

No. CEA-EC-11/16/2024-FCA Division / 916

भारत सरकार

केंद्रीय विद्युत प्राधिकरण

वित्तीय और वाणिज्यिक मूल्यांकन प्रभाग

Sewa Bhawan, New Delhi-66

01.01.2025

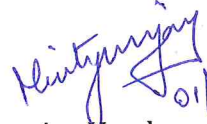
विषय: वर्चुअल पावर परचेज एग्रीमेंट (वीपीपीए) और नवीकरणीय ऊर्जा अनुपालन टोकन (आरईसीटी) पर अवधारणा नोट Subject: Concept Note on Virtual Power Purchase Agreement (VPPA) and Renewable Energy Compliance Token (RECT)

The undersigned is directed to refer to discussion in the meeting taken by Secretary (Power) on 25.11.2024 to discuss compliance of Renewable Consumption Obligation by Designated Consumers. In the meeting, it was directed that CEA in consultation with BEE, will share a concept note on on Virtual Power Purchase Agreement (VPPA) and Renewable Energy Compliance Token (RECT)

2. A meeting was held under Member (E&C), CEA on 20.12.2024 with GRID-India, BEE, IEX and Director (R&R), MoP. Based on discussion in the meeting and inputs received from these stakeholders, concept notes on VPPA and RECT have been prepared and the same are enclosed.

3. This issues with the approval of Chairperson, CEA.

Encl. As above.


(Mrityunjay Varshney)

Deputy Director

To

Chief Engineer (R&R)

Ministry of Power

New Delhi

Copy to:

1. Shri Samir Saxena, Director (Marketing), GRID India, New Delhi
2. Shri Rohit Bajaj, Joint MD, IEX, New Delhi
3. Shri Nikhil Prasad, Senior Experts, BEE, New Delhi
4. Shri Manish Mishra, Director, MoP

Concept Note on RE Commitment Token (RECT) mechanism

1. Background:

Sub-section (2)(tf) of Section (13) of Energy Conservation Act 2001 as amended by Energy Conservation (Amendment) Act, 2022 prescribes that Bureau of Energy Efficiency may “*recommend minimum share of consumption of non-fossil sources by designated consumers as energy or feedstock.*”

Sub-section (x) of Section 14 of Energy Conservation Act 2001 as amended by Energy Conservation (Amendment) Act, 2022 states that “*Central Government may, by notification, in consultation with the Bureau specify minimum share of consumption of non-fossil sources by designated consumers as energy or feedstock, provided different share of consumption may be specified for different types of non-fossil sources for different designated consumers*”.

Ministry of Power vide order dated 20th October, 2023 specified following year-wise minimum share of consumption of non-fossil sources (renewable energy) (herein referred as RCO) by designated consumers applicable from 1st April 2024

Table 1: RCO trajectory from FY 2024-25 till FY 2029-30

FY	Wind RE	Hydro RE	Distributed RE	Other RE	Total RCO/RPO target
2024-25	0.67%	0.38%	1.50%	27.35%	29.91%
2025-26	1.45%	1.22%	2.10%	28.24%	33.01%
2026-27	1.97%	1.34%	2.70%	29.94%	35.95%
2027-28	2.45%	1.42%	3.30%	31.64%	38.81%
2028-29	2.95%	1.42%	3.90%	33.10%	41.36%
2029-30	3.48%	1.33%	4.50%	34.02%	43.33%

For Designated Consumers (DCs) with Captive Power Plants (CPPs) and Open Access Consumers, total RCO/RPO targets shall be applicable irrespective of the non-fossil fuel source.

2. Year-wise required Generation from Renewable Energy sources to meet RCO target

Table 2: Year-wise projected generation from RE sources

Description	2025	2026	2027	2028	2029	2030
Projected Electricity Consumption (BU) (including CPP, Discom , OA)	1587	1726	1864	2002	2141	2280
RE requirement to meet RCO/RPO (factoring in technical losses) (BU)	522	623	728	839	950	1053
Projected RE installation (GW) (As per MNRE)	223	275	327	380	437	475
Maximum RE Available (BU)	390	475	582	693	814	923
Shortfall (BU)*	132	148	146	146	136	130
Shortfall (%) (BU shortfall / BU RCO/RPO Target)	25%	24%	20%	17%	14%	12%

Note:

- Year-on-year RE generation from various sources has been evaluated considering MNRE data on RE projects under implementation, tendered, and targeted up to 2030. (485 GW RE-Non-Fossil @ 2030)
- Data from projects currently under implementation and tendered out by MNRE (215 GW) are expected to be completed by 2027-28, with additional capacities to be added during FY 29-30 (78 GW).
- Energy requirements have been projected based on CEA data from FY25-30, including technical losses.
- Projected RE generation as a percentage of total energy requirements is calculated and compared with the RCO trajectory to identify any deficit of RE power.

- v. Additional capacities of Solar RE under PM KUSUM and PM Surya Ghar considered during FY25-27

3. Challenges in meeting the RCO targets

Designated Consumers are required to meet the specify RCO targets either by meeting their electricity demands from Renewable Energy Sources or buying Renewable Energy Certificate (REC) produced by generation of RE energy. In both the cases, there is a requirement of availability of sufficient RE generation to meet the specified RCO target.

As illustrated in Table 2, there will be shortages in RE Generation to meet the overall RCO targets against the targets the specified by the Central Government. This shortage is estimated to be 25% (132 BU) in FY 2025, gradually decreasing to 12% (130 BU) in FY 2030.

The stock of Renewable Energy Certificates (RECs), currently standing at 45.9 billion units, is insufficient to meet the demand for RCOs, exacerbating the problem for Designated Consumers trying to fulfil their RCO obligations.

4. Alternatives to address the shortfall in likely RE Generation

The challenges faced by Designated Consumers in meeting the RCO target due to non-availability of sufficient RE generation is genuine. Therefore, there is a need to explore an instrument, which can give RE purchase pledge for RE energy required to meet the shortfall in specified RCO target against some token payment. It is proposed to christen this instrument as Renewable Energy Commitment Token (RECT).

5. Salient Features of RECT

Concept	RECT to be issued to any Designated Consumer as a token of commitment to make good for any shortfall in meeting the specified RCO target on payment of token rate. The issued RECT would have limited shelf-life of 3 financial years (excluding the financial year, in which it is issued) and should be redeemed within the shelf life of RECT, other-wise penalty provision for non-fulfillment of RCO target as per Energy Conservation Act 2001, as amended from time to time would be applicable.
Nodal Agency for issuing RECT	BEE

Unit size of RECT	1 unit of RECT would be equivalent to 1 MWh of RE electricity.
Quantum of RECT	RECTs will be purchased by Designated Consumers based on their specific renewable energy requirements. However, the total amount of RECTs purchased by Designated Consumers cannot exceed RE Generation equivalent to 50% of their RCO for the financial year 2024-25, 40% of their RCO for the year 2025-26 and 30% of the RCO obligation for the financial year 2026-27. This will ensure that while RECTs can be used to defer compliance, a significant portion of the RCO has to be met through direct renewable energy consumption or through buying RECs, thus promoting actual generation of renewable energy over time.
Shelf Life of RECT	3 Financial Years excluding the Financial Year in which it is issued. E.g. if RECT is issued in 2024-25, then its shelf life would be upto 2027-28.
Price of RECT	Price of RECT should be decided in a manner, so that it is not onerous to Designated Consumers (DC), and it is slightly more than discovered price of Renewable Energy Certificate (REC). This will encourage DC to first buy REC and if REC is exhausted, then they will buy RECT. Presently, REC is traded in Power Exchanges twice in a month. The latest discovered REC price is about 26 paise/unit. Following options of RECT prices have been deliberated upon: - I. The difference between GDAM and DAM prices can serve as indicator for RECT price. Generally, GDAM prices are higher than DAM prices. RECT prices in a financial year can be considered as difference between yearly average Market Clearing Price (MCP) of GDAM and DAM in the last Financial Year. Difference of average MCP in GDAM and DAM in 2023-24 comes to about 57 paise/unit, while in 2024-25 (upto November 2024), difference is about 36 paise/unit. However, the issue to be considered as that the difference between GDAM and DAM would be volatile, and in future, there is

	no certainty that GDAM prices would be higher than DAM prices. Besides, in case, RECT price fixed is lower than REC price, then DC may opt for RECT instead of buying REC. II. A fixed price of RECT may be specified with annual 5% escalation. In case of non-compliance of RCO obligation, the Designated Consumers are liable for penalty payment. As the Designated Consumer is deferring her RCO obligation through RECT, RECT price may be linked to the interest rate of the ceiling penalty rate (₹ 3.72/unit). Considering interest rate of 7%, RECT price can be fixed at 25 paise/unit for the year 2024-25 with annual escalation of 5%. In this concept, if the price of RECT is lower than REC, DC may opt for RECT instead of first buying REC, which may not be desirable. III. Price of RECT may be kept as 110% of latest discovered prices of REC in the Power Exchange. However, REC prices are volatile of late. Recently, it has increased from 19 paise/unit to 26 paise/unit in next round at PX. There will be lot of uncertainty among the DC about the prices of RECT. Because of volatility, RECT price may become onerous for DC. IV. Quarterly weighted average price of REC in the power exchanges, with the clearing volume as the weight may be considered as RECT price. Based on discovered prices of REC in each quarter, RECT price will be notified by BEE in their website. DCs have to buy the RECT at the latest notified RECT price. With quarterly averaging of REC prices, there will be less volatility in RECT and uncertainty for DC will reduce. Among all the above options, Option 4 appears to be balanced one, as Designated Consumers have certainty of RECT price and as RECT prices are determined after discovery of all REC prices, RECT price would not impact price discovery of REC.
Window for purchase of RECT	DC can buy RECT at any time of the year based on latest notified price of RECT by the Nodal Agency.

Procedure for buying RECT	Designated Consumer shall make an application to Nodal agency along with required payment on an online portal and make the required payment digitally. Designated Consumers can also submit requisite LC issued by Schedule Commercial Bank as alternative of payment. Nodal Agency would check the eligibility of Designated Consumers, in terms of maximum value of RECT that can be issued. Nodal agency shall issue the RECTs to the Designated Consumer within 15 working days from the date of receipt of the application
Procedure for mandatory redemption of RECT	Designated Consumer, which has bought RECT, shall have to redeem RECT within the shelf life of RECT, either through actual consumption of renewable energy or the acquisition of RECs for meeting the compliance obligations of the financial year, in which the RECT is being redeemed and the issued RECTs will be extinguished. RECT redemption will be on First-In-First-Out (FIFO) basis i.e. RECT first bought will be redeemed first. E.g. If a Designated Consumer has availed RECT in 2024-25 and 2025-26, then RECT bought in 2024-25 will be redeemed first Designated Consumers shall make an application to Nodal Agency in this regard along with documentary evidence for actual consumption/REC bought and the purchase amount/LC will be refunded/released to the Designated Consumers within 15 days of the receipt of application.
Penalty for non-redemption of RECT	If Designated Consumer, which has bought RECT, could not redeem the RECT within the shelf life of RECT, the Designated Consumer may have to pay the penalty as imposed under Section 26(3) of Electricity Conservation Act 2001. As per the above provision of the Act, the defaulting entity shall need to pay penalty which shall not exceed twice the price of every metric ton of oil equivalent

	prescribed under this Act, which is in excess of the prescribed norms MoP has notified value of 1 ToE as Rs. 21650 for 2019-20 and accordingly, ceiling value of additional Penalty works out to be Rs. 3.72 per unit of electricity. Cost paid towards RECTs will be forfeited if the Designated Consumers could not redeem the RECT within its valid shelf life.
Multiplier Effect	If Designated Consumer consumes renewable energy stored in an energy storage system (ESS), a multiplier (say 1.5) may be specified, in line with multiplier specified by CERC for Hydro Project in CERC (Terms and Conditions for Renewable Energy Certificates for Renewable Energy Generation) Regulations, 2022. E.g. If multiplier is 1.5, 100 MWh consumed through storage will be equivalent to 150 MWh plain vanilla RE consumption. The nodal agency will ensure appropriate accounting methodology for the same.
Maintaining a Pool on account of RECT	Nodal agency shall open a RECT pool account bearing interest for settlement of all payments related to RECT.
Utilization of balance in RECT pool account	If a DC is not able to redeem RCET, it will have to be treated as part of the penalty that will be imposed by the State Commission. However, some interest may be earned between creation of IECT and its redemption. Funds collected through such interest will be utilized as for promotion of non-fossil fuel-based technologies.

6. How to implement RECT mechanism?

Ministry of Power has notified the RCO target through Notification dated 20th October 2023. As per para 7 of the Notification, the specified renewable energy consumption targets shall be met either directly or through Certificate in accordance with the Central Electricity Regulatory Commission (Terms and Conditions for Renewable Energy Certificates for Renewable Energy Generation) Regulations, 2022, published in the Gazette of India, Extraordinary, Part III, Section 4, dated the 24th May, 2022.

The concept of RECT may be introduced by amending the above notification of Ministry of Power by stating that specified RCO target shall be met either directly or through renewable energy certificate or through RECT issued in line with Ministry of Power's Notification on RECT.

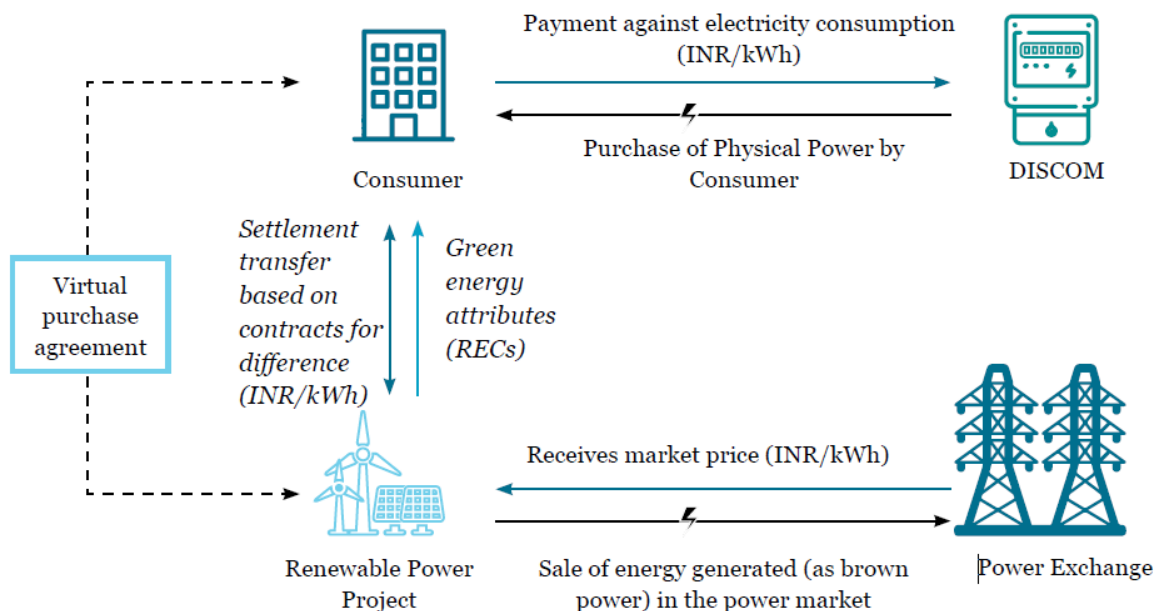
BEE will notify the detailed procedure for issue and accounting of RECT.

A. Note on Virtual Power Plants (VPPAs)

1. Introduction:

Under the Virtual Power Purchase Agreement (VPPA) model, a renewable energy generator and a consumer enter into an agreement with agreed pricing arrangement (strike price). The generator sells power as brown power (i.e. power without green attributes) on the exchange, while the consumer procures power from sources such as DISCOMs or captive plants. As the renewable generator sells energy as brown power, it becomes eligible for Renewable Energy Certificates (RECs), which are transferred to the consumer under the VPPA contract. The consumer, typically a commercial and industrial (C&I) or corporate entity, uses these RECs to fulfil Renewable Purchase Obligations (RPOs) and meet climate commitments. Payment settlement under the VPPA model generally follows a two-way structure, where any gain (Market Price – Strike Price) is passed on to the consumer, while any loss (Strike Price – Market Price) is paid by the consumer to the generator. In this arrangement, the generator is assured a fixed realization of the strike price for the contract's duration, while the market risk and associated rewards are borne by the consumer.

The VPPA model provides several key benefits such as flexibility for consumers, allowing them to meet their energy needs from DISCOMs or captive power plants while avoiding the complexities of aligning demand with variable renewable energy (RE) generation. For RE generators, the VPPA ensures assured revenue, supporting financial stability and project financing. The model also protects DISCOMs by maintaining their revenue base, as high-tension consumers continue sourcing power from them. Additionally, the VPPA facilitates the aggregation of demand from C&I and corporate consumers, enabling economies of scale for larger RE projects. Finally, it reduces RE integration costs, supporting grid stability by minimizing supply variability.



2. The VPPA Structures:

(1) Bilateral Contract Settlement (BcS) mechanism. The BcS mechanism involves the following steps:

- i. **Strike Price:** Strike price is the price which the buyer in a VPPA guarantees the RE developer and reflects the LCOE of the project.
- ii. **BcS Models:** In the simplest model, if the RE developer recovers a price lower than the strike price from sale in normal power exchange the difference is paid by the buyer to the RE developer. If a higher price is realized the benefit is passed on to the buyer by the RE developer. The green attribute of the RE power is transferred to the buyer. The strike price may be determined through competitive bidding

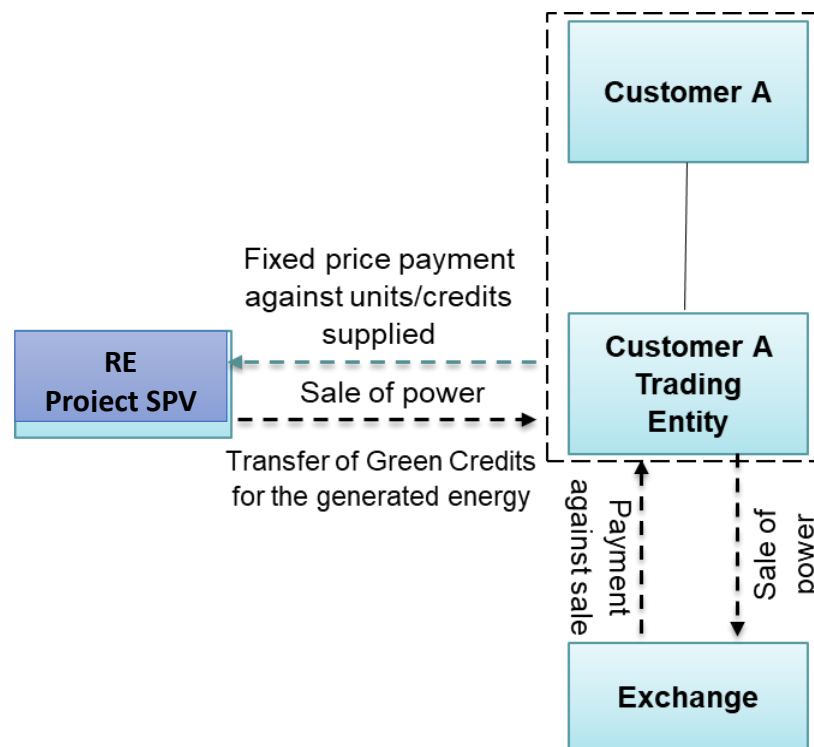
1. Two-way settlement mechanism

- a) If the strike price is more than the market price, the Consumer pays the RE Generator for the difference.
- b) Conversely, if the strike price is lower than the market price, the RE Generator pays the Consumer.
- c) This arrangement provides a desirable hedge against power price volatility.
- d) This kind of settlement is also known as Bilateral Contract Settlement (BcS) mechanism and is particularly attractive for corporates as it allows them to plan for electricity expenditures even in a highly volatile energy market.

2. One-way settlement mechanism

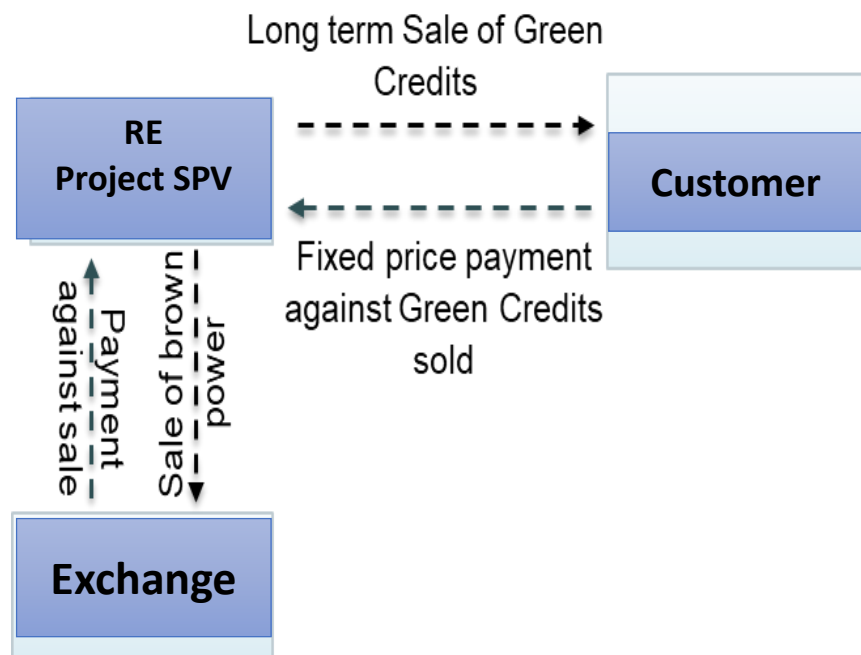
- a) Only the Consumer compensates the RE Generator when the market price is below the strike price.
- iii. **REC Registration:** The renewable energy project will be registered under the REC mechanism to facilitate the issuance of RECs for the generated renewable power.
- iv. **Sale of Non-RE Energy:** The "non-RE" energy, stripped of its green attributes (RECs), will be sold in the DAM or Real-Time Market (RTM).
- v. **Transfer of RECs:** The renewable energy generator will transfer the RECs (green attributes) to the buyer, through a nominated agency which will manage their accounting and registry.

(2) Trading Company model



- The customer sets up a trading entity and the agreement is executed between the customer's trading entity and RE Generator's Project SPV.
- RE Generator sets up the RE project and sells generated power to the customer's trading entity at a fixed price.
- The trading entity then further sells the power as brown power into the Energy Exchange at the prevailing market rates.
- As the power is being sold as brown power into the exchange, green credit certificates are issued for equivalent power and transferred to the customer's trading entity.
- This model is being followed in Renew – Amazon VPPA contract of 210 MW (Solar) in India. Renew has entered into a VPPA agreement with Amazon's trading arm, which serves as the counterparty. The trading arm purchases electricity from the renewable energy (RE) developer and sells it on the brown market via the exchange. The RE developer transfers the associated green attributes (I-REC) to Amazon's trading arm. This is a fixed-price VPPA, the buyer through trading company purchases the entire RE power. Price risk is borne by the buyer.

(3) Green Credit Sale Agreement Model



- RE Generator sets up wind/solar plants and sells generated power as brown power to into the Energy Exchange at the prevailing market rates.
- The customer does not consume or buy the generated power from this project.
- Long-term contracts with the customer wherein only Green Credits are sold to the customer at a pre-determined fixed rate.
- This model is being followed Renew – Microsoft VPPA contract of 150 MW (Solar) + 440 MW (pipeline). The Renew-Microsoft VPPA operates under a distinct model, where Microsoft, as the counterparty, guarantees the price of green attributes only for the duration of the PPA. The RE generator sells the power in the brown market. In this arrangement, any discrepancies between actual and expected power sales are the responsibility of the RE generator.

In the Trading Company Model and Green Credit Sale Agreement Model, no BcS is involved.

3. Benefits of the VPPA model

The VPPA offers a mutually beneficial approach for accelerating the expansion of renewable energy (RE) capacity. Key benefits of the VPPA model include:

- Flexibility for Consumers:** Consumers continue to meet their energy needs from DISCOMs, allowing them the flexibility to draw power based on their

demand. This contrasts with direct bilateral agreements, where aligning demand with variable RE generation can be challenging.

- b) **Assured Revenue for RE Generators:** The PPA provides revenue certainty, ensuring financial stability and facilitating project financing.
- c) **Revenue Protection for DISCOMs:** Since the VPPA counterparty (typically high-tension consumers, such as C&I and large corporates) continues to source power from DISCOMs, the VPPA model does not pose a threat to DISCOMs' business prospects.
- d) **Aggregation of C&I Consumers:** The VPPA enables the aggregation of demand from C&I and corporate consumers across different regions of India. This aggregation allows for the economies of scale needed to deploy larger RE plants.
- e) **Reduced RE Integration Costs:** Under the VPPA model, variable generation is aggregated at the national level and dispatched through the Power Exchange. This aggregation reduces supply variability, may minimize the need for ancillary services, and supports grid stability as the share of RE in the energy mix increases.

4. International Experience with VPPAs

- a) More than 80% of these contracts signed in the U.S. in 2019, or 11.2GW, were under the virtual PPA model. Source: [BloombergNEF](#)
- b) Vast majority of the 24.1 GW of contracts signed in the U.S. in 2023 was through Virtual PPAs. Source: [Bird & Bird](#)
- c) Since 2017, over 130 Corporate Power Purchase Agreements (PPAs) have been signed in Australia, totalling more than 5.6 GW of renewable energy commitments. Notable companies doing VPPA include Apple, Telstra's and Microsoft's. Source: [Bird & Bird](#).
- d) The global Power Purchase Agreement (PPA) market is projected to grow from USD 28.3 billion in 2023 to USD 444.3 billion by 2033, with a CAGR of 31.7% from 2024 to 2033. Virtual PPAs have become a major segment, accounting for 59.2% of the market share in 2023, reflecting their increasing adoption. Source: [Market.US](#)

5. Case for VPPAs in India

- a) As India pursues its ambitious NDC targets and Net Zero goals, decarbonizing power generation is critical, given that the power sector accounts for approximately 40% of the country's total GHG emissions.
- b) As of FY24, electricity consumption by C&I consumers stands at 770 BU, representing around 50% of India's total power demand. This consumption is expected to grow at a CAGR of approximately 7% over the next decade.
- c) VPPA provides flexibility to C&I as they continue to draw power from Captive plants or Discoms and use the RECs under VPPA contract to make their consumption green

- d) VPPA model is a long-term reliable model to hedge the cost of reducing CO2 emission.
- e) VPPA model is not conflicting with Discom's interest, off-taker is unaffected by Open Access charges risk
- f) According to estimates (WWF,ICF), VPPA markets in India has a potential to reach beyond 22 GW by 2030
- g) Consequently, VPPA models provide an effective solution for decarbonizing industries, while also offering additional benefits such as minimizing RE integration costs and ensuring revenue protection for DISCOMs.

6. Analysis about regulatory jurisdiction:

- a. CERC passed orders in April 2009 and January 2010 claiming exclusive jurisdiction over forward contracts and futures in electricity in a matter involving commodity exchanges MCX and FMC.
- b. Aggrieved by this decision, the commodity exchanges filed a writ in high court and the matter was finally settled by the Hon'ble Supreme Court.
- c. During the pendency of the matter, MoP formulated a committee on efficient regulation of electricity derivatives and the committee recommendations were agreed upon by SEBI and CERC and were issued as an office memorandum dated July 10th 2020
- d. After hearing arguments from both sides and taking into cognizance the office memorandum issued by the Ministry of Power, the matter was finally settled by the Hon'ble Supreme Court.
- e. All, ready physical delivery contract, and specific delivery contracts in electricity, wherein the rights and liabilities are not transferable (Non-transferable Specific Delivery Contract), entered by members of the power exchanges, registered by CERC, shall be regulated by CERC. All commodity derivatives in electricity other than Non- transferable Specific Delivery Contract shall fall under the purview of SEBI
- f. One may infer that the BcS being referred in this note is very similar to derivative instrument called Contract for Difference (CfD). The SECURITIES CONTRACTS (REGULATION) ACT (SCRA), 1956 defined derivative as under:

“(ac) derivative” includes—

(A) a security derived from a debt instrument, share, loan, whether secured or unsecured, risk instrument or contract for differences or any other form of security; (B) a contract which derives its value from the prices, or index of prices, of underlying securities;”

Further, section 18A of the aforesaid act provides as under:

“Contracts in derivative.

18A. Notwithstanding anything contained in any other law for the time being in force, contracts in derivative shall be legal and valid if such contracts are— (a) traded on a recognised stock exchange; (b) settled on the clearing house of the recognised stock exchange, in accordance with the rules and bye-laws of such stock exchange.”

However, in case of VPPAs, the BcS generated is settled between the parties and not sold to third party. This type of BcS is akin to what is referred to as corporate CfD in some other countries. It may be noted that the BcS does not involve any speculative element, nor affects public at large. Further, the BcS is backed by physical delivery in the spot market. Therefore, when viewed in the spirit of the SCRA, the BcS generated during execution of VPPA is not a derivative and hence need not be regulated by SEBI.

7. Way Forward:

- 1) Ministry of Power after taking into confidence Ministry of Finance may issue a resolution/notification specifying that C&I consumers may enter into VPPA contracts to meet their RE requirements. The resolution/notification can bring out the key features of the VPPA. This will be similar to High level outline of CfD compatible PPA Heads of Terms issued by Government of UK (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/342575/2014-06-10_CfD_compatible_PPA_HoTs_logo.pdf). The VPPA contract shall clearly bring out the mechanism for accounting of green attribute and shall ensure that double accounting is not done. The RE credits issued and exchanged shall be registered with a nominated agency. Once an RE plant has transacted its green attribute through a VPPA mechanism no other benefits such as REC, etc shall be available to the Re generator. The credits procured through the VPPA mechanism shall be considered as compliance of RCO obligations of the designated consumer. The contract shall ensure that provisions for arbitration, payment security and dispute resolution.
- 2) The BcS mechanism may also be utilized by the government to promote development of RE plants through market based dispatch mechanisms also wherein a Nodal Agency nominated by the government would be the counter party to the BcS contract. The government may facilitate the scheme through initial financial support.