aspects that are relevant for growth and spread of renewable energy generation sources. I believe conferences like TICE enable in bringing the narrative of such important aspects and brainstorm the way forward to address each of these aspects. I wish the entire team of TICE IV good luck and success for this edition of the conference.

With best wishes

Pranav R Mehta

Chairman, Global Solar Council
Founder Chairman, National Solar Energy Federation of India

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Indian Institute of Governance & Leadership

MESSAGE

I am immensely pleased to know that the movement "Right to Energy" geared towards accomplishing the goal of "Energy for all" under the aegis of Dr. Gopal Energy Foundation (DGEF) has gained more momentum and acceptance as the foundation will be organizing TILA International Energy Conference (TICE-4) sharing the thematic "URJA KRANTI"

I applaud the commitment of the India-Africa Energy Forum (IA-YES) and do wish that this conference further empower the Energy Movement to the peak we aim; Energy for all. The Indian Institute of Governance and Leadership (IIGL) would be happy to collaborate and partner with your organization in the coming months and jointly contribute to nation building.

28/03/19

Ezeugo Nnamdi
Director African Affairs
Indian Institute of Governance and Leadership (IIGL)

To,
Convener, TICE
Dr. Gopal Energy Foundation
New Delhi-110025

के.टी.एस. तुलसी
वरिष्ठ अधिवक्ता
सांसद (राज्यसभा)

K. T. S. TULSI
SENIOR ADVOCATE
MEMBER PARLIAMENT (RAJYA SABHA)

ਕੇ.ਟੀ.ਐਸ. ਤੁਲਸੀ
ਸੀਨੀਅਰ ਐਡਵੋਕੇਟ
ਮੈਂਬਰ ਪਾਰਲੀਮੈਂਟ (ਰਾਜ ਸਭਾ)

08th April 2019

Dear Dr. Rajni Patel,

My best wishes to the whole team of the Dr. Gopal Energy Foundation for the grand success of the 4th TILA International Energy Conference scheduled on 15th April 2019 in New Delhi.

The conference will play a vital role in spreading awareness with respect to upgradation and expeditious change in the energy sector.

I wish the team all the very best for their future endeavours.

Best wishes,

KTS TULSI

To,
Dr. Rajni Patel
Convener
TILA International Energy Conference
TILA Suite, JA -120
DLF Tower -A, Jasola District Centre,
New Delhi-110025

3, MOTILAL NEHRU MARG, NEW DELHI - 110011
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Ref. No. : DGEF-B60-201-08 9th April, 2019

CONVENER'S MESSAGE

"Electricity can transform people's life not just economically but also socially."

We thank all the well-wishers and supporters of 4th TILA International Conference Energy to take forward the energy Revolution and Right to Energy movement. This year the following agenda has been suggested by Energy Experts for deliberation in TICE-4, 2019.

1- Land Acquisition for Energy Projects (Solar/ Wind/Hydro/waste to Energy/Biomass & others).

2- Insolvency and Bankruptcy Code 2016- Implication on Energy Companies.

3- Sovereign Funds/Lending to infrastructure Projects especially power sector - Round Table.

4- Contract Management with focus on PPAs and Alternative Dispute Resolution with discussion on future of International Energy Arbitration centre.

I would like to express my warm greetings and heartiest congratulations for the success of the Event. I personally feel that the time, efforts and contributions may go a long way in encouraging investments in India in the Energy Sector and may also contribute to Energy Security of the nation to a great extent.

TRANS-INDIA LAW ASSOCIATES Advocates & Legal Consultants NEW DELHI

Raj Singh Niranjan

(Raj Singh Niranjan)
Managing Partner – Trans India Law Associates
Legal Advisor – International Solar Alliance
Convener – 4th TILA International Conference on Energy, 2019

Trans-India Law Associates, Advocates & Legal Consultants
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Tel. :91-11-26943664, Fax.: 91-11-26970075
24*7*365 Helpline No. – 08860635075, Whatsapp N 9810070075
info@dgef.in www.dgef.in

Ref. No.: DGEF-B60-201-09

9th April, 2019

CO-CONVENER'S MESSAGE

We congratulate the organizing team of 4th TILA International Conference on Energy, 2019 (TICE-4) for initiating these wonderful concepts. I am glad to share the same as below:-

1. Right to Energy Day – 15th April will be declared as International Right to Energy Day.

2. Dr. Gopal Energy Prize – to be awarded to living individual for maximum contribution by initiatives for Energy Revolution/ Right to Energy to remove the curse of energy poverty across the globe.

3. International Energy Arbitration Centre – Worlds first institutional Arbitration to resolve energy disputes in time bound manner.

4. Model Energy Laws – for Law Schools across India to enable the Right capacity building.

5. Sovereign Funds Round Table – being organized along with pitching session for startup's.

6. CEO Round Table being organized.

The conference will surely provide a great platform for upgrading and keeping in touch with the rapid changes in the Energy Sector and will further promote investments in India in the Energy Sector in the future.

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(Dr. Rajni Ratel)
Co-founder- Dr. Gopal Energy Foundation
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PART - B

THEME- A: POWER

"Nuclear Power is our gateway to a prosperous future"

-A.P.J Abdul Kalam
Indian Scientist and Former Indian President

NUCLEAR ENERGY LAW IN INDIA: AN ANALYSIS OF GENERATION OF ENERGY

by

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1. Introduction

THE DEVELOPMENTS after the World War I were marked as an era of rapid advancements in the field of technology and cheap energy. With the passage of time in the middle of the 20th century, sustainable development programmes, use of renewable sources of energy was being propagated. Nuclear accidents at Three Mile Island in March 1974 and Chernobyl in April 1986, in which 65,000 people died and the damages went as high as US $250 billion, made the public apprehensive of nuclear energy; it was a realization of the potential catastrophe that lies close beneath the nuclear reactors. These accidents proved that they have serious consequences on the property, economy, environment and health of the people. The environmental movements were giving little comfort to the public who were already fearful of the harms that would be caused to them and their family in case of nuclear accidents. However, by end of 1990s and beginning of the twenty first century, radioactivity was being replaced by global warming as more imminent and dangerous environmental threat in the public eye. Growing concern over global warming has now put a veil of respectability on nuclear energy as carbon emissions from a nuclear power plant are trifling.

The Nuclear reactors and nuclear power plants have been in operation without any large public concerns and issues for more than three decades now. They are making a significant contribution in the world's energy[1] and some countries have turned their back on developing nuclear weapons program and expansion of nuclear power program, after a strong opposition for the use of nuclear power. The emergence of serious issues like global warming, reducing greenhouse gas emissions, along with concerns about depletion of fossil fuels, use of renewable sources of energy, energy security led to the development of nuclear power in the developed and developing countries of the world.

Energy security has been an integral part of foreign and security policy objectives of all nations, ever since the First World War when British navy converted its ships from coal to oil propulsion to gain advantage over German ships powered by coal. Several major battles fought during the Second World War, including the 1941 German attack on Russia and Japan's decision to attack the US naval base in Pearl Harbor at the end of that year, were directly or indirectly related to the energy security.[2]

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[1] *Leonardo Maugeri, 'Oil: Never Cry Wolf-Why the Petroleum Age is Far from Over', 304:5674 Science 1114-15 (2004).*

[2] *Jan H. Kalicki and David L. Goldwyn, 'Introduction: The Need to Intergerate Energy and Foreign Policy' in Jan H. Kalicki and David L.*

2. Growth of Nuclear Power in India

Nuclear power accounts for a small fraction of the total commercial primary energy consumed within India. Used for generating electricity, nuclear power accounts for a very negligible amount of the total electricity generated within India. In spite of its small current contribution, nuclear power has thepotential to offer India 'energy independence' beyond 2050 and hence its development is seen as crucial.[3] However, India is endowed with low concentrations of poor quality uranium ores but with large quantities of thorium ores. Consequently, India's nuclear-generation programme is based on a three-stage plan-(i) Pressurized Heavy Water Reactors, (ii) Fast Breeder Reactors; and (iii) Reactors based on the Uranium 233-Thorium 232 cycles- aimed eventually at the exploitation of the country's vast thorium reserves. However, as a non-signatory to the nuclear Non-Proliferation Treaty (NPT) and having conducted nuclear tests in 1974 and 1998, India has been under international sanctions to access its nuclear materials and technology from abroad[4]. The future development of nuclear power within India is dependent on civilian nuclear commerce with the international community. The International Atomic Energy Agency (IAEA) was established in 1956 with the main objective of encouraging and facilitating the spread of nuclear power.[5] It was presumed that atomic energy would contribute to 'peace, health and prosperity' throughout the world. According to the objectives of IAEA health and environmental risks would be managed by various legal systems themselves by formulating rules and regulations taking into account guidelines on safety measures set up by IAEA.

3. Nuclear Power: The Emergence of Environmental Concerns

It was the popularity of nuclear power as an answer to the oil crises of the 1970s which ultimately brought long term health and environmental consequences to the forefront of international concern. The Stockholm Conference in 1972 had called for a registry of emissions of radioactivity and international co-operation on radioactive waste disposal and reprocessing.[6]It recognized that the latter was a growing problem, caused by the increasing use of nuclear power, but offered no clear policy guidelines. Oceanic dumping of nuclear waste was partially banned in 1972, suspended entirely in 1983, and banned outright by the 1996 Protocol revising the London Dumping Convention leaving disposal on land or reprocessing as the only viable option. But nuclear reactors accident at Three Mile Island in the USA and Chernobyl in the Soviet Union showed how serious were the risks for health, agriculture and the environment posed by nuclear power.[7] Spreading contamination over a wide area of Eastern and Western Europe, the accident

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Goldwyn (ed.), Energy and Security: Toward a New Foreign Policy Strategy 9 (Washington, D.C.: Woodrow Wilson Center Press and The John Hopkins University Press, 2005).

[3]*Anil Kakodar, 'Energy in India for the Coming Decades', paper presented at the Inter-Ministerial Conference on 'Nuclear Power for the21st Century', organized by the International Atomic Energy Agency, Paris, March 21-22, 2005.*

[4]*A. Gopalakrishnan, 'Evolution of the Indian Nuclear Programme', Annual review of Energy and the Environment 369-95 (2002).*

[5]*International Atomic Energy Agency (IAEA) Statte, Articles III (1) – (4).*

[6]*Report of the United Nations Conference on Human Environment, available at: http://www.un-documents.net/aconf48-14r1.pdf. (Last accessed on June 06, 2016).*

[7]*IAEA, Summary Report on the Post Accident Review Meeting on the Chernobyl Accident, Vienna, 1986.*

at Chernobyl in1986 revealed the limitations of international policy for containing catastrophic risks, and some of the true costs of nuclear power.

Chernobyl cast doubt on the adequacy of national and international regulation of nuclear facilities. It showed how limited were the powers of IAEA,[8] and how little agreement existed on questions of liability and state responsibility. It gave new importance to the interest of neighbouring states in the setting of nuclear power plants, the opportunities for consultation on issues of safety, and the right to prompt notification of harmful accidents. It became evident that the initial compassionate view about nuclear power which was adopted in 1950 needed more emphasis on stronger international control of safety matters.[9]

4. Importance of Nuclear Power and Challenges in India

A new chapter about nuclear power has been written in the last 10-15 years. Increased competition over fossil fuels, and global concerns over climate change have prompted many legal systems to shift to nuclear energy. Indeed, the World Nuclear Industry Status Report 2010–2011 states that there were more nuclear reactors under construction worldwide in 2010 than in any year since 1988.[110] Whereas in 2014, the number of operational reactors in the world has dropped by 39 (9 percent) from 427 in July 2013 to 388 in July 2014, this is 50 fewer than at the peak in the year 2002.[11] The shift to nuclear energy is particularly strong in the energy-starved but fast-growing economies of China, India and South Korea. In fact, India has drawn up an ambitious plan to reach a nuclear power capacity of 63,000 MW in 2032 and it has been repeatedly asserted by the Indian Government that nuclear energy will play an important role in the country's quest for a clean and environmentally friendly energy mix. However, even as the global nuclear energy industry and the Asian countries have been bracing for this renaissance, the recent accident at Fukushima in 2011[12] has served a stark reminder of the capacity of nuclear power to inflict catastrophic damage and the need for stringent safety norms. Not surprisingly, scholars and experts have accorded considerable attention to formulation of appropriate safety regulation for civil nuclear installations.[13]

India has achieved a healthy economic rate at 8% per annum.[14] In order to sustain this growth rate, the countryrequires emphasis on creation of infrastructure and enhanced supply of input (such as energy).[15] The total commercial energy requirement in India is estimated to increase by 7.5 times in the next thirty years, but the current growth rate is a meager 3.29%. It is also

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[8]*Jack Barkenbus, "Nuclear Power Safety and Role of International Organization", International Organization 41, No. 3, 1987, p 475-90*

[9]*IAEA General Conference, Special Session, 1986*

[10]*Daniel Yergin, 'Ensuring Energy Security', Foreign Affairs 65:2 (March/April 2006), p.69*

[11]*Raju G C Thomas, 'India's Energy Policy and Nuclear Weapons Programme', in D R SardesaiAhomas (ed.) Nuclear India in the Twenty-First Century, 282-87 (Palgrave-Macmillan, New York, 2002).*

[12]*SudhaMahalingam, 'Diversification and Energy Security', The Hindu, March 30, 2006.*

[13]*Convention on Nuclear Safety 1994; Convention on the Safety of Spent Fuel and Radioactive Waste Management 1997, The Convention on Assistance in Cases of Nuclear Emergency 1986.*

[14]*India GDP Growth Rate, Trading Economics, http://www.tradingeconomics.com/india/ gdp-growth (Last accessed on June 06, 2016).*

[15]*The Government of India planned to achieve a GDP growth rate of 10% in the Eleventh Five Year Plan (2007-12) and maintain an average growth rate of about 8% in the next 15 years.*

important that the energy that is created does not pollute the environment, considering the imminent danger of climate change and environmental pollution. This is possible by using renewable energy sources as well as by using nuclear fuels. The current sources of energy creation in India are as given below.

Table 1: All India Energy Sector at a Glance (as on 31.03.2015)[16]

FUEL	MW	PERCENTAGE
Hydro (Renewable)	41,267	15.4
Nuclear	5,780	2.2
Renewable Energy Sources	31,692	11.8

Over the years, most of the energy that is produced in India is from hydropower stations coupled with thermal power stations. At the same time, energy production from nuclear power stations witnessed a negative growth even though the National Electricity Policy, 2005 portrays a need for increase in the share of nuclear power significantly by enhancing public sector investments. The overall growth rate of energy in thermal, hydro and nuclear sector is 6.04% in 2013-14 and 2014-15 (provisional) is 8.4%. The category wise generation performance is as follows:

Table 2: Overview of Power Generation in India (2013-14)[17]

Energy	Improved/Declined	Percentage (%)
Thermal	Improved by	4.18
Hydro (Renewable)	Improved by	18.58
Nuclear	Improved by	4.14
Overall growth rate	Improved by	6.04

Nuclear power constitutes approximately 16% of the world's electricity.[18] In the year 2009 alone more than 15% of the world's electricity came from nuclear power.[19] Apart from this, more than 150 naval vessels have been built using nuclear propulsion around the world. At present India has nineteen nuclear power plants in operation generating 4,560 MW with 4 others are under construction and are expected to generate an additional 2,720 MW of energy. India is also envisaging an increase of contribution of nuclear power to overall electricity generation capacity from 4.2% to 9% within 25 years. According to the official report, India has an ambitious plan to reach a nuclear power capacity of 63,000 MW by

[16] *PravinSawhney, 'India's First Airpower Doctrine Takes Shape', 30(6) Jane's International Defence Review 33-38 (1997).*

[17] *Available at: http://www.powermin.nic.in/Overview-0 (Last accessed on May 20, 2016)*

[18] *Nicolas Blarel and Manjeet S. Pardesi, 'Price of Failure', Daily News & Analysis, November 13, 2007*

[19] *Id at p. 4.*

2032.[20] However, this aim has been challenged by the recent public protests against establishment of new nuclear power plants. For example, a 9900 MW Nuclear Power Project at Jaitapur, in the state of Maharashtra and another 2000 MW Nuclear Power Plant at Koodankulam, in the Indian State of Tamil Nadu has seen unprecedented public protest. Similarly the state government of West Bengal has refused permission to a proposed 6000 MW plant at Haripur citing safety concerns.

In the background of removal of global sanctions and growing energy need of the country and increase in nuclear commerce, the Indian Parliament has passed the Civil Liability for Nuclear Damage Act, 2010 to put a definite mechanism in place to deal with compensation claims arising from a nuclear accident. After the bill was passed in LokSabha, Prime Minister Manmohan Singh said that the occasion signaled the 'completion of a journey to end the apartheid against India in the field of atomic power.[21] However, the issue is not merely the amount of compensation to be paid in the event of an accident, but who would encumber the bill, whether the operators or the suppliers, and to what extent.

5. International Atomic Energy Agency as an International Inspectorate and Review Body

International Atomic Energy Agency (IAEA) was the product of compromise following failure to agree on the proposals proposed by US for international single head management of all nuclear power plants by an international body. Its main tasks were confined to encouraging and facilitating the development and inspection of nuclear power,[22] and ensuring through the non-proliferation safeguards that it was used only for peaceful purposes.[23]It had the important responsibility to set the standards for health and safety of humans in collaboration with other international agencies.[24] IAEA has only limited power to act as an important nuclear safety inspectorate under its statute.[25] However, the Agency can, if requested, also provide safety advice and a review of safety practices for any nuclear installation or waste disposal site.

The IAEA has laid down certain principles to be followed by its member states for nuclear safety and precautions.[26]They principles are as follows:

(a) The Safety Principle: This principle lays emphasis that the legal regimes in a country should adopt certainminimum standards of safety for the purposes of protecting health and minimize the danger to life and property from exposure to radiation. This principle is further divided into two subsidiary principles. They are as follows:

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[20]*Ashley J. Tellis, India as a New Global Power: An Action Agenda for the United States 19-54(Washington, D.C.: Canegie Endowment for International Peace, 2005)*

[21]*John Cherian, 'Safety Last' Frontline, 2010, p.28.*

[22]*IAEA Statute, Articles III (1)-(4)*

[23]*AEA Statute, Articles III (5).*

[24]*IAEA Statute, Articles III (6).*

[25] *Mac Donald and Bethany Danyluk, 'Pursuit of Energy Security can enhance its Relationship with the US*

[26]*Available at: http://www.world-nuclear. org/info/inf67.html (Last accessed on May 12, 2015).*

(i) **Prevention and Protection Principle**: This principle lays down that every legal regime should adoptstandards of safety for radiation protection, transport and handling of radioactive materials, radioactive waste disposal and safety of nuclear installations**.**

(ii) **Precautionary Principle**: This principle lays emphasis on establishing basic international minimumsafety standards and guiding principles regulating the design, construction, siting and operation of nuclear power plants. The utmost priority should be given to protecting public health, security, safety and the environment.

(b) Security Principle: The Security Principle suggests the legal system should include the provisions against,both accidental and intentional radiation which can pose threat to the life and property of the people. This principle also cautions against illegal acquisition of nuclear materials by criminal or terrorist groups.

(c) Responsibility Principle: When there are Trans boundary nuclear accidents, it becomes difficult to findmost preferred method for ensuring safety and reallocating the costs for accident. Generally, the principle of equal access and non discrimination to nuclear risks and a number of national legal systems facilitate trans-boundary proceedings.

(d) Permission Principle: Prior permission is required to do those things, which may pose serious threat orinjury to persons or environment. Use of nuclear technology inherently involves some risk, prior permission is always required. The law also clearly needs to identify those activities that require prior permission.

(e) Continuous Control Principle: A continuous monitoring of the activities to provide safety advice and areview of safety practices for any nuclear installation or waste disposal site. IAEA safety inspections are valuable to governments because of their independence and the reassurance they provide.

(f) Compensation Principle: The states should create a common scheme for loss distribution among thevictims, focusing liability on the operator of a nuclear installation, based on the principle of absolute or strict liability and re-inforced by state-funded compensation schemes.

(g) Sustainable Development Principle: The principle of sustainable development has special relevance innuclear energy production. It is "because some fissile material and sources of ionizing radiation can pose health, safety and environmental risks for very long periods of time."

(h) Compliance Principle: Nuclear energy production involves particular risks of radiological contaminationtranscending national boundaries. There are many bilateral and multilateral instruments that aim at determining an international law of nuclear energy. The fundamental question is to what extent a particular state has adhered to these international legal regimes. It is also important that the national legal regime incorporates the provisions of customary international law also.

(i) Independence Principle: It is very important that the powers, functions and decisions of the RegulatoryAuthority that is constituted under the nuclear law are not interfered by the executive or other branches of the State and also from entities involved in the development or promotion of nuclear energy.

(j) Transparency Principle: Erstwhile, information of nuclear materials was guarded, categorizing it as'sensitive' and 'confidential'. In the recent past, however, the emphasis is "with the development of the peaceful uses of nuclear energy, however, public understanding of and confidence in the technology have required that the public, the media, legislatures and other interested bodies be provided with the fullest possible information concerning the risks and benefits of using various nuclear related techniques.

6. The Civil Liability for Nuclear Damage Act, 2010

Operators of nuclear establishments are liable as per law for any damage caused by them. The liability of operators is not based on fault principle but on the principle of no fault or strict liability, regardless of fault. This damage will have its impact not only in the country of the disaster but also in the neighbouring countries as well. Normally to certain extend the operators of the plants/nuclear establishments are made liable for the damage, which they may pay through insurance. Beyond that, according to international law and practice, States accept responsibility as the insurer of the last resort[27].

Currently there are three major international agreements, which form the international framework of nuclear liability. They are:

(a) The Paris Convention of 1960.[28]

(b) The Vienna Convention of 1963[29] along with the Protocol to amend the Vienna Convention, 1997.

(c) The Convention on Supplementary Compensation for Nuclear Damage of 1997.

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[27] *The (Paris) Convention on Third Party Liability in the field of Nuclear Energy, 1960.*

[28] *The (Vienna) Convention on Civil Liability for Nuclear Damages, 1963.*

[29] *For details see: http://www.iaea.org/newscenter/news/2010/indiaconvention.html (Last accessed on May 03, 2015)*

Among these conventions, India is a signatory to only the Convention on Supplementary Compensation for Nuclear Damage[30], but she has signed few bilateral agreements with other countries, including USA, UK, Russia, France, and Canada, for co-operation in using of nuclear energy for civilian purposes. The India-France bilateral agreement explicitly states that India has to create a civil nuclear liability regime for compensating damage caused by incidents involving nuclear material and nuclear facilities.

Even though there are more than four hundred nuclear reactors operating worldwide[31], there have been only three major accidents in nuclear reactors in which human lives have been lost.[32] However, damage caused in a major nuclear accident, such as Chernobyl[33], was disastrous. The objective of Civil Liability for Nuclear Damage Act,2010 is to provide quick compensation in the event of such a nuclear tragedy. International agreements have certain common features to address this issue:

(a) Fixing no-fault liability[34] on operators and requiring them to take insurance or provide financial security.

(b) Limiting no-fault liability in time and amount.

(c) There is a process for expeditious distribution to victims by fixing which court/ authority has jurisdiction.

The Civil Liability for Nuclear damage Act, 2010 received the president's assent on 21st September 2010. The main purpose of this legislation is to provide for civil liability for nuclear damage and give prompt compensation to the victims of a nuclear incident through a no-fault liability regime channeling liability to the operator and also on the State. This Act also aims at appointing a Claims Commissioner and establishment of a Nuclear Damage Claims Commission. It is also stated that it is being enacted to provide for liability arising out of a nuclear incident, and also due to the "necessity of joining an international liability regime.

The Act applies to nuclear damage suffered in or over the maritime areas beyond the territorial waters of India, in or over the exclusive economic zone, on board or by a ship registered in India or on or by an artificial island, installation or structure under the jurisdiction in India. At the same time it applies only to the nuclear installation owned or controlled by the Central Government either by itself or through any authority or corporation established by it or a government company.

6.1 Liability for Nuclear Damage

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[30] *World Nuclear Power Reactors & Uranium Requirements, http://www.world-nuclear. org/info/reactors.html. Last accessed on 03.05.2015.*

[31] *Appendix 2: Serious Nuclear Reactor Accidents, Safety of Nuclear Power Reactors, http://www.world-nuclear.org/info/inf06app.html (Last accessed on May 07, 2015).*

[32] *Backgrounder on Chernobyl Accident, available at: http://www.nrc.gov/reading-rm/doc-collec-tions/fact-sheets/chernobyl-bg.html. (Last accessed on May 07, 2015).*

[33] *Preamble to the Civil Liability for Nuclear Damage Act, 2010.*

[34] *Id. S. 4(2).*

Chapter II of the Act, (sections 3 to 8) lays down the law and procedures on the liability for nuclear damage. Within 15 days from the occurrence of any nuclear incident, the Atomic Energy Regulatory Board (AERB) shall notify a nuclear incident if it feels that the gravity of the threat and risk involved is not *insignificant*. Once notified, the Board shall also give wide publicity to the incident so that people can be cautious and take all the necessary precaution. However the word 'insignificant' that is used in this section seems to be confusing. It gives room for the AERB to determine what is significant and what is not significant as there are no criteria laid down.

For any such nuclear incident the Operator shall be liable for the resultant 'Nuclear Damage' if it involves the 'nuclear installation' or 'nuclear materials' under its control. Where there is more than one operator and damage attributable to each operator is not separable, the liability of each operator shall be 'Joint and Several.'[35] However even in case of such joint and several liabilities, the total liability of such operator shall be as specified under section 6(2). At the same time if there are several nuclear installations by the same operator that are involved in a nuclear incident, such operator shall, in respect of each such nuclear installation be separately liable to the extent pre-scribed under section 6 (2).

6.2 Liability of an Operator to be 'Strict Liability' based on the principle of 'No-Fault Liability'

The Indian version of strict liability, the 'absolute liability' principle, stipulates that "where an enterprise is engaged in a hazardous or inherently dangerous activity and harm results to anyone on account of an accident in the operation of such hazardous or inherently dangerous activity resulting, for example, in escape of toxic gas, the enterprise is strictly and absolutely liable to compensate all those who are affected by the accident and such liability is not subject to any of the exceptions which operate *vis-à-vis* the tortious principle of strict liability under the rule in *Rylands* v. *Fletcher*" In other words absolute liability is strict liability without any exception. This liability standard has been laid down by the Indian Supreme Court in *M.C. Mehta* v. *Union of India (OleumGas Leak Case)*.[36]

(a) However, the nature of liability in the event of a nuclear catastrophe in India is not prescribed. The Act itself provides for certain exceptional circumstances under which an operator shall not be liable (however, even under these circumstances the victim will get compensation as the liability is transferred to the Central Government). These circumstances are as follows:A grave natural disaster of an exceptional character. However the phrase 'exceptional character' has not been defined under the Act. This leaves a lot of discretion with the authorities.

(b) An act of armed conflict, hostility, civil war, insurrection or terrorism.

[35] *(1868) LR 3HL 330.*
[36] *AIR 1987 SC 1086.*

If these circumstances directly cause the nuclear damage, the Central Government assumes liability instead of the operator. Further the list continues to include any nuclear damage that is caused to:

(a) The nuclear installation itself and any other nuclear installation, fully or partially constructed, on the site where such incident occurred.

(b) To any property on the same site which is used or to be used in connection with such installation.

(c) To the means of transport upon which the nuclear materials involved was carried at the time of nuclear incident.

These provisions, though aimed at preventing the operator from getting compensation for nuclear incident caused by him, may go against the interest of another party whose property at the time of the nuclear incident was on the same site

7. Conclusion

Nuclear energy has seen tremendous growth in the last few decades, riding mostly on the growing concern in international community about global warming. All international liability regimes for nuclear damage share two common features *i.e.,* channeling liability to the operator and capping this liability and transferring the final responsibility to compensate the victims to the government. Relieving the supplier from all liability in case of a nuclear accident carries with itself high risks, essentially leaving less incentive for the supplier to design safer nuclear plants.

In the Indian civil nuclear liability regime, apart from channeling liability to the operator, capping this liability and transferring the final responsibility to compensate the victims to the government, the operator has been given a right of recourse against the supplier if the nuclear incident has resulted as a consequences of equipment or material with patent defects or latent defects or substandard services supplied by the supplier. It is indeed a substantial departure from the international best practices but this departure is more than justified as it makes suppliers accountable in nuclear commerce and minimizes the risks of relieving supplier from all liabilities.

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ENERGY REVOLUTION IN INDIA (NATIONAL INITIATIVES FOR ENERGY REVOLUTION)

by

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This conceptual research paper will be dealing with a detailed analysis of the concept of *'Energy Revolution in India'*.

As we progress, our energy requirements increases and there is always a need to develop new sources of energy. India started off with traditional sources of energy like *"fossil-fuels"* and switched over to initiative and renewable sources of energy like *Green energy* which generates electricity from *"renewable"* sources, for example *solar power, geothermal energy* andetc.

With the launch of the *Saubhagya Scheme*, and being a part of the *International Solar Alliance*, India has already shown its intention of being capable enough to produce and lead others in the world of Energy Revolution. This research paper will also be dealing with various hurdles which India will be facing in the form of money, manpower and machinery and the need to successfully overcome these hurdles in order to implement this ambitious project of Revolution of Energy.

Keywords

(Saubhagya Scheme, International Solar Alliance, renewable, fossil fuels, and geothermal power)

MAIN CONTENT

Green energy is a generic term used to describe electricity created from "renewable" sources other than traditional "fossil- fuels" such as coal, oil and natural gas. "Renewable" means that the same sources can be recycled to create energy.[37] Being Renewable they can easily replace the fossil fuels which are non-renewable and are on the verge of existence because of their excessive use, *wind energy, solar energy, tidal energy, sunlight* are some of the main component from which green energy is produced not only being renewable they are also present across the whole globe including the rural and remote sectors which don't have access to the electricity.

The main benefit of advancement in renewable energy technologies is that it has lowereddown the cost of solar panels, wind turbines and other sources of wind energy and it has given the caliber of producing energy in the hands of the people rather than using the old traditional method. The most common type of green energy are *solar power, Wind power, geothermalenergy, hydropower, Biomass and Bio fuels.*

Solar power- The most prevalent type of renewable energy which uses *photovoltaic cells*to produce solar power. These photovoltaic cells activatesin the sunlight and convert this sunlight into electrical energy by absorbing it. Heating of water, providing natural lighting and to cook food all these can be achieved by solar power. Solar power nowadays have become quite inexpensive to power everything from small hand gadgets to entire neighborhood.[38]

Wind power- Wind power is the conversion of wind energy into more useful forms, such as electricity, using wind turbines[39], areas just-offshore and on high altitudes provides the best conditions for capturing the strongest winds, according to a study conducted in 2009 *"a network of land-based, 2.5 megawatt and turbines in rural areas operating at just 20% of their rated capacity could supply 42 times the current worldwide consumption of energy"*.

Geothermal energy- Under the earth's crust there is a massive amount of thermal energy, which originates from the time of the formation of planet and from the decaying of the radioactive minerals. Hot springs which is a form of geothermal energy which has been used by people for bath since millennia is now used to generate electricity, with this method power is generated by

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[37]*DR. NEERAJ ANAND, CONTEMPORARY ISSUES IN ENERGY SECTOR 557 (1st ed. 2009).*
[38]*S.A. Rogers, What is Green Energy?, MMN.com (Jul. 25, 2012), https://www.mnn.com/earth-matters/energy/stories/what-is-green-energy.*
[39]*Anonymous, Wind Power, SD (Feb. 2, 2019), https://www.sciencedaily.com/terms/wind_power.html.*

using the heat from the hot spring water to vaporize a heat carrier with a low boiling point and then using the steam from this to turn a turbine[40].

Hydropower- This type of power is created by earth's water cycle including rainfall, tides, evaporation and the force of water running through a dam. Hydroelectric power depends upon the high levels of precipitation to produce significant amount of energy.

Biomass- Biomass are those organic material which comes from the plants and animals, being a renewable source of energy all these can be converted into electricity with the emission of fewer emission of greenhouse gas as compared to emission produced from petroleum-based fuel sources.

Biofuels- Instead of burning the biomass sometimes these renewable organic materials are converted into fuels such as ethanol and biodiesel, both ethanol and biodiesel are the first generation of biofuel technology. The common method for converting biomass into ethanol is called fermentation. The most common blend of ethanol is E10 (10% ethanol, 90% gasoline). Some vehicles, called flexible fuel vehicle's, are designed to run on E85 (a gasoline-ethanol blend containing 51% to 83% ethanol, depending on geography and season), an alternative fuel with much higher ethanol content than regular gasoline[41]. Roughly 97% of gasoline in the United States contains some ethanol[42]. Biodiesel is a type of liquid fuel produced from used and new vegetable oil and animal fats and is used as a cleaner- burning replacement for petroleum based diesel fuel[43].

National initiatives for Energy Revolution

The 'first' co-generation project to be implemented in India was established in Karnataka where a sugar mill installed a 22MW electric power plant which uses the waste product bagasse as the fuel source. In this project, these were the following main features of this project:

- A loan of 30 crore project was taken from IREDA at concessional rates.
- A grant of three crore eighty-four lakh rupees (eight lakh US dollars) from USAID[44].
- A Financial 'assistance' of three crore rupees from IDBI.

[40]*Anonymous, The Introduction of Power Generated from Hot Springs is Making Advances in Kyushu, ABO (Feb. 2, 2019), https://www.asiabiomass.jp/english/topics/1309_06.html.*
[41]*Ibid note 1.*
[42]*Anonymous, Energy Efficiency & Renewable Energy, BIO (Feb. 3, 2019),https://www.energy.gov/eere/bioenergy/biofuels-basic.*
[43]*Ibid note 1 at 23.*
[44]*Ibid note 2.*

- A twenty-five lakh per MW subsidy by the State government for 'evacuated' power to the grid. 18 MW of the capacity is earmarked for the grid, implying a total annual subsidy of four and a half crore rupees[45].

The National Action Plan on Climate Change (NAPCC) outlines the policies to address climate mitigation from fossil fuel to non-fossil fuel based economy by utilizing renewable energy sources. The plan identifies eight "National Missions" to promote development along with addressing climate change issues effectively.The eight missions are being implemented by different ministries of Government of India (GOI) namely environment, water resources, urban development, agriculture, power, and new and renewable energy. The concerned ministry has developed implementation strategies, timeline, monitoring and evaluation criteria The progress of each mission is periodically reviewed by the Council on Climate Change headed by the Prime Minister of India. The eight "National Missions" under the plan are[46]:

- National Solar Mission
- National Mission for Enhanced Energy Efficiency
- National Mission on Sustainable Head
- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- Green India Mission
- National Mission for Sustainable Agriculture
- National Mission on Strategic Knowledge for Climate Change

National Solar Mission- Jawaharlal Nehru National Solar Mission was launched in our country in the year 2010 in order to promote solar technology in our country the project is being implemented by the Ministry of New and Renewable Energy and it was a major initiative to meet the global challenges of climate change it is a project with an ambitious target of deploying 20 GW of grid connected solar power by 2022with reduced cost of solar power generation through long term policy initiatives, research and development, production of critical raw materials, components and products, to achieve grid tariff parity. This target of 20 GW of solar power by 2020 has recently been revised to 100 GW which will play a major role to meet the energy needs of the country[47].

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[45]*CONTEMPORARY ISSUES IN ENERGY SECTOR 553 (Dr. Neeraj Anand ed., 1st ed. 2009).*
[46]*P. Ramaswamy, Rajnish Shrivastava, S.S. Chandel, Vikrant Sharma, Overview of the Initiatives in Renewable Energy Sector Under th1e National Action Plan on Climate Change in India, 54 ELV L.J. 867, 867-868 (2015).*
[47]*Ibid note 7.*

National Mission for Enhanced Energy Efficiency (NMEEE) - Bureau of energy efficiency (BEE) of Power Ministry, GOI is the nodal agency for implementing the national mission on energy efficiency which is based on the Energy Conservation Act 2001[48]. The following are the main features of this mission:

- Introducing innovative mechanisms, such as Perform, Achieve and Trade (PAT) wide which is mandatory for large energy-consuming industries to reduce energy consumption and trade in energy-savings certificates.
- Energy incentives, including reduced taxes on energy-efficient appliances.
- Creating suitable mechanism for financing public–private partnerships to reduce energy consumption through demand-side management programs in the municipal, buildings and agricultural sectors.

Under PAT, the energy efficiency financing platform has been provided through public-sector banks by establishing Partial Risk Guarantee Fund (PRGF) and Venture Capital Fund. A super-efficient equipment program has been initiated under Market Transformation for Energy Efficiency (MTEE) along with promotion of Energy Service Companies (ESCOs)[49].

National Mission on Sustainable Habitat (NMSH) - The main aim of this mission was to promote energy efficiency as a core component in urban planning with the following implementation:

- Extension of the existing Energy Conservative Building code.
- Emphasizing on urban waste management, recycling such waste and producing electricity from such recycled waste.

NMSH was an extension of the Jawaharlal Nehru National Urban Renewable Mission. Energy Conservation Code 2007 has been made compulsory for the new and old buildings in India and incorporated in 2013 in the general specifications for electrical works undertaken by Central Public Works Department (CPWD).The Green Building norms have been made mandatory for the CPWD with effect from 2009 and incorporated in the CPWD works manual 2012 which aims at saving energy in building sector[50].

National Water Mission (NWM)- This mission was implemented by Ministry of Water Resources with an objective to improve the efficiency of water by 20% considering the fact that the scarcity of water is likely worsen in the coming future. The following initiatives have been initiated under this mission:

[48]*Ibid note 7.*
[49]*Ibid note 7.*
[50]*Ibid note 7.*

- State-specific action plans on climate change are being prepared.
- Godavari and Brahmani-Baitarani river basins pilot study has been carried out. The studies are being extended to all river basins in the country.
- Ministry of Water Resources has signed Memorandum of Understanding (MOU) with Asian Development Bank to provide technical assistance to develop strategies for flood mitigation and flood plain management[51].

National Mission for sustaining the Himalayan Ecosystem (NMSHE) -This mission was launched in 2010 with an aim to protect the flora and fauna of the Himalayan ecosystem and receding glaciers. The project is being implemented by the Ministry of Science and technology covering all the twelve Himalayan States and the hilly areas of Assam and West Bengal, under this mission the following progress has been made:

- Networking and Strengthening of knowledge institutions[52].
- Establishment of centers in the Himalayan states for the detection of the climate changes.

National Mission for a Green India (NMGI) - This mission was implemented by the Minster of Environment and Forests and considering all the facts that the natural forests of the country and associated livelihoods of the people will be affected by the climatic changes, the main objective of this committee is to expand the Indian forest cover from 23% to 33%.

National Mission for Sustainable Agriculture (NMSA) –Ministry of Agriculture aims to support climate adaption in agriculture through the development of climate- resilient crops, expansion, seed processing, creation of storage, livestock and increases in fish production have been initiated under the mission[53].

National Mission on Strategic Knowledge for Climate Change (NMSKCC) – Department of Science and Technology implemented this mission and aims to create a new climate science research fund, the mission also encourages private sector initiatives to develop adaptation and mitigation technologies through venture capital funds. The mission has set specific targets achieve various goals, established 10 thematic knowledge networks, developed regional climate models and established 11 technology watch groups[54].

National Clean Energy Fund (NCEF)

[51]*Ibid note 7.*
[52]*Ibid note 7.*
[53]*Ibid note 7.*
[54]*Ibid note 7.*

A National Clean Energy Fund was created from the imposed coal cess of Rs 50 per ton, for funding the *Solar Photovoltaic* (SPV) lights this fund proved to be a boon for the implementation of solar energy for example solar lights, grid-connected rooftops. The following are the main advantages of this fund:

- *Clean fossil energy*
- *Funding in the Critical Renewable Energy fund*
- *Funding in the Marine Technologies*

Current status of grid interactive renewable energy power generation under NAPCC

Year 2018 proved to be a fruitful year for stepping towards the use of renewable energy because India was able to move ahead in the sector of Energy Revolution.

A Report has been attached in the form of annexure. Which shows the progress which we have made in this field.

Saubhagya Scheme

According to the Section (3) and (4)[55]

National Electricity Policy and Plan

(1) The Central Government shall, from time to time, prepare the National Electricity Policy and tariff policy, in consultation with the State Governments and the Authority for development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy

Whereas Section 4 states that

National Policy on stand-alone systems for rural areas and non-conventional energy systems

The Central Government shall after consultation with the State Governments, prepare and notify a national policy, permitting stand-alone systems (including those based on renewable sources of energy and other non-conventional sources of energy) for rural areas.

The expression *"stand-alone system"* has been defined in section 2 (63) of The Electricity laws of India, 2003 as *"the electricity system set up to generate power and distribute electricity in a specified area without connection to the grid".*

[55]*The Electricity Laws of India, 2003.*

And The Saubhagya Scheme is the implementation of the above laws

The Saubhagya Scheme is a scheme initiated by the Indian Government to provide electricity to all households. On September 2017 the Indian Prime Minister Narendra Modi announced this scheme with an aim to achieve complete electrification process by December, 2018.As per the given data till date 99.99% households has been electrified[56] with the aim to provide last mile electricity connectivity to all the rural and urban households the following are the salient feature of this scheme:

- This scheme does not anticipate any beneficiation for electricity consumption i.e. the bill will be charged as per the consumption.
- It has made a provision for the solar powers system of 200-300 Wp capacity. It will prove as an 'alternative to Kerosene' and thus by using it as an alternative to Kerosene in all the rural sectors it will reduce the cost of importation.
- As per the government of India nearly 16,000 crore will be injected in the economy to create assets, which in return will add more investments in the economy and will also benefit to the job sectors.
- 60% grant will be provided by the Union Government and 10% by the states towards the funding of this scheme, while the remaining amount will be covered by loans.

By March 31, 2019 all the States and Union Territories are required to complete the household electrification ofvillages to facilitate on-the-spot filling up of application forms including release of electricity connections to households. DISCOMs/Power Department will also adopt innovative mechanism through dedicated web-portal/Mobile App for collection/consolidation of application form in electronic mode and also capturing process of release of electricity connections. The details of consumers' viz., Name and Aadhar number/Mobile number/Bank account/Driving License/Voter ID etc., as available would be collected by the DISCOMs[57].

The 16,230 crore project envisages to provide households with solar power packs with five LED lights, one fan and one power plug point with five years of repair and maintenance service to people living in remote areas without access to a power transmission grid[58], this power transmission will be done through Mini- grid projects, these mini-grid projects have the ability to ensure that reliable and quality electricity is provided to the households and enterprises in the

[56]*PRADHAN MANTRI SAHAJ BIJLI HAR GHAR YOJNA-SAUBHAGYA, http://saubhagya.gov.in/ (last visited Feb. 4, 2019).*
[57]*REC- ENDLESS ENERGY, INFINITE POSSIBILITIES, https://www.recindia.nic.in/saubhagya (last visited Feb. 4, 2019).*
[58]*FE Online, Village Electrification Done, The Challenges and Implementation, FINANCIAL EXPRESS (Feb. 4, 2019, 5:55 PM), https://www.financialexpress.com/economy/village-electrification-done-but-these-challenges-could-hurt-modis-dream-of-lighting-up-every-household/1151687/.*

village. Mini-grid project would not only be better solution but it would also lead to less distribution losses which occurs at the time of the power generation.

India's demand for energy rises by 5% every year which is a rapid growth and to meet such growth it is necessary to implement the new ideas. Solar energy is the head of this movement, installations of solar rooftops are rising at the local level, according to Ramapati Kumar, founder of the Centre for Environment and Energy Development *"Access to solar energy has greatly benefitted health and economic development, and given a sense of security to people"* India's largest and world's largest single location solar power plant Kamuthi Solar Power Project located in Tamil Nadu has a capacity of 648 MW commissioned by Adani Power which is estimated to make enough power for 7,50,000 citizens and this project is the best example that how solar energy can be used in an efficient manner.

INTERNATIONAL SOLAR ALLIANCE

Vision and mission of the International Solar Alliance is to provide a dedicated platform for cooperation among solar resource rich countries where the global community, including bilateral and multilateral organizations, corporates, industry, and other stakeholders, can make a positive contribution to assist and help achieve the common goals of increasing the use of solar energy in meeting energy needs of prospective ISA member countries in a safe, convenient, affordable, equitable and sustainable manner[59].

At COP21 India and France launched an International Solar Alliance in Developing Countries, this initiative was launched by Indian Prime Minister Narendra Modi and French President Francois Hollande during the UN Climate Change Conference held in Paris on 30th November, 2015. Prime Minster Narendra Modi said that he was encouraged by the industry support show so far for solar energy and that "The sun is the source of all energy. The world must turn to solar, the power of our future",The ex UN Secretary-General Ban Ki-moon, who attended the launch, said that the climate change agreement that will be concluded in Paris at COP21 must send a clear enough signal to investors to encourage the scaling up of solar and other renewable forms of energy and urged all the governments meeting in Paris to work in a spirit of cooperation and compromise to conclude an effective agreement[60].

[59] *VISION AND MISSION OF THE ISA, http://isolaralliance.org/AboutISA.aspx (last visited Feb. 23, 2019).*
[60] *UNITED NATIONS CLIMATE CHANGE, https://unfccc.int/news/international-solar-energy-alliance-launched-at-cop21 (last visited Feb. 23, 2019).*

India has recognized that sustainable development, universal energy access, and energy security are critical to the shared prosperity and future of our planet, and has acknowledged that clean and renewable energy needs to be affordable for all.

CONCLUSION

With the aim of cooperating towards the improvement of benchmarks and supporting research advancement India has just demonstrated that it is empowering imaginative and reasonable applications for environmentally friendly power vitality.

With the longing of building up an International Alliance of nations committed to the advancement of the environmentally friendly power vitality, India has not just demonstrated its aims of being sufficiently able yet additionally it is sufficiently skilled to lead alternate nations in the segment of Energy Revolution.

ANNEXURE

GOVERNMENT OF INDIA
MINISTRY OF NEW AND RENEWABLE ENERGY

Published on *Ministry of New and Renewable Energy* (https://mnre.gov.in (https://mnre.gov.in))

Physical Progress (Achievements)

Ministry of New & Renewable Energy

Programme/Scheme wise Physical Progress in 2018-19 & Cumulative upto Jan, 2019

Sector	FY- 2018-19		Cumulative Achievements
	Target	Achievement (April-Dec 2018)	(as on 31.12.2018)
I. GRID-INTERACTIVE POWER (CAPACITIES IN MWp)			
Wind Power	4000.00	1145.10	35288.10
Solar Power - Ground Mounted	10000.00	3994.38	24582.23
Solar Power - Roof Top	1000.00	380.11	1443.74
Small Hydro Power	250.00	42.25	4528.05
Biomass (Bagasse) Cogeneration)	250.00	374.70	9075.50
Biomass (non-bagasse) Cogeneration)/Captive Power	100.00	41.93	704.74
Waste to Power	2.00	0.00	138.30
Total	**15602.00**	**5978.47**	**75760.66**
II. OFF-GRID/ CAPTIVE POWER (CAPACITIES IN MW_{EQ})			
Waste to Energy	18.00	6.58	178.73
Biomass Gasifiers	1.00	0.00	163.37
SPV Systems	200.00	171.70	843.11
Total	**219.00**	**178.28**	**1185.21**
III. OTHER RENEWABLE ENERGY SYSTEMS			

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A DISQUISITION ON ENERGY LAW

by

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ABSTRACT

Energy law is the field of law concerned with creating, enforcing and challenging laws that regulate energy use. Many people don't realize how much energy laws and regulations impact their daily life. Each time you put gasoline in your vehicle, you're paying energy taxes. When you sell a vehicle or renew your license plate, you pay fees to the state you live in. When you use power in your home, you're using energy from a power plant that complied with regulations to conduct business. There are energy laws at federal, state and even local levels. Energy laws and policies even impact international relations. So the aim of this paper is to frame out what constitutes energy law then keeping a short discussion on the principles of energy law such as the principle of sovereignty over onshore and offshore energy resources, principle of access to modern energy services, principle on energy justice, principle of prudent, rational and sustainable use of natural resources, principle of the protection of the environment, human health and combating climate change, principle of resilience etc.

Prologue

A review of what constitutes 'energy law' as a discipline in academic literature is currently needed with the last such review completed over 20 years ago.[61] There are many reasons for this both in legal practice and in research. Over the past three decades, largely because of privatization and liberalization of energy markets across the globe, the ongoing 'energy transition' (primarily related to climate change considerations), and the internationalization of and changes in energy markets, energy law as a legal discipline has grown and matured.[62]In practice, energy law has flourished, with energy law and related legal practice becoming one of the major practice areas.[63] Indeed, in considering energy law from a practice perspective, governments have identified the importance of energy and put it high on the political agenda due both to its environmental impact and its economic consequences. There have for example, been government 'Energy Departments' and energy regulators in many countries for a long time—spurred by the oil crisis of the 1970s for the former and by the liberalization trends in the 1980s and 1990s for the latter. Further, now legal job advertisements in the energy sector have increased both in academia and practice. Private law firms across the globe have created specific energy practice areas focusing on all facets of energy markets, from extraction to production to transportation and end use. As noted elsewhere, 'there are hundreds of different industries, and only a few have, so far, given rise to a particular professional and academic sub-discipline', and energy is one where this has happened.[64] In academia, while a debate of what constitutes energy law has continued for three decades this has only occurred to a very limited extent. The aim of this article is to return to this debate and update and advance the literature. Although to some degree environmental, climate change and energy law are interrelated, energy law has not evaluated itself and grown theoretically as the other two have. For example, we identify later in this article how environmental law has developed core principles that have not only been adopted legally into international, European, national and local law, but also outside the legal profession by the business sector and the general public.[65] The origin and debate of what constitutes energy law is evident in the leading texts on energy law, albeit only mentioned to a limited extent. It is only recently, however, that academics are moving to analyse this in more detail again and

[61]A Bradbrook, 'Energy Law as an Academic Discipline' (1996) 14(2) Journal of Energy & Natural Resources Law 93

[62] A treatise for energy law ,Raphael J Heffron, Anita Ronne, Joseph P Tomain, Adrian Bradbrook and Kim Talus, ***The Journal of World Energy Law & Business***, Volume 11, Issue 1, 1 March 2018, Pages 34–48,

[63]For example, energy practices can range from 10% to 50% of a firm's revenues in many cases

[64]K Talus, ***EU Energy Law and Policy: a Critical Account*** (OUP 2013).

[65] A treatise for energy law ,Raphael J Heffron, Anita Ronne, Joseph P Tomain, Adrian Bradbrook and Kim Talus,***The Journal of World Energy Law & Business***, Volume 11, Issue 1, 1 March 2018, Pages 34–48

advance energy law as an academic field.[66] And it should be remembered that the last paper to do this was Adrian Bradbrook's 1996 seminal paper entitled 'Energy Law as an Academic Discipline'.[5] In other areas of the law and in energy studies this is completed on a more regular basis. In contrast, energy law has suffered from attempts at splintering it further with some scholars suggesting separate legal areas for oil and gas (***lex petrolia***), and for mining (***lex mineralia***); however, recently Daintith has critiqued extensively the aim of scholars to state there should be such a energy law area as ***lex petrolea***[6] and the same can be said for ***lex mineralia***.[67] This article reviews what currently constitutes energy law after a near 20-year hiatus in doing so (21 years since Bradbrook's paper),[68] and also advances principles that guide energy law. In essence, we advocate for a paradigm shift in our current thinking of energy law; to some degree it should be stated it is not a paradigm shift due to there being no core set of principles of energy law.

We argue that in our advancing of guiding principles we set out a new path for the study and practice of energy law and thus we aim to shift what constitutes energy law and assist in challenging and developing current assumptions of existing researchers. This is of vital importance as globally countries are transitioning to low-carbon economies. Further, energy law also has to reach out beyond just the energy law community and appeal to more practitioners, and interdisciplinary energy researchers as well as the public. In this context energy law has been less successful than environmental law where its principles have been far more effective and have found their way into legislation at local, national and international levels.[69]In addition, in considering the energy transition, energy law has to some degree been a forgotten discipline[70] There are few legal principles of law specific to the energy field and most energy issues have to be resolved by general principles of law established in other contexts (such as contracts, torts or property law). Even where specific laws exist in relation to energy, they are often inadequate and ill-suited to impact upon the energy transition, and even if 'Laws on the book are one thing. Laws implemented and enforced are another.'[71] There are numerous examples where general

[66]***Law as Change: Engaging with the Life and Scholarship of Adrian Bradbrook*** (University of Adelaide Press 2014) 223.

[67] A treatise for energy law ,Raphael J Heffron, Anita Ronne, Joseph P Tomain, Adrian Bradbrook and Kim Talus,***The Journal of World Energy Law & Business***, Volume 11, Issue 1, 1 March 2018, Pages 34–48

[68]It is now 21 years, but this project was begun in early 2016. See also the seminal paper Bradbrook (n 1).

[69] A treatise for energy law ,Raphael J Heffron, Anita Ronne, Joseph P Tomain, Adrian Bradbrook and Kim Talus,***The Journal of World Energy Law & Business***, *Volume 11, Issue 1, 1 March 2018, Pages 34–48*

[70]*This has been an ongoing problem for decades: see AJ Bradbrook, 'Energy Law: The Neglected Aspect of Environmental Law' (1993) 19 Melbourne University Law Review 1.*

[71]*DN Zillman, and others, (eds),* **Beyond the Carbon Economy: Energy Law in Transition***(OUP 2008) 551 Ch.*

areas of law rather than energy-related laws have been the decisive factor in legal decision-making. One illustration is the Deepwater Horizon incident in the USA in 2010, where the legal solution came from tort law rather than any principles or theories of energy law itself.[72] In the solar access context, where disputes arise over shading of solar collectors by buildings or vegetation on neighbouring properties, similar use had to be made of the tort of private nuisance to provide a remedy for the solar user in cases such as ***Prah v Maretti***. The fault lies with both the legislature and the courts. The courts have been slow and reluctant to develop new principles and the legislatures have failed to take appropriate action to support the energy transition. In the future there should surely at the very least be some reference to principles and/or theories of energy law in the resolution of energy-related disputes.[73]

A review of what constitute energy law

In advancing the principles of energy law, the question arises of what energy law is. There is a rather limited academic literature, which discusses this but more recently several key leading texts from 2015 and 2016 have raised this issue. These latter texts and the key literature are discussed in the proceeding paragraphs. Many of the key texts (literature) in this area since the Bradbrook article 20 years ago ask the question—what is energy law—in some way, but all fall short of advancing a more complete definition, or suggesting a theoretical framework or advancing guiding principles. As the following discussion below highlights, scholars[14] have been demonstrating thinking in this direction, but as of yet they have not made the final step towards advancing what constitutes energy law on a more holistic basis. Indeed, the same can be said for practitioners, who have perhaps had more success in contributing to the development of energy law, with contributions ranging from model-contracts[15] to practitioner texts, case law developments and legal issues from day-to-day practice. However, as of yet, energy law has not benefited from a set of principles like environmental or climate change law, which have through these principles engaged more effectively with non-law scholars and practitioners, and also the judiciary and policymakers.

Energy law's seven principles

What prompted this search for Energy Law's guiding principles was a workshop (organized by two of the authors and attended by a third) where we presented and discussed the Evolution of

24 (Conclusion).

[72] For a discussion of the outcome of liability and in relation to the Deepwater Horizon incident, see R Heffron, S Ashley and WJ Nuttall, 'The Global Nuclear Liability Regime Post Fukushima Daiichi' (2016) 90 Progress in Nuclear Energy 1.

*[73] A treatise for energy law ,Raphael J Heffron, Anita Ronne, Joseph P Tomain, Adrian Bradbrook and Kim Talus,**The Journal of World Energy Law & Business**, Volume 11, Issue 1, 1 March 2018, Pages 34–48*

Energy Law.[74]The evolution of energy law is guided by certain influences, one of which is 'energy justice'. Energy justice has its own conceptual basis, which is recognized in several early and now more influential articles. However, energy justice has its own principles and this prompted what would be energy law's guiding principles. Energy justice as a concept and its principles have an interdisciplinary focus.[75] Energy law has to concern itself also with what law is and what it should be and this prompted a need to examine and identify what the guiding principles of energy law should be and the role that law can have in the development of the concept of energy justice.The prompt to determine guiding principles of a discipline are many. For energy law and climate change scholars the need for guiding principles is clear. It will assist in the understanding of the design and development of a legal field that has been shaped in a piecemeal fashion in response to different geopolitical circumstances and increasing environmental and costs awareness impacting the whole global society.

Its related subject, environmental law, has a clear core and guiding principles as stated earlier . Climate change law, a related sub-discipline where energy contributes the majority share of greenhouse gas emissions (and CO_2emissions), also has its own core set of principles. These principles are first and foremost reflected in the Framework Convention for Climate Change but further elaborated upon by the International Law Association, Committee on Legal Principles Relating to Climate Change. The core aim of setting out principles is to seek the increased application of human rights on a particular issue, and this is the same whether it be for the environment, the climate or the energy sector. As it may be understood several of the climate change principles coincide with the listed principles under environmental law and indeed also principles relating to human rights. Despite the longer existence of energy law, it lacks such principles. To redress this omission, we propose that there are seven guiding principles that have developed in practice and legislation and then explained in more detail in the following text of this section.[76]

The principle of sovereignty over onshore and offshore energy resources

The principle of permanent sovereignty over natural resources is closely connected with energy resources. The discussion over sovereignty over natural resources, petroleum in particular,

[74]*R Lyster and AJ Bradbrook,* **Energy Law and the Environment** *(CUP 2006).*
[75]*RJ Heffron and D McCauley, 'The Concept of Energy Justice across the Disciplines' (2017) 105 Energy Policy 658.*
[76] *A treatise for energy law ,Raphael J Heffron, Anita Ronne, Joseph P Tomain, Adrian Bradbrook and Kim Talus,***The Journal of World Energy Law & Business**, *Volume 11, Issue 1, 1 March 2018, Pages 34–48*

emerged after the end of the colonial period.[77] Prior to this, the international oil companies controlled exploration and production of petroleum resources in many of the colonial and post-colonial states and, by default, the government's revenue by regulating production. This placed severe constraints of national sovereignty and the wealth these energy resources could mean for a country.In the post-World War II era, which was marked by rising nationalism in the post-colonial world, many of the ex-colonial countries started to demand a change. Similarly, governmental interference with energy activities through regulation started to grow. That era is marked by the creation of Organization of the Petroleum Exporting Countries (OPEC) and several important United Nations (UN) Resolutions on the permanent sovereignty over natural resources. The 1962 UN General Assembly resolution recognized the 'inalienable right of all states freely to dispose of their natural wealth and resources accordance with their national interests'[78] was followed by UN General Assembly Resolution 3281 (XXIX) 1974 providing that:

"Full permanent sovereignty of every State over its natural resources and all economic activities. In order to safeguard these resources, each State is entitled to exercise effective control over them and their exploitation with means suitable to its own situation, including the right to nationalization or transfer of ownership to its nationals, this right being an expression of the full permanent sovereignty of the State. No State may be subjected to economic, political or any other type of coercion to prevent the free and full exercise of this inalienable right."

Likewise, the principle of national sovereignty was agreed as a specific principle in the Stockholm and Rio Declarations of 1972 and 1992, respectively. Today permanent national sovereignty over resources is recognized under international law and its exercise is established under national constitutions. The close connection between sovereignty and energy is not only significant for energy- or hydrocarbon-producing states. Energy supply is also considered a sovereign issue in many of the energy importing and consuming states. The organization and division of competences within the European Union (EU) energy law and policy area is an example of this. The 'sovereignty exception' under Article 194 (2) of the Treaty on the Functioning of the EU (TFEU) provides that '[EU energy policy] measures shall not affect a Member State's right to determine the conditions for exploiting its energy resources, its choice between different energy sources and the general structure of its energy supply […]'. The

[77] *Conference Resolution 2/2014: Declaration of Legal Principles Relating to Climate Change and conference report for the Washington Conference (2014), Sofia 2012 and the Hague 2010 on Legal Principles Relating To Climate Change.*

[78] *ibid.*

rationale of this provision is that Member States have decided that[79] these issues are and should remain within the scope of national sovereignty. It is moreover reflected directly in the Directive 94/22/EC on the conditions for granting and using authorizations for the prospection, exploration and production of hydrocarbons, preamble and Article 2.

The principle of access to modern energy services

It has been belatedly recognized in recent decades that in order for sustainable development to occur in developing nations it is essential that modern energy services are available to the general community. The importance of this issue was first recognized in 1986 in the Report of the World Commission on Environment and Development (the Brundt land Report).[80]The issue gained momentum in 2000 in a joint report, *World Energy Assessment: Energy and the Challenge of Sustainability,* prepared by the UN Development Programme (UNDP), the UN Department of Economic and Social Affairs (UN DESA), and the World Energy Council. The report called for world action to provide access to energy services for all, and emphasized the strong nexus between energy and poverty. The 2000 Report was strengthened and updated by a further 2004 Report prepared by UNDP.[81] 'Energy services' is needed rather than simply 'energy' as it is not energy in itself that society requires, as energy has no intrinsic value, but rather the lifestyle changes that modern energy services provide. Energy services result from the combined operation of primary energy sources, energy-related technologies, labour, materials and infrastructure. Traditional energy services provided simply for fire, based on the burning of biomass in the form of wood, or dung for cooking and heating and animals for transport. Modern energy services, in contrast, provide for lighting, cooling, refrigeration, clean cooking and transport. The increasing recognition of the importance of access to energy services is apparent from a comparison between the UN General Assembly's Millennium Development Goals (MDGs), declared in the 2000 Millennium Declaration, and the Sustainable Development Goals (SDGs), also declared by the General Assembly in *Transforming Our World: The 2030 Agenda for Sustainable Development*[82]In the former case, the goals make no mention of energy. In contrast, Goal 7 of the SDGs is expressly devoted to energy: 'Ensure access to affordable, reliable, sustainable, and modern energy for all.' Each of the SDGs contains a number of targets. Target 7.1 declares: 'By 2030, ensure universal access to affordable, reliable and modern energy

[79] *A treatise for energy law ,Raphael J Heffron, Anita Ronne, Joseph P Tomain, Adrian Bradbrook and Kim Talus,**The Journal of World Energy Law & Business**, Volume 11, Issue 1, 1 March 2018, Pages 34–48*

[80]***Our Common Future,*** *UN Doc A/42/427 (1987) 8.*

[81]*UN D* ***Update****(2004).evelopment Programme,* ***World Energy Assessment: Update****(2004).*

[82]*GA Res 55/2, UN Doc A/Res 55/2 (2000)*

services.'The magnitude of the issue is apparent from the fact that according to the most recent international report on the issue, the 2016 report on the realization of the SDGs, there are still 40 per cent of people living in developing countries still relying on polluting and unhealthy fuels for cooking or gas supplies. [83]The majority of these people live in Africa and south Asia. At present over 65 per cent of the population of sub-saharan Africa is without electricity.[84]

The principle of energy justice

Energy justice is a growing moral, philosophical and ethical movement that developed in the late 20th and early 21st centuries. It has been defined as:

"*a global energy system that fairly disseminates both the benefits and costs of energy services, and one that contributes to more representative and impartial energy decision-making."*[85]

This social justice issue looks beyond traditional government and industry concerns regarding energy security, economic development and technology to consider morality in decision-making. It is relevant to both international issues (such as the right of people in developing countries to escape the poverty trap by the provision of universal access to energy services and to avoid environmental damage resulting from exploitation from multinational energy corporations or the disposal of nuclear waste shipped from developed nations), and to domestic issues (such as ensuring the affordability of energy supply for the poor or outlawing the forcible abandonment of homes and villages for the creation of new large-scale hydroelectric projects).The energy justice movement emerged out of and has the same philosophical background as the more general issues of environmental justice and atmospheric and climate justice. The existing literature divides energy justice into three core themes: distributional justice, procedural justice and recognition justice.[86]Distributional justice seeks to ensure that it is not always the disadvantaged and poor people who suffer most from the siting of energy projects and those objections to new energy projects are examined thoroughly by governments and judicial planning bodies without undue pressure from developers. The denial of distributional justice has tended to occur in the past in relation to governmental decision concerning, for example, the siting of wind generators, coal plant projects and nuclear power plants. It is argued that all segments of society should benefit

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[83] *A treatise for energy law ,Raphael J Heffron, Anita Ronne, Joseph P Tomain, Adrian Bradbrook and Kim Talus,**The Journal of World Energy Law & Business**, Volume 11, Issue 1, 1 March 2018, Pages 34–48*

[84]*See: UN 2017. Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all <http://unstats.un.org/sdgs/report/2016/goal-07/> accessed 30 September 2017.*

[85]*BK Sovacool and others, 'Energy Decisions Reframed as Justice and Ethical Concerns' (2016) 1 Nature Energy 1 <www.nature.com/natureenergy>.*

[86]*These issues are considered in detail in D McCauley and others, 'Advancing Energy Justice: The Triumvirate of Tenets' (2013) 3 International Energy Law Review 107.*

and suffer equally from such decision-making. Procedural justice involves the equal ability of all social groups to be able to participate in decision-making processes in proposed energy developments. While this protection exists already in international environmental law in the 1998 Aarhus Convention, its application in individual cases can often appear compromised. Thus decisions may be taken without full disclosure of all relevant issues to affected parties, and bias and political pressure from powerful vested interests may be unfairly influential when proposed energy developments are assessed. The unequal distribution of subsidies to different energy sources may also result in inappropriate decision-making. Recognition justice involves a consideration of differing community opinions and perspectives based on such matters as gender, race and cultural background as well as ensuring that certain groups and places are not devalued or disrespected. [87]Modern illustrations of the problem include disrespect to local anti wind farm groups by vested interests in the renewable energy field and the downplaying, ignoring and devaluing opponents of nuclear energy plants. Recognition justice seeks to ensure a level playing field for all stakeholders in energy development decision-making.[88]

The principle of prudent, rational and sustainable use of natural resources

Sustainable use of natural resources is a term referred to in several conventions either directly or by using alternative expressions like 'conservation' 'sustainable management', 'optimal, efficient and rational use' or 'reduce and eliminate unsustainable patterns of production and consumption' as stated in the Rio Declaration on Environment and Development (1992), Principle 8 Already the Stockholm Declaration (1972),[89] however, included the principle (No 5) that non-renewable resources of the earth must be employed in such a way as to guard against the danger of their future exhaustion and to ensure that benefits from such employment are shared by all mankind. The principle of sustainable use is also reflected in the objective of United Nations Framework Convention on Climate Change (UNFCCC) Article 2 to 'allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner' in Article 3.4 'should promote sustainable development …protect the climate system against human-induced change' and more directly under the commitments of all Parties to 'Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and

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[87] *A treatise for energy law ,Raphael J Heffron, Anita Ronne, Joseph P Tomain, Adrian Bradbrook and Kim Talus,**The Journal of World Energy Law & Business**, Volume 11, Issue 1, 1 March 2018, Pages 34–48*

[88] *For recent analyses of the energy justice movement, see the writings of L Guruswamy, **Global Energy Justice: Law and Poverty** (West 2016) and 'The Contours of Energy Justice' in Shawkat Alam and others **International Law and The Global South** (CUP 2015) 529ff.*

[89] *Declaration of the UN Conference on the Human Environment adopted in Stockholm, 16 June 1972.*

reservoirs …, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems', cf Article 4.1 (d). To reduce harmful atmospheric emissions sustainable use of energy comes to the very forefront implying promotion of energy efficiency, energy conservation and use of renewable energy as also reflected in the Kyoto Protocol (1997) Article 2. Likewise, the Paris Agreement (2015) acknowledges the need to promote universal access to sustainable energy in developing countries, as well as the deployment of renewables. The 17 Sustainable Development Goals adopted by the UN General Assembly in 2015,[90] expanded the range of the Millennium Development Goals from 2000[51] to cover among other issues energy and the use of natural resources directly. A goal to reach is thus *Affordable and Clean Energy* (No 7). Other additional goals like *Sustainable Cities and Communities* (No 11), *Responsible Consumption and Production*(No 12) and *Climate Action* (No 13) also have direct reference and relevance to the sustainable use of natural resources.

Sustainable use of natural resources is also embedded at the EU level. Environmental protection requirements must thus be integrated into the definition and implementation of the Union policies and activities, in particular, with a view to promoting sustainable development, cf the TFEU, Article 11. Moreover, Union policy on the environment shall contribute to pursuit of preserving, protecting and improving among others the prudent and rational utilization of natural resources, and combating climate change. The objective of Union policy on energy should promote energy efficiency and energy saving and the development of new and renewable forms of energy, cf Article 194. A long range of directives have over the years implemented these political goals into binding commitments on all Member States on eg waste, water, renewables and energy efficiency. Examples of the EU policy implementation may be found in the Sixth Environment Action Programme[52] where sustainable use and management of resources are referred to as one of the priority areas and called for the preparation of 'a thematic strategy on the sustainable use and management of resources…' and in practical terms reducing the environmental impact of resource use.

Natural resources are defined as encompassing all raw materials including biomass, water, wind, geothermal, tidal and solar energy. The need to take into account the life cycle and global perspective when tackling unsustainable use of natural resources is emphasized. Sustainable use of natural resources is also recognized as critical for further economic development and became the core point under one of the seven flagship initiatives within the 'Europe 2020

[90]*UN Res A/70/1,* **Transforming Our World: The 2030 Agenda for Sustainable Development***, adopted on 21 October 2015.*

Strategy.'[54] This Strategy aims to support the shift towards a resource efficient and low-carbon economy and decouple economic growth from resource and energy use. It stresses how resource efficiency will prevent environmental degradation, biodiversity loss and unsustainable use of resources.[91]Like the EU also some states have adopted constitutional provisions or acts that require sustainable use of the natural environment and natural resources. Further, all the mentioned international agreements and resolutions recognize that there are limits on the utilization of land, water and ocean, and natural resources if irreversible damage is to be avoided. Whether international law today imposes upon states a customary obligation of sustainable use of natural resources may be arguable but it is beyond doubts that sustainable use of natural resources are accepted as a global objective and has an increasing recognition internationally in treaty law. As far as shared and common resources are concerned there has been established a clear practice endorsing the existence of a general obligation to ensure conservation and sustainable use of the high seas, the deep sea-bed, the Antarctica and the Moon[56] and that these resources are the common heritage of humankind.[92]

The principle of the protection of the environment, human health and combatting climate change

Energy and the environment are physically linked in the natural fuel cycle. From exploration and extraction through processing and transportation and then to distribution, consumption, and disposal of the natural resources that are used to produce energy, environmental consequences follow. Consequently, energy law and policy and environmental law and policy cannot be treated as distinct areas of regulation. Most notable, the phenomenon of climate change exacerbates the environmental problems attendant with the energy system—the energy sector being the main contributor of CO_2 emissions. These environmental problems include degradation of natural environments and the imposition of risks and fatalities on humans.[93]

Energy security and reliability principle

Energy security is at the heart of any modern energy policy system and is reflected in a large number of national energy laws and regulations. Its significance is connected with the general importance of energy for the society. The concept refers to two distinct but related energy policy

[91]*See Report 'On the Progress of the Thematic Strategy on the Sustainable Use of Natural Resources' (SEC 2011) 1068 of 20 September 2011, 8 and 'A Resource-Efficient Europe', COM (2011) 21 and the 'Roadmap for a Resource-Efficient Europe', COM (2011) 571.*

[92] *A treatise for energy law ,Raphael J Heffron, Anita Ronne, Joseph P Tomain, Adrian Bradbrook and Kim Talus,***The Journal of World Energy Law & Business**, *Volume 11, Issue 1, 1 March 2018, Pages 34–48*

[93]*A Okun, **Equality and Efficiency: The Big Trade-Off** (Brookings Institution Press 1975).*

objectives. It refers to security of supply, which typically means the continuous availability of energy at a reasonable cost. Most modern energy policies also add the social or environmental costs to this definition. It also refers to security of demand, which means the continuous demand for energy products produced within the country in question. Traditionally this refers to hydrocarbons, but it also includes energy from renewable energy sources like hydropower. While security of supply is a somewhat universal energy policy objective, its practical application at the level of national law and policy depend on the national specificities.[94]

Principle of resilience

The energy sector of the economy can be assessed in two parts—transportation and electricity although fossil fuels dominate both systems. The crucial difference between the two, however, is that they each have their own particular physical characteristics. Transportation fuels, for example, can be easily identified and stored. Electricity is fungible and storage only possible short term at best. More importantly, the electricity system must be in balance at all times as well as readily available. Regardless of these differences, however, energy for both sectors must be reliably available. Additionally, both systems must be resilient. Because transportation fuels are easily storable and dispersed throughout a country, the transportation system is relatively resilient. Not so for the electricity system. In fact, resilience is now become a major concern to the electricity sector as a result of a series of disruptive weather events that have shut down the delivery of electricity at great economic costs. Consequently, the energy future must pay close attention to the concept of resilience.[95]

Conclusion

Since the time of St Thomas Aquinas and his Treatise of Law, scholars have been attempting to establish guiding principles of law.[96] The aim of this article has been to attempt something similar but for energy law. Indeed, in another Treatise, Jean-Jacques Rousseau's Treatise on Education *Emile, or On Education*—he was aiming to reform our thinking about education. This is also the aim of our 'Treatise of Energy Law' to reform what constitutes energy law and how scholars and practitioners should interact with it. Energy law's related areas (or sister subjects) of environmental and climate law have many principles which are outlined in sections

[94]*Various elements of energy security have been discussed in detail in B Sovacool (ed),* ***Handbook of Energy Security*** *(Routledge 2011).*

[95] *A treatise for energy law ,Raphael J Heffron, Anita Ronne, Joseph P Tomain, Adrian Bradbrook and Kim Talus,***The Journal of World Energy Law & Business**, *Volume 11, Issue 1, 1 March 2018, Pages 34–48*

[96]*And Archibald Brown: W Bainbridge,* **A Treatise on the Law of Mines and Minerals**, *A Brown (ed) (4th edn,*
Butterworths 1878).

'Introduction' and 'Energy law's seven principles' . These two areas have been defining and developing them for close to several decades now. One of the reasons energy law has not followed environmental and climate change law in having its own principles is because of the lack of consensus of what energy law is. It remains an issue in energy law scholarship. Evidence of this is presented in the section 'A review of what constitutes energy law'. Further, it is notable that in 2017 energy law was accepted as a section in one of the world's oldest annual legal conferences—the Society of Legal Scholars Annual Conference—which was held in Dublin (Ireland) from 5 to 8 September 2017. It was the 108th time this legal conference has been held and it only now has an energy law section—and it is now recognized alongside the other 27 sub-disciplines of law. The first energy law keynote speakers at this event notably, in essence, both presented on the issue of what constitutes energy law scholarship and energy law. As the definition of energy law scholarship has evolved to some degree since Bradbrook's seminal article in 1986, in more recent scholarship it reads as 'energy law is the regulation of energy related rights and duties of various stakeholders over energy resources over the energy life-cycle'.[97] And this definition and Bradbrook's will no doubt be debated in the literature in years to come. However, for energy law to further develop, and to ensure it takes into account the advance of society, new international agreements such as Paris COP21, new technology and new government policies for transitioning to low-carbon economics, it is time for energy law to have its own set of guiding principles. This article states that there are seven energy law principles (and a more detailed description is included in section 'The principles of energy law explained').These principles should act as a guide to policymakers, academics, lawyers, judges and arbitrators when adjudicating, enforcing, making or formulating documentation, laws, regulations, judgments, etc on energy law. The majority of these are already in operation to varying degrees in practice and the aim of this article is to advance these principles as the guiding principles of energy law for both research and practice. These seven principles of energy law can also enable other energy scholars to engage more directly with energy law. And in terms of thinking of the study and the definition of energy law in the future, there is a need for more interdisciplinary engagement. Indeed, both the keynotes at the aforementioned 108th Society of Legal Scholars Energy Law section highlighted the importance of interdisciplinary scholarship as a characteristic of energy law. Finally, the question arises as to whether in light of societal drivers[75] or changes in eras of energy law energy law as a discipline is modernizing? Indeed, scholars have noted this term 'modern energy law' in the literature to-date and as society moves

[97]*Heffron and Talus, 'The Evolution of Energy Law' (n 4) 4.*

towards low-carbon economies energy law needs a new treatise based on a core set of principles as advanced in this article to modernize itself.[98]

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[98] *A treatise for energy law ,Raphael J Heffron, Anita Ronne, Joseph P Tomain, Adrian Bradbrook and Kim Talus,***The Journal of World Energy Law & Business***, *Volume 11, Issue 1, 1 March 2018, Pages 34–48*

CROSS BORDER ELECTRICITY TRADE IN SOUTH ASIAN REGION: OPPORTUNITYROADS A HEAD

by

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ABSTRACT

Emancipating the global borderless trade, cross border energy trade catalyzes the growth of regional cooperation for making available energy sources. Despite the prolific potential of the cross border energy trade, the trade has witnessed only bilateral energy cooperation.

However, these large infrastructural projects accrue benefits and certain costs. The tremendous amount of investment in such arrangement has higher stakes of not only the investor but also the inhabitants of the participating countries.

Following the western trend, the SAARC nations stepped forward to expand a regional energy cooperation arrangement wherein the resources collectively shall be utilized to not only boost the economies of the South Asian countries but also to serve greater public good. Subsequently, in 2014 the SAARC framework Agreement for Energy (Electricity) Cooperation was signed with a vision to create a cohesive sustainable power for South Asia.

The reason why these South Asian countries are collectively referred to here is that collective effort of these countries shall promote better efficiency and utilization of resources for greater good of the people. While South Asia is endowed with large hydropower potential, only around 20 percent has been exploited so far. Abundance of renewable resources has to be utilized in a fairly efficient and sustainable manner.

Swimming through the chapters the research work shall enlist the impacts of the cross border electricity on the socio-economic growth of the individual nations with political relations as a contact factor. This piece of research therefore aims to elaborate upon the transnational integration for creating a sustainable South Asian power grid.

INTERNATIONAL ELECTRICITY TRADE: AN INTRODUCTION

1.1 WORLD TRADE IN ELECTRICITY

While the past two centuries have witnessed the growth of international trade across the world, the mid of 21st century has accorded the growth of regional integration model. Moving towards a sustainable development goal, the countries at regional level try to fade the boundaries to ensure benefits of relocation of resources.

It is uncontested that power is a basic amenity for survival. However, electricity is not a typical arbitraged product, because it has several dimensions of quality including voltage and frequency.[99] Facts and figures time and again indicate that substantial portion of world's population is still electricity-less.[100] It is also undeniable that power sector is capital intensive industry that not only needs robust infrastructure but also needs a continued growth and comprehensive economic adjustments.

While the Electricity Generation patterns across the globe show an increasing indent[101], it is interesting to note how the renewable energy has been sweeping the overall dependence of the world on the oil for power. The BP Statistical Review on World Energy 2018 provides how the developing countries have been ameliorating[102]; the cross border electricity trade has been playing a crucial role in the intensifying international electricity statistics.

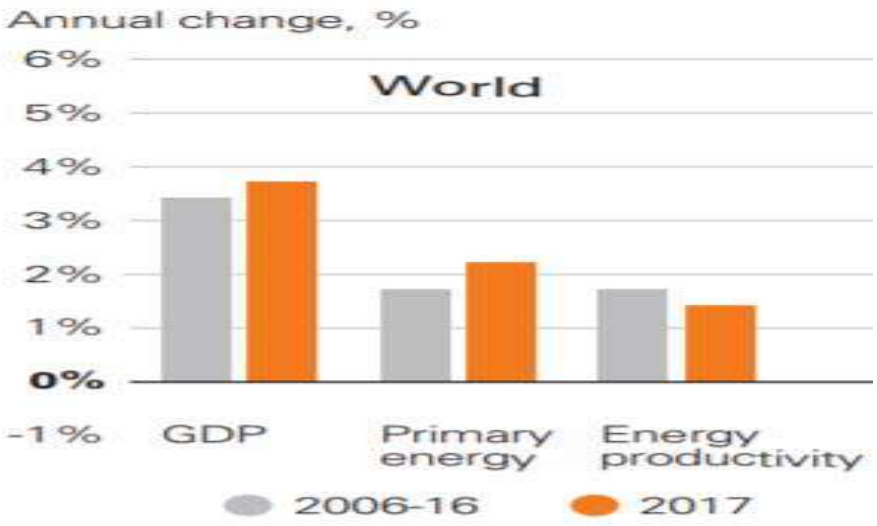

Fig. 1 Annual Percentage change in energy patterns from 2006-16 viz. 2017

[99] *http://documents.worldbank.org/curated/en/707091468183843171/pdf/WPS6947.pdf*
[100] *For nearly three-fifths of the world population, the lack of access to energy is a major challenge to economic development and poverty reduction. MICHAEL POLLITT (2014) http://blogs.worldbank.org/trade/power-pools-how-cross-border-trade-electricity-can-help-meet-development-goals [Last accessed on 23/02/2019 at 14.18IST]*

[101] *Power generation rose by 2.8%, close to the 10-year average* ***BP Statistical Review on World Energy 2018***
[102] *Practically all growth came from emerging economies (94%)* ***BP Statistical Review on World Energy 2018***

Sharing of economic benefits between countries grouped on the basis of region is advantageous. This arrangement brings together developed and developing nations under the integrated cooperation model to accredit comprehensive and sustainable development. Regional integration as an arrangement promotes expansion of the territories to avail the regional benefit of resources, provide demand and supply set and aims to broaden the markets access.

Another reason for emphasis on the regional cooperation was to ensure that the importation cost of expensive energy source for power generation could be reduced. World trends have also resulted in this shift.

International Electricity trade in its simple sense means trading electricity beyond the national boundaries. Cross border electricity Trade therefore means borderless trade seeking integration of a cohesive power grid to ensure greater access to electricity and shared investment arrangements.

Successful international electricity exchange can be a win- win game.[103] The experts eye on the increasing dependence on the international power pooling from significantly two view points. The positivists believe that the increasing technological advancements and changing global energy priorities, subsequently changing trend of electricity consumption and supply at the national level, has modeled regional cooperation to meet the upcoming demand pattern challenges. While the rationalist thinkers follow that the diplomatic relations with the involvement of regional intergovernmental organizations shall dynamized the status of international trade as a whole. Regional trade in electricity also fosters balancing the historical generation infrastructure and reserve with the current needs of the population. It allows the pooling of reserve capacity thereby reducing costs for extra power stations and limiting inefficient dispatch of power stations required for provision of spinning reserve.[104]

While there are challenges in terms of unequal availability of sources for energy production, the countries at regional and global level decided to come together to deal with this global issue of energy crisis. Energy crisis is what every country across the globe has been facing or is reasonably foreseeing to occur. The scarcity of clean energy sources is a big challenge clubbed with a sustained and continued availability of the resources to ensure economic viabilities and profits to the investors.

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[103] *Karsten Neuhoff, International Electricity Trade - Economic Considerations, UNIVERSITY OF CAMBRIDGE (2004) See http://oldsite.nautilus.org/DPRKbriefingbook/energy/neuhoff.pdf [Last accessed 23/03/2019 at 9.45 IST]*

[104] *Id. at 2*

Cross-border trade in electricity has unique characteristics: it is constrained to an integrated wide-area transmission grid and it is often two-way.[105] CBET helps India to better use of its power plants, therefore, enhancing profitability. Export revenue earning makes Indian households gain through increased consumption, which is higher when trade is higher. Export demand and earning contribute to higher investment in the power sector as well as to the entire economy and the GDP increases.

ELECTRICITY TRADE IN SOUTH ASIA

Cross Border Electricity Trade (CBET) in South Asia region has brought in a sense of shared benefits and prosperity amongst the neighboring nations.[106] The main players in South Asia have been organized through various regional platforms. The present pattern of energy consumption has been as much a result of the natural endowment as the historical evolution.[107] For this study, we shall try to analyze significant states under the South Asian Association for Regional Cooperation (SAARC).

In 2013, value of exported electricity across the globe was estimated at US$34.2 Billion which increased by 19.3% to approximately US$ 65 Billion in 2017. While European Union's share alone was around 66% of the global electricity export in the year 2017. However, the survey interestingly depicts how the value of electricity exported by the developing countries especially South Asian countries proliferated and the share of the developed countries continued to fall from 2013 to 2017.

India's GDP figures are predicted to grow by 7.3 percent in FY2018/19 and subsequently, 7.5 percent. Private utilization is anticipated to stay hearty and speculation development is relied upon to proceed as the advantages of late strategy changes start to appear and credit bounce back. Solid household request is imagined to broaden the present record shortfall to 2.6 percent of GDP one year from now. Swelling is anticipated to transcend the midpoint of the Reserve Bank of India's objective scope of 2 to 6 percent, basically attributable to vitality and sustenance costs. In the remainder of the area, monetary action will average 5.6 percent over the gauge skyline.

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[105] *Werner Antweiler, Cross-border trade in electricity, 101 J. of In'tl Economics 43, 42-51 (2016)*

[106] *Ghani, E. & R. Kanbur. Urbanization and (In)Formalization , Policy Research Working Paper 6374, WORLD BANK, WASHINGTON, DC (2013).*

[107] *Kuntala Lahiri-Dutt, Energy Resources: Will they be the last frontier in South Asia? (Jan 29, 2006) https://crawford.anu.edu.au/acde/asarc/pdf/papers/2006/WP2006_10.pdf [Last accessed 13/03/2019 at 18.45 IST]*

In Pakistan, macroeconomic imbalances weigh on growth outlook. Pakistan is expected to face financing needs due to large current account and fiscal deficits combined with low international reserves. GDP growth is projected to decelerate to 3.7 percent in FY2018/19[108], with financial conditions tightening to help counter rising inflation and external vulnerabilities.[109] Activity is projected to rebound and average 4.6 percent over the medium term with support from stabilizing macroeconomic conditions.[110]

In Bangladesh, the GDP growth is predicted to be 7.0 percent in FY2018/19 and activity will be supported by strong private consumption and investment on the back of infrastructure projects. Net exports are projected to contribute negatively to GDP growth as imports outpace exports in response to strong domestic demand.

In South Asia, an expansive extent of movement is casual, which may oblige profitability, wages, and access to social security frameworks. Putting resources into training and aptitudes, improving the business condition by upgrading administrative structures and boosting the nature of taxpayer supported organizations gave to formal firms are among the approach estimates which can energize formal action.

In a conference organized by United Nation Economic and Social Commission for Asia and South Pacific, the Sustainable Development Goals for trade in electricity was discussed. Emphasis was laid on implementing with all possible valor, the Sustainable development goals shall lead us way forward. It is significant to note that relation between sustainable development and regional cooperation between SAARC nations is an interrelated one. While to achieve sustainable development goals we need to ensure cohesive regional trade cooperation and we must carry on regional trade in such a manner to ensure sustainable development goals.

COMING TOGETHER OF SAARC NATIONS

While South Asian countries have high population, yet the total energy consumption of any individual SAARC nation was less than power consumption figures of countries like USA and China in early years of last decade. The domestic resource development pace in the SAC, together with existing regional bilateral energy trade arrangements, cannot match the growing

[108] *Arby, M. F., M. J. Malik, and M. N. Hanif. Size of Informal Economy in Pakistan. Working Paper 33, STATE BANK OF PAKISTAN. (2010).*
[109] *S. Cevik, Unlocking Pakistan's Revenue Potential IMF Working Paper 16/182, INTERNATIONAL MONETARY FUND (2016).*
[110] *World Bank 2018*

commercial energy supply required in the region.[111] However, last two decade indicate a changed pattern of electricity consumption and demand.

In 1985, South Asian Association for Regional Cooperation (SAARC) laid the foundation for integrated market for expanding the trade limits. SAFTA was signed between the member states on similar grounds as are various trade agreements ratified between developed states in the world. SAFTA in fact laid the roots for regional energy cooperation arrangement. In 2006, South Asia Regional Energy Coalition (SAREC) was established to formulate advocacy issues regarding policy-oriented business solutions across the region. The most indicative step wastaken in 2014 when SAARC Energy Cooperation agreement was signed by the member states.

Country	GDPper Capita (constant 2000 US$)*	Per Capita Energy Supply (TOE)	Per capita energy Consumption (TOE)	Per capita Electricity Supply (kWh)	Per capita electricity Consumption (kWh)*
Bangladesh	402	0.16	0.15	140	127.70
Bhutan	**695**	**0.87**	**0.62**	**3,971**	**942.07**
India	538	0.53	0.50	457	434.80
Nepal	231	0.34	0.32	69	67.90
Pakistan	566	0.49	0.44	425	407.80
Sri Lanka	962	0.49	0.42	345	325.10
Myanmar	-	0.28	0.27	104	101.10
China	1,323	2.36	1.11	2,140	1,378.50
Norway	39,005	6.50	5.81	22,859	23,195.80
USA	36,655	7.82	7.63	12,187	13,243.00

Table showing comparison of per capita energy and electricity supply and consumption for selected countries

Fig. 2 Comparison of per capita electricity supply and consumption for selected countries

Note: Data is from UN Comtrade database. Years are calendar years. Export growth in nominal USD

[111]*Priyantha Wijayatunga & P. N. Fernando, An Overview of Energy Cooperation in South Asia 19* SOUTH ASIA WORKING PAPERS *(2013) Available at https://www.adb.org/sites/default/files/publication/30262/overview-energy-cooperation-south-asia.pdf [Last accessed on 13/02/2019 at 2.35 IST]*

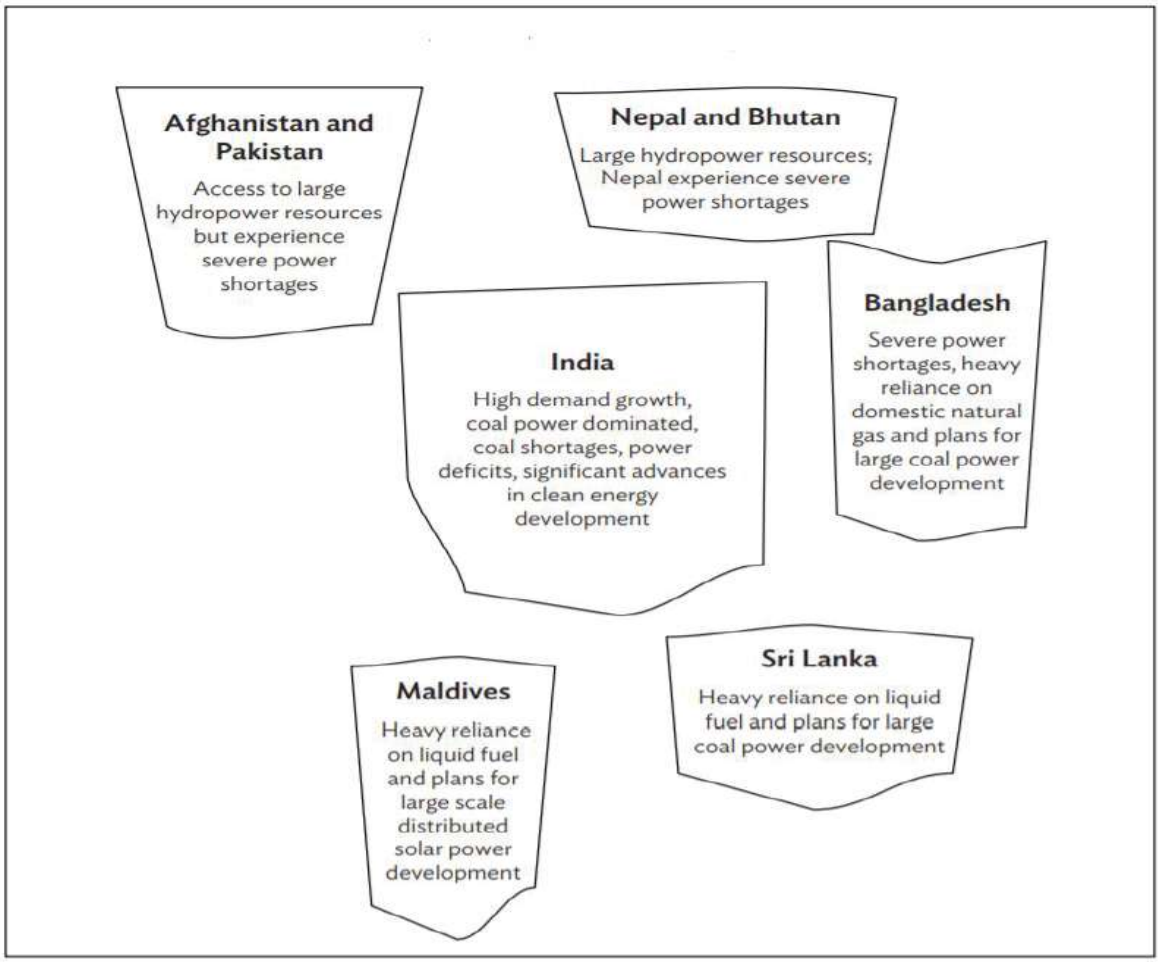


Fig. 3 Overview of SAARC countries and their energy potential highlights

ENERGY SOURCES POTENTIAL

There is a strong consensus among SAARC nations that energy trading between the eight member countries will help optimize the existing potential for power generation and boost region-wide prosperity.[112]

In South Asia, the countries have found power pooling as a feasible and futuristic solution to corroborate a regional resourceful development. South Asia is endowed with hydropower

[112]NEXT STEPS TO SOUTH ASIAN ECONOMIC UNION A STUDY ON REGIONAL ECONOMIC INTEGRATION (PHASE II) Prepared for South Asian Association for Regional Cooperation (SAARC) *Available at* http://saarc-sec.org/download/downloads/Study_-_SAARC_Next_Steps_to_SAEU.pdf [Last accessed on 27/02/2019 at 3.45 IST]

potential of 294,330 MW; coal reserves of 108,961 million tons; large renewable energy resources but relatively small reserve of 95 TCF of natural gas.[113]

It is pertinent to note that the primary sources of energy were coal, oil and gas. Though these sources are in ample abundance, it shall always be relatively less, owing to the continuing increase in the population.

Renewable power grew by 17%, higher than the 10-year average and the largest increment on record (69 mtoe).[114] In the South Asian region, the renewable energy sources viz. solar energy, wind energy, hydropower, bio-fuel, nuclear energy are potentially aimed at. While abundance of these resources is not in question, potent infrastructure to support sustainable utilization of these resources is required.

While world consumption of energy from primary sources of energy is showing in increasing trend (Fig.2), South Asian region depicts a significant increase in the renewable sources of energy (Fig.3).

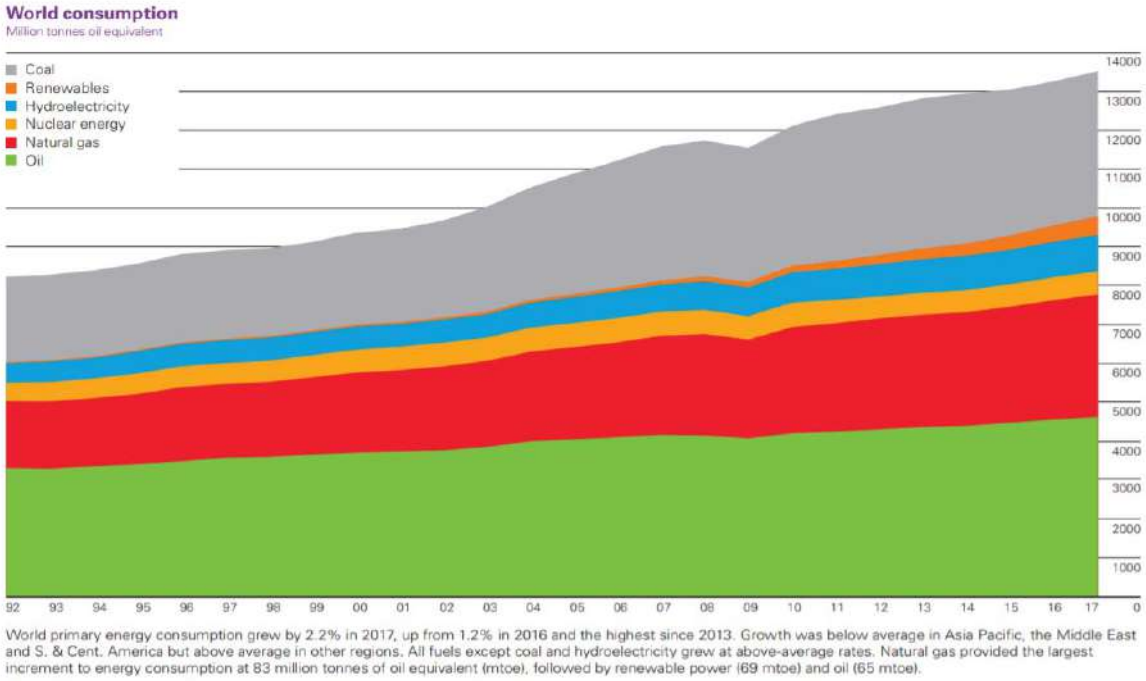
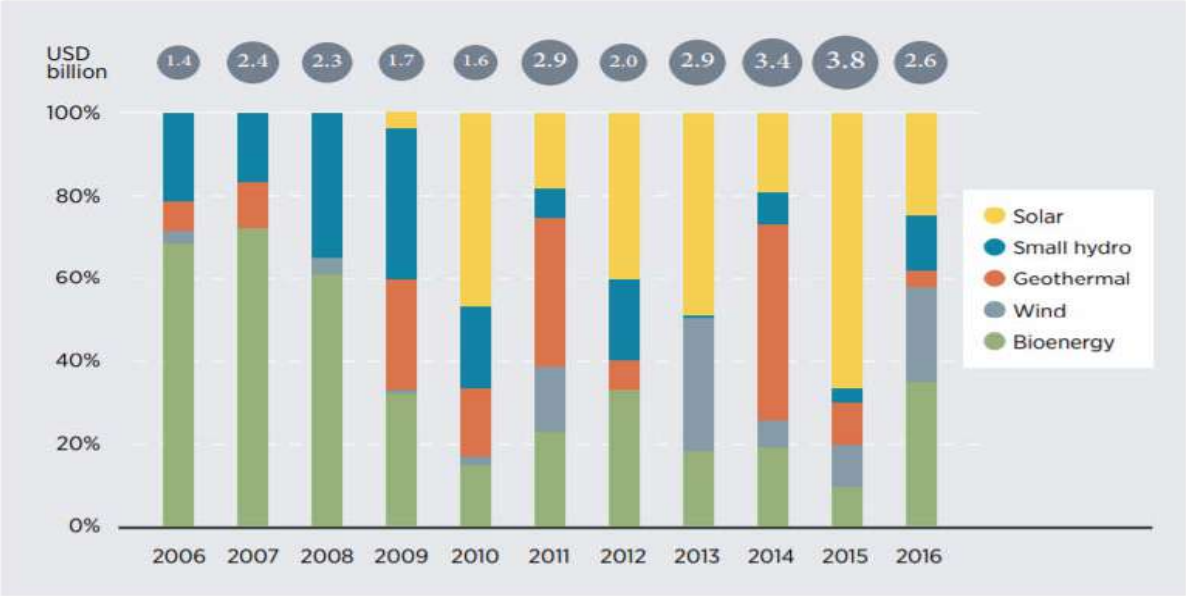


Fig. 4 World Electricity Consumption from different sources

[113]REVIEW OF ELECTRICITY LAWS AND REGULATION OF SAARC MEMBER STATES *Available at* http://www.saarcenergy.org/wp-content/uploads/2018/05/2013-Review-of-Electricity-Laws-and-Regulations.pdf [Last accessed 13/02/2019 at 10.45 IST]

[114]BP STATISTICAL REVIEW OF WORLD ENERGY 2018 *Available at*https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2018-full-report.pdf [Last accessed 13/02/2019 at 10.45 IST]

Note: Data is from UN Comtrade database. Years are calendar years. Export growth in nominal USD



Source: BP STATISTICAL REVIEW OF WORLD ENERGY 2018

Fig.5 Renewable Energy mix from 2016-2016 in South Asia

INDIA

While India in the South Asian region stands in a comparatively resourceful and prosperous situation, the country has been witnessing supply deficit and has been mostly dependent on imports. This has not only led to trade model shifts but also to carve out clean energy infrastructure for sustainable development.

Size of the Market

As on October 2018, total installed capacity for electricity generation from renewable sources (excluding large hydro) was 73.31QAZ5 GW. Capacity in Off-grid renewable power has surged. As of October 2018, generation capacities for Waste to Energy, Biomass Gasifiers, SPV systems stood at 175.28 MWeq, 163.37 MWeq and 767.51 MWeq, respectively.[115]

[115]RENEWABLE ENERGY INDUSTRY IN INDIA *AVAILABLE AT* HTTPS://WWW.IBEF.ORG/INDUSTRY/RENEWABLE-ENERGY.ASPX [LAST ACCESSED ON 22.02.2019]

The anticipated increase in the potential renewable capacity to 363 GW and comprehensive and focused policies in this sector, North India shall soon be the focal point in the Indian Renewable energy market.

Investments/ Developments

According to data released by the Department of Industrial Policy and Promotion (DIPP), FDI inflows in the Indian non-conventional energy sector between April 2000 and June 2018 stood at US$ 6.84 billion. More than US$ 42 billion has been invested in India's renewable energy sector since 2014. In the first half of 2018, investments in clean energy in India reached US$ 7.4 billion.

Potential sources for power

While in 2017, South Asia's Solar energy electricity generation constituted 22% of the Energy Mix (Fig.3), India's solar energy generation constituted 65% of its energy mix (Fig.4). This clearly indicates how India is the largest contributor in the solar energy generation in South Asia.

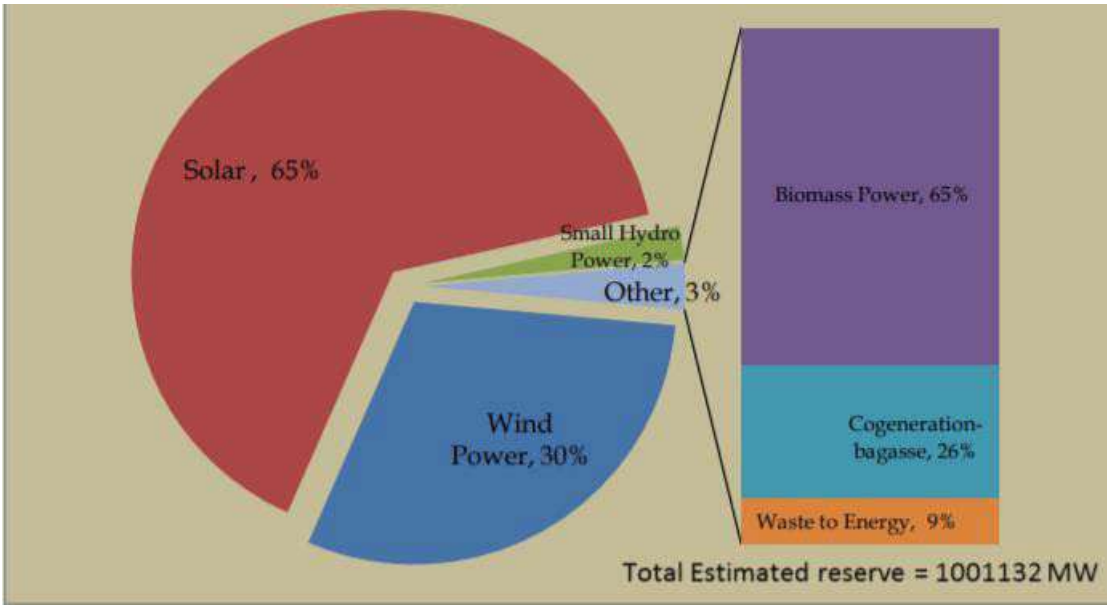


Fig. 6 Renewable Energy Mix in India by the end of FY 2017

Note: Data is from UN Comtrade database. Years are calendar years. Export growth in nominal USD

Since the Indian economy started boosting its renewable energy potential, the Electricity generation capacity (Installed) has rapidly increasing (Fig. 5). Geographical advantage has

helped India serve its electricity demand generation with a unique mix of policy initiative at not only national level but also at regional level.

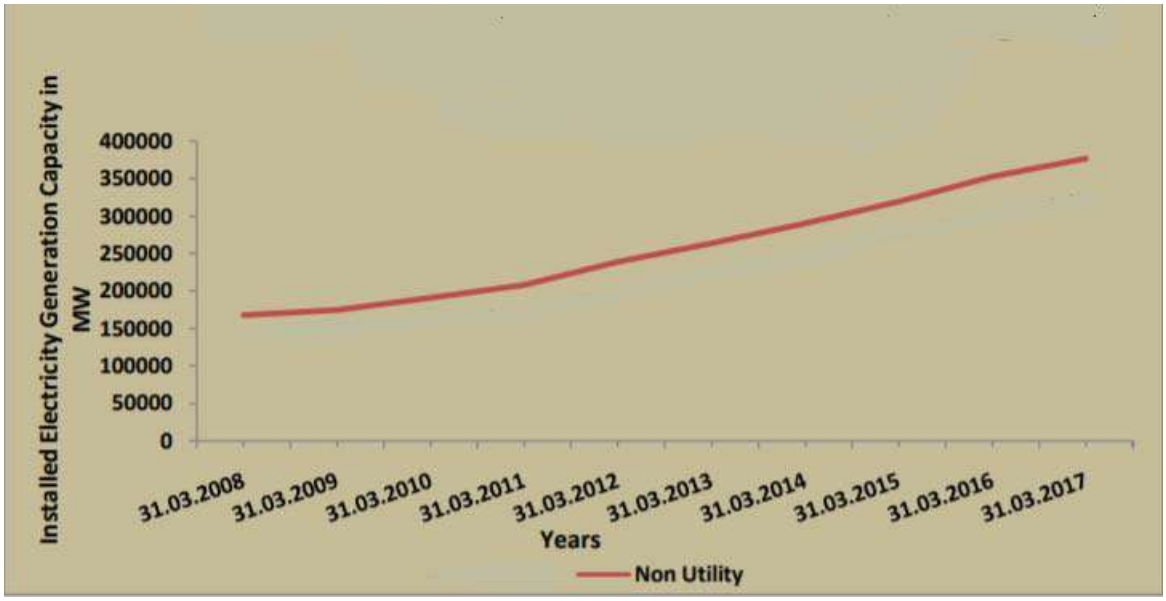


Fig. 7 Installed Electricity generation capacity in India at the end of FY 2017

Note: Data is from UN Comtrade database. Years are calendar years. Export growth in nominal USD

Attempting to realize the renewable energy potentials, India's Renewable energy sector was found to be the fourth most attractive renewable energy market across the globe. Post the signing of Paris Agreement, India has shifted to clean energy sources to meet its energy requirements. Installed renewable generation capacity has been rapidly increasing and as on October 2018, India's installed renewable power generation capacity was ranked 5th in the world. It is expected that by the year 2040, around 49 per cent of the total electricity will be generated by the renewable energy[116], as more efficient batteries will be used to store electricity which will further cut the solar energy cost by 66 per cent as compared to the current cost.[117]

NEPAL

While Nepal is a country small in size, however, the seriousness of circumstances it has been through has always been high. The geopolitical and economic crisis in the nation has made it dependent on tourism and neighboring countries for stability. While the recent earthquake shook

[116] As India looks to meet its energy demand on its own, which is expected to reach 15,820 TWh by 2040, renewable energy is set to play an important role.
[117]Bloomberg New Energy Outlook 2017

the economy of Nepal, the cross border electricity and especially, friendly relation with India has helped Nepal prosper at a faster pace.

The potentials of hydropower in Nepal are immense. The clean energy drive in the South Asian region has given Nepal an edge over the terrific potential and feasible future of hydropower for electricity generation. The transmission infrastructure is also essential to ensure continued and uninterrupted supply of electricity. Fig. 6 highlights the proposed transmission lines in the Nepal region to facilitate the cross border power trading.

With the geopolitical and financial conditions of the neighboring countries, Nepal is expecting a strategic advantage for cross border trade in electricity. The Hydropower potentials are anticipated to be utilized at a rate untenable and the highest in renewable source in South Asia.

S.N.	Cross-border TL Project	Length, km (up to border)	MW Flow
A. Nepal -India			
1	Dodhara-Bareli	58	3,000
2	Attariya-Bareli	30	700
3	Phulbari-Lucknow	44	2,600
4	Butwal-Gorakhpur	30	2,500
5	Inaruwa –Purnera	50	1,800
6.	Dhalkebar-Muzaffarpur	39	3,100
	Sub-total	251	13,700
B. Nepal-China			
1	Chilime-Kerung	14	1500
2	Upper Arun –Latse	23	700
	Sub-total	37	2,200
	Total (A+B)	**288**	**15,900**

Source: MoEWRI and RPGCL, 2018

Fig. 8 Proposed 400 KV cross border transmission lines

Electricity trade between India-Nepal has been flourishing since a decade. Hydropower potential in Nepal has helped not only Nepal for boosting its electricity generation and trade, but also India for encouraging private investors and companies to showcase their work.

Fig. 7 illustrates that by 2020 Nepal targets to generate 47% of its electricity through renewable and clean energy sources. While this is a low target in relation to other SAARC countries, it is important to see that Nepal has domestic challenges to combat also.

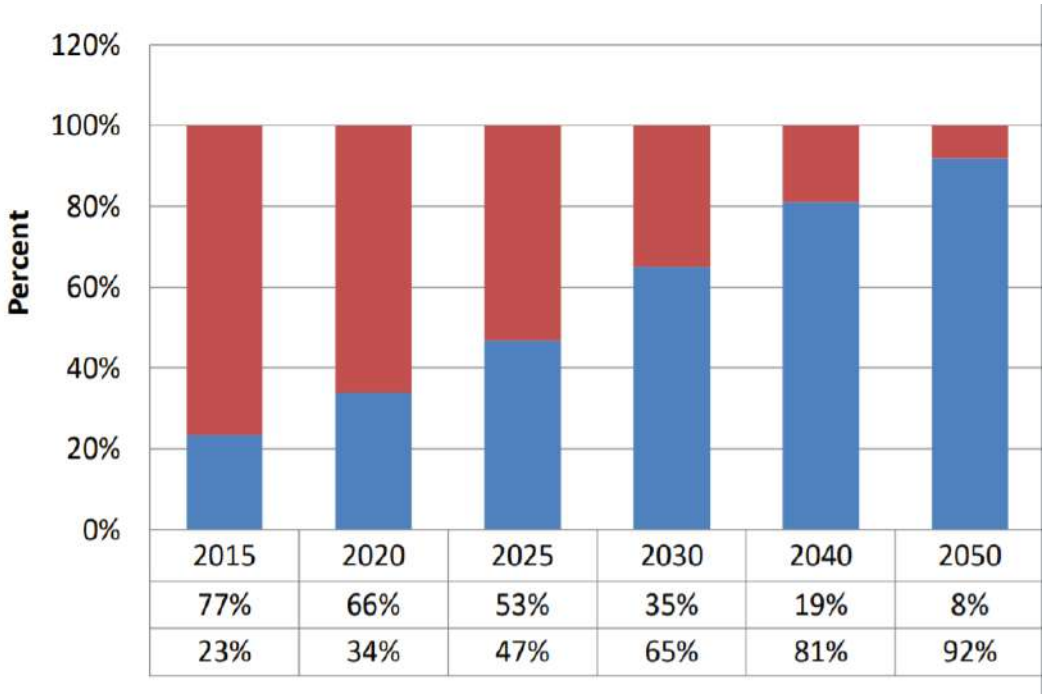


Fig. 9 Primary source versus Modern energy sources in Nepal Source: Ministry of Energy, Nepal

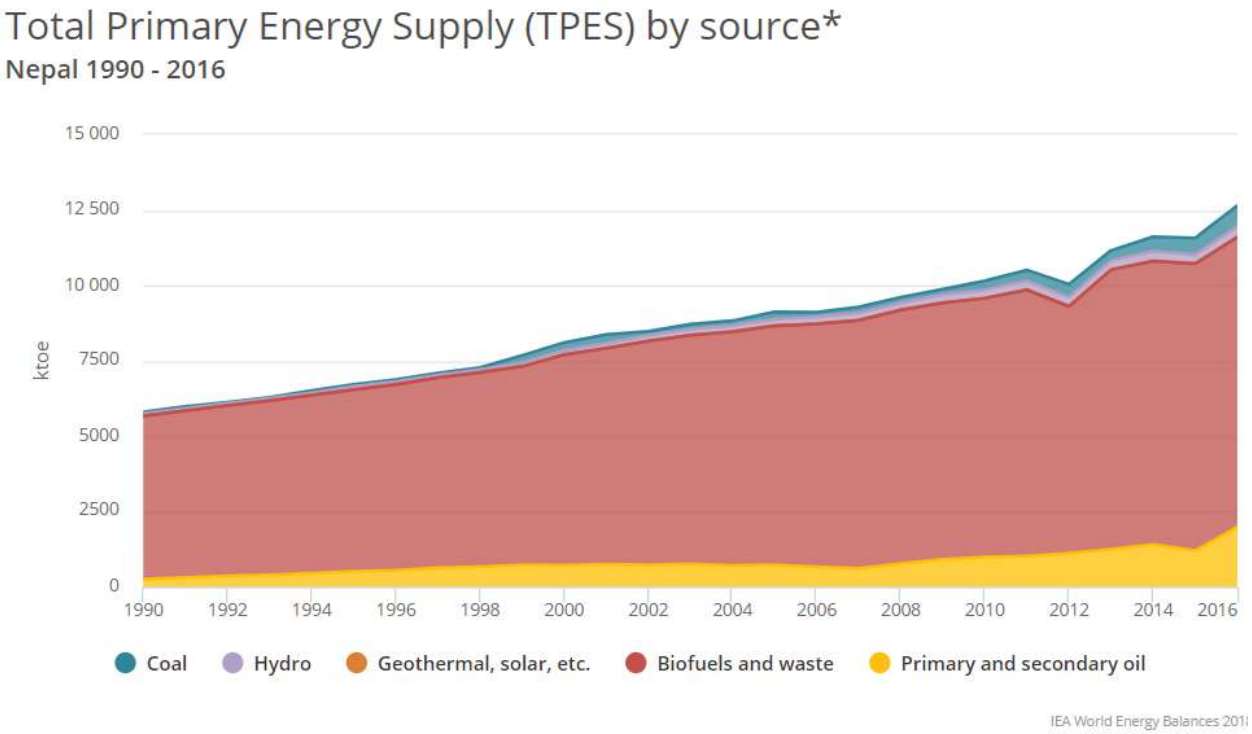


Fig. 10 Total Energy from primary source

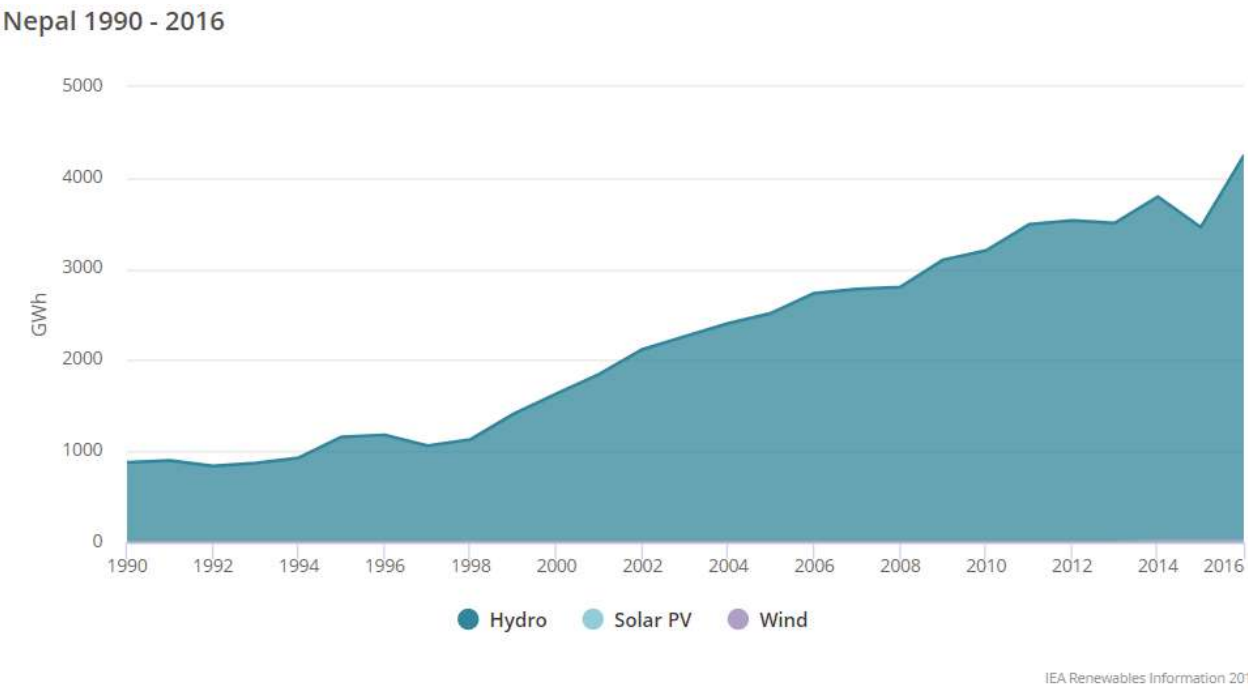


Fig. 11 Renewable sources in Nepal

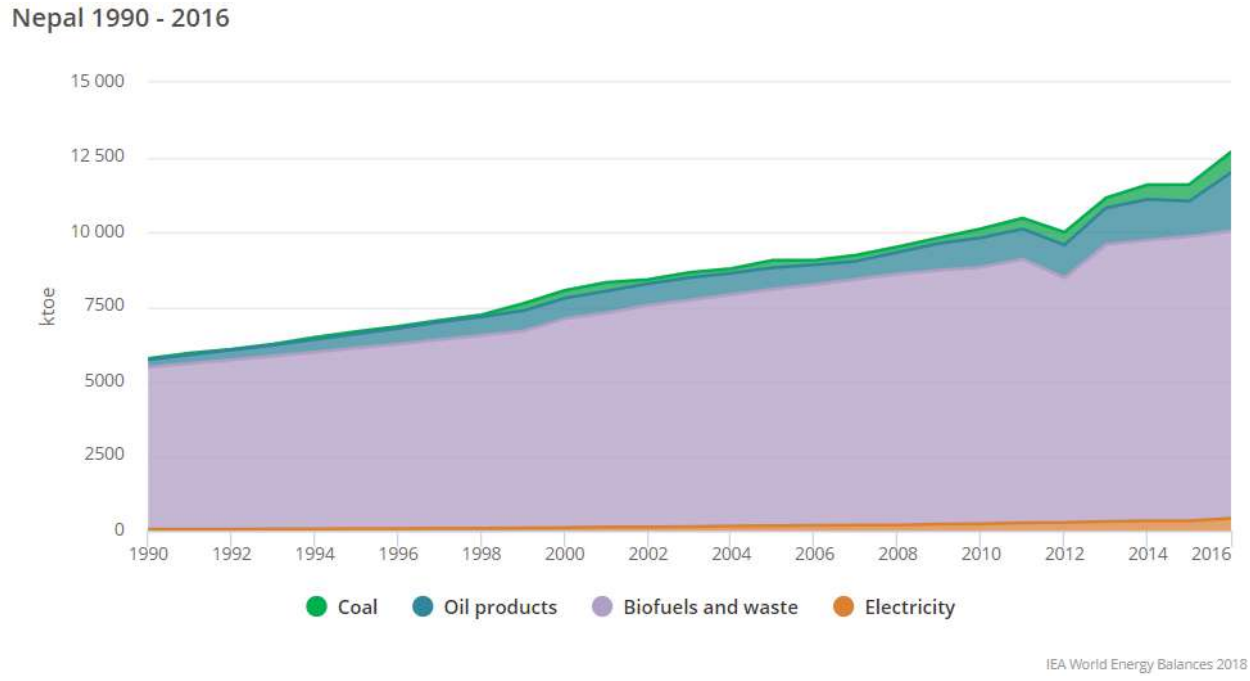


Fig. 12 Total Final Consumption of Energy

Total final Energy Consumption in Nepal has not been consistent; Bio-fuels and waste have the highest share in the statistics.

In the present shape, Nepal has interlinking transmission network with India only. The cross-border electricity trade between Nepal and India is predominantly characterized by the import of

electricity needs of isolated areas of both sides of border.[118] All together over 20 cross-border bilateral power exchange facilities are operational at 11kV, 33kV and 132kV. The total electricity flow from cross-border transmission lines of capacity 33kV to 400kV is about 488MW.[119]

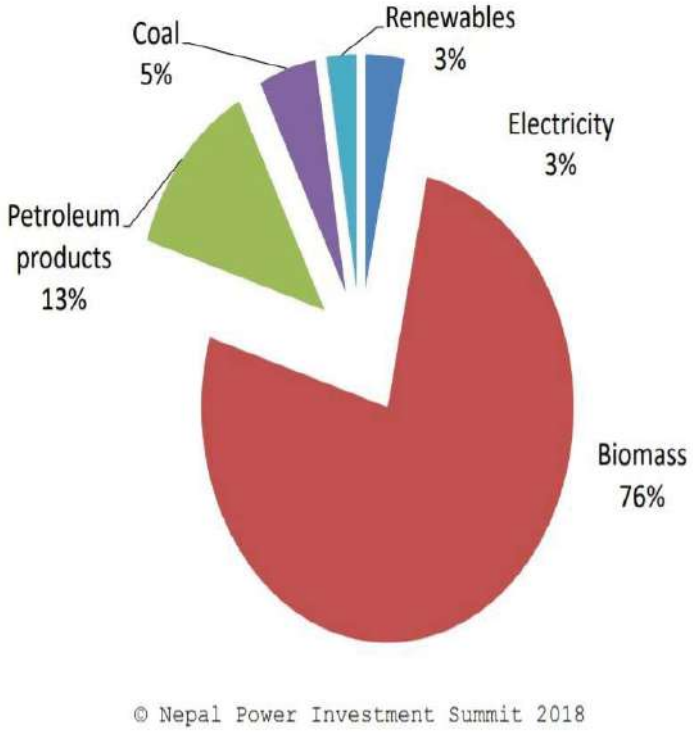


Fig.13 Energy Mix, Nepal for the FY 2017

BANGLADESH

Bangladesh is an emerging economy that is outperforming in the cross border electricity cooperation regime. Like all other countries, the electricity grid infrastructure comprises of generation companies, transmission system operators, distribution and trading system operators. Moving towards harmonized cross border electricity relations with India, Bangladesh has also improved its national electricity infrastructure and regulatory regime with introduction of concepts of third party open access and formation of power exchange. (Fig. 14)

[118] Prakash Gaudel, Cross-Border Electricity Trade: Opportunities and Challenges for Nepal (2018)
[119] MoEWRI and RPGCL, 2018. Transmission System Development Plan of Nepal. Ministry of Energy, Water Resources and Irrigation; and Rastriya Prasaran Grid CoBAmpany Limited, Kathmandu

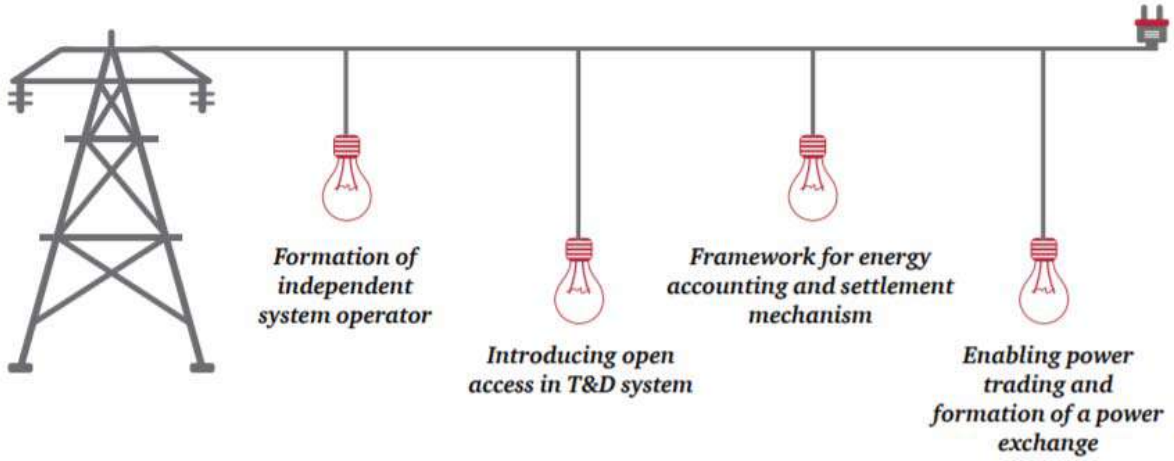


Fig.14 Source: PWC report, Transforming the Power Sector in Bangladesh

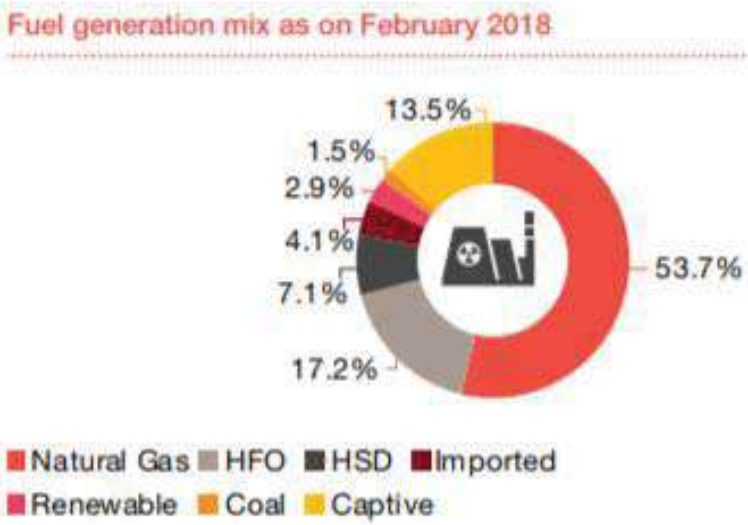


Fig. 15 Source: PWC report, Transforming the Power Sector in Bangladesh

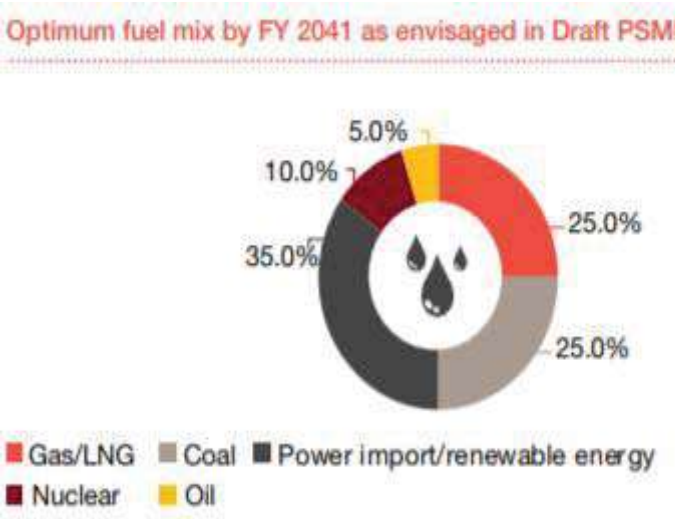


Fig. 16 Source: PWC report, Transforming the Power Sector in Bangladesh

As in 2018, Bangladesh had installed generation capacity of 11,534MW. The energy mix as on date (Fig.15) constitutes natural gas as the most dependent source. However, with the growing population, in the coming years natural gas will not be sufficient to cater to the energy needs in Bangladesh. (Fig.16)

Industries and the residential sector are the two largest energy consumers in Bangladesh's economy, followed by commercial and agricultural consumption.

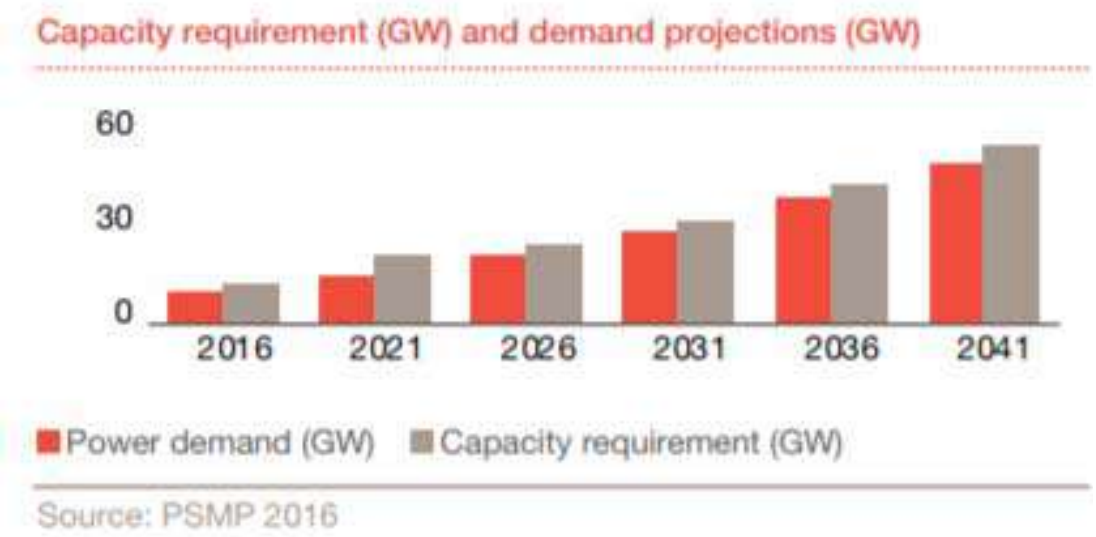


Fig.17 Capacity requirement and Demand Projections

However, with the realization of CBET potentials in South Asia, Bangladesh has emphasized to increase its imported power percentage in the projected fuel mix. Interestingly, the nuclear potentials are also being explored, that shall not only make the country self sufficient but also enhance its participation in the cross border electricity trade between the SAARC nations in the years ahead.

BHUTAN

With abundance of seasonal hydropower, Bhutan is one single country in South Asia with surplus capacity in electricity generation. The power sector in Bhutan contributes 30% to its GDP and around 40% to the Government's revenues. However, the increase since 2009 was not significant. This is because the hydropower potentials with Bhutan have remained underutilized.

With major projects, hydropower potential of Bhutan has been utilized that have also helped India to import electricity to meet its consumption demand and also cater to export to countries like Nepal and Bangladesh.

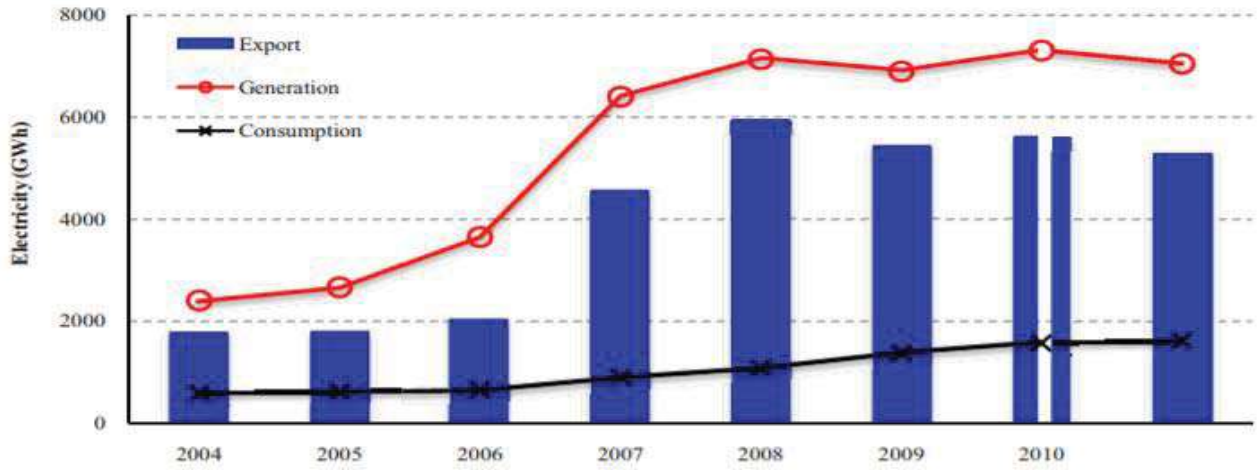


Fig. 18 Electricity export, generation and consumption from 2004-10 Source: World Bank 2010

Not even 1% of the total power generation capacity of Bhutan has been utilized. While surplus of electricity has led to a lot of challenges to the investors, return on investment is not adequate. While Bhutan's Renewable energy mix consists of Wind power, hydropower, Biomass and Solar energy, the thermal electricity generation in Bhutan is dependent on import of Coal and petroleum from gulf countries.

The four major players in the South Asian region have been analyzed to read through the scenario of cross border electricity trade between these countries. The participation of these

industries in the regional electricity trade brings in benefits at individual level as well as regional level. The next part highlights the socio-economic impacts of CBET at macro and micro level.

SOCIO-ECONOMIC IMPACT OF CBET ON THE SAARC COUNTRIES

INTERNATIONAL SALES REVENUE FROM ELECTRICITY EXPORTS BY COUNTRIES ACROSS THE GLOBE TOTALED US$30.7 BILLION IN 2017.[120] WHILE INTERNATIONAL FIGURES OF GROWTH ARE RAPIDLY CHANGING THERE ARE ECONOMIC, SOCIAL AND POLITICAL CONCERNS ATTACHED. HOWEVER, THE SOCIO-ECONOMIC FACTORS VIZ. EMPLOYMENT, STANDARD OF LIVING, CHANGES IN THE INVESTMENT PATTERNS, POPULATION ETC. SHALL BE CRITICALLY ANALYZED.

Economic concerns in the market are competition, infrastructural challenges, change in demand and supply factors, investment patterns and regulatory regime. Mediation of market power is therefore the major concern in the process of liberalization and might inhibit a total liberalization in certain situations.[121] Besides, issues related to competitive exchange rate, proliferating bilateral and regional trade integration, evading the temptation to cave in the rhetoric on trade protectionism, and embedding deep in the global value chains all assume great significance and require an objective discussion and assessment.[122]

Adequacy of cross-border transmission capacity is essential. However it's not just the physical interconnection at boundaries but the local transmission infrastructure shall robust to handle load fluctuations to ensure frequent and uninterrupted power flow to the consumers across border also. Because electricity flows in loops, national systems must be able to handle a higher load and its fluctuations.

CBET AND EMPLOYMENT

[120]REPORT ON ELECTRICITY EXPORTS (2017)*Available at* http://www.worldstopexports.com/electricity-exports-country/ [Last accessed 19/02/2019 at 10.45 IST]
[121]Karsten Neuhoff, *International Electricity Trade - Economic Considerations* (2013) *Available at* http://oldsite.nautilus.org/DPRKbriefingbook/energy/neuhoff.pdf [Last accessed 13/02/2019 at 10.45 IST]
[122]INDIA'S GROWTH STORY*Available at* http://documents.worldbank.org/curated/en/941201538406933607/pdf/WPS8599.pdf [Last accessed 13/0/2019 at 17.45 IST]

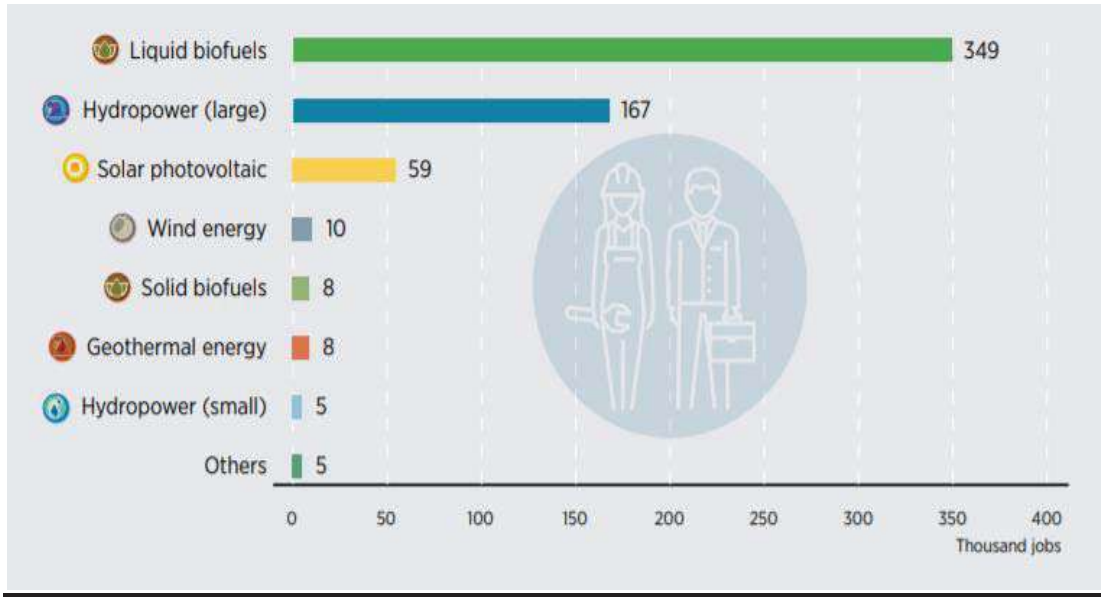


Fig. 19 Number of jobs under various sources of electricity Source: Ministry of Energy, Nepal (2017)

Uninterrupted access to electricity reaps incidental benefits also. For instance, development of power projects results in extended road connections to interior habitats leading to increased market access; it helps in bringing down prices of commodities as well. Many a times, hydropower companies invest in community development by helping build local schools, healthcare and drinking water infrastructure, among others.[123]

A study conducted by UNDP in Baglung and Kavre districts of Nepal indicates that the total benefits attributable to electricity access amount to about US $150 per year for a rural household.[124]With the commissioning of the products the economy at local level gets a boost. With the chain reaction of employment, increased income, lesser wastage of time in arranging for alternatives to electricity, productive labour, standard of living and quality of life improves.

Fig. 19 highlights the proportion of jobs created under different sources of electricity in Nepal and Bhutan. While we shall understand it at micro level under 2.3, this portion highlights the the growth in employment opportunities at regional level.

POLICY FRAMEWORK FOR PROMOTING REGIONAL TRADE

[123] Shrestha & Shyam Sundar, *Study for Development of a Potential Regional Hydropower Plant in South Asia*, ISLAMABAD, PAKISTAN: SAARC ENERGY CENTRE (2016)

[124] Legros, Gwénaëlle et al., *Decentralized Energy Access and the Millennium Development Goals: An analysis of the development benefits of micro-hydropower in rural Nepal* (2011)

Free trade arrangements between countries leads to the establishment of the trust required to promote the development of a regional power pool.[125] Over last 7 years, it has been witnessed how bilateral trade in power between South Asian countries has rendered positive results. However, these results are not that significant. One of the reasons could be lacunas in the policy framework. While it is only lately that Government of India has released Guidelines on Cross border electricity trade, the national electricity framework has played a key role in navigation of CBET between India-Pakistan-Nepal-Bangladesh-Bhutan.

While the growth patterns in the these four countries, India, Nepal, Bhutan and Bangladesh have been analyzed in this study, South Asia aims to increase its Capacity twofold to meet the already demand and peak deficit issues and over it cater to the constantly increasing demand for electricity in the coming years.(Fig. 25)

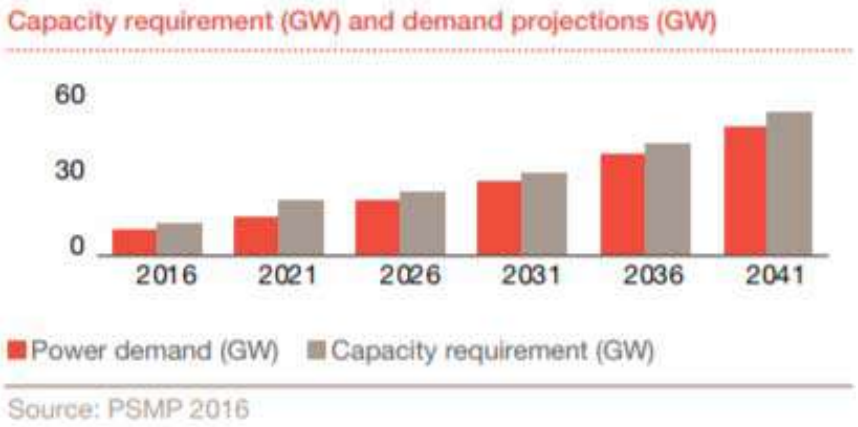


Fig. 20 Capacity and Demand projections

POLICY CHALLENGES

SAARC Regional Cooperation Agreement was signed on 27 September 2014, that gave a boost to the bilateral electricity trade relation between the South Asian countries. India-Nepal-Bhutan-Bangladesh had commenced the electricity exchange by 2015. However, the bilateral trade agreements did not prove to be effective and ambitious enough to correspond to all the local level problems, we have noted certain policy challenges that are faced by the policymakers:

[125]Musiliu O. Oseni & Michael G. Pollitt, *Institutional Arrangements for the Promotion of Regional Integration of Electricity Markets International Experience* (2017) http://documents.worldbank.org/curated/en/707091468183843171/pdf/WPS6947.pdf [Last accessed on 12/02/2019 at 18.18 IST]

- Lack of comprehensive feed-in tariff arrangement
- Lack of incentives for private sector involvement and inconsistent policies.
- Subsidies for electricity generation from Fossil fuel.
- Easy environmental clearances and lack of monitoring
- Low priority given to renewable energy in national planning and weak implementation framework.
- Lack of independent autonomous organization to monitor overall growth
- Lack of data and figures for growth analysis and thereby efficient review of policies at regional level
- Lack of coordination between national legal frameworks of the countries
- Investment financing and security issues

India also released for cross border electricity trade to channelize investment opportunities, encourage competition and fairness in the market, and to map the future goals of clean energy. While dependence on renewable sources increased, Integrated Energy Policy (IEP) was released by MNRE to achieve its 100GW renewable electricity generation targets by 2020.[126]

HIGHLIGHTS OF THE GUIDELINES ISSUED BY CERC ARE AS FOLLOWS:

1. Ministry of Power shall constitute an Authority to monitor the process of approval and to codify procedures for cross border exchange transaction in the electricity trade. The authority shall also coordinate with the different nodal agencies in the neighboring countries to facilitate trade relations along with catering to private interests of the investors.[127]

[126] REPORT OF EXPERT COMMITTEE ON INTEGRATED ENERGY POLICY 2017 http://planningcommission.nic.in/reports/genrep/intengpol.pdf [Last accessed on 23/02/2019 at 16.17 IST]
[127] CERC Guidelines for CBET, 2017

2. For approval to participate in the cross border electricity trade, the entities shall approach the designated authority. However, the guidelines lay down certain conditions and if any entity meets those conditions, One-time Approval shall be sufficient. These conditions are:
    i. The electricity shall be imported from
        A. power generation projects situated outside owned and funded by:
            a. Government of India
            b. Indian PSU
            c. Private companies with 51% or more ownership of Indian entity(s)

        B. Projects with 100% equity by Indian entities and/or Government controlled and owned company(s) of the neighbor countries/ Government of that country

        C. Licensed traders of neighboring countries having more than 51% Indian entity(ies) ownership of any of the sources mentioned in A) and B).

    ii. Export of electricity by PSU's or Distribution companies only if they are able to certify surplus capacity. In case of Thermal power generation plants (coal based), the export of electricity can be allowed only if the designated authority hereunder certifies.

3. Where there are no express import/exports agreements between Governments of two countries for a specific transaction, the tariff for importing electricity from project outside India shall be determined under a short-term/medium term/long term contract obtained after the process of competitive bidding. In case where trade of electricity is agreed between the Governments of two countries, the tariff shall be determined by the G2G negotiations.

4. In cases of export of power from Indian entities to entities / projects outside India shall be through mutual agreements between the entities or through competitive bidding, subject to release of payment of transmission charges.

5. The CERC shall make regulations to facilitate cross border electricity trade between the countries.

6. CERC shall define categories of contracts viz. term ahead contracts, intra-day contracts, contingency contracts under which the entities can undertake CBET through power exchange of India.

FRAMEWORK TOWARD INTEGRATED MULTILATERAL ELECTRICITY TRADE

While only India has come with such guidelines on cross border electricity trade, the other SAARC member states largely rely on the bilateral electricity agreements between the nations or the SAARC regional cooperation agreement.[128] Under this, the member states established a SAARC Council of experts of Regulators. This is basically entrusted to coordinate the role of different regulators of the member states and thereby analyzing the growth and address the problems in the trade arrangements. Since its establishment, the Council has met 3 times. The recent meeting focused on the problem of under utilization of surplus generation.

The above read chapters highlight the importance of regional cooperation in the South Asia, individual energy source potentials of the 4 member states, and thereby the legal framework adopted by those member states.

The significant issue of concern here is that in the process of bilateral exchange between India-Bhutan where India imports the surplus power from Bhutan is either distributed to local consumers or in most cases exported to Bangladesh and Nepal.

While the geographical conditions in the countries do not support an isolated network between two countries, India has an advantage of having such a huge number of neighboring countries. An integrated electricity Grid between the 4 Member states herein discussed would be a significant step towards establishment of one grid for South Asia.

With an example of European Union, the South Asian integrated grid infrastructure shall be developed and monitored at a regional level under one common body. The present framework constitutes framework per transaction whereas a comprehensive and continuous permanent body established by the member states shall foster Integrated Grid for South Asia.

The national regulators are the best source to address the local concerns; however, they may not be as effective to handle multilateral electricity transactions. The regional market consists of wholesale markets and retail electricity markets. The essential features of the market catered at a regional level impact not only economy of the two countries but also affects their social

[128] *Ibid.* at 29

conditions. Therefore, a common entity that makes a common framework within which the member states shall lay down the rules shall make the process of CBET more convenient and cost effective.

GENERAL PRINCIPLES FOR CONSIDERATION

I. RIGHTS OF CONSUMERS

Legal framework must be comprehensive to cater to the rights of the consumers. SAARC Council of Experts of Regulators also recognized certain important concerns and rights to be safeguarded to the consumers:

a. Right to electricity at affordable prices
b. Continuous and uninterrupted power supply
c. Right to choose the supplier/distributor of their choice
d. Transparent billing system, with smart meters
e. Right to be involved in the demand response mechanisms and law must ensure that the consumers must know about the technicalities of the services
f. Right to know about the option of Dynamic prices option according to the Day-ahead market tariff and technicalities therein

II. *RENEWABLE ENERGY SUPPORT*

The grid infrastructure must be facilitated with the coordinated growth of renewable energy sources and non-renewable too. With adequate procedural safeguard of private investment, renewable projects in the neighboring countries n=must be catalyzed by a common legal framework and provide uniform privileges to all the investors. The impact mitigation process must facilitated by a common body that shall also be ensuring that laws are adequately enforced.

Installation of grid capacity with proper infrastructure and minimizing the transmission losses at a regional level, shall help the South Asian region achieve its sustainable development goals with economic growth.

III. R&D

While facts and figures are important for policy making, the regulators at a national level shall encourage and initiate studies and surveys that shall depict the real rural and urban picture. This data however, shall be understood and analyzed at a regional level to codify rules and procedures.

Private investment being significant to growth of this sector, it is essential that necessary mathematical calculations are done by the experts to channelize the laws and policies that catalyzes the growth in a meticulous manner.

The need of a common robust policy framework has been coming up. This is with regard to the growing regional cooperation. The regional trade between these countries has been at peak but towing to the nature of electricity, it is significant to promote sustainable development with a comprehensive and strong infrastructure and grid requirements to reduce not only the cost but also minimize the dependence on far reaching high cost imports.

The ideal example of a regional electricity trade model is European Union. The following chapter brings in a comparative study for the regional cooperation models and analyzes the prospects for South Asian Regional Electricity Trade.

POTENTIAL FOR MULTILATERAL TRADE

South Asian Region, as we have already seen has immense potentials in renewable sources of energy. While post the SAARC regional electricity Cooperation Agreement in 2014, the bilateral trade agreements between the 8 countries in South Asia has extensively increased.

Potential for electricity generation is unquestioned, however, implications of the CBET in its bilateral form as against potential benefits from an integrated electricity grid across South Asia is what we shall discuss in this chapter.

BILATERAL TRADE POTENTIALS IN SOUTH ASIA

INDIA- NEPAL exchange of power aimed at connecting local remote areas of both the countries to intensify the quantum of power exchange volumes. Power needs are primarily handled by NEA (Nepal Electricity Authority) and UPPCL, BSEB and UPCL utilities in India. As of now, there exist 12 cross border bilateral power exchange facilities at different levels between Nepal and India.

With 6 major inter-nation transmission corridors (Fig. 35), India-Nepal bilateral trade functions under the Mahakali Treaty. 70 Million units of electricity is traded annually through Tanakpur Bridge under Mahakali Treaty, however the volume of electricity is less in accordance with its potential. This is however, due to unsynchronized radial mode of operation of grid infrastructure. Joint Study Committee and Joint Working Group has been created under the Agreement between Government of Nepal and India on Inter Nation Transmission interconnection and Grid connectivity, which recommended evacuation plans from various hydropower projects and the power stations in Nepal. For the future consequences and critical analysis of such plans, experts from India and Nepal are brought together under Joint Technical Team established under the Agreement.

Fig.21 depicts the cross border grid connections. The line between Tamakoshi and Muzzafarpur is the longest one and with the highest load capacity between India-Nepal.

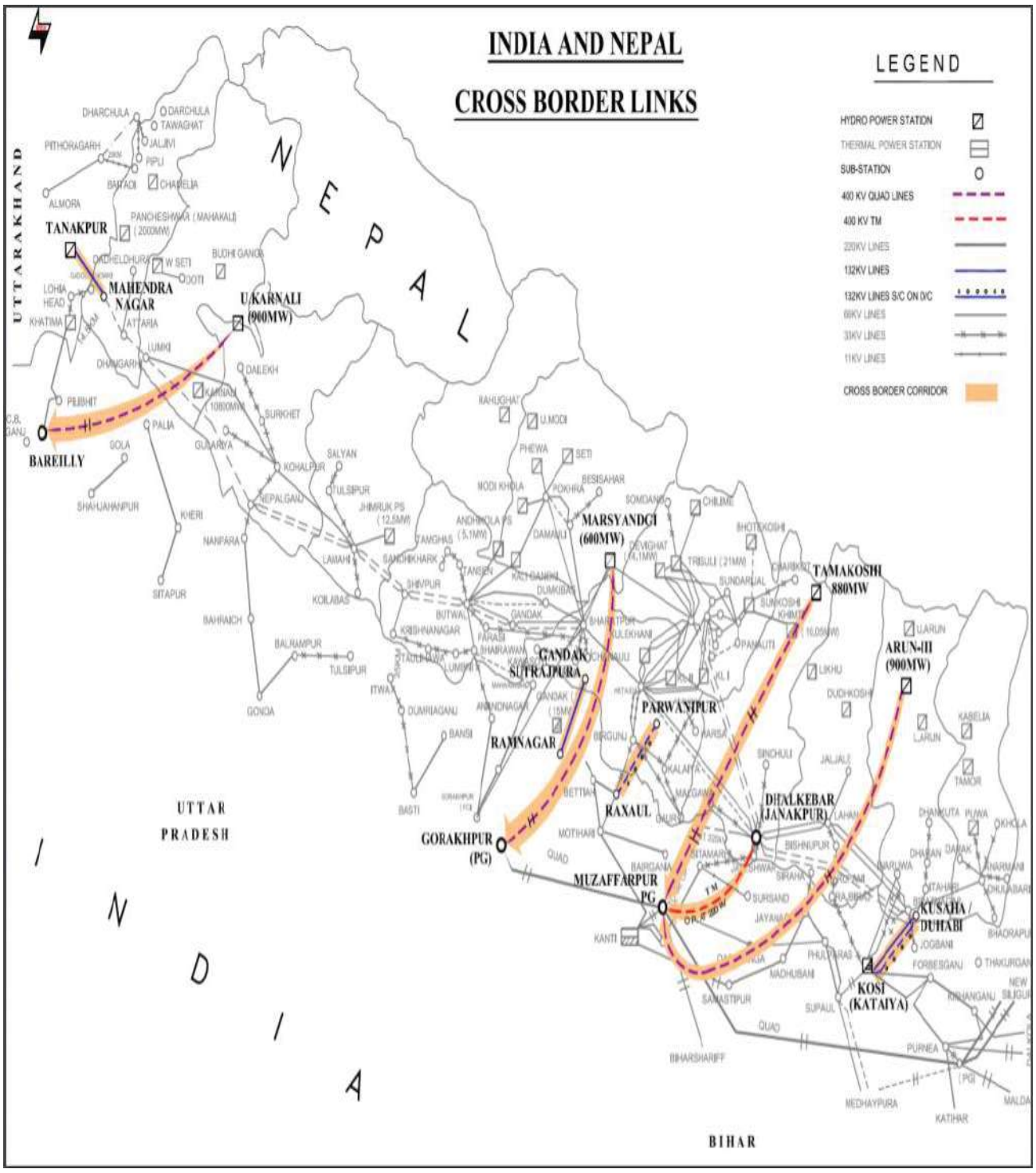


Fig.21 Indo-Nepal Cross Border Links Source: IRADe-SARI 17(2018)

5.1.2 INDIA-BANGLADESH

The cross border bilateral trade relations between India and Bangladesh commenced on 05 October 2013. Indian side of the grid was implemented by POWERGRID whereas Bangladesh side was handled by their Power Grid Company. The Baharampur-Bheramara 400kV DC spread

through 71 km of distance establishment of 400 kV Switching Station at Indian side and 500MW HVDC back-to-back Station and 230kV Switching station on Bangladesh side.(Fig. 22)

With various under construction transmission lines at national level in both the countries, the grid connectivity through three significant grid corridors need to work upon the base load factor efficiencies, in order to ensure stable and continuous supply of power inter countries.

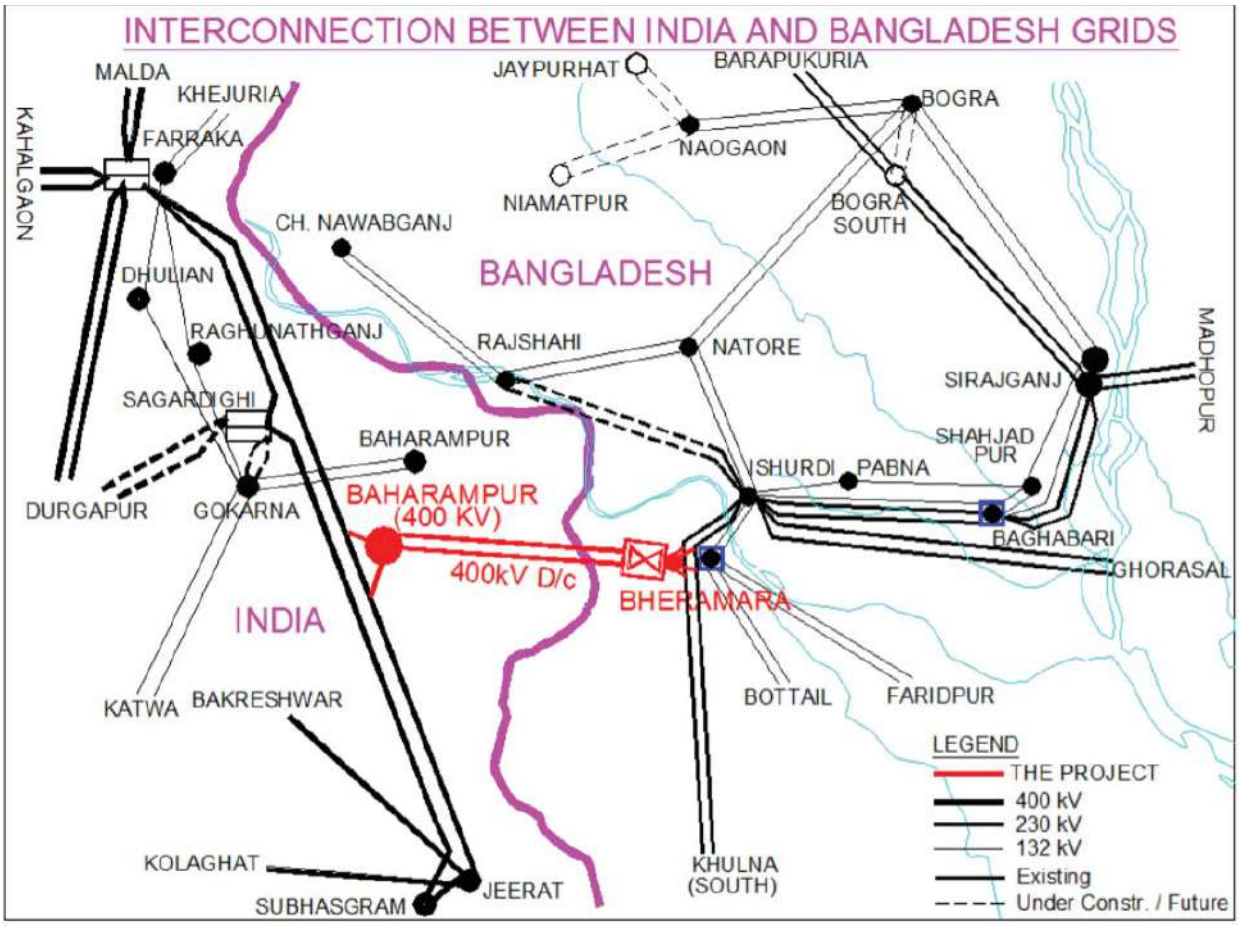


Fig.22 India-Bangladesh Cross Border Transmission lines Source: IRADe-SARI 17(2018)

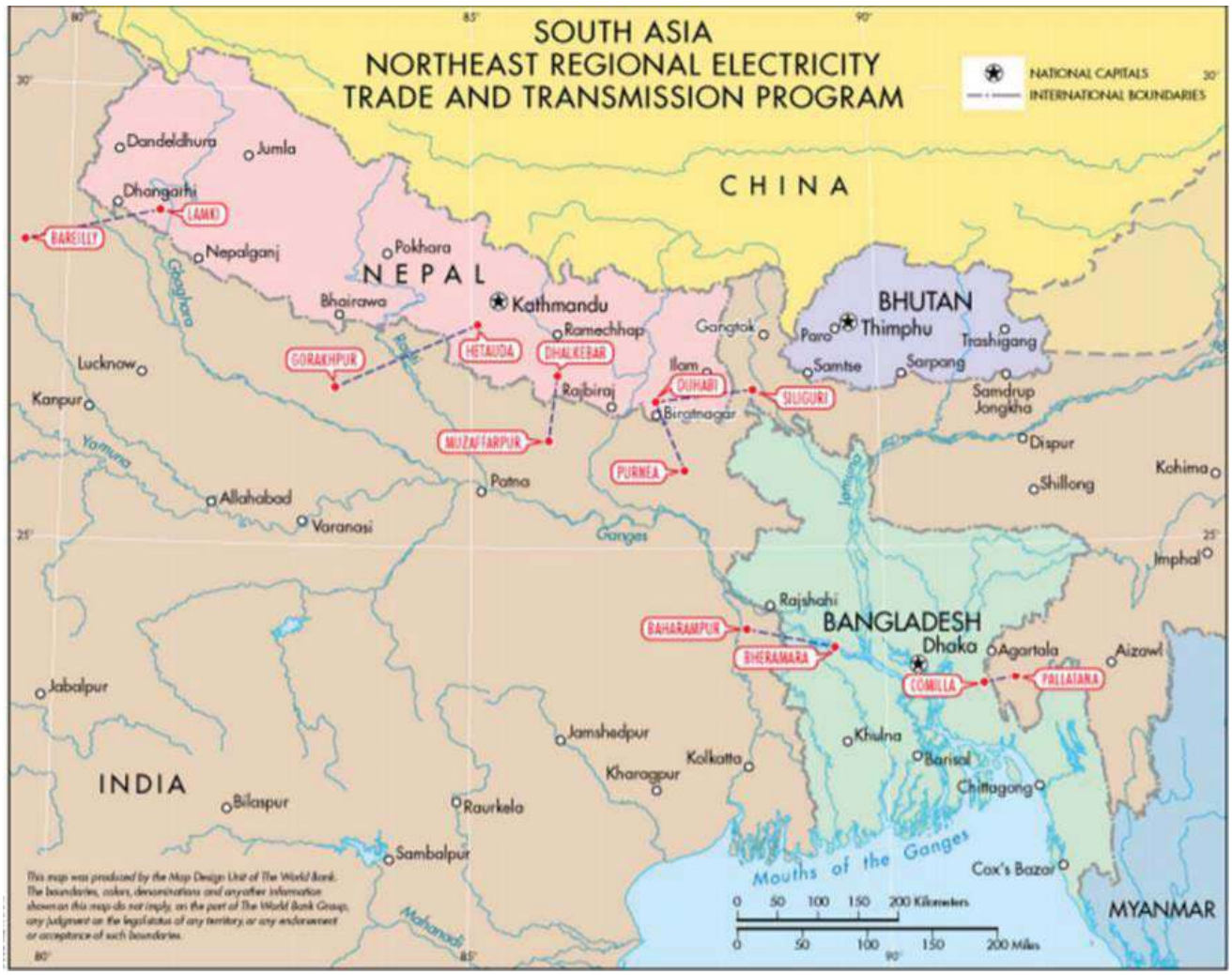


Fig.23 Source: IRADe-SARI 17(2018)

The increasing bilateral trade between the South Asian countries as has been discussed above, the integrated South Asian electricity grid infrastructure can be the future ahead. Integration of grid to ensure regional cooperation is a feasible solution that not only catalyzes the national trade in the countries but also ensure cost optimization.

In chapter 4, we discussed the European Model of cross border electricity trade that created an internal market for grid connectivity. Where all countries under one coordinating body are facilitating the grid infrastructure in their share that fosters their objective of quality electricity supply to all at an affordable rate and stable continuous supply.

Interestingly, the policies related to transformation in grid infrastructure are released as Directives at Central level and are to be ratified and implemented by the member nations.

In contrast, when we analyze the in South Asia, the integration of grid between two countries is an essential step leading towards multilateral regional trade cooperation.[129] While India serves the common link, it is essential to appreciate that when the multilateral trade through an integrated grid infrastructure is implemented, it shall lead to not only sharing resourceful development but also shall help the countries in this region to achieve their sustainable development goals. Harmony in electricity trade shall reap SAARC cost benefit.

Storage is another big issue catered through this. Like under European trade model, capacity reserve mechanisms have been cost linked or otherwise investor linked. However, such alternatives are only possible in case of integrated electricity grid infrastructure. South Asian region in populous scenario, it is necessary to cater to consumption demand and also at the same time ensure optimum utilization of the potential capacity to attract investment and ensure adequate returns on investment.

The above read chapters highlight the importance of regional cooperation in the South Asia, individual energy source potentials of the 4 member states, and thereby the legal framework adopted by those member states.

The significant issue of concern here is that in the process of bilateral exchange between India-Bhutan where India imports the surplus power from Bhutan is either distributed to local consumers or in most cases exported to Bangladesh and Nepal.

While the geographical conditions in the countries do not support an isolated network between two countries, India has an advantage of having such a huge number of neighboring countries. An integrated electricity Grid between the 4 Member states herein discussed would be a significant step towards establishment of one grid for South Asia. (Fig. 23)

With an example of European Union, the South Asian integrated grid infrastructure shall be developed and monitored at a regional level under one common body. The present framework constitutes framework per transaction whereas a comprehensive and continuous permanent body established by the member states shall foster Integrated Grid for South Asia.

The national regulators are the best source to address the local concerns; however, they may not be as effective to handle multilateral electricity transactions. The regional market consists of wholesale markets and retail electricity markets. The essential features of the market catered at a

[129] *Supra* at note no. 10

regional level impact not only economy of the two countries but also affects their social conditions. Therefore, a common entity that makes a common framework within which the member states shall lay down the rules shall make the process of CBET more convenient and cost effective.

CONCLUSION

Borderless trade strikes a new opportunity for achieving the socio-economic objective of ensuring continuous and uninterrupted power supply. Multitude of power sources amplifies the trade prospects in the South Asian region. Primary shift from use of fossil fuels for meeting energy requirements towards renewable and cleaner sources of electricity amplifies the room to maneuver between the patterns of electricity demand and abundance of resources.

Following the western trend, the SAARC nations stepped forward to expand a regional energy cooperation arrangement wherein the resources collectively shall be utilized to not only boost the economies of the South Asian countries but also to serve greater public good. Subsequently, in 2014 the SAARC framework Agreement for Energy (Electricity) Cooperation was signed with a vision to create a cohesive sustainable power for South Asia.

Cross border electricity Trade therefore means that borderless trade seeking integration of a cohesive power grid to ensure greater access to electricity and shared investment arrangements. This piece of research therefore aims to elaborate upon the transnational integration for creating a sustainable South Asian power grid. Multilateral cooperation shall be the next step after successful implementation of the bilateral cooperation between the SAARC nations.

It was widely argued that large infrastructure projects are beneficial to local community, provided the adverse impact on environment and ecology caused by the development works are properly mitigated. The direct benefit comes in forms of employment opportunities for the locals and investment by the projects on education, health facilities, among others. The socio-economic impact study of hydro power projects, Rahughat Hydro Power Plant, Nepal and Tala Hydro Power Plant, Bhutan, has revealed that the access to electricity has predominantly improved the quality of lives of students, housewives (women) and the rural households. Further quality of services of basic health units and other services such transport and communications also improved tremendously.

It is broadly contended that large infrastructural ventures are advantageous to regional network, subject to deliberate and concentrated efforts to achieve sustainable development goals and to

minimize the impact on the regional environment. While robust infrastructure is one significant achievement in the last decade, the proximate advantages come in form of employment to local population, improved health, transportation and communication facilities in the local area. Chapter 2 reads the socio-economic impacts of various projects between India-Bhutan, India-Nepal and India-Bangladesh to uncover the improved standard of living of the locale and thereby enriching economies at both micro and macro levels.

Besides, such ventures contributed gigantically in the advancement of remote places by blending the rustic occupations. The ideal vitality supply and advancement acquired by the hydro control ventures had been conceivable because of adequate stream of speculation and convenient execution of tasks. Thusly, it is suggested that respective exchange, however territorial exchange ought to likewise be advanced.

It was additionally talked about that for a regional collaboration to be fruitful at the provincial dimension, arrangements and speculation activities ought to be in intelligence with the requirements of local individuals. Local people must almost certainly interface themselves with the activities attempted under such undertakings. It may be helpful in advancing CBET if the advantages wind up noticeable at granular dimension.

Moreover, it was examined that while such ventures are valuable, there are likewise a few people who lose in the undertakings. This is for the most part since arrangement creators and undertaking engineers neglected to perceive the asymmetry of expense caused and benefits procured by the nearby individuals. As there would be some neighborhood gatherings, for example, occupants giving power access to the nearby individuals through diesel generator sets would lose their business among others. Along these lines, it was proposed that such activities ought to build up a system to recognize individuals who lose in the undertaking and repay them decently and evenhandedly.

The national regulators are the best source to address the local concerns; however, they may not be as effective to handle multilateral electricity transactions. The regional market consists of wholesale markets and retail electricity markets. The essential features of the market catered at a regional level impact not only economy of the two countries but also affects their social conditions. Therefore, a common entity that makes a common framework within which the member states shall lay down the rules shall make the process of CBET more convenient and cost effective.

Countries like India, were predicted to be dependent upon imports for meeting its electricity demand. However, with recent shift in the electricity trade across the border in the South Asian region along with realization to shift to renewable energy sources has lead this part of the World to believe in self sufficiency and to be trade sufficient.

The increasing bilateral trade between the South Asian countries as has been discussed above, the integrated South Asian electricity grid infrastructure can be the future ahead. Integration of grid to ensure regional cooperation is a feasible solution that not only catalyzes the national trade in the countries but also ensure cost optimization.

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GLOBAL ENERGY RESEARCH: A GUIDE FOR A BEGINNER

by

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ABSTRACT

This paper explores the field of energy and illuminates most of the present and future energy related sectors of the world. And gives a list with brief detail of all technical non technical,law, policy and governance related areas and future energy sectors in which a scholar should research for a better future.

The objective of this paper is to help the scholars who either want to start or already started their career in field of energy and are unaware of this sector .By providing them short notes on various fields within the energy sector where they can work in future

This study advances our understanding of every minute sector of energy where further detailed study can be done by scholars. This study can be used to make further add on in present Curriculum of universities which are offering various courses related to Energy sector

During this research 50 students were interviewed who are presently graduating in energy related course and were asked about various fields in energy sector

It is found that scholars are not aware of every field which is there in energy sector and carrying a myth that energy sector is limited

It is a promissory abstract and it is expected. This paper will make scholars more enthusiastic towards research. By exposing them to various unidentified fields of energy sector.

Index

Introduction

This paper starts with a very simple theme of right to energy. And it is very important that if a person is demanding rights over something he/she should know about what all things are available. This article provides basic brief knowledge about various fields and division in energy sector. This paper is for those who either just started their graduation in the field of energy or want to start their career. This article covers not only the technical division of energy sector but also provides information about governance and law of energy fields

This article starts with statement of research which showcases the need and achievement of research and is followed by objective of this paper which gives a brief idea to reader about what all things are talked about and why those are relevant. Objective also tells the need of this article and how it will be helpful particularly for students

Because theme of this paper is not a specific research problem hence there are no such conclusions or suggestion thus conclusion is a mere theoretical conclusion which provides some more point to the whole paper

This article is divided into 3 categories one provides information about core energy sector and includes renewable and non renewable energy 2nd talks about its law and policy particularly in India and 3rd provides wide information about energy governance

Statement of research

Over the past few years, energy sector across the globe has emerged as a major new field of enquiry in international studies. Every country is somewhere dependant on its energy resources and government of all developing under developing and developed nation are trying to maximize their energy output and are struggling to make energy governance more stable.

To make countries energy sector more progressive various government are in search of competent professional and researchers. This talent hunt is creating tremendous opportunity for scholars who are willing to start their career in energy sector

In developing country like India lack of literature for new comers in energy sector is felt continuously. To fulfill this many professional are trying to provide much needed information to students through seminars and conferences but lack of interest among students minimize the results of efforts done

To illuminates various sectors within energy circle and to make scholars aware about various fields where a huge scope of research is still present no specific literature in simple language is published

All present literature are topic oriented and are approached by only those who take keen interest

This situation is over all reducing the number of research scholars in energy field and a myth among UG students is created stating that these specialized courses make career limited

Objective

Objective of this paper is to provide a basic idea about energy sectors to scholars and to illuminate the sectors which are not in news

This paper is made to provide a list of various fields in energy sector on a single page .and to develop interest among new scholars by giving them idea of future energy revolution themes on which they can work upon

This paper can also be used by academician to enhance teaching in energy schools by discussing the fields provided in this paper and some specialized literature can be added to curriculum to enhance the quality of classroom study

This study is done to highlight future energy sectors and area where students from law background can also work. Ultimate aim of this study is to provide more competent scholars to this field and to make global energy research, production and governance more stable and good

Hypothesis

It is assumed that this research will be able to find maximum possible fields where further research can be done by scholars. It is believed this paper will list down all major fields which are currently present and all future fields of energy which are identified till date

Though this paper will not provide deep detail of any particular sector with energy circle but it will provide list of all sectors or issues where a detailed study is required

It is expected this article will illuminate the world of energy and will create a eagerness among scholars to know more about it

This paper is made to promote right to energy theme by spreading awareness about energy among the youth particularly scholars

Data collection

Energy sector is divided into few classification which are further classified into huge number of fields

Starting with the core fields which constitutes energy sector this paper will talk about their details in discussion

Major classification of on the basis of source in energy sector

1) Energy
2) Electricity
3) Natural gas
4) Nuclear
5) Solar
6) Oil
7) Water
8) Hydrogen
9) Biomass
10) Wind
11) Coal
12) Geothermal

Now further classification of these opens a whole new world of opportunity for researchers
In below notes particular area where research can be done are mentioned

I. **Energy:**
   Alternative energy, fossil fuels, renewable energy, heat, light, power, products Transportation
II. **Electricity:**
   Power plant, cogeneration, combined cycle, steam turbine, gas turbine electrical grid, energy storage, smart grid
III. **Natural gas:**

Conventional gas, unconventional gas, offshore gas, shale gas, gas hydrates, coal bed methane, hydraulic fracturing, natural gas transport, liquefied natural gas, natural gas storage

IV. **Nuclear :** Nuclear fission and nuclear fusion

V. **Solar :**Solar PV, solar thermal

VI. **Oil:** conventional oil, enhanced oil recovery, unconventional oil, heavy oil, oil sands, oil sands mining in SITU upgrading , tight oil. Offshore oil, arctic oil, oil shale, drilling, oil transport, oil storage, refining, transport fuels, refined products

VII. **Water:** hydro power and tidal power

VIII. **Hydrogen:** Electrolysis, Steam methane reforming, fuel cell

IX. **Biomass:** PYROLYSIS, Gasification, waste of energy, BIODIGESTION, BIOCHAR and BIOFUELS

X. **Wind :**

XI. **Coal:** Mining**,** In SITU gasification, coal liquefaction

XII. **Geothermal :**

These all sectors need immense research and every scholar can take some of these and work upon

Note: Now after analyzing contemporary needs and evolution of energy sector it is found that renewable and nuclear energy are the most important fields which require research for growth in future

If we talk about renewable energy we come across some specific area where research is required in present scenario

RENEWABLE ENERGY

- PHOTOVOLTAICS
- BIO ENERGY
- GEO THERMAL
- RENEWABLE FUELS
- SOLAR THERMAL AND WINDS
- EARTH SCIENCES
- ENVIRONMENTAL ENGINEERING
- CARBON ACCOUNTING

Some specified **technical** research topics for renewable energy are

a. Lignocelluloses hydrolysis technology
b. Production of bio oil from bio mass pyrolysis
c. Membrane enhanced reforming technology
d. Wave energy conversion system
e. Dye sensitized solar cell
f. Printing cigs technology
g. Silicon crystalline solar cell
h. Low carbon technology

Non technical research area for renewable energy

a) How to implement solar pv industry policy
b) Wind resource assessment and wind farm planning

Nuclear energy: co2 capture storage and conversion, enhanced oil recovery, radioactive waste

Non technical research areas in energy

1. **Policy and economics:**
    - Economic and development equity
    - Energy markets
    - Finance and subsidies
    - Law
    - Management and innovation
    - National security
    - Public opinion
    - Tax and regulation
    - Global energy governance

2. **Energy storage and grid modernization**:
    - Electric grid
    - Batteries and fuel cells
    - Grid scale storage
    - Superconductors
3. **End use and efficiency**
    - Buildings
    - Energy and behavior
    - Green computing
    - Sensors and data

- Thermoelectric
- Transportation
- Water system

4. **Environmental impacts :**
    - Integrated modeling
    - Air quality
    - Climate
    - Land use and water

Discussion

Broadly every sector can be divided into generalized categories which can be on the basis of

1) Economics and competitiveness
2) New build
3) Security of supply
4) Climate change
5) Safety
6) Innovation research and development
7) Health
8) Waste management and decommissioning

Energy sector is also classified into different fields on the basis of above mentioned points

Topics mentioned in this study are field of research itself and contains more than 500 sub topics on which a proper thesis can be made

Wind kites, micro nukes, ocean thermal energy conversion, bio crop waste, municipal solid waste are also some example which comes under the ambit of energy sector
The ambit of energy sector can be imagined by this paper where law is only sub topic mentioned in this paper and there are number of literature published only on electricity laws

Conclusion

Hence global energy research is theme which will pave a way to bring energy in ambit of fundamental rights of people, by making energy production a fundamental duty of citizens and innovations will lead to a world where every person will produce energy for his/her own consumption.

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ENERGY REVOLUTION OF INDIA

SOLAR ENERGY AND ITS FUTURE PROSPECT

by

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ABSTRACT

The Sun is an inexhaustible source of energy and it is responsible for all the basic processes of life on Earth like photosynthesis and evaporation. Solar energy is the energy received from the sun and it is the main source of energy on Earth. With the evolution of humankind man has learnt to use solar energy for various purposes. Solar energy as a renewable source of energy has substantial potential as it can be harnessed by employing the use of different devices. It has been observed that there is tremendous pressure on the non-renewable sources of energy like fossil fuel, coal, petroleum and natural gas, the stock of which is finite. It has thus become imperative to switch to other sources, primarily, the renewable sources of energy for domestic as well as industrial purposes.

Most of the developed countries of the world are trying to substitute solar energy for other non-renewable sources of energy. India as a tropical country has a great potential for harnessing and utilizing solar power as it receives about 300 days of sunshine in a year. This will reap benefits for the country in terms of power generation and also in reducing the pollution levels as solar energy is a clean and eco-friendly source of energy and does not release any harmful pollutants.

INTRODUCTION

The world is entirely dependent on different forms of energy for the smooth functioning of various processes that sustain life on this planet. Energy is derived from different sources and depending on these sources it is classified as renewable or non-renewable in nature. Most of today's energy consumption is in the form of non-renewable energy which comes from sources like coal, petroleum, natural gas and so on. Non-renewable energy tends to diminish over time and it is not easily replenishable or, in other words, it is finite. On the other hand, Renewable energy as defined by the U.S. Environmental Protection Agency is, "the energy that includes resources that rely on fuel sources that restore themselves over short periods of time and do not diminish."[130]

Solar Energy is a renewable source of energy that comes directly from the Sun during daytime in most places. It does not diminish and can be used by harnessing through various devices. The world is going to face an acute energy crisis in the coming decades as the non-renewable sources of energy on which most of the world is dependent are running out. It is, therefore, important to immediately start shifting to alternate energy sources before it is too late. In this aspect the most promising sources that are available at our disposal are the renewable sources of energy which include Solar energy, wind energy, tidal energy, hydro energy and geothermal energy.

Solar power is a clean source of energy as it does not produce any emissions; is not harmful to the environment and will help in achieving the goal of sustainable development. The different types of solar energy are:

- Passive Solar Energy
- Active Solar Energy
- Photovoltaic Solar Power
- Solar Thermal Energy
- Concentrated Solar Power

There are numerous uses of Solar energy both for domestic as well as industrial or commercial purposes. It is used for heating, lighting, transportation and in gadgets. The energy can be used directly to heat, and light homes or it can be converted into electricity using solar energy technologies like solar panels. People are increasingly investing in solar energy to save on out-of-pocket costs and get rid of dangerous and expensive power lines. Two of the key reasons

[130] U.S. E.P.A.

many invest in harnessing the sun is to get energy for heating water in homes and to generate electricity.

ADVANTAGES OF SOLAR ENERGY[131]:

- *RENEWABLE SOURCE*: The main advantage of employing the use of solar energy is that it is a renewable resource and can be used again and again during the daytime. It can harnessed by using solar panels and it can reduce our dependence on other exhaustible resources like coal.
- *ECO-FRIENDLY*: Solar energy is undoubtedly an eco-friendly and pollution-free source of energy. It does not pollute the air by releasing harmful gases like carbon dioxide, sulphur oxide and nitrogen oxide. In fact, it can be used to reduce the carbon footprint of the countries. Solar energy also does not require any fuel to produce electricity and thus avoids the problem of transportation of fuel or storage of radioactive waste.
- *REDUCTION IN ELECTRICITY BILLS:* Installation of solar panels can greatly help in reducing and cutting back on huge electricity bills.
- *EASY INSTALLATION AND LITTLE MAINTENANCE*: Although the initial cost of installation and setting up of solar panels may be high, but in the long run it requires minimal maintenance and reaps great benefits to the user. Solar panels are easy to install and does not require any wires, cords or power sources. Unlike wind and geothermal power stations which require them to be tied with drilling machines, solar panels do not require them and can be installed on the rooftops which means no new space is needed and each home or business user can generate their own electricity. Moreover, they can be installed in distributed fashion which means no large scale installations are needed. With the advancement in the technology and increase in the production, the cost of solar panels has come down slightly.
- *CAN BE USED IN REMOTE LOCATIONS:* Solar energy can be of great boon in areas which have no access to power cables. It works great in remote locations where running power lines would be difficult or costly. Solar panels can set up to produce solar energy there as long as it receives the sunlight.
- *COMES WITH MONEY BACK GUARANTEE:* A consumer of solar energy is likely to get a money back guarantee by installing solar panels besides saving on utility bills. Governments, these days, are encouraging the use of solar energy by giving tax credits to

[131] https://www.conserve-energy-future.com/Advantages_SolarEnergy.php (last visited on 6th April,2019)

homeowners. Added to that, if a solar panel generates more than enough energy utility companies allow the consumers to sell them back the energy.

DISADVANTAGES OF SOLAR ENERGY[132]:

- *IT IS NOT COMPLETELY RELIABLE:* Solar energy can only be extracted during the daytime, i.e., when the sun shines. This acts as a hindrance to the generation of power. Most people have now invested in battery backup systems, which store up power to be used when the sun is not shining. However, investing in backup systems can ramp up the overall cost of installing a solar panel. It mostly ends up not adding value to the solar energy technology. Most people have now invested in battery backup systems, which store up power to be used when the sun is not shining. However, investing in backup systems can ramp up the overall cost of installing a solar panel. It mostly ends up not adding value to the solar energy technology. Apart from that, storms or hurricanes also reduce your ability to draw power during those days.
- *HIGH INITIAL CAPITAL COSTS:* Although in the long run solar energy accrues benefits to its user in terms of money, the initial costs of installation are very high which can discourage many potent consumers.
- *MATERIALS USED TO MAKE SOLAR PANELS CAN CAUSE POLLUTION:* It has been observed that the recycling process of solar panels is a very difficult and time-taking process. Although solar panels have a long lifespan of about 50 years, their careless disposal can have adverse effects on the environment.
- *INSTALLATION AREA:* For domestic purposes a solar panel does not require a large area of installation as it can be installed on rooftops which helps in producing sufficient amount of energy but for industrial purposes, it requires a huge area for installation and functioning in order to become efficient to provide electricity on a regular basis.

SOLAR ENERGY IN INDIA

The Indian renewable energy sector is the fourth most attractive renewable energy market in the world as per the Renewable Energy Attractiveness Index 2018. Installed renewable power generation capacity has increased at a fast pace over the past few years, posting a CAGR of 19.78 per cent between FY14–18. Power generation from renewable energy sources in India

[132] https://www.conserve-energy-future.com/Disadvantages_SolarEnergy.php (last visited on 6th April,2019)

reached 101.84 billion units in FY18 and 97.92 billion units between April 2018-January 2019. As of October 2018, India ranked 5th in installed renewable energy capacity. India ranked second among the emerging economies to lead to transition to clean energy in 2018[133].

On an average India receives about 300 days of sunshine in a year. This makes it a perfect candidate to harness the solar power available. The National Action Plan on Climate Change (NAPCC) also points out: "India is a tropical country, where sunshine is available for longer hours per day and in great intensity. Solar energy, therefore, has great potential as future energy source. It also has the advantage of permitting the decentralized distribution of energy, thereby empowering people at the grassroots level"[134].

GROWTH OF SOLAR ENERGY IN INDIAN CONTEXT:

India has the third largest capacity of concentrated solar power. The Government of India has formulated an action plan to achieve 100 GW of solar power by March 2022. Solar installation in India is expected to increase 360 per cent by 2020. Three new solar parks were approved in 2017-18 with a total capacity of 1,523 MW. Rapidly falling costs have made Solar PV the largest market for new investment. Further, the scaling up of the target of National Solar Mission to 100 GW from 20 GW of grid connected solar power by 2022, has created a positive environment for investors keen to tap into India's renewable energy potential. In November 2017, Government of India signed a US$ 100 million agreement with the World Bank for 'Shared Infrastructure for Solar Parks Project'. Government of India is also planning 'Rent a Roof' policy to push adoption of solar energy while giving the households a chance to become energy independent. Under Union Budget 2018-19, zero import duty on components used in making solar panel was announced to give a boost to domestic solar panel manufacturers.

Under the National Solar Mission, the Government of India has undertaken the following initiatives:

- Targeted deployment of 100 GW of solar power by 2022.
- Zero import duty on capital equipment, raw materials.
- Low interest rates and Priority Sector Lending.
- Single window mechanism for all related permissions.
- Tax exemption and capital subsidies have been made available.

[133] https://www.ibef.org/industry/renewable-energy-presentation (last visited on 6th April,2019)
[134] http://www.irdindia.in/journal_ijeecs/pdf/vol3_iss5/7.pdf (last visited on 6th April,2019)

- To meet the rising demand of trained manpower, a target of achieving 50,000 "Surya Mitras" of skilled manpower in solar energy sector by 2019-20 has been set.

INTERNATIONAL SOLAR ALLIANCE:

The International Solar Alliance (ISA), an Indian initiative, was launched jointly by Shri Narendra Modi, Hon'ble Prime Minister of India and H.E. François Hollande, Hon'ble President of France on 30 November 2015 in Paris, France on the side-lines of the 21st Conference of Parties (CoP 21) to the United Nations Framework Convention on Climate Change. The Alliance, recognising that solar energy provides potential member solar resource rich countries lying fully or partially between the Tropics of Cancer and Capricorn, with an unprecedented opportunity to bring prosperity, energy security and sustainable development to their peoples, opened ISA Framework Agreement for signature on 15 November 2016 in Marrakech, Morocco, on the side-lines of COP-22.

In conformity with the ISA Framework Agreement, 30 days after ratification by the 15th country, on 6 December 2017, ISA became the first full-fledged treaty based international intergovernmental organization headquartered in India. Through this initiative, the countries, inter alia, share the collective ambition:

(i) to address obstacles that stand in the way of rapid and massive scale-up of solar energy; (ii) to undertake innovative and concerted efforts for reducing the cost of finance and cost of technology for immediate deployment of competitive solar generation, mobilise more than 1000 Billion US Dollars of investments by 2030. The Government of India has committed Rs.175 crore for setting up of ISA and till date released a sum of Rs 140 crore for creating a corpus fund, building infrastructure and meeting day to day recurring expenditure.

CONCLUSION

Solar energy has uplifted the Indian society to an immense socio economic growth opportunity but the solar requires supportive policies for its continuous growth. By this research, we saw that solar energy holds value and importance for the countries especially like India were it is present in abundance and it can curb the need of want for renewable resources. India's venture in form of International Solar Alliance seems to be an ambitious approach in the direction of utilizing it to its fullest capacity.

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INTRODUCTION AND DETAILS

SUB THEME - KYOTO PROTOCOL AND CARBON CREDITS: ANALYS AND WAY FORWARD

TITLE OF PAPER

KYOTO PROTOCOL: PLATFORM FOR SOLUTION OR CONTENTION

by

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ABSTRACT

In today's world , you just have to name the thing and it has to have a force of energy behind it for its proper functioning. Energy has become imperative in today's society and its unavailability to meet the demands of the growing population is one of the most important reason behind the clash of interests among people in the emerging competitive world Energy is mainly the driving force or strength which is **required to make the system work for the completion of work**. In present days , for the fulfilment of the growing needs and desires of the mankind there is a need of energy in great amount. Energy is not only seen as important for the development but also for the production of those sources which has become very essential for the survival ,like electricity , heat etc . There are mainly two kind of sources of energies , Renewable sources like solar energy , wind energy , tidal energy which are available in abundance in nature and Non-Renewable sources like coal, petroleum, uranium, nuclear energy which are fighting with the world for their continuous existence . **Non – compassionate and Non- competence use of non-renewable energy** and the failure of the conventions and the stipulated assumptions made by the countries in these conventions is the major area of contention.

Kyoto protocol which is considered as one of the most important conventions on environment protection which has tried to deal with the energy crisis and has tried to control the degrading position of environment in present world. In order to understand the progressiveness of the protocol ,its important to understand the reason why this convention was called .The reason behind the current depleting environment is the human's action and the negligible attitude of the human towards environment and continuation of same for whole of 21st century was also one of the main concern .The alarming situation in world is directing us to take major steps as soon

possible and directing us to implement more strict protocols and bringing changes in the existing protocols.

INTRODUCTION : HISTORICAL BACKGROUND

Environmental concerns were raised for the first time at international level during the UN Conference on the Environment and Development in 1992 in Rio De Janeiro. Kyoto Protocol is the outcome of United Nation Framework Convention on Climate Change (UNFCCC). The main objective of UNFCCC is to "*stabilize green house concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."**[1] UNFCCC is an international environmental treaty adopted on ***9th May 1992*** and it was presented in the ***Earth Summit*** in front of other countries from ***3rd to 14th June*** . It came into force on ***21st March 1994*** when prominent number of countries ratified to it. Major issues were raised during this conference concerning environment at large scale .Between the period of the first conference of UNFCCC and the signing of Kyoto Protocol , two conferences were organised which led to the implementation of Kyoto protocol. First meeting was organised in Berlin in 1995, in which ***Berlin Mandate*** was accepted , were specific target and timeframe within which these targets have to be achieved were highlighted and the second conference was organised in ***Geneva Switzerland***, in which filtration of the major concerns were done and broad area of contention were targeted and was decided that the steps were needed to be taken as soon as possible and the commitments have to be made legally binding on the countries ratifying it. In 1999 , finally the third conference of UNFCCC took place where parties to the treaty, met at Kyoto (Japan) and decided to implement protocol at international level to control environment degradation. Kyoto Protocol was expounded as a result of the continuous ***environmental activism*** in the 20th century. The main reason behind these activism were the depleting condition of environment mainly due to the developmental strategies adopted by the developed nations in west , which was having major negative effect on the health of the biotic as well as a-biotic components of nature. These countries agreed to the fact that the activities carried on in the name of development by the human is the main reason behind deteriorating environment and natural surrounding. In total many countries including developed as well as developing countries agreed to the directions laid down in the protoc[135]ol. During the time of formation of protocol, 37 industrialised countries and some European countries ratified to the protocol and gave their assent towards the adherence of the directions laid down in the protocol.

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135 "Question 1". In Watson, R.T.; the Core Writing Team. *Climate Change 2001: Synthesis Report. A Contribution of Working Groups I, II, and III to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)*. Cambridge University Press.
2.. Report Of The Conference Of The Parties On Its Third Session, Held At Kyoto From 1 To 11 December 1997 https://unfccc.int/resource/docs/cop3/07a01.pdf#page=28

Insight into Kyoto Protocol

Kyoto Protocol is a comprehensive International legal binding agreement which can be seen as a collective efforts by the countries ratifying to the protocol to improve the living conditions of lifestyle. Kyoto conference was organized in Kyoto (Japan) on 11th December . The environmental activists and researchers after the scientific consensus reached to the fact that the earth's temperature is increasing day by day and the reason behind the growing temperature is the proliferating amount of greenhouse gas in the environment .The protocol laid down the objectives to combat the amount of green house gas in environment . Kyoto Protocol has laid down six Greenhouse gases, whose quantities need to be lowered down and these are Carbon Dioxide, Methane, Nitrous Oxide, Hydro fluoro carbons, Perfluoro carbons, Sulphur Huxafluoride .*[2] Main sources of carbon dioxide (CO^2) are the effluents from heavy industries like cement industry, deforestation and from the burning of fossil fuels like coal, petrol, natural gases . Landfills , Live stocks and Fossil fuels are some of the sources of methane . We can see that the sources of these harmful activities are mainly concerned with the human activities and use of these sources are made to make the human life much easier and for the various development purpose and same can be said about the other sources of green house gases. These gases traps the harmful rays of sun and increase the earth's temperature .The main motive behind the Kyoto Protocol was to reduce the emission of these harmful greenhouse gases for which various restrictions on the conduct of the developed countries were applied. But this also led to contention between the perspective of developed and developing countries and also revealed the different meaning of ***development*** for different countries.

The Kyoto Protocol was based on the principle of ***Common but differentiated responsibility*** , it respects and recognise the fact that different countries have distinct ability and capacity and ways to deal with the degrading environmental issues. This principle was made more visible when the ***limit of 5.2 %*** on the emission of carbon in respect of standard of 1990_s was enforced on some countries and not on the others. Carbon emission was one of the most important concern of this protocol so as to achieve the vision of the protocol . Carbon Credits is the 'generic term to assign the value to a reduction or offset of greenhouse gas emissions .A carbon credit is generally equivalent to one tonne equivalent .' Carbon Credits were given to various countries according to their carbon emission and the number of credits determined how much carbon can be emitted by these countries.

It's very important to know whether the protocol could make any change , which it intended to make or not?. Everyone has different views on this .Kyoto protocol was divided into three

commitment period. Many people and organisations thought that the '***modesty'*** of the first commitment period did not give kick start to the protocol . ***World bank*** pointed out to the fact that the protocol has helped only slightly in dealing with the carbon emission and the protocol was negotiated in 1997 but in 2006 the level of carbon dioxide raised by 24% in 2007.

Kyoto Protocol tried it's best to bring changes in all the ways and the difference in the level of carbon emission was also visible but many major defects can be seen in the formulation and implementation of the Kyoto Protocol. According to the author, the major defect is with the loose implementation and application of the guidelines laid down in the rule book of the administration and functioning of the protocol. Unlike the Paris agreement , Kyoto protocol was not enforced on all the countries and due to this, many countries which are the primary producer of the green house gas took the defence of the developing nations and ran away form the responsibilities. The other limitation to the protocol according to the author is the power to transfer the carbon credit between the countries due to which the changes in the carbon emission cannot be seen .

The other set back to this protocol was the non participation of USA in this protocol, one of the reason why USA backed out was because it wanted the active participation of all the countries not only the developed one and some other subsequent reasons as well .Kyoto could not become successful because of other reasons as well, including the punishments for those who did not follow the guidelines were not draconian in comparison to that of the punishments granted under the Montreal Protocol.

INDIA'S ENVIRONMENTAL STAND ON KYOTO PROTOCOL

Many countries signed Kyoto Protocol in it's first commitment (2005-2012) but some other countries like India and China were exempted from ratifying ,if they didn't want to. This relief was given to these country's because of the view that the main reason behind the deteriorating and alarming rate of environment is due to the emissions from already ***developed countries*** , thus on this ground the developing countries like India were exempted from the responsibility of signing the protocol. It was also seen that the restrictions on these countries to control the carbon emission will divert their mind from the other development goals which are necessary for their country. During the signing of the protocol India and China were the most prominent advocate of ' common but differentiated responsibility' and fought whenever the developed countries tried to impose the restrictions under the protocol on India as well.

India's environment condition is deteriorating day by day and it's performance in terms of Air quality is also declining due to pollution of India. ***India stands 3rd in terms of most polluted air***

quality index. India ratified to the Protocol in the second commitment which is the ***Doha agreement*** (2013-2020) of Kyoto protocol. By ratifying this protocol India did not only wanted to contribute towards betterment of environment but also wanted to bring new technology from west to bring improvements to deal with various environmental problems.

Under this , there are some policies which has been adopted by India to control emission of the green house gases like India has decided to increase electricity supply in backward areas. India gas set up a target to increase its energy efficiency by 20% by 2016-2017. India has also planned to lay emphasis on use of renewable source of energy. By the plans undertaken by India, it can be seen that the country is trying to develop a balance between environmental development and economic prosperity which is the basis of Sustainable development .India has ratified to the protocol and has established Clean Development Mechanism (CDM) and believes that CDM will attract investment in India as well. Despite of it's prior disapproval to the Kyoto protocol India realized it's responsibility towards environment and ratified to it in the second commitment . India's Environmental concern can be seen from its current participation in other international environmental conventions and treaties as well which can be seen as a good sign in the development of any country.

SUGGESTIONS

Not only the international committee, the citizens of the nation ,also need to understand that the individual contribution is needed to curb the ongoing situation in world .There is a need to shift to other sources of energy which should be concerned about the emission of greenhouse gases. The main reason behind the growing vulnerable environment is the emissions from burning fossil fuels , which includes coal , petrol, gasoline etc ,these fossil fuels are no doubt of various use but their unavailability and ability to cause harm to environment poses a greater problem. It is the time to think and try to focus on the renewable sources of energy and to discover their potential in terms of helping the people in place of renewable energy .

It's time to realize that without stringent measures the countries will not abide to the protocol and will not be competent to participate in reducing the amount seriously. Due to the loose administrative measures the countries should not run away from the responsibility thus it's time to apply strict measures on both developed and developing nations . The countries not abiding to the protocol should be given warnings from time to time and they should be forced to send reports during intervals and if they are not following the guidelines then they should be asked to follow the Polluter Pay Principle. The 'polluters pays' principle is the commonly accepted practice that those who produce pollution should bear the costs of managing it to prevent damage

to human health or the environment*. There are other measures as well which needs to be discovered in order to strengthen the Kyoto Protocol and curbing and protecting the environment.

It has recommended in Asia Pacific Economic Corporation that this is the time when the countries should not think about cutting the emission but should think about the **'aspirational goals'*** [3]

CONCLUSION

The main motive of this research work was to make people understand that the current situation in the world cannot be made better without the participation of the ***world community***. There are problems with the principles and procedures of the protocol and conventions but the motive is only for the good cause , 'which is to create healthy environment for all .' Development is the term in trend nowadays but It's also important to understand that , just for the namesake of development of people we cannot put their life in threat and instead of thinking about the individuality its important to think collectively in general. According to author Kyoto Protocol was an important measure to make the world realize that the damage done by all cannot be curbed individually but collectively. On International level, contentions were visible between the countries like the one which can be seen from the ***Transboundary Air Pollution Case***, which was a result of environment issues and this is one of the case which also leads us to think that the matters related to the environment, should be dealt in harmonious way as this topic is very sensitive.

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[3] Bryan Walsch, "Can the world improve on Kyoto?", *Time, September 05 2007*

"INNOVATION IN TRANSMISSION: A STORY OF POWER GRID"

by

Lalit Ambastha

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Introduction

Dawn of electricity began when AC electric power was first transmitted from Niagara Falls through 11 KV three-phase transmission line, over twenty-six miles, to Buffalo, USA in 1893.This brought about the economic prosperity in human civilization. To strengthen the same, an interconnected "Power Grid" structure was thus created and soon became a global standard for transmission of power and electricity. Till date, this transmission of prosperity has passed many miles stone from Atomic Age to Space Age to Information Age to Dotcom Age. Now, we have entered the Energy Age where our biggest challenge is to minimize the amount of energy consumed per unit of function performed by every piece of equipment or appliance we use, and to find out the best way of generation, storage and transmission of electricity. In this line our "Power Grid" is now turned into a "Smart Grid".

Power Grid Industry Overview

India is the third largest producer and fourth largest consumer of electricity in the world, with the installed power capacity reaching 343.79 GW as of April 2018. The country also has the fifth largest installed capacity in the world. The Government of India's focus on attaining 'Power for all' has accelerated capacity addition in the country. The Government of India has released its roadmap to achieve 175 GW capacities in renewable energy by 2022, which includes 100 GW of solar power and 60 GW of wind power. The Union Government of India is preparing a 'rent a roof' policy for supporting its target of generating 40 Gigawatt (GW) of power through solar rooftop projects by 2022.

The government targets capacity addition of around 100 GW under the 13th Five-Year Plan (2017–22). 100 per cent foreign direct investment (FDI) is allowed under the automatic route in the power segment and renewable energy. Total FDI inflows in the power sector reached US$ 12.97 billion during April 2000 to December 2017, accounting for 3.52 per cent of total FDI inflows in India. Investment for 7 new transmission systems that includes strengthening of national grid has been sanctioned. India's power sector is forecasted to attract investments worth

Rs 1,155,652 crore (US$ 179.31 billion) between 2017-2022 in thermal, hydro, nuclear, and renewable segment. India will become the world's first country to use LEDs for all lighting needs by 2019, thereby saving Rs 40,000 crore (US$ 6.23 billion) on an annual basis. With electricity production of 1,201.543 BU in India in FY18, the country witnessed growth of around 55.72 per cent over the previous fiscal year. Over FY10–FY18, electricity production in India grew at a CAGR of 5.69 per cent. In March 2017, the Power Ministry has launched an application named - GARV-II, to provide real time data related to rural electrification regarding all un-electrified villages in India. A total of 17,164 villages out of 18,452 un-electrified villages in India have been electrified up to March 2018 as part of the target to electrify all villages by May 1, 2018.

Facts about Power Grid Industry

- With a production of 1,423 Tera-Watthour, India is the third largest producer and the third largest consumer of electricity in the world.
- India has large reserves of coal. By the end of April 2018, total installed coal capacity in India stood at 196,957.50 MW.
- India's proven natural gas capacity measures about 24,897.46 MW as on April 2018.
- As of April 2018, India has 45.29 GW of hydro power generating capacity
- There are plans to set up four solar power plants of 1GW each. As of April 2018, India has 69.02 GW of renewable energy capacity
- As of April 2018, India has 67.80 GW of net electricity generation capacity using nuclear fuels (across 20 reactors) and aims to increase it to 45 GW by 2020
- Initiatives taken by the Energy Efficiency Services (EESL) have resulted in energy savings of 37 billion kWh and reduction in greenhouse gas (GHG) emissions by 30 million tones.

Major Players

The Indian power sector is largely dominated by local players, especially relating to the matters of transmission and generation. However, the Indian companies are lagging when it comes to global competition and need -to revolutionize their efforts in the sectors of research and development, to reach the benchmark in global energy market.

Major Players in India

1. **National Thermal Power Corporation**: It is the sixth largest thermal power producer in the world with installed capacity of more than 50Gigawatt in 2018 It comprises of 51

NTPC Stations (21 Coal based stations, 7 combined cycle gas/liquid fuel based stations, 2 Hydro based station, 1 Wind based Station), 9 Joint Venture stations (8 coal based and one gas based) and 12 renewable energy projects.

2. **Tata Power**: India's largest integrated power company in solar, hydro, wind and geothermal energy. The company accounts for 52 per cent of total generation capacity in the private sector. The company has an installed capacity of 10,757 MW in 2018.
3. **Reliance Power:** It has been established to develop, construct and operate power projects both in India as well as internationally.It has the generation capacity of 6 Gigawatt in 2018.
4. **Calcutta Electric Supply Corporation:** An integrated player engaged in coal mining and generation and distribution of power. It owns and operates 3 thermal power plants generating 1225 MW of power.
5. **National Hydro Power Corporation:** Largest power hydro utility in India. In 2018 it executes 25 projects. Its objective is to plan, promote and organize an integrated and efficient development of hydroelectric power in all aspects.
6. **Power Finance Corporation:** A dominant player with around 20% market share. A non-banking financial company engaged in banking activities within power sector. Major products and services include project term loans, lease financing, direct discounting of bills, short-term loans and consultancy services. It is designated as a "Nodal Agency" for development of Integrated Power Development Scheme (IPDS), Ultra Mega Power Projects (UMPPs) and "Bid Process Coordinator" for Independent Transmission Projects (ITPs).
7. **Adani Power:** India's largest private thermal power producer, with a capacity of 10 Gigawatt in 2018.It is the world's largest single location thermal plant in Gujarat. The transmission team of Adani Power was set up to help support the state and central utilities in evacuating power to benefit the end user. The team ended up creating over 5000 circuit Kilometers of transmission system and went on to become a publicly listed business shortly afterwards.
8. **Power Grid Corporation of India:** It is the single largest transmission utility of India. It is responsible for planning and control over inter-state transmission system.
9. **Damodar Valley Corporation:** It is engaged in power transmission, generation and distribution of electric power.
10. **Satluj Jal Vidyut Nigam Limited:** It is the second largest hydro company in India. In April 2018, SJVN signed a MoU with the Ministry of Power to achieve 9,200 million units generation during 2018-19.In 2018-19, SJVN will have Capital Expenditure

(CAPEX) target of Rs 900 crore (US$ 139.64 million) and turnover target of Rs 2,175 crore (US$ 337.47 million).

Major Global Players

1. **Duke Energy Corporation:** The largest electric power holding companies in the U.S. Headquartered in Charlotte. Electricity generation comes from coal, natural gas and oil. As of mid-2018, it has 28,798 employees, $23.9 billion in operating revenue, approximately $52 billion market capitalization and $133 billion in total assets. Duke Energy operates 32,200 miles of total transmission lines, 268,700 miles of total distribution lines and 32,900 miles of total gas transmission and distribution pipelines.
2. **Engie:** A multi-national utility company headquartered in France. It has operations in electricity generation and distribution, natural gas and renewable energy. The company has 154,950 employees and €65 billion in revenues. The firm's market capitalization was €31.52 billion as of June2018.
3. **National Grid:** National Grid is a multinational electricity and gas utility company with principal activities in the U.K. and Northeastern U.S. The company owns and maintains the high-voltage electricity transmission. National Grid has approximately 25,000 employees, $20 billion in revenue and a $37.99 billion market capitalization.
4. **Next Era:** An investment company with interests in power generation, transmission and distribution in the U.S. and Canada. In 2018, Next Era operates with a 45,900 MW generating capacity, has 14,700 employees and $16.6 billion in revenue.
5. **Electricite De France:** It provides power generation, transmission, distribution, and energy supply and trading. Group companies operate in many countries around the world and employ approximately 155,000 people.. EDF owns and operates three of the world's top 10 nuclear power plants by capacity and is the largest producer of low-carbon electricity in the U.K. EDF had €69.63 billion in annual revenue in 2017 and currently $33 billion market capitalization.
6. **Enel**: It operates in hydroelectric, thermoelectric, nuclear, geothermal, wind, solar PV and other renewable sources. Almost half of the electricity it produced in 2017 was free of carbon dioxide emissions, making it one of the world's major producers of clean energy. As of year-end 2017, it has 63,500 employees, €74.64 billion in revenues and in June 2018, a $49.12 billion market capitalization.
7. **Dominion Resources:** The largest producers and transporters of energy in the U.S. It features a 25,700 MW generating capacity, 15,000 miles of natural gas pipeline and 6,600

miles of electric transmission lines. The company operates one of the nation's largest natural gas storage systems with 928 billion cubic feet of storage capacity, serving utility and retail energy customers in 14 states. It has 16,200 employees, approximately $13 billion in sales and a $42.93 billion market capitalization.

8. **Iberdrola:** A Spanish public multinational electric utility company based in Bilbao. It has an approximately 31,000 employee workforce over four continents, serving around 32 million customers. The company had €31 billion in sales as of 2017 and a €42 billion market capitalization in June 2018.

Components of Traditional Power Grid

1. **Generators:** Also called as dynamo. It isa device that converts mechanical energy to electrical energy. Sources of mechanical energy include turbines.
2. **Transformers:** It is a static device that transfers electrical energy from one circuit to another without any electrical connection and with the help of mutual induction between two windings. It transforms power from one circuit to another without change in frequency.
3. **Transmission lines:**long conductor with special design (bundled) to carry bulk amount of generated power at very high voltage from one station to another as per variation of the voltage level.
4. **Substation:** The assembly of apparatus used to change the characteristics like current, voltage, frequency of electric supply.
5. **Load:** It is the device or group of devices that consumes energy.

Components of Smart Power Grid

"Smart grid" technologies are worked on two-way communication technologies, control systems, and computer processing. Smart Grid automatically manage and store excess energy and make it available later to the grid to meet customer demand.

1. **Smart appliances:** These appliances are set to consumer's predefined preference level and they have an idea on when to consume energy on what level. These appliances have help in understanding the power position and reduce the peak load factors.
2. **Smart meters:** They are a two-way communicator that helps create a bridge between the power providers and the end consumer. It automates the billing data collection on the very convenient manner, detects system failures and sends repairing teams much faster

than before because as soon as a system or a unit fails, the service providers are notified immediately.

3. **Smart substations:** They monitor the performance of the station and control any critical and non-critical data that could be the status of the power, power performance, circuit breakers, security and the operationalization of the transformers. These are also used to transform voltage at several stations and operational regions and to split the path of electricity into several routes.
4. **Synchro Phasors:** They gather data from various locations of the grid to get a coherent picture of whole network using GPS and transmit for analysis to central locations.

Path of Evolution: Intellectual Property Rights

Innovation is the key ingredient for the development of any technology. The same goes with energy industry too. Path of evolution starts with just one breakthrough invention that further results into a series of innovation and creates a healthy competition amongst the innovators to innovate and further reap the benefits of true intellect. Intellectual Property Rights played an important role in keeping the right pace of development and proliferation of power grid technology too; and in return provided a successful business tool to the innovators and creators of the technology.

Improvement and innovation are the key factors for the success and survival of any business. Intellectual Property Rights and associated strategies are always considered as path of evolution for any organization whether it's an old and big organization or a small organization or an upcoming organization. The most common ingredient of evolution of all business giants is their Intellectual Property (IP) and its proper & strategic protection followed by enforcement and commercialization. IP has become an integral and essential part of business plans and budgets of power sector business houses.

To sustain in a long run and in competitive business environment, acquiring IP Rights is the best path known to all. However, during foundation period many organization forget this path and in a long run they fail to survive due to sudden technological drift in the market.

How Electricity Grew?

The history dates back to the generation of electricity from the preserved document "Agasthya samshita" in first millennium BC which contains detailed description of construction of electric battery. Agasthya used earthen pot, copper plate, copper sulphate, wet saw dust and zinc

amalgam to generate electricity. But the need of transmitting this energy was a question. The first breakthrough in the technology was made on 4th September 1882 when Thomas Edison made first central power plant in USA which served 85 customers, providing electricity to 400 lamps. Since then there have been hundreds of power grids with advanced technologies. The big historical giant, Thomas Edison and George Westinghouse were pioneering in DC and AC current transmission respectively.

Technology Breakthrough in Power Grid

Grid is used for an electricity system that may support all or some of the following four operations: electricity generation, electricity transmission, electricity distribution, and electricity control. An "electricity grid" is not a single entity but an aggregate of multiple networks and multiple power generation companies with multiple operators employing varying levels of communication and coordination, most of which is manually controlled.

September 4, 1882: Birth of Pearl street station, the first power plant in USA served 85 customers by providing electricity to 400 lamps. The source used was Direct current.

March 20, 1886: Transmission of AC electricity to remotely located loads first demonstrated by George Westinghouse and William Stanley in Great Barrington, MA. Same year a four-mile transmission line successfully tested at Lawrenceville, PA by Westinghouse Electric Company.

1889: Thomas Edison bought out Thomson-Houston and merged it with his Edison General Electric to establish General Electric Company and began directly competing against Westinghouse Electric Company for AC power projects

1890: Westinghouse Electric had some 300 central generating stations supplying AC electricity to primarily lighting loads.

1893: George Westinghouse won the contract for lighting the Columbian Exposition in Chicago and used the opportunity to display its two-phase system with 12-1000 HP alternators.

October 26, 1893: Niagara Cataract signed the contract with Westinghouse to supply 3-5000 HP [250 rpm/ 2200V/2ϕ/ 25 Hz] units after several compromises and modifications to the initial proposal were agreed to.

1894: Charles F. Scott of England invented the "T" connection for the transformers to convert two-phase AC to three-phase AC

August 26, 1895: First power from the 5000 HP units was delivered to the Pittsburgh Reduction Company [Alcoa] in Niagara Falls, NY

November 15, 1896 Westinghouse built a hydroelectric power plant on Niagara Falls using AC technology through 11 KV three-phase transmission line, over twenty-six miles, to Buffalo, NY.

1900-1932: Age of Private Electric Companies started. Regulation of electric companies by government and assignment of specific territories to these companies. The grid looked as same in 1890. Although modernization take place in construction of transformers and electric poles.

1952: The world's first 380 kV power line was built in Sweden, the 952 km Harsprånget – Hallsberg line.

1965: the first extra-high-voltage transmission at 735 kV took place on a Hydro-Québec transmission line.

1980 Era: Traditional grid started transforming into smart grids. Automatic meter reading was used for monitoring loads from large customers, and evolved into the Advanced Metering Infrastructure.

1982: the first transmission at 1200 kV was in the Soviet Union.

Improvements in Smart Grid with Changing Era:

Technologies Involved:

1. Integrated communications across the grid.
2. Advanced control methods.
3. Sensing, metering, and measurement.
4. Advanced grid components.
5. Decision support and human interfaces

The Smart Grid technologies used:

Network Topology used	Advantages	Disadvantages

Zigbee Com	Simplicity, mobility, robustness, low bandwidth requirement, load control and reduction, demand response, real-time pricing, real-time system monitoring and advance metering support	Low processing capability, small memory size, small delay requirement, noise and EMI, shares common frequency band ranging from IEEE 802.11 WLANs, Wi-Fi, Bluetooth and Microwave
Wireless Mesh Network	Cost effective solution, dynamic self-organization, self-healing, self configuration, high scalability services, improved network performance, balanced load network, extended network coverage	Network capacity, EMI, Urban coverage issue, complex infrastructure, bandwidth reduction, high maintenance
Cellular Network	Cost-effective, widespread, sufficient bandwidth, strong security control, excellent coverage, low maintenance cost, quick installation, authentication, demand response	Network congestion, poor emergency response, involvement of various private ventures for use of various spectrum band
Power line Communication (Plc)	Cost-effective, ubiquitous nature, widely available infrastructure, wide range, enhanced system security	EMI, noise, low-bandwidth, device sensitivity towards disturbances and quality of signal, multilevel protocols
Digital Subscriber Line (Dsl)	Widespread availability, low-cost, high bandwidth data transmission	Distance dependency, lack of standardization, costly set-up, high maintenance,

Moving from Traditional to Smart Grid:

Electric System	Traditional	Smart
Generation	CentralizedDispatch able Large Thermal Plants Mechanically coupled	Centralized and Distributed Efficient and Flexible Unit Electronically coupled

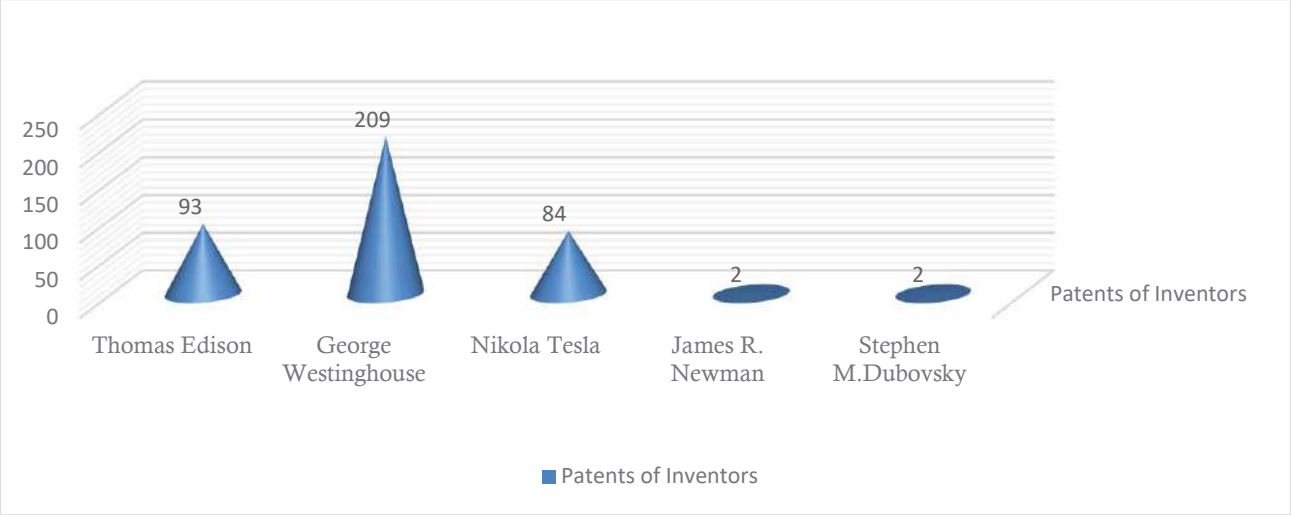
Transmission	SCADA for visibility Congestion Threats not defined	Time synchronized management Automatic control Threats are managed
Distribution	Limited visibility Limited Controllability Increasing fault current during stress	Observability Coordination Two way flow Self healing Active monitoring

Patent Story

Breakthrough Inventions:

S. No.	Invention	Inventor	Patent No.	Date
1	System of Electric Distribution	Thomas Edison	US287516 A	1883-10-30
2	Method of distributing Energy	George Westinghouse	US645612 A	1900-03-20
3	System of Transmission of Electrical Energy	Nikola Tesla	US645576 A	1900-03-20
4	Electrical meter box for service lateral and method of using same	James R Newman	US566352 5A	1997-09-02
5	Grid-connected power systems having back-up power sources and methods of providing back-up power in grid-connected power systems	Stephen M. Dubovsky	US694984 3B2	2005-09-27

Major Inventors:



Technology Segments: Patents

Technology Segments	No. of Patents
Three Phase Transformer	2396
Single Phase Transformer	5565
Power Cable	126556
Substation	420
Energy Meters	3099
IEC 61850	84
Zigbee communication	1996
STATCOM	132
Static Var compensator	117
Scada	220
Electric Pole	2732
Smart Meters	581
Alternator	27315
Induction Machine	1348

Source: Questel Orbit Patent Database

Top Players

Top Players	Patents
General Electric Company	101220
Enel	400
Dominion Resources	67
National Grid	84
Electricite De France	4490
Iberdrola	95
Tata Power	44
Adani Power	01
NextEra Energy	01
Engie	140
NTPC	01
SJVNL	01

Source: Questel Orbit Patent Database

Major Ruler:

General Electric:

General Electric Company (GE), incorporated on April 15, 1892 by great Thomas Alva Edison, is a global digital industrial company. The Company's products and services range from aircraft engines, power generation, and oil and gas production equipment to medical imaging, financing and industrial products. The Company's segments include Power, Renewable Energy, Oil & Gas, Aviation, Healthcare, Transportation, Energy Connections & Lighting, and Capital. As of December 31, 2016, the Company served customers in approximately 180 countries. Considering the Power area, The Company's products and technologies harness resources, such as oil, gas, coal, diesel, and nuclear to produce electric power and include gas and steam turbines, full balance of plant, upgrade and service solutions, as well as data-leveraging Software. The Company's Gas Power Systems offers a spectrum of heavy-duty and aero derivative gas turbines for utilities, independent power producers and industrial application, from small, mobile power to utility scale power plants. Its Steam Power System offers steam power technology for coal and nuclear applications, including boilers, generators, steam turbines, and Air Quality Control Systems (AQCS) to help efficiently produce power and provide performance over the life of a power plant. The Company's Power Services delivers maintenance, service and upgrade solutions across total plant assets and over their operational lifecycle. Its Distributed Power provides technology-based products and services to generate power at or near the point of use.

Overview of General Electric Company in terms of Patents:

Area of Work	Patents Granted
Electric Power	57,293
Aviation	7439
Digitization	18116
Healthcare	6569
Automotive	9497
Renewable Energy	16136
Transportation	6107
Medical	7335
Smart grid	**83 granted and 177 filed**

Source: Questel Orbit Patent Database

What's Next? :

Between now and 2030, the electric grid will confront significant new challenges and inevitably undergo major changes. The environment in which the grid will operate will change substantially in the next two decades. A range of system-level issues need to be addressed, and new technologies need to be used as appropriate. Regulators should seek to develop policies that better align incentives of participants in electricity markets (including consumers) with policy goals. The industry needs to conduct research in key areas and both collect and share important data.

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Author:

“WHILE FORTUNE 500 COMPANIES HAVE 84% WORTH IN THE FORM OF INTANGIBLE ASSETS, WE ARE STILL FOCUSING ON IP AWARENESS AND START-UP INDIA SCHEME. WHILE THEY ARE KNOWN AS GREAT CREATORS, WE ARE KNOWN AS GREAT USERS. AS SOON AS WE REALIZE AND IMBIBE THESE PRACTICES IN REAL SENSE AND ITS IMPACT ON OUR CURRENT STATUS, WE WILL TAKE THE “FIRST STEP IN A POSSIBLE PATH OF EVOLUTION”. THE ONLY THING IS TO UTILISE AND PROTECT OUR INTELLECT IN LIKE MANNER.”

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Solar Energy – Today's Resource for a Brighter Tomorrow

-Anonymous

PART – C

PETROLEUM & ENERGY GAS

India's Initiatives to Enhance Renewable Energy for Sustainable Development

by

M.C Chauhan
Ex. General Manager, North Central Railway

India is progressively becoming the most favoured destination for investment in renewable energy. Over **US $42 billion investment was made in renewable energy in India** during the last four years. New opportunities have emerged altogether which led to creation of new business space. Indian companies have begun to explore foreign stock exchanges as a source of funds.

The Government of India is also encouraging foreign Investors to set up renewable energy based power generation projects on build-own-operate basis (BOO).

Foreign investors can enter into joint venture with an Indian partner for financial and/or technical collaboration and for setting up of renewable energy-based power generation projects.

India's aim of having installed capacity of 175 GW from Renewable Energy by 2022 is ambitious. The **Renewable Energy capacity has reached approximately 74 GW as per the Central Electricity Authority (CEA's) January 2019 Report.** Approximately 40 GW renewable power capacity is under construction or is tendered. The solar energy capacity is increased by over 10 times from 2.63 GW in 2014 to 27 GW and wind capacity is also increased by over 1.6 times from 21 GW in 2014 to 35.3 GW. World's largest and first-of-its-kind high altitude solar project of 7.5 GW is initiated at Ladakh.

There are a number of schemes at State as well as the national level that are introduced or at advanced stages of being launched. One of the examples is KUSUM (Kisan Urja Suraksha evam Utthaan Mahaabhiyan) Scheme. The proposal on **KUSUM Scheme** provides for: (i) Installation of grid-connected solar power plants each of Capacity up to 2 MW in the rural areas; (ii) Installation of standalone off-grid solar water pumps to fulfil irrigation needs of farmers not connected to the grid; and (iii) Solarisation of existing grid-connected agriculture pumps to make farmers independent of grid supply and also enable them to sell surplus solar power generated to DISCOM and get extra income. The others are SRISTI (Sustainable **Roof top Implementation** for Solar Transfiguration of India), which is a new scheme for solar rooftop that is being formulated.

Summary of Renewable Energy Generation

Ministry of New & Renewable Energy			
Programme/Scheme-wise Physical Progress in 2018-19 & Cumulative up to Jan, 2019			
Sector	**FY 2018-19**		**Cumulative Achievements**
	Target	**Achievement (April-Dec 2018)**	**(As on 31.12.2018)**

I. GRID-INTERACTIVE POWER (CAPACITY IN MWp)			
Wind Power	4000.00	1145.10	35288.10
Solar Power - Ground Mounted	10000.00	3994.38	24582.23
Solar Power - Roof Top	1000.00	380.11	1443.74
Small Hydro Power	250.00	42.25	4528.05
Biomass (Bagasse) Cogeneration)	250.00	374.70	9075.50
Biomass (non-bagasse) Cogeneration)/Captive Power	100.00	41.93	704.74
Waste to Power	2.00	0.00	138.30
Total	**15602.00**	**5978.47**	**75760.66**
II. OFF-GRID/ CAPTIVE POWER (CAPACITY IN MW_{EQ})			
Waste to Energy	18.00	6.58	178.73
Biomass Gasifiers	1.00	0.00	163.37
SPV Systems	200.00	171.70	843.11
Total	**219.00**	**178.28**	**1185.21**

The process of transparent bidding and facilitation for procurement of solar and wind power through tariff based competitive bidding process has led to significant reduction in cost of solar and wind power. In the year 2017 competitive bidding guidelines for procurement of solar and wind power have been notified. **Tariffs as low as Rs. 2.44 per unit for solar and Rs. 2.43 per unit for wind have been discovered.**

State-wise installed capacity of Grid Interactive Renewable Power as on 31.01.2019.

S. No.	STATES / UTs	Small Hydro Power	Wind Power	Bio Power				Solar Power			Total
				BM Power Bagasse - e Cogen. (Grid Inter-active)	BM Cogen. (Non-Bagasse/ Captive Power)	Waste to Energy	Bio Power Total	Ground Mounted	Roof Top	Total	Total Capacity
		(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)

1	Andhra Pradesh	162.11	4076.45	378.20	98.98	23.16	500.34	2840.77	48.52	2889.29	7628.19
2	Arunachal Pradesh	107.100						1.27	4.12	5.39	112.49
3	Assam	34.11						10.67	7.98	18.65	52.76
4	Bihar	70.70		113.00	8.20		121.20	138.93	3.52	142.45	334.35
5	Chhatis-garh	76.00		228.00	2.50		230.50	215.83	15.52	231.35	537.85
6	Goa	0.05						0.95	0.74	1.69	1.74
7	Gujarat	45.70	5965.87	65.30	12.00		77.30	1836.3	166.73	2003.03	8091.90
8	Haryana	73.50		121.40	84.26		205.66	130.80	88.79	219.59	498.75
9	Himachal Pradesh	860.61			7.20		7.20	0.00	4.50	4.50	872.31
10	Jammu & Kashmir	179.03						8.49	5.89	14.38	193.41
11	Jharkhand	4.05			4.30		4.30	19.05	13.36	32.41	40.76
12	Karnataka	1230.73	4682.80	1783.60	15.20	1.00	1799.80	5175.06	153.75	5328.81	13042.14
13	Kerala	222.02	52.50		0.72		0.72	100.00	38.49	138.49	413.73
14	Madhya Pradesh	95.91	2519.890	93.00	12.35	15.40	120.75	1619.22	30.67	1649.89	4386.44
15	Maharashtra	375.570	4794.13	2499.70	16.40	12.59	2528.69	1447.30	172.26	1619.56	9317.95
16	Manipur	5.45						0.00	3.23	3.23	8.68
17	Meghalaya	31.03			13.80		13.80	0.00	0.12	0.12	44.95
18	Mizoram	36.47						0.10	0.40	0.50	36.97
19	Nagaland	30.67						0.00	1.00	1.00	31.67
20	Odisha	64.625		50.40	8.82		59.22	383.56	6.71	390.27	514.12
21	Punjab	173.55		194.00	123.10	9.25	326.35	828.1	77.52	905.62	1405.52
22	Rajasthan	23.85	4299.72	119.30	2.00		121.30	3045.69	96.2	3141.89	7586.76
23	Sikkim	52.11						0.00	0.01	0.01	52.12
24	Tamil Nadu	123.05	8764.34	941.00	56.48	6.40	1003.88	2098.27	135.07	2233.3	12124.6

										4	1
25	Telangana	90.87	128.10	158.10	1.00	18.50	177.60	3519.27	64.34	3583.61	3980.18
26	Tripura	16.01						5.00	0.09	5.09	21.10
27	Uttar Pradesh	25.10		1957.50	160.01		2117.51	834.00	68.33	902.33	3044.94
28	Uttara-khand	214.320		73.00	57.50		130.50	239.78	64.49	304.27	649.09
29	West Bengal	98.50		300.00	19.92		319.92	50.00	19.56	69.56	487.98
30	Andaman & Nicobar	5.25						5.10	1.46	6.56	11.81
31	Chandi-garh							6.34	26.06	32.40	32.40
32	Dadar & Nagar Haveli							2.49	2.97	5.46	5.46
33	Daman & Diu							10.15	4.32	14.47	14.47
34	Delhi					52.00	52.00	8.96	115.25	124.21	176.21
35	Lakshwa-deep							0.75	0.00	0.75	0.75
36	Pondi-cherry							0.03	1.77	1.80	1.80
37	Others		4.30								4.30
	Total (MW)	4528.045	35288.100	9075.50	704.74	138.30	9918.54	24582.23	1443.74	26025.97	75760.66

The **Green Energy Corridor** projects seek creation of transmission infrastructure for renewable power evacuation and to reshape the power grid for future requirements. The intra-state transmission scheme (InSTS) being implemented by eight renewable rich States with an investment of Rs.10,141 crores containing about 9400 ckm transmission lines and Substations of total capacity of approx. 19000 MVA to be completed by March 2020.

Ministry of Power (MoP) has waived the **Inter-state Transmission System charges and losses for inter-state sale of solar and wind power** for projects to be commissioned by March 2022.

This will encourage setting up of the projects in states that have greater resource potential and availability of suitable land. It also helps in creating a pan-India renewable power market, as generation in excess of the state's own requirement could be transmitted to the resource poor states without additional financial burden. On the other hand the introduction of **Renewable Generation Obligation (RGOs)** will encourage coal based thermal power generators to diversify in renewable energy portfolio.

For optimizing land use and harnessing solar and wind energy potential optimally, MoP has notified **Solar-Wind hybrid policy.** This policy will help in better harnessing of renewable energy resources and to an extant also address renewable energy variability. Off-shore power potential from Tamil Nadu and Gujarat coasts is among the best for wind power generation and therefore, in order to harness this potential the Ministry of Power has formulated the **offshore wind power policy, wherein wind power shall be generated at sea.**

While there are issues such as delayed payments from discoms, land and transmission availability that bedevil the renewable energy sector in India, there is hope such issues shall eventually be resolved in the interest of sustainable development of green power in India.

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Renewable Energy Regulation in India: Barriers and Challenges

by

Yatin Kathuria, Research Scholar
Punjab University, Chandigarh

ABSTRACT:

The Renewable Energy, often referred as clean energy is considered as the perfect solution to the concerns of energy insecurity, energy inefficiency and climate change which the world is facing today. In pursuit of promoting green growth in the country, India is strongly changing its energy policies and strategies in support of Renewable Energy technologies. This is the reason; India has set out the aggressive target of achieving 175GW of renewable energy capacity by 2022. Beginning with the existing constitutional provisions and institutional structures, this article surveys critical policy developments and regulatory frameworks that supported renewable energy expansion in India. The article finds that despite the broad policy and regulatory framework, the growth of RE sector regulation suffers on account of a number of restraints and barriers. The issues like disconnect between the central policies and State requirements, non-fulfilment of targets at regional level and non- stringent behaviour of state regulatory bodies has created barriers for deployment of renewable technologies. Therefore, it is a necessity to review the existing regulations and address these barriers. The paper pinpoints the issues that have to be addressed and provides for recommendations and suggestions for the real development of Renewable Energy sector in the country.

Keywords: Renewable Energy,Clean Energy, Solar Mission, NAPCC, Climate change, SERC Regulations, Energy policy, MNRE.

Introduction

It is the established theory that the nation who procreates the power of clean and renewable energy will lead the 21st century. The pursuit for clean energy is considered as the perfect solution to the difficulties of energy insecurity, energy inefficiency and climate change. In order to promote green growth, an environment of supportive policies and regulations is required as proficient legislative framework have always been the major catalysts in triggering technology transition in a country. India has been an early mover in initiating policies for development of renewable energy sector, as well as in establishing institutional structures for the same. Renewable energy has become akeyitinerary of India's energy planning process particularly since climate change mitigation has become an important agenda in international policy arena. Further, at the domestic level the Government of India to demonstrate its commitment to renewable energy, the government has set aggressive targets, to progressively increasing the share of Renewable Energy in the energy mix. Today Renewables contribute about 21%of the total installed capacity (excluding large hydro installed capacity) in the country as of December 2018[136] which was more or less zero in 1985.The Paper begins with the overview of Energy sector in India and share of renewables in existing energy mix. Further, the paper surveys Constitutional and Institutional structures, and analyze the crucial policy developments and regulatory frameworks that supported renewable energy expansion in India. The provisions of the *Electricity Act, 2003* and inferences of *National Electricity Policy 2005*,*National Tariff Policy 2006*,*Integrated Energy Policy 2006, National Action Plan on Climate Change (NAPCC)* and recent policy initiatives specifically aiming growth of Renewable Energy sector have been analyzed in detail.

The promotional regulatory mechanisms like Renewable Energy Purchase Obligation (RPO), Renewable Energy Certificate (REC) Mechanism, Tariff regulations, Net metering regulations for decentralized rooftop solar projects also been covered. But question arises, are these provisions adequate to standardize renewable sector in India, is there any scope of improvement in our current legal regime. In order to strengthen the case of comprehensive legal structure for ensuring the desirable growth of the sector, it has been proposed that a stringent legislative and regulatory environment is desirable to strengthen the existing policy initiatives.

Renewable energy Overview and Targets

[136] *CEA, Report - ALL INDIA INSTALLED CAPACITY (IN MW) OF POWER STATIONS (As on 31.12.2018). available at - http://cea.nic.in/reports/monthly/installedcapacity/2018/installed_capacity-12.pdf*

The Government of India in the union budget of 2015 set the target of accomplishing175GWby 2022. The said target comprises of achieving 60GWfromwind,100 GW from solar, 10GW from biomass, and 5GW from small hydro.[137]The figure below shows a comparison between current renewable power installed capacity as of march 2018 and the targeted installed capacity to be achieved by 2022.

Installed grid interactive renewable power capacity (excluding large hydropower) as of 31 March 2018 (RES MNRE)[1]

Source	Total Installed Capacity (MW)	2022 target (MW)
Wind power	34,046	60,000
Solar power	21,651	100,000
Biomass power	8,701	*10,000
Waste-to-Power	138	
Small hydropower	4,486	5,000
TOTAL	**69,022**	**175,000**

In position of achieving aspiring 2022 targets, as of 31 March 2018, wind power is around halfway towards its goal, whereas solar power is21%of its motivated target,installed capacity for

[137]*Press Information Bureau, Government of India, Ministry of New and Renewable Energy,A target of installing 175 GW of renewable energy capacity by the year 2022 has been set, 19-July-2018.Available at : http://pib.nic.in/newsite/PrintRelease.aspx?relid=180728.*

Bio energy is already above 80% mark while small hydro power is already 85% of the way to meet its target. Overall India was at 33% towards meeting its 2022 renewable installed power capacity target of 175 GW.Therefore, special efforts have to be made to boost wind and solar sector. As of march 2018 around 60 GW of renewable energy capacity have been installed against the target of 175 GW, which shows that 65% of the desired target still have to be achieved in just the period of four years.

Total Installed Capacity Mix

India is the third largest producer of electricity all over the world, having total installed capacity of 343,898.39 MW. In the electricity sector, renewable energy account for 34.4% of the total installed power capacity including large hydro installed capacity of 45.4 GW as of 31 March 2018, contributing to 13% of the total power capacity. The remaining renewable energy sources accounted for 20% of the total installed power capacity around 69 GW as of March 2018.
Wind power capacity was 34,046 MW as of 31 March 2018, making India the fourth-largest wind power producer in the world.[138]The total breakdown of installed grid connected capacity from all sources including large hydro was as follows:

Grid connected installed capacity from all sources as of 31 May 2018[13]

Source	Installed Capacity (MW)	Share
Coal	196,957.50	57.27%
Large hydro	45,403.42	13.20%
Other renewables	69,022.39	20.07%
Gas	24,897.46	7.23%
Diesel	837.63	0.24%
Nuclear	6,780.00	1.97%
Total	**343,898.39**	**100.00%**

Electricity Generation from Renewable Energy Resources

The electricity generation from renewable energy sources has been rising rapidly. Total

[138]Central Electricity Authority, Ministry of Power, Govt. of India. "Executive Summary Power Sector May 2018". *report*. 31 May 2018.

renewable energy which includes large hydro with pumped storage generation, is nearly 17.5% of total utility electricity generation in India during the year 2017-18.[139] Table 1.4 shows that in the year 2016-17, total electricity generation through renewablesinIndiawas81.88BU whereas it was just 65.78 BU in 2015-16.This marked 24.47% progressfrom2015-16.The electricity generation from solar has been almost doubled in 2016-17 and wind on the other hand continued to dominate renewable electricity generation in India. The share of wind in total Renewable Energy electricity generation increased from 50.21% in 2015-16to56.19% in 2016-17. Notably, in the same period, share ofsolarincreasedfrom11.32%to16.49%,with biomass, small hydro and waste-to- energy accounting for 17.28%,9.68%and 0.37% respectively.

	WIND		SOLAR		BIOMASS		SMALL HYDRO		WASTE TO-ENERGY		TOTAL	% GROWTH
	BU	%	BU	%	BU	%	BU	%	BU	%	BU	
2014-15	33.77	54.65	4.60	7.44	14.95	24.19	8.06	13.04	0.41	0.67	61.79	-
2015-16	33.03	50.21	7.45	11.32	16.68	25.36	8.35	12.70	0.27	0.41	65.78	6.47
2016-17	46.00	56.19	13.50	16.49	14.15	17.28	7.92	9.68	0.30	0.37	81.88	24.47

Table1.4: Renewable Electricity Generation (BU) with % Share in Total RE Electricity (2014-15to2016-17)[140]

[139]"Overview of renewable power generation, CEA" (PDF). Retrieved 30 April 2018.available at http://www.cea.nic.in/reports/monthly/renewable/2018/overview-03.pdf

[140]Source: WISE, 2017 (Compiled from CEA reports)

India is blessed with over 150,000MW of exploitable Renewables, even after realizing the vast potential, Renewable energy still remains a small fraction of installed capacity that is 17 % of total installed capacity. Although a considerable growth in renewable energy deployment is evident since last decade, but the current figures are not enough to meet the problems of energy security, energy dependence on fossil based fuels, issues of environmental protection and social equity.

CONSTITUTIONAL BACKGROUND

India's aim towards environmental sustainability and to establish effective policies in this regard are grounded in the Constitution itself. There are explicit provisions within the Constitution which directly or indirectly support the generation and consumption of renewable energy resources in the country. The Constitution of India embodies environmental protection and promotes sustainable growth under Article 21 which is the fundamental right itself. [141]Additionally, Article 48-A, which forms part of the Directive Principles of State Policy of India, though not enforceable but acts as the guiding principle for policy creation and dictates that the state should endeavor to safeguard and improve the environment.[142] Additionally, Article 51-A(g) imposes a fundamental duty on every citizen of India to protect the natural environment.[143]All these constitutional provisions have been encouraging India to take effective step towards environmental safety and indirectly to revolutionize energy sector as there is strong relation between the two. Also the Supreme Court of India has already recognized the constitutional mandate to promote renewable energy by relying on Article 21 and Article 51-A (g) of the constitution[144].Boosting the share of renewable resources through effective policies and regulation in the energy sector is the revolution which is been adhered here.[145]

For Division of responsibilities and powers in regard to formulation of policies and regulation on the subject, regard can be given to the nature of the constitution we have in force. India is a quasi-federal constitutional arrangement where legislative and executive powers are delineated between the Centre and states. [146]The Seventh Schedule of the Constitution describes subjects over which the legislative power is assigned to the Center exclusively that is Union List (List I) a, for states (List II), and concurrent list (List III) where both Centre and state can make laws[147].

[141] Article 21 Constitution of India
[142] Article 48 Constitution of India
[143]Article 51-A(g)Constitution of India
[144]*Hindustan Zinc Limited* v. *Rajasthan Electricity Regulatory Commission*, Judgment dated May 13, 2015 in Civil Appeal No. 4417 of 2015 before Supreme Court.
[145]M. O. N. A. R. ENERGY and G. O. INDIA, "Strategic plan for new and renewable energy sector for the period 2011-17," http://mnre.gov.in/file-manager/UserFiles/strategic_plan_mnre_2011_17.pdf2011
[146]K.P. Mukherjee, 'Is India a Federation?' Indian Journal of Political Science, Vol. XV, No. 4 July-Sep., 1954, p.17
[147] Seventh Schedule of Constitution of India.

Electricity is a concurrent subject under List III, therefore, both Centre and states can enact on this subject[148]. Matters relating to inter-state transactions are in the Centre's domain while states are responsible for the intra-state sale, purchase, distribution and supply of electricity. However, in practice, the demarcation of power between the state and Centre is not as simplistic. Concurrent jurisdiction prevents the Centre from directing the states to take specific action. The Central Government's thrust on development of renewable energy is apparent but the constitutional framework prevents the Centre from realizing its vision without the support of the states. While the Centre can facilitate and incentivize the states to achieve renewable energy targets, it cannot overstep the bounds of concurrent jurisdiction to implement or penalize non-compliance by the states. States have often used this constitutional authority to push back on reforms spearheaded by the Centre, which do not further their political agenda[149].Majority of the states have been particularly slow to implement obligations as set out by the Centre Government under the Electricity Act or through any other regulation.[150] Therefore, the issue of electricity sector reform, which has a substantial impact on the renewable energy sector, is a complex one not just from a constitutional and legal perspective but also because of its political underpinnings.

INSTITUTIONAL FRAMEWORK

India with ample renewable energy resources, is privileged to have originated major programs for development of renewable in the country. The Energy Crisis of 1970's and problem of Energy security compelled India to exploit alternate sources for energy , which in turn leads to initiation of renewable energy programmes in India.[151]The planned initiative in the field started in 1981 with the establishment of, *The Commission for Additional Sources of Energy (CASE)*. The commission was entrusted with the responsibilities of formulating policies and programmes for the development of new and renewable sources of energy. Following year in 1982 itself, the *CASE* was incorporated into newly set up Department *of Non-Conventional Energy Sources* to undertake necessary measures in the area of alternate sources of energy. The department was upgraded to a separate Ministry of Non-Conventional Energy Sources (MNES) in 1992 and was

[148] Entry 38 , List III Constitution of India
[149]Jessica Wallack, comment on Frank A. Wolak, "Reforming the Indian Electricity Supply Industry," in *Sustaining India's Growth Miracle*, ed. Jagdish N. Bhagwati and Charles W. Calomiris (New York: Columbia University Press, 2008), 162-163. As of 2016,
[150]For instance, even six years after the issuance of the CERC REC Regulations, most states have a low level of RPO compliance and Sikkim has not even issued its RPO regulations yet.
[151]*Smith, William D. (17 April 1973). "Energy Crisis: Shortages Amid Plenty". The New York Times. New York.*

renamed as the Ministry of New and Renewable Energy (MNRE) in 2006 [152]with this, India became the world's first nation to have an exclusive ministry for expansion and growth of renewable energy sector. Today this ministry is considered as the nodal ministry in the promotion of the renewable energy in India. The mission of the Ministry is to ensure energy security, to provide energy affordability as well as availability and to develop the atmosphere of energy equity by increasing the share of Renewable and Non-conventional sources of Energy.[153]There are several institutions working under MNRE and supporting it to accomplish this mission.

INSTITUTIONS UNDER MNRE

The five specialized technical institution working in the area are:

- **Indian Renewable Energy Development Agency (IREDA):** In 1987 an institute of national importance was established in New Delhi. IREDA is a Government of India Enterprise working under the administrative control of Ministry of New and Renewable Energy (MNRE) primarily engaged in promoting, developing and extending financial assistance for setting up projects relating to new and renewable sources of energy.[154]
- **National Institute of Solar Energy (NISE):** National Institute of Solar Energy located in Gurugram, Haryana is an apex institute of the Ministry of New and Renewable Energy in the area of Solar Energy. The Government of India converted 25-year-old Solar Energy Centre (SEC) under MNRE to an autonomous institution NISE in September 2013 to assist the Ministry in implementing the National Solar Mission and to coordinate research & development, testing, certification, standardization, skill development, resource assessment and awareness in the field of solar energy and associated technologies.[155]
- **National Institute of Wind Energy (NIWE):** NIWE established in Chennai, Tamilnadu in 1998, is an autonomous Research & Development institution working under Ministry of New and Renewable Energy (MNRE), Government of India working in the area of Wind Energy. It is a knowledge-based institution of high quality and dedication, offers services and seeks to find complete solutions for the kinds of difficulties and

[152]MNRE, Government of India *"Annual Report 2016-2017"pg No- 20. Available at -https://mnre.gov.in/file-manager/annual-report/2016-2017/EN/pdf/2.pdf*

[153]*"Ministry of New and Renewable Energy - Mission". mnre.gov.in.*

[154] Available at: http://ireda.in/forms/contentpage.aspx?lid=820.

[155] Available at: https://nise.res.in/about-us/about-nise/#page-content.

improvements in the entire spectrum of the wind energy sector by carrying out further research.[156]

- **SardarSwaran Singh National Institute of Bio-Energy (SSS-NIBE):** SSS-NIBE which was formerly known as SardarSwaran Singh National Institute of Renewable Energy is also an autonomous Institution of the Ministry of New and Renewable Energy. The Institute is a Global Centre of Excellence in the Bio-Energy. The objectives of the Institute are to carry out and facilitate research, design, development, testing, standardization & technology demonstration eventually leading to commercialization of RD&D output with a focus on bioenergy, biofuels & synthetic fuels in solid, liquid & gaseous forms for transportation, portable & stationary applications, development of hybrid / integrated energy systems, to undertake & facilitate human resource development at all levels including postdoctoral research. It is located in Kapurthala (Punjab).[157]

- **Solar Energy Corporation of India (SECI):** SECI is a CPSU under the administrative control of the Ministry of New and Renewable Energy (MNRE), set up on 20th Sept 2011 to facilitate the implementation of JNNSM and achievement of targets set therein. It is the only CPSU dedicated to the solar energy sector. It was originally incorporated as a section-25 (not for profit) company under the Companies Act, 1956.[158]

REGULATORY FRAMEWORK FOR PROMOTION OF RENEWABLES IN INDIA

The Electricity Act 2003

The *Electricity Act, 2003* is an Act of the Parliament enacted to transform the energy sector in India.The Act provides the legal framework for the development of the power sector, including renewable energy sector in India. As per the Act, the Central Electricity Regulatory Commission (CERC) and State Electricity Regulatory Commissions (SERCs), both the commissions are responsible for regulating the generation, distribution and transmission of electricity, based on the jurisdiction and powers vested in them, under the Act[159]. The Act has several enabling

[156] Available at :http://niwe.res.in/about.php
[157] AVAILABLE at http://www.nibe.res.in/about.php
[158] Available at :http://www.seci.co.in/other_page.php?mmid=1&page=about_us
[159]Government of India (2003): Electricity Act, 2003.

provisions, promoting and accelerating the development of non-conventional energy based power generation.

According to *Section 3 (1)* of the Act**,** Government of India shall, from time to time, prepare the National Electricity Policy and Tariff Policy, in consultation with the State Governments for developing the power system based on optimal utilization of resources such as coal, natural gas, nuclear, hydro, and renewable sources of energy. Whereas Act also provides that**,** Government of India shall, after consultation with the State Governments, prepare a national policy, permitting stand-alone systems (including those based on renewable sources of energy) for rural areas[160].The Act also provides that the appropriate Commissions while determining the tariff shall take into consideration the promotion and generation of Electricity from renewable sources of Energy[161].Further Section 86(1) (e) of the Act provides that the State Commission to promote generation of electricity through renewable sources of Energy. Further State Commissions are directed to provide adequate measures for connectivity with the grid and sale and purchase of electricity from such renewable energy sources and specify the percentage of the total utilization of electricity in the area from renewable sources of Energy.[162]

National Electricity Policy 2005

With the enactment of the Electricity Act, renewable energy found more mention in national level policy instruments such as the National Electricity Policy (NEP), formulated in 2005.The policy also reconsidered the fact that renewable energy sources being environment friendly should be promoted for generating electricity.The policy also provided that for this purpose, efforts need to be made to trim down the capital cost of projects based on and renewable sources of energy by promoting competition within such projects.[163]Generation of electricity from non-conventional sources would be promoted by the SERCs by providing suitable measures for connectivity with grid and sale of electricity to any person and also by specifying, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee[164].SERCs may promote arrangements between the co-generator and the concerned distribution licensee for purchase of surplus power from such plants. Cogeneration

[160]Section 4,Electricity Act, 2003.
[161]Section 61 (h) ,Electricity Act, 2003.
[162]Section 86(1) (e),Electricity Act, 2003.
[163]Section 5.12.1 COGENERATION AND NON-CONVENTIONAL ENERGY SOURCES, National Electricity Policy 2005.

system also needs to be encouraged in the overall interest of energy efficiency and also grid stability.[165]

National Tariff Policy 2006

Soon after the National Electricity Policy, the National Tariff Policy (NTP) was released in 2006, which meant to direct central and state regulators in tariff determination. The Tariff Policy obligated the purchase of Renewable Power for distribution companies and realization of Renewable Energy by distribution companies shall be at preferential tariffs as determined by AppropriateCommission. The Policy also provided that the appropriate commission shall fix a minimum percentage of energy to be purchased from renewable energy sources considering the availability of such resources in the region and its impact on retail tariffs.[166] . The latest version of NTP, 2016 primarily focuses on renewable energy and in particular solar energy thereby ensuring energy security and affordable tariffs.In order to promote renewable energy sources, NTP, 2016 provides that 8% of total consumption of electricity, excluding hydropower, shall be from solar energy by March 2022.As per NTP, 2016 in order to encourage inter-state transaction of power, there shall be no interstate transmission charges applicable in relation to electricity generated from solar and wind sources of energy[167].

Integrated Energy Policy, 2006

The Integrated Energy Policy, released in August 2006, addresses all aspects of energy, including energy security, access and availability, affordability and pricing, efficiency and the environment. The Policy was based on the idea to make Indiaself-sufficient of energy sources to meet increasing demands as well exploring the resources sustainably and reasonably cost-effective. In relation to renewable energy, the policy proposed that effective policies to promote various renewable sources like Mini Hydro,Wind Power, Bio Gas,Solar Photovoltaic's,and Solar Thermal Water Heaters shall be prepared and implemented.[168] The Policy suggested to provide capital subsidies to increase investment in Renewable Energy Sector and urged power regulators to mandate feed-in laws for renewable energy, where appropriate, as provided under the

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[164] Section 5.12.2 COGENERATION AND NON-CONVENTIONAL ENERGY SOURCES, National Electricity Policy 2005.

[165] Section 5.12.3 COGENERATION AND NON-CONVENTIONAL ENERGY SOURCES, National Electricity Policy 2005.

[166] GisèleSchmid,The Development of Renewable Energy Power in India: Which Policies Have Been Effective? Energy Policy 45 · August 2011

[167] Government of India,amendments to the National Tariff Policy on 20 January 2016 ("**NTP, 2016**").Available at: http://aureuslaw.com/national-tariff-policy-2016/

[168] Planning Commission; Expert Committee,Draft Report of the Expert Committee on Integrated Energy Policy,2005.availab le at-http://planningcommission.nic.in/reports/genrep/intengpol.pdf

Electricity Act 2003.[169] It further recommended thatthe environmental subsidy for utilizing renewable sources could be covered up by a cess on non-renewable sources and fuels causing environmental damage.Preparation of an annual report providing details of actual performance of different renewable technologies at the state and national levels was also suggested.[170] Suggestions were also made for some institutional arrangements to promote renewable energy such as making *Commission for Additional Sources of Energy (CASE)* an independent authority and delinking it with the*Ministry of Non-Conventional Energy Sources* and making it responsible for overall development of Renewable Energy sector in the country and Conversion of existing IREDA into a national apex refinancing institution on the lines of NABARD[171].

National Action Plan on Climate Change (NAPCC)

On 30 June 2008, India released its first *National Action Plan on Climate Change (NAPCC)* outlining existing and future policies directed at climate change mitigation. This action plan been submitted to United Nations under United Nations Framework Convention on Climate Change (UNFCCC) under India's Intended Nationally Determined Contribution (INDC) tries to address the urgent and decisive need of the nation by changing and adjusting the policies for development in the concerned areas.[172] *NAPCC* is being implemented in different stages and parts by means of eight missions under it. These eight missions covers numerous aspects associated directly or indirectly to climate change like sustainable habitation, focus on renewable energy, improved energy efficiency, uncontaminated drinking water, sustaining the Himalayan Ecosystem, conserving and establishing green spaces, knowledge creation about climate change[173].

The Mission named as National Solar Mission or Jawaharlal Nehru National Solar Mission under *NAPCC* specifically focused on strengthening Renewable Energy sector in India. The objective of National Solar Mission is to establish India as a global leader in solar energy, by creating such policy conditions and target mandates to ensure large scale diffusion of solar power across the country. Other objectives include the establishment of a solar research centre, increased international collaboration on technology development, strengthening of domestic manufacturing capacity, and increased government funding and international support. The Mission adopted a 3-phase approach spanning the period of the 11th Plan and first year of the 12th Plan (up to 2012-

[169] Ibid pg 90
[170] Ibid pg 91
[171] Ibid pg 98
[172] Government of India ,Prime Minister Council on Climate Change,National Action Plan on Climate Change,2008.Available at : http://www.moef.nic.in/downloads/home/Pg01-52.pdf.
[173] ibid

13) as Phase 1, the 12th Plan (2013-17) as Phase 2 and the 13th Plan (2017-22) as Phase 3[174]. The mission set an ambitious target of adding 20 GW of Grid connected solar capacity by 2022 which was later increased to 100 GW in the year 2015.[175]The ultimate aim is to focus on setting up an enabling environment for solar technology by implementing long term, stable and consistent policies both at centralized and decentralized level.

National Offshore Wind Policy, 2015

On 9th September 2015, the Cabinet gave its affirmation to the National Offshore Wind Energy Policy, 2015 with the intent to support and incentivize the growth of offshore wind energy.The Ministry of New & Renewable Energy (MNRE) been authoritative as the Nodal Ministry for use of offshore areas within the Exclusive Economic Zone (EEZ) of the country and the National Institute of Wind Energy (NIWE) has been certified as the Nodal Agency for expansion of offshore wind energy in the best interest of the country. The policy comes up with following objectives[176] :

- To survey and uphold setting up of Offshore Wind Farms in the Exclusive Economic Zone (EEZ)
- To provide incentives to private players of our nation as well as multinational giants of other countries to invest and build farms.
- To facilitate the development of Project EPC (Engineering, Procurement, and Construction) and Operation & Maintenance with regard to the offshore wind industry.
- To develop as well as maintain the coastal infrastructure and supply chain to support heavy construction & fabrication work and the Operation & Maintenance activities in the offshore wind energy sector.
- To raise financial investment in the Energy Infrastructure, which will enhance the deployment of offshore wind farms.

The major benefit of the initiative is that the offshore wind speeds tend to be faster than on land, faster wind speeds offshore means much more energy can be generated. [177]With the help of this policy, India will be able to harness the offshore winds in the best interest of the nation.Further, adding large capacities of offshore wind generation to the power system would also require

[174]Ministry of New & Renewable Energy,Jawaharlal Nehru National Solar Mission Phase II – Policy Document, December, 2012,

[175]Press Information Bureau,Government of India,Cabinet,Revision of cumulative targets under National Solar Mission from 20,000 MW by 2021-22 to 1,00,000 MW,17-June-2015.

[176]http://mnre.gov.in/file-manager/UserFiles/National-Offshore-Wind-Energy-Policy-Gazzette-notification.pdf (Last visited:30th june,2017

[177]Offshore Wind Energy *Bureau of Ocean Energy Management.*

reliable integration to the national grid so that there is no heavy loss of electricity during transmission[178].

Regulatory promotional mechanisms:

Feed-in-tariff and Competitive Bidding

The Feed-in-tariff is a policy mechanism designed to accelerate investment in renewable energy technologies. It achieves this by offering long-term contracts to renewable energy producers, typically based on the cost of generation of each technology.Eligible renewable electricity generators, including homeowners, business owners, farmers and private investors, are paid a cost-based price for the renewable electricity they supply to the grid. This enables diverse technologies (wind, solar, biogas, etc.) to be developed and provides investors a reasonable return.[179] The provisions in the Electricity Act, 2003, empowers the Electricity Regulatory Commissions to determine the feed-in tariff (FIT) for RE, under Section 62 of the Act, by following the 'cost-plus' approach. Additionally, the tariff can also be discovered by following the transparent competitive bidding process as per provisions under Section 63 of the Act. The CERC in 2009 has[180], for the first time, notified RE Tariff Regulations (amended in 2012 and 2017), specifying the RE technology-wise normative technical and financial parameters for determination of RE tariff on cost-plus basis[181]. Subsequently, the State Electricity Regulatory Commissions has also developed similar regulations at the state level for determining feed-in tariff. Further Central Government agencies and various state governments are responsible for

[178] Shehjan Tabasum, National Offshore Wind Energy Policy A Step Towards 0Better And Healthy Energy Generation ,Government Schemes,Sarkariniti,March2018.Available at https://sarkariniti.com/national-offshore-wind-energypolicy/#National_Offshore_Wind_Energy_Policy_A_Step_Towards_Better_And_Healthy_Energy_Generation

[179]Couture, T., Cory, K., Kreycik, C., Williams, E.,Policymaker's Guide to Feed-in Tariff Policy Design,National Renewable Energy Laboratory, U.S. Dept. of Energy,2010.

[180]CERC (2009): Terms and Conditions for Tariff determination from Renewable Energy Sources Regulations, 2009.

[181]CERC (2012): Terms and Conditions for Tariff determination from Renewable Energy Sources Regulations, 2012.CERC (2017): Terms and Conditions for Tariff determination from Renewable Energy Sources Regulations, 2017.

conducting the process of competitive bidding. A substantial reduction in solar[182] and wind tariff has been witnessed in successive biddings over the past few years.[183]

However, sustainability of these low bidding strategies may pose a challenge for the sector, especially for power purchase agreements (PPAs) signed earlier at higher rates. There are concerns whether distribution licensees will honour the PPA terms of higher tariffs or force generators to reconsider. Tariff rates need to be sustainable if the RE industry is to survive. While the industry has to be transparent in declaring real costs, the government and regulators need to address technology-specific issues. It is not reasonable to pit one technology against another since all renewable power generation technologies need to prosper.

RENEWABLE PURCHASE OBLIGATION (RPO) and Renewable Energy Certificate Mechanism

When India declared the National Action Plan on Climate Change (NAPCC), which was to be implemented through eight missions. One of these was the national solar mission, whose aim was to promote the development and use of solar power. Specific targets were set. Soon thereafter came the policy of renewable purchase obligations (RPOs), which were to be implemented by state governments. Renewable Purchase Obligation (RPO) refers to the obligation of certain entities to meet a portion of their electricity consumption using electricity produced from renewable resources. As discussed earlier, Section 86 (1) (e) of the Electricity Act, 2003, empowers SERCs to set targets and to mandate purchase of a percentage of the total consumption of electricity, from renewable energy sources.[184]

ROOFTOP SOLAR PROJECTS AND NET METERING REGULATIONS

Apart from promoting the ground mounted solar PV projects, the JNNSM also has a mandate to encourage the rooftop solar segment. Under Phase I of JNNSM, a separate scheme called 'Rooftop PV and Small Scale Solar Generation Program (RPSSGP)' was implemented for developing solar PV projects with maximum capacity of 2 MW as rooftop or, small scale ground

[182]The initial tariff discovered under JNNSM Phase I, Batch 1, in 2012, was around `10.95/kWh.result of the solar bidding conducted in 2017 by NTPC, SECI and some states witnessed a drastic fall in the tariff rates, with the 750 MW REWA, Madhya Pradesh bidding, hitting a historic low of `3.30/kWh levelised tariff

[183]In February 2017, SECI conducted the first-ever bidding for procurement of wind power at inter-state transmission system.[9] The tariff discovered through this bidding process touched a record low of `3.46 per kWh

[184]J. K. Jethani, Principal Scientific Officer, Ministry of New and Renewable Energy, Government of India, Renewable Policy Framework and Wind Energy Programme in India, 22 August 2016.

mounted solar projects.[185] As of now the solar revolution on India's rooftops is gaining momentum. During the financial year 2017, some 715 megawatts (MW) of systems were added and by 2022, the report estimates that the country will have around 9.5 GW of rooftop solar capacity.[186]The net metering based rooftop solar projects facilitates the self-consumption of electricity generated by the rooftop project is a new concept where an instrument which has a special metering and billing agreement between utilities and their customers, facilitates the connection of small, renewable energy-generating systems to the power grid. if their renewable energy-generating systems make more electricity than is consumed, they may be credited or paid for the excess electricity contributed to the grid over that same period.The guiding regulations for net metering were prepared by the Forum of Regulators (FoR). Based on these regulations, most SERCs issued their own net metering regulations.[187]Despite these supporting policies and regulations, the 40 GW target by 2022 appears challenging. Although the net metering regulations are notified by the SERCs (at state level), real challenges are being faced at the implementation level. In some states, grant for connection is provided by the DISCOMs after several days of application. Another big challenge lies in educating people, especially small domestic consumers, on the benefits of solar rooftop and facilitation of easy financing for installation. Therefore, lessons from industry experience and best practices adopted by other countries should be used to help improve the policy and regulatory framework of rooftop solar.[188]

Acceleration Depreciation and Generation Based Incentive

Accelerated depreciation allows the asset owner to write off more of the value of the asset the depreciation on an asset thereby reducing taxable income. Accelerated Depreciationis a tax benefit scheme that can be availed by a person or entity which sets up or invests in renewable energy projects (popular in wind projects) irrespective of the power generated. About 80 per cent of the project cost is paid back if the plant is commissioned before September 30 of the financial year concerned and around 40 per cent of the cost if commissioned before March 31.The Ministry of New and Renewable Energy (MNRE) has initiated Generation Based Incentives (GBI) for wind and solar energy, respectively. These long term contracts provide rewards for

[185]MaltiGoel,Solar rooftop in India: Policies, challenges and outlook,Green Energy & Environment Volume 1, Issue 2, July 2016, Pages 129-137

[186]Report by Bloomberg New Energy Finance (BNEF), November 2018

[187] Renewable Energy, AkshayUrja ,Policy Intervention – NET MEETERING, Volume- 5,Isuue -4,Feb 2012.avvailable at : https://mnre.gov.in/file-manager/akshay-urja/january-february-2012/EN/44-45.pdf

[188]Amit Kumar,India's rooftop solar sector - A success story but challenges remain,Energy World, The Economic Times,5th July, 2017.

producers of renewable energies, intended to increase the renewable energy deployment and also the competitiveness against conventional sources.[189]

The Ministry of New and Renewable Energy has announced the extension of the scheme for continuation of Generation Based Incentive for Grid Interactive Wind Power Projects for the entire 12th plan period (2012-2017). Under the scheme, a GBI will be provided to wind electricity producers @ Rs. 0.50 per unit of electricity fed into the grid for a period not less than 4 years and a maximum period of 10 years with a cap of Rs. 62 Lakhs per MW. The total disbursement in a year will not exceed one fourth of the maximum limit of the incentive i.e. Rs. 25.00 Lakhs per MW during first four years. The Accelerated Depreciation (AD) scheme and Generation-Based Incentive (GBI) scheme, which provided subsidies for setting up wind-generated power plants, were withdrawn in 2012.[190] While investors and generators have been calling for its restoration, however, only the GBI has been restored so far. Currently, the AD scheme is available for investments in other sources of renewable energy[191]

Challenges and Barriers

Necessity for Renewable Energy Enactment

Legislative Enactments, Government policies, Regulations and government initiatives have been the main engines driving new technology transitions since the beginning of the 20th century. Therefore, in order to realize the future powered by Renewable Energy, effective and stringent regulatory frameworks specifically focusing renewable energy sector in the country have to be framed.The Electricity Act 2003 can be considered as backbone of the Regulatory framework guiding renewable Energy sector in the country. Where Sections 61 (h) and 86 (1) (e) are the only real and apparent provisions relating to renewable energy under the Act (EA), 2003. The primary issue which can be sensed clearly is that these sections are mere enabling provisions and not mandatory. Hence, the enforcement has not been effective enough. The drafting of this Act started many years before its adoption whereas progress in renewable technology development and its adoption worldwide is a recent phenomenon.Now the world have realised the potential of Renewable sources and have started tackling the issues of energy insecurity, energy inefficiency, climate change through the deploying Renewable Technologies in their existing power structure.

[189] Available at :http://www.sunwindenergy.com/news/india-generation-based-incentive

[190] GireeshShrimali, Shreya Pusarla, and Saurabh Trivedi, Did Accelerated Depreciation Result in Lower Generation Efficiencies for Wind Plants in India: An Empirical Analysis, 102 Energy Policy 154 (2017).

[191] IANS,Accelerated Depreciation scheme for wind energy restored.

A great amount of detailing of the technological, legal, policy and institutional framework is required and The Electricity Act, 2003, is totally inadequate in this respect.

The existing polices and regulatory promotional mechanisms pertaining to clean energy will gain teeth only when addressed through a proper legal environment. The Power sector in India is in the middle of a seismic revolution, with targeting 40% renewable sources in the energy mix by 2030. The accomplishment of these ambitious targets depends on effective by regulatory and policy interventions and co-ordinations at the national and state level. While there is sincerity at the Central level on driving renewable energy reforms, there is an observable disturbance at the state level. Ineffective implementations of the policies at the state level have been the greater hindrance in the growth of renewables in the country. The deployment of Renewable Energy sources in India is widely dependent on achieving NAPCC Renewable Purchase Obligation targets. However, overall compliance with RPO has not been encouraging. Effective implementation of the Renewable Purchase Obligation by SERC'S and State Agenciesis essential. To make this happen, SERC'S regulations need to be built upon stringent legislations, providing effective monitoring, penal and compliance mechanism. Renewables are the future of the energy sector and this future needs to be addressed through a new law or by widening the scope of Electricity Act 2003 through amendments specifically promoting the growth of renewable energy sector.

Strengthening Centre and State Cooperation to Accomplish RPO

A nation is buildup of states and it cannot progress lest the states are on board with the Centre's. The target of achieving 175 GW of renewable energy capacity by 2022 appears to be difficult. The CERC in accordance with the NAPCC cited the uniform Renewable Purchase Obligation target of 5%starting from 2009-10 in every state with an annual increase of 1%for 10 years, till a target of 15% was reached by 2020[192]. While the introduction of the RPO mechanism illustrated the national shift towards renewable energy, the response from states has not been encouraging. The mechanism is suffering from array of issues. It is noticed that most of the state's distribution companies are not meeting their RPOs, the reason being the State electricity regulatory commissions are not penalizing discoms for not meeting their obligations and targets. Though there is a provision of penalty of Rs 1 lakh, but either it is rarely enforced or even if it is imposed the amount is very less. For instance, the RPO target for the year 2012-13 and 2014-15 was 8% and 9% correspondingly, the achievement was only 4.28% and 4.51%. State specified RPO

[192]CERC (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) Regulations, 2010

targets are not in sync with NAPCC.According to the CAG report, the Renewable Purchase Obligation targets set by SERCs for 2010-11 to 2019-20 in 22 out of the 24 States sampled for the audit were not keeping with NAPCC RPO targets; they were considerably lower and differ to a great extent from each other.[193] Further some SERC's assert very small RPO targets or mostly keep the targets constant although there should be an upturn in target proportion for each year. Some states like Andhra Pradesh have kept the RPO constant at 5 per cent from financial year 2011-12 till 2015-16. It is evident that there are no standardized guidelines or comprehensible criteria adopted by the SERCs while fixing RPO targets. Further majority of the states have not even met SERC specified RPO targets (only 6 out of 24 States fulfilled SERC mandated RPOs), also there is no effective monitoring and enforcement of RPO targets by the SERCs.[194]

To tackle the discrepancy between accessibility of Renewable energy potential across the states and prerequisite for meeting Renewable Purchase Obligation, CERC introduced the Renewable Energy Certificate (REC) mechanism in 2010. According to the mechanism, if an entity doesn't have Renewable power generation can achieve their RPO through purchasing REC. Since the REC mechanism is driven mainly by the needs of obligated entities to meet their RPO. Failure of States to achieve specified RPO targets meant that obligated entities failed to make full use of the REC mechanism for compliance – only 6 States reported purchase of RECs towards fulfilling RPO targets, indicating the REC mechanism has not been particularly successful. The success of the REC mechanism depends crucially on whether SERCs enforce the compliance mechanism for RPO or not. Many SERCs have not initiated any action on obligated entities for non-compliance,17 of the 24 States which reported shortfalls in achieving RPO targets, SERCs have failed in imposing and collecting penalties from obligated entities.[195]The CAG audit of 2015 estimated that an amount of approximately ₹42.34 billion in terms of penalties was leviable on defaulting obligated entities.

The foremost step towards ensuring strict renewable purchase obligation compliance, have to be the SERCs invoking penal provisions stringently. The SERCs shall slap show cause notices on the delinquent discoms under Section 142 of the Electricity Act, 2003, there by querying them to

[193]DipeshSuvarna, CAG Performance Audit Summary - Renewable energy sector in India,PRS Legislative Research ,Institute for Policy Research Studies,New Delhi,January 4, 2016.
[194]**Alfred Adebare**,India: Assessment Of Renewable Power Purchase Obligations In India,**LexCounsel Law Offices**,23 November 2016
[195]REC Registry of India (2017): https://recregistryindia.nic.in, 2017.

justify such deportment. Further The Centre has to undertake vigorous monitoring over SERCs, checking that state commissions are imposing strict penalties on discoms for non-compliance.

The significant suggestion is that commission shall create of 'RPO Charge Regulatory Fund'. The fines collected from the obligated entities is proposed to be utilized by State Renewable Energy Development Agency to overcome the gap in RPO realization. The good part is that The MNRE, has already constituted an RPO compliance cell to coordinate with the state governments, the Central Electricity Regulatory Commission (CERC) and SERCs.[196] In addition, under an MNRE project, The Energy and Resources Institute (TERI) has developed a centralised platform to monitor the status of RPO compliance for all states. Developing an RPO compliance regime is considered critical to reaching 175 Gw renewable power capacity by 2022.

Under utilisation of funds

Underutilisation of funds can also be seen as the major barrier against growth of renewable technology in the country. The 39th report of the Standing Committee on Energy discoveries that the Ministry of New and Renewable Energy has been unable to properly utilise the funds allotted for renewable energy deployment. The report, highlights that MNRE was able to utilise only 63 per cent of the aggregate fund allocated during the 2015-16, 65 per cent during 2016-17 and 70 per cent during 2017-18 respectively. Such low deployment of apportioned funds is analytic of poor fiscal planning by the ministry. [197]The report, also provided that budgetary allocation is generally lesser than what MNRE demands and which even gets reduced during the revised estimates. For example, in 2017-18, MNRE received Rs 5,472.84 cr against the demanded Rs 5843.96 cr. The budget was further reduced to Rs 4,080 cr at the revised estimates stage. This practice of lowering the budget "is not in sync with the humongous targets". In 2016-17, budget estimates of Rs 445 cr was reduced to Rs 272.85 cr during revised estimates. In 2017-18, the initial allocation was Rs 144 cr which was reduced to Rs 81 cr during revised estimates. Even the reduced amounts could not be fully utilised, says the report, demanding regular monitoring. [198]

[196]Govt of India , MNRE, Order, Subject – Creation of RPO compliance cell, 22 may 2018.Available at :https://mnre.gov.in/sites/default/files/webform/notices/RPO%20Compliance%20cell%20order.pdf
[197] Standing Committee on Energy (2017-18),Ministry of New and Renewable Energy,Thirty Ninth Report on 'Demands for Grants of the Ministry of New and Renewable Energy for the year 2018-19'.available at :http://www.indiaenvironmentportal.org.in/files/file/16_Energy_39.pdf
[198] ibid

Conclusion

At present nation is experiencing substantial economic progression, while at the same time the evolving economy is threshing for surplus installed electrical energy. Population growth, economic growth and an increase in electricity demand each year could further strain the grid. Therefore, intensifying installed electrical capacity is vital. Although a considerable growth in renewable energy deployment is evident since last decade and the electricity generation from renewable energy sources has been rising rapidly but the current figures are not enough to meet the problems of energy security, energy dependence on fossil based fuels, issues of environmental protection and social equity. The undertaking of 175 GW of Renewable Installed capacity looks worth challenging as renewable energy development in India confronts a cloud of structural, strategical and governance hurdles. Despite the comprehensive regulatory set up for promoting renewable energy in the country, the vision continues to be blurred. India is blessed with over 150,000MW of exploitable renewables, even after realizing the vast potential, Renewable energy still remains a small fraction of installed capacity that is 21% of total installed capacity. Therefore, the above mentioned barriers are to addressed in order to promote green growth in the country.

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Ownership Rights and Mineral Resources: Coal Mining Sector in India

by

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This seminar paper is on the ownership of mineral resources and analyzes the economic policy adopted by the Government in the coal mining sector in India. The paper analyzes the ownership of mineral resources in various countries. It also encompasses the rationale behind such ownership and its merits. Later, the paper critically analyzes the ownership of resources in India and also studies the recent judgement by Supreme Court in case of mineral ownership. The paper also examines the earlier policy of nationalization of coal sector in the Indian economy and the recent policy shift of the Government. Later, it compares the ownership principle and liberalization in the coal mining sector. The paper suggests that the ownership of mineral resources must not be confined in the hands of Sovereigns or private parties. There must be internationalization of resources for utilizing it for global good.

TABLES OF CASES

CHAPTER I

INTRODUCTION

Minerals are produced through natural process with a duration of years. So, these minerals accumulated over years shall be owned by whom is the question. The question whether State owns it, or land owners is still in ambiguity. The Supreme Court of India, in a recent judgement[199] said that there is nothing in law which states that all mineral wealth sub-soil rights vest in the State, on the other hand, the ownership of sub-soil/mineral wealth should normally follow the ownership of the land, unless the owner of the land is deprived of the same by some valid process. Across the world, the sovereign / federal / union government usually owns title to all minerals. Coal is an important energy source in India and across the world. Coal mining sector was nationalized in the year 1973 by the Union Government but now there is a policy shift from the part of the Government. The rationale behind such shift must be analyzed.

STATEMENT OF RESEARCH PROBLEM

The ambiguity regarding the ownership of mineral resources is a matter of concern and an issue that must be addressed in today's scenario. The rationale behind the ownership of the State or how ownership by the landowners affects the nation is a vital question. Recent policy shift in the coal mining sector is contradicting the interest of the Government. The rationale behind such shift must also be analyzed in the light of ownership of mineral resources.

RESEARCH OBJECTIVES

- To determine who owns the mineral resources and global trend.
- To determine the ownership status of mineral resources in India.
- To analyze the dynamics of coal mining and the policies of Government.

RESEARCH METHODOLOGY

This paper relies on secondary sources or doctrinal sources.

CHAPTER SCHEME

Chapter I

- Introduction
- Statement of Research Problem

[199] Thressiamma Jacob v Dept of Mining & Geology, (2013)9 SCC 725

- Hypothesis
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Chapter II

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CHAPTER II
REVIEW OF LITERATURE

The existing law and policy on ownership mineral resources and management of coal resources are the focused area of this paper. The literature review will address research related to the issues of ownership rights over the mineral resources. The first section will address research related to the analysis of the laws relating to ownership of mineral resources across the globe. The second

section will deal with the issues in India regarding ownership of mineral resources. The third section will discuss the research related to the coal mining sector.

- Studies related to ownership of mineral resources across the globe.

Growth in the need of energy and ever-growing demand for fuel makes mining activities important. A study[200] by David Grinlinton draws a picture of property rights in common law and whether subsoil rights are vested upon the owner of the land. It also draws a clear picture regarding the ownership and exploitation of natural resources and the remedies to address environmental changes. The article assume that landowners have few rights to minerals in the subsoil, but it does not clearly explain the limit to such right.

An article by C K Leith[201] explains the mechanisms and control over mineral resources. It explains the idea of political control over mineral resources and the arguments behind the state ownership. The article promotes state ownership of resources and also internationalization of resources but do not explain the rationale behind it. A briefing paper[202] by Nicholas Haysom and Sean Kane on ownership, control and wealth sharing over natural resource draws a clear picture of the arguments on the ownership of natural resources. It explains how the power to allocate, manage and develop natural resources are vested and the methods of treatment of natural resource revenue. It also explains why ownership of natural resources must be clearly accommodated in the Constitution of the States.

A briefing paper[203] prepared by Client Earth on the ownership and use rights of Forests natural resources, explains ownership and use rights of indigenous people, the 1992 Constitution of Ghana and its explanation regarding ownership of natural resources and also explains the term ownership in international law. And how natural resources and forest resources are owned and managed in Ghana. A study[204] by Tumai Murombo on regulating mining in South Africa and Zimbabwe explains the origins of mining framework in both the States. It explains how mining activities are done without the permission of the communities living in the concerned areas and how they are focused on

[200]David Grinlinton, *The Continuing Relevance of Common Law Property Rights and Remedies in Addressing Environmental Challenges*, (62 McGill L. J. 633, 2017)
[201]C. K. Leith, *The Political Control of Mineral Resources*, (Foreign Aff. 541,1925)
[202] Nicholas Haysom, Sean Kane, *Negotiating natural resources for peace: Ownership, control and wealth-sharing,* (Centre for Humanitarian Dialogue, 2009)
[203] Client Earth UK aid org, *Ownership and use rights of Forest Natural Resources,* (UK aid, 2013)
[204]Tumai Murombo, '*Regulating Mining in South Africa and Zimbabwe: Communities, the Environment and Perpetual Exploitation'*, (9/1 Law, Environment and Development Journal,2013)

profits. It also explains how mining activities and ownership are vested upon the State and how they are utilized focusing on the common good.

An article[205] by V K Moorthy, on changes in the federal state ownership and exploitation ofpetroleum resources in Malaysia, examines the authority of various States of Malaysia and the federation over petroleum resources in the land and also over the offshore minerals. A study[206] by Globalaw on the basics of mining law on selected jurisdictions, including Argentina, West Australia, Bolivia, Brazil, Canada, Chile, Spain, Peru, United States of America, Uruguay etc. are included in the study. It explains the mining codes of various jurisdictions where the information is contributed by firms in the respective jurisdictions. Also, the article explains how these rights are acquired over the mineral resources by the State.

- Studies regarding ownership of mineral resources in India

An article[207] by Jaivir Singh on 'right to property' in India which explains the doctrine of separation of powers and ownership rights and 44th amendment of the Indian Constitution which made right to property in India only a statutory right. The article tries to address the issues regarding those rights guaranteed by the Constitution and becomes operational through the legislature and executive. The paper addresses the constitutional changes made by the legislature of India to give a wider interpretation to 'the right to property' notion but the article does not address the issue of acquisition of land by the State and the legal and moral issues connected therewith. An article[208] by Goenchimati on who own the title to minerals in India. It analyzes Article 297 of Indian Constitution on the ownership of offshore minerals by the Central Government, also Articles 294 and 295 which states that the States are the successors to the properties and estates of the Government that previous ruled those areas. The article favors the recent development on ownership of mineral resources by the title holders but only through a narrow approach.

A report[209] issued by Indian Bureau of Mines on the concept of royalty. And It explains the concept of royalty prevailed in ancient India, explains the royalty policy in post-independence period, also explains the types of royalties prevailing in India. Also, the

[205] V. K. Moorthy, *Changes in the Federal-State Ownership and Exploitation of Petroleum Resources in Malaysia*, (24 Malaya L. Rev. 186l, 1982)
[206] Globalaw, *Basics of Mining in Selected Jurisdiction,* (GlobalMine™ Basics of Mining Law, 2016)
[207] Jaivir Singh, *(Un)Constituting Property: The Deconstruction of the 'Right to Property' in India,* (Centre for the Study of Law and Governance Jawaharlal Nehru University, 2004)
[208] Goenchi Mati, *Who owns title to Minerals in India?,* (The Goenchimati movement, goenchi.org, 2016)
[209] Indian Bureau of Mines, *Mineral Royalties,* (Government of India, Bureau of Mines, Nagpur, 2006)

royalty structure in several other jurisdictions including Australia, Kazakhastan, United States of America, Brazil, Tanzania etc. are explained and gives a picture on how royalty regime is administered in India. But the report does not give a clear picture on royalty regime according to the recent developments in India. An article[210] by Stan Swamy where he critically examines the meaning of land, whether subsoil/ mineral wealth follows the ownership of the land. The article states that the owner of the land is also the owner of the minerals relying on the recent Supreme Court judgement on that regard. The article explains the ownership of minerals by State as a myth created by the ruling class and the Government.

- Studies relating to Coal mining sector

A study[211] by Indian Chamber of Commerce on the strategic importance of coal and the scope for private participation. It analyzes the growing dependence on coal resources. The private participation through captive mining is also analyzed and coal exploration statistics are also listed. The article suggests private participation in the coal sector is the answer to many issues now faced and there lies the future of the coal sector. The article focuses on the policy of privatization and do not address the economic impact or legal issues while opening for private participation. An article[212] by M P Ram Mohan and Shashikant Yadav on various cases and judgements on coal sector by the Supreme Court and the current position of participation by private players and the judicial attitude towards the policy. Relying on various Supreme Court judgements the article elucidates the power of the Centre on invoking many economic policies and the article also suggests that whenever a conflict on legislation regarding mineral resources comes into picture the decisions shall be always in favor for the Union Government.

An article[213] by Rustam Singh Thakur on economic policies in the petroleum and mining sector. The article analyzes the decisions of disinvestments by the Government, the economic impact of it and also the powers of the Courts to analyze such economic policies. The article agrees with the disinvestment policies of Government in various

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[210] Stan Swamy, *Is the Owner of Land also the owner of minerals?,* (Sanhati, http://sanhati.com/excerpted/13650/, 2015)

[211] Indian Chamber of Commerce, *Coal mining: Is private participation the answer?,* (Pricewaterhouse Coopers, www.pwc.in , 2013)

[212] M P Ram Mohan& Shashikant Yadav, *Constitution, Supreme Court and Regulation of Coal Sector in India*, (11 NUJS L. Rev. 1, 2018)

[213] Rustam Singh Thakur, *Disinvestment in the Petroleum and Mining Sector: A Critical Analysis,*(Manupatra articles, 2016)

sectors including coal mining sector considering recent growth in the need for energy resources and the functioning of Coal India Ltd as a monopoly in the market. The article has tried to draw a clear picture of socialism guaranteed in the Constitution, but the article does not compare the socialistic ideology and disinvestment policies adopted by the Government now. A working paper[214] by Molshree Bhatnagar on the regulatory codes of coal mining sector and explains the role of PSUs in nation building. The paper also analyzes the effectiveness of nationalization of the sector and compares with the current scenario of coal block allocation to private parties. The article also focuses on the ambiguity in the sudden policy shift and do not analyze the economic impact.

CHAPTER III

MINERAL RESOURCES AND OWNERSHIP

Ownership can be referred to as a 'bundle of rights'[215] which includes both usage as well as title.[216]Ownership rights are vast and perpetual and includes the right to alienate and most importantly considered as immune from third party interference.[217]Generally, the title of land includes surface above and surface underneath. According to Halsbury's Laws of England, the term 'land' includes everything on or under the surface. The authority of law can separate ownership of land from the natural resources on or underneath it.[218] It is common for the Government to retain ownership rights over sub surface mineral resources with only the land and surface resources available for private ownership.[219]

The question of key importance is that who has the power to make and manage laws concerned to the ownership, growth and usage of natural resources. The power to legislate and regulate natural resources development determines the rights and limits of the rights of ownership.[220] There are many conflicts on this regard.The only source of income in many countries is the

[214]Molshree Bhatnagar, Competition and Regulatory Issues in Coal Sector in India, (CIRC Working Paper No. 11. New Delhi: CUTS Institute for Regulation & Competition, 2015)
[215]UKaid, Client Earth, *Ownership and use rights of Forest and Natural Resources* (2013) https://www.documents.clientearth.org/wp-content/uploads/library/2013-11-01-ownership-and-use-rights-of-forest-natural-resources-ghana-ce-en.pdf accessed 31 October 2018
[216]*Ibid*
[217] UKaid, Client Earth, *Ownership and use rights of Forest and Natural Resources* (2013) https://www.documents.clientearth.org/wp-content/uploads/library/2013-11-01-ownership-and-use-rights-of-forest-natural-resources-ghana-ce-en.pdf accessed 31 October 2018
[218]*Ibid*
[219]*Ibid*
[220]Nicholar Hayson and Sean Kane, *Negotiating Natural Resources for Peace: Ownership, Control and Wealth sharing* (2009) http://comparativeconstitutionsproject.org/files/resources_peace.pdf accessed 31 October 2018

natural resources they possess. Thus, it is of prime importance for nation building and ownership of these resources by individuals posts a serious issue. Land is considered as an emotional asset. The uneven geographical distribution of natural resources corresponds with ethnic, religious or linguistic divides.[221]

The biggest challenge is balancing the interests of private ownership, communal and customary rights and state ownership. The trend in many first-generation constitutions of the 20th century with respect to natural resources is their focus on establishing resources as owned by the State itself and for the benefit of the country.[222] Those constitutions which specifically address the ownership of natural resource express it as the asset for all the people in the country which is another form of conveying they belong to the State. The inference is that natural resources are meant for the nation development. Clearnessconcerning ownership rights and regulatory authority is grave for political stability and investor confidence.[223] The rights over the land by people are redefined. Mining laws have been an integral part of this redefinition of land and mineral resources ownership.[224]

Mining is an important economic activity that has many implications with respect to a nation's wealth. This has stimulated many nations to acquire mining lands, or for public ownership of mining lands irrespective of the title to surface land. In many countries, like Australia, South Africa and Canada mineral rights lie with the State.[225] Only very few countries like U.S.A confer ownership of mineral rights on landowners.[226] The rights of ownership of petroleum resources in Malaysia is reliant upon which State jurisdiction they belong. Under the Malaysian Constitution, Petroleum interest is the property of the respective States.[227] In Ghana, all minerals are vested upon the President. In South Africa, the mining legislations recognize the State as the trustee or custodian of extractive resources. The mining legislations in Argentina regards the State as the true owner of minerals. In Brazil ownership of mineral resources is considered apart from the ownership of the land.[228] Under Peruvian law, all naturalresources including metal and non-metal

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[221] *Ibid*
[222] *Ibid*
[223] *Ibid*
[224] Tumai Murombo, *Regulating Mining in South Africa and Zimbabwe: Communities, the Environment and Perpetual Exploitation*, 9/1 Law, Environment and Development Journal (2013),http://www.lead-journal.org/content/13031.pdf accessed 31 October 2018
[225] Special Correspondent, 'Ownership of mineral rights vests with landowners', *Times of India*(Delhi, 16 July 2013), https://timesofindia.indiatimes.com/edit-page/Ownership-of-mineral-rights-vests-with-landowners-says-Supreme-Court/articleshow/21090028.cms
[226] *Ibid*
[227] V K Moorthy, *Changes in the Federal-State Ownership and Exploitation of Petroleum Resources in Malaysia*(1982)24 Malaya L. Rev. 186,190
[228] Globalaw, *Basics of Mining Law-Selected Jurisdiction*2016, https://www.globalaw.net/wp-content/uploads/2016/03/Globalaw_Basics-of-Mining-Law-2016-Final.pdf accessed 08 November 2018

minerals are property of the Nation and the State is sovereign over the exploitation of natural resources.[229]India, along with many other states like New Guinea, South Africa, Nigeria treated natural resources as a national heritage, important in the financing of equal services and development nationwide, rather than as a regional resource.[230]

There are always limitations to ownership rights. Individually held property rights have never been absolute under the law.[231] Private property rights have always been subject to limitations in the public interest often expressed through planning, environmental and natural resource regulatory regimes.[232] The argument is that the natural resources must be used for the common good of all people and thus the land owners cannot hold private ownership over them. Public control of mineral resources takes many forms, among them direct Government ownership and operation control through leases and royalties, many forms of licenses, concessions, taxes and tariffs etc.[233] The basic thought behind the argument for Government ownership is because those minerals which are accumulated after many years must be utilized for the betterment of people. In the light of that argument, some say that nationalization of such resources is not the answer and debates have started for internationalization of such resources. The thought is growing that mineral deposits, so slowly accumulated by nature, are the heritage of all the people and are not to be exploited exclusively by any party.[234]There are views that some arrangements should be made to protect nations weak in resources against nations better favored by nature.[235]All these accounts to the idea that mineral resources belongs to all and those must be used for the global well-being.

CHAPTER IV

MINERAL RESOURCES AND INDIAN SCENARIO

As discussed above the ownership and control over mineral resources is upon the State in India. Ownership and control of the material resources of the community is to be distributed according to the policy of the state to sub serve the common good, as it is given in Article 39 of the

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[229]*Ibid*
[230]Tumai Murombo, *Regulating Mining in South Africa and Zimbabwe: Communities, the Environment and Perpetual Exploitation*, 9/1 Law, Environment and Development Journal (2013),http://www.lead-journal.org/content/13031.pdf accessed 31 October 2018
[231]David Grinlinton, *The Continuing Relevance of Common Law Property Rights and Remedies in Addressing Environmental Challenges* (2017) 62 McGill L. J. 633, 663
[232]*Ibid*
[233]C. K. Leith, The Political Control of Mineral Resources (1925), 3 Foreign Aff. 541, 550
[234]*Ibid*
[235]*Ibid*

Constitution of India.[236] The question is whether the right to property in India, initially a fundamental right and after 44th amendmentonly a statutory right, is absolute or not. No right in India is absolute. All rights are subject to many exceptions, but what is the limitation to the right to property and whether the meaning of the word 'property' include the minerals underneath is a question that must be answered.In early India, according to the ancient law, even though the King represented the State, the mineral wealth did not vest intheKing, but the King was entitled to realize revenue from his subject.[237]Later, Kautilya maintained that mining and commerce in minerals were the monopoly of the state.[238] This principle continues even today in the Indian polity.

The Constitution of India guarantees positive and negative rights for its people. The fundamental rights are regarded as the negative component and the Directive Principles are regarded as the positive components.[239] The conflict in relation to property has been expressed as interplay between the positive attempt of the State to plot a certain economic, social and political configuration subsequent in the abuse of negative liberties or rights as a consequence.[240] Earlier in *Jilubhai case*[241], the Supreme Court upheld the right of the State to acquire mines under Article 300A[242]. Kerala High Court also, in a landmark decision[243] in 1999 held that the minerals belong to the State. But now in India, there is a significant change to this view. And the above judgments were over ruled by the Supreme Court in 2013.

In *Thressiamma Jacob v Department of Mining & Geology*[244], the Hon'ble Supreme Court held that, "there is nothing in the law which declares that all mineral wealth subsoil rights vest in the State, on the other hand, the ownership of subsoil mineral wealth should normally follow the ownership of the land, unless the titleholder of the land is disadvantaged of the same by some lawful process."[245] Yes, the Court is of the opinion that subsoil rights also vest with the owner of the property and not the State. The above judgement lifts property rights and economy.[246] While

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[236] Dr. Kondaiah Jonnalagadda, *Ownership and Control of Material Resources of the Community* (2014), Lex warrior, http://www.lex-warrier.in/2014/12/ownership-control-material-resources-community/ accessed 09 November 2018

[237] Ministry of Mines, *Mineral Royalties* (2006), Indian Bureau of Mines, 3

[238] *Ibid*

[239] Jaivir Singh , *(Un)Constituting property: The deconstruction of the right to property in India* (2004), CSLG/WP/04-05, 18

[240] *Ibid*

[241] Jilubhai Nanbhai Khachar v. State of Gujarat 1995 Supp (1) SCC 596, AIR 1995 SC 142

[242] Constitution of India, Article 300A

[243] AIR 2000 Ker 300

[244] (2013)9 SCC 725

[245] *Ibid*

[246] Special Correspondent, 'Ownership of mineral rights vests with landowners', *Times of India*(Delhi, 16 July 2013), https://timesofindia.indiatimes.com/edit-page/Ownership-of-mineral-rights-vests-with-landowners-says-Supreme-Court/articleshow/21090028.cms

analyzing the judgement, the Court said that the Mines and Minerals (Development and Regulation) Act,1957 is only for the development of the mines and nothing in the Act states that all the mines belong to the Government. "The said Act does not in any way sense to declare the proprietary rights of the State in the mineral wealth nor does it comprise any provision rejecting any owner of a mine of his proprietary rights."[247] The acts which nationalizing mines and for acquisition of mining property is a reminder that those property does not belong to the Government. The Supreme Court states that, "if it belonged to the Government, it would be absolutely an unnecessary exercise on the part of the Parliament to make laws dealing with the nationalization of mines."[248] The preamble of the Coal Mines (Nationalization) Act, 1973 states that the Act is to "provide for the acquisition and transfer of the right, title and interest of the owners"[249]. This itself gives the inference that the mines or the subsoil rights do not belong to the Government as such. Natural resources found on or in land such as minerals, trees, structures and other fixed objects are normally considered to be part of the land.[250]

Analyzing Halsbury's Laws of England, it states the legal position as mines, quarries and minerals in their original position are part and parcel of the land.[251]Consequently, the titleholder of surface land is eligible prima facie to everything underneath or within it, down to the Centre of the earth.[252]TheCourt in the 2013 Case[253] also noted that the makers of the Constitution also were of the view that all mineral resources in the land did not belong to the State. The Court said, "they were conscious of the fact that under the law, as it existed, proprietary rights in minerals (subsoil) could vest in private parties who happen to own the land"[254].The Court also observed that under the Mineral Concession Rules, 1960[255] there are different procedures contemplated for the grant of mining leases in respect of two different categories of lands, they are minerals vested with Government and in a person other than Government.[256]The Court also observed that even the British recognized that the State had no inherent right in law to be the owner of all mineral

[247]Thressiamma Jacob v Department of Mining & Geology, (2013)9 SCC 725
[248]*Ibid*
[249]Coal Mines (Nationalization) Act, 1973
[250] Nicholar Hayson and Sean Kane, *Negotiating Natural Resources for Peace: Ownership, Control and Wealth sharing* (2009) http://comparativeconstitutionsproject.org/files/resources_peace.pdf accessed 31 October 2018
[251](2013)9 SCC 725
[252]*Ibid*
[253](2013)9 SCC 725
[254]*Ibid*
[255]Mineral Concession Rules, 1960
[256] (2013)9 SCC 725

wealth in the country.[257]All these facts indicates that minerals were not naturally vested with the Government.

The United Nations Declaration on the Rightsof Indigenous Peoples, adopted by General Assembly of Resolution 61/295 on 13September 2007, in Article 26 affirmsIndigenous people have the right to the lands, territoriesand resources which they have customarily owned, occupied or else used or attained.[258] India is also a signatory to the declaration. Land ownership includes certain rights to use the land and the natural resources associated with it and such rights extends to flora and fauna and minerals.[259]Thus, in India, the ownership of mineral resources vests with the landowners after the 2013 judgement[260].

CHAPTER V

COAL MINING SECTOR IN INDIA

In an economy like India, coal is a crucial resource for generating energy. Coal supplies about 53% of the primary commercial energy in India.[261] India has the fifth major coal assets in the World.[262] Coal resources being the highest provider for energy in a country like India must be used judiciously and efficiently to meet the objectives of its country for a developed nation and for a sustained economy. Production of coal has been a natural Government monopoly with over 90% of the production coming through Coal India Ltd along with its subsidiaries.[263] Unplanned growth, inability of the sector to cater to the needs of the economy along with unscientific exploitation of coal reserves, despicable conditions at work etc., lead to a series of enactments nationalizing coal mining in the early 1970s.[264] Accusations of inadequate private investment and the prevalence of unscientific mining practices, the poor working conditions of labor, particularly safety conditions turned an economic activity into a political argument that lead to nationalization.[265]Nationalization of coal sector is regarded as one of the major policies that shaped India.

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[257]*Ibid*
[258]Stan Swamy, *Is the owner of the land also the owner of minerals,*(Sanhati, 6 June 2015) http://sanhati.com/excerpted/13650/ accessed 30 October 2018
[259](2013)9 SCC 725
[260]*Ibid*
[261]Molshree Bhatnagar, *Competition and Regulatory Issues in Coal Sector in India*(2014), CIRC Working Paper No. 11,1
[262]*Ibid*
[263]*Ibid*
[264]*Ibid*
[265]GAUTAM CHIKERMANE , *70 POLICIES THAT SHAPED INDIA: 1947 TO 2017, INDEPENDENCE TO $2.5 TRILLION* (2018), HTTPS://WWW.ORFONLINE.ORG/WP-CONTENT/UPLOADS/2018/07/70_POLICIES.PDF ACCESSED 11 SEPTEMBER 2018

NATIONALIZATION OF COAL MINING SECTOR

The nationalization process of Coal Mining Sector came operative in India completely through four different acts passed by the Parliament. The Coking Coal Mines(Emergency Provisions) Act of 1971 took over the management of coking coal mines.[266] The Government in 1972, nationalized coking coal mines and coke oven plants except Tata Iron and Steel Company ltd and Indian Iron Steel Company and made the sector into a Public Sector Undertaking known as Bharat Coking Coal Ltd through Coking Coal Mines (Nationalization Act) of 1972. In 1973, the Parliament enacted Coal Mines (Taking over of management) Act, 1973 to take over the control and management of coking mines and non-coking coal mines in various States.And these mines were later nationalized through the enactment of another Act known as Coal Mines (Nationalization) act,1973. Under Coal Mines Authority India ltd, the Government formed Coal India ltd as a holding company.[267] In India, now over 937 mines are nationalized including coking and non-coking.[268] The Government now enjoys a dominant position in producing coal with over 90% of the production coming from the Government controlled mines.[269]Thus, the coal mining sector is completely owned by the Central Government.

CENTRE OR THE STATE?

The ever-increasing energy demand and power parity gap in India make the coal sector an imperative asset to the Indian economy.[270]India being a federal nation, the management of mineral resources is divided between the State Governments and the Central Government. After a decade of India being a constitutional republic, the Coal Sector posed an issue in the realm of Centre State relationship regarding the acquisition of land and related natural resources.[271] In the case *State of West Bengal v Union of India*[272], the Union Government's Coal Bearing Areas (Acquisition and Development) Act, 1957 which gave power to compulsorily acquire land and related properties, including coal owned by or vested in sovereign authorities of a State was challenged. The Supreme Court answered the question by examining List III, Entry 42 of the Constitution of Indiaconcerning to "Acquisition and requisitioning of property". The Court said

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[266]*Ibid*
[267]*Ibid*
[268]*Ibid*
[269]Indian Chamber of Commerce,*The Indian Coal Sector: Challenges and Future Outlook*, PricewaterhouseCoopers Pvt Ltd, https://www.pwc.in/assets/pdfs/industries/power-mining/icc-coal-report.pdf accessed 03 November 2018
[270]M P Ram Mohan & Yashikant Yadav, *Constitution, Supreme Court and Regulation of Coal Sector in India* (2018), 11 NUJS L. Rev. 1
[271]*Ibid*
[272]State of West Bengal v. Union of India, AIR 1963 SC 1241

that the disputed Act was not ultra vires as it was inside the Centre's competence to make laws for the procurement of State's property.[273]

Now considering the ownership of mineral resources, ownership of mining areas has a direct relation with the governance of proprietary rights over coal.[274] The Supreme Court in *Monnet Ispat & Energy Pvt. Ltd. v. Union of India*[275] ruled that "If Parliament by its law has professed that Regulation of mines and development of minerals should in the public interest be under the control of Union, which it did by making a declaration in Section 2 of the Mines and Minerals (Development and Regulation) Act,1957 to the extent of such legislation including the declaration, the power of the State Legislature is excluded. Any legislation by the State after such declaration, trespassing the field occupied in the declaration cannot constitutionally stand." [276] . Also, Supreme Court in *State of Kerala v. M/S Kerala Rare Earth & Minerals*[277]observed that "the ownership of the state of the minerals within its territory is not denuded by the 1957 Act. Once the Parliament, in public interest, brings in a law to regulate and develop mines and minerals under its control, the subject to that extent comes within the exclusive domain of the Parliament." [278] The Supreme Court emphasized that any state legislation, after such a pronouncement by the Parliament, effectively entrenches upon the field and is unconstitutional.[279] Thus, even though the State under the Constitution is given the power to regulate mines and minerals for its development, the Parliament has the upper hand.

NATIONALIZATION AND CURRENT SCENARIO

The nationalization of Coal Mines reinforces the essence of the Mines and Minerals (Development and Regulation) Act, 1957 as coal mining sector is a Public Sector Undertaking now. The spirit behind the idea of nationalizing coal mines was to avoid mis management and unsound mining methods including slaughter mining, uneconomic collieries, unfair labor practices like underpayment of wages and malpractice in sales which were then used by private actors exploiting the minerals.[280] The objective of nationalization was to foster the judicious use of the natural resource and to ensure 'common good' through scientific exploitation of mineral

[273]*Ibid*
[274] M P Ram Mohan & Yashikant Yadav, *Constitution, Supreme Court and Regulation of Coal Sector in India* (2018), 11 NUJS L. Rev. 1

[275]Monnet Ispat & Energy Pvt. Ltd v. Union of India, (2012) 11 SCC 1
[276]Monnet Ispat & Energy Pvt. Ltd v. Union of India, (2012) 11 SCC 1
[277]State of Kerala and Ors. v. Kerala Rare Earth and Minerals Limited and Ors., AIR 2016 SC 181
[278]*Ibid*
[279]M P Ram Mohan & Yashikant Yadav, *Constitution, Supreme Court and Regulation of Coal Sector in India* (2018), 11 NUJS L. Rev. 1
[280]*Ibid*

resources.[281] In Sanjeev Coking Coal v. Bharat Coking Coal Ltd[282], the nationalization of a coal mine was upheld as a step towards socialism and it was held that the ownership, control and distribution of national productive wealth for the benefit and use of the community and the rejection of a system of misuse of its resources for selfish ends is what socialism is about.[283]

But recently, since Coal India Ltd is the monopoly in the sector, Competition Commission of India has recommended that the Government must initiate a process through which more players can be introduced in the mining sector.[284] There was a case before the Competition Commission alleging abuse of dominance by Coal India Ltd. The Commission observed that since there are no other players in the market, the consumers have been paying high amount for their electricity consumption. The Commission ruled that Coal India ltd through its subsidiaries operated independently of market forces and enjoyed undisputed dominance and has imposed unfair conditions of supply of non-coking coals.[285] And the Central Government have now unlocked the sector for private players and have allocated coal blocks for many private parties and this is now regarded as the biggest reform in the mining sector ever since nationalization. The allocation of some coal blocks was challenged and was cancelled by the Supreme Court finding the process of allocation arbitrary. The allocation of coal blocks is under the provisions of the Mines and Minerals (Development and Regulation) Amendment Act, 2010 and Rules. Otherwise, entry of private players to the sector is now welcomed and thus there is a policy shift by the Government.

CHAPTER VI

OWNERSHIP AND COAL SECTOR: THE ROAD TAKEN AND THE PATH AHEAD

The term ownership is very complicated and is interpreted differently according to the context. It can be limited by procedures of law since ownership right is not absolute. The interests of the Government and the common people must be balanced. In many countries around the globe natural resources belongs to the State. The rationale behind it is, these resources given by the nature must be used for the benefit of all the people and should not be confined to any person's hands. These resources are thus for the common good. Thus, the idea of socialism is prevalent in

[281] *Ibid*
[282] Sanjeev Coking Coal v. Bharat Coking Coal Ltd., AIR 1983 SC 239.
[283] Rustom Singh Thakur, *Disinvestment in the petroleum and mining sector: A critical analysis* (2016), Manupatra articles, http://www.manupatra.com/roundup/327/Articles/DISINVESTMENT.pdf accessed 03 November 2018
[284] Molshree Bhatnagar, *Competition and Regulatory Issues in Coal Sector in India* (2014), CIRC Working Paper No. 11,1
[285] *Ibid*

the case of natural resources. Many countries be it Capitalist or Socialist, this principle is used for nation building. The idea of internationalization of such resources are also debated. This idea is to help those countries with less resources so that the resources are utilized for people around the globe equally. Thus, ownership of such resources by individuals or private parties cannot serve this ideology and thus it is inferred that such resources belongs to the State. Many nations have adopted this in their Constitution as well. The natural resources are understood as state legacy to be shared impartially. This is the argument for disallowing private ownership of such resources and the reason behind public ownership. But public ownership can in turn create many conflicts in federal states. Whether the resource belong to the Country as a whole or provinces is the question of major importance and impact. Often in many countries natural resources are the only source of income. Thus, the idea of common good is again invoked and thus in many Countries it belongs to the Sovereign. Thus, ownership is always a battle between private title, communal rights, customary rights and socialism. And due to the 'common good' claim, socialism often wins the battle. And the Sovereigns have an inherent right to exploit the natural resources from their adjoining sea beds and there comes the contradiction. Inherent rights can be exercised by Sovereigns were individuals are denied even the right over the property they hold title. Thus, sometimes these can be interpreted as economically motivated. Thus, minerals resources must be internationalized. The term 'common good' should be widely interpreted as 'global good'.

India is a socialist country. The term socialism is added to the Preamble of Indian Constitution. Thus, India also follows the ideology of 'common good' but recently in a Supreme Court judgement, the Court observed that the subsoil minerals belong to the title holder and nothing in the law states that it belongs to the State. This defeats the entire idea conceived over the land. Thus, land includes subsoil. Ownership of resources now in India is upon land owners. This is because of a lacuna in the law. This has now led to many connecting issues like the issue of royalty and the royalty issue is yet to be decided by a larger bench in the Supreme Courtand also resources scattered among land owners can promote only small-scale mining activities and this might lead to a heavy fall in investments and thus a major fall in the revenue of the country. Thus, this can have a negative impact as well while acknowledging the right of the land owner.

The Thressiamma Jacob[286] judgement shouldn't be applied for coal industry since it is governed by Special Legislation. The nationalization of coal mining sector and now opening the sector for private participation is a policy shift which is affecting socialism. But the Courts cannot interfere

[286]Thressiamma Jacob v Department of Mining &Geology, (2013)9 SCC 725

in matters where there is a policy shift by the Government. It was held by the Supreme Court in Bank Nationalization case[287] the Court will not question the policy shift by the Government. Thus, the new policy is questioning the ideology of socialism and 'common good'. The sector is opened by the Government expecting greater efficiency and technological advancement. But the precedents of liberalization in many sectors have witnessed major price hikes like the Delhi water and power supplies. India meets half of its energy requirements through coal produced by Coal India Ltd.Until nationalization, the coal sector was a corrupted and fierce sector, the nationalization made it organized and emerging sector and helped in nation building to a very large extent. But the monopoly of Coal India Ltd in the economy was abusive and thus the consumers were paying extra costs due to this many a times. Thus, there are positive and negative impacts for nationalization. But opening the coal mining sector for private participation can have major negative impacts with regard to the ideology of 'common good' and socialism. Major groups who are arrogant players coming to the market might lead to efficiency, but the constitutional morale will be compromised.

Since, there are conflicts and contradictions with the policies and objectives, to achieve the idea of common good, there must be internationalization of resources. These resources belonging to everyone must not be confined for nation development but for the upliftment of the mankind. There mustalso be a mechanism to safeguard these resources and measures to identify and protect the interests of the local communities.

CHAPTER VII

CONCLUSION

The ownership of mineral resources belongs to the State in many countries except a very few. Ownership of such resources is upon the State or private individuals, this depends upon the policy of the States. Ownership of natural resources is mostly conferred upon the States because of the view that those resources belong to everyone and those resources shouldn't be concentrated in few hands. Thus, natural resources are meant for nation development, but this idea is defeating the rights of many land owners and many customary rights.

In India, the resources belong to the land owners. It has been observed by the Supreme Court that nothing in law states that those resources belong to the State. The lacuna in law must be addressed. Coal mining sector was nationalized in the year 1973 and recently there has been a policy shift and the coal mining sector is now open for private participants. This is against

[287] R C Cooper v Union of India, 1970 AIR 564

constitutional objectives and principles. Resources which are gifts of nature must be utilized for a global good. Internationalization of mineral resources must be adopted, and the rights and livelihood of local people must be safeguarded.

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COMPARATIVE ANALYSIS OF ETHANOL PRODUCTION IN INDIA: AN ANALYTICAL STUDY WITH REFERENCE TO EXISTING POLICY AND DECIDED CASE LAWS

by

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Bio fuels have emerged as the most efficient alternative fuel in place of fossil fuels in past few years. The core motives behind the broader switch towards the Bio fuel are the energy security, air quality and fuel efficiency. Among the Bio fuels, Ethanol is most widely used as an alternative to fossil fuels due to some of its specific physical and chemical characteristics.

Even after doing efforts in the development of Bio ethanol Blending since a decade, India has not yet performed well as compared to other countries at a global level. This study will give the major discussion to the features of the national legal policy frameworks related to the production of bio ethanol especially with the national bio fuel policy of 2018. For the ethanol production in a better way, it is necessary to evaluate the national legal framework, its strength, weakness, gaps, loopholes through reviewing the policy from several dimensions along with production of bio ethanol. Also, this paper will analyse the various case laws of India and United States related to the Ethanol production and Ethanol Blending that can be useful for the country in future for legislative and litigation perspective to achieve targets in a better way.

ABBREVIATIONS

APMC	: -	Agricultural Produce Market Committee
BIS	: -	Bureau of Indian Standards
BSC	: -	Bio-fuel Steering Committee
CAA	: -	Clean Air Act
CCEA	: -	Cabinet Committee on Economic Affairs
DBT	: -	Direct Benefit Transfer
EBP	: -	Ethanol Blending Programme
EPA	: -	Environment Protection Agency
FDI	: -	Fund Direct Investment
IEM	: -	Industrial Entrepreneur Memoranda
IRDA	: -	Indian Renewable Energy Development Agency
ISMA	: -	Indian Sugar Mills Association
Lmt.	: -	Limited
LPG	: -	Liquefied Petroleum Gas
MCD	: -	Model Contract Draft
MNRE	: -	Ministry of New & Renewable Energy
MOU	: -	Memorandum Of Understanding
MPP	: -	Minimum Purchase Price
MSP	: -	Minimum Support Price
MSW	: -	Municipal Solid Waste
NABARD	: -	National Bank of Agricultural & Rural Development
NAC	: -	National Alcohol Council
NBCC	: -	National Bio-fuel Coordination Committee
NDDB	: -	National Bio fuel Development Goal
NDM	: -	National Bio Diesel Mission
NEC	: -	National Execution Commission
NGO	: -	Non-Government Organisation
OMC's	: -	Oil Manufacturing Companies
OPEC	: -	Organization of the Petroleum Exporting Countries
Ors.	: -	Others
R&D	: -	Research & Development
RFS	: -	Renewable Fuel Standard
RON	: -	Research Octane Number

SHG	: -	Self Help Group
SIDBI	: -	Small Industry Development Bank of India
SMP	: -	Statutory Minimum Price
SRA	: -	Strategic Research Agenda
Vs.	: -	Versus
W/W	: -	Weight/Weight

COMPARATIVE ANALYSIS OF ETHANOL PRODUCTION IN INDIA: AN ANALYTICAL STUDY WITH REFERENCE TO EXISTING POLICY AND DECIDED CASE LAWS

The legal frameworks and policies related to biofuel are gaining continuous importance for the socio economic and environmental aspects. Emphasis is to minimise the hazardous impacts and maximising the welfares for the long term. In the past ten years, government has made intensive efforts by running interventional steps in the promotion of the biofuel policy of India. Namely, 'The ethanol blended petrol programme', 'National biodiesel mission', 'biodiesel blending programme'. After observing the trends of fuel consumption in the country and adequate research the government has shaped the schemes and programs that support to uplift the pricing, the subsidies etc. government has also shifted its focus on further research and development in the ethanol blending promotions, resulting in boosting the biofuel promotion in India on an increasing scale of graph.[288] But even after doing efforts in the development of Bioethanol Blending, India has not yet performed well as compared to other countries at a global level.

[288] National Policy on Biofuel, 2018, sec. 1.6, 335 (2017), petroleum.nic.in/sites/default/files/biofuelpolicy2018_1.pdf.

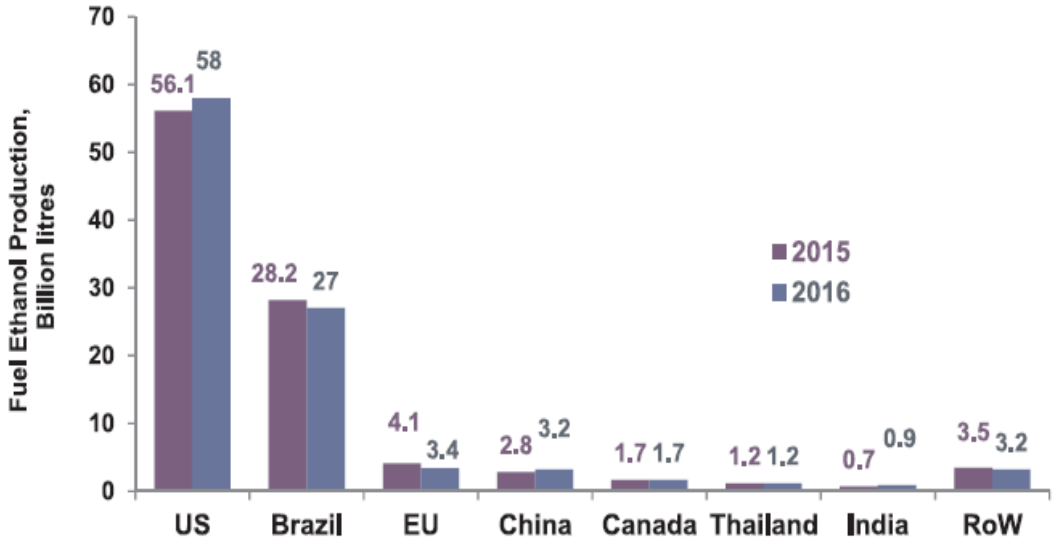

Fig.1:Country-wisefuelethanolproductionduringtheyear2015and 2016.[289]

Governments support Bio fuels in many different ways, including blending mandates or targets, subsidies, tax exemptions and credits, reduced import duties, support for research and development and direct involvement in bio fuel production, as well as other incentives to encourage local bio fuel production and use. Biofuel blend mandate, which require that specific amounts of biodiesel, ethanol, and/or advanced bio fuels be mixed with petroleum-based transportation fuels are now in place in 33 countries, with 31 national mandates and 26 state or provincial mandates.[290]

US has passed several number of legislations in sequence involving financial supports in form of tax policies, loan assurance to set up Biofuel Plants. Energy Policy Act, 2005, enacted to contribute 4 billion gallons biofuels in transport sector. Energy Independence & Security Act, 2007 has an aim of 18% renewable fuel in the Transports by 2022. Biomass program, 2008 has an aim to reduce gasoline consumption by 2030 to 30%, & there should further increase in the corn based Ethanol Production.

Implementation Crisis: The main issue with which India is going through is Implementation Crisis. Due to this poor implementation, India keeps on making new policies, new laws and new targets without achieving the earlier ones. Best example to cite over here for this is National

[289] P. Sakthivel et al., Indian scenario of ethanol fuel and its utilization in automotive transportation sector, 132, Resources, Conservation and Recycling 102, 106 (2018).
[290]PallavPurohit, SubashDhar, Biofuel Roadmap for India, DTU Library (2015), http://orbit.dtu.dk/files/120569025/Biofuel_Roadmap_for_India.pdf.

Biofuel Policy of 2018 and a big failure of the Biofuel policy of 2008. When we compare it with other countries as like USA, they set target not just to set them but to achieve them as well.

This study will give the major discussion to the features of the national legal policy frameworks related to the production of bio ethanol especially with the national biofuel policy of 2018. For the ethanol production in a better way, it is necessary to evaluate the national legal framework, its strength, weakness, gaps, loopholes through reviewing the policy from several dimensions along with production of bioethanol. It is necessary to have a comparative analysis of legal policies of other countries related to production of bio ethanol to achieve targets in a better way. A single biofuel policy works along with the agriculture and energy sector, trade, land management, technological advancements, economic affairs, cooperation of several agencies and many more. Narrow focus only on biofuel production in isolation could not give a regulatory basis to achieve set goals of Ethanol production and Ethanol Blending. We will have to see the several aspects altogether including technological advancements, economic feasibilities, environmental aspects, governmental support in form for strong legal frameworks and public awareness. Adequate research and development can handle all the aspects but only if it is backed by a good legal policy.

VISION AND GOAL OF NATIONAL BIOFUEL POLICY, 2018

The focus of the National Biofuel Policy 2018 is towards the domestic feedstock. It gives emphasis to utilise this domestic feedstock into biofuel production to change the graph to the fossil fuel and oil import. This polices target towards the issues prevailing in the country for instances Climate Change, Unemployment and Energy Security the policies tries to replace these prevailing concerns through the production of Biofuel. In place of traditional ones, the advance technologies being promoted in the provisions of the policy. The Goal of this new National Biofuel Policy 2018, has the goal of blending of 20% Ethanol by 2030 in petrol and in regard with the diesel, there should be 5% biodiesel blending in diesel by 2030.

EVALUATION OF NATIONAL BIOFUEL POLICY, 2018: WITH CRITICAL ANALYSIS

1. **The Preamble**: Its preamble has pointed out about the problems that has forced for the development of national biofuel policy. Along with that, it shows the aims and target areas of the policy. However, at the initial stage of preamble, this policy, gives prominence on the need of the escalation of biofuel through emphasizing on the number of negatives of conventional or fossil fuel resources.

2. **FOOD HUNGER Vs. FUEL HUNGER**: This policy mainly curb the issue of India as FOOD HUNGERY or FUEL HUNGRY, through generation biofuel from non-edible food crops and agricultural residues. The formation of this policy gives some hope of regarding energy security. Biofuel policy is a strategic approach towards technology, financial and institutional area.

   Through the biofuel policy, the Ethanol is produced from the molasses. Every another body or person including farmers, landless labourers even company is encouraged by this policy to get involved and work for the production of bioethanol.

3. **National registry of feedstock**: the Earlier National Biofuel Policy of 2009 says that, "The blending levels of Biofuel will be reviewed and moderated periodically as per the availability of bio-diesel and bio-ethanol. And a National Registry of feedstock availability, processing facilities and offtake will be developed and maintained to provide necessary data for such reviews with a view to avoid mismatch between supply and demand."[291] But in the National Biofuel Policy 2018 published in official gazette on Friday, 8 June 2018, there is no discussion about such registry. Also there is no provision given in the policy regarding the maintenance of data of these reviews or to maintain the data of demand and supply. Without such significant provisions, the data management will remain an issue.

4. **Joint mechanism for industries and OMCs:** All the BIS specification and the certification standards would be taken care in respect of blending levels. The undated document of the National Biofuel policy uploaded on the website of ministry of new and renewable energies (MNRE) mentions that OMCs and processing industry would need to set up jointly an appropriate mechanism and required facilities[292], but the officially published National Biofuel policy 2018 does not mention anything regarding it. Moreover, due to the responsibilities given to the OMC regarding pricing, marketing and distribution, and the provisions of blending reviews, such joint settlement between OMC and processing units is necessary otherwise, it will not be able to work properly.

5. **Entrance of FDI :** However, regarding the point of investment, it is pertinent to note that even though 100% FDI is allowed but with the limitation that it would not be applicable in case of plantation of nonedible. This provision under automatic route is allowed only

[291] National Policy on Biofuels, 5.8, https://mnre.gov.in/file-manager/UserFiles/biofuel_policy.pdf.
[292] National Policy on Biofuels, 5.10, https://mnre.gov.in/file-manager/UserFiles/biofuel_policy.pdf.

for the purpose of biofuel technology and projects. It will help in the technological expertise and for the entrance of new technologies in India. This is a beneficial point for the farmers as well as for the country. As, farmers will develop through plantation and country will develop through technology.

6. **Model Contract Draft:** There is no provision related to model contract draft that must be formed by the State Councils to protect farmers from the further exploitation by the producers. There are the chances that further farmers can be exploited by the producers on the basis of bounded contact of farming and selling them the biomass. The state should be the mediator in regard with contract farming between the farmer and the production houses.

   That draft should be made in consent with the production houses or industrialist and the farmers both.

   The members that can be involved to form this contract may be as following:
   The Law Minister, The Agriculture Minister, Heads of Agricultural Produce Market Committee (APMC), A renowned NGO working in the sector of growth of farmer in that state, and Minister of Commerce.

7. **Tax structure varies from state to state:** Due to the different tax policies at different states as specified in Figure 2, can create hurdles in the speedy and effective implementation of National Biofuel Policy. There would also be issues in free movement of ethanol across states due to excess administrative controls and different tax rates.

8. **No additional Incentives to biofuel blenders and retailers**: Unlike other countries in India, there is no provision in the policy to give any kind of additional incentives to the biofuel blenders or retailers. Such provisions are necessary to encourage the production, blending and the sale of ethanol in the market.

   As in USA, there is a provision of blender's tax credit, such as the $1.00 per gallon credit given to biodiesel blenders, which expired at the end of 2013, gives an incentive to blenders to use more biofuel.[293]

[293]Ag Professional, EPA add-up RFS and the biodiesel blenders tax credit, farm journal's agpro, March 12, 2014 04:18 PM, https://www.agprofessional.com/article/epa-add-rfs-and-biodiesel-blenders-tax-credit.

9. **Strict Enforcement of Biofuel Quality**: In the National Biofuel Policy published in official gazette, there is no provision mentioning for the strict enforcement of the standard provisions and no particular agency has been designated to have a proper check on the quality of biofuel being supplied.

10. **Narrowness of practical experience**: If the table under **Figure 2,** is observed, the practical experience can be seen. Even after several researches done and it is said that approximately 400 plant species to be used as oil seeds, but practically only Jatropha plant is focused by the state and formation of research agencies. Reason behind it could be anything. "Jatropha plant is the major source of biodiesel in India. Moreover, it is not treated as a viable source on commercial ground and challenges related to marketing and yield also involved in it. To get a better result, the research should be made on climate and soil of the agriculture in place of the plant. Also, on the type of soil that can result for the better productivity of these plants."[294]

States Involved	Nodal agency involved/ proposed	Targeted non-edible oil seed crops	Main actors	Type of land made available	Support provided by Government	Government procurement price	Sales tax rate on Diesel (in %)	Sales tax rate on Ethanol (in %)
Rajasthan	Biofuel authority	Jatropha	SHGs, CDOs, Panchayats, and private companies	Wastelands and ravine lands	Subsidized seeds and a 20 year lease of govt. wasteland for plantation	Rs 6/ kg		
Gujrat	Agro Industrial corporation	Jatropha		Hilly areas and barren lands			21	4
Chhattisgarh	Biofuel Development Authority	Jatropha and pongamia	JFMCs, local farms, and private investors	Wastelands and ravine lands	Free Jatropha seeds for planting, and tax duty exemptions	Jatropha- Rs 6.5/kg Pongamia- Rs 6/kg	25	

[294]AzhahamPerumalSaravanan et al., Biofuel policy in India: A review of policy barriers in sustainable marketing of biofuel, 193, Cleaner Production, 734, 759 (2018).

Uttarakhand	Biofuel Board	Jatropha	Van panchayats (local forest councils), Joint forest Management committees, SHGs	Wastelands	Genebank for Jatropha to preserve high yielding varieties	Rs 3.5/kg (lower price because of lack of competition)	21	
Odisha	Odisha Renewable Energy Development agency	Jatropha and pongamia	Pani panchayats, and SHGs	Wastelands	Subsidy for seeds and create linkage to MGNREGA			
Karnataka	Biofuel Development Board & State task force on biofuel	Jatropha, Pongamia, Simarouba, Mahua and neem	Traditional communities	Waste and irrigated lands	Biofuel Park proposed, tax exemptions	–	–	–
Andhra Pradesh	Biodiesel Board	Jatropha, Pongamia and Simarouba		Irrigated and rainfed lands	Systematic R & D support involving ICRISAT and State Agricultural Universaties		22.25	12.5
Tamil Nadu	Wateshed Development Agency and Watershed Development Corporation	Jatropha	D1 Mohan, AGNI NET, AHIMSA	Wastelands and degraded forest lands	Subsidized loans, Tax exemptions, VAT on oil, Several State sponsored programmes linked with biofuel programme.	Rs 5-10 /Kg (with buy back)	21.43	8+5% surcharge

Figure 2 Analysis of Some Selected State-Specific Biofuel Policies (Raju et al., 2009; Pohit et al., 2010; Raju et al., 2012; Kumar Biswas and Pohit, 2013; Dwivedi et al., 2014; Awalgaonkar et al., 2015)[295]

11. **Coordinating Ministry**: Earlier National Biofuel Policy 2009 declared Ministry of New and Renewable Energy as the coordinating ministry responsible to maintain the coordination for the National Biofuel Program. Now the work of overall coordination

[295]Azhaham Perumal Saravanan et al., Biofuel policy in India: A review of policy barriers in sustainable marketing of biofuel, 193, Cleaner Production, 734, (2018).

maintenance has been shifted to Ministry of Petroleum & Natural Gas. Apart from other many functions, this is also a significant function transferred to the ministry.

12. **Biofuel Steering Committee (BSC)**: As per the earlier National Biofuel Policy, there would also be a BSC, under the Chairmanship of the Cabinet Secretary. Its main work will be so see the implementation of the Policy. Such institution plays a vital role regarding price discussions, R&D and so more. But the present policy does not talk anything regarding such institution even after this heavy implementation crisis of the policy.

    When we evaluate the policies of other nations, like Brazil, it also has BSC. "Within the ministries of agriculture and energy, similar actors form the institutional core of Brazilian bioenergy, with one in each ministry acting as a steering committee to guide policy development and another to carry out that policy."[296]

13. **Minimum Price:** There is no provision regarding minimum Support Price (MSP) to the farmers to ensure the fair price for them, neither there are the provisions related to Statutory Minimum Price (SMP), Minimum Purchase Price (MPP). Altogether, there is no provision related to the calculation and periodic revision of such minimum support prices.

14. **Transferring Benefit to farmers:** There is no criteria given regarding the transfer of the direct benefit to the farmer, for instance through carbon credits. Any institution is also not established that can be involved to provide such benefit to the farmers involved. It is needed to address these issues through existing institutional mechanism or new mechanism.[297]

15. **National Biofuel Development Board:** As per the sources, earlier there was the provision suggested by the NBM for the establishment of the NBDB, but later on it has been withdrawn and did not specify and reason behind the withdrawal.

16. **Unavailability of Recent data:** No ministry is bound by this policy to make available the latest data related to biofuels to the public by its website. Unavailability of the data is the major issue for the researchers to move ahead in the field of R&D. Data available in the

[296]Elisa Morgera et al., Case studies on bioenergy policy and law: options for sustainability, FAO Legislative study, 91 (2009).
[297]AzhahamPerumalSaravanan et al., Biofuel policy in India: A review of policy barriers in sustainable marketing of biofuel, 193, Cleaner Production, 734, 754 (2018).

document is very old and many a times, even if the data is available, different articles shows different data of the same year, which means the information related to data is unauthenticated. Therefore, to move ahead in the field of research with the authenticated information, the latest data should be easily available on the official websites of the responsible ministries.

17. **Absence of Awareness Responsibility:** In most of the rural areas, farmers are not yet aware about the use of their agricultural residues or rotten agricultural material for the use of production of biofuel. There would not be implementation of the plans without enhancing the awareness in the people involved. The National Biofuel Policy 2018, does not give the responsibility to create awareness to any ministry, not any institution has been formed to create awareness among the people regarding the same. In such situation of unawareness, to achieve the targets of ethanol production, a ministry should be given a sole responsibility to go to different areas and aware people through various activities and media sources. Creating awareness in the farmers and other people regarding this program will surely increase the production amount of Ethanol.

18. **Absence of Transportation link:** Many a times, even if the farmer and other people are aware concerning this production through waste program, still did not get involved to send their supplies to the producer and the major reason behind this is the transportation issue. The policy must have assigned this responsibility to a ministry or some institution that should be involved in taking the products from the farmers and deliver it to the producers. If up to the root level such ministry will reach to take the products, and to deliver it to the producer, the rate of increase in production of ethanol can become another story of success in the country.

19. **Role of Ministries as per the Policy:** As per the National Biofuel Policy 2018, the ministries are given the respective responsibilities.[298]

[298] National Policy on Biofuel, 2018, 335 (2017), petroleum.nic.in/sites/default/files/biofuelpolicy2018_1.pdf.

Ministry/Department	Role
Ministry of Petroleum & Natural Gas	• Overall Coordinating Ministry for development of biofuels • National Biofuel policy & its implementation • Research, Development & Demonstration on applications of biofuels • Marketing and Distribution of biofuels • Blending levels of biofuels • Development & Implementation of Pricing & Procurement Policy • Dispute redressal • Foster international collaboration for advance Biofuel research and Capacity Building • MSW to transportation fuels
Ministry of Rural Development	• Plantation, Supply Chain activities along with Rural livelihood programs, MGNREGA etc.
Department of Agriculture & Cooperation (Ministry of Agriculture & FW)	• Production of plant materials through Nurseries and plantations for biofuels in coordination with other Ministries
Ministry of Environment, forest and Climate Change (MoEF&CC)	• Biofuel plantations in forest lands and environmental issues concerning biofuels • Involvement of communities in maintenance of plantations and supply chain
Ministry of Science and Technology (Department of Biotechnology and Department of Science & Technology)	• R&D on various feedstock and improvement of technologies for Biofuel development.

	• Promote innovation and cutting edge research in Biofuel area. • Development of technologies for bio-refinery and value added products.
Ministry of Road Transport and Highways	• Encourage consumption/usage of Biofuels in transport sector.
Ministry of Railways	• Encourage consumption/usage of Biofuels
Department of Consumer Affairs (Ministry of CA, F&PD)	• Laying down specifications, standards and codes for ensuring quality control of biofuels for end uses
Ministry of Heavy Industries and Public Enterprises	• To advise Manufacturers of Equipment for making them compatible with biofuels available in the market
Ministry of New & Renewable Energy	• To generate/produce energy through biogas including enriched biogas, bio-CNG and bio-power etc. from biomass/urban, industrial and agricultural waste. .
Ministry of Housing & Urban Poverty Alleviation	• To coordinate with States and ULBs for the availability of MSW as an important feed stock for biofuels including municipal solid waste in urban areas for which the policies are being enunciated by this Ministry
Ministry of Consumer Affairs, Food & Public Distribution, Department of Food & Public Distribution	• DFPD to provide suitable financial incentives to the sugar sector for setting up of ethanol distilleries

India is trying to achieve success in the Biofuels to resolve many issues of the country, but a policy framed with number of critics cannot achieve the targets in a well-defined manner. In

today's era when every another country is playing a leading role in the direction of Biofuel, India have to work very hard whether in terms of policy, technology, fiscal benefits, implementation and so more to get success.

STORY BEHIND THE SUCCESS OF BRAZIL

This area of the research work deals with the review of the key success factors of pro ethanol countries and review about their experiences in the bioethanol industry. The governmental moves in form of policies of Brazil is covered in this section.

Several drivers takes part to increase the production of biofuels in a particular country. The stakeholders, issues related to production, and rest key features differ from country to country. Brazil is having abundant quantity of ethanol production due to number of reasons behind including the land of Brazil is in itself favourable for the production of sugarcane. Some other things also play their role as the fortune of Brazil in this field including the water availability, the people of Brazil including farmers are very skilled, they are trained, and land can be easily available to them on an easy basis for production. Brazil has become independent country in the energy field due to increase in the use of renewables and production of petroleum. Ethanol industry of Brazil is majorly based of sugar cane and it widely focus on first generation ethanol production. Especially under its ***"Pró-Álcool"*** programme, it is leading in all over the world since more than 30 years. Brazil started this program in 1975. This program boosted the ethanol production in the country in highly unexpected way. Number of significant provisions were brought through this program including fiscal schemes to provide loans at low interest rates, 25% ethanol blending mandate, making engines those are suitable for blending fuels in place of earlier used pure gasolines, prices of ethanol fuel is also made competitive to the price of the gasoline. This was the most leading programme globally. It was converted high range of oil import to domestically formed fuel as alternative.

Afterwards, in 1990, this ***"Pró-Álcool"*** program was terminated but some of the schemes continued to remain related to market regulation and tax relaxation. However, the concept of ***Flex Fuel vehicle*** came in 2003 proved as a game changer in the country. The main characteristics of those vehicles is that they can run through pure gasoline, or through pure ethanol and even through the combination of both. By these, flex fuel vehicles, E85 came into the Brazilian market.

The new technology that came in automobiles fired up in the market of Brazil. The practice of the flex fuel vehicles raised above 80% in 2009. This has elevated the demand for the bioethanol,

which resulted into increase in the production of biofuel. In the era prior to invention of flex fuel vehicles, the demand for the biofuel was lying in between 10.5 to 13.6 billion litres/year. After 5 years of the introduction of flex fuel vehicle, the demand for bioethanol raised to 18 billion litres in a year. At that time, the total production of Bioethanol in Brazil was 22.5 billion litres. The rest amount after the consumption is exported by the country. This figure clearly shows that how Brazil was self-sufficient in the biofuel production. After this achievement, the Brazilian government brought other plans to focus on the other objectives of biofuels. ***The Brazilian Agro energy Plan 2006-2011:*** This plan was originated with the aim that, now the priority of Brazil became to "produce and transfer knowledge and technologies that contribute to the sustainable production of energy from agriculture." Under this plan, the Brazil government was more focused towards sustainability and environmental upgradation; there should be minimised GHG emission. Through this plan, they also emphasised on the maximum level of employment generation and towards the better techniques to export the export the Biofuel.[299]

To understand the plans of Brazil in the sector of Bio energy so that India can take some benefits, the National alcohol programmes of Brazil can be divided in parts.

- **PHASES OF *"PRÓ-ÁLCOOL"* PROGRAM:**

The ***"Pró-Álcool"***program (1975-2006): This plan can be in 4 Phases to understand it briefly:

- **Phase 1 (1975-1979):** this was the stage when government subsidies and tax benefits were started with some targeted reasons behind them. There was an oil crisis came in 1973. It has also increased the oil import cost from US$ 500 million in 1972 to US$ 2.8 billion in 1974. So, this program has two targets in between this era, first is to protect the nation from vulnerability, and another is to stabilise domestic price and sugar demand. Therefore, sugarcane producers and ethanol distilleries were provided benefits from such governmental schemes.

- **Phage 2 (1878-1989):** in 1979, the oil prices reached up to its highest pitch and oil import reached to 10 billion US$.

In 1979, Brazil was largely evolved in the production of Bioethanol and it was receiving the appropriate support by the government. The government created majorly two bodies for the

[299] Elisa Morgera et al., Case studies on bioenergy policy and law: options for sustainability, FAO Legislative study, 83 (2009).

execution of the plan, namely: National Alcohol Council (NAC), National Execution Commission (NEC).

NAC was evolved for the evaluation of *"Pró-Álcool"* Program. It has given the responsibility to over sight the program. NEC was given the responsibility regarding the implementation of the *"Pró-Álcool"* program.

For the success of any policy or plan, these two actions are predominant i.e. its Evaluation and its Implementation. Firstly, there should be a proper Evaluation the plan and after that, there should be a proper implementation. The plan should not remain merely on pages. On evaluation of National Biofuel policy of 2018, it is observed that, even after the heavy implementation crisis of the National Biofuel Policy 2009, this new policy has not formulated any particular agency, which should be given the major responsibility regarding implementation of the policy.

Around 96% of all automobiles were running on the road through Bioethanol in Brazil by 1985. Therefore, this era came out as a flourishing era for the *"Pró-Álcool"*programme. In this time around 4.5 million flex fuel cars were sold in the Brazilian market. The six main mechanism on which Brazil was giving emphasis in the plan were "(i) the requirement that bioethanol be priced lower than gasoline at the pump. (ii) a guaranteed even price across the nation for all bioethanol producers; (iii) tax incentives for bioethanol automobiles; (iv) loans to bioethanol producers for expanding capacity; (v) the obligation for gas stations to sell bioethanol; and (vi) the creation and maintenance of strategic bioethanol reserves." The NPC was responsible to assure the adequate supply of bioethanol, for development of infrastructure for ethanol distribution and the prices of Bioethanol to fix rates at which Bioethanol should be sold. The incentives provided by the government for this program was made on a temporary basis and it can fluctuate with the fluctuations in the oil rates.[300]

- **Phase 3 (1989-2000):** Termination phase of *"Pró-Álcool"*program. 1989 came out as the history of ethanol with heavy drop in its production. There were many reasons behind the fall of its production including:

This success of Bioethanol that was raised in the earlier era, that was drastically came down by 1996 and nearly disappeared in this phase. The major reasons played the role behind this downfall were, with the increase in the sugar prices, higher rate ethanol fuel had to compromise

[300] Elisa Morgera et al., Case studies on bioenergy policy and law: options for sustainability, FAO Legislative study, 85 (2009).

with the gasoline, which was economic friendly to the consumers. Other causes of the shutdown of these automobiles were, the governmental tax incentives were more going in the automobiles sector for its encouragements, and consumers are continuously losing their interests and faith regarding the adequate ethanol production to be used as the fuel for a long time. During this time, the average ethanol production cost declined at more than double the rate experienced in the previous ten years. Yeast recovery, water recycling and improvements in energy in economy were among the highly innovative measures taken on the industrial side. Another innovative step was the leadership role played by private sector in pushing the sugarcane innovation system forward at the time when government support was weakening due to financial and institutional pressures. Private sector actors took over major roles in agricultural research. The role played by private sector in agriculture was unusual for a developing country.[301]

Brazilian Government made an effort to protect this struggling industry in 1993. Law. 8.723 passed by the government. This has a biding effect regarding the emission pollutants rate and regarding the mandatory blending requirements of 20-25%. This is still effective in Brazil.

This law is not yet removed so that even if in future any such crisis will come again for the ethanol demand due to oil price fluctuation or any other reason, then at least the mandatory requirements would be needed to be followed by the stakeholders.

- **Phase 4 (After 2000):** in this phase Bioethanol again recover its value after that heavy drop in production due to increase in the price of oil. The launch of flex-fuel technology 2003-2004 was a game changing solution and it marked as another successful phase in the problem-innovation phase. It is virtually eliminated the issue of consumer confidence, as car owners would henceforth have flexibility in choice of fuel. As the sixth largest automobile manufacturing country in the world, Brazil's automobile manufacturers provided the major testing ground for investing in the new flex-fuel technology. At the same time, the long experience with the ethanol in Brazil and the maturity of its supply and end use infrastructure facilitated rapid consumer uptake of the new flex-fuel vehicles, which now account for over 90% of new car sales in Brazil.[302]

[301]Francis X. Johnson, SemidaSilveira, Pioneer countries in the transition to alternative transport fuel: comparison of ethanol programmes and policies in Brazil, Malawi, and Sweden, 11, Environmental Innovation and Societal Transition, 8 (2014).
[302] Francis X. Johnson, SemidaSilveira, Pioneer countries in the transition to alternative transport fuel: comparison of ethanol programmes and policies in Brazil, Malawi, and Sweden, 11, Environmental Innovation and Societal Transition, 8 (2014).

India should research not only on the increase in its demand but for the increase in production, effectiveness and viability as well. India also needs to motivate customers, manufacturers, producers, farmers more towards the Bioethanol.

- **MAJOR PROVISIONS BEHIND THE SUCCESS OF BRAZIL:**

1. Earlier, the powers between the respective ministries responsible for the success of Bioethanol program were overlapping, ambiguous were not defined properly, but the powers are much clear and well defined now. The ministry of Agriculture and Energy Ministry are the main players for the success of ethanol industry in Brazil. Ministry of Environment is also one of the stakeholder in this sector but still in comparison with the other two ministries, it does not that vital role.

2. **Regular meetings**: Regular meetings takes place of all the ministries after a fixed interval of time: "There is a provision that there would be a regular joint meeting of all the ministries involved in this sector and the Minister of Agriculture precedes the meeting. Ministers of finance, development, industry and foreign trade, and energy join the meeting. The board, discussion regarding the ongoing policy and new plans, does the work for the coordination in the meeting. In the meeting, the executives also approves the new blending mandates as per the discussion."[303]

   India should inbuilt this provision of brazil in its plans and in India as well there should be provision of joint meeting, joint discussions and decision on the blending mandates as per the opinions of the ministries involved for the formulation and execution apart from the decision of OMCs or any particular ministry.

3. Initially in 1937, the blending mandate made was just 5% that vary accordingly with time. Recent blending mandate is minimum 20 to 25% depending upon the vehicle pollution emission.

4. **Additional fiscal benefits:** "Initially *"Pró-Álcool"* had the provision of direct incentives to the Alcool industries. Now, with the change in time the Government just made the tax differentials. Tax benefits are provided on the fuel, flex fuel vehicles and the binding provision of blending remain effective. The criteria of sales tax is not fixed, it varies with the affecting factors. Sales tax was reduced in 2009 during the time of international

[303] Elisa Morgera et al., Case studies on bioenergy policy and law: options for sustainability, FAO Legislative study, 92 (2009).

economic crisis. The concept this was, as the economic crisis came, the people were having a low purchasing power, so the overcome this issue of low sale, the sales tax decreased. Now, the taxes again reached back to its level. Currently, there is a scheme of different tax reduction of the purchase of flex fuel automobiles, with approximately 7% reduction over 2000cc vehicles, and around 1% for the vehicles in between 1000-2000cc."[304]

5. **Market Mechanism of Brazil:** Few things took a very important role to create market in this sector in Brazil, which is leaded by mandatory blending mandate of ethanol by 25% in gasoline and the invention of flex fuel vehicle that can run through pure gasoline, pure ethanol or mixture of both altogether.

6. **Fiscal Mechanism:** Historically, six provisions were majorly applied by the Government of Brazil to increase the production of Bioethanol. Those provisions gave the emphasis for the both side of the market including there should be an adequate supply of Bioethanol and there should not be a downfall in the demand of the same. This parallel focus lead to the success of the ethanol industry in Brazil. The provisions included: A). Price Control: under the price control, the government has taken care of two major things, including, there should be a same price for the producers all over the nation. Also, at every distribution pumps the prices of Bioethanol should always be less than the price of gasoline. B). there should be a provision of tax incentive for creating motivation. C). Loans are provided to the people for the production of Bioethanol Plans. D). Obligation: there was a mandate for every pump to deliver ethanol-blended fuel. E). Bioethanol Reserves: the government was properly maintaining and creating the reserves for the bioethanol in a planned manner. F). Governmental Price: there was the provision of the government to give the guarantee regarding the price to create motivation for the production. Out of all these plans, just two plans remain effective at present i.e. the provision of Tax reductions and mandatory blending requirements.[305]

   At the initial phase, these provisions are needed to create motivation among the people for the production and to raise the demand. And afterwards with time and success, changes can be made through reducing provisions. But in India this phenomenon is not

[304] Elisa Morgera et al., Case studies on bioenergy policy and law: options for sustainability, FAO Legislative study, 94 (2009).
[305] Elisa Morgera et al., Case studies on bioenergy policy and law: options for sustainability, FAO Legislative study, 115 (2009).

followed yet. Until India generate the demand and production of Biofuel, it cannot remove the major provisions like government guarantee purchase.

Today also, the government of Brazil even after receiving enough success in this field plays a vital part. There are the provisions still going on in Brazil to motivate the Bioethanol production, Demand and Supply, other than mandatory blending includes, they provide the credit to its producers, tax reduction to both the producer of Bioethanol and to the sales of flex-fuel vehicle.

FEW CASE LAWS OF USA WITH REFERENCE TO ETHANOL PRODUCTION AND ETHANOL BLENDING

1. **Comptroller of Customs v Terminals (NZ) Limited (18.12.2012 - NZCA) : MANU/NZCA/0330/2012**

   The main issue in this appeal relates to a process undertaken by the respondent (TNZ) involving the addition of locally made butanol to imported motor spirit. The question is whether this process amounts to the "manufacturing" of motor spirit for the purposes of the Customs and Excise Act 1996 (the CE Act). The appellant, the Comptroller of Customs, contends the process does amount to manufacturing with the consequence that TNZ ought to be paying duty at a higher rate on the full volume of motor spirit resulting from the process.[306]

Evaluation: when we will do the evaluation of this case, we find out certain points on which the government of India should focus.

a. Definition: the definition clause of the policy is very narrow in its scope giving the few definitions including biofuel, biomass, bioethanol, biodiesel and other biofuels. It should cover few more definitions as well on which there are major chances that disputes can occur in future as number of countries came across with the same issue. When we analyse the case laws then we will realise that even though no such case came to Supreme of India yet but in other countries the cases filed we mostly related to the tax benefit issues. The things on which tax benefits are given should at least be defined in the definition clause to protect from future litigation.

[306]Comptroller of Customs v Terminals (NZ) Limited (18.12.2012 - NZCA) : MANU/NZCA/0330/2012

As the policy says about the fiscal incentives to the conversion process and process units specifically, then although giving some inclusive definition but definitions of such terms should be there.

b. Scope of Tax benefits: manufacturing, retailers.

Blending with Butanol:

While doing evaluation of these cases laws the thing came out is the benefits of adding of butanol in the petrol. The policy does not anywhere talks about it but several countries including USA used to add butanol in the fuel to make it better.

Since ethanol is an oxygenated fuel, its use results in a lower energy output, as well as increased damage to engines via corrosion. Now a research team, led by William Jones at the University of Rochester, has developed a series of reactions that results in the selective conversion of ethanol to butanol, without producing unwanted by-products. "Butanol is much better than ethanol as an alternative to gasoline," said Jones, the C.F. Houghton Professor of Chemistry. "It yields more energy, is less volatile, and doesn't cause damage to engines." In fact, Jones was able to increase the amount of ethanol converted to butanol by almost 25 percent over currently used methods. Jones describes his process in a paper just published in the *Journal of the American Chemical Society*. Converting ethanol to butanol involves creating a larger chemical molecule with more carbon and hydrogen atoms. Although both molecules have a single oxygen atom, the higher carbon-to-oxygen ratio in butanol gives it a higher energy content, while the larger size make it less volatile.[307]

The point raised in this case 1 was does the blending of butanol and motor sprit will be regarded as manufacturing. So, this case also cited about the benefits of adding butanol into petrol saying, "the blending of butanol with petrol can result in the Research Octane Number and/or Motor Octane Number of the petrol changing. For example, the addition of butanol to petrol with a Research Octane Number of 91 would most likely result in an increase in the Research Octane Number".[308]

2. KAAPA ETHANOL, LLC, Plaintiff-Appellee/Cross Appellant, v. AFFILIATED FM INSURANCE COMPANY, Defendant-Appellant/Cross Appellee.

[307] PETER IGLINSKI, MORE EFFICIENT WAY OF CONVERTING ETHANOL TO A BETTER ALTERNATIVE FUEL, PHYS ORG., (DECEMBER 3, 2015),HTTPS://PHYS.ORG/NEWS/2015-12-EFFICIENT-ETHANOL-ALTERNATIVE-FUEL.HTML#JCP.

[308] Comptroller of Customs v Terminals (NZ) Limited (18.12.2012 - NZCA) : MANU/NZCA/0330/2012

KAAPA Ethanol ("KAAPA") manages a facility in Kearney County, Nebraska that distils corn into ethanol, a biofuel additive for gasoline. The plant was insured against property damage by an "all-risk" insurance policy issued by Affiliated FM Insurance Company ("Affiliated"). Soon after KAAPA began production, the plant's ethanol production and storage tanks began to lean, their foundations began showing visible signs of distress, and their supporting concrete walls sunk into the ground. KAAPA commenced this diversity action after Affiliated denied KAAPA's claim to recover the cost of extensive repairs and business interruption losses. After a lengthy trial, the jury found that some losses were caused by "collapse" of the tanks, awarded KAAPA property damages of nearly $4 million, but denied its claim for business interruption losses. Both sides appeal raising various issues.[309]

Issues

1. Whether the business loss occurred due to collapse of the storage tanks?
2. Whether the policy also covered the loss or damage caused by the collapse?

Helding of the Supreme Court

The district court's interpretation of the policy is supported by the Supreme Court of Nebraska's only decision resolving collapse coverage issues. It held, a Comprehensive Dwelling Policy covered "multiple enumerated scheduled risks" including "collapse." The Court held that the policy covered the costs of repairing both collapse damage and other damage caused by the collapse. *Id.* at 716-17. This treated "collapse" as both a covered "risk" and a loss-causing "peril." The extent of coverage should be the same under an all-risk policy.[310]

3. **ROCKY MOUNTAIN FARMERS UNION Vs. COREY (18.09.2013 - 9th Circuit) : MANU/FENT/3936/2013**

Case Summary:

It is related to Fuel Standards/Commerce Clause. The panel denied the petitions for rehearing the case alleging that California's Low Carbon Fuel Standard, violated the dormant Commerce Clause and was pre-empted by Section 211(o) of the Clean Air Act. In the opinion, the panel held that the Fuel Standard's ethanol provisions were

[309]KAAPA ETHANOL. LLC Vs. AFFILIATED FM INS. CO. (03.11.2011 - 8th Circuit) : MANU/FEET/0975/201
[310] *Id.*

not facially discriminatory, and reversed that portion of the district court's decision. The panel also reversed the district court's decision that the Fuel Standard was an impermissible extraterritorial regulation. The panel affirmed the district court's conclusion that the Fuel Standard's crude oil provisions were not facially discriminatory, but reversed the district court's holding that the provisions were discriminatory in purpose and effect. The panel affirmed the district court's conclusion that Section 211(c) (4) (b) of the Clean Air Act did not insulate California from scrutiny under the dormant Commerce Clause. Judge Murguia concurred in part and dissented from the majority's conclusion that the ethanol regulations did not facially discriminate against interstate commerce. Concurring in the denial of rehearing en banc, Judge Gould stated that in his view, the opinion and partial dissent fairly presented the key issues in this appeal, and the denial order should be read with the majority opinion's reasoning in mind. He wrote to offer supplemental observations that responded to the views of the judges who dissented from the denial of rehearing en banc. Dissenting from the denial of rehearing enbanc, Judge M. Smith, joined by Judges O'Scannlain, Callahan, Bea, Ikuta and N.R. Smith, and joined by Judge Murguia as to Part III, stated that in upholding California's ethanol regulations, the majority disregarded longstanding dormant Commerce Clause doctrine, and placed the law of this circuit squarely at odds with Supreme Court precedent.[311]

Evaluation:

Apart from the court helding, it is pertinent to note that in this case the data of RFS is maintained in the Federal Register each year. In our National Biofuel Policy 2018, there is no provision related to Biofuel Register or maintenance of Data, which should be there to avoid the mismatch. This standard should be reviewed and maintain every by the concerned authority as per purpose, effect and demand for a proper development.

4. **SINCLAIR WYOMING REFINING COMPANY v. State of Wyoming, Amicus Curiae.**

In an amendment to the Clean Air Act (CAA), Congress directed the EPA to operate a Renewable Fuel Standards Program (the RFS Program) to increase oil refineries'

[311] ROCKY MOUNTAIN FARMERS UNION V. RICHARD W. COREY, No. 12-15131 (9th Cir. 2014), Justia US Law, https://law.justia.com/cases/federal/appellate-courts/ca9/12-15131/12-15131-2014-01-22.html

use of renewable fuels. But for small refineries that would suffer a "disproportionate economic hardship" in complying with the RFS Program, the statute required the EPA to grant exemptions on a case-by-case basis. In this case, the EPA has exceeded its statutory authority under the CAA in interpreting the hardship exemption to require a threat to a refinery's survival as an ongoing operation. That interpretation is outside the range of permissible interpretations of the statute and therefore inconsistent with Congress's statutory mandate.[312]

Issue: As the petitioner find that the EPA exceeded its statutory authority, they vacate the EPA's decisions and remand to the EPA for further proceedings.

Renewable Fuel Sale PROGRAM:

Through the RFS Program, Congress prescribed annual target volumes for renewable fuel sales, which increase each year until reaching a maximum level in 2022. Congress charged the EPA with implementing the Renewable Fuel Sale Program and empowered it with authority to alter the statutory volumes of renewable fuel if the EPA finds that this Program is causing severe economic or environmental harm or there is an inadequate supply of domestic renewable fuels. The EPA must also consult with the Department of Energy (DOE) in exercising this power. The statute further requires "obligated parties," including "refineries, blenders, and importers," to comply with the Renewable fuel sale Program. Under the EPA's accompanying regulations, an obligated party must satisfy its Renewable Volume Obligation each year by holding sufficient credits, known as Renewable Identification Numbers (RINs), at the end of each compliance year. A RIN is created when a producer makes a gallon of renewable fuel, blends the renewable fuel with petroleum-based fuel, and sells the resulting product domestically. An obligated-party can accumulate RINs to meet its Renewable Fuel Sale Program requirement by: (1) blending renewable fuels into petroleum-based fuel and selling the product domestically; or (2) obtaining RINs through another source, such as the RIN trading system Congress directed the EPA to establish. Put simply, the program induces refineries to produce renewable fuel products (e.g., ethanol), and if they cannot, to purchase biofuel-generated credits from refineries that can.[313]

Small refinery exemption: Congress was aware the Renewable Fuel Sale Program might disproportionately affect small refineries because of the inherent scale advantages of large

[312]SINCLAIR WYOMING REFINING COMPANY v. State of Wyoming, Amicus Curiae. (15.08.2017 - 10th Circuit) : MANU/FETT/0527/2017.
[313] *Id.*

refineries and therefore created three classes of exemptions to protect these small refineries. **First,** the statute exempted all small refineries from the RFS Program until 2011. **Second,** in the meantime, Congress directed DOE to conduct a study "to determine whether compliance (with the Renewable Fuel Sale Program) would impose a disproportionate economic hardship on small refineries" after the program's implementation. DOE conducted the study in 2011 and determined that a number of small refineries, including Sinclair's two Wyoming refineries, would suffer "disproportionate economic hardship" if they were required to comply with the Renewable Fuel Sale Program. Accordingly, the EPA extended the blanket exemption for two more years. **Third**, after the exemption period expired, Congress provided a process for small refineries to petition the EPA "at any time" for an extension of the initial exemption "for reason of disproportionate economic hardship." In evaluating these petitions, the EPA must consult with DOE and consider the findings of DOE's study in addition to "other economic factors." This third exemption is at issue in this case.[314]

Evaluation:

On doing analysis of this case, we can observe that even after achieving the top positions in ethanol generation and ethanol blending, U.S keeps on doing changes in its policies and technologies to acquire something better. To accomplish its target of ethanol blending, India can emphasis on few binding programs for instance renewable fuel sales, taking care of some principles like economic hardship, other economic factors, exemptions for small refineries, environmental issues and others. If government will set a renewable fuel sale, objective then that can boost the ethanol production and ethanol blending in India.

CONCLUSION AND SUGGESTIONS

Through the evaluation of the provisions of National Biofuel Policy, 2018, it can be concluded that the existing policy is not sufficient for the efficient level of Ethanol production in India. Firstly, the policy needed to be amended by the government as per the need of the Indian Society. Secondly, India as a developing nation,needs to take up several provisions as discussed earlier and as followed by the pro alcohol nations.

- Recognition should be given to the states while formulating the divisible pool of taxes by finance commission on the basis of efforts made by the states in promotion of Biofuel:

[314] *Id.*

The 14th Finance commission, in its report, accepted the following five criteria for sharing the divisible pool of taxes horizontally among the states:

Population, Demographic Change, Income Distance, Area, Area of forest cover.

In future steps should be taken by the various states in use of its waste land as a source of its raw material for biofuel, promotion of production of biofuel in the state, promotion of consumption of biofuel in state, use of MSW in production of Biofuel etc. should also be added as a criteria for division of revenue share. This will motivate the states for production and consumption of Biofuel.

- There should be some mandatory provision by the Government in either the legal framework or the policy regarding the maximum time limit within which the ministries should update its website.

  The official website should have the information regarding the last date of its modification or update, so that the researcher would get an idea about the latest data available and about the data that is required to be searched. Implementation of these provisions are must to move in a better way in R&D.

- Official website of the ministries should cover the latest passed policy, other vital information regarding the plan, latest data regarding it and rest notifications published in gazette. It can be beneficial for the researcher as well as authenticated data would be used for the further research.

  MNRE should update its website regularly. On the official website of MNRE, only the information regarding the MOUs is updated in time. Regarding rest other things including even the National Biofuel Policy of 2018 has not yet been uploaded on its official website. The present law and policies regarding Biofuel available over its web site still shows the document of 2009, that too a pdf is available which is undated and even the year of that policy is not mentioned over that pdf document.

  The policy is uploaded over an official website should be the one which was published in gazette; it should be properly dated and provided with other required details.

  The National Biofuel Policy 2018 gives enormous focus on R&D, but if the latest and authenticated data, latest policy, other developmental activities etc. would not be available even on the official websites of the responsible ministry then it would be difficult for a researcher to do R&D. Moreover, such provisions will remain mere on pages with no development.

- On the line of DBT (Direct Benefit Transfer) of LPG customers, the same line may be used for the subsidy transfers to those customers who use biofuel and purchase it through E-mode of transaction. It will boost both electric mode of payment and Biofuels in India.
- Model Contract Draft (MCD): The State Council should form a model contract draft a model contract draft regarding contract farming to protect farmers for further exploitation by the producers.
- The other concern is that in spite of focusing majorly on the production of Biofuel, there should also be a focus on its efficiency as compared to Petrol/diesel. The area related to efficiency of Biofuel left untouched and has many unfolded dimensions which needs to be explored and it can give a better yield of Bio fuel which could be a major game changer in the field of fuels.
- There should be a quantitative, qualitative analysis of the production of biofuel based on BIS, and it should have timely sudden inspections to check whether the same standards are followed or not.
- The maximum MOU's or bilateral treaties signed by Indian government with other countries are related to renewable energies but the specific focus on bio-ethanol or biofuel is neglected in most of the treaties or MOU's. India as a developing country should focus on to sign some major bilateral treaty or agreement with a developed country, which gives a focus to Bio fuel or bio ethanol including the exchange of technologies, improved production methods etc.
- There should be a mandatory or binding provision in the policy based on Bio fuel sale quantity along with the quality. The Policy should give clear-cut guidelines on the minimum production of bio fuel/ethanol specifically. It will bind the individual/firm to produce the minimum amount of bio fuel in a certain period. If the firm/individual fails to follow the minimum criterion of the binding provision, the rights or license of the firm should be cancelled with immediate effect. Only such strict provisions can be helpful to produce efficient quantity of ethanol. Some of the exemptions can be given on genuine basis for example to the Small-scale industries.
- There can also be some provision of some extra benefits to the industries depending upon the additional produced quantity of ethanol after the minimum specified amount. This will encourage the producer to produce it in more.
- The National Biofuel Policy should assign a particular ministry to create awareness. It is very necessary to achieve success. Most of the farmers or villagers of our country do not know about the production of Bio fuel/ethanol from the wastes of their farms.

- Along with the focus on production, the emphasis should also be on increase in demand from the side of consumers. This action will encourage the manufacturers of vehicles to produce hybrid vehicle, and the vehicles that use Bio-fuel with great efficiency.
- We should also focus on transportation and storage facilities of biomass. Even though it is there in The National Biofuel Policy but the farmers are not able to utilize their agricultural residues due to shortage of transportation. The government must assign some agency or mediator whose responsibility would be to take up the product from the several farmers and to deliver it to the production houses. These agencies will also play the role in creating awareness among the other farmers.
- There are no direct benefits provided to the farmers or retailers in the policy that must be there to encourage them.
- There should be a regular joint meeting of all the ministries involved in the Biofuel at a fixed schedule to discuss regarding the ongoing issues with respective ministry, latest developments achieved by the respective ministry, future targets and with respect to the blending ratios. So that issues of all the ministries altogether can be resolved in, a better way and practical blending ratios can be set.
- Over the tools, there should be some tax benefits given to the vehicles running on the Biofuel. Such tax provision will motivate the vehicle users and it will increase the demand and acceptability of biofuel in our country.
- There are many other loopholes in the existing policy which must be removed as discussed in the chapter of evaluation of National Biofuel Policy, for instance regarding no provision related to Minimum support price, Minimum purchase price etc.

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PART-C

THEME-C:E-MOBILITY

EFFECTIVENESS OF HYDROCARBON EXPLORATION LICENSING POLICY

by

Anviksha Pachori & Loveleen Singh

ABSTRACT

The oil and gas sector is one of those areas which plays a very significant role in the economic development of the country and has potential to do so as compared to other sectors in India because of liberalisation and privatisation. In the year 2011-12 India was the fourth largest consumer of oil and consumed 4% of the total consumption in the world.[315] With the overall development of the country at domestic and industrial level the demand will automatically increase. Hence there is a need to figure out the drawbacks of existing mechanisms in oil and gas industry to meet the demands in order to be self-reliant with respect to crude oil and natural gas[316]. The main purposefor introducing Hydrocarbon Exploration licensing policy (HELP) is to bring stability and certainty in the domestic production of the oil and gas in order to ensure transparency and reducing administrative discretion. The uniform license for the exploration and production of all types of hydrocarbons i.e. conventional as well as unconventional oil and gas resources including coal bed methane (CBM), shale gas, tight gas and hydrates of gas etc can be explored under the same license under a new policy[317]. Under the EarlierPolicy i.eNELP only petroleum and petroleum products mainly oil and natural gas were allowed to be exploited and for other resources separate license was required which makes the whole procedure stringent for the contractor and as well as for the Government because providing one more license for the same field will increase administrative burden on the Government. HELP will also help in maintaining the stability among the prices of oil and gas which was being affected due to the poor function of the exploration and production *sector*

[315] RK Pachauri and PoojaMehrotra,'Vision 2020: Sustainability of India's Material Resources' available at <http://planningcommission.gov.in/reports/genrep/bkpap2020/13_bg2020.pdf .>accessed on 20 April 2016
[316]Nisith Desai (N 1)
[317] Id

EFFECTIVENESS OF HYDROCARBON EXPLORATION LICENSING POLICY

Oil and Gas industry is divided into three sectors: upstream, midstream and downstream. The activities related to the exploration and production of hydro carbons comes under the upstream sector. Upstream activity involves exploration and production. All the stages from exploration to production come under upstream activity. The discovery of the vast Bombay High field in 1974 in the west coast offshore was the most significant event in India's upstream sector[318]. Foreign companies have entered the Indian Exploration & Production scene in the past through joint venture with the NOC's. But after New exploration licensing policy (NELP) the participation of foreign companies is allowed to 100% in upstream sector. In the past only NOC's were there in the upstream sector but now scenario has been changed after the introduction of new policies. The downstream sector mainly deals with the refining, selling and distribution of the natural gas and the products derived from crude oil. Downstream does not include exploration and production of crude oil and natural gas. Private players are allowed across the downstream sector. The midstream sector deals with activities like storage, processing and transportation of products derived from crude oil or natural gas.

Recently the Government of India has approved Hydrocarbon Exploration and Licensing Policy (HELP) on March 10, 2016. HELP replaces NELP – the New Exploration Licensing Policy (for exploration and production of oil & natural gas but excluding coal bed methane), and the Coal Bed Methane ("**CBM**") Policy, both of which were formulated by the Government of India in 1997. In past the NELP has played a significant role in the oil and gas sector by introducing 100% foreign participation for the exploration and production of hydrocarbons in under which 9 rounds took place since 1999 with a total of 254 blocks awarded, of which, according to Directorate General of Hydrocarbon ("**DGH**") report, 148 are currently operational and 106 relinquished[319]. Many major discoveries like KG-D6 basin and many others have taken place under NELP. Initially NELP was proved to be advantageous for the economic development of the country to meet the supply-demand for the natural gas and oil from the growing population of the country[320]. But with time many challenges were faced by the NELP and the Production Sharing Contracts which are signed between the Contractor and Government of India in pursuance of the NELP for exploitation of hydrocarbons. So far as commercial discoveries and commercial production goes, NELP has had limited success, hence as a result of which

[318] Id
[319] Nisith Desai (N 1)
[320] Id

Government decided to bring necessary changes in the existing model of policy and introduced HELP.

Background of Hydrocarbon Exploration Licensing Policy

To overcome the various prevailing issues in the PSC, The Minister of Petroleum Shri Dharmendra Pradhan proposed in Rajya Sabha that it's been long when NELP was being enforced and now it's time to introduce some changes with respect to exploration and production of hydrocarbons[321]. The main problem which has been faced by the contractors and investors operational issues and administration of Management Committee in PSC is related to the production of conventional or unconventional resources other than oil & gas. Such observations were also made by the Chawla Committee on "Allocation of Natural Resources" and Rangarajan Committee on "Production Sharing Contract Mechanism in Petroleum Industry" bringing out various deficiencies in the existing Production Sharing Contract under NELP[322]. The alternative methods that can be used by Government is to include all natural resources which include hydrocarbons under one policy by replacing NELP (New Exploration Licensing Policy) by HELP (Hydrocarbon Exploration Licensing Policy). HELP will be applicable to all kinds of hydrocarbons without any discrimination between conventional oil & gas or unconventional oil & gas like shale gas[323].

Moreover, Petroleum and Natural Gas Rules (PNG Rules) 1959, define Petroleum as "*naturally occurring hydrocarbons in a free state, whether in the form of natural gas or in a liquid, viscous or solid form*[324]" Hence only one license can work for the exploration & production of all kinds of hydrocarbons under new policy called HELP. The progress under HELP would be totally dependent on the increase in number of the investors and private players in bidding rounds.

Additionally contractor will have freedom to fix prices for the hydrocarbons produced in the blocks allotted to him which would be major amendment in the existing PSC model. The main recommendations made by the Committee with respect to the introduction of HELP are[325]:-

- **Fiscal terms under PSC:** In the existing model of PSC, the contractor is allowed to recover all the cost incurred by him. 100% cost recovery is allowed under PSC which

[321] HELP Policy, 2016 available at <http://www.petroleum.nic.in/docs/HELP.pdf> accessed on 15 June 2016
[322] Chawla Committee Report, 2011 available at <http://www.cuts-ccier.org/pdf/Report_of_the_Committee_on_Allocation_of_Natural_Resources.pdf> accessed on 18 June 2016
[323] Id
[324] Petroleum and Natural Gas Rules 2003, R 3(k)
[325] RangarajanCommiittee, "Committee Report on the Production Sharing Contract Mechanism in Petroleum Industry" [2012] <http://eac.gov.in/reports/rep_psc0201.pdf> accessed 25 November 2015

attracts certain criticism by the government that the Contractor usually inflates the costs in order to give less share of profit petroleum to the state. To overcome any chances of such conflict the Rangarajan committee recommends dispensing away such provision under PSC and suggests for the production-linked payment system where Contractor would be liable to pay government the share agreed by him during the bidding process depending upon the level of output and revenue rose from it.

- **The production-linked payment-** It would be dependent on the different revenue shares offered by the bidder to the Government for different level of production on a condition that bids have to be progressive on the level of production and price level. Such measure will ensure transparency and will protect the interest of both. The reason behind adopting such method is to ensure that when the contractor will earn more on the increased level of output, the government will also get higher share in revenue. In its report, the committee has opined that since cost recovery is at the root of the problems experienced so far, it is proposed to dispense with it, in favor of sharing of the overall revenue of the contractor, without setting off any costs. The Directorate General of Hydrocarbons had reportedly advocated a production linked payment system, where oil companies would have to pay the Government an agreed amount depending on the level of output, and not on the investment in the exploration block[326]. In the present fiscal model, the contractor first recovers its expenditure before sharing profit.
- **Tax Holiday**: In the existing model of PSC, the tax holiday available for contractor is for 7 years. The committee has also recommended that an extended tax holiday of 10 years against 7 years already available for all exploration blocks, be granted for blocks having a substantial portion involving drilling offshore at a depth of more than 1,500 metres, since the cost of a single well can be as high as $150 million[327].
- **Extension**: Further, the committee has recommended extending the timeframe for exploration in future PSCs for frontier, deep-water (offshore, at more than 400 m depth) and ultra-deep-water (offshore, at more than 1,500 m depth) blocks from eight years currently to 10 years.

Main Features of Hydrocarbon Exploration Licensing Policy

[326] DGH Report, 2013 'Policy for Extension of Exploration Phases Under NELP and PRE-NELP Production Sharing Contracts' available at < http://www.dghindia.org/index.php/page?pageId=74> accessed on 25 June 2016
[327] Id

The main features of new policy are[328]:

- **Uniform license for exploration and production of all forms of hydrocarbons**: Under the present model of Production Sharing Contract, the exploitation rights with the contractor are available only for oil and natural gas and not for any other unconventional hydrocarbons like shale gas which can come across while producing hydrocarbons[329]. The main rationale behind introducing HELP is to provide license for exploitation of unconventional hydrocarbons which was not recognized under the NELP and PSC. Now only one single license will serve the exploration and production of conventional oil and gas, coal-bed methane, shale oil and gas and gas hydrates. Earlier it has been found that the investors used to find difficulties while exploring for one type of hydrocarbon used to discover another one which leads to the disturbance among the contractor and the Government because under PSC no such provision has been laid down which can overcome such an issue. A separate license for carrying out the production of other hydrocarbon is required leading to delays which ultimately affects the whole work program committed by the contractor under the PSC[330]. Hence the Government has formulated new policy called HELP under which a uniform license will be granted for exploration and production of all types of hydrocarbons including CBM, shale gas/oil, tight gas, gas hydrates etc.
- **Open acreage licensing policy ("OALP")**: The adoption of OALP by the Government is the major initiative taken in the favor of exploration and production of hydrocarbons. Earlier under the NELP the blocks were allotted yearly on the basis of competitive bidding due to which there used to limited choice with the investors with respect to blocks allotted and offered for the bids[331]. The major drawback was the bidding process used to take place only once in a year and if investor wants to bid in between when the blocks are already offered than he has to wait for another year so that he can participate in another round. Such loopholes which makes the investors and bidders disinterested have been curtailed by the introduction of open acreage licensing policy where bidder can apply and show his interest for bidding whenever he wants throughout the year by submitting an Expression of Interest (EOI). The Government will consider the EOI and if found advantageous and suitable will call for the bids after fulfilling all the other

[328] Santhosh Thangaraj&MythreyiVelury,' Advent of Hydrocarbon Exploration and Licensing Policy (HELP) & How it Influences Investments in E&P' [2016] 2 (6) IJIR <http://www.onlinejournal.in/IJIRV2I6/024.pdf>accessed on 15 June 2016
[329] HELP Policy, 2016 (N 3)
[330] Id
[331] Neeraj Anand (N 12)

compliance requirements. One more attachment has been mandatory for OALP to be effective i.e. a national data repository (NDR) which is a pre-requisite. A Government has to make a sponsored data bank to preserve the information related to upstream oil and gas and under Petroleum & Natural Gas Rules 2006; the operator is liable to give all necessary and authenticated information to DGH[332].

- **Revenue sharing model-** In the present model of Production Sharing Contract, the mechanism is based on the profit sharing among the Contractor and Government after the cost recovery by the Contractor of the expenditure incurred by him. But such mechanism has faced much criticism from the stakeholders of the Government and has become one of the major issues for the execution of PSC under NELP. The reason behind the failure of such mechanism is that the Contractor during the cost recovery can inflate the costs with respect to the expenditure incurred by him so that the profit sharing petroleum left after the cost recovery which is subject to split between the contractor and Government is less in amount and as a result of which Government gets less share[333]. This practice on behalf of the Contractor can affect the interest of the Government. As a result of which Government has introduced revenue based sharing model to replace the cost recovery model. Another issue which led to the introduction of new model was investment multiple upon which the split of profit is dependent between the Government and Contractor. Under the revenue based sharing model the Government's revenue will be determined separately for crude oil and natural gas in accordance with a two dimensional production–price matrix (separate for on-land, shallow water, deep water areas and CBM), linked to the average daily production in a month and average oil and gas prices in a month, which will be as quoted and bid for by the contractor under the RSC.[334]
- **Marketing and pricing freedom for oil and gas:** At present the price fixing of natural gas and petroleum is in the hands of the Government and the whole administration of price mechanism is governed by the Government itself without the interference of the producers[335]. On contrary to this, producers are raising objections with respect to the price fixation specifically for the gas produced from ultra deep water blocks which involves huge investment and higher risks are involved in the exploration and production of oil and natural gas from such areas. Such scenario led to the concern of loss of revenue in the minds of investors which results in the disputes among the producers and investors.

[332] Rose Mary K. Abraham' Hydrocarbon Exploration Licensing Policy' [2006] IES < http://www.arthapedia.in/index.php?title=Hydrocarbon_Exploration_and_Licensing_Policy_(HELP)> Accessed on 29 June 2016
[333] Id
[334] Santosh Thangaraj (N 10)
[335] Id

To overcome such issues. New policy introduces the right in favor of the producers to sell the crude oil in the domestic market on the basis of competitive bidding on arm's length basis without any discrimination on nomination basis[336]. Exact mechanism for the sale of gas in not out yet but there is a probability of the establishment of State agency to channelize the gas pricing in their respective states. The major concern in the whole gas pricing mechanism would be Government's share i.e. minimum price will be calculated on the basis of domestic price prevailing at the relevant point of time. In case of crude oil the minimum price will the price of Indian basket of crude oil (currently comprising of sour grade (Oman and Dubai average) and sweet crude (dated brent) of crude oil processed in Indian refineries), as calculated by the Petroleum Planning and Analysis Cell on a monthly basis. If in case the price arrived through bidding is more than the price of Indian basket of crude oil/gas price then the share of Government will be calculated based on the actual price[337]. The important point which should be brought in notice that the new pricing mechanism would be applicable on the discoveries made in future and the present discoveries which are yet to commence for commercial production.

- **Concessional royalty regime:** Unlike NELP, the new policy now distinguishes between on-land, shallow water (where costs and risks are lower), deep/ultra deep water fields (where risks and costs are much higher) so far as royalty payable to the Government is concerned. The royalty rates will be as follows[338]:

Blocks	**Duration**	**Royalty Rates**	
		Oil	**Gas**
On-land	-	12.5%	10%
Shallow water	-	7.5%	7.5%
Deep water	First 7 years	No royalty	No royalty
	After 7 years	5%	5%
Ultra deep water	First 7 years	No royalty	No royalty
	After 7 years	2%	2%

- **Role of Management Committee ("MC"):** The role of the Management Committee has been curtailed. Under PSC the MC which is constituted is comprised of the

[336]Rose Mary (N 14)
[337]Id
[338] HELP Policy,2016 (N 3)

representatives of the Government and the Contractor[339]. The more influence of the Management Committee is always on the operational matters and the approvals related to budget. Now the role of the management committee has been limited to the monitoring of the minimum work program and all the technical aspects attached for carrying out the operations. Such changes have been introduced with respect to the policy initiatives introduced by the Government i.e. "Minimum Government- Maximum Governance" so that more preference should be given to the governance without the interference of the Government for its own advantage.

Apart from the above stated features other aspects which have been introduced under HELP are[340]:-

- Increased exploration phase- 8 years for on-land and shallow water fields and 10 years for deep/ultra deep water fields
- no restriction on exploration activities during the entire contract period
- Extension of tax holiday
- Foreign as well as Domestic companies can have 100 % participating interest
- No mandatory requirement for Government Companies in joint ventures

The main purpose for introducing such policy is to bring stability and certainty in the domestic production of the oil and gas in order to ensure transparency and reducing administrative discretion. The uniform license for the exploration and production of all types of hydrocarbons i.e. conventional as well as unconventional oil and gas resources including coal bed methane (CBM), shale gas, tight gas and hydrates of gas etc can be explored under the same license under a new policy[341]. Earlier under NELP only petroleum and petroleum products mainly oil and natural gas were allowed to be exploited and for other resources separate license was required which makes the whole procedure stringent for the contractor and as well as for the Government because providing one more license for the same field will increase administrative burden on the Government.

The Open Acreage Policy will help the National Oil Companies and International Oil Companies to choose the blocks whenever they want as per the favourable conditions pertains to

[339] Model Production Sharing Contract, A 6
[340] Alfred Adebare, 'Hydrocarbon Exploration Licensing Policy' [2016] Lexcounsel< http://www.mondaq.com/india/x/486160/Oil+Gas+Electricity/Hydrocarbon+Exploration+And+Licensing+Policy+HELP> accessed on 2 July 2016
[341] Id

the Exploration and Production sector[342]. Now they don't have to wait for next round to wait which used to take place on yearly basis under the NELP. Such move will make the exploration of hydrocarbons flexible for the Oil Companies and will attract more investors.

The major amendment in the fiscal regime of introducing revenue based sharing model replacing the cost recovery model and production sharing based on Investment multiple and cost recovery or production linked payment will resolve all the disputes among the parties and will be easy to administer on behalf of the administrative authorities. In earlier system under the Production Sharing Contract or the contractor was first entitled to recover the costs incurred by him in carrying out the exploration and production activities when commercial discovery takes place. After the cost recovery the oil which is left is known as profit oil which is subject to split between the Government and the Contractor. Under such mechanism the contractor may inflate costs during the cost recovery to earn more which can affect the interest of the Government as it will get fewer shares from the profit oil. Hence such loophole will be no more left after the introduction of revenue based sharing model, the Government will not be concerned with the cost incurred and will receive a share of the gross revenue from the sale of oil, gas etc. The rationale behind introducing such regime is to fulfil the objectives of the Government's policy of "ease of doing business" by not affecting the interest of all the parties involved.

In the earlier regime of NELP, the royalty rates set were not in accordance with risk and capital involved for different kinds of blocks. Under new policy Government considered such factors and introduced lower rates of royalty as per the risks involved in carrying out exploration and production activities over such blocks. Such initiative under the new policy will encourage exploration and production in India. Under new system royalty rates decreases for shallow deep water blocks and ultra-deep water blocks. On the other hand royalty rates have been kept favourable for state government in order to generate revenue with respect to on land blocks. No import duty would be applicable over the installation and equipment's imported for carrying out the exploration and production activities which is line with the earlier policy called NELP. Apart from the above stated fiscal terms the new provision which has been inserted is that the contractor will have freedom to sell crude oil and natural gas produced from the blocks allotted to them.

[342] Vivek Rae,' New Hydrocarbon Policy' [2014] Indianexpress< http://indianexpress.com/article/opinion/columns/hydrocarbon-exploration-licensing-policy-the-gas-opportunity/> accessed on 2 July 2016

Hence the various drawbacks to which the PSC model is subject to has been discussed in detail by the researcher in the earlier chapters and is of the view that the action taken by the Government towards the enforcement of new policy called HELP is going to bring reformation in the exploration and production of hydrocarbons which will include not only oil and gas sector but also coal blocks which have been subject to lot of criticism in the past with respect to the allocation of coal blocks and the corruption on part of the Government. Now one uniform policy will introduce transparency in the whole mechanism that will help the sector to grow effectively in consonance with the economic development of the country. Moreover HELP will also help in maintaining the stability among the prices of oil and gas which was being affected due to the poor function of the exploration and production sector.

Additionally, the DGH which is the sole regulator of upstream sector shall discharge its functions more efficiently in order to avoid delays due to workload. The electronic mode should be introduced for keeping the records and for carrying out the paper work to avoid mistakes in order to keep transparency. In the whole process what is required is the proper implementation of the regulatory framework which can be amended from time to time to maintain the stability with the growing concerns in the upstream sector for the exploration and production of hydrocarbons.

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PART – D

Theme: Others

An Analysis of the Process under the provisions of Insolvency And Bankruptcy Code 2016 in special reference to recovery of dues in relation to sale of electricity.

by

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ABSTRACT

The Insolvency And Bankruptcy Code 2016 has been enacted to provide law relating to the reorganisation and insolvency procedure. Electricity trading and supply create a financial commitment over the corporate personalities as well as to the electricity trading and supply companies, for the purpose of recovery of electricity dues, which is a necessary finamina for the financial health of electricity companies and an effective legal process would support development of electricity market and encourage entrepreneurship and facilitate more investment leading to the higher economic growth and development

Insolvency resolution and liquidation is a two step process,the financial creditor or any other person on behalf of the financial creditor as may be notified by the central government or debtor own self, can file an application in the prescribed format along with applicable fees to the tribunal. the jurisdiction of the tribunal is determined on the basis of the location of the registered office address of the corporate debtor, the act divided the debt in three parts first financial credit second operational credit and third the government dues, the proper visil over the insolvency and bankruptcy process is must for the every company.

Electricity dues are coming under the definition of the operational credit, therefore the electricity suppliers may file liquidation process under the code for recovery of electricity dues, after pendency of proceedings before the Company Law Tribunal, all other proceedings were set aside In view of sections 14 and 238 of Insolvency and Bankruptcy code,

The main object of this paper to emphasize the role of Insolvency and Bankruptcy Code to give the relief to the electricity companies recovery of electricity dues.

Supply of electricity is a contractual obligation

Supply of electricity by a distribution Company to a consumer is a sale of goods, the distributor is the supplier and the owner occupier of the premises with whom it enters into a contract for supply of electricity are the party to the contract **Reference** ***Panchsheel Vidyut Vitran Company versus DVS steel and alloys***.

Under Sec 48 of the Electricity Act 2003 a distribution licensee may require any person who requires a supply of electricity in pursuance of section 43 to accept

(a) Any terms restricting any liability of the distribution licensee for economic loss resulting from regions of the person to whom the electricity is supplied.

Under Section 47 a distribution licensee may ask reasonable security as may be determined by the regulations for the payment to him of all monies which may be come due to him in respect of the electricity is supplied to such person are there any electric line are electrical plant are electric meter is to be provided for supplying electricity to such person in respect of the provision of such line plant and meter

(3) if the person referred to in subsection 2 fails to give CSS security the distribution licensee Mein if he thinks fit discontinue the supply of electricity for the period during which the failure continues.

In case of ***Bihar SEB vs Rameswar Kumar Agarwal 1996 4 SCC 686*** the Apex court has held that the condition of supply are part of the statutory terms and circulars in view of the above the electricity supply code framed under the provisions of electricity act 2003 have statutory force.

Current Provisions for Recovery of dues

Provisions of Dues Recovery are made by the legislatures of respective States to recover the outstanding dues of electricity undertakings, the electricity is sitting Supply Company may proceed against the defaulters for the recovery of dues under the provisions of dues recovery act 1960 The expression 'dues' has been defined in Clause (b) of Section 2. It reads as under : --

"(b) "dues" means any sum payable to a Government electrical undertaking on account of-

(i) Consumption of electrical energy supplied; or

(ii) any remuneration, rent or other charges for hire, inspection, test, installation, connection, repair, maintenance or removal of any electrical motor, electric machinery, control gear, fittings,

wires, or apparatus for lighting, heating, cooling or motive power or for any other purpose for which electricity can or may be used or any industrial or agricultural machinery operated by electricity; or

(iii) Price of any such goods as aforesaid taken on loan but not returned.;"

And the expression 'debtor' has also been defined in Clause (c) as under: --

"(c) "debtor" means a person by whom any dues are payable."

A perusal of these definitions would show that any sum payable to a Government Electrical Undertaking of the nature specified in the definition shall be considered to be dues and a person by whom such sum is payable is taken to be a debtor. In both the definitions the word which has been used is payable. If dues are payable by a person then he is a debtor and "dues" are any sum payable to a Government undertaking under nature specified in the definition of the expression "dues". Under Section 3 it is provided that every bill for dues payable to a Government Electrical Undertaking by a debtor shall be in the prescribed form. Here again the words which have been used are "dues" payable to a Government Electrical Undertakings.

Situation after enactment Insolvency and Bankruptcy Code 2016

However after coming of insolvency and bankruptcy code 2016 the situation is become different , the insolvency and bankruptcy code 2016 is promulgated to consolidate and amend the laws relating to reorganization and insolvency resolution of Corporate persons partnership firms and individuals in a time bound method for maximization of value of Assets of such persons to promote entrepreneurship availability of credit and balance the interest of the all stakeholders including alteration in the priority of payment of government dues and to establish and insolvency and bankruptcy fund and mentors connected therewith or incidental thereto has been introduced and now it is become necessary to the electricity supply companies to make a vision over the taking shelter by the defaulter companies under the provisions of the provisions of the code. The companies partnership firms and individual consumers after finding that they are unable to pay the dues of electricity company may file a petition before the national Company Law Tribunal Gate declare himself insolvent and transfer the property to any other person and the electricity companies may lose their revenue.

Procedure:

An insolvency plea is given to the authority that adjudicates (in corporate debtor's case it is NCLT) by operation or financial creditors or the corporate debtor. The plea can be accepted or rejected in a maximum time period of fourteen days. In case the plea gets acceptance then the tribunal will have to quickly appoint an IRP or Insolvency Resolution Professional for drafting a plan of resolution within a period of 180 days (that can be extended by ninety days). Following this, the court would initiate the process of resolving corporate insolvency. For that particular period, the company's directors shall remain suspended whereas the promoters shall have no say in the company management. The Insolvency Resolution Professional can seek help of the management of the company for handling everyday operations. In case the CIRP is unable to revive the organization, then the process of liquidation shall be initiated. **What enactment would prevail**

It is known principle of construction that when s special enactment provides for a special procedure for recovery of dues and that procedure must be adopted and to that extent any general procedure provided under any other institutes for recovery of such that cannot be held to be applicable ***Re Asks Central Multipurpose v. Secretary Orissa Khadi AIR 1992 ORI 238***

In case of ***JayantiLa lAmritlal v. The Union of India reported in AIR 1971 SC 1193*** it is held by the Apex Court that in order to see whether the rights and liability under the repealed law have been put an end by new enactment the proper approach is not to enquire if the new enactment had by its new provisions kept alive the rights and liability under the repealed law but whether it has been taken away those rights and liabilities, absence of a saving clause in new enactment preserving the rights and liability under the repealed law is neither material not decisive **Re Agarwal v. OL *Gujrat high Court.***

How the electricity distributor save it's revenue

1. By incorporating proper terms and conditions in agreement.

2. By Asking Security for complete liability, and review periodically.

3. In case arrear cross the amount of security, discontinue the supply and file the petition before NCLT to get declare the defaulters insolvent and get a scheme for recovery of money due.

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THE SUSTAINABLE STORY WHEN REFLECTING ON EARTH STRESS OR GEOPATHIC STRESS

by

Ms. Pooja Srivastav
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The understanding of Geopathy or 'earth sicknesses' has opened new doors of comprehension on sustainability of building structures on earth with a greater leverage to the importance of Geopathic Stress Rectification or Earth Stress Rectification. We must know that while we have endeavored to reaching to sustainability of solar energy, water resourcefulness and waste management, we are yet to give the same emphatic importance to how to sustain the buildings structures on earth without the negative effectives of Geopathic stress

Geopathic stress is relatively a new term that covers the relationship between the earth energies and peoples' well-being. There are areas of geopathic stress across the surface of the earth but how these areas affect living organisms and the mechanism of interference is something worth understanding. The world has become more curious about it as there is an increase in the number of geopathic stress-related diseases.

I must say that there is an immense need to understand geopathic stress and to learn the solutions as well as to get deeper into electromagnetic radiation, its effects and solutions.

'So, in today's environment when people say I don't feel comfortable in my homes or offices and when corporate performance is defrayed – it means it's important to check the geopathic stress in that room

Complaints such as 'in certain rooms in my home or my sleep pattern is disturbing or I am ill but there is no apparent reason or I am taking all the supplements but I don't feel good, are the areas where I know I need to check the geopathic line in their homes, under their beds or even under the couch in the living room

Sustainability through understanding of Geopathic Stress

Geopathic Stress (GS) is the sole factor found to be associated with majority of serious ailments and psychological issues – the negative effects of GS were proven to the satisfaction of medical professionals more than 70 years ago – many medical doctors as well as therapists are now of the opinion that no treatment can be considered a complete success without GS says Pooja

GS really refers to the earth energies that are harmful to mankind – GS runs in lines through the earth – When a structure is built above underground water, the natural magnetic flow of the water energy is restricted and disruptive vibrations are sent into the building – if we sleep over these lines over a period of time, the body's resistance to disease can be affected – GS may be caused by natural factors such as underground streams, geological faults, railway cuttings, quarries, tunnels and building foundations, basically anywhere where there has been a lack of respecting the resources of the earth. Many believe that underground water sources are the causes of GS creating a thought – how can this be rectified, and the underground water be still utilized as a valuable resource

Sustainable study needs to focus on rectification of underground displacements, core deposits, mineral deposits and caves to avoid them being obstacles to natural energy resulting in harmful frequencies

Pooja continues 'All places have GS lines – the energy comes from the core of the earth. As it goes up, ripple effect is created – so the lines will be stronger in the ground floor of a building – but it affects upstairs as well. GS lines hit waterfront bodies more, as it joins with the energy from water – If we observe nature here are the most common findings – Lightning will fall on GS affected areas only; the accident prone areas of a road are always on GS lines – Plants and trees will not grow properly on GS zones – the lines are stronger at night – and they are high during winter and rainy season – because of these heavy lines, it is not possible to have accurate readings after sunset

How can the sustainable knowledge of Geopathic Stress Rectification reach the masses and why?

Let's consider some matters close to the heart:

Pregnancy and Fertility: Geopathic stress (GS) will reduce our ability to create a new life. It is estimated that in the cases of over 90% of women who could not conceive, they or their partners were sleeping in GS place. In more than 50% of the cases it is the main cause of infertility. If you

are sleeping in a Geopathic Stress place during pregnancy, it can be the unfortunate factor for miscarriage or an unhealthy new born baby

Effects in children: Kids will sleep very badly in GS places. Many confirm, including researchers, that 90% of kids who died of cot death had been sleeping in GS places – Children do not thrive in GS, and are often hyperactive and prone to allergies, asthma and eczema. Kathe Bahcler, a famous researcher, surveyed over 3,000 school children and showed 95% of children with learning difficulties, hyperactive tendencies, or continuous bad behavior who slept or had their school desks or both in strong GS areas. Children may be experiencing GS if they are wetting their beds and infants may be experiencing it if they are continuously crying. They are more sensitive to GS

Geopathic Stress and Sleep: Sleeping in a geopathic stressed place is particularly stressful as a large area of your body is exposed to GS. During sleep, your brain is supposed to rest half the time and heal your body during the other half. If you are geopathic stressed during sleep, your brain has to spend all of its time working due to the strain of GS and you will wakeup tired. During sleep, the brain creates 80% of your new cells, giving the right signals for your body to operate properly and absorb the correct level of vitamins and minerals together with adjusting hormone balance. GS will interfere with this process and leave your immune system weak. All these body functions will usually become normal very quickly after GS is cleared from our systems. By sleeping in a GS place – the stress energy created below the ground can affect our sleeping position and result in cancer and tumors

Cancer: The worst outcome of GS in human body is cancer – if not rectified GS can take us to cancer level and leave us there – GS is a common factor in most cancer cases – many doctors have admitted that all their patients who got cancer were sleeping in the geopathic stressed areas

Sustainability when considering Geopathic Stress scenarios

Even as geopathic stress scenarios cannot be ignored as they effect human behavior, when considering ‘sustainability of self’ we need to educate the masses on the following factors which they need to be aware of when considering Sustainable Living

It is a fact that The World Health Organization (WHO) has recognized Sick Building Syndrome (SBD) for over 20 years and estimates 45% of schools, offices, hotels, institutions and industrial premises have SBS which causes machinery breakdown, tensions between staff and employer, lethargy, getting low results, children getting difficulties in learning, hyperactive tendencies or

lack of concentration, continuous bad behavior, eye symptoms, depression, stress and fatigue. Very high proportion of children who continuously play truant or who are refused places in ordinary schools due to misbehavior are in electromagnetic zones. Class teachers in electromagnetic field exposures in schools have a high rate of absenteeism – NASA also has recognized that Sick Building Syndrome – Geopathic Stress is the most serious hazard in the modern world.

With these revelations we at Shreem International Consultancy, would like TILA and the sustainability associations in India to seriously give a thought on sustainability of self from electromagnetic and geopathic zones which will result in long life and prosperity

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PROCUREMENT OF RENEWABLE ENERGY THROUGH OPEN ACCESS – EXPERIENCE / CHALLENGES THEREOF

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ABSTRACT

This paper defines the principles of transmission and wheeling of renewable energy (RE) through Open Access (OA). It reviews experiences of Delhi Metro Rail Corporation Limited (DMRCL) during implementation of 99 MW solar power purchase from M/s Rewa Ultra Mega Solar Limited (RUMSL), Madhya Pradesh through long term open access and discusses key policy and regulatory considerations for devising more effective provisions with ambitious RE deployment targets. The paper addresses the challenges of competing needs of stakeholders, especially those of RE generators, distribution utilities, and transmission network owners and operators. The importance of regulations and their effectiveness for financial viability of RE deployment is also explored. This paper aims to benefit policymakers and regulators as well as key renewable energy stakeholders. Key lessons for regulators include: creating a stable long-term regulatory policy framework, considering incentivizing RE through discounted transmission access, and assessing the cost implications of such discounts, as well as expanding access to renewable energy customers.

1.0 DMRC INTRODUCTION

Delhi Metro Rail Corporation Limited (DMRC) is registered under Companies Act, 1956 with equal equity participation of Government of National Capital Territory of Delhi and Government of India to construct and operate a world class Mass Rapid Transport System (MRTS).

DMRC has operational network of 9 lines having 250 stations covering a distance of 344kms in Delhi and National Capital Region. It is the 8th largest metro network in the world.

It is a known fact that electricity is the main input cost to the operational expenses of a Metro system. DMRC is taking all possible steps to preserve environment at all stages from “Construction to Operation”. Electricity bill accounts for more than 30% of DMRC’s operating expenses, and in the past electricity tariffs have shown an increasing trend.

DMRC at present has a total demand of around 200 MW of electric power and which is likely to further increase in future, currently it uses approximately 3 million units every day

to run the metro system in Delhi. The demand is more in summer due to air conditioning provided at stations and in trains for the passenger comfort.

2.0 SOLAR ENERGY (RE) IN INDIA

India has tremendous scope of generating solar energy due to geographical location advantage. The reason being India is a tropical country and it receives solar radiation almost throughout the year, which amounts to 3,000 hours of sunshine. This is equal to more than 5,000 trillion kWh. Almost all parts of India receive 4-7 kWh of solar radiation per sq. metres. This is equivalent to 2,300–3,200 sunshine hours per year. States like Andhra Pradesh, Bihar, Gujarat, Haryana, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, and West Bengal have great potential for tapping solar energy due to their location. Since majority of the population lives in rural areas, there is much scope for solar energy being promoted in these areas. Use of solar energy can reduce the use of firewood and dung cakes by rural household

The Government has set a target of installing 40 GW of grid connected rooftop solar capacity in the country including Delhi and National Capital Region (NCR) by the year 2022. As per Delhi Solar Policy, 2016 notified by Government of National Capital Territory of Delhi, target has been set for installation of 1 GW of solar power by the year 2020 and 2 GW of solar power by the year 2025 in Delhi.

The Government has set a target of installing 100 GW of solar capacity by 2022 in the country. A target of installing 175 GW of renewable energy capacity by the year 2022 has been set, which includes 100 GW from solar, 60 GW from wind, 10 GW from bio-power and 5 GW from small hydro-power.

The Ministry of Urban Development had requested all States & UTs, in 2014 to issue necessary directives to all State Government Departments for using rooftop of buildings under their control for solar power generation on mandatory basis and also to local bodies under their jurisdiction to incorporate the similar provision in their building bye-laws so that installation of Roof Top Systems (RTS) on rooftops of all types of buildings in their jurisdiction may become mandatory. Further, the Ministry of Urban Development also issued Model Building Bye-Laws, 2016, in which suitable provisions for installation of RTS on buildings have been incorporated. Four States/UTs viz. Haryana, Chandigarh, Uttar Pradesh and Chhattisgarh have already issued mandatory notifications for installation of RTS in different categories of buildings.

The Capacity Utilization Factor (CUF) of solar power projects is less than thermal, hydro, nuclear, wind and bio-mass power projects. The Government has launched several schemes for promotion and development of renewable energy including solar energy in the country from time to time. The Government is promoting development of solar energy in the country by providing various fiscal and promotional incentives such as accelerated depreciation, waiver of Inter State Transmission System (ISTS) charges and losses,

financing solar rooftop systems as part of home loan, and permitting Foreign Direct Investment up to 100 per cent under the automatic route.

3.0 UTILITY OF RENEWABLE ENERGY (RE) IN DMRC

In order to reduce carbon footprints and to mitigate the impact of electricity price rise of about 20% per annum in five years from 2009-14, DMRC decided to explore the possibility of installing rooftop solar plants on its premises.

DMRC has achieved the target of 20 MWp set by the solar policy one month ahead of schedule, i.e., by July 2017. Subsequently, DMRC has revised the target to 50 MWp by 2021, of which 25 MWp has already been commissioned till 31.12.2018. Work for 10 MWpcapacity is in progress and is likely to be commissioned by August 2019.

By going solar, DMRC has contributed significantly in reducing CO2 emissions. During the year 2017-18, Solar Plants collectively generated approximately 26 Million units thereby resulting in reduction of CO2 emissions by about 23.92 kilo tonnes. (i.e. 23,920 tonnes)

The major drawback of DMRC's rooftop solar installations is that, they are smaller in size due to the constraint of available roof area for installing solar, resulting in shortfall to meet the entire demand of DMRC by solar. Moreover, In National Capital Region (NCR) land is scarce and very costly, so installing large ground mounted solar plants to meet the large energy demand is not feasible.

Considering this, in order to increase the share of solar energy in DMRC's power portfolio, On 17.04.2017, DMRC has signed Power Purchase Agreement (PPA) for 25 years with Rewa Ultra Mega Solar Limited (RUMSL), Govt. of Madhya Pradesh to procure 345 Million Units / annum from Rewa Solar Plant. The base tariff is Rs. 2.97 per unit (kWh) in the first year with a hike of Rs. 0.05 per unit (kWh) from 2nd year onwards for next 15 years with the levellised tariff of Rs. 3.33 per unit, to meet substantial amount of DMRC power requirement through clean Solar Energy.

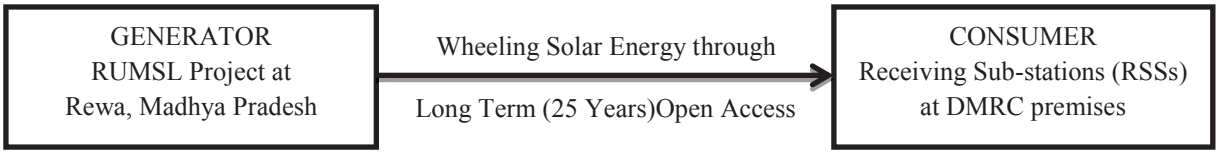

Fig.1 Wheeling Solar Energy from RUMSL to DMRC premises

DMRC is the first metro to procure Solar Power on RESCO basis through Inter State Open Access. Power from this plant is likely to be available to DMRC from March - 2019.

4.0 REGULATORY COMMISSIONS AND OPEN ACCESS REGULATIONS

The Electricity Act 2003 envisaged competition in the retail supply of electricity by introducing the concept of "Open Access" in a phased manner. Central Electricity Regulatory Commission (CERC) and the State Electricity Regulatory Commissions

(SERCs) notified Open Access Regulations which facilitated procurement of power through the Open Access route. Such Regulations have been developed in line with the prevailing Legislative and Policy provisions as well as considering the operational challenges faced by all stakeholders.

The introduction has been largely successful in promoting competition with the incumbent distribution licensees by providing consumers access to alternate sources of power. However, a number of issues have come up in the operationalization of Open Access.

5.0 ROLE OF TRANSMISSION& DISTRIBUTION UTILITIES IN WHEELING ENERGY THROUGH INTER-STATE OPEN ACCESS

Varioustransmission and distribution utilities are involved in wheeling energy from RUMSL to DMRC premises through inter-state and intra-state open access.

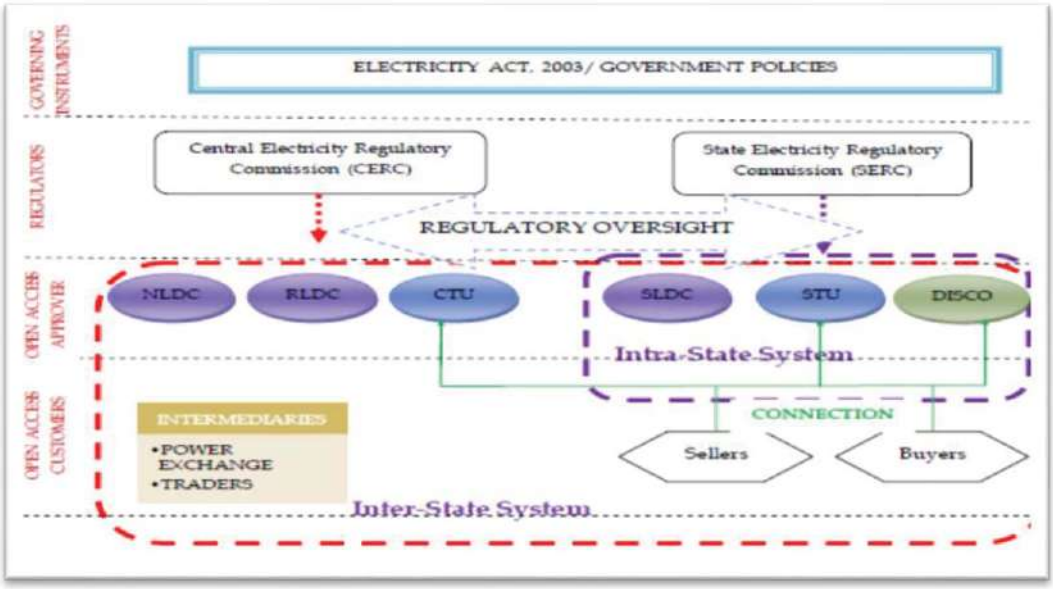

Fig.2 Governance Framework

For Example, the following three different Agreements are to be signed by DMRC for wheeling or transmission of power from RUMSL to DMRC premises through inter-state and intra-state open access:-

(i) Transmission Service Agreement (TSA) to be signed with Central Transmission Utility (CTU) i.e. M/s Power Grid Corporation of India Limited (PGCIL)

(ii) Bulk Power Transmission Agreement (BPTA) to be signed with State Transmission Utility (STU) i.e. M/s Delhi Transco Limited (DTL)

(iii) Bulk Power Wheeling Agreement (BPWA) to be signed with State Distribution Licensee Companies (DISCOMs) i.e. M/s BSES Rajdhani Power Limited (BRPL), M/s M/s BSES Yamuna Power Limited (BYPL) and M/s Tata Power Delhi Distribution Limited (TPDDL)

6.0 APPLICABLE CHARGES FOR AN OPEN ACCESS CONSUMER

6.1 Charges to be levied by Central Transmission Utility (CTU)

(i) Inter-State Transmission (ISTS) Charges and Losses which is approximately Paise 80 to 90 per KWH for solar energy, at present.

At the time of signing of PPAs, ISTS Charges and Losses on transmission of electricity generated from solar and wind sources were exempted.

Subsequently, Ministry of Power amended the earlier order dated 14.06.2017, by extending the ISTS exemption to all entities, including Distribution Companies for procurement of power from solar and wind power projects for compliance of renewable purchase obligation (RPO), for projects commissioned till 31st March, 2022. Despite this amendment, ISTS exemption is not available to DMRC, since DMRC is not an RPO obligated entity.

The imposition of ISTS charges on Renewable Energy (RE) is extremely onerous compared to conventional energy.

6.2 Charges to be levied by State Transmission Utility (STU)

(i) State Transmission Charges and Losses

State Transmission Charges are not applicable on Renewable Energy at present. However, transmission losses are approximately 0.84% on the quantum of wheeled energy.

6.3 Charges to be levied by State Distribution Companies (DISCOMs)

(i) Energy charges to the seller of electricity as per the contract entered into by him;

(ii) Wheeling charges, as applicable, to the distribution licensee in whose area he is located, at the rate fixed in the Tariff Order;

(iii) Cross subsidy surcharge, as applicable, as determined by the Commission or the nodal agency (STU), to the distribution licensee in whose area the consumer is located;

(iv) Additional surcharge, as applicable, to the distribution licensee in whose area the consumer is located;

(v) Standby charges, as applicable, to the distribution licensee in whose area the consumer is located;

(vi) Scheduling and system operating charges to State Load Despatch Centre (SLDC);

(vii) Reactive energy charges, as applicable, to the distribution licensee in whose area the consumer is located;

(viii) Regulatory Surcharge to the distribution licensee;

(ix) Metering charges to the Licensee;

(x) Any other charges not mentioned above, but covered by this Order and the detailed procedures drawn by SLDC for operationalization of Open Access in State

However, at present, as per clause 6 of DERC Order dated 01.06.2017, *"Wheeling, Transmission and Additional surcharge shall not be applicable on Open Access Consumers availing energy from all renewable energy sources within or outside Delhi. Open Access consumer receiving electricity from renewable energy sources shall be exempted from the cross subsidy surcharge to the extent of RPO:*

Provided that the generators using renewable energy sources shall certify that no REC / RPO claim for this power has been made".

Since, the Power Purchase Agreement (PPA) between power purchaser and power producer is generally signed for a period of 25 years, some firm regulations have to be framed by the Hon'ble Commission to give benefit to the long term open access consumers procuring renewable power from other states of India.

7.0 ADDITIONAL FINANCIAL IMPLICATION ON PROCUREMENT OF SOLAR ENERGY (RE) DUE TO THE IMPACT OF GST AND SAFEGUARD DUTY

7.1 Impact of GST

The order in the case of Petition filed by different solar developers issued by the court of Central Electricity Regulatory Commission for the assessment of impact of GST (Change in law) came on dated 09.10.2018.

As per Central Electricity Regulatory Commission (CERC) Order dated 09.10.2018, 5.55% of Project cost is the impact of GST, post 01.07.2017 under Change in Law on total project cost.

7.2 Impact of Safeguard Duty

As per Govt. of India Notification, Ministry of Finance (MoF) has imposed Safeguard Duty on imports from China and Malaysia on solar cells for 2 years as per the following:-

S. No.	Year	Safeguard Duty
1	First Year	@ 25% ad valorem
2	Second Year (For First 6 months)	@ 20% ad valorem
3	Second Year (For Next 6 months)	@ 15% ad valorem

The safeguard duty has directly impacted the solar project to the extent of 60 – 70%, as major cost of the project is constituted by solar panels made by importing solar cells.

The import duty prima-facie has been placed in order to encourage the local solar panel manufacturers in the country to give a push to the "Make in India" effort. However, with the majority of top solar projects using these imported panels especially from China, this will at least in the short term create choppy waters and Add in the confusion surrounding GST, the solar industry has a fight on its hands.

8.0 PROJECT VIABILITY

To promote use of solar energy and to mitigate the impact of electricity tariff, DMRC had signed Power Purchase Agreement (PPA) to procure 345 Million Units per annum from Rewa Solar Plant, despite having No RPO obligations.

After signing of PPA, following significant policy changes have taken place:-

(i) Withdrawal of exemption for Inter-State Transmission charges and losses,

(ii) Introduction of GST, with effect from 01.07.2017

(iii) Introduction of Safe Guard duty on imported solar cells, with effect from 01.08.2018

The cumulative impact of the above policy changes may significantly affect the financial viability of procuring solar energy from Rewa project for DMRC.

9.0 INITIATIVES REQUIRED TO BE TAKEN BY GOVT. OF INDIA AND REGULATORY COMMISSIONS

Provide a long term roadmap on the exemptions available for open access charges for the renewable power procurement by open access consumers. These exemptions shall include ISTS charges and losses, wheeling charge, additional surcharge, banking charges and cross subsidy charges on solar power project and shall be exempted for at least 12 years from the date of commissioning of the project.

Funding the GST implication may be taken up with State Government, as the tax revenue share of State Government has increased.

In larger public interest, Ministry of Finance, Government of India will compensate the Solar Project Developers (SPDs) directly from National Clean Energy Fund (NCEF) or any other alternative source for the impact of safe guard duty and save the Solar Power Procurers from such huge financial burden due to the impact of Safeguard Duty.

These initiatives will help in planning for green power and support Government of India's agenda of 175 GW renewable capacities by 2022.

10.0 CONCLUSION

After examining the current scenario of Open Access in the Indian Power Sector, it is clear that there are a number of issues that are hindering stakeholders while operationalizing open access power.

It will be very difficult to arrive at landed cost of inter-state open access power before the actual flow of power and energy takes place from DISCOMs.

It is not possible to generate solar power in urban areas due to huge scarcity of land and cost of land being highly exorbitant. So large solar power projects can be constructed away from the load centres and inplaceslike coastal areas of India and remote areas in Madhya Pradesh, Rajasthan, Gujarat and Andhra Pradesh. This solar power generated in bulk cannot be consumed around generated areas and needs to be wheeled to cosmopolitan cities like Delhi, Chennai, Kolkata, Mumbai and other bulk power consuming cities. In case, organizations demanding to procure renewable energy from these generating areas to the load centres are not given exemptions in various regulatory charges imposed by various Central and State commissions at present, it will be very difficult for bulk consumers to procure renewable power for their use as it would not translate into any major benefits in terms of differential tariff and would thus discourage generators for installing these solar power plants. Adequate guidelines to establish a framework for inter-state banking arrangement of renewable energy power is the need of the hour. Consequently, India may not be able to achieve the desired target of 175 GW renewable capacities by the end of 2022.

Government of India will have to advise various Hon'ble Electricity Regulatory Commissions to bring forth compatible regulations in order to facilitate long term open access consumers of renewable energy including solar power developers so that potential of solar power generation is timely tapped and growth given a flip to achieve the desired target set by Govt. of India.

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GLOBAL ENERGY, SOCIETY AND ENVIRONMENTAL CONCERNS

by

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Introduction

The **Right to life**, liberty, and all the pursuit of happiness begins with the word **life**, and **life** begins at conception.

Human beings are product of their environment, a good environment would help all round development of one's personality and a bad or degraded environment would inhabit its development. Environmental degradation in bare terms means the deterioration of ecosystem which consists of Air, Water, Forest, Wild life etc. According to Article 21 of the Indian Constitution which grants every person the fundamental right to life and personal liberty. The right to life which is most fundamental yet it is most difficult to define. In Part- 4 of the Indian Constitution it is stated under Art.48A protection and improvement of environment and safeguarding of forest and wild life is the responsibility of the Government this was added after Forty-second Amendment in 1976.

Hence, the major cause of Environmental degradation has been natural as well as man-made. Natural causes being drought, floods, cyclone, earth-quakes etc and major man made causes being population spring, urbanization and industrialization. International awakening in respect of environmental protection owes its origin to the **United Nation Conference on Human Environment at Stockholm in 1972**. The Stockholm declaration on Human Environment is considered to be the **magna carta** of environmental protection. It was the first occasion when the world community got together to consider seriously the matter of Environmental Protection.

The Stockholm declaration made certain principles which other countries were bound to follow, firstly the ambit of right to life was amplified. Man has a fundamental right to freedom, equality and adequate conditions of life in an environment of quality that permits a life of dignity and well-being. States shall take all possible steps to prevent pollution of the sea by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.

The proclamation adopted by the United Nations Conference on the Human Environment held in 1972 in Stockholm , in which the Indian delegation together with the house contemplated that :

1. Man is both creature and moulder of his environment which gives him physical sustenance and affords him the opportunity for intellectual, moral , social and spiritual growth. Both the aspects of man's environment, the natural and man made , are essential to his well being and to the enjoyment of the basic human rights even to the right of life itself.
2. The protection of the human environment is a major issue which affects the well being of peoples and economic development throughout the world is the urgent desire of the people of the whole world and the duty of all Governments.
3. Man has constantly to sum up experience and go on discovering, inventing, growing and advancing. We see around growing evidence of man made harms in may regions of the earth.

With this research paper the authors would like to establish a relationship between environmental degradation and societal concerns, whether environmental degradation conflicts with Art. 21. The authors would like to conclude by assessing the damages which are caused to Art.21 when the process of environmental degradation takes place and at the same time bring out provisions from IPC against damages.

Environment & Society

According to Section 1(2) of the Environment Protection Act, 1986, the term 'Environment' includes water, air , land and human beings, other living creatures , plants, micro organisms and property. Therefore, both the society and the environment are inter linked. Moreover, the concept of Sustainable development relates to an improvement in human well being that allows us to meet the needs of the present without compromising the ability of future generation to meet their own needs.

Keeping in mind the relation of humans, society and the environment, certains objectives of Environment protection have been endeared:

i) Controlled, restricted and mindful use and exploitation of natural resources
ii) Maintenance and protection of environmental quality
iii) Protecting and balancing of the eco-system
iv) Achievement of substantial development
v) Environment awareness among the people

vi) Working out the Pollution problems

vii) Environmental education and training

viii) Punishment of the polluter

The Natural environment is at its exists with bot its biotic and abiotic components, living and non living components. However, the Man-made environment is deliberately created by men such as through industrial revolution, Communication networks like Telephone, Telex, Fax, agricultural apparatus, satellite and energy sources like thermal, hydro energy and atomic energy.

According to the U. N Council on Environmental quality , Eco-system is the interdependence of non-living and living beings, i.e animals, plants, forests, lakes and rivers etc.

The services which are endeared or designed to protect and sustain eco system are called Eco-system services. The Eco systems include:

1) Purification of water and air
2) Production of scope for droughts and floods
3) Generation of soil fertility
4) Decomposition and detoxification of wastes
5) Promote natural vegetation
6) Pollination of crops
7) Control of potential agricultural pests
8) Stabilization of climate
9) Dispersal of nutrients
10) Supporting of diverse human culture
11) Maintenance of bio-diversity
12) Maintenance of atmospheric temperature

According to Section 2(C)of Environment (protection) Act, 1986, " Environmental Pollution refers to presence in the environment of any environmental pollutant and environmental pollutant can be any solid, liquid or gaseous substance present in such concentration as may be injurious to environment. Today, our society and the vicinity is much polluted . The major factors of environmental pollution are:

1. Population growth
2. Indiscriminate use of Pollutants
3. Uncontrolled use of Pollutants

4. Unmindful exploitation of natural resources
5. Industrial development
6. Discharge of Pollutants into air and water
7. Improper disposal excreted and waste water
8. Inadequate management of solid waste
9. Failure to control noise pollution
10. Failure in food protection
11. Failure to check emission of ionizing radiation
12. Inadequate management of electro-magnetic energy
13. Inappropriate management of sound and heat

In India, the remedies for environmental pollution is under the following heads:

1. Civil remedies: The civil remedies for environmental pollution is available in the nature of compensation or damages to the victim and cost to recover the disturbed ecological balance or the environment
2. Criminal remedies: These remedies are available by way of penal action/punishmentsOther remedies: The other remedies for environmental pollution are :
   - i) Remedies under Constitutional Law
   - ii) Remedies under Law of Torts
   - iii) Riparian remedies
   - iv) remedies under the IPC , 1860 and Code of Criminal Procedure , 1973
   - v) Remedies under Insurance Laws
   - vi) Remedies under Labour laws
   - vii) Remedies under Wild life (Protection) act, 1972
   - viii) Remedies under forests(Conservation) Act, 1980

The history of legislation in India dates back to the starting of Indian Penal Code , 1860. Whereas Section 268 dealt with public nuisance, abatement of Public nuisance was dealt in with Section 133 to 144 of IPC, regarded as prohibitive nuisance. As per Sections 269 to 278 , a person is liable to prosecution and punishment if found guilty of an offence. Environment (Protection) Act, 1986 is considered to be an important act for environmental protection. At the same time , the Govt. of India has launched various programs, much in accordance with social welfare and protection of environment . Much effort has been done continuously by the Indian Govt. but how much have the people at large understood the facts and remain educated about

various environmental hazards and it's after effects? Many people still pollute the environment owing to disposal of solid waste , polluting potable water and what not ?

That environment can't be separated from Ecology and the lives of people should be understood . It is high time that we understood that

1) It is the fundamental human right to live in pollution free environment
2) Also that it is the fundamental duty of every individual to maintain purity of environment.

It is evident that after the Stockholm Conference of 1972, may acts like Wildlife Act, 1972; Water act of 1974 and Air act of 1981 was passed.The protection of environment is now a fundamental duty under Constitution Act of 1976.

It is notable that The Supreme Court vide Writ Petition (Civil) No. 860 of 1991 has directed UGC to prescribe a course on ' Man and environment' , to which a mandatory course on ' Environmental Education' has already been instituted. The major aims of this course is to sensitize the students and the society:

1. Knowledge about Over population and its effects- ways to check over population
2. Prevention of Soil erosion
3. Prevention of water pollution
4. Afforestation-Observing Tree plantation week
5. Methods to prevent Sound pollution
6. General principles of Sanitation
7. Ban on the use of loud speakers etc
8. Smokeless cooking
9. Understanding the concordance and harmony between humans and environment
10. Understanding the need and developing methods for safe disposal of solid wastes.

In the context of the above, In L.K Koolwal Vs. State of Rajasthan and ORs, it was pleaded under Article 226 and highlighted that the Municipality has failed to discharge ite primary duty resulting in the acute sanitation problem in Jaipur which is hazardous to the life of the citizens of Jaipur. The Court held that it is the duty of the Municipality to fulfill its primary duty and ordered to clean the filth in 6 months' time

GLOBAL ENERGY : The world possesses awide resource of energy ranging from fossil fuels and nuclear fuels , renewable energy such as wind, hydro and solar energy. When this energy is drawn upon to do work, and is converted to a less useful , energy consumption is said to have occurred

The European Commission has proposed in its Renewable Energy Roadmap, a binding target on increasing the level of renewable energy in the EU's overall mix less than 7 % today to 20 % by 2020. The Global energy resources consist of Fossil fuels, Renewable energy resources, Alternative energy paths. The total flux of power entering the Earth's atmosphere is estimated at 174 Peta watts. This consists of Solar radiation, geothermal energy, tidal energy, energy stored and produced by heat by radioactive decay leaking out of Earth's interior, and also that which is produced by the interaction of the earth's mass with the gravitational fields of other bodies such as Mon, and the Sun. The outgoing albedo (reflectivity) of the earth is about 0.3 , which means that 30% of the incident solar energy is reflected back into the space w, while 70 % is absorbed by the Earth and reradiated as infrared.. The 30 % reflected energy conmsists of that reflected from clouds, reflected from ground and the atmosphere. The 70 % is that which is absorbed by land, water and transferred back to the clouds.Emission of greenhouse gases and other factors such as land use changes , modify the energy budget slightly but significantly.

Nuclear energy uses an abundant , widely distributed fuel, and mitigates the greenhouse effect if used to replace fossil fuel derived electricity. International research is ongoing into various safety improvements , the use of nuclear fusion and additional uses such as the generation of of hydrogen for desalinating sea water and for use in district heating system

There is concern in some countries over North Korea and Iran operating research reactors and fuel enrichment plants , since those countries refuse adequate IAEA oversight and are believed to be trying to develop nuclear weapons . North Korea admits that it is developing nuclear weapons , while the Iranian Govt. vehemently denies the claims againt Iran. Critics, including most major environmental groups, believe that the nuclear power ia an uneconomic , unsound and potentially dangerous energy source, especially compared to renewable energy and dispute whether the costs and risks can be reduced through new technology.

Socio-Legal aspects of Environment

Article 48 –A states" The protection and improvement of natural environment is the duty of the state". Article 49-A od Directive Principles of State Policy states" The Sate shall endeavor to preotect and improve the environment and to safeguard the forests and wildlife of the country. At the same time, Article 51-A(g) states" It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers, wildlife and to have compassion for living creatures".

In Kinkari Devi Vs. State, the apex Court held that " There is both a Constitutional pointer to the State and a Constitutional duty of the citizens not only to protect but also to improve he environment and to preserve and safeguard the forest, flora and fauna, rivers, lakes and all other water resources of the country. The neglect or failure to abide by the pointer to perform the duty is nothing short of betrayal of the fundamental law which the State and indeed every Indian is bound to uphold and maintain".

The judiciary has been very concerned about these rights and duties. In the Kamal Nath Case, where, the family members of Shri Kamal Nath, then Minister for Environment and Forests, tried to divert the course if river Beas and also had encroached upon some forest land , to beautify their motel, Span Motel; the apex court delivered a landmark judgement and established the principle of exemplary damages for the first time and recognized Polluter Pays principle and Public Trust Doctrine ; affine of Rs ten Lakhs was imposed on Span motel .

In the Oleum Gas leak case, where Oleum gas had leaked from Shriram Chlorine plant in Najafgarh, the Supreme Court held that " Any enterprise that is engaged in an inherently dangerous activity is ' absolutely liable to compensate all those who are affected by an accident'.

Similarly in the case of Khoday Distilleries Ltd Vs State of Karnataka, 19th October 1994, Article 19(1) g read with Article 19(6) was stressed- it is the Fundamental right of the citizens to practice any profession or to carry on any occupation, trade or business so long as it is not prohibited or is within the framework of the regulation, if, any , if such prohibitions or regulations has been imposed by the State by enacting a law in the interest of the general public. The right conferred upon the citizens under Article 19(1)g is subject to the complete prohibition or to regulation, by the state. However, these regulations have to be in the interests of general public. However, certain restrictions of this right is provided under Article 301, 19(6), 47, 302, 303 and 305.

Article 21 of the Indian Constitution provides for the right to life and personal liberty and states that "No person shall be deprived of his life or personal liberty except according to procedure

established by Law " In this context also, we find various examples where the Law shows protection for the environment and also for the people. In Rural Litigation and Entitlement Kendra Vs Sate of UP, the Supreme Court held that Pollution caused by quarries adversely affects the health and safety of the people and therefore, it should be stopped as being violative of Article 21 of the constitution. In the case of Suvbhash Kumar Vs. State of Bihar, the apex court held that the right to get Pollution free water and air is the fundamental right under Article 21. This was eventually followed as the right to pollution free environment under Right to Life .

In the case of Ratlam Municipality Vs Vardicharan, where the problem was due to private polluters and haphazard town planning, the Supreme Court held that Pollution free environment is an integral part of Right to life under Article 21.

Therefore, we can see that the concern for The environmental protection has not only been raised to the status of fundamental law of land but it also goes together with the basic human right of every individual to live in a pollution free environment with full human dignity.

The Supreme Court has aptly held that essential feature of ' Sustainable Development', Polluter Pay Principle" and Precautionary Principle " are part of the environmental law of the country. Article 47 imposes the primary duty on the Stateto provide the public with improved health , raised level of nutrition and improved standard of living. (Vellore Citizens Forum vs Uniion of India , 1996, 5 SCC647)

Article 48 states "The State shall endeavor to organize agriculture and animal husbandry on modern and scientific lines and shall, take stepsfor preserving and improving the breeds and prohibiting the slaughter, of cowsand calves and other milch and draught cattle".

Article 49 states, " It shall be the obligation of State to protect every monument or place or object of artistic or historic interest, declared by or under Law made by Parliament to be of national importance, from spoliation, disfigurement , destruction, removal , disposal or export , as the case may be "

India , as the fastest developing country , has always believed in both national and international environmental protection programmes. The objectives of international environmental agreements contain all aspects of environmental and industrial hygiene. India had participated in Stockhom Conference 1971, Earth Summit Plus Five, 1997, Earth Summit at Johannesburg in 2002. In view of Article 253 read with entries no. 13 and 14 of the Union list is, that The Parliament can pass any law on environment protection and the same cannot be questioned before the courts on the ground that the parliament lacked legislative competence.. In view of the same, Air

(Prevention and Control of Pollution) Act 1981 and Environment (Protection) Act of 1986 were enacted. Actually, these acts were enacted to implement the decisions reached at the Stockholm Convention of 1972. This could be seen in Peoples' Union for Civil Liberties Vs Union of India , the Supreme Court held that the provisions of the International Covenant, which elucidates and go to effectuate the fundamental rights guaranteed b our Constitution, can certainly be relied upon by Courts as facets of those fundamental rights and hence, enforceable as such.

It is also important to understand Article 51-A; which means as the duty of the citizens to move to the court to see that the State performs its duties faithfully and the obligatory and primary dutiesare performed in accordance with the law of the land

In Sitaram Chhaparia Vs. State of Bihar, where five people filed aPIL seeking help and orders from the Court regarding environmental degradation due to Tyre manufacturing plant in the residential area, The Patna High Court held that the Protecting the environment is now afundamental duty under Article 51-A of the Constitution and the respondents were ordered to wind up their industry and the State respondents were obliged to ensure that. Similarly, In Abhilash Textiles Vs. Rajkot Municipal Corporation, it was held that the notices asking the petitioner to stop discharging the effluents from the factory on Public road or drainage having natural environment on the the pain of closing the factory will be valid.

Protection of Environment and Environmental Impact assessment are bot equally important. The EIA should take into consideration the inter –governmental equity and compensation also.The main laws in India , in action, in the context of EIA are Water Act, 1974, Indian Wildlife Protection Act, 1972, Air Act 1981 , Environment Protection Act, 1986 and Biological Diversity Act 2002. The responsible body for this is Central Pollution Control Board. EIA studies need both primary and secondary data and are conducted over a short period of time. In India, Environmental Information Centre has been set up to serve as a professionally managed clearing house of environmental information that can be used for environmental assessment in India.

Environmental Education would continue to follow the following :

i) Environmental awareness among the people
ii) Finding out solutions to the environment problems
iii) Conservation and preservation of natural resources
iv) Sustainable development of environmental quality
v) Providing economic incentives to the Non-governmental organization involved in the relevant field.

Class Action and Environment :

The term Class action connotes one or more members of a numerous class , having the common interest , and which may sue on behalf of themselves and all the other members of the class. Class actions is statutorily recognized by virtue of Order 1, Rule 8 of the Code of Civil Procedure , 1908; however, it should follow the conditions as :

1. A number of members ' interest involved
2. Their interest being common in suit
3. The Court permits a few persons to sue or be sued on behalf of the entire class
4. That the Court issues notice of the suit to all persons having the same interest or common interest

The best example of Class action was seen inn in the background of Bhopal Gas tragedy case, where the Govt. of India filed a class action suit on behalf of all the Poisonous gas victims in terms of the Bhopal Gas Leak disaster(Processing), Act, 1985

Similarly, in the Ganga Pollution (Tanneries) case , the apex Court in M.C Mehta Vs Union of India and another, AIR 1988 SC 1037, observed:

" When this petition came up for preliminary hearing, the Court directed the issue of notice under Order 1, Rule 8 of the Code of Civil Procedure , 1908 treating this case as a representative action by publishing the gist of the petition in the newspapers in circulation in northern India and calling upon all the industrialists and municipal councils having jurisdiction over the areas through which the river Ganga flows to appear before the Court and to show cause as to why directions should not be issued to them as prayed by the petitioner asking them not to allow trade effluents and the sewage into the river Ganga without appropriately treating them before discharging them into the river ".

Environmental Justice:

According to the Supreme Court (T. N Godavarman Thirumulpad vs. Union of India &Ors , 2012(3) SCC 277 , environmental justice could be achieved only if we drift away from the principle of anthropocentric to ecocentric. Many of our principles like sustainable development, Polluter pays principle, inter-generational equity have their roots in anthropocentric principles. The public trust doctrine is meant to ensure that all humans have equitable access to natural

resources treating all natural resources as property and life. That principles are also rooted in anthropocentric principles.

In M.C Mehta vs Kamal Nath & Ors , 1997(1) SCC 388, the Supreme Court propounded that the doctrine of public trust , the trust of that theory is that certain common properties such as rivers, seashores, forests, and the air are held by the Govt. in trusteeship for free and unimposed use of the general public. Resources like air, water , forests have such great importance to the people as a whole, that it would be totally unjustified to make them a subject of private property. The State, as a custodian of natural resources has a duty to maintain them not merely for the benefit of public , but for the best interest of flora and fauna, wild life etc. The importance of Doctrine of Public Trust has been seen in many cases. As in the Supreme Court in Association for Environmental Protection Vs State of Kerala &Ors observed that construction of hotel would adversely affect the flow of water as well as the river bed. The construction of building would adversely affect Marthanada Varner bridge.

As per this doctrine, natural resources, natural resources are held by the State as "Trustee" of the public. The natural resources can be disposed of only in a manner that is consistent with the nature of such a trust.

Summary:

The environment protection needs immediate attention worldwide. It is the prime concern of all of us in both individual and social capacity to understand the need of controlling pollution of the natural environment and also at the same time, abide by the laws made to protect the environment. Protection and improvement of the human environment, its society, is a vital major issue affecting not only the creatures, living beings but also the nonliving beings. While according to Article 48 –A of the Constitution of India, The State shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country. Article 51-A of the Constitution imposes as one of the fundamental duties on every citizen , the duty to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living beings. Everything can just be achieved only if there is a major participation of the people at large, and also that the people be educated about Environment .the apex court in Rural Litigation and Entitlement Kendra vs State of U.P., observed that for purpose of social development , the natural resources have got to be tapped , but at the same time, one cannot forget that tapping of resources have to be done with requisite attention , so that both ecology and environment be protected in the long run as a precious national wealth.

Key terms:

Fundamental Rights: The basic rights enshrined in the Constitution which are also justiciable and guaranteed by the State .

Fundamental Duties: Those duties enshrined in the Constitution which every individually is morally obliged to follow.

Environmental degradation: Activities which are acusingair, water pollution , soil erosion and other damages to the environment.

Natural resources: Resources available on the earth and which are put into use by man

Ecology: Scientific analysis and study of the interactions between the organisms and the environment.

Natural environment: The immediate vicinity in which man finds himself is the natural environment. Generally, it is referred to the forests, lakes, river, wildlife etc.

Environmental protection: The very concept of conserving and protecting the immediate natural environment, so that man can sustain without irreparable damages.

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PART-E

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PART- F

GLIMPSES OF TRAINING & WORKSHOP BY SH. RAJ SINGH NIRANJAN

Left to Right: Dr. Rajni Patel, Sh. Raj Singh Niranjan with Sh. K.T.S Tulsi (MP, Rajya Sabha & Sr. Adv. and Dr. Harsh Purohit (Dean, Law Department, Banasthali University) at 1st TILA International Moot Court Competition, 2018.

Sh. Raj Singh Niranjan delivering words on "RIGHT TO ENERGY" to the audience of 1st TILA International Moot Court Competition, 2018

Right to Energy index launched during Inter solar Banglore on 13th Dec,2018. The youths from Africa, Asia and Europe joined hands under the aiges of India Africa Youth Energy forum supported by TILA (http://www.tila.in) and DGEF (http://www.dgef.in).

Sh. Raj Singh Niranjan with Prime Minister of Bhutan.

Sh. Raj Singh Niranjan discussed steps to be taken for Food Revolution in India by encouraging Agri business and food processing with BHARAT RATNA M S SWAMINATHAN, Father of Green Revolution in India.

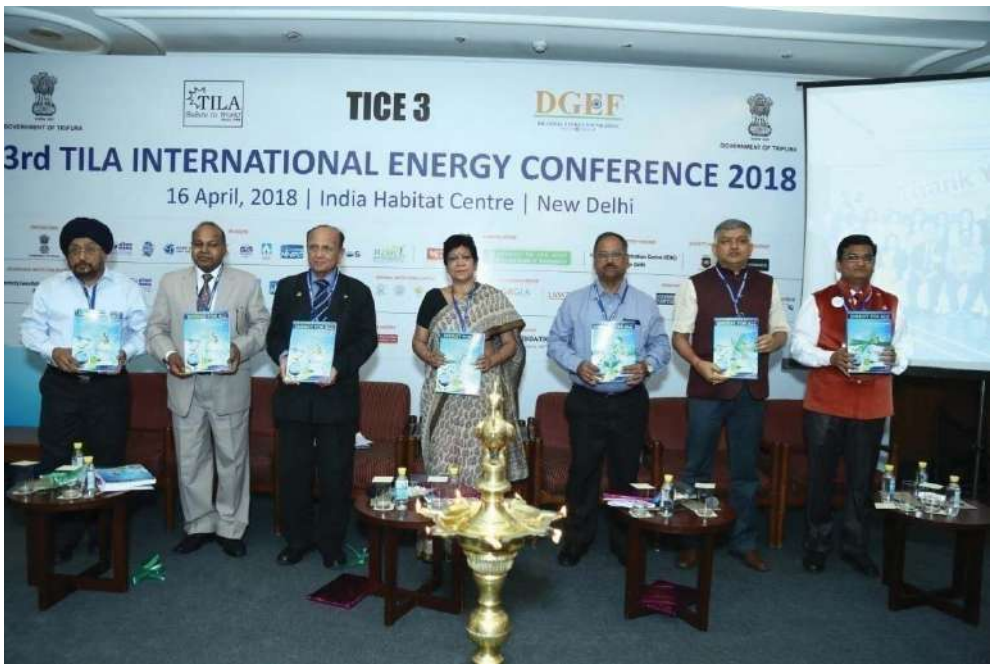
Sh. Raj Singh Niranjan delivered expert session on Energy Laws to Law Professors from across India at National Law University, Delhi.

Sh. Raj Singh Niranjan presenting book on Electricity Laws to Ms. Anjuli Chandra and Sh. Sushil Kapoor while NHPC Training

NSEFI President & Chairman Global Solar Counsel Sh Mehta joins as distinguished Arbitrator of International Energy Arbitration Centre (IEAC) in presence of Mr Swain, MD, SECI ; Mr Niranjan, Managing Partner of TILA and European delegation.

GLIMPSES OF TILA INTERNATIONAL CONFERENCE ON ENERGY, 2018

Sh. Raj Singh Niranjan with Ms. Sofia Oliveira Pais, Professor of Law at the Faculty of Law of Universidade Católica Portuguesa (Porto) at 3rd TILA International Conference on Energy, 2018.



Releasing the TILA International Conference on Energy Journal, 2018

TICE-5

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5TH TILA INTERNATIONAL
CONFERENCE ON ENERGY 2020

"Energy Revolution & Right to Energy"

April 15, 2020

Time 8:30 Hrs to 16:30 Hrs

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- **THEME - A :** CEO Round table
- **THEME - B :** Sovereign Fund Round table
- **THEME - C :** Regulatory Round table

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- **MAKE IN INDIA :** New & Renewable Energy
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OBJECTIVE OF THE COURSE

The course is designed in such a manner to make you familiar with the Electricity laws with regard to Electricity Act, 2003. This Certificate Course in Electricity laws is offered by Dr. Gopal Energy Foundation and is a highly recommended course for Law/Engineering/Management Students, Professionals (Lawyers/CA/CS) Managers/ Engineers who are working in Energy PSU's and Private Energy Companies or anyone who wants to excel in Electricity laws.

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