ENERGY ANALYTICS LAB
Department of Management Sciences
Indian Institute of Technology Kanpur

ISSN: 2583-2409 (O)
Volume 6 | Issue 3
January 2024

Power Chronicle

Editorial

Onset of the winter season is generally characterized by lower electricity demand as compared to the post monsoon season. However, significantly higher demand ramp during the morning hours, primarily due to demand for hot water, especially in the northern region, representing about 60 GW of rise in electricity demand in 4-5 hours of early morning. The Rise in renewable, particularly solar generation, while partially assisting to meet this demand also makes the power system vulnerable to weather related uncertainty.

The month of October witnessed a stiffening of the market prices with price cap being hit multiple times across all the time blocks of the day on some counts. While this translated to near cap prices in the term ahead market, softening of the same in the subsequent months signaled a relative softening of prices in the DAM and RTM. HP-DAM market segment witnessed significant activity during Oct 10-14, 2023 with prices hovering over Rs. 15 /kWh. As suggested earlier, the HP-DAM segment should be analyzed to evaluate the adoption of the dynamic price cap.

The country's commitment to reduce global warming impact of its energy use it witnessing developments in the renewable energy segment. Following its INDC, the Electricity Conservation Act was amended in 2023 to enable the setting up of a carbon market in the country. The draft 'Detailed Procedure for Compliance Mechanism under the Indian Carbon Market' aims to detail out the implementation framework for the carbon market's compliance mechanism.

Limited the carbon emission reduction of the incremental reduction beyond the stipulated compliance target limits the avenue for market liquidity. It is suggested that market liquidity and hence its efficiency can be enhanced if carbon credits are issued towards all the emission reduction, wherein the amount equivalent to the compliance target is submitted towards the compliance of the obligated entity while the rest is available for trade. Furthermore, given the variation in monthly production of such units, some of the carbon credits available early on would be available for market trading, in anticipation of either higher target achievement later or lower market price expectations. This would also require a pre-defined penalty (per tonne of carbon equivalent) for non-compliance ensuring serious effort to achieve the required reductions. A bench marking based approach to setting emission reduction targets may be implemented ensuring that differentiated targets are defined over a time horizon bringing greater policy certainty to assist decision-making for long-term investment for emission reduction. A multi-year historical baseline data would be more appropriate than reliance on single year data.

NIC based classification of the obligated entities, accounting for fuel/input/output inventory and sale/purchase thereof, and a clear definition of the boundary for electricity consumption is desirable to ensure procedural clarity and avoid legal disputes later. Apart from this, several grey areas have been identified herein and need to be addressed. The Exclusion of electricity consumed from the solar rooftop and the need for pre-defined normalization criteria are to name a few.

Anoop Singh (Editor)
Founder & Coordinator, Energy Analytics Lab

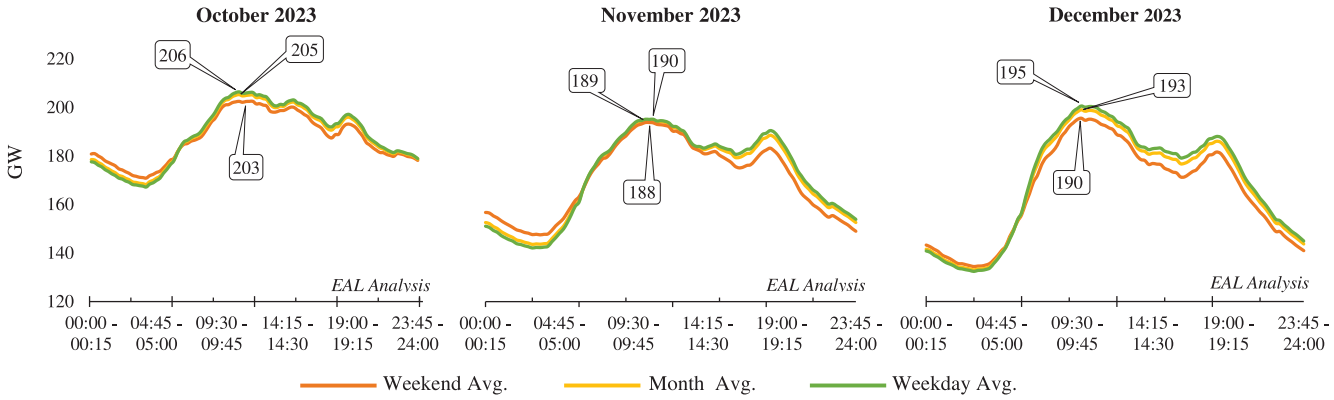
Access Online
eal.iitk.ac.in

☞ Register at **eal.iitk.ac.in** to access data and resources

Publisher: Energy Analytics Lab (EAL)
Department of Management Sciences
Indian Institute of Technology Kanpur, Kanpur – 208016 (India)

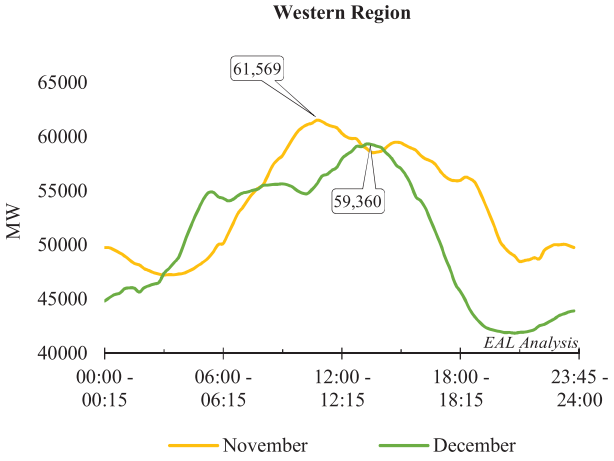
Power System Overview & Analysis

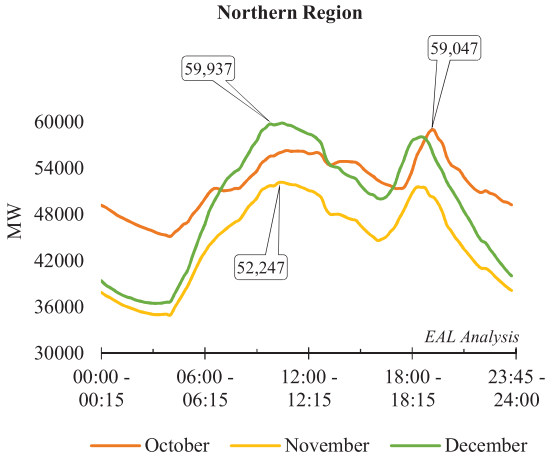
All India Demand Met Profile

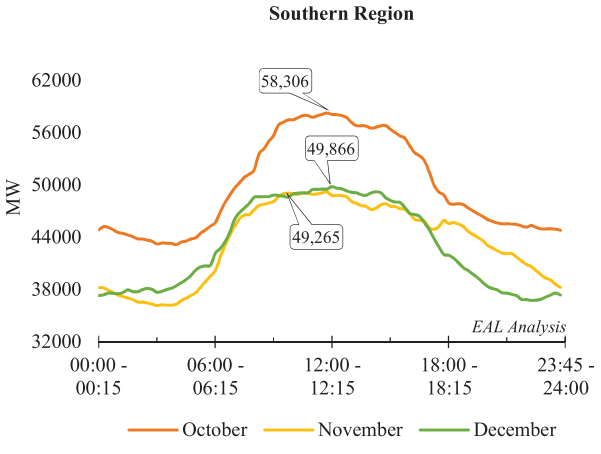


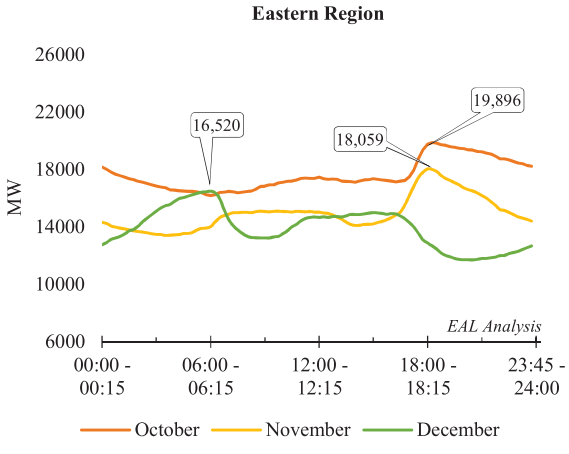
From October to December quarter, all India peak demand reached 221.5 GW (12:15 - 12:30) on 10th October, 2023, about 8.05% higher than the previous year's peak demand recorded at 205 GW (10:45 - 11:00) on 31st December, 2022 during the same quarter.

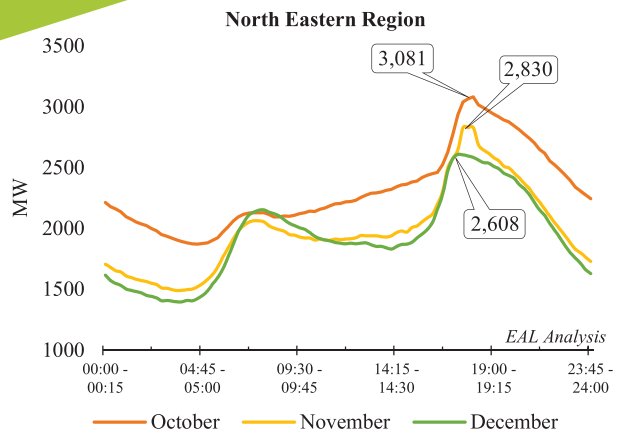
Region-wise Demand Met Profile







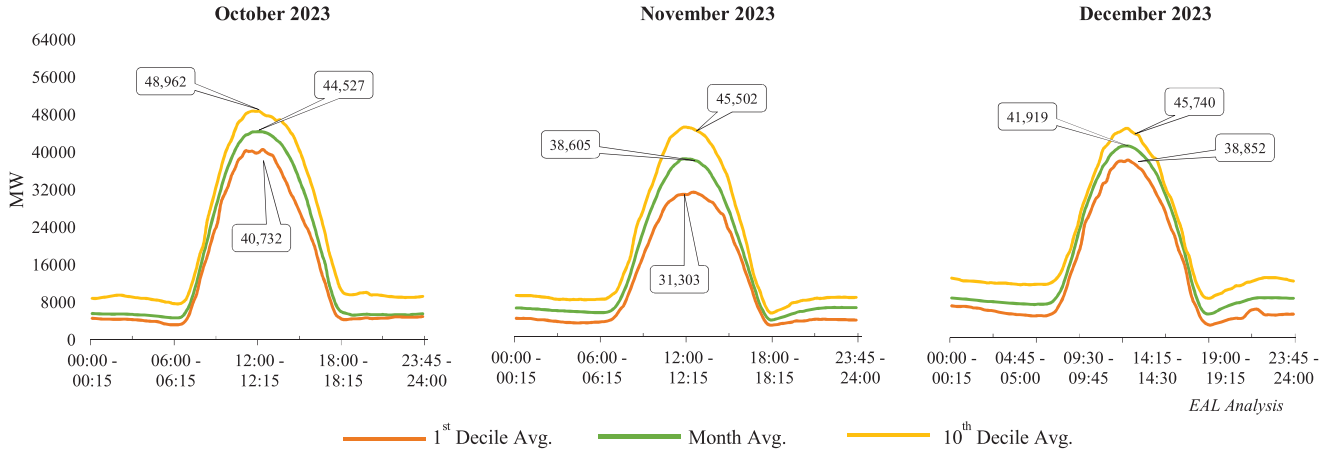




- Significant increase in demand can be observed for North Eastern region from 17:00 to 18:30 & Northern region from 16:00 to 19:00 hrs in all the three months.
- Gradual decrease in demand can be observed for Northern & North Eastern regions from 13:00 to 17:30 & 18:45 to 24:00 hrs in all the three months respectively.
- Average demand is found to be higher for Northern region as compared to other regions in the month of October.

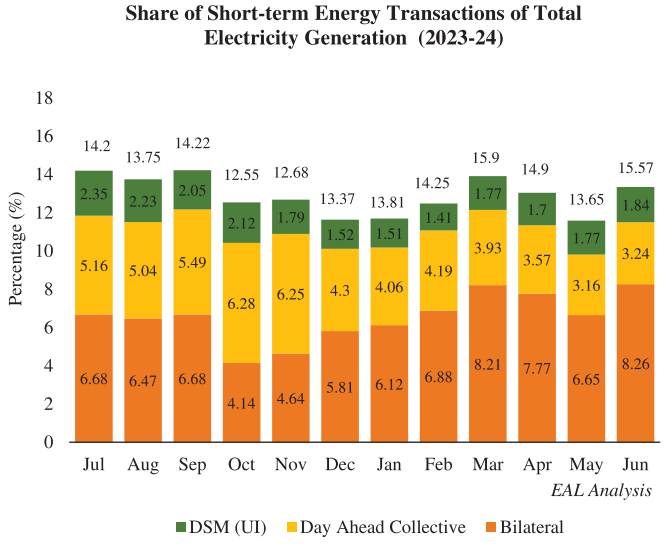
Demand and generation profiles at National, Regional and State-level can be accessed on EAL's web portal.

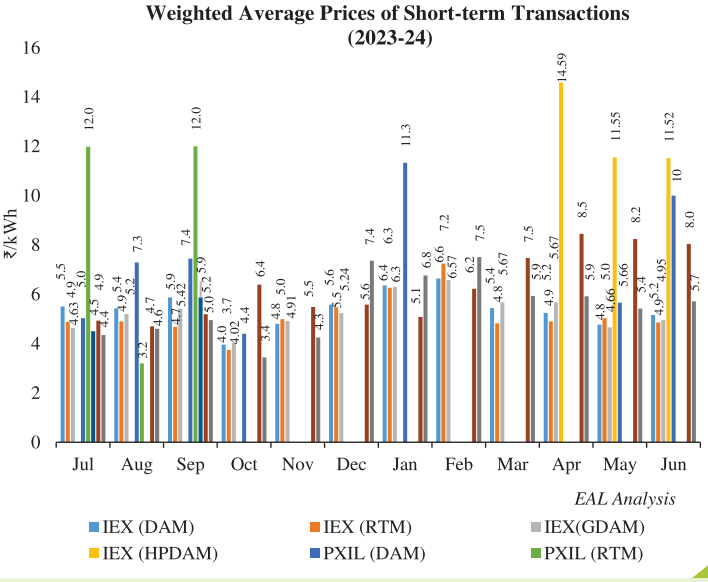
All India Renewable Energy (RE) Generation Profile



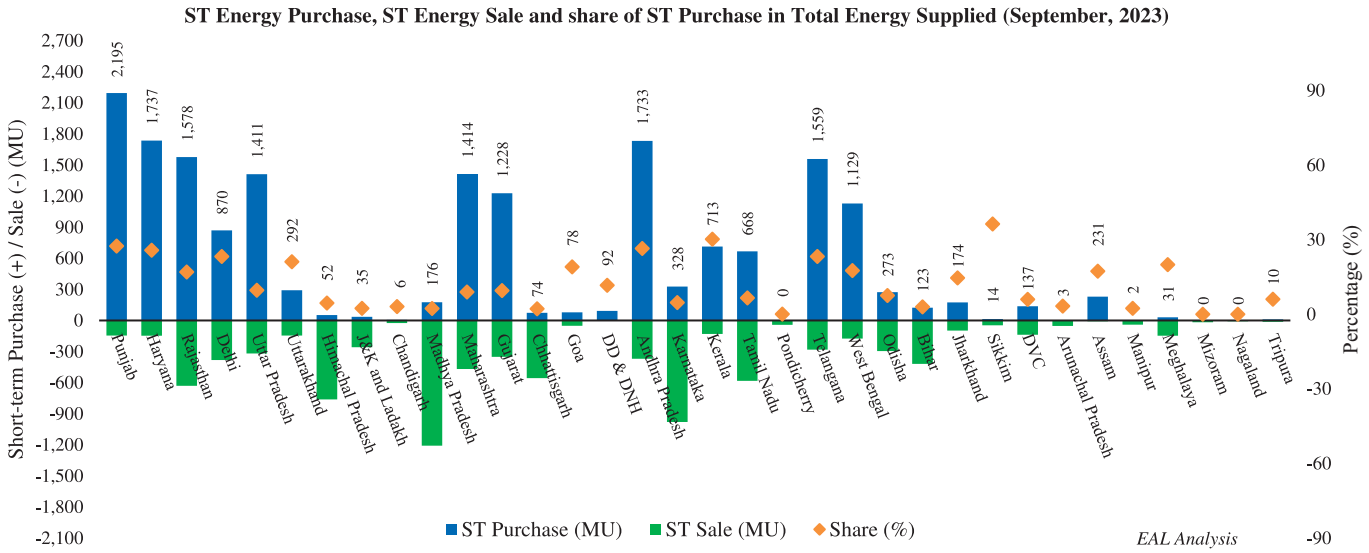
All India peak RE generation reached 49.88 GW (11:15 - 11:30) on 6th October, 2023, about 14.96% higher than the previous year's peak of 43.39 GW (12:15 - 12:30) on 22nd December, 2022.

Short-term Energy Transactions



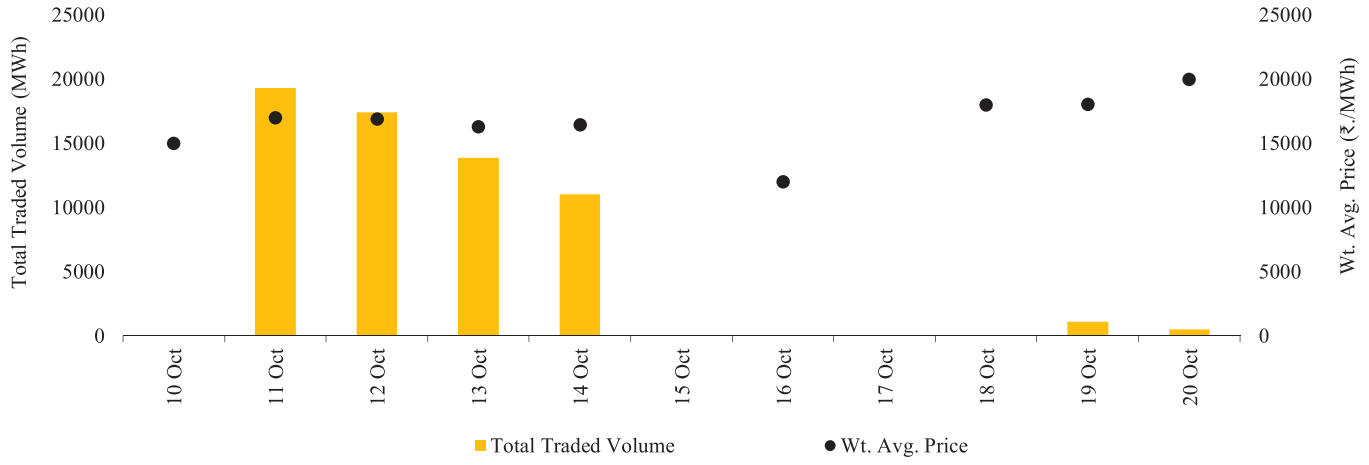


Monthly Short-term (ST) Purchase and Sale Quantum across States

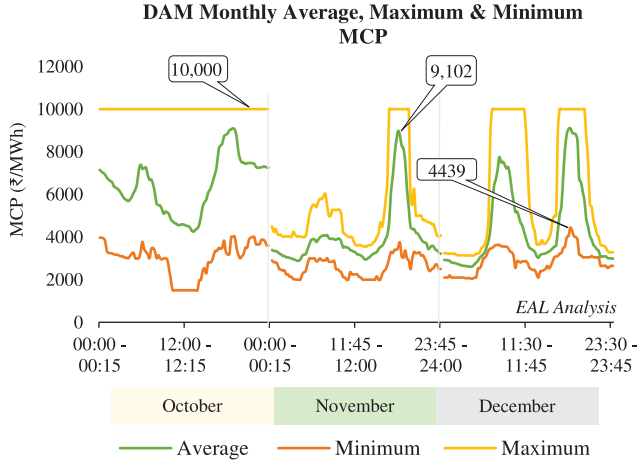


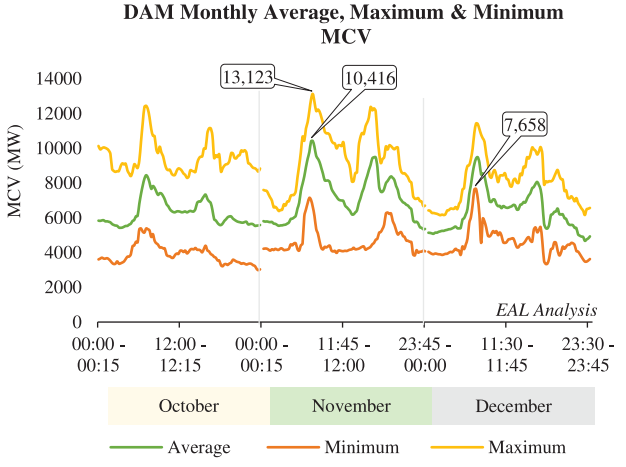
Power Market Overview & Analysis

HP-DAM - Market Clearing Price (MCP) & Market Clearing Volume (MCV)



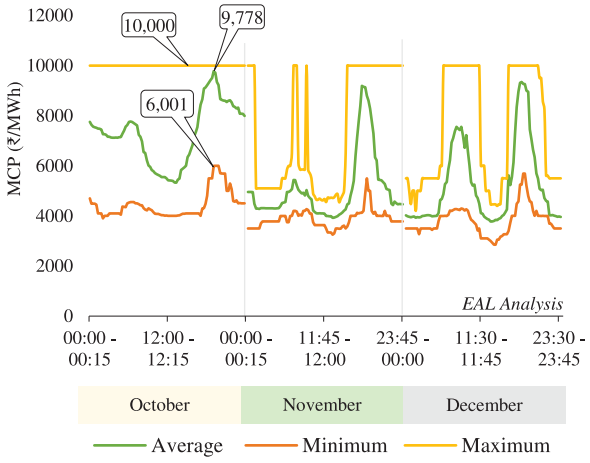
DAM - Market Clearing Price (MCP) & Market Clearing Volume (MCV)



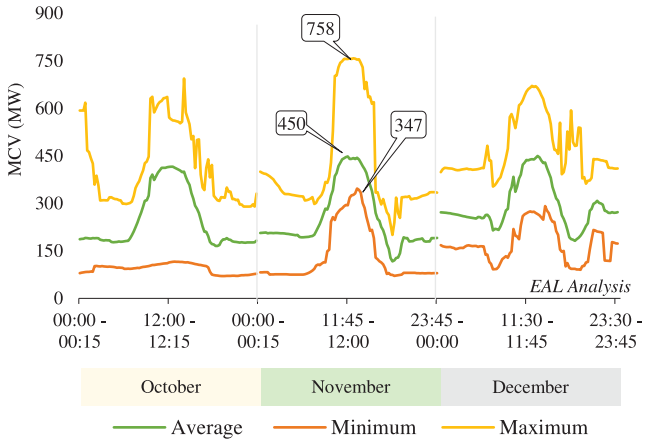


G-DAM - Market Clearing Price (MCP) & Market Clearing Volume (MCV)

G-DAM Monthly Average, Maximum & Minimum MCP

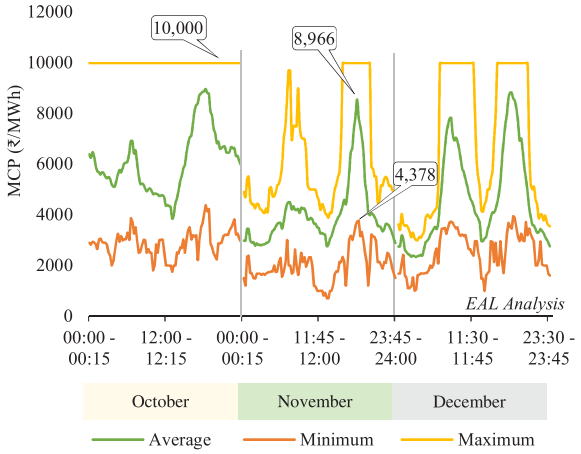


G-DAM Monthly Average, Maximum & Minimum MCV

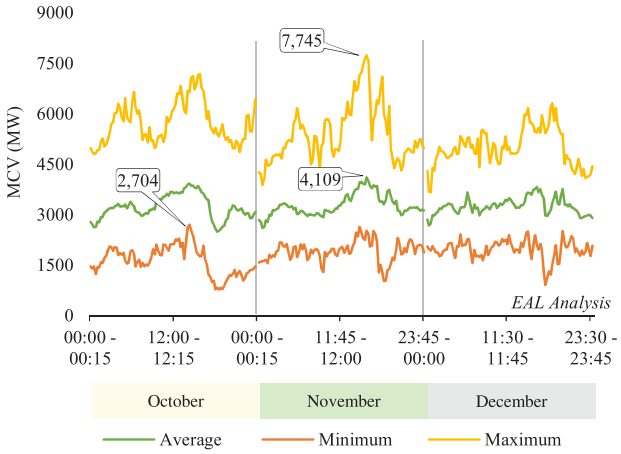


RTM - Market Clearing Price (MCP) & Market Clearing Volume (MCV)

RTM Monthly Average, Maximum & Minimum MCP

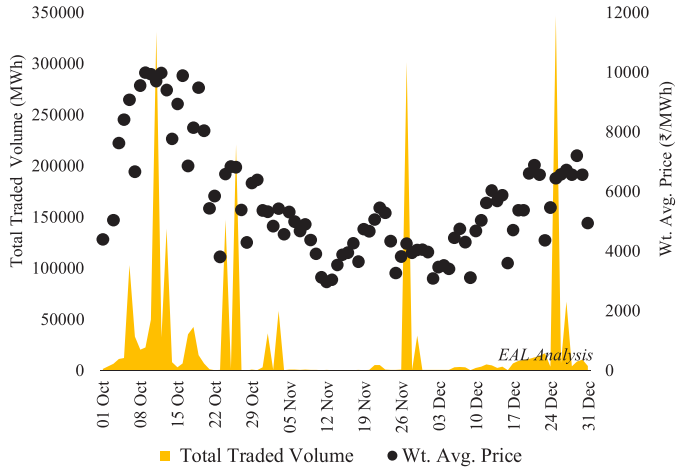


RTM Monthly Average, Maximum & Minimum MCV



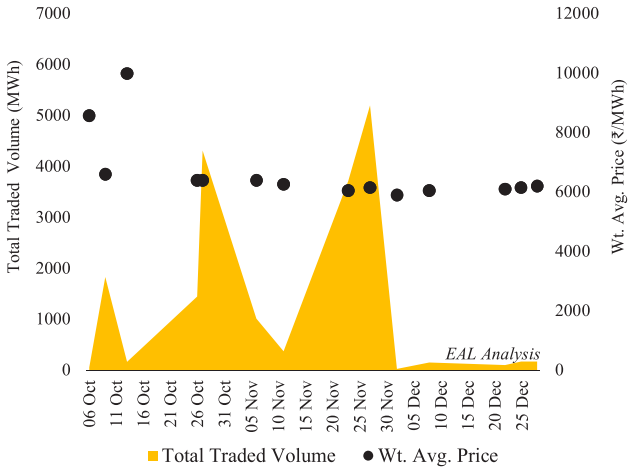
Term-Ahead Market (TAM)

Day-Ahead Contingency & Daily Transactions

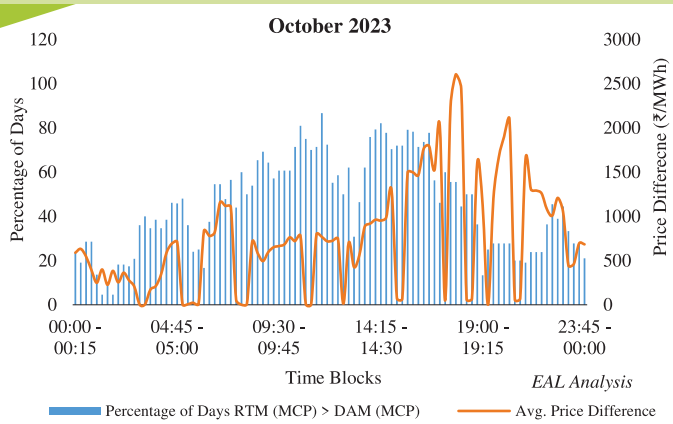


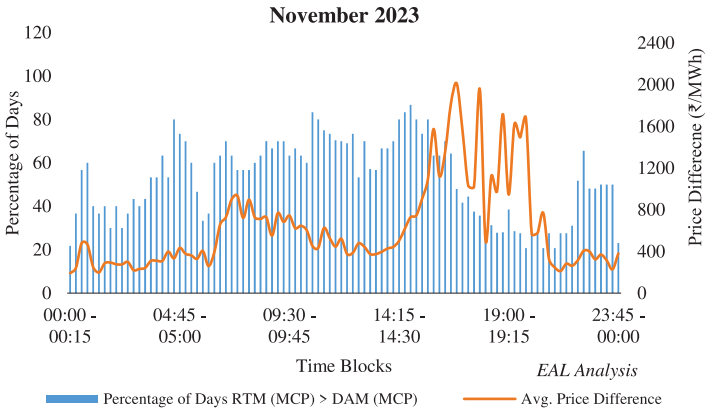
Green Term-Ahead Market (G-TAM)

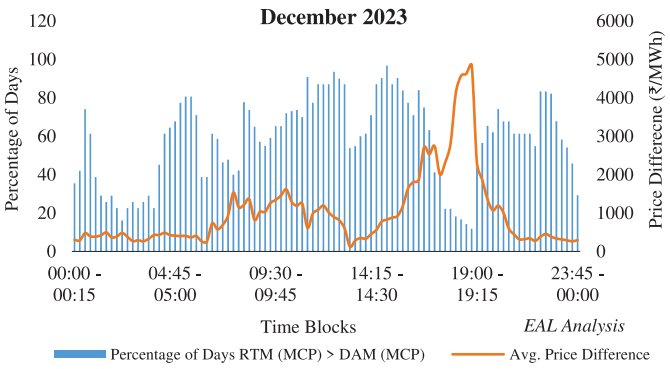
Day-Ahead Contingency & Daily Transactions (Non-solar)



Price Difference b/w RTM vs DAM



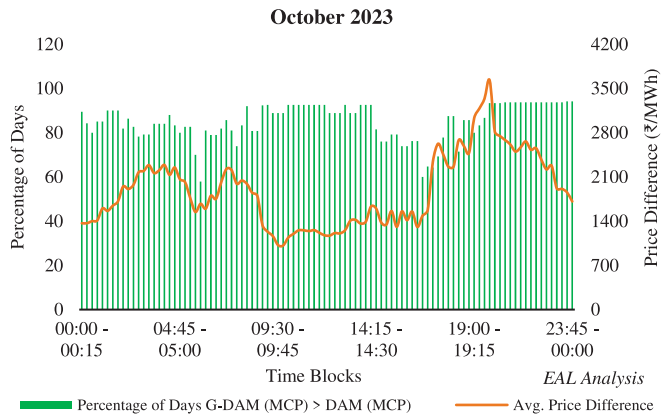


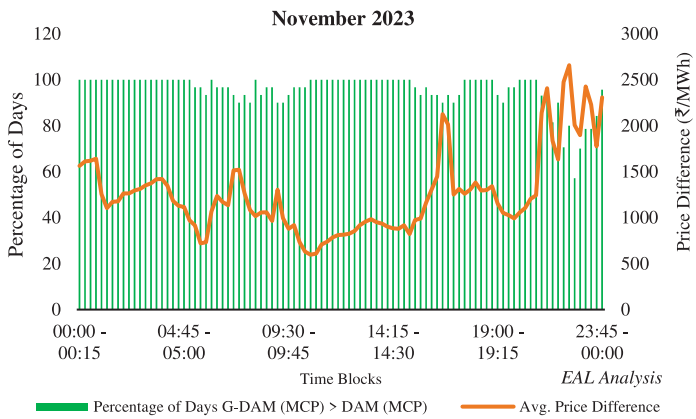


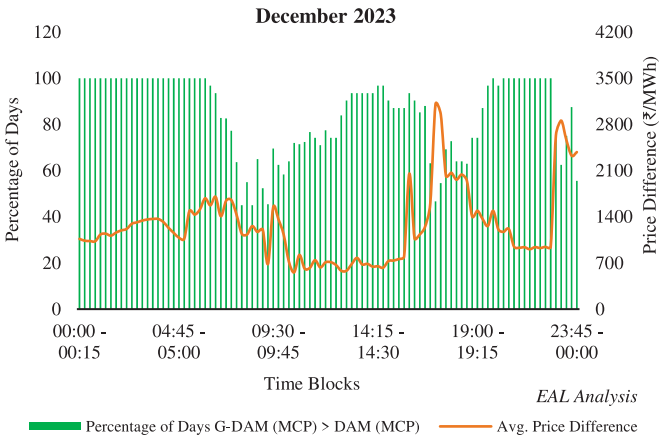
EAL Analysis

- The analysis is based on comparison between the average price difference of RTM and DAM, when MCP of RTM is greater than DAM for the third quarter of FY-24.
- The graph shows the percentage of days, price for RTM is greater than DAM on the primary axis and the average price difference between the two on secondary axis.
- The maximum price difference between RTM and DAM has been observed in the evening peak blocks for the month of December, 2023.
- The average price difference between RTM and DAM is ₹ 796.33/ MWh for the quarter.

Price Difference b/w G-DAM & DAM





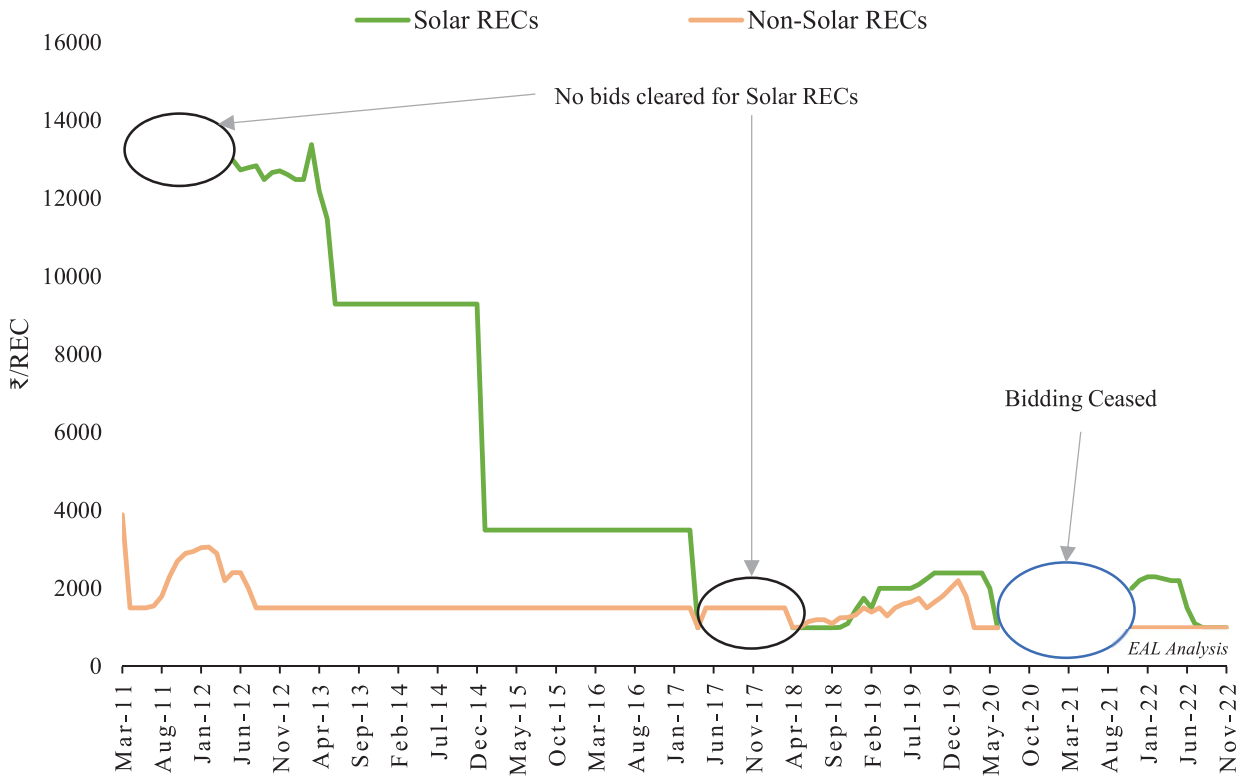


EAL Analysis

- The analysis is based on comparison between the average price difference of G-DAM and DAM, when MCP of G-DAM is greater than DAM for the third quarter of FY-24.
- The graph shows the percentage of days, when price for G-DAM is greater than DAM on the primary axis and the average price difference between the two on secondary axis.
- The maximum price difference between G-DAM and DAM has been observed in the evening peak blocks for the month of December, 2023.
- The average price difference between G-DAM and DAM is observed to be ₹ 1464.67/ MWh.

Renewable Energy Certificates (RECs) - Histrorical Review

REC Traded Price at IEX (₹/REC)



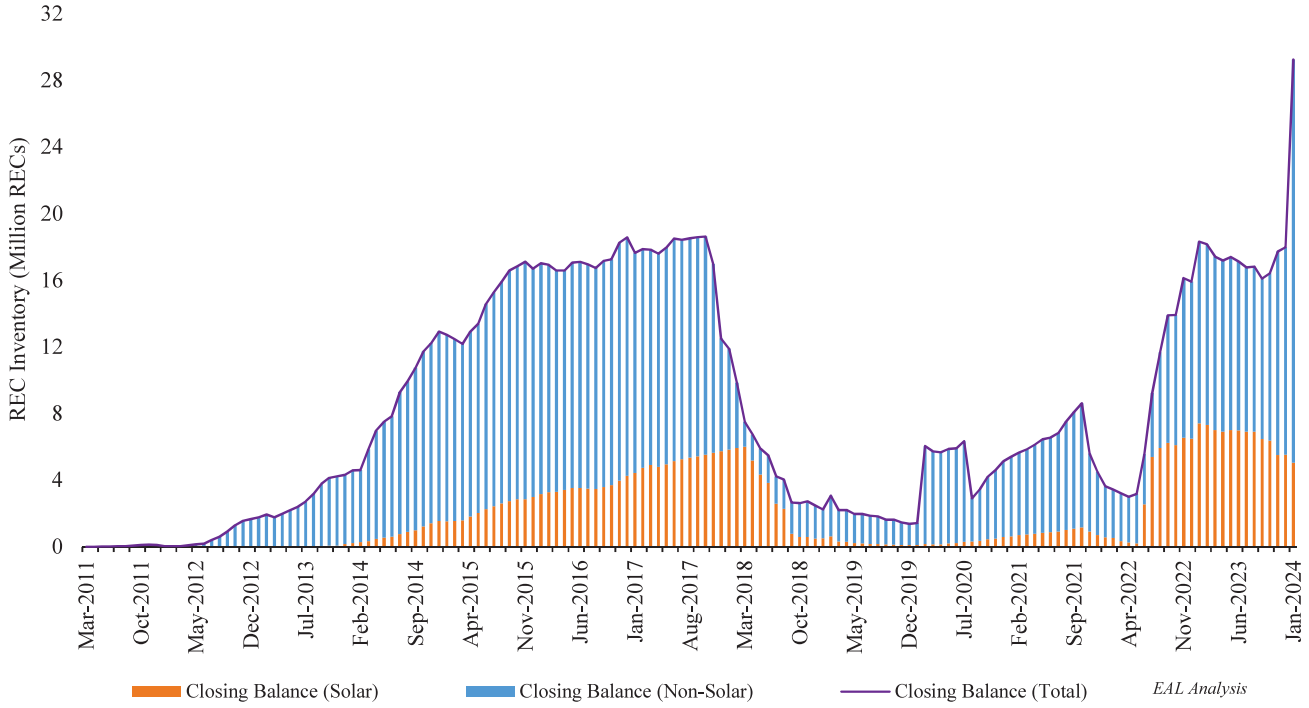
- Renewable Energy Certificates (RECs) were introduced through CERC (T&C for recognition & issuance of REC for RE generation) Regulations, 2010, issued on 18th November, 2010. Initially, RECs comprised two distinct segments,viz. Solar and Non-solar RECs. Trading for Non-solar RECs commenced on power exchanges in February, 2011 whereas, trading for solar RECs began in May, 2012.
- Floor and forbearance price were applicable for REC trading as per the table below. Initially, the RECs were traded above their respective floor prices. However, since June, 2013 and September, 2012, the RECs were traded at floor prices for Solar and Non-solar RECs respectively.

Forbearance & Floor price (₹/REC)				
Date (w.e.f)	Forbearance price		Floor price	
	Solar	Non-solar	Solar	Non-solar
01-06-2010	17000	3900	12000	1500
01-04-2012	13400	3300	9300	1500
01-03-2015	5800	3300	3500	1500
01-04-2017	2400	2900	1000	1000
05-12-2022	Floor and Forbearance price were removed.			

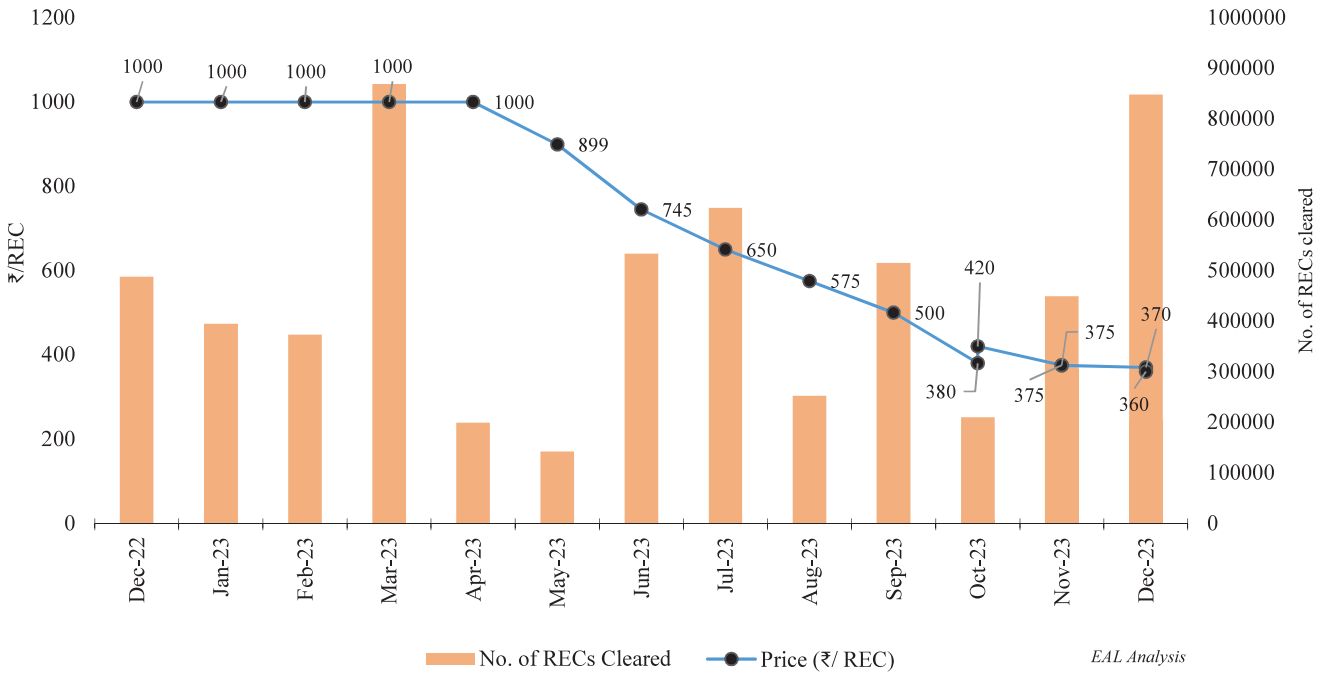
- The bidding process for Solar and Non-solar RECs ceased from June, 2020 to October, 2021 due to a pending appeal at the Hon'ble Supreme Court against the CERC order dated 17th June, 2020 on determination of floor & forbearance price of RECs. According to the Hon'ble Supreme Court Judgement on appeal no. 4801/2018, the floor and forbearance price for Solar and Non-solar RECs as determined in the CERC order dated 1st April, 2017 were made effective from 29th November, 2021. From 6th December, 2022 the floor and forbearance price were done away with.
- It can be observed that after the recommencment of the trading, RECs were cleared at the floor price for both Solar as well as non-solar RECs.

RECs Monthly Inventory & Trading Analysis

Monthly REC Inventory



RECs Trading (IEX)



(Dec 2022 onwards)

EAL Analysis

- The latest CERC (T&C for REC for RE generation) Regulations, 2022 stipulate an unified framework for all REC trading. The certificate multiplier for different technologies are as shown in table below:

Renewable Energy Technologies	Certificate Multiplier
On-shore Wind and Solar	1
Hydro	1.5
Municipal Solid Waste (MSW) and non-fossil fuel-based cogeneration	2
Biomass and Biofuel	2.5

- Bi-monthly trading of RECs started from October, 2023 and gradual increase in volume has been observed since then. However, the overall REC inventory still shows the increasing trend.
- Decrease in prices for RECs cleared on exchange has been observed after April, 2023 with the lowest price of ₹ 360/ REC discovered on 27th December, 2023.

EAL comments:

1. Comments by Dr. Anoop Singh, Statement of Object and Reasons, "CERC (Terms and conditions for recognition and issuance of Renewable Energy Certificate for renewable energy generation) Regulations, 2010."- https://cercind.gov.in/Regulations/Statement-of-Reasons_SOR_for-CERC_REC_regualtions_2010.pdf
2. Singh A. 2009. A market for renewable energy credits in the Indian power sector, Renewable and Sustainable Energy Reviews; 13(3): 643-652. https://doi.org/10.1016/j.rser.2007.10.011
3. Singh, A. 2010. "Economics, Regulation and Implementation Strategy for Renewable Energy Certificates in India" in India Infrastructure Report 2010, Oxford Univ. Press. -https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3440253
4. Comments by Dr. Anoop Singh, Statement of Reasons, "CERC (Terms and conditions for recognition and issuance of Renewable Energy Certificate for renewable energy generation) (Second Amendment) Regulations, 2013"- https://cercind.gov.in/2013/regulation/sor15.pdf
5. Comments by Dr. Anoop Singh on "WBERC (Co-generation and Generation of Electricity from Renewable Sources of Energy) (First Amendment), Regulations, 2020." - https://wberc.gov.in/sites/default/files/SOR71.pdf
6. CER comments on "Discussion paper on Redesigning of Renewable Energy Certificate (REC) Mechanism on 7th June, 2021" by Ministry of Power - https://cer.iitk.ac.in/blog/new_blog/?id=ODQ1ue

Regulatory & Policy Perspective

BEE (Detailed Procedure for Compliance Mechanism under the Indian Carbon Market), 2023 [Draft]

BEE notified draft "Detailed Procedure for Compliance Mechanism under the Indian Carbon Market" on 9th November, 2023. The key highlights of the draft are mentioned below :

- **Objective**: The purpose and vision for the development of the Indian Carbon Market (ICM) is to accelerate decarbonization and meet Nationally Determined Contributions (NDCs) targets.
- **Legal framework:**
  - ICM was established under the Energy Conservation Act, of 2001, and the Environment (Protection) Act, of 1986.
  - The Energy Conservation Act, 2001 empowers the Union Government to specify the Carbon Credit Trading Scheme (CCTS) and emission standards for obligated sectors. The Government of India notified CCTS on June 28, 2023.
- **Compliance mechanism:**

Obligated Entity Definition	• Registered entities under the Compliance Mechanism are called 'Obligated Entities' (OE). Here, OE are the Designated Consumers by the Central Government.
GHG Emission Intensity Targets	• MoEFCC notifies GHG emission intensity targets (tCO_2e per unit of equivalent product). • Annual targets assigned for a three-year trajectory period, subject to revision.
Compliance Cycle	• Annual Targets - OE comply with annual targets in each compliance cycle. • Revision - Targets are revised at the end of the trajectory period.
Issuance of Carbon Credit Certificates (CCCs)	• Exceeding Targets - OE receive CCCs. • Calculation - Based on the difference between achieved and targeted emission intensity for the production quantity.
Purchase of CCCs	• Failing to Achieve Targets - OE can purchase CCCs. • Calculation - Based on the difference between achieved and targeted emission intensity for the production quantity.

- **GHG emission intensity targets:**

Targets Trajectory	• Targets will be considered based on energy consumption intensity, investment requirements, industry capacity and technology availability. • Trajectory developed for each sector. • Average rate of reduction across all OE in the sector.
Calculation of GHG Emissions	• GHG emissions converted to CO_2 equivalent (CO_2e) based on Global Warming Potential (GWP). • Direct and indirect GHG emissions from the obligated entity's establishment. • Exclusions specified for certain sources.
Excluded Emission Sources	• Biomass or biogenic source emissions. • Renewable energy sources. • Emissions captured or utilized through carbon capture technology. • Other excluded sources as per technical committee and NSCICM recommendations.

Production Calculation	• GHG emission intensity calculated based on the main product or equivalent product. • Notification requirement in case of production cessation.

EAL Opinion

- **Issuing Carbon Credits: Incremental Reduction vs Total Emission Reduction:** The proposed framework provides for issuance of carbon credit for emission reduction beyond the stipulated target. Let us call it Incremental Emission Reduction. **We suggest that carbon credits be issued towards all the emission reduction, wherein that achieved would be surrendered to the nodal agency, the rest (incremental) would be available for trade in the Indian Carbon Market.** This would contribute to liquidity in the carbon market, wherein a designated consumer can sell carbon credits, say in one of the earlier months, and buy it from the market subsequently towards its compliance. **This would have twin advantage – (i) enhancing market liquidity for carbon credits, and (ii) allowing early monetization of emission reduction earlier in a financial year thus improving their cashflow within a year rather than waiting for carbon credits to be traded next year onwards.** This would improve attractiveness of participation in the emission reduction program.

- **Market-based rather than a Compliance-based framework:** The current compliance mechanism proposes an annual target. Consider converting these annual targets into normative quarterly targets for effective monitoring. This would also provide early signals for potential shortage and allow for taking measures to address that shortage within the year (at least for shortages discovered till the third quarter). Further, this would also help enhance liquidity in carbon market. However, overall compliance will still be evaluated based on an annual basis.

  This would also enhance participation in the carbon market throughout the year rather than postponing the same to the later months. As mentioned in the comment #1, this would also enhance market liquidity and provide early cash flow to the OE having complied beyond target.

  Since the target trajectory spans three years, OE may be encouraged to achieve targets earlier through suitable investment means, if there are early cash flows associated with the reduction. This flexibility would enable the entity to make investment decisions for emission reduction interventions for the second and third years, contributing to a more strategic and forward-looking approach. This approach can encourage industries to actively participate in emissions reduction activities, fostering a more sustainable and market-driven approach. **The shift towards a market-based approach with carbon trading acting as a business activity instead of limiting to compliance mechanism can enhance the ICM.**

- **Banking and Rollover of CCCs:** To enhance flexibility for OE, it is recommended to allow for limited banking of carbon credits (beyond that required for compliance) and rollover of the non-complied emission quantum. This will enable entities to carry forward unmet obligations to subsequent periods, providing a more adaptable approach to compliance. Similar suggestions were provided in the context of Renewable Energy Certificate (REC) mechanism, leading to extended validity of the RECs in subsequent amendment to the regulations.

  Further Reading:

  - *Anoop Singh, A market for renewable energy credits in the Indian power sector, Renewable and Sustainable Energy Reviews, 13(3), April (2009).*
  - *Anoop Singh, Economics, Regulation, and Implementation Strategy for Renewable Energy Certificates, in India Infrastructure Report OUP (2010).*
  - *Singh, Anoop. (2022). Regulatory Insights - CER Newsletter - Volume 05 Issue 02. https://cer.iitk.ac.in/newsletters/regulatoryinsights/Volume05Issue02.pdf*

  Banking can be implemented by extending the validity of the carbon credits over to the period of compliance (3-years), say up to 10% of the credits beyond the compliance limit and limited rollover in case of shortfall, say up to 5% of the target. Limiting banking and rollover within a compliance period would provide useful flexibility while also ensuring that compliance target for the said period is retained overall.

- **Revision of targets:** The existing compliance mechanism's mention of target revision at the end of the trajectory period may be reconsidered. It is advisable to revise targets earlier, preferably at least one year in advance,

providing scope for advance planning for the next target year before the trajectory period concludes. Shutdown time or it will be applicable for the minimum dispatch duration as well.

- **Penalty for Non-compliance:** The Energy Conservation Act, 2001 does not currently outline penalties for non-compliance related to the ICM. It is suggested that the penalty for non-compliance be pre-determined by MoEFCC. This determination could be based on a per-ton assessment of excess emissions and a lump-sum amount after reaching the threshold emission level. Additionally, repeated non-compliance by an obligated entity should incur an additional lump-sum amount penalty.

  The current compliance mechanism lacks mention of the forbearance prices for newly issued CCCs. Consider setting the penalty at a level that can function as the forbearance price.

- **Approach to target setting:** When setting targets for emission intensity, it's worth considering multiple approaches such as Data Envelopment Analysis (DEA) other benchmarking methods. This allows for a more comprehensive evaluation and selection of the most suitable approach based on the characteristics and goals of the entities involved. An application of DEA based approach is explained below.

- **DEA-based target:** Consider adopting an alternative target-setting method based on DEA. This approach accounts for variations in vintage, scale, output mix, input mix, technical and operational differences across industrial plants. DEA provides a comprehensive framework to set targets that reflect the unique characteristics of each plant, promoting a more nuanced and tailored approach to performance evaluation.

  Further reading:

  - *Anoop Singh and Bharat Sharma, DEA Based Approach to Set Energy Efficiency Target Under Pat Framework: A Case of Indian Cement Industry (Feburary 2, 2018). Central European Review of Economics and Management, ISSN 2543-9472; eISSN 2544-0365, Vol. 2, No. 1, 103-132, March 2018, Available at SSRN:https://ssrn.com/abstract=3440444 or http://dx.doi.org/10.2139/ssrn.3440444*

  For Example: The current compliance framework relies on the intensity of energy consumed as a criterion. However, it is recommended to shift to a system based on relative intensity for target setting. Entities with higher intensity should be assigned higher targets, taking into account the relative intensity difference between different entities during the target-setting process. The draft clause 3.1.(1) "The Central Government in consultation with the Bureau, having regard to the intensity or quantity of energy consumed…" may be rephrased as "The Central Government in consultation with the Bureau, having regard to the **relative intensity** or quantity of energy consumed…" (emphasis added).

- **Benchmarking:** The regulatory approach in setting emission intensity target benchmarks[1] for identified obligated entities should convey crucial signals to both the entities and stakeholders like investors and lenders, encouraging a reduction in emission intensity through innovative and efficient operational practices. Introducing a progressive efficiency factor (X) across various components of energy consumption and manufacturing activities can serve this purpose. Initiatives by BEE to establish lower base benchmarks, considering criteria such as energy consumption intensity, investment requirements, industry capacity, and technology availability are essential. Regularly revisiting existing benchmarks is necessary to prevent potential inflation of targets in subsequent years.

- **NDC and GHG emission intensity target:** The draft clause 3.4.(1) "The GHG emission intensity reduction trajectory will be developed for the considered sectors based on the: (i) India's nationally determined contribution commitments..." is misaligned with the current compliance mechanism. **The NDC target considers <u>emission intensity in relation to GDP,</u> while the compliance mechanism calculates <u>intensity based on the physical quantity manufactured.</u> It is crucial to ensure the translation of physical quantity and GDP onto the same scale within the compliance mechanism before determining the trajectory.**

- **Three-year historical data for baseline year:** The utilization of a single year data to set a benchmark may result in an unreliable baseline due to uncertainties associated with production, sales, and energy mix fluctuations. **Using a three-year dataset would be more reliable than relying on a single year.** The draft clause 3.4.(5) "The GHG emissions intensity shall be calculated for the baseline year **from the verified data for that year** and submitted by

[1]Singh,Anoop (2021).Regulatory Insights - CER Newsletter - Volume 03 Issue 04.
https://cer.iitk.ac.in/newsletters/regulatoryinsights/Volume03Issue04.pdf

the obligated entity (emphasis added)" may be rephrased as "The GHG emissions intensity shall be calculated for the baseline year from the verified data for **average of three historical years** and submitted by the obligated entity" (emphasis added).

- **Resale of banked CCC:** The mechanism allows for banking of purchased carbon credits, not their sale. This restriction on the resale of purchased CCC reduces liquidity in the CCC marker and also hampers flexibility of the obligated entities. This also places accounting challenge wherein each credit would have to be monitored and accounted for based on its origin and history of trade. Allowing the resale of excess CCC ensures that obligated entities, who may have surplus certificates due to improved performance, can trade them effectively.

- **Streamlined classification of Obligated Entities:** When collecting verified data w.r.t Annexure V, section A, it is advisable to use the names of sectors and sub-sectors along with their Harmonized System Nomenclature (HSN) and National Industrial Classification (NIC) codes. This approach streamlines the data, making it organized and suitable for academic purposes. This would also allow this to be linked to respective sectors while calculating emission reduction at sectoral and sub-sector level.

- **Inclusion of inventory and sales data:** In Annexure V, section B, the current production details for verified data solely focus on the total production of various products in tonnes. However, **it's imperative to address scenarios where entities purchase finished products, impacting emission intensity, such as the purchase of clinker by cement industries.** To ensure a comprehensive understanding, **a clear definition of the production boundary is essential.** The verified data should extend beyond production details to incorporate inventory and sales-related data for an accurate estimation of emission intensity.

  Electricity Consumption Boundary: For the verified data collection of energy consumption details (Annexure V, Section B), additional clarification is needed. It is crucial to clearly **define the energy consumption boundary.** Specifically, **electricity purchased from the market or through open access should be based on the electricity received at the boundary of the OE.** Likewise, electricity generated should be confined within the boundary of the obligated entities for accurate and transparent reporting. A detailed illustration is shown in Figure 1 below. Furthermore, it is suggested to include the collection of energy storage-related data as part of the verified data. This addition is deemed relevant due to **greater deployment of energy storage technologies in future.**

  Further reading:

  - *Anoop Singh, Kirit Parikh & Jyoti Parikh, "Inter-fuel Substitution, Industrial Energy Demand and Carbon Emissions: An analysis using firm/plant-level data for 14 industrial sectors in India", VDM VerlagI SBN: 9783639152081, August 2010, Available at: https://www.researchgate.net/publication/335790639_Inter-fuel_Substitution_Industrial_Energy_Demand_and_Carbon_Emissions_An_analysis_using_firmplant-level_data_for_14_industrial_sectors_in_India*

- **Classification of Fuel Consumption:** The fuel consumption data to be collected as verified data should undergo further classification. Specifically, **solid fuel consumption data should be separated into fossil and biomass categories.** It is recommended to subtract the biomass fuel used as solid fuel from the total fuel consumption. Furthermore, it is advised to account for the export of solid fuels and liquid fuels by subtracting these quantities. The data related to **fuel trading and fuel stock is** of utmost importance. Additionally, for both solid and liquid fuel, providing details such as the **grade and caloric value of the fuel used** is essential. This refined data classification will not only enhance accuracy but also prove valuable for subsequent target-setting and research purposes.

- **Thermal Energy Consumption:** In the context of Annexure V, where data related to total thermal consumption is collected, it's important to acknowledge scenarios of certain large entities in industrial areas where an industrial plant may export steam to other nearby plants.

- **Pre-defined Normalization criterion:** The draft document mentions the normalization of verified data in Annexure V, Section B, Sub-Section 5.1, 5.3, 5.5.1, 5.5.2, and 5.6. However, **it fails to elucidate the necessity and methodology for normalization, resulting in uncertainty in target setting and allowing for subjective interpretation.** For the verified data collected according to Annexure V, where energy and emission-related data is required both with normalization and without normalization, it's essential to **establish pre-defined criteria for normalization in the compliance mechanism.** The normalization formula should be defined before target setting, providing a clear basis for the process. This pre-defined approach ensures transparency and prevents potential adjustments by obligated entities, promoting accuracy and consistency in energy and emission data.

- **Solar-rooftop accounting in net energy input:** In the energy input details for distribution companies as designated consumers (Annexure V, Section B, Sub-section 5.4), it is recommended that **the net energy input takes into account solar-rooftop contributions.** The calculation of net energy input should involve subtracting the distributed solar PV based electricity that consumers export through net metering. To ensure accuracy, data from both net metering and gross metering should be considered and made available by distribution companies in the verified data proforma.

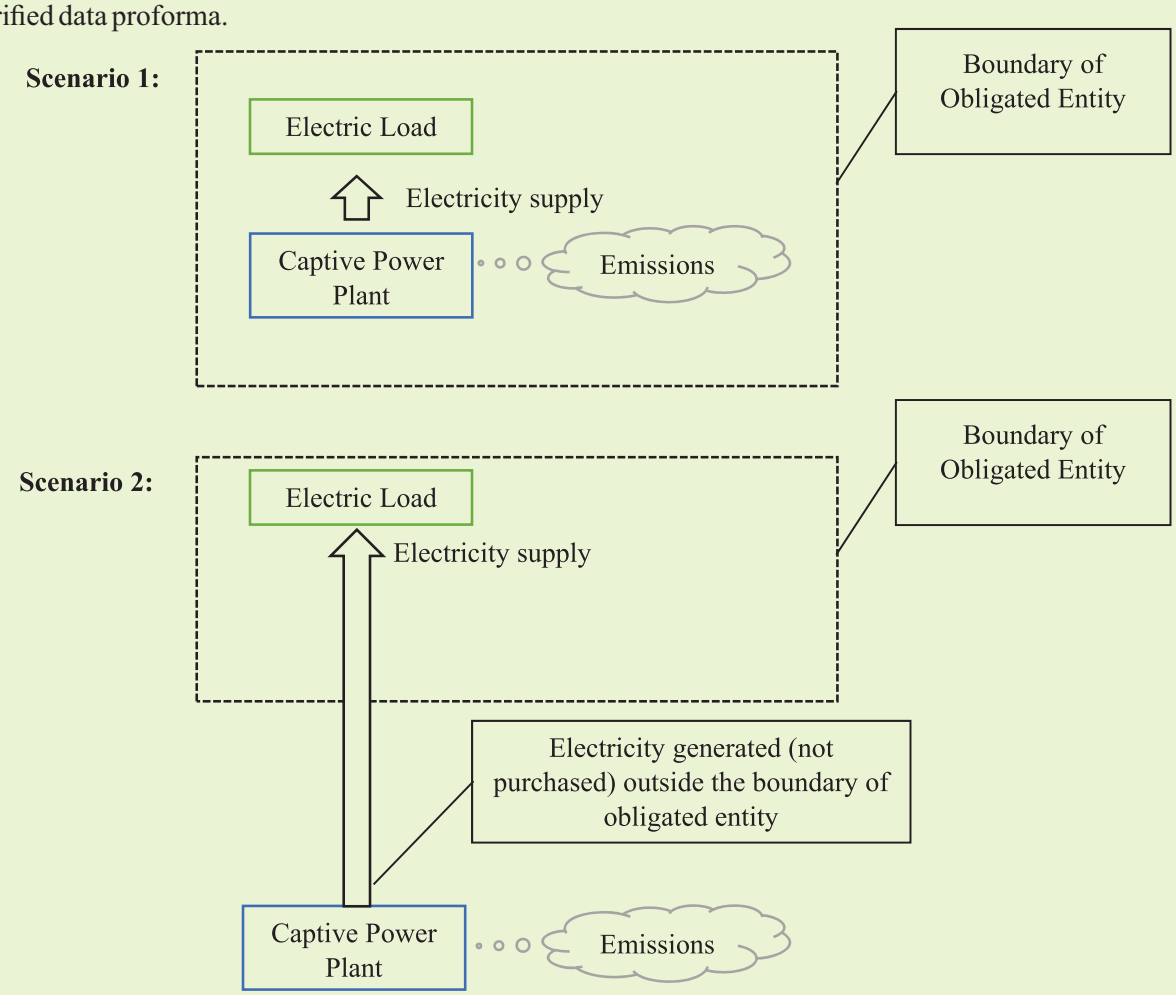


Figure 1: Electricity generated outside the boundary of obligated entity

- **Unmetered consumption towards energy accounting :** In the energy input details for distribution companies as designated consumers (Annexure V, Section B, Sub-section 5.4), where the total energy billed is considered, it's crucial to address the absence of billed data for agriculture consumers. As they continue to be charged based on hours of usage[2], it is recommended to **use the SERC's approved number of hours.** This approach, through still inaccurate, ensures that the compliance calculations are coherent with those approved by the SERCs and avoids further overestimation of the energy billed for agriculture consumers.
- **Defining types of areas for accurate interpretation:** In the verified data for commercial buildings as designated consumers (Annexure V, Section B, Sub-section 5.6), where information on total built-up area and gross floor area is collected, it is crucial to provide clear definitions for these data fields. Definitions often vary and can be interpreted differently by stakeholders, and a standardized definition is essential for accurate reporting.
- **Volumetric measure for air-conditioning**: Moreover, for air-conditioned area data, the current collection in square meters should be reconsidered. Instead, it is recommended **to use volumetric measures such as tons or**

[2] Anoop Singh (2006), Power Sector Reform in India: Current Issues and Prospects, Energy Policy, 34(16), 2006

BTU rating, especially for large hotels with multi-floored lobbies. This adjustment ensures a more accurate representation of the energy load required for cooling larger spaces.

- **Other energy footprints of buildings:** In the verified data for commercial buildings, specifically hotels, as designated consumers (Annexure V, Section B, Sub-section 5.6), it appears that electricity consumption data is currently collected only for the building area. It is essential **to broaden the scope of data collection to include other activities that contribute significantly to electricity consumption, such as water treatment, water heating and refrigeration.** This adjustment ensures a more comprehensive understanding of the overall electricity consumption within the designated commercial building.
- **Clarification with specific energy consumption:** The calculation of specific energy consumption by dividing energy consumption with a thousand square meters **lacks clarity regarding which specific area among data-points (5.6(a) (i) to (vii)) is being used for the division.** It is recommended to clearly define the relevant area to ensure consistency and accuracy in calculating specific energy consumption.
- **Zone-wise target methodology:** Given the varying energy requirements for hotels located in different geographical areas, where some require cooling and others heating, it is advisable to reevaluate the approach for calculating emission intensity and defining targets. Considering a **zone-wise methodology for target-setting could be a more effective approach, accounting for regional variations in energy needs.** This ensures a more tailored and equitable framework for hotels across different geographical zones.
- **ESCerts conversion and trading:** The current compliance mechanism overlooks the trading of existing ESCerts under the PAT Scheme. It is recommended to **introduce a provision specifying a cut-off date for the mandatory conversion of existing ESCerts.** Additionally, ensure that newly issued ESCerts in the upcoming cycle are obligatory for trading on the ICM. A cut-off date for ESCerts compliance will provide opportunity to obligated entity to plan ahead with investment decision.

EAL News

4th Global Regulatory Perspectives Program

CER on behalf of the Forum of Regulators (FOR), organized the **4th Global Regulatory Perspectives Program for Members of State Electricity Regulatory Commissions from 20th November to 22nd November, 2023 at Sydney, Australia.** The program was designed to help all SERCs members to understand the regulatory governance, implementing retail competition, regulatory and policy framework, consumer protection and grievance redressal for the Electricity Sector in Australia. The key speakers were Mr. Jesse Price (Director, Australian Energy Regulator), Mr. Carl Hutchinson (Head, Enel X Australia), Dr. Anoop Singh (Founder & Coordinator, CER, IIT Kanpur), Mr. Charles Popple (Commissioner, Australian Energy Market Commission), Ms. Sarah Sheppard (Chief Executive Officer, Essential Services Commission, Australia) , Ms. Helen Ford (Deputy Ombudsman, Energy & Water Ombudsman NSW), Mr. John Kettle (Head, International and Energy at Gadens, Australia) & Ms. Stephanie McDougall (General Manager Regulation, Transgrid, Australia). For further program details including program duration, key topics,

please visit: https://cer.iitk.ac.in/Grpp_4

Regulatory Certification Program on "Power Sector Regulation: Theory and Practice"

CER in association with EAL, is pleased to announce the 4th Regulatory Certification Program on **"Power Sector Regulation: Theory and Practice"** commencing from **17th February** to **03rd March, 2024.** The program would help to understand and analyze the key issues in the power sector from economic, legal and regulatory prospective. It builds upon economic rationale for regulatory and policy changes in the power sector, and engage in informed discussions on the regulatory framework, particularly those governing determination of tariff. The Program would be conducted under the aegis of Centre for Continuing Education, IIT Kanpur. The last date for registration is **16th February, 2024.** For further program details including program duration, key topics, schedule, admission process and fee, please visit:

https://cer.iitk.ac.in/olet/rcp.

We request your feedback for making EAL and this newsletter more relevant to the sector.
Log on to our portal or write to us at:

Contact Us (Publisher):
Energy Analytics Lab (EAL)
Department of Management Sciences
Indian Institute of Technology Kanpur
E-mail: eal@iitk.ac.in | *Follow us on :*
Phone: 0512-259 6448

Dr. Anoop Singh
Professor, Dept. of MS
Indian Institute of Technology Kanpur
Founder & Coordinator, CER and EAL
Website: www.iitk.ac.in/ime/anoops/

eal.iitk.ac.in

Other Initiatives

Centre for Energy Regulation

cer.iitk.ac.in

EAL News

Identifying Key Risks and Risk Hedging Avenues in the Indian Power Market

The Indian power sector is experiencing significant changes, transitioning from long-term Power Purchase Agreements (PPAs) to short-term contracts traded on power exchanges. However, this transition has exacerbated existing risks.

The Centre for Energy Regulation (CER), IIT Kanpur, as part of ongoing research invites you to participate in an online expert survey on **Identifying Key Risks and Risk Hedging Avenues in the Power Market** from the perspective of the following key stakeholders:

- Distribution Companies
- Open Access/ Captive Consumers
- Renewable Generators having long-term PPA
- Merchant Renewable Generators
- Conventional (Thermal) Generators with long-term PPA
- Merchant Conventional (Thermal) Generators
- Hydro Generators

This study aims to identify key risks and relevant avenues to hedge their risk. The key identified risks include DSM, Payment risk, price volatility, lack of visibility of resource inadequacy, penalty concerns, transmission congestion, RPO shortfalls and disapproval of short-term power purchase costs etc.

As a significant stakeholder in the Indian Power Sector, you are invited to share your valuable insights by completing the survey:

https://cer.iitk.ac.in/Survey_PMD

Scan to participate in survey

We request your feedback for making EAL and this newsletter more relevant to the sector.
Log on to our portal or write to us at:

Contact Us (Publisher):
Energy Analytics Lab (EAL)
Department of Management Sciences
Indian Institute of Technology Kanpur
E-mail: eal@iitk.ac.in | *Follow us on :*
Phone: 0512-259 6448

Dr. Anoop Singh
Professor, Dept. of MS
Indian Institute of Technology Kanpur
Founder & Coordinator, CER and EAL
Website: www.iitk.ac.in/ime/anoops/

eal.iitk.ac.in

Other Initiatives

Centre for Energy Regulation

cer.iitk.ac.in