Chapter-IV

Trading of Renewable Energy Certificates

1. Renewable Energy Certificate Mechanism

The Renewable Energy Certificate (REC) mechanism is a market-based instrument, to promote renewable sources of energy and development of market in electricity. The REC mechanism provides an alternative voluntary route to a generator to sell his electricity from renewable sources just like conventional electricity and sell the green attribute separately to obligated entities to fulfill their Renewable Purchase Obligation (RPO). Such a generator can either opt to enter into a Power Purchase Agreement for sale at preferential full cost tariff to a distribution licensee or can opt to take the REC route for such untied capacity. If he opts for the REC route, he can sell his electricity to a distribution licensee such as a conventional source-based generation at an average power purchase cost. Alternatively, he can sell it to a third party, that is, to an open access consumer at mutually settled price, or even on power exchanges. On every one-megawatt hour of such electricity generated, the generator is entitled to get one REC from the central registry (which is regulated by the CERC) after getting registered once with this registry. Such registration requires prior accreditation with the state nodal agency for verifying the source of generation, capacity, and grid metering.

There had been two categories of RECs, namely solar and non-solar, to meet the RPO of the corresponding category. This was because the cost of solar-based generation is very high compared to all other sources. The RE generator as an eligible entity applies for issuance of REC within 6 months from the month in which RE power was generated and injected into the grid. The central agency issues the RECs to the eligible entity within 15 working days from the date of physical receipt of the application by the eligible entity. The validity of issued REC had been 1095 days. It is to be sold on power exchanges regulated by CERC, which also fixed a price band for exchange of REC (the band of forbearance price and floor price) to protect the interests of obligated entities and generators, respectively. Obligated entities can fulfill RPO by purchasing renewable electricity at full cost preferential tariff or by purchasing REC equivalent to their RPO. Voluntary buyers

can also purchase REC. Regulatory charge for shortfall of RPO compliance was at the rate of forbearance price.

The Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) Regulations, 2010 were issued on 14th January, 2010 for the development of market in power from non-conventional energy sources by issuance of transferable and saleable credit certificates. The CERC has nominated NLDC as the Implementing Agency (for the Central Registry), which prepares procedures and a web-based platform for the REC mechanism. The REC mechanism was formally launched on 18th November 2010.

CERC notified the Central Electricity Regulatory Commission (Terms and Conditions for Renewable Energy Certificates in Renewable Energy Generation) Regulations, 2022 on 9th May 2022. Some of the key features of REC Regulations 2022 are as under:

I. **Validity of RECs:** As per the new regulations, the certificates issued shall remain valid until they are redeemed.

II. **Eliminated Floor and Forbearance Price:** Floor and Forbearance price are not required for trading of RECs. Prices would be discovered in the power exchanges and as mutually agreed between eligible entities and electricity traders. The Commission by an order may give such directions to the Power Exchange(s) or the electricity traders or the Nodal Agency as may be considered necessary, on being satisfied that any of the following circumstances exist or are likely to occur-

   i. Abnormal increase or decrease in prices of Certificates;
   ii. Sudden volatility in the prices of Certificates;
   iii. Sudden high or low transaction volumes of Certificates on a Power Exchange

III. **REC Fungibility:** There is a new concept of fungibility for Renewable Energy Certificates, where the categorization of RECs, i.e., solar and non-solar has been eliminated in the REC Regulations, 2022. The regulations have provision for all

types of renewable energy technologies, like solar, wind, hydro, biomass and biofuel, conversion of waste into energy and any other RE technology into a new REC contract through which RECs of all RE technologies are traded.

IV. **Certificate Multiplier:** A new concept of Certificate Multiplier has been introduced for promoting less mature and high-price RE technologies. The multiplier will increase the market value of different RE technologies. The certificate multiplier assigned to RE technologies depends upon the date of commissioning of the project. Multipliers are assigned as per the tariff range (in Rs/kWh) for different RE technologies, as given in Table-37 below:

Table-37: Multipliers for different RE Technologies

RE Technologies	Tariff Range (Rs/kWh)	Certificate Multiplier
On Shore Wind and Solar	<=4	1
Hydro	4-6	1.5
Municipal Solid Waste and Non-Fossil Fuel based Cogeneration	6-8	2
Biomass and Biofuel	8-10	2.5

Multipliers have been assigned for the next three years from the date of effect of new regulations or such other period as may be decided by CERC. The Certificate Multiplier, once assigned to RE generating stations and Captive generating stations, shall be valid for fifteen years from the date of commissioning of these RE and captive generating stations. The RE projects which have already been commissioned before the new REC regulations came into effect shall not be subjected to these conditions.

V. **Transactions of RECs through Trading Licensees:** With a view to increase competition in the Renewable Energy Market and reducing the transaction costs of RECs, the Commission approved the transactions of RECs through the trading licensees. It will give long-term visibility to all the buyers of RECs, as they can fulfil their RPOs easily. This will facilitate even the small buyers who face difficulty in trading REC to fulfil their RPO.

2. Trading of Renewable Energy Certificates

Trading of RECs, till September 2023, was being held on Power Exchanges on the last Wednesday of every month. Subsequent to CERC order dated 8th October 2023 in Petition No. 375/MP/2022 and 379/MP/2022, trading of RECs is being held on Power Exchanges on the second and the last Wednesday of each month.

The CERC has notified the band of floor price and forbearance (ceiling) price for trading of RECs, from time to time (Table-38).

Table-38: Floor and Forbearance Price applicable for REC Transactions

Applicable Period	Floor Price (₹/MWh)		Forbearance Price (₹/MWh)	
	Solar	Non-Solar	Solar	Non-Solar
w.e.f. 1st June 2010	12000	1500	17000	3900
w.e.f. 1st April 2012	9300	1500	13400	3300
w.e.f. 1st March 2015	3500	1500	5800	3300
w.e.f. 1st April 2017	1000	1000	2400	3000
w.e.f. 5th December 2022	The Commission decided to do away with the requirement of determining floor and forbearance price for REC			

The first REC trading session was held on power exchanges in March 2011. The growth of RECs transacted on power exchanges and through trading licensees for the period from 2011-12 to 2024-25 is given in Table-39. As may be seen in the table, the number of RECs transacted increased significantly from 10.15 lakh in 2011-12 to 162.00 lakh in 2017-18, declined to 89.28 lakh in 2019-20 and again increased from 82.50 lakh in 2022-23 to 343.10 lakh in 2024-25. As per the Hon'ble APTEL Order, trading sessions of RECs at both the Power Exchanges remained suspended from July 2020 to October 2021 and resumed from November 2021 as per Hon'ble APTEL Order dated 09.11.2021.

The categorization of RECs between solar and non-solar has been dispensed with the introduction of the concept of multiplier under the REC Regulations, 2022 w.e.f. 05.12.2022. Accordingly, the power exchanges deactivated the Solar and Non-Solar REC contract for trading w.e.f. December 2022. A new contract, namely "REC", has been made available for trading. The number of RECs during the year 2022-23 and onwards is

inclusive of RECs transacted on the power exchanges and traded bilaterally through trading licensees.

Table-39: Growth of RECs transacted through Power Exchanges & Traders, 2011-12 to 2024-25

Year	Number of buyers	Number of sellers	Number of RECs transacted (Lakhs)	% increase in Number of RECs Transacted
2011-12	390	168	10.15	-
2012-13	790	487	25.90	155%
2013-14	1071	703	27.49	6%
2014-15	801	906	30.62	11%
2015-16	1313	1010	49.55	62%
2016-17	1734	1062	64.88	31%
2017-18	1140	1088	161.84	149%
2018-19	988	830	126.09	-22%
2019-20	830	820	89.28	-29%
2020-21	277	523	9.21	-90%
2021-22	541	749	84.60	819%
2022-23	520	820	82.50	-2%
2023-24	493	723	138.53	68%
2024-25	484	364	343.10	148%

Note: 2022-23 onwards includes RECs traded bilaterally through Trading Licensees.
Source:NLDC

Table-40 provides on the demand and supply of RECs (i.e., the gap between the volume of buy and sell bids of RECs) transacted on power exchanges from 2012-13 to 2024-25. As may be observed from the table, the volume of buy bids as a percentage of the volume of sell bids initially showed a declining trend from 2012-13 to 2016-17, followed by an increasing trend from 2017-18 to 2019-20 in both IEX and PXIL because of change in demand for both Solar and Non-Solar RECs. It can also be observed from the table that the dynamics of demand and supply of RECs have been completely changed from December 2022 onwards, and this was mainly due to the removal of the distinction between Solar RECs and Non-Solar RECs.

Table-40: Demand and Supply of RECs on Power Exchanges, 2012-13 to 2024-25

Year	IEX			PXIL			HPX		
	Volume of Buy Bid of RECs (Lakhs)	Volume of Sell Bid of RECs (Lakhs)	Volume of Buy Bid as % of volume of Sell Bid	Volume of Buy Bid of RECs (Lakhs)	Volume of Sell Bid of RECs (Lakhs)	Volume of Buy Bid as % of volume of Sell Bid	Volume of Buy Bid of RECs (Lakhs)	Volume of Sell Bid of RECs (Lakhs)	Volume of Buy Bid as % of volume of Sell Bid
Solar									
2012-13	0.77	0.14	549%	0.12	0.05	265%	-	-	-
2013-14	0.54	5.86	9%	0.14	1.35	10%	-	-	-
2014-15	1.01	37.00	3%	0.63	33.46	2%	-	-	-
2015-16	4.65	227.67	2%	1.83	93.80	2%	-	-	-
2016-17	4.04	323.70	1%	1.53	147.66	1%	-	-	-
2017-18	0.89	34.99	3%	1.20	13.68	9%	-	-	-
2018-19	86.45	152.51	57%	44.46	99.85	45%	-	-	-
2019-20	71.49	19.45	367%	26.80	8.12	330%	-	-	-
2020-21*	1.46	2.44	60%	0.37	0.71	51%	-	-	-
2021-22*	38.73	30.01	129%	6.21	5.58	111%	-	-	-
2022-23 (upto Nov-22)	23.28	215.24	11%	9.33	92.67	10%	0.02	0.09	23%
Non Solar									
2012-13	24.35	91.85	27%	6.55	24.90	26%	-	-	-
2013-14	12.71	251.65	5%	14.11	172.33	8%	-	-	-
2014-15	14.47	553.25	3%	14.51	550.88	3%	-	-	-
2015-16	26.73	889.92	3%	16.34	644.01	3%	-	-	-
2016-17	42.15	981.50	4%	17.16	596.37	3%	-	-	-
2017-18	94.17	635.09	15%	67.89	324.13	21%	-	-	-
2018-19	88.05	60.43	146%	37.82	16.53	229%	-	-	-
2019-20	91.87	94.72	97%	46.71	48.15	97%	-	-	-
2020-21*	5.78	41.70	14%	1.91	21.05	9%	-	-	-
2021-22*	50.84	90.58	56%	21.52	40.41	53%	-	-	-
2022-23 (upto Nov-22)	19.70	238.86	8%	9.70	111.02	9%	0.04	0.12	33%
REC**									
2022-23 (Dec-22 to Mar-23)	25.00	114.35	22%	4.52	33.16	14%	1.10	1.48	74%
2023-24	89.04	1511.64	6%	53.36	693.34	8%	1.35	73.72	2%
2024-25	287.03	799.64	36%	197.35	598.89	33%	31.13	341.47	9%

** As per Hon'ble APTEL Order trading sessions of RECs at both the Power Exchanges was suspended from Jul'20 to Oct'21 and resumed from Nov'21 as per Hon'ble APTEL Order dated 09.11.2021*

*** The categorization of RECs has been dispensed with, on introduction of the concept of multiplier under the CERC REC Regulations, 2022 w.e.f. 05.12.2022. Accordingly, the power exchanges deactivated the Solar and Non-Solar REC contract for trading w.e.f. December 2022. A new contract named "REC" has been made available for trading.*

Source: CERC MMC Report (Data from Power Exchanges)

The volume and price of RECs transacted on the power exchanges from 2012-13 to 2024-25 are given in Table-41, and the volume and price of RECs transacted through the trading licensees are given in Table-42.

The market clearing volume of Solar RECs transacted on the power exchanges increased from 0.14 lakhs in 2012-13 to 25.86 lakhs in 2022-23 (upto November 2022), whereas the weighted average market clearing price of these RECs declined from ₹12740/MWh in 2012-13 to ₹1189/MWh in 2022-23 (upto November 2022). The market clearing volume of Non-Solar RECs transacted on the power exchanges also increased from 25.76 lakhs in 2012-13 to 29.43 lakhs in 2022-23 (upto November 2022), whereas the weighted average market clearing price of these RECs declined from ₹1692/MWh in 2012-13 to ₹1000/MWh in 2022-23 (upto November 2022).

It can also be observed from the table that the market clearing volume of RECs (both Solar and Non-solar) increased from 26.32 lakhs in 2022-23 (December, 2022 to March, 2023) to 304.18 lakhs in 2024-25, whereas the market clearing price of these RECs declined from ₹1000/MWh to ₹225/MWh.

Table-41: Volume and Price of RECs Transacted on Power Exchanges, 2012-13 to 2024-25

Month	IEX		PXIL		HPX		Total	
	Volume of RECs (MWh) in Lakhs	Weighted Average Price of RECs (₹/MWh)	Volume of RECs (MWh) in Lakhs	Weighted Average Price of RECs (₹/MWh)	Volume of RECs (MWh) in Lakhs	Weighted Average Price of RECs (₹/MWh)	Volume of RECs (MWh) in Lakhs	Weighted Average Price of RECs (₹/MWh)
Solar								
2012-13	0.10	12782	0.04	12615	-	-	0.14	12740
2013-14	0.53	9383	0.14	9668	-	-	0.67	9441
2014-15	1.01	3725	0.63	4756	-	-	1.64	4121
2015-16	4.65	3500	1.83	3500	-	-	6.48	3500
2016-17	4.04	3500	1.53	3500	-	-	5.57	3500
2017-18	0.89	1000	1.20	1000	-	-	2.08	1000
2018-19	46.59	1113	25.36	1067	-	-	71.95	1097
2019-20	17.11	2293	6.04	2292	-	-	23.15	2293
2020-21*	1.19	1491	0.33	1290	-	-	1.52	1447
2021-22*	11.21	2201	2.42	2166	-	-	13.63	2195
2022-23 (upto Nov-22)	18.71	1182	7.13	1208	0.02	1000	25.86	1189
Non-Solar								

2012-13	19.81	1731	5.95	1564	-	-	25.76	1692
2013-14	12.71	1500	14.11	1500	-	-	26.82	1500
2014-15	14.47	1500	14.51	1500	-	-	28.98	1500
2015-16	26.73	1500	16.34	1500	-	-	43.07	1500
2016-17	42.15	1500	17.16	1500	-	-	59.31	1500
2017-18	92.41	1480	67.35	1487	-	-	159.76	1483
2018-19	41.22	1298	10.77	1274	-	-	51.98	1293
2019-20	43.16	1634	21.71	1659	-	-	64.88	1642
2020-21*	5.78	1000	1.91	1000	-	-	7.69	1000
2021-22*	49.57	1000	21.41	1000	-	-	70.98	1000
2022-23 (upto Nov-22)	19.70	1000	9.70	1000	0.04	1000	29.43	1000
REC **								
2022-23 (Dec-22 to Mar-23)	21.24	1000	4.19	1000	0.89	1000	26.32	1000
2023-24	75.39	447.24	39.85	431.97	1.34	447.92	116.58	442.03
2024-25	178.17	225.52	114.65	218.25	11.36	294.77	304.18	225.36

** As per Hon'ble APTEL Order trading sessions of RECs at both the Power Exchanges was suspended from Jul'20 to Oct'21 and resumed from Nov'21 as per Hon'ble APTEL Order dated 09.11.2021*

*** The categorization of RECs has been dispensed with, on introduction of the concept of multiplier under the CERC REC Regulations, 2022 w.e.f. 05.12.2022. Accordingly, the power exchanges deactivated the Solar and Non-Solar REC contract for trading w.e.f. December 2022. A new contract named "REC" has been made available for trading.*

Source: CERC MMC Report (Data from Power Exchanges)

The REC Regulations, 2022 provides for transactions of RECs through the trading licensees in addition to the transactions of RECs through power exchanges. The volume of RECs transacted through the trading licensees increased from 0.90 lakhs in 2022-23 to 38.91 lakhs in 2024-25 whereas the weighted average price of these RECs declined from ₹925/MWh in 2022-23 to ₹291.32/MWh in 2024-25 (Table-42).

Table-42: Volume and Price of RECs transacted through Trading Licensees, 2022-23 to 2024-25

Year	Volume of RECs (MWh) in Lakhs	Weighted Average Price of RECs (₹/MWh)
2022-23	0.90	925.00
2023-24	21.95	452.00
2024-25	38.91	291.32

Source: NLDC & Trading Licensees

***