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Centre for Energy Regulation

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REGULATORY AND ENABLING ENVIRONMENT FOR SMART GRIDS

ANOOP SINGH

CENTRE FOR ENERGY REGULATION & ENERGY ANALYTICS LAB

DEPARTMENT OF INDUSTRIAL AND MANAGEMENT ENGINEERING

IIT KANPUR



Technology Adoption and the Indian Power Sector – Experiences so far

- Super Critical Plants – Thermal generation → Mandate Driven
- RE Adoption → Regulatory Mandate
- HVDS → Pilot Funding (Central, State and Discoms)
- ToD/ABT Compliant Metering → Regulatory Mandate and Tariff design
- EV → Government Supported and Consumer Choice

Drivers for Smart Grid Investment



Policy Maker



Regulators



Utility (Discom)

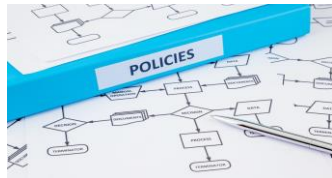


Consumers

Instruments for Smart Grid Investment (Contd.)



Policy Maker



Mandate



Incentivise



Fund Investment
(in Pilots)



Regulators



Mandate



Incentivise



Approve Investment for
recovery through tariff

Instruments for Smart Grid Investment (Contd.)



Utility (Discom)

- Investment (₹)
- Self-driven
- Mandate/Incentive



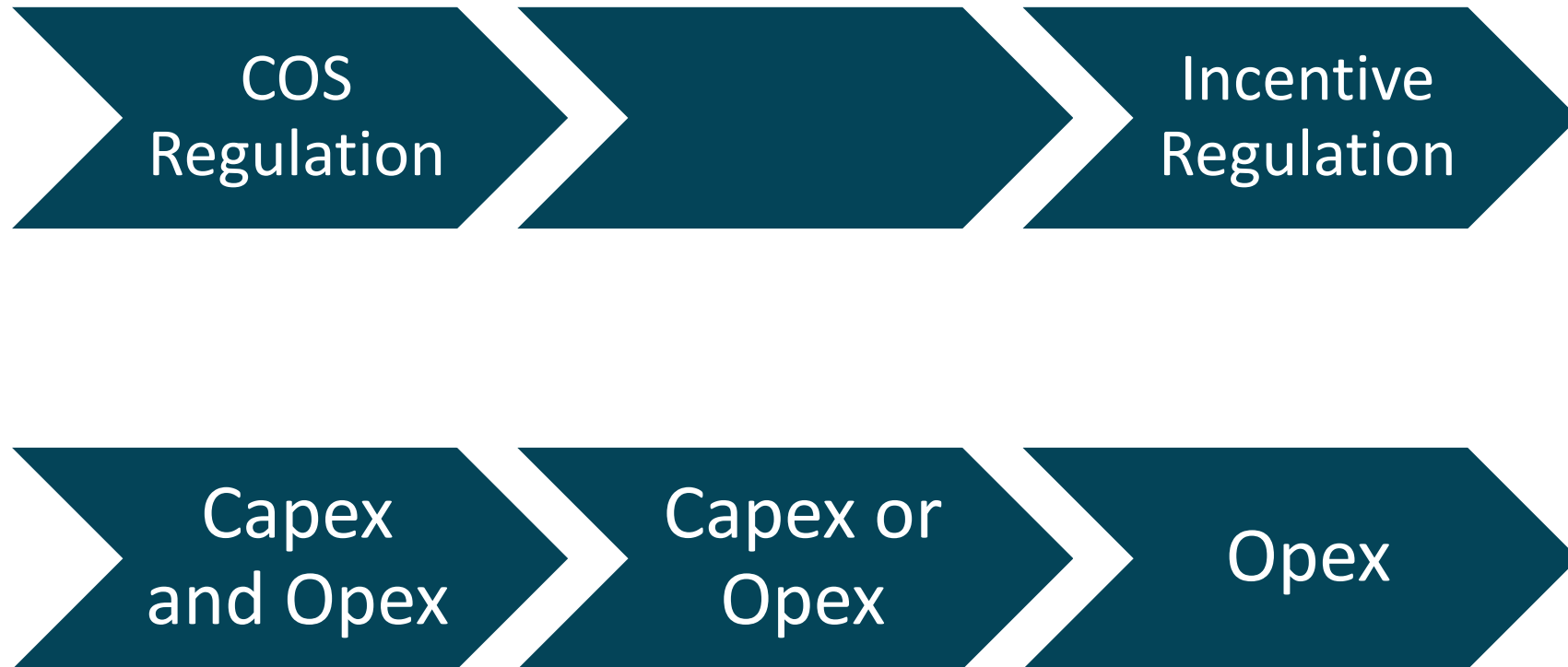
Consumers

- Investment
 - Home automation
 - Adoption of Solar PV, Storage and EV
- Incentives
 - ToD/Flexible tariff
- Social Energy Marketplace
 - 'Peer to Peer Trading'

Proposed Amendments to Electricity Act 2003 (2018)

- Separation of Carriage and Content: Distribution and supply are defined explicitly and to be segregated [1]. → Retail Competition
- Renewable Generation Obligation and Renewable Energy Service Company introduced, along with the existing Renewable Purchase Obligation[1].
- Distribution/supply licensees to be obligated to supply 24×7 power [42]
- Mandatory metering of electricity consumption, and Direct Benefit Transfer (DBT) [45];
- Regulatory Scrutiny/control over Power Purchase [42, 49]
- SG Defined and its promotion [2, 3, 55, 79, 86, 177]

Need for a New Regulatory Paradigm



New Regulation Paradigm – Network Business

- Regulatory framework for **‘Evaluating SG Projects’ – ‘Business Plans’ of Discoms**
- **Towards OPEX model** for recovery of SG project cost
- **‘Monetize Smart Meters’ data without compromising privacy.**
- Learnings from UK’s RIIIO (Revenue = Incentives + Innovation + Outputs)

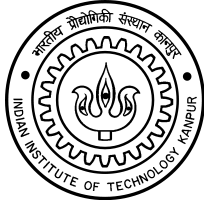
Only Regulatory mandate and incentive may be costly proposal for SG adoption

- Smart Phones – completely consumer funded!!
- Need to show value to consumers (and to utilities)
- Emergence of Smart Homes → Consumer driven

We have Smart Grid → What next?

How to derive benefits of Smart Grid (SG)/Smart Meter (SM) for consumers and utilities

- ToD/dynamic tariff for consumers with SM
- Analytics of SM data by consumers, utilities and regulator (and researchers)
-



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CER Newsletter – “Regulatory Insights”

ISSUE 01 (JULY, 2018)

ISSUE 02 (OCTOBER, 2018)

Issue 01 Volume 01 July, 2018

REGULATORY INSIGHTS

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Editorial

It gives me immense pleasure to present the first issue of **Regulatory Insights**, the quarterly newsletter of Centre for Energy Regulation (CER). Each issue aims to bring insights into key regulatory and policy developments in the power sector, accompanied with analysis based on CER's Regulatory Database: **ERC Tracker**, comprising regulatory updates and tariff orders, would be a constant feature of the Regulatory Insights. **CER Opinion** is a special feature of the newsletter as it presents the views of CER on regulatory and policy developments – draft as well as notified. We expect discussions on such developments and other topics of interest to continue on the **Online Discussion Forum** of the Centre, and hope that these opinions and discussions would serve as useful inputs for regulators and policy makers.

Development of offshore wind power generation capacity must be undertaken on a competitive basis and may initially be supported by viability gap funding (VGF), which should also be used as the bidding parameter. With respect to CER's consultation paper on Terms and Conditions of Tariff Regulations, we suggest replacement of incentive on early completion of projects with penalty for delay, benchmarking of capital cost and operational parameters, and periodical revision of ROE using appropriate risk evaluation approach. Adoption of market prices for frequency deviations under the DSM mechanism needs to be strengthened by setting up of analogous and effective intra-state AFT regime across the country. Further, we suggest adoption of area-specific Market Clearing Price (MCP) in the case of market splitting, and highlight the need for smoothing the transition from existing price vector to a rather steeper price vector.

The proposed amendments to the Tariff Policy 2016, being an important policy instrument guiding tariff determination by the ERCs, need to be further evaluated as some of the proposed amendments may have far-reaching implications on competition and efficiency in the sector. Specific suggestions include delinking of operational norms from past performance, adoption of a regulatory framework for demand forecasting and efficient power procurement planning by utilities, and using REC's as an RPO compliance mechanism and strengthening the REC market. The detailed analyses of the issues and the submissions can be accessed on the web portal of CER.

Anoop Singh
Coordinator, Centre for Energy Regulation

The Centre is seed funded by the Government of United Kingdom through a programme titled 'Supporting Structural Reforms in the Indian Power Sector under Power Sector Reforms (PSR) programme.'

UK Government

Centre for Energy Regulation (CER), Department of Industrial and Management Engineering, Indian Institute of Technology Kanpur, Kanpur - 208016 (India)

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CER In Focus

Offshore Wind

Key Initiatives

- Facilitating offshore wind in INDIA (FOWIND) consortium as a part of Indo-European Cooperation on Renewable Energy programme – a roadmap for offshore wind in India
- First Offshore Wind Project of India (FOWPI) under 'Clean Energy Cooperation with India (CECI)'

must also take clearances/NOC's from over ten Central/State government ministries/departments.

- Capacity: 1000MW
- Location: Earlier restricted to Gulf of Khambat, later extended to the EEZ of India
- Offtake: To be traded through a designated Govt. agency through a 25-year PPA
- Evacuation Infrastructure:
 - Offshore (up to CTU/STU Network);
 - Developer
 - Onshore: CTU/STU

NIWE also invited private sector players to conduct offshore studies and surveys.

Driven by emission reduction targets, offshore wind farms are being promoted worldwide as oceans offer higher wind speeds. India, with its vast coastline of 7517 km and significant experience in onshore wind development, is ready to take the next leap. Ministry of New and Renewable Energy (MNRE) notified **National Offshore Wind Energy Policy** on 6th October, 2015. More recently, an offshore installation target of 5 GW by 2022 and 30 GW by 2030 was set by the Ministry. NIWE shall demarcate sea blocks for open international competitive bidding and take in-principle clearances from the Ministries of Defence, Home Affairs, External Affairs, Environment and Forests and the Department of Space. Offshore wind farms have to be mandatorily declared as restricted areas by the Directorate General of Shipping. The successful bidder/developer, facilitated by NIWE,

Ministry of New and Renewable Energy (Nodal Ministry)

Offshore Wind Energy Steering Committee (Policy Advisor)

National Institute of Wind Energy (NIWE)

(Nodal Agency)

Offshore Wind Development in India

(Western Coastline) Potential Offshore Sites (Southern Coastline)

Source: FOWIND 2018

CER Opinion

- Competitive bidding for offshore wind should be the only basis for its development.
- Cost of dedicated transmission line from offshore pooling station to the CTU/STU network can be supported by viability gap funding from the corresponding Regional Deviation Pool Account
- Fund. A specific normative amount should be pre-specified in the bid document.
- NLDC should, in cooperation with IMD and NIWE, set up a dedicated centre for monitoring and forecasting of generation.

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Coordinator, Centre for Energy Regulation

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Issue 02 Volume 01 October, 2018

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Editorial

Post Electricity Act, 2003, the Indian Power Sector entered into a phase of market reforms, targeted largely at bringing competition in wholesale procurement of power. The benefits of power market developed thus far have been limited to distribution licensees and Open Access consumers, who have access to competing options for power procurement.

The sectoral reforms have had limited and varying impact on the performance of distribution segment, with some states leading the performance and some yet to catch up. Unmetered consumption, electricity access especially using distribution RE and Standards of Performance need special attention. The proposed amendments to the Electricity Act, 2003 have addressed some of these gaps. Additionally, an era of choice of supply to all consumers is to dawn upon the sector through cartage and content separation as proposed in the amendments. The operational as well as regulatory challenges to the introduction of cartage and content need to be deliberated with stakeholders for their buy in. The proposed amendments also address the need for promoting RE through alternate means such as RGO, and promotion of smart grids. Deemed licensee status for railways and metro services would resolve some of the regulatory ambiguities.

Reorganisation of tariff categories should precede with an assessment of impact on revenue realisation by utilities and on consumers' bills. Introduction of DBT would make low tariffs for lower consumption slabs dispensable. Reduction in regulated tariff for RE, as delineated in ERC Tracker, is a reflection of the impact the competitive process has brought about across the sector. However, generic levelised tariff obfuscates higher nominal tariff that procuring DISCOMs would pay post the application of escalation factor which needs to be explicitly notified, along with the first year's tariff.

In its endeavour to assist regulatory and policy formulation for the sector, CER organised a five-day Regulatory Research Camp (RRC) on Long-term Demand Forecasting and Power Procurement Planning, in July, 2018. The outcome of the workshop would assist SERCs in framing regulations for the same. A report on the same would be published by CER.

The online discussion forum of CER, is an online platform for deliberating regulatory and policy issues. It can be accessed at CER's web portal. We request your feedback for making CER's activities and outputs more relevant to the sector.

Anoop Singh
Coordinator, Centre for Energy Regulation

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CER ERC Tracker

Regulatory Updates

Tariff

HPERC approved generic levelised tariff for solar PV power plants for FY 2018-19 as under:

Capacity (MW)	Generic Levelised Tariff (₹/kWh)	Discount Factor (%)
31	4.00	30.00
1-3	4.15	30.00

KERC determined generic tariff for new ground-mounted solar and solar rooftop photovoltaic projects.

Project Type	Capacity (MW)	Generic Levelised Tariff (₹/kWh)
Grid-connected solar	53	3.05
Grid-connected solar rooftop	41	3.00 (without capital subsidy), 3.00 (with capital subsidy)

MERC determined generic tariff for renewable energy for FY19 as order dated 18th August, 2018.

RE Source	Capacity (MW)	Tariff (₹/kWh)
Wind	—	4.00
Mini and Micro Hydro	40-5	5.60 (without AID), 5.20 (with AID)
Other SHPs	0.5 - 1	5.14 (without AID), 4.80 (with AID)
Human-based (commissioned in E.Yaj)	1-3	4.64 (without AID), 4.30 (with AID)
Non-small fast based organisations	5-45	3.88 (without AID), 3.60 (with AID)
Solar PV	—	7.41 (without AID)
Solar Rooftop PV	—	3.33
Solar Thermal	—	11.40 (without AID), 10.34 (with AID)

*AID: accelerated depreciation

Against ZEDA's petition, JERC (M&M) released a tariff order for rooftop solar plants in Mizoram, determining and approving levelised tariff (FIT) with and without subsidy as follows:

Capacity (kW)	1 year	20 year	30 year	40 year	50 year
Capital Cost of ₹200/kWh	10.00	9.21	8.53	7.94	7.44
Without subsidy	0.07	0.00	0.00	0.00	0.00
With 10% subsidy	1.07	1.00	0.93	0.87	0.80
With 20% subsidy	1.00	0.93	0.87	0.80	0.74

Others

KERC ordered that all power procurement from bagasse-based cogeneration power plants and wind power plants shall be only through competitive e-reverse bidding. KERC recognised the difference in Fuel Cost Adjustment (FCA) charges as submitted by the ESCOMs and as calculated by the Commission, and decided to carry forward the savings and the increase in FAC of all the ESCOMs as at the end of the fourth quarter of FY18 to the APR as may be approved by the Commission after the APR for FY18.

DERC notified Electronics Regional Test Laboratory (North) as the laboratory for carrying out testing of suspected tampered meters, along with the guidelines for carrying out such testing.

DERC allowed TPODL the cost of power purchase from PPA 2012-13 till FY 2016-17 on the principle of Merit Order considering their petition a special case wherein PPA is bundled and the agreement does not provide for partial termination of the PPA with regard to the generating station and needs to be enforced in a combined manner.

MERC allowed MSEDL to procure short-term power at rates higher than the ceiling of ₹4/Wh, through competitive bidding or Power Exchanges, till March, 2019.

MERC approved the petition of MSEDL for long-term procurement of 250 MW wind power with a ceiling rate of ₹2.52/kWh towards the fulfillment of its non-solar RPO targets, accepting the deviation in the bidding document from MoF guidelines.

RERC granted permission to JVNL for setting up Electric Vehicle (EV) charging stations on the grounds of optimum utilisation of surplus power available and assets by JVNL, taking cognizance of environmental benefits of EV.

In response to a petition seeking directions for the implementation of REC (Connectivity and Net Metering for Rooftop and small Solar Grid Interactive Systems) Regulations, 2015, RERC permitted the DISCOMs (RECL, AVNL, JVNL and JVVNL) to enter into agreement with any RESCO and/or consumers to bolster the solar rooftop scenario in Rajasthan.

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Regulatory Research Camp & Online Discussion Forum




Regulatory Framework for Long-term Demand Forecasting and Power Procurement Planning

Anoop Singh, Manvendra Pratap, Abhishek Das, Piyush A Sharma, Kamal K Gupta




CER Monograph | 2018




Centre for Energy Regulation
Department of Industrial and Management Engineering
Indian Institute of Technology Kanpur



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Discussion Forum



Anoop Singh

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Power Markets

Redesigning of Ancillary Services fo... <i>Created By:</i> GAURAV YADAV (1 week ago) <i>Posts:</i> 1 <i>Last Post By:</i> GAURAV (1 week ago)	Redesigning of Indian Real Time Ele... <i>Created By:</i> GAURAV YADAV (1 week ago) <i>Posts:</i> 1 <i>Last Post By:</i> GAURAV (1 week ago)
Ancillary Services Follow	Real Time Electricity Market Follow

Power Sector

Consultation Papers <i>Created By:</i> Kamal Gupta (1 week ago) <i>Posts:</i> 1 <i>Last Post By:</i> Kamal (1 week ago)	Tariff Policy Amendments - Tariff Cat... <i>Created By:</i> Rashmi Saurav (1 week ago) <i>Posts:</i> 1 <i>Last Post By:</i> Rashmi (1 week ago)
Act & Policies Follow	Act & Policies Follow

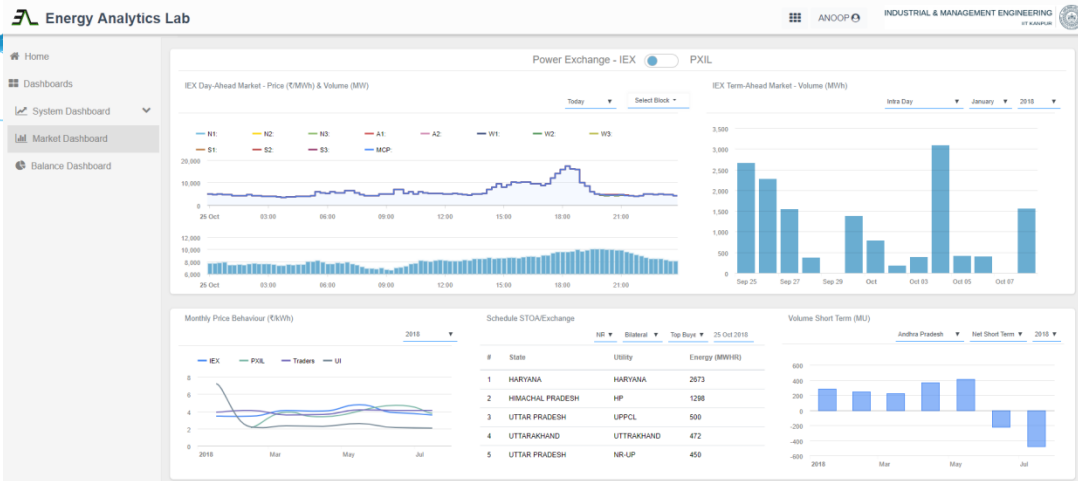
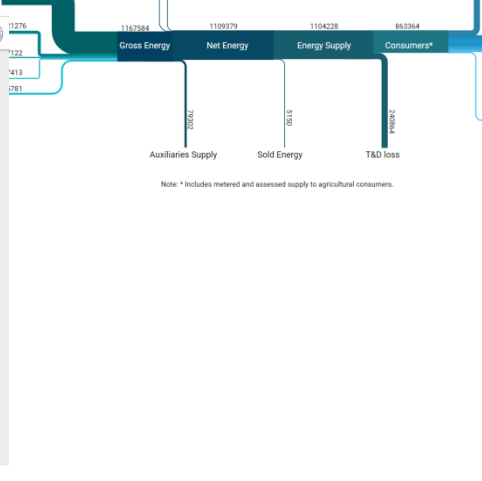
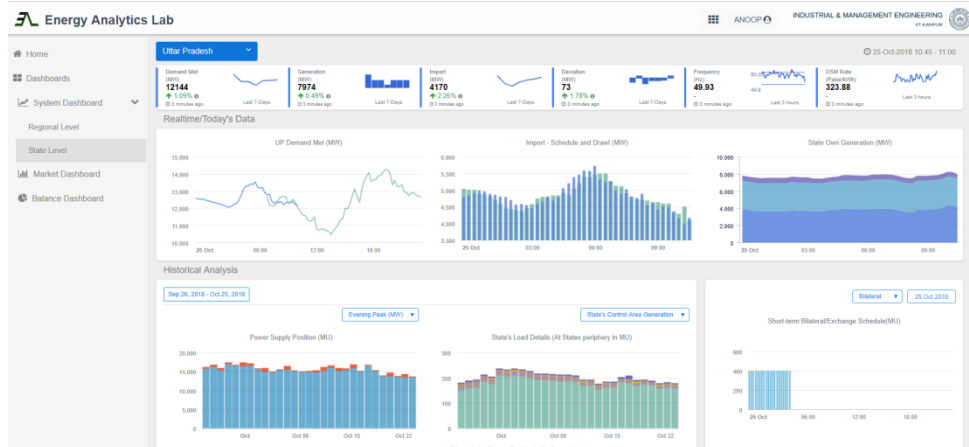
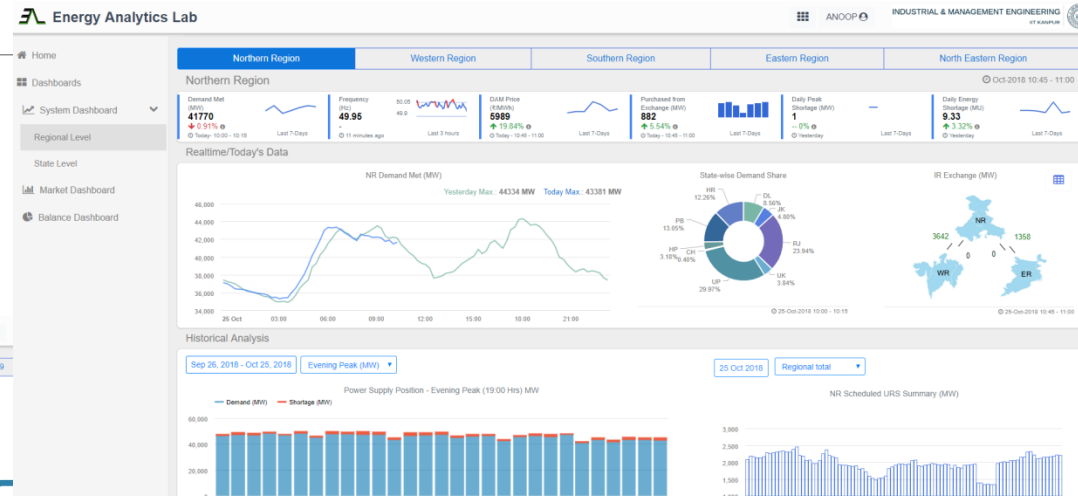
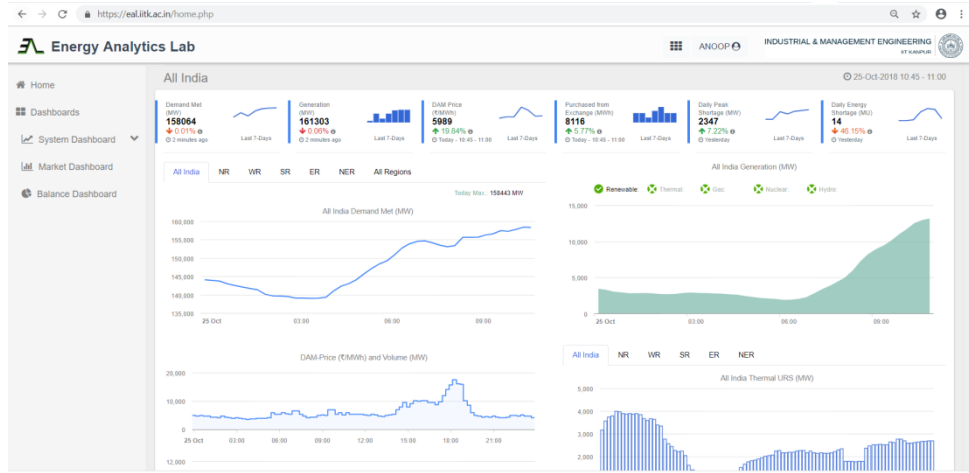
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Thank You..

