INTERNATIONAL JOURNAL FOR LEGAL RESEARCH AND ANALYSIS

Open Access, Refereed Journal Multi Disciplinary
Peer Reviewed

www.ijlra.com

DISCLAIMER

EDITORIAL TEAM

EDITORS

Dr. Samrat Datta

Dr. Samrat Datta Seedling School of Law and Governance, Jaipur National University, Jaipur. Dr. Samrat Datta is currently associated with Seedling School of Law and Governance, Jaipur National University, Jaipur. Dr. Datta has completed his graduation i.e., B.A.LL.B. from Law College Dehradun, Hemvati Nandan Bahuguna Garhwal University, Srinagar, Uttarakhand. He is an alumnus of KIIT University, Bhubaneswar where he pursued his post-graduation (LL.M.) in Criminal Law and subsequently completed his Ph.D. in Police Law and Information Technology from the Pacific Academy of Higher Education and Research University, Udaipur in 2020. His area of interest and research is Criminal and Police Law. Dr. Datta has a teaching experience of 7 years in various law schools across North India and has held administrative positions like Academic Coordinator, Centre Superintendent for Examinations, Deputy Controller of Examinations, Member of the Proctorial Board

Dr. Namita Jain

Head & Associate Professor

School of Law, JECRC University, Jaipur Ph.D. (Commercial Law) LL.M., UGC -NET Post Graduation Diploma in Taxation law and Practice, Bachelor of Commerce.

Teaching Experience: 12 years, AWARDS AND RECOGNITION of Dr. Namita Jain are - ICF Global Excellence Award 2020 in the category of educationalist by I Can Foundation, India.India Women Empowerment Award in the category of "Emerging Excellence in Academics by Prime Time & Utkrisht Bharat Foundation, New Delhi.(2020). Conferred in FL Book of Top 21 Record Holders in the category of education by Fashion Lifestyle Magazine, New Delhi. (2020).Certificate of Appreciation for organizing and managing the Professional Development Training Program on IPR in Collaboration with Trade Innovations Services, Jaipur on March 14th, 2019

Mrs.S.Kalpana

Assistant professor of Law

Mrs.S.Kalpana, presently Assistant professor of Law, VelTech Rangarajan Dr. Sagunthala R & D Institute of Science and Technology, Avadi.Formerly Assistant professor of Law,Vels University in the year 2019 to 2020, Worked as Guest Faculty, Chennai Dr.Ambedkar Law College, Pudupakkam. Published one book. Published 8Articles in various reputed Law Journals. Conducted 1Moot court competition and participated in nearly 80 National and International seminars and webinars conducted on various subjects of Law. Did ML in Criminal Law and Criminal Justice Administration.10 paper presentations in various National and International seminars. Attended more than 10 FDP programs. Ph.D. in Law pursuing.

Avinash Kumar

Avinash Kumar has completed his Ph.D. in International Investment Law from the Dept. of Law & Governance, Central University of South Bihar. His research work is on "International Investment Agreement and State's right to regulate Foreign Investment." He qualified UGC-NET and has been selected for the prestigious ICSSR Doctoral Fellowship.He is an alumnus of the Faculty of Law, University of Delhi. Formerly he has been elected as Students Union President of Law Centre-1, University of Delhi.Moreover, he completed his LL.M. from the University of Delhi (2014-16), dissertation on "Cross-border Merger & Acquisition"; LL.B. from the University of Delhi (2011-14), and B.A. (Hons.) from Maharaja Agrasen College, University of Delhi. He has also obtained P.G. Diploma in IPR from the Indian Society of International Law, New Delhi.He has qualified UGC – NET examination and has been awarded ICSSR – Doctoral Fellowship. He has published six-plus articles and presented 9 plus papers in national and international seminars/conferences. He participated in several workshops on research methodology and teaching and learning.

ABOUT US

INTERNATIONAL JOURNAL FOR LEGAL RESEARCH & ANLAYSIS ISSN

2582-6433 is an Online Journal is Monthly, Peer Review, Academic Journal, Published online, that seeks to provide an interactive platform for the publication of Short Articles, Long Articles, Book Review, Case Comments, Research Papers, Essay in the field of Law & Multidisciplinary issue. Our aim is to upgrade the level of interaction and discourse about contemporary issues of law. We are eager to become a highly cited academic publication, through quality contributions from students, academics, professionals from the industry, the bar and the bench. INTERNATIONAL JOURNAL FOR LEGAL RESEARCH & ANALYSIS ISSN 2582-6433 welcomes contributions from all legal branches, as long as the work is original, unpublished and is in consonance with the submission guidelines.

SUSTAINABILITY OF RENEWABLE ENERGY: AN ANALYSIS OF INDIA'S RENEWABLE ENERGY CERTIFICATES REGIME.

AUTHORED BY - KAPULURU SAIVARUN

Abstract

In the recent decade 'climate change' and 'sustainability' are the buzz words and yes looking at the alarming rate of greenhouse gas emissions and rise in global temperatures due to burning of fossil fuels and it is high time that the world should move towards renewable energy. Use of energy is inevitable thus it is important to choose wisely whether it is renewable or otherwise. India being a developing country is heavily dependent on fossil fuels for producing the electricity as it is the viable source of producing electricity than producing it through renewable sources as it need huge investments. However, India is putting its complete efforts towards energy transition in achieving sustainability. As a part of the promoting renewable energy, the Renewable Energy Certificates (RECs) was introduced through the policies framed under the Electricity Act, 2003 along with National Action Plan on Climate Change (NAPCC). Once the electricity flows into the powergrid, electrons are not identifiable whether it is generated using renewable or non-renewable resources. So, RECs are the market-based instruments that allows the consumers to purchase these RECs to claim that energy used by particular entity is from renewable source. This acts as an accounting and tracking mechanism for green energies. This paper assesses whether renewable energy certificate mechanism is actually sustainable in the light of analysing effectiveness and efficiency of RECs in climate change.

Keywords: India, Sustainability, Climate change, Renewable energy

Introduction

Recent years have seen a shift in India 's approach to negotiations within the United Nations Framework convention on Climate Change (UNFCCC), as well as more advanced climate policy actions are taken at national level. This trend towards a multi-level governance regime, with a more independent sub-national dimension, makes it important to study the factors that are driving and shaping policy at each level.[1] Further, Risks associated with climate change and concerns about environmental sustainability have endangered the need to transition to low carbon energy systems.

Since the advent of the World Commission on Environment Development's study "Our Common Future", the need for a sustainable world has been a common issue among nations. The use of energy is a very important international concern, since nearly all global environmental issues relate to the use of energy. Apart from energy conservation and efficiency a shift to renewable sources is inevitable for climate change, if we want to take the environment seriously. The only way is a sustainable world using renewable energy sources if it is, how can these sources be implemented in society?

Renewable energy (RE) is considered to be one of the catalysts of 'sustainable and inclusive growth' in India. Considering that India is rich in potential Renewable energy sources, it could be a solution to India's overdependence on fossil fuel to eradicate energy poverty. The Government of India, through the Ministry of New and Renewable Energy (MNRE), has implemented many initiatives to run a large and wide range of programmes covering the entire range of new and renewable energies in the country. There have been constant efforts by the Government to increase penetration of renewable energy to increase more conventional energy sources. Renewable sources like solar, wind, small hydro, and biomass have been very useful in improving energy accessibility in the rural areas across the country.

India imports about 80% of its crude oil and the rising demand for energy may push the oil import to an unsustainable level[2]. In 2013-14, India imported crude oil valued at $142.97 billion 41 times higher compared to $3.5 billion in 1998-99. Similarly, import of liquefied natural gas reached

[1] Aaron Atteridge, Manish Kumar Shrivastava, Neha Pahuja and Himani Upadhyay, *Climate Policy in India: What Shapes International, National and State Policy?*, 41 AMBIO , 68 (2012).

[2] Ernst and Young, *Mapping India's Renewable Energy Growth Potential: Status and Outlook 2013*, NATIONAL INSTITUTE OF URBAN AFFAIRS, https://smartnet.niua.org/sites/default/files/resources/EY-Mapping-Indias-Renewable-Energy-growth-potential.pdf.

$9.23 billion in 2014-15 which is just over 26 times higher than $346.8 million in 2004-05.[3] Greater dependency on oil and gas, could pose serious challenges to the environment as burning of fossil fuels causes carbon emission and these green house gases results in global warming and climate change India is blessed with plenty of renewable resources like solar, wind, biomass and small hydro, an estimated potential of 897GW has been identified from various renewable energy sources in the country, which includes 749GW from solar, 103 from wind, 25GW from bio-energy and 20GW from small hydropower.[4]

The Indian renewable energy market is going through a transformation, which should excite global investors, renewable equipment producers, bankers, renewable energy technology developers and others interested in the renewable market in Inda.

As a part of the promoting renewable energy, the Renewable Energy Certificates (RECs) was introduced through the policies framed under the Electricity Act, 2003[5] along with National Action Plan on Climate Change (NAPCC).[6] Once the electricity flows into the powergrid, electrons are not identifiable whether it is generate using renewable or non-renewable resources. So, RECs are the market-based instruments that allows the consumers to purchase these RECs to claim that energy used by particular entity is from renewable source. This acts as an accounting and tracking mechanism for green energies.

This paper provides the India's Renewable Energy Aspirations and Endeavours and Renewable Energy Certificates: the legal and regulatory framework along with comparative analysis of RECs model in other countries.

India's Renewable Energy Aspirations and Endeavours

A sustainable world and a sustainable development are recently reintroduced terms in relation to the environmental situation in the world. Best known in this context is perhaps the use of these concept in the report of the World Commission on Environment and Development "Our Common

[3] S. K. Kar and P. K. Sinha, '*Ensuring Sustainable Energy Security: Challenges and Opportunities for India*, 12 OIL, GAS & ENERGY LAW INTEL., 8 (2014).
[4] Sanjay Kumar Kar, *Renewable Energy Market Developments: A Study of India*, 6 RENEWABLE ENERGY LAW AND POLICY REVIEW, 238 (2015).
[5] The Electricity Act, 2003, No. 36, Acts of Parliament, 2003 (India).
[6] Grid-India, Renewable Energy Certificate Registry of India, https://www.recregistryindia.nic.in/index.php/publics/index (last visited Apr. 9, 2023).

Future" (UN, 1987).[7]

In accordance with the Paris Agreement, India expressed its Intention Nationally Set Contribution (INDC 2015), which was submitted to the UNFCC in October 2015, to reduce the intensity of its GDP's greenhouse gas emissions by 33–55% from its 2005 level by 2030. It also stated that by 2030, about 40% of the total installed electricity capacity would be based on non-conventional sources. More recently, India announced an ambitious target of 450 GW installed capacity of renewable energy by 2030 to combat climate change at the United Nations Climate Action Summit in September 2019 in New York. With 100 GW of solar, 60 GW of wind, 10 GW of biomass, and 5 GW of small hydro, the cumulative installed capacity of renewable energy in the country was established as an interim goal of 175 GW by the year 2022.

Essentially, as sustainable world means a world where everything which is taken from the nature is to be restored in the same manner, which results in an earth where future generations have same sources as the former generations.

Fundamentally, in a sustainable world the use of certain form of energy should be at the same rate at which its is getting produced and restored. So, only renewable energy sources are such sources which are sustainable in nature like Solar, Wind, Hydro, Bio-mass and Etc.

India is also one such nation which is striving for making its working model sustainable and carbon free. The ministry of New and Renewable Energy (MNRE) is one of the ministries under the government of India which is responsible for development of new and renewable energy requirements of the country. The two Oil shocks during 1970s, the sudden increase of oil prices and adverse impact of balance of payments position led to the establishment of commission for additional Sources of Energy in the Department of Science & Technology. The Commission was responsible for formulating policies for development of new and renewable energy and their implementation. In 1982, Department of Non-conventional Energy Sources (DNES) and the then Ministry of Energy was created. In 1992, DNES became the Ministry of Non-conventional Energy Sources. In October 2006, the Ministry was re-structured as the Ministry of New and Renewable Energy.[8]

[7] Ruud Pleune, *The Role of Renewable Energy Sources in a Sustainable World*, 3 ENERGY & ENVIRONMENT, 430 (1992).
[8] Ministry of New and Renewable Energy (MNRE)-Government of India, https://mnre.gov.in/the-ministry/what-does-the-ministry-do/ (last visited Apr. 9, 2023).

The ministry's mission is to ensure.

- Energy security by decreasing dependency on oil imports and developing alternate fuels like bio-fuels and green hydrogen.
- Increase the share of green energy in the energy-mix
- Energy availability and access to all sectors of the society
- Energy affordability through providing cost effective and efficient energy supply
- To meet the global average per-capita energy consumption by 2050.[9]

Solar

Since, ancient times Sunlight is considered as a source of life to our planet. India being the 7th largest country in terms of land area has a vast potential of solar energy around 5000 trillion kWh per year energy which on average receiving upto 4-7 kWh per sq. m per day.[10] Solar is the most secure source of energy of all others reason being its abundantly available. In the recent years India is investing on solar energy for the social and economic benefits like reduction in use of fuel wood, minimising the risks of contracting lungs and eye ailments, employment at rural level.

National Institute of Solar Energy has evaluated the India solar potential of approximately 748 GW and solar panels covering around 3% of the waste land. In addition, the deserts offer great potential for solar power generation in India. About 271GW of solar power potential exists in the deserts of Ladakh (Jammu and Kashmir), Thar (Rajasthan), and Kutch (Gujarat).[11]India's target is to install 100 GW grid-connected solar power plants and already 40.1 GW is installed. Recently, India stands 4th in solar PV instalment across the globe as on end of 2021.[12] The objective of India is become world leader in solar power by creating the policy ecosystem for solar technology distribution across the country.

Wind

The India is 4th largest in wind energy sector in world which is making steady progress. The country has a strong ecosystem with a total installed capacity of 35.6 GW (as on 31 March 2019). Wind is a site-specific energy resource and therefore, selection of potential sites requires a

[9] *Id.*
[10] Ministry of New and Renewable Energy (MNRE)-Government of India, https://mnre.gov.in/solar/current-status/ (last visited Apr. 9, 2023).
[11] Power Grid Corporation India Limited, Desert Power India-2050, Integrated Plan for Desert Power Development', [Dec. 2013], https://www.powergrid.in/sustainability (last visited Apr. 9, 2023).
[12] MNRE, *supra* note 7, at 4.

comprehensive wind resource assessment. Through the National Institute of Wind Energy (NIWE), the government has installed over 800 wind-monitoring stations across the country at 50m, 80m and 100m above ground level and issued wind potential maps. Recent assessments show a wind energy potential of about 302 GW at 100 m above ground level in India. Further, Government is promoting wind power projects across the country through private sector investment.[13]

Small-Hydro

Hydro power projects are categorised as large and small hydro based on their production capacity. Different countries have different criteria to categorize hydro power projects. In India, hydro power plants with capacity up to 25 MW are categorised as small hydro. Prior to 1989 ministry of power looked after Hydro Power. Subsequently, plant capacity up to 3MW was transferred to the MNRE. Lately in 1999 plant capacity up to 25MW also was entrusted with the MNRE.

Hydro and Renewable Energy Department (HRED) assessed that the country has an estimated potential of 21133 MW from 7133 sites for power generation in the country from small / mini hydel projects. India's target is to install 5 GW small hydro and 4.8 GW is already installed.[14]

Waste to Energy

With the advent of industrialisation and urbanisation negative impacts are accompanied by the positive impacts. One such negative impact is increase in waste quantity which poses threats to environment. However, the technological advancement helps in safe disposal of waste and also can convert such waste in the form of electricity and Biogas.

There are various processes through which waste can be converted in to energy

i. Biomethanation: is anaerobic digestion of organic materials which is converted into biogas
ii. Incineration: is complete combustion of Municipal Solid Waste with the recovery of heat to produce steam that in turn produces electricity through steam turbines.

[13] Ministry of New and Renewable Energy (MNRE)-Government of India, https://mnre.gov.in/wind/current-status/ (last visited Apr. 9, 2023).
[14] Ministry of New and Renewable Energy (MNRE)-Government of India, https://mnre.gov.in/small-hydro/current-status (last visited Apr. 9, 2023).

iii. Gasification: is a process that decomposes materials at high temperature and low oxygen to produce synthetic gas (a mixture of carbon monoxide (CO) and hydrogen (H2)). These gases are used to produce electricity and act as a

iv. Pyrolysis: Pyrolysis uses heat to break down combustible materials in the presence of low oxygen which produces a mixture of combustible gases; methane, complex hydrocarbons, hydrogen, and carbon monoxide. These gases are used to produce electricity through steam generators.

The total estimated potential of India's **urban and industrial** organic waste approximately can generate 5690 MW. India's target is to install 0.5 GW "Waste to Energy" and 0.2 GW is installed capacity.[15]

Bio Energy

Bio Energy is further divided into two types that is Biomass and Biogas.

Biomass is a renewable and carbon-neutral source of energy, 32% of country total energy use is from biomass and 70% of the country's population rely on this source of energy for daily livelihood. The Biomass provides resources for grid power generation. According to the study of MNRE India has the potential of 28 GW from agricultural residues and 14 GW from bagasse produced by sugar mills.[16]

Biogas is a mixture of methane and carbon dioxide, produced from organic materials which are bio-degradable through decomposition of this materials in the presence of low oxygen. There are many programmes which was implemented by MNRE for development of Biogas which also provides rural employment. **BPGTP scheme provides the decentralised energy source for various activities from cooking to small power generation plant and this a very reliable source.**

Renewable Energy Certificates – The Legal and Regulatory Framework.

Once the electricity flows into the grid, electrons are not identifiable whether it is generated using renewable or non-renewable resources. RECs are the market-based instruments that allows the consumers or obligated entities to purchase these RECs to claim that energy used by particular entity is from renewable source. This acts as an accounting and tracking mechanism for green energies. As a part of the promoting renewable energy, the Renewable Energy Certificates (RECs)

[15] Ministry of New and Renewable Energy (MNRE)-Government of India, https://mnre.gov.in/waste-to-energy/current-status (last visited Apr. 9, 2023).

[16] Ministry of New and Renewable Energy (MNRE)-Government of India, https://mnre.gov.in/bio-energy/current-status (last visited Apr. 9, 2023).

was introduced by the Central Electricity Regulatory Commission (CERC) through the policies framed under the Electricity Act, 2003[17] along with National Action Plan on Climate Change (NAPCC). The NAPCC provides flexibility in achieving the purchase requirements through tradeable Renewable Energy Credits, Certificates, or RECs in anticipation of potential difficulties for states in meeting their obligatory RPOs.

Renewable purchase obligation means, it a mandatory obligation created by the State Electricity Regulatory Commissions (SERCs) under the Electricity Act, 2003[18], to purchase minimum portion of renewable energy out of total energy consumption by the obligated entity. RECs abridge the lack of availability of renewable energy in different states of the country and requirement of the obligated entities to meet the renewable purchase obligation (RPO).

The Act required the State Electricity Regulatory Commissions (SERCs) to establish a minimum purchase requirement for renewable energy and to use price regulations to encourage the grid connectivity of electricity produced from renewable sources. In order to achieve this, the 2006 National Tariff Policy mandated that distribution companies purchase electricity based on renewable energy sources at preferential feed-in tariffs (FIT) set by the SERCs. It also gave the SERCs instructions for establishing minimum renewable purchase obligations (RPOs) at the state level. In India, since it is a concurrent issue, both the federal and state governments have policies governing it. Based on their understanding of regional resource availability and its effect on retail tariffs, SERCs were to set the RPOs.

The RPO is a crucial policy element in modifying the profile of energy use and ensuring demand for power produced using renewable sources. The National Tariff Policy allowed for some flexibility in how RPOs were determined by SERCs (lower RPO in states with few renewable resources), but it was anticipated that over time the states would improve their renewable energy mix availability and the impact on retail tariffs.

Through REC mechanism, a power generator may generate electricity using renewable energy sources in any part of the country and can trade it through Power Exchanges at the market determined prices. There are three Power Exchanges in India; Hindustan Power Exchange (HPX), Indian Energy Exchange (IEX), Power Exchange India Limited (PXIL).

[17] Electricity Act, *supra* note 5, at 3.
[18] Electricity Act, *supra* note 5, at 3.

Features of RECs

Particulars	Description
REC Types	Solar REC
	Non-Solar REC
Trading Platforms	CERC approved Power Exchanges
REC SI-unit	1 MWh
Validity period	1095 Days
Resale of Certificates	Not Allowed
Banking	Not Allowed
Eligibility	Grid connected Renewable Energy Technologies approved by MNRE
Trading Entities	Eligible Entity
	Obligated Entity
	Voluntary Entity
Forbearance Price	As per CERCs circular
Floor Price	As per CERCs circular
Trade hours	Last Wednesday of the month or as per the circular issued by the exchange (During Holidays)

Central Electricity Regulatory Commission in exercise of powers conferred under sub-section (1) of Section 178 and Section 66 read with clause (y) of sub-section (2) of Section 178 of the Electricity Act, 2003[19] has come up with REC Regulations, 2022[20] for development of power sector market renewable energy through renewable energy certificates.

These Regulations includes the following framework:

i. National Load Despatch centre is a Central Agency and its functions are specified.
ii. Who are Eligible Entities and eligibility for issuance of RECs.
iii. REC mechanism involves various steps
    a. Accreditation to the eligible entities for REC
    b. Registration of the eligible entities for REC
    c. Issuance, exchange, and redemption of REC

[19] The Electricity Act, 2003, § 66, 178(1), 178(2)(y), No. 36, Acts of Parliament, 2003 (India).
[20] REC Regulations, 2022, Central Electricity Regulatory Commission, May 9, 2022, https://cercind.gov.in/regulations/REC-Regulations-2022.pdf.

iv. Grant of Accreditation of Certificates

v. Revocation of Accreditation

vi. Grant of Registration for Certificates

vii. Revocation of Registration

viii. Issuance of Certificates

ix. Exchange and Redemption of Certificates

x. Denomination of Certificate

xi. Pricing of Certificates

xii. Validity of Certificates

xiii. Fees and Charges

The detailed Procedure for implementation of REC mechanism in compliance with REC Regulations, 2022 as follows:[21]

i.) **Procedure for Accounting of Generating in Respect of Eligible Entities**

Renewable Energy Generating Station (REGS) based on Hybrid technology i.e. with a combination of two or more renewable sources of technology shall require separate energy accounting for capacity linked to each source of technology.

- Eligible entities must submit meter data to SLDCs/RLDCs
- As per Grid Code SLDCs must prepare energy accounts of intra-state entities and has to submit such energy accounts to RLDCs in case of inter-state entities for the purpose of accounting the renewable energy flow into the grid.
- The eligible entities shall apply for issuance of certificates by SLDC/RLDC based on energy account.
- Energy injection data of eligible entities will be submitted by SLDC/RLDC on REC web portal of Central Agency (NLDC) on monthly basis.
- NLDC shall issue Renewable Energy Certificates to eligible entities based on the energy injection report submitted by SLDC/RLDC.

ii.) **Procedure for Accreditation of REGS Including CGP Under REC Mechanism by State Agency/RLDC**

- Application for Accreditation by REGS/CGP to SLDC/RLDC.

[21] Procedure for implementation of REC mechanism, GRID-India, Dec. 2022, https://www.recregistryindia.nic.in/pdf/REC_Procedures.pdf.

- Review of Application by SLDC (in case of intra-state entity) / RLDC (in case of inter-state entity).
- Submission of applicable Fees by REGS/CGP.
- Grant of accreditation by SLDC/ RLDC.

iii.) **Procedure for Registration of REGS Or CGP Or Distribution Licensee or Open Access Consumer, by Central Agency (NLDC)**

- Application for Registration by REGS/CGP/Distribution Licensee/Open Access Consumer to Central Agency.
- Review of Application by Central Agency.
- Submission of applicable Fees by Eligible Entity.
- Grant of registration by Central Agency.

iv.) **Procedure for Issuance of Renewable Energy Certificate to The Eligible Entity by Central Agency (NLDC)**

- An application shall be made to NLDC by eligible entities for issuance of renewable energy certificates through web portal/physical copy as per details provided in the Energy Injection Report (EIR) with duly singed and stamped by authorized signatory.

  In case user of CGP routes power through Open Access for self-consumption, such quantity is accounted as self-consumption and accordingly will be considered for issuance of RECs which are not eligible for sale. Self-consumption of such open access user will be as per schedule.
- After receipt of the application by eligible entities, NLDC will undertake preliminary scrutiny and all the attached documents will be verified.
- After the preliminary scrutiny, NLDC shall intimate the applicant in writing for furnishing of any further necessary information or documents. Further, NLDC can accept or reject the application
- While considering the application for RECs, NLDC shall check the availibilty of the following information:
  - The Time period for which the RECs are issued.
  - Eligible entity has duly certified EIR by SLDC/RLDC.
  - Confirmation of Compliance Auditor Report.

- Payment for REC issuance fee by Eligible Entity through online payment within 15 days from the date of application by NLDC.

- NLDC shall issue RECs only after confirming the claims made by the Eligible Entity, with duly certified EIR by SLDC/RLDC/Recommendation of SERC for issuance RECs.

  The denomination of each REC as per REC Regulations, 2022 is 1MWh of electricity generated through renewable energy source. Certificates shall be issued in accordance with the assigned Certificate Multiplier as per clause 12(2) of REC Regulations, 2022.
- NLDC shall issue RECs to the Eligible Entity within 15 days from the date of receipt of application along with necessary information and payment of issuance fee.
- NLDC may reject the application if Eligible Entity has failed to provide with necessary information within stipulated time period.
- Upon issuance of RECs, NLDC shall make the details available to the respective SLDC/RLDC.

v.) **Procedure for Redemption of Renewable Energy Certificate**

The NLDC being the Central Agency shall maintain the registry of RECs issued and these RECs can be exchanged in two ways:

a) Exchange through Power Exchange
b) Exchange through Electricity Trader

The REC once exchanged or redeemed or used for the RPO compliance of the obligated entity shall redeemed and cannot be subjected to further usage or redemption.

a) Procedure for redemption through Power Exchange(s)

- The Power Exchange shall be registered with NLDC on web portal.
- Eligible Entities can place RECs for trade on any registered Power Exchange as per REC Regulations.
- During the biding period, Eligible Entities and buyers quote their offer and bid prices respectively.
- The Power Exchange(s) shall send the offers and bids to the NLDC for the verification of the available quantity and price of RECs.
- The combined maximum bid volume shall be checked by the NLDC and it shall send a report to Power Exchange(s) for confirming the availability of the RECs

with the Eligible Entity. Further, Power Exchanges will determine the market price and accordingly the bids will be transacted.

b) Procedure for redemption through Electricity Trader(s)

- The Electricity Trader(s) shall be registered with NLDC on wen portal.
- NLDC is informed of the number of certificates which the Eligible Entity is intended to sell through Electricity Trader(s). The Eligible Entities who are intended to trade RECs through Electricity Trader(s) must apply online every month. These are traded on First come First serve basis.
- The RECs which are blocked by NLDC for solely to be traded through Electricity Trader(s) until it is deblocked by the NLDC upon the request of Eligible Entity.
- The Electricity Trader will take the seller code and the buyer code from the NLDC.
- Within 3 working days of the trade request placed by the Electricity Trader, the Eligible Entity shall accept the same, otherwise, NLDC will reject the application.
- The Transaction of RECs and Accounting of valid certificates will be maintained by the NLDC on successful completion of transaction or otherwise.

The Experience of India related to Renewable Energy Certificates.

It is very apparent looking at the legal and regulatory framework that India is having a robust REC mechanism which is highly regulated with a system of checks and balances at various levels of governance. The redemption of RECs is completed operated through Power Exchanges with complete transparency of the Power market.

Over few years, industries are more conscious of the electricity consumption through renewable energy sources and Introduction of Renewable Purchase Obligation Under Section 86(1)(e) of the Electricity Act, 2003[22] and the National Tariff Policy, 2006 created obligation on the entities to mandatorily use some percentage of renewable energy out of their total electricity consumption. This RPO percentage varies from every state in India.

the Hon'ble Supreme Court also gives obligated entities the option of purchasing RECs to comply

[22] The Electricity Act, 2003, § 86(1)(e), No. 36, Acts of Parliament, 2003 (India).

with RPO regulations.[23]

Month, Year	Opening Balance (A)	REC Issued (B)	No. of REC Redeemed			Total E= (C1+C2+D)	REC Revoked /Deleted (G)	Closing Balance (F= ((A+B)-E)-G)
			RECs Redeemed through Power Exchanges (C1)	RECs Redeemed through Traders (C2)	RECs retained by RE Generators (D)			
Jan, 2023	15913438	2897495	490561	0	3401	493962	0	18316971
Feb, 2023	18316971	342706	497860	0	2924	500784	432	18158461
Mar, 2023	18158461	372548	976637	90049	44394	1111080	0	17419929
Apr, 2023	17419929	258234	376132	111567	0	487699	0	17190464
May, 2023	17190464	505759	234711	65713	0	300424	0	17395799
Jun, 2023	17395799	417231	655430	36532	0	691962	0	17121068
Jul, 2023	17121068	551447	725212	133367	43198	901777	0	16770738
Aug, 2023	16770738	569697	333917	169548	7656	511121	0	16829314
Sep, 2023	16829314	372593	1071838	29999	7979	1109816	0	16092091
Oct, 2023	16092091	683200	313819	14609	22094	350522	1735	16423034
Nov, 2023	16423034	3138586	1349601	465342	14764	1829707	0	17731913
Dec, 2023	17731913	249975	0	0	0	0	0	17981888
Total:		**107037600**	**81183244**	**1116726**	**3129680**	**85429650**	**3626062**	

Table 1: Data of RECs which are issued and redeemed in the past 1 year by REC registry of India.[24]

This data clearly shows how RECs market is very promient in India energy sector. India is moving towards Green energy and sustainbility.

Additional scope has been provided to Renewable Energy (RE) generator(s) by REC mechanism to sell the power which is generated locally to DISCOM as well as through open access consumer(s). As on March 2018, total capacity of 6,022 MW has been registered under REC mechanism. After notification of CERC Regulations on January 14, 2010, around 4,360 MW have been commissioned and registered under the REC mechanism, amounting to capital investment of more than Rs. 23,000 crores, as per the standardized capital cost notified by the CERC in the renewable energy tariff regulations. Moreover, number of registered projects, number of transactions, traded value of RECs which is about Rs. 8,54,29,650 crores if the cost of 1 unit of REC is Rs.1000. These figures have created a positive impact on investors towards renewable energy sector.[25]

Almost 30,000 RECs have been purchased by voluntary buyers including companies, institutions, and individuals. The stakeholders' response proves the potential of the voluntary market in India.

[23] Hindustan Zinc Ltd. v. Rajasthan Electricity, Supreme Court of India, Civil Appeal No. 4417 of 2015, (order date: May 13, 2015).
[24] Renewable Energy Certificates Registry of India (Grid-India), https://www.recregistryindia.nic.in/ (last visited Dec. 3, 2023).
[25] Renewable Energy Certificates Registry of India (Grid-India), https://www.recregistryindia.nic.in/pdf/Others/Report_on_REC_Mechanism.pdf (last visited Apr. 13, 2023).

To further enhance the potential of the voluntary market, appropriate regulatory and policy measures are required to increase the purchase of RECs by volunteers.[26]

The Experiences of world Related to Market-Oriented Mechanisms for Renewable Energy Target Attainment.

The International REC Standard (I-REC Standard) is a non-profit foundation with the objective of empowering electricity purchasers with the ability to make renewable consumption options in any part of the world. I-REC Standard foundation enables the ability to purchase and sell renewable electricity for electricity suppliers, consumers, brokers, traders, electricity generators and national governments.

The International REC (I-REC) is a tracking system that supports compliance tracking with requirements of governmental renewable energy, as well as voluntary consumers to track and verify progress towards their environmental goals. This allows tracking the characteristics of (renewable) electricity production from its location of generation to its place of consumption. Such as the location of the electricity generator, the type of primary energy input, the date of commissioning, the installed capacity, the volume and timing of electricity production, are all factual attributes that can be tracked with the I-REC tracking system. This tracking takes place in the form of a digital statement, or I-REC standard certificate which is based on one MWh of electricity production from a single, generation facility. Ownership of this digital statement allows consumers of electricity to claim the attributes of a particular generating facility.[27]

United Kingdom

It started with NFFO scheme, wherein the generators are awarded the contracts to purchase the renewable electricity at premium price for a specific time period. Lately, this scheme was replaced with Renewable Obligations (RO). RO was brought through Utilities Act, 2000. Under the new scheme all the distributors shall buy a portion of total electricity supplied from renewable sources. The obligated percentage is increased from 3% in 2002 to 20% in 2020. The Office of Gas and Electricity Markets (OFGEM) is the administering and regulating authority for this scheme.

Under this scheme, the generators get ROCs for the quantity of electricity that is generated from renewable sources and can sell them in the open market or can sell to companies who fail to meet

[26] *Id.*
[27] International REC Standard, https://www.irecstandard.org/ (last visited Apr. 13, 2023).

their obligations. If the generators are connected to grid then they can inject into grid and at the end of each year they receive the ROCs for the amount of electricity feed into the grid.

United States of America

Renewable energy certificates (RECs) have been the preferred instrument to overcome renewable power obligation. RECs mechanism is a part of U.S. electricity markets, used to validate renewable electricity purchasing, and use by the voluntary and compliance renewable electricity markets. RECs provide the certification of electricity generated from renewable resources, and these certificates are sold or traded independently of the electricity. RECs are now commonly used to comply with a state's RPS, as part of a green power marketing strategy for retail consumers, and as a source of additional revenue to support renewable energy projects.[28]

The RPS Program by central government provides provision to obtain environmental attributes from generators and this prevent generators from selling or transferring their environmental attributes to others. a certificate-based tracking system is developed in the form of renewable energy certificates (RECs), which would be easily redeemed through NYSERDA (New York State Energy Research and Development Authority) as proof of its purchase of renewable attributes. Thus, introduction of RECs has the potential of establishment renewable energy market and opportunities for achieving the mandatory compliance of the RPS Program.[29]

The U.S. Department of Energy (DOE) Federal Energy Management Program (FEMP) recognizes that RECs "represent the environment and technology features of energy generated from renewable sources," and it can be sold in the mega-watt hour of generated electricity, which "enables customers to fulfil a percentage of their annual energy use with certificates generated elsewhere." FEMP mandates that federal agencies retain ownership of RECs in order to show renewable energy consumption to comply with the Energy Policy Act of 2005 and it supports that, "Retention of a REC that expressly says that the Federal agency retains or stops transfer to other parties of all renewable energy certificates of the project is the best practice of meeting this standard."[30]

This market-based instrument also supported by the court in United States on the legal basis of

[28] *The Power of Renewables: Opportunities and Challenges for China and the United States, Washington*, DC: THE NATIONAL ACADEMIES PRESS 2010, https://doi.org/10.17226/12987.
[29] Todd Jones, *The Legal Basis for Renewable Energy Certificates*, CENTER FOR RESOURCE SOLUTIONS (Apr. 2023), https://resource-solutions.org/wp-content/uploads/2015/07/The-Legal-Basis-for-RECs.pdf
[30] *Id.*

RECs as attributes and property rights. For example, the Apex Court of New Jersey has recognized that "One Renewable Energy Certificate represents the environmental benefits of one megawatt-hour of electricity generated through renewable energy sources," and RECs are considered "property."[31]

Japan

It was in 2003, the Japan introduced RPS law which states that a certain portion of total electricity procured by the distributors has to be from renewable energy sources. Under this law, the distributors of electricity can fulfil their obligations through generating & purchasing electricity from renewable sources or by purchasing "New Energy Certificates" (NECs).[32]

There is no floor price of the certificate which is set but 11Yen/KWh the ceiling price and the price is decide through market-based mechanism. Further, for non-compliance of the obligations there is huge penalty up to 10 Lakh Yen will be imposed.[33]

Further, there is unregulated trading system which is for voluntary users of renewable energy that is known as Green Power Certification System that is managed by Japan Natural Energy Company Ltd. Through this system corporates/companies can either generate on it own or out-source the same. The "Certification of Green Power" is received by the consumers renewable energy. These certificates are verified and recorded by the Green Power Certification Council.[34]

Conclusion and Suggestions

RECs as a market-based instruments which are introduced to promote the renewable energy and sustainability. This is an innovative move towards the climate change and environment as it creates an obligation on industries to purchase the renewable energy directly or generate on own or in form of RECs for portion of their total electricity consumption which bring a positive impact towards the environment and helps to mitigate the effects of climate change. As per the data and reports mentioned above RECs are highly successful instruments which are widely traded and it is increasing the investment towards renewable energy markets.

[31] In re Ownership of Renewable Energy Certificates ("RECs"), 913 A.2d 825 (N.J. 2007).
[32] Kriti Bhardwaj, *REC MECHANISMS IN DIFFERENT COUNTRIES*, GREAT LAKES (Jan. 14, 2011), https://www.greatlakes.edu.in/gurgaon/sites/default/files/REC_mechanism_in_different_countries.pdf
[33] *Id.*
[34] *Id.*

India has recently come up with REC regulations, 2021. These regulations are very well framed for having a robust mechanism that it is very much evident from the compliance mechanism of the Eligible Entities and involvement of Nodal agencies in this system for proper function.

Not only in India the RECs are encouraged but also across the global there many countries which have the renewable power certification system which are introduced in the early 21st century. Major 1st world countries like USA and Japan are having various mechanisms for promoting the green energy and its usage by creating obligation on the users.

Yes, RECs mechanism is a very efficient and effective method to have tracking and accounting on the renewable energy usage out of total energy consumption. Further, it helps to bridge the gap of non-uniform availability of renewable energy. Through this system it become very convenient for renewable energy markets to have check on the developments and investments towards this sector. Ultimately, REC mechanism is sustainable and promote green energy.

However, there are challenges and issues faced and these issues need to be addressed and the way forward regarding a smooth functioning of the REC mechanism specifically in India as follows:

i. RPO compliance: Strict enforcement of RPO compliance is fundamental for vibrant REC market in the country. Therefore, there should be dedicated regulatory authority which will govern this mandatory compliance towards industries and corporation. Similar to that of Japanese system India must also consider to impose the heavy financial penalty on those who does not meet the Renewable purchase obligations.

ii. Mismatch Between Demand and Supply of RECs: it should be ensured that there are enough measures to regulate the prices at power exchanges as supply of RECs is more in comparison to demand due to which RECs are left untraded. Looking that the numbers given in the Table 1, there are substantial number of RECs which are left untraded. To overcome this issue, Demand for RECs has to be increased and this can be done through State Electricity Regulatory Commission by increasing the RPO percentage for each state in India.

Bibliography

Legislations

- The Electricity Act, 2003, No. 36, Acts of Parliament, 2003 (India).
- REC Regulations, 2022, Central Electricity Regulatory Commission, May 9, 2022, https://cercind.gov.in/ regulations/REC-Regulations-2022.pdf.
- Procedure for implementation of REC mechanism, GRID-India, Dec. 2022, https://www.recregistryindia.nic.in /pdf/REC_Procedures.pdf.

Case Laws

- Hindustan Zinc Ltd. v. Rajasthan Electricity, Supreme Court of India, Civil Appeal No. 4417 of 2015, (order date: May 13, 2015).

Research paper/Journals

- Aaron Atteridge, Manish Kumar Shrivastava, Neha Pahuja and Himani Upadhyay, *Climate Policy in India: What Shapes International, National and State Policy?*, 41 AMBIO , 68 (2012).
- S. K. Kar and P. K. Sinha, *Ensuring Sustainable Energy Security: Challenges and Opportunities for India*, 12 OIL, GAS & ENERGY LAW INTEL., 8 (2014).
- Sanjay Kumar Kar, *Renewable Energy Market Developments: A Study of India*, 6 RENEWABLE ENERGY LAW AND POLICY REVIEW, 238 (2015).
- THE POWER OF RENEWABLES: OPPORTUNITIES AND CHALLENGES FOR CHINA AND THE UNITED STATES, Washington, DC: The National Academies Press 2010, https://doi.org/10.17226/12987.
- Amanda D.Boyd and Amanda Miller, *Climate Change, Energy Developments and Perceptions of Place*, 24 HUMAN ECOLOGY REVIEW, 3 (2018).
- Rajendra K. Pachauri, *Energy, Environment and Sustainable Development in South Asia*, 52 THE PAKISTAN DEVELOPMENT REVIEW, 273 (2013).
- Kartikeya Singh, *In India's Sea of Darkness: An Unsustainable Island of Decentralized Energy Production*, CONSILIENCE, 120 (2008).
- Alimpan Banerjee, India's Renewable Energy Act 2015: The Missing Piece in India's Renewable Energy Puzzle, 7 Renewable Energy Law and Policy Review, 145 (2016).

- Benjamin K. Sovacool, *Policy Lessons From Ten Renewable Energy Access Programs in Developing Asia*, 37 The Journal of Energy and Development, 1 (2012).
- Ashok Parthasarathi, *Renewable Energy Sources*, 10 THE JOURNAL OF INTERNATIONAL ISSUES, 112 (2006).
- Melissa Powers, *Sustainable Energy Subsidies*, 43 ENVIRONMENTAL LAW, 211 (2013).
- Ruud Pleune, *The Role of Renewable Energy Sources in a Sustainable World*, 3 ENERGY & ENVIRONMENT, 430 (1992).
- Todd Jones, *The Legal Basis for Renewable Energy Certificates*, CENTER FOR RESOURCE SOLUTIONS (Apr. 2023), https://resource-solutions.org/wp-content/uploads/2015/07/The-Legal-Basis-for-RECs.pdf
- Kriti Bhardwaj, *Rec Mechanisms In Different Countries*, GREAT LAKES (Jan. 14, 2011),https://www.greatlakes.edu.in/gurgaon/sites/default/files/REC_mechanism_in_different_countries.pdf

Editorials/News Articles/Websites

- Grid-India, Renewable Energy Certificate Registry of India, https://www.recregistryindia.nic.in/index.php/publics/index (last visited Apr. 9, 2023).
- Ernst and Young, *Mapping India's Renewable Energy Growth Potential: Status and Outlook 2013*, NATIONAL INSTITUTE OF URBAN AFFAIRS, https://smartnet.niua.org/sites/default /files/resources/EY-Mapping-Indias-Renewable-Energy-growth-potential.pdf.
- Ministry of New and Renewable Energy (MNRE)-Government of India, https://mnre.gov.in /the-ministry/what-does-the-ministry-do/ (last visited Apr. 9, 2023).
- Ministry of New and Renewable Energy (MNRE)-Government of India, https://mnre.gov.in /solar/current-status/ (last visited Apr. 9, 2023).
- Power Grid Corporation India Limited, Desert Power India-2050, Integrated Plan for Desert Power Development', [Dec. 2013], https://www.powergrid.in/sustainability (last visited Apr. 9, 2023).
- Ministry of New and Renewable Energy (MNRE)-Government of India, https://mnre.gov.in /wind/current-status/ (last visited Apr. 9, 2023).
- Ministry of New and Renewable Energy (MNRE)-Government of India, https://mnre.gov.in /small-hydro/current-status (last visited Apr. 9, 2023).
- Ministry of New and Renewable Energy (MNRE)-Government of India, https://mnre.gov.in /waste-to-energy/current-status (last visited Apr. 9, 2023).

- Ministry of New and Renewable Energy (MNRE)-Government of India, https://mnre.gov.in /bio-energy/current-status (last visited Apr. 9, 2023).
- Renewable Energy Certificates Registry of India (Grid-India), https://www.recregistryindia. nic.in/ (last visited Apr. 9, 2023).
- Renewable Energy Certificates Registry of India (Grid-India), https://www.recregistryindia. nic.in/pdf/Others/Report_on_REC_Mechanism.pdf (last visited Apr. 13, 2023).
- International REC Standard, https://www.irecstandard.org/ (last visited Apr. 13, 2023).
- United States Environmental Protection Agency, https://www.epa.gov/green-power-markets/renewable-energy-certificates-recs (last visited Apr. 15, 2023).