

ENERGY ANALYTICS LAB

Department of Industrial and Management Engineering Indian Institute of Technology Kanpur

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Power Chronicle

Power System Overview & Analysis

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eMasters Program

Editorial

The peak electricity demand across the country scaled a new high due to hot summer and economic recovery across most of the sectors. Rising share of Renewable Energy (RE) sources, aimed at decarbonising the power sector, is now being reflected in high share of RE in the overall electricity supply. The high peak RE generation exceeding 40 GW is now placing greater demand for grid flexibility, which can be enhanced by enabling more flexible operation of thermal power plants, better and reliable RE generation and demand forecasting, and an effective demand response program. Economic storage services that can bring economic value to the grid should find room for adoption while safeguarding the final consumers of electricity from undue burden.

The Deviation Settlement Mechanism (DSM), including its precursor mechanism of Unscheduled Interchange (UI), has been able to bring about significant grid discipline and ensure its reliable and secure operation. To ensure efficiency in the power market and provide correct signals for maintaining grid discipline amidst rising Variable Renewable Energy (VRE), DSM Regulations should be in line with the proposed/expected developments in the market for Ancillary Services (AS). Given the increasing share of VRE across most of the states, in a few years, majority of large states would qualify as 'RE rich' states, thus negating the relevance of differentiated deviation limit for such states. Furthermore, such definition should take into account the contracted VRE from plants located in other states.

Determination of normal rate of charge (NROC) as well as deviation limits applicable to conventional as well as RE generators, and to the drawing entities should be supported with an analysis of their response to the existing DSM. The AS regulation should be finalised before implementing the proposed DSM Regulation, as the latter should then account for implications arising out of the design and implementation timeline of the AS market. The relevance of linking the NROC for DSM with the discovered price for DAM, RTM and ancillary services' products should be more weighted towards the price discovery mechanism with proximity to the near 'real time' response expected from the entities rather than those observed a day before.

Anoop Singh

Founder & Coordinator, Energy Analytics Lab



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Power System Overview & Analysis





From July to September quarter, all India peak demand reached 200.5 GW (12:00 - 12:15) on 7th July 2021, about 13.4 percent higher than the previous year's peak demand recorded at 176.77 GW (19:30 - 19:45) on 18th September 2020, during the same quarter.

Region-wise Demand Met Profile











- Significant reduction in the demand profile can be seen in the month of September across Western, Northern and Eastern region as compared to month of July and August. Average Demand is found to be higher for Northern region as compared to the other regions in the month of July.
- Significant rise in the demand during the evening time between 19:00 23:00 hours for Northern and Eastern regions in the month of July.

Demand and generation profiles at national, regional, and state-level can be accessed on EAL's web portal.



All India peak RE generation reached 42.67 GW (12:30 - 12:45) on 27^{th} July 2021, about 32.77% higher than the previous year's peak of 32.14 GW (13:15 - 13:30) on 8^{th} August, 2020 during the same quarter.



Short-term Energy Transactions





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



ST Energy Sale, ST Energy Purchase and share of ST Purchase in Total Energy Supplied (March 2021)

ST Energy Sale, ST Energy Purchase and share of ST Purchase in Total Energy Supplied (April 2021)



Power Market Overview & Analysis

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



DAM Monthly Average, Maximum & Minimum **MCV** 18000 15,161 7,784 15000 11,691 12000 MCP (MW) 9000 6000 3000 EAL Analysis 0 00:00 · 00:15 12:00 · 12:15 00:00 00:15 23:45 -24:00 00:00 -12:00 -11:45 12:00 00:15 12:15 September July August Average Minimum Maximum



Term-Ahead Market (TAM)



The weighted average clearing price observed in Intra-day market during July to September quarter is higher in comparison to the Day-Ahead Contingency market. Also, the proportion of sell bids is much higher when compared to purchase bids placed in the Term-Ahead Market.

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





Green Term-Ahead Market (G-TAM)



The weighted average clearing price of non-Solar is higher in comparison to Solar in Day-Ahead transaction during July to September quarter. The proportion of sell and purchase bids in Solar is higher when compared to the bids placed in Non-Solar.

Note: The above power market overview and analysis are based on the data from IEX Website.



Regulatory & Policy Perspective

Tamil Nadu Electricity Supply Code on Stipulating Harmonic Limits, Methodology of Measurements, Meter Standards, Penalties etc., to ensure Quality of Supply to Consumers [Draft Amendment]

TNERC has issued a draft amendment on the TN Electricity Supply Code on stipulating harmonic limits, Methodology of measurements, meter standards, penalties etc., to ensure Quality of Supply to Consumers on 29th June, 2021.

The key highlights of the draft are given as:-

of the Table 1.

- A In a power system, harmonic currents are introduced due to increased usage of non-linear loads. The injection of harmonics into the system causes power quality issues, hence these harmonics needs to be regulated.
- *■* IEEE Std. 519-2014 shall be followed for measuring the harmonics and deciding the limit of harmonic current injection at the Point of Common Coupling (PCC) and other such matters.
- Applicability: The draft amendment is applicable for bulk consumers (33kV and above) & consumers, prosumers and charging stations below 33kV. It is not applicable for HT Tariff-IV (Lift Irrigation). The harmonic distortions are measured at the PCC.
- ▲ For measurement of the harmonics, power quality meter of IEC Standard 61000-4-30 edition 3.0 Class-A shall be used. The distribution licensee shall use this power quality meter for 1 week for each consumer to measure distortions.

The measured values of harmonic distortions are compared with values specified in IEEE Standard 519-2014. The penalty shall be levied if allowed number of reading does not satisfy the thresholds mentioned in column (d) and (e)

Table 1: Total demand and distortion values				
TDD Measurement	Duration of	Total No. of	Allowed No. of Readings	
Values (a)	Measurement (b)	TDD Readings (c)	within limit (% of (c) > (d)	Exceeding limit $(\% \text{ of } (c) \leq (e)$
99th Percentile (3 sec.) Very Short Time Value (VSTV)	24 Hrs.	28800	99	1
99 th Percentile (10 min.) Short Time Value (STV)	1 Week	1008	99	1
95 th Percentile (10 min.) STV	1 Week	1008	99	5

Table 1: Total demand and distortion values

A Penalty: Maximum of 10% penalty in steps of 1% increase will be levied on the monthly current consumption charges as shown in Table 2.

Excess TDD (ETDD) limit (%)	Penalty (%)
ETDD < 3	1
$3 \leq \text{ETDD} < 6$	2
$6 \leq \text{ETDD} < 9$	3
$9 \leq \text{ETDD} < 12$	4
12 ≤ ETDD < 15	5
$15 \leq \text{ETDD} < 18$	6
$18 \leq \text{ETDD} < 21$	7
$21 \leq \text{ETDD} < 24$	8
$24 \leq \text{ETDD} < 27$	9
$27\% \leq ETDD$	10





If decimal in ETDD is within 0.1 to 0.4, the whole number will be taken, if it is within 0.5 to 0.9 next whole number is taken.

J. For Existing Connection:-

- In case harmonic limits are exceeded, a duration of 6 months shall be given to the consumers to install harmonic filters. In case of non-compliance, penalty will be levied for subsequent 12 months and service shall be disconnected after any further non-compliance.
- Penalty shall not be imposed when filters are installed and harmonics are brought within limits. From the date of installation of filters and declaration by customer as ready for testing, the penalty will be halted. If limits are exceeded even after testing, the penalty is continued and rectification and re-testing shall be done within the given 12 month's tenure.
- In case adequate filters are not installed or harmonic current levels are not maintained even after expiry of 12 months, a 30 days disconnection notice shall be served. If customer installs adequate filters within these 30 days and declares the same to the licensee, re-testing will be done. After re-testing, if harmonic limits are maintained, service shall not be disconnected, but penalty will be levied till the date of declaration. In case harmonic limits are exceeded, disconnection shall be done after the expiry of the original 30 days.
- For New Connection: In supply application, applicant has to declared their concerns that filters will be installed. Initially supply may be given, and harmonics testing shall be done after 12 months. In case limits are exceeded, 30 days disconnection notice will be served, and thereafter supply shall be straight-away disconnected. Penalty shall be levied from date of expiration of 12 months.
- *■* Licensee may conduct the measurement anytime at their own discretion.

EAL Opinion

- Scope of Applicability of the Regulation (Regulation 1 (c)): Applicability of the draft regulation seems to be ambiguous as "Measurement of current distortion/harmonic currents shall be made at the PCC of the installation of bulk consumers at 33kV and above and consumers, prosumers, charging stations below 33kV", also refers to consumers connected below 33kV. This may seem to suggest it's applicability to all the consumers of DISCOMs. Also, the PCC needs to be defined in the draft Regulation.
- Computation of TDD (Regulation 1 (f)): It may be clarified in the draft Regulation that which of the following value(s) should be considered while computing the TDD values at 99th Percentile or 95th percentile at the interval of 3 sec./10 min.:-
 - Average Value
 - Highest Value
 - Value at the beginning/end of the observed time period
- J Violation Limit for Individual and Total Harmonics: The Commission may like to seek appropriate technical advice (say, after 3 year of implementation of these Regulations) from a reputed research institution/organisation working on the engineering/technical aspects of power system to identify the scale of problem of harmonic within the system and then consider appropriate adjustment in the multiplier (currently 1.5) for 99th/95th percentile limits.
- Frequency of Measurement of Harmonic Distortions (Regulation 1 (m)): The frequency of measurement of harmonic disturbances in a year should be included in the draft Regulation. A transparent method with a fixed timeline needs to be established for measurement of harmonic disturbances. It is suggested that:
 - Consumers below 33kV Harmonic measurement on a sampling basis, ensuring that all such consumers are covered at least once in 2 years.
 - Consumers 33kV and above Harmonic measurement should be taken at least once in a year.
 - Consumers with non-linear loads i.e. arc furnace, etc. (irrespective of voltage level) Harmonic measurement should be taken mandatorily twice a year with about 6 month interval.



It is suggested that the test should be conducted during the normal operating hours of consumer ensuring that harmonic causing load is switched on during such period of measurement. This would help avoid any malpractices to circumvent the process.

- *A* **Standards for Harmonic Filters:** The filters to mitigate the harmonics to be deployed by consumers should be in accordance with the applicable IEEE or BIS Standards. The Regulation may identify the same.
- A Basis for Calculation of Penalty (Regulation 1 (h)): Penalty should be linked to the sum of fixed charges (FC) and variable charges (VC) to be paid by the consumer in the current billing cycle. The Regulation refers to consumption charges, which are generally attributed to the VC to be paid by the consumer. We suggest that the statement mentioned in the Table 2 as 'penalty charge % on the monthly current consumption charges' may be rewritten as "penalty charge as a % of the current month's fixed and variable charges". The above suggested provision would ensure that the consumers, who may be paying much lower variable charges to DISCOM on account of its consumption being met through open access or captive generation sources, are not treated leniently by the compliance framework.
- Calculation of Penalty (Regulation 1 (h)): The statement "TDD excess % over and above the limit" may be rewritten as 'TDD in excess of the percentage points over and above the limit' to provide more clarity.
- **A** Re-structuring of Compliance Timeline (Regulation 1 (g): After the installation of harmonic filters, the licensee should conduct a test within 6 months of each such installation. In case of the harmonics going beyond the prescribed limit, adequate filters needs to be installed within the next 6 months, otherwise penalty should be applied. In case of failure of two subsequent tests after each installation of the harmonic filters, the penalty should be applicable for each of the preceding months, since the first installation of the harmonic filter. In the absence of such a provision, the consumer may perpetually extend installation of appropriate harmonic filter and also avoid the payment of penalty.
- Cost of Harmonic Measurement: Cost incidence for the harmonic measurement test should be clarified in the Regulation. We suggest that the cost of measurement test would be borne by the licensee if it is found within the prescribed limits. If not, it should be borne by the consumer. It is suggested that the cost of testing should also be specified in the supply code. For small consumers (category (a) identified in comment Frequency of Measurement of Harmonic Distortions), cost of first test may be borne by the licensee. Cost of any subsequent test (required due to failure of first test and the need for installation of appropriate filters) should be at the cost of the consumer in case the test fails, else it should be borne by the licensee. The above provision would provide incentive to the consumer in ensuring that the measures taken by the consumers are successful in addressing the identified harmonic issue due to its load characteristics.

CERC (Deviation Settlement Mechanism and Related Matters) Regulation, 2021

CERC notified draft for Deviation Settlement Mechanism (DSM) on 7th Sep, 2021. The Key highlights of this Regulation are given below:

Objective: These Regulations aims to ensure grid stability and security.

Scope: It's applicability extends to all grid connected regional & other entities engaged in Inter-state purchase and sale of electricity.

New definitions included in the draft Regulation:

General seller: Seller who provide non-solar and non-wind resource based power.

WS seller: Seller who provide solar and wind resource based power.

Run-of-River (RoR) generating station: Hydro generating station which does not have upstream pondage.

Computation of Deviation (in MWh & %) in a time block:

1. For general sellers:

Deviation (MWh) = [(Actual injection) - (Scheduled generation)](1)

Deviation (%) = 100 x [Deviation] / [Scheduled generation]



(2)

2.	For WS sellers:	
	Deviation (MWh) = [(Actual Injection) – (Scheduled generation)]	(3)
	Deviation (%) = $100 x [Deviation] / [Available Capacity]$	(4)
3.	For buyers:	
	Deviation (MWh) = [(Actual drawl) - (Scheduled drawl)]	(5)
	Deviation (%) = $100 x [Deviation] / [Scheduled drawl]$	(6)

Normal Rate of Charges for Deviations: It is the Weighted Average (Wt. Avg.) Ancillary Service Charge (paise/kWh), and is calculated on the basis of total quantum of Ancillary Services deployed and the total charges payable to the Ancillary Service providers for all the Regions for that time block.

Provided that for one year tenure when these Regulations will come into effect, the Normal Rate of Charges(NROC) for deviation for a time block will be equal to the maximum of the Wt. Avg. Area Clearing Price (ACP) of the DAM, RTM segments of all the Power Exchanges, or the Wt. Avg. Ancillary Service Charge of all the regions for that time block. If there is any non-availability of ACP for any time block on a given day, ACP for the corresponding time block of the last available day will be considered.

Table-3: Charges for Deviation (for seller) payable to Deviation and Ancillary Service pool account

	Deviation for over injection		Deviation for under injection	
Seller	Deviation Limit	Deviation Charges (% of NROC)	Deviation Limit	Deviation Charges (% of NROC)
General seller (other	≤ 2%	Zero	≤ 2%	100
than RoR & MSW)	> 2%	10	> 2%	110
Generalseller (RoR)	Zero		≤ 12%	100
Generalsener (RoR)			> 2%	110
Generalseller (MSW)	Zero		≤ 20%	Zero
			> 20%	100
WS coller	Zero		≤ 10%	Zero
w S sellel			> 10%	10

Table-4: Charges for Deviation (for buyer) payable to Deviation and Ancillary Service pool account

		Deviation for over drawl		
Buyer	Deviation for under drawl	Deviation Limit	Deviation Charges (% of NROC)	
Buyer (with schedule	Zero	Minimum ((≤12%, ≤150 MW	100	
>400 MW)	Zeiu	> 2% or >150 MV	110	
Buyer (with schedule	Zero	≤ 20%	100	
up to 400 MW)		> 20%	110	
Buyer (being an	Zero	Minimum ((≤12%, ≤ 250MW)	100	
RE-Rich State)		> 12% or > 250MW	110	

EAL Opinion

Timeliness and Need for Amending Deviation Settlement Mechanism (DSM) Regulation: Deviation Settlement Mechanism (DSM) (and the erstwhile Unscheduled Interchange (UI)) were introduced amidst uncertainty associated with electricity demand and supply. Rising share of Renewable Energy (RE) has further exacerbated overall uncertainty to ensure demand supply balance in the power system.

Evolving market structure, especially with the implementation of the Real Time Market (RTM), and proposed



market for Ancillary Services (AS) provide an opportunity for the DSM price signals to be more closely associated with value of deviations close to the real time. However, a number of issues identified herein need to be addressed to ensure that the implemented scheme is able to efficiently address the issues in the evolving scenario.

- J Definition of RE Rich State: A RE rich state is defined as a state with 1000 MW or above installed capacity of Variable Renewable Energy (VRE) (i.e. Solar and Wind) within the control area of the state. The variability and uncertainty associated with the schedule of a state depends on the 'contracts that it handles for consumption within the state. The RE rich state should thus be defined with reference to the contracted capacity of VRE by all entities connected to the 'control area of the state' (i.e. including long-term open access for VRE by consumers).
- Additional Deviation Limit and DSM Applicability for RE amidst Growing RE Share: Given the growing VRE capacity across states, more states would soon be added to the list of RE-rich state. In a few years, most of the larger states may qualify as RE rich state. Relevance of additional deviation limit would then no longer exist, and would need to be re-evaluated.
- Additional Limit for RE Rich State: RE rich states, defined as states with 1000 MW or above installed capacity for Solar and Wind energy, are allowed 250 MW deviation limit against 150 MW limit for other states. The additional deviation limit should be linked to the 'impact' that higher capacity of variable RE (wind & solar) brings to RE rich states as compared to other states. Some states with, say 900 MW VRE capacity, may be subjected to higher uncertainty due to the resource profile and, mix of solar and wind energy.

Further, higher deviation limit would continue to dissuade investment in demand side management and economical energy storage (pumped hydro, BESS (when economical) etc). The former needs much more attention due to its lower cost as compared to other options.

- Seed to Finalise Ancillary Services Regulation: The draft Regulation proposes deviation charges to be linked to, among others, to the discovered price for ancillary service products. the ancillary services' Regulation, which is yet to be finalised, would have implications for the design and implementation of the amended DSM. It is suggested to finalise the AS Regulation to bring a clarity to its role and efficiency. This would also address regulatory uncertainty by providing adequate information to the stakeholders to evaluate its impact on DSM and hence the deviation charges that may need to pay.
- Standardised Definitions (Regulation 3.1 (m & aa)): For ease of understanding and implementation, choice of new terms to define existing ones should be avoided. New definitions should be logical extension of the ones in practice as far as possible. Few cases are identified herein.

The draft Regulation defines General Seller as "*a seller in case of a power project based on other than wind or solar resources*" and WS Seller as "*a seller in case of a power project based on wind or solar energy*". It is suggested to modify the above definitions of General Seller and WS Seller. The General Seller may be renamed as 'Despatchable seller' in case of a power project based on the conventional power like thermal power and a 'constrained Despatchable seller' like Run-of-River (RoR) generating stations. The WS Seller may be renamed as 'Non-Despatchable seller' in case of a power project based on wind or solar energy.

- A Normal Rate of Charges for Deviation (Regulation 7.1): In determination of NROC for deviation, following aspects should be considered,
 - The key **difference between energy market (on PXs) and ancillary market** is that the market outcome of the former is dependent on competing buyers and sellers, where as in the latter case, the decision for quantity of procurement is undertaken by the system operator, while 'price discovery' (in its current form) is primarily dictated by the 'Regulated' tariffs. The economic efficiency of the quantum as well as price discovery for AS is still evolving. The market for AS in India is neither liquid nor mature enough, and does not currently reflect the value of required services.
 - Day Ahead Market (DAM) does not capture the uncertainties close to the real time and does not provide correct value of resources for the NROC. It is suggested that the weighted average price of RTM and the AS should be used in the interim with weights for AS to be increased gradually with maturity and efficiency of the AS market.
 - It is suggested that the weighted average price of RTM and the AS should be used in the interim till maturity and efficiency of the AS market is built up. Accordingly, the weight for RTM can be reduced gradually with maturity of the market for AS. DAM does not capture the uncertainties close to the real time and does not provide correct value of resources for the NROC.



- As per the draft Regulation, the deviation charges are to be related to 'all' types of AS (including SRAS & TRAS as per draft AS document). The AS associated with products close to real time should primarily be used. Therefore, NROC should be maximum of discovered price in RTM and Secondary Ancillary Services (as the case may be).
- Applicable Market Price in Case of Market Splitting (Regulation 7.1): Energy market price (e.g. RTM) may differ across market areas in the case of market splitting. While instances of market splitting are currently limited but can't be ruled out in the future. Hence, 'weighted average price' across all market areas/regions may be used in the methodology specified for calculating NROC. In case of significant impact of market splitting, NROC may be differentiated across regions in the future.
- Jeployment of Up and Down-Regulation AS: Up-Regulation and down-Regulation AS may be deployed simultaneously across different the regions, particularly in case of transmission constraints. The methodology for calculation of 'Weighted Average Ancillary Service Charge' should provide for the same (as additional explanation).

The provision of computing overall Wt. Avg. AS Charge may not be applicable for multiple regions, so, it is suggested that the DSM charges should be charged as per the region-wise Regulated/deployed AS. Then the applicability of the DSM charges for that block should be related to the highest of (Wt. Avg. ACP of RTM or up/down Regulation AS) for that particular region.

- 3 Basis for Redrawing Deviation Limits (Regulation 8): The draft Regulation provides different deviation limits for buyers and sellers. It is suggested to share the information/analysis related to the distribution of such deviation limits around 12%, 15% etc. for RE projects, so that one can make a judgement about the appropriate limit and the applicable NROC.
- **A** Deviation Limit and Charges for Hybrid Projects: Treatment of DSM limit and applicable NROC should be clarified in the case of hybrid projects (e.g. Solar-Wind+MSW) with a single interconnection/metering point.
- Charges for Deviation for General Seller (MSW) (Regulation 8.1): According to the draft Regulation, charges for deviation for General seller Municipal Solid Waste (MSW) in case of under injection is zero (for deviation up to 20%). It is suggested to ensure uniformity of charges between despatchable and non-despatchable RE based plants respectively. Thus, charges for deviation for MSW based General seller in case of under injection should not be zero so as to provide correct regulatory signal to all the system participants.
- A Methodology for Calculation of Deviation for Renewable Energy Projects: To ensure that RE projects play a vital and growing role in the Indian power sector, such plants should gradually be subjected to analogous metrics for deviation measurement. The current methodology for calculation of deviation with the available capacity in the denominator should now be replaced with the schedule.

The overall regulatory framework may instead allow for sufficient deviation limit so as to reduce sudden impact of change in the methodology. Adoption of correct formula for calculation of deviation is recommended.

- Incentive for Over Scheduling and Payment for RE Energy: In case of payment on the basis of scheduled energy for RE projects with relaxed deviation limits and limited penalty for deviation, there is ample incentive to over schedule. While one would expect such a behaviour from an economic point of view, the same should be examined in detail to ascertain the scale of such behaviour. Such analysis should be part of the statement of reasons for the proposed Regulations.
- A Charges for Deviation for Seller in Case of Over-Injection (Regulation 8.1): The proposed deviation charges for General Seller (except RoR & MSW) i.e. 10% of NROC should be applicable for greater than 2% of deviation. It is suggested that up to 2% deviation should be related to normal charge rate and deviation beyond 2% should be zero. This will be in line with the graduated approach in the prevailing Regulation wherein over-injection does not get additional compensation when frequency deviation is significantly higher than or beyond 50 Hz. Since a generator will not have precise control over the output, so NROC will be given to the generator up to 2% of deviation for over-injection, and zero beyond that limit. Otherwise this may provide incentive to deviate beyond 2% to claim NROC, in case the limit is applied in a non-telescopic manner.
- Charges for Deviation for Injection of Infirm Power (Regulation 8.3 (a)): The draft Regulation should limit the duration of injection of infirm power. It is advised to add a proviso such that the duration of infirm power should be limited to two weeks in the case of RE and up to two months for thermal and hydro generating stations.



EAL News

Regulatory Certification Program on "Power Market Economics and Operation"

CER, IIT Kanpur is pleased to announce its second Regulatory Certification Program on "Power Market Economics and Operation" from November 20 - December 20, 2021.

The program is suitably designed for Commissioners and Officers from Electricity Regulatory Commissions (ERCs), Relevant Ministry and Government Departments, Stakeholders from Generating Companies, Energy Companies, Licensees (Transmission, Distribution, and Trading), Power Exchanges, Open Access Consumers, Load Dispatch Centers, Financial Institutions and Investors, Consultants, Faculty, Researchers and Students from Academic Institutions, Consumer Organisations, NGOs and other stake holders who want to enhance their understanding

of this multi-disciplinary area.

For further program details including key topics, registration fee, resource persons, please visit https://cer.iitk.ac.in/olet/rcp

eMasters Program

IIT Kanpur has introduced eMasters program on "Power Sector Regulation, Economics and Management" under the aegis of Department of Industrial and Management Engineering (IME). This multidisciplinary program, approved by Senate, IIT Kanpur, aims to provide conceptual and applied understanding of power sector regulation from economic and regulatory perspectives.

Highlights of the Program :

- Direct Selection (GATE Score not required) •
- **Executive Friendly Schedule**
- Career Advancement and Networking
- Leading National and International Experts
- Live Interactive Sessions
- Credits Transfer for M.Tech./ Ph.D. at IIT Kanpur

For more details about minimum qualification, admission criteria, application process and course fee structure, please visit our page: https://emasters.iitk.ac.in/

We request your feedback for making EAL and this newsletter more relevant to the sector.

Team Power Chronicle Energy Analytics Lab (EAL)

Department of Industrial and Management Engineering Indian Institute of Technology Kanpur E-mail: eal@iitk.ac.in | Follow us on : in 😏

Phone: 0512-259 6448



∎ys

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





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