

MINUTES OF THE 59TH MEETING
OF THE
FORUM OF REGULATORS (FOR) HELD AT GUWAHATI (ASSAM)

**VENUE : HOTEL RADISSON BLU
NATIONAL HIGHWAY-37
GOTANAGAR
GUWAHATI (ASSAM).**

DAY / DATE : FRIDAY, THE 21ST APRIL, 2017

LIST OF PARTICIPANTS : AT ANNEXURE-I (ENCLOSED)

The meeting was chaired by Shri Gireesh B. Pradhan, Chairperson, Central Electricity Regulatory Commission (CERC) and Chairperson for Forum of Regulators (FOR).

Shri Naba Kumar Das, Chairperson, Assam Electricity Regulatory Commission (AERC) formally welcomed Members of the Forum to the meeting being held in Guwahati. He informed the Forum that Shri Sarbananda Sonowal, Hon'ble Chief Minister of Assam, who was scheduled to interact with the Members of the Forum, would not be able to participate due to other pressing engagements and he has conveyed his best wishes for fruitful deliberations during the meeting.

In his opening address, the Chairperson welcomed all Members of the Forum to the 59th Meeting of "FOR". He thanked the Chairperson, AERC for hosting the meeting and appreciated the efforts made by the Chairperson, Members, Officers and Staff of AERC. He further lauded the contributions made

by AERC in the progress made by electricity sector in the State of Assam. While appreciating the well structured website of AERC, he observed that AERC's is one of the excellent websites providing all information in a lucid, clear and most user friendly way.

He, while outlining the sectoral performance by the North-East Region, observed that the region as a whole falls short of the national averages with regard to parameters related to electricity. This being an area of concern, he suggested that a dedicated task force comprising Members of FOR may be constituted to identify the issues of concern and the Members could share their expertise for facilitating the NE Region to take urgent remedial action and improve upon the performance.

While drawing attention of the Members of the Forum to the issues arising out of increasing share of renewable energy in the energy portfolio of State, the Chairperson observed that besides variability and uncertainty of renewable energy, renewable purchase obligation is also an area of challenge. He advised the SERCs to enforce the prescribed RPO trajectories and refrain from providing any roll over for compliance in the subsequent years. He further suggested the SERCs to bring the Open Access and Captive Consumers under the ambit of RPO and ensure their compliance. He informed the Forum that CERC has recently notified downward revision of Floor & Forbearance price of REC. This is a golden opportunity for utilities to comply with their RPO targets.

Chairperson, UPERC stated that the growing profile of renewable energy in energy portfolio of States needs to be examined encompassing all other issues related to integration of renewable energy into the grid. In this regard, the Joint Chief (RA), CERC informed that the Forum has already constituted a high powered Technical Committee with Shri A.S. Bakshi, Member, CERC as its

Chairman and Technical Members of RE rich States as its Members. The Committee has been mandated to study issues related to integration of RE and provide its recommendations. The Committee has already met 11 times so far and its preliminary findings from time to time have been placed before the Forum for discussion.

In order to handle variation in RE and its effective integration, the Committee has also drafted a roadmap. The roadmap *inter alia* included forecasting, scheduling and deviation settlement mechanism, accounting, metering and settlement system, availability based tariff mechanism, DSM Regulations etc. These preliminary reports have been placed before the Forum. The Committee also decided to assess the impact of RE integration and need for regional cooperation among various States. The issue of flexing of thermal generation to facilitate RE integration is also being discussed in the Committee.

Thereafter, the Forum took up the agenda items for consideration.

**AGENDA ITEM NO. 1 CONFIRMATION OF MINUTES OF THE
58TH MEETING HELD ON 27 FEBRUARY,
2017 AT NEW DELHI.**

The Forum considered the minutes of the 58th Meeting of Forum of Regulators held on 27.2.2017 at New Delhi with a correction in first para of the minutes of the meeting. It has been suggested that JERC (UTs except Delhi) may be indicated as JERC (State of Goa & UTs). With this correction, the Forum endorsed the minutes of the 58th Meeting of Forum of Regulators held on 27.2.2017 at New Delhi.

**AGENDA ITEM NO. 2(i) BUDGET OF THE FORUM OF
REGULATORS FOR FY 2017-18.**

The budget for the year 2017-18 as circulated was discussed in detail. Salient features of the proposed budget as reflected in the income and expenditure statement (contained in Annexure-I of the Agenda Note) were explained. The Forum approved the Annual Budget for FY 2017-18.

**AGENDA ITEM NO. 2(ii) PROPOSED STUDIES & TRAINING
PROGRAMMES OF THE FORUM OF
REGULATORS FOR FY 2017-18.**

The Forum was informed that the proposal for commissioning the studies and conducting the training programmes during the financial year 2017-18 was evolved keeping in view the need for detailed analysis of the emerging issues facing the sector and also with due regard to the need for capacity building for Regulators and regulatory staff. Considering the suggestions for studies made by the Members of the Forum, it was decided that the following studies and capacity building programmes would be undertaken during the financial year 2017-18 :

Studies-

1. Study on Electricity Storage system
2. Study on Renewable Energy Certificates
3. Study on National Level RPO Registry
4. Review of status of Open Access in Distribution.

The Forum also decided that *inter se* prioritisation of studies/programmes would be left to the Chairperson, FOR.

Training Programmes-

1. Training Programme on Consumer Protection and Consumer Interest
2. Training Program on Legal aspects of Regulations
3. Training Program on tariff setting principles, fixation of tariff, principles of prudence check
4. Capacity Building Training Programme for Officers of SERCs at IIT Kanpur (including international component).

The Secretariat has been advised to bring out a training calendar for convenience of the Members.

AGENDA ITEM NO. 2(iii) RESOLUTION FOR APPLYING FOR NET BANKING FOR THE FORUM OF REGULATORS.

The Forum considered the proposal related to applying for internet banking (only viewing facility of the bank statements) for the savings bank account of FOR, being maintained with Corporation Bank, K.G. Marg, New Delhi. The Forum approved the “Resolution” in this regard (placed at **Annexure-II**).

AGENDA ITEM NO. 3

REPORT OF FOR WORKING GROUP ON LOAD BASED CONNECTION CHARGES.

The Forum was informed that a request was received from the Ministry of Power (MoP) to internally examine the issue of load based connection charge for a new connection especially for domestic households and small shops / commercial establishments and advise SERCs to facilitate universal electrification. In response to the request, the matter was referred to the “*FOR Working Group for special category of telecom towers*” to study the issue of load based connection charges for new connection and submit the same to "FOR" for further discussion and decision.

A brief presentation on the recommendations of the Working Group (WG) has been made by the "FOR" Secretariat (**enclosed** as **Annexure-III**). The WG observed that there is no uniformity (including high variation under different heads) in charges. The WG recommended not to levy any application fee and development charges. As regards Service Line Charges, the WG recommended that for consumers with 2 kW load and upto 50 m distance, no charges may be levied and for cases beyond 50 m, respective SERCs will decide.

It was recommended to re-name the category of “Other Charges” as “Meter & Related Charges” to include “Meter Testing Charges” & “Cost of Meter Boxes”. For consumers with 2 kW load (single phase connection) only meter rental charges may be levied. For consumers with a load above 2 kW and consumers with three phase connections, the recommended options include that the consumers may purchase their own meter (subject to testing) and no Security Deposit be collected. Alternatively, consumers may avail meters from Discom either by paying rent to the utility (or) by paying full cost to the utility. Apart from

the above no other charges may be levied.

Discussion & Consensus :

The Forum deliberated upon the Report of the WG and decided that apart from Service Line Charges, Meter & Related Charges and Security Deposit (upto a maximum of three months of billing) no other charges including system loading charges be levied. In case the consumers opt to purchase their own meter, then no meter security deposit be charged. It is further recommended in the light of financial impact owing to providing free service line for consumers with 2 kW load and upto 50 m, a communication may be sent to Ministry of Power, to cover under the grants being given to the distribution utilities under various schemes to provide last mile connectivity to consumers as recommended above.

**AGENDA ITEM NO. 4 REFERENCE FROM BIHAR SERC ON
DEFINITION OF SAIFI / SAIDI.**

The Forum considered the reference received from BERC for revision of formula of Reliability Indices (RI) in Model SOP Regulation and endorsed the suggestion of it being in line with IEEE 1366 Standards. The Forum decided to take up the matter with Central Electricity Authority for necessary modification of the definition of Reliability Indices in line with IEEE Standards.

**AGENDA ITEM NO. 5 DIRECTIONS TO SECRETARIAT OF
"FOR".**

A. Mechanism for uniform method of charging in the States for the energy drawn at EHV AC substations through tertiary winding for auxiliary

consumption purposes

The issue related to uniform method of charging in the States for the energy drawn at EHV AC substations through tertiary winding for auxiliary consumption purposes was considered by the Forum. Representatives of PGCIL made a presentation before the Forum (**enclosed as Annexure-IV**).

The PGCIL brought the matter before the Forum in pursuance to the directions contained in the CERC Order dated 28.2.2017 in the petition No. 133/MP/2014. PGCIL, is meeting a part of its auxiliary power requirements through tertiary winding of ICT installed in AC sub-stations. However, six States have been levying dual capacity charge, separately for the above arrangement. PGCIL submitted that the States may be directed to bill for capacity charge against the HT connections availed from State Power Utility (as per the contract agreement) and energy charge as per the actual consumption and no capacity charge for drawl of power through tertiary of the ICT installed in POWERGRID substation may be demanded.

The Forum noted the issues highlighted.

B. Need for appropriate regulatory framework stipulating mandatory requirement for operational feedback by SLDCs to STUs

C. Declaration of TTC/ATC by STUs for State network in planning as well as operating horizon

The Forum noted the need for determination of permissible power transfer limits on inter-regional corridors and making it available publicly for the

market players in order to facilitate Short Term Open Access (STOA) through the inter-State Transmission System (ISTS). The Forum further underlined the need for TTC/ATC computations by STU for the planning horizon, TTC/ATC computations by SLDC for the operating horizon, besides providing the operational feedback by SLDCs to respective STUs and its discussion in the State Power Committees or Grid Coordination Committees.

The Forum decided that SERCs may take up the matter at their end for suitable action.

AGENDA ITEM NO. 6 PRESENTATION ON DEMAND PATTERN ANALYSIS.

The System Operators, i.e., SLDCs, RLDCs and NLDC carry out the supervision and control of the Indian electricity grid as mandated by the Electricity Act, 2003. In this process, the NLDC at national level archived real time data since 2008. A presentation on the “Electricity Demand Pattern Analysis Report” was made by the representative of POSOCO (**enclosed as Annexure-V**).

A detailed statistical analysis of electricity demand related time series data of the past eight years has been made. This analysis is primarily aimed at providing insights towards diurnal, seasonal, yearly pattern of electricity demand besides examining the load curves at all India level, each of the five regions and 34 States / UTs. The analytics brought out a deep insight into the past patterns and offered a basis for future projections and is expected to be helpful in generation, transmission and distribution planning by the Central and State level power system planning agencies.

The analysis offered the impact of societal lifestyle changes on the seasonal / diurnal patterns, alignment of consumption patterns with sunrise / sunset and offered a deeper understanding on the base load, peak power, seasonal effects, possible strategies for power procurement, flexibility and need for demand response etc.

Discussion & Decision :

The Forum noted the analysis which offered the correlation between demand pattern of two States by providing the details of how the demand of one State varies in comparison to the other on the same time-scale. This correlation exercise assumes importance in the context of much desired regional cooperation among a group of States to minimize the impact of RE integration into the grid. This correlation analysis may facilitate the States to efficiently design their power procurement strategies. It may also offer insights to the Regulators to determine ToD tariff, Markets to offer signals for pairing / pricing, impact analysis of policies and regulations, and course corrections for policies and regulations.

In response to the observations of Chairperson, UPERC that the demand pattern cannot be completely attributed to the consumption behaviour of domestic consumer only, but includes *inter alia* other factors viz. industrial consumers, impact of time of day tariff etc., representative of POSOCO clarified that a deeper analysis of demand pattern is required, as the report offered a set of preliminary observations only.

The Forum appreciated the presentation.

AGENDA ITEM NO. 7**RENEWABLE ENERGY GENERATORS –
DATA COMMUNICATION SYSTEM.**

The Forum considered the reference received from Ministry of Power on the importance of data communication system for Discom embedded Renewable Energy generators (Solar, Wind, Roof top solar) in the light of Grid security and the need for proper metering and accounting. The Forum noted the non-availability of real-time generation data and the urgent need for data registry (at the Centre and State levels) to be maintained by NLDC and SLDCs respectively.

Discussion & Consensus :

The Forum noted that in order to take the matter further, as a first step in the direction, communication standards are required to be determined. Therefore, "FOR" Secretariat may take up the matter with Central Electricity Authority with a request to expedite the same. It was informed that CERC has finalized Regulations on Communication. SERCs may issue complementary regulations for respective States.

AGENDA ITEM NO. 8**ROOF TOP SOLAR INSTALLATIONS.**

A presentation was made by Chairperson, WBERC on Installation issues in Roof Top Solar and the necessity for Discoms to take extra efforts to facilitate the integration of power and strengthening of communication system so that Roof top solar installations become feasible (**enclosed as Annexure-VI**).

Discussion & Consensus:

The Forum decided to refer this issue to the "FOR" Working Group on Renewable Energy for examination along with other related issues of RE. The Forum also

observed that flexing of thermal plant generation is one of key issues related to integration of RE. Therefore, the Forum authorized Chairperson, CERC / FOR to constitute a Working Group to examine the issue of flexing of thermal plant generation and place its recommendations to the Forum for further necessary action.

Chairperson, CERC on his behalf and on behalf of the Members of the Forum conveyed deep gratitude to Shri T.M. Manoharan, Chairperson, Kerala State Electricity Regulatory Commission (KSERC), who was due to retire on 2nd May, 2017, for his outstanding contribution to the Forum.

On conclusion of the meeting, Chairperson, CERC / FOR thanked the Chairperson, Members and staff of the Assam Electricity Regulatory Commission (AERC) for their painstaking efforts to host the 59th Meeting of "FOR" at Guwahati. He also thanked all the dignitaries present in the meeting. He conveyed to the Members of Forum that the next "FOR" Meeting will be held in New Delhi.

Secretary, CERC / FOR thanked the staff of "FOR" Secretariat for their arduous efforts in organizing the meeting.

The meeting ended with a vote of thanks to the Chair.

**LIST OF PARTICIPANTS ATTENDED THE 59TH MEETING
OF**

FORUM OF REGULATORS (FOR)

HELD ON 21ST APRIL, 2017 AT GUWAHATI (ASSAM).

S. No.	NAME	ERC
1.	Shri Gireesh B. Pradhan Chairperson	CERC – in Chair.
2.	Justice (Retd.) Shri G. Bhavani Prasad Chairperson	APERC
3.	Shri R.P. Singh Chairperson	APSERC
4.	Shri Naba Kumar Das Chairperson	AERC
5.	Shri S.K. Negi Chairperson	BERC
6.	Shri Narayan Singh Chairperson	CSERC
7.	Shri Anand Kumar Chairperson	GERC
8.	Shri Jageet Singh Chairperson	HERC
9.	Shri S.K.B.S. Negi Chairperson	HPERC
10.	Shri M.K. Goel Chairperson	JERC (State of Goa & UTs)
11.	Shri M.K. Shankaralinge Gowda Chairperson	KERC
12.	Shri T.M. Manoharan Chairperson	KSERC
13.	Dr. Dev Raj Birdi Chairperson	MPERC
14.	Shri W.M.S. Pariat Chairperson	MSERC
15.	Shri Imlikumzuk Ao Chairperson-cum-Member	NERC

16.	Shri U.N. Behera Chairperson	OERC
17.	Shri Vishwanath Hiremath Chairperson	RERC
18.	Shri Nanda Ram Bhattarai Chairperson	SSERC
19.	Shri S. Akshayakumar Chairperson	TNERC
20.	Shri Niharendu Chakraborty Chairperson	TERC
21.	Shri Desh Deepak Verma Chairperson	UPERC
22.	Shri Subhash Kumar Chairperson	UERC
23.	Shri R.N. Sen Chairperson	WBERC
24.	Shri B.P. Singh Member	DERC
25.	Shri Sanoj Kumar Jha Secretary	CERC/FOR
26.	Dr. Sushanta K. Chatterjee Joint Chief (RA)	CERC
SPECIAL INVITEES		
27.	Shri A.S. Bakshi Member	CERC
28.	Dr. M.K. Iyer Member	CERC
29.	Shri Dipak Chakravarty Member	AERC
30.	Shri Subhash Chandra Das Member	AERC

RESOLUTION

“**Extract** of resolution passed in the 59th meeting of M/s Forum of Regulators (FOR) held at Guwahati (Assam) on 21st April, 2017.

After discussion it was resolved that an application be made to Corporation Bank, K.G. Marg Branch, New Delhi for availing Internet Banking facility as per the terms and conditions of the Bank for the said services. The details of the persons authorized to obtain User ID and Password to operate the account through Internet Banking and the Accounts to which access is to be given along with their respective user access rights to be provided is as follows:

Sl. No.	User Name	Preferred User ID	User Type	Branch/ Account No.	User Access Rights	Limit (for funds transfer)	Mobile No. / Email ID
1.	Rashmi Somasekharan Nair, Dy. Chief (RA), CERC	rashmisnair	Normal	K.G. Marg Branch / Savings A/c No. CNPSB/01/140004	View	NA	956002 2909 & rashmisnair102@gmail.com
2.	Arun Kumar, Assistant Secretary, FOR	arunkumar	Normal	K.G. Marg Branch / Savings A/c No. CNPSB/01/140004	View	NA	989954 7322 & asecy.for@gmail.com

Certified true copy."

For M/s Forum of Regulators

Company Seal

(Secretary)



LOAD BASED CONNECTION CHARGES

– A REPORT OF THE FOR WORKING GROUP

59 Meeting of FOR
21.4.2017, Guwahati

Contents

- Background
- Status of Connection Charges across States
- Observations of the WG
- Recommendations of th WG

Background

- Communication from MoP

“One of the serious impediments faced by prospective domestic consumers is exorbitant estimates charged for taking connection. In such scenario, unduly high burden of last mile connectivity falls on consumer. Therefore, it would be prudent to switch to load based connection charge. Several States have already brought amendments in their supply code and introduced load based estimates for domestic consumers. This provides transparency as well as encourages prospective consumers to take connections”

- MoP requested CERC to examine the issue of load based connection charges, especially for domestic / small shops & commercial establishments
- Chairperson, CERC / FOR assigned this issue for examination to the FOR Working Group (WG) already constituted for *“Assessing the need for special category of power tariff for telecom towers”*
- The FOR WG consists of Chairpersons of ERCs of Rajasthan, UP, Jharkhand, Tamil Nadu, West Bengal, Kerala as Members and Chairperson CERC as its Chairperson.

Status of Connection Charges

- Information regarding “Connection Charges” obtained from different distribution utilities.
- Observed levy of charges are a combination of
 - **Application Charges**
 - *On the basis of Load of connection; Most of the states in the range of Rs. 5 to Rs. 100; Chattisgarh Rs. 200; Eight States do not levy any Application Charge*
 - **Service Line Charges**
 - *In the range of Rs. 200 to Rs. 1000; Generally high in the load range of 4-5 kW; Gujarat Rs. 3500 – 6500; Delhi Rs.3000; No charges in Sikkim*
 - **Development Charges**
 - *14 States are not levying development charges; Charges for 1-5 kW load in the range of Rs. 500 – 4500;*
 - **Security Deposit**
 - *For load of 1-5 kW, the charges range from Rs. 400 – 8000;*
 - **Other Charges**
 - *This is generally related to meters to be installed; Maximum Rs. 2000; No charges levied in 9 states.*

Observations

- No uniformity in charges
- High level of variation in charges under different heads
- The charges are expected to be low in electrified areas and high in case of un-electrified areas
- Security Deposit is applicable only if electricity supplied and not applicable in case of pre-paid metering
- Load based connection charges may not be possible as the cost of connectivity is linked to the connectivity rather than load.

Recommendations

■ Application Fee

- *No Application Fee may be charged from consumers taking new connection*

■ Service Line Charges

- *No Service Line Charges may be levied for consumers with 2 kW load and within 50 metres distance. For consumers above 2 kW, the charges may be decided by respective SERCs*

■ Development Charges

- *No Development Charges may be levied*

■ Security Deposit

- *Security Deposit should not exceed three months of billing*

Recommendations

■ Other Charges

- *May be named as “Meter & Related Charges”*
- *Also includes “Meter Testing Charges” & “Cost of Meter Boxes”*
- *For consumers with 2 kW load (single phase connection) only meter rental charges may be levied*
- *For consumers with a load above 2 kW and consumers with three phase connections, the recommended options are*
 - *Consumers may purchase their own meter (subject to testing) and no Security Deposit be collected*
 - *Consumers may avail meters from Discom either by paying rent to the utility (or) by paying full cost to the utility*

■ Apart from the above, no other charges may be levied

Thank you

Presentation
on
Auxiliary Power Charges
for
EHV AC Substations of POWERGRID

By
Y. K. Sehgal
Executive Director
Powergrid Corporation Of India Ltd

Content

- Drawl of auxiliary power requirement through tertiary winding of the ICT installed in AC substations.
- Mechanism for uniform method of charging for drawl of auxiliary power

Power Grid Transmission System

- Assets of POWERGRID

- Transmission Line – 138857 Ckm
- Transformation Capacity – 288544 MVA
- Total number of substations – 219

Description	No. of substation	Voltage level	No of Substation
AC substations	205	765 kV	40
		400 kV	142
		< 400 kV	23

	BtB station	Bipole station	Bipoles links
HVDC System	4	10	± 800 kV Agra – BNC - 1754 Kms ± 800 kV Champa – Kurukshetra – 1288 Kms ± 500 kV Talcher – Kolar – 1368 Kms ± 500 kV Balia – Bhiwadi – 790 Kms ± 500 kV Rihand – Dadri – 815 Kms

➤ Overall availability of Transmission System > 99.5%

Auxiliary power supply – its reliability & availability

- Smooth operation of substation involves proper functioning of various Substation equipments / assets with Safety & Security
- Reliable auxiliary power supply is of absolute necessity for smooth operation of all sub-system of the substation including protection system.
- Inaccurate / mal-operation of protection system may result damage of equipment and potential threat of grid disturbance
- Auxiliary power supply need to be highly reliable with high availability so that all auxiliaries including protective gears operate correctly in case of any exigency

CEA Regulation on Auxiliary Power Supply for EHV substation

- CEA vide Notification dated 21st February 2007 issued regulation on grid connectivity wherein at Serial No. 6 of Part III, criteria for auxiliary power for EHV AC Substations has been notified
 - 220 KV and above: *Two high tension (HT) supplies shall be arranged from independent sources. One of the two high tension shall be standby to the other. In addition, an emergency supply from diesel generating (DG) source of suitable capacity shall also be provided*
 - 66 KV and below 220 KV: *There shall be one HT source*
- Independent source i.e. from two different substations of state utility.
- Around 94% of substations are having only one source from state utility. This is due to non-availability of utility substations nearby to POWERGRID substation (33kV, 11 kV level).

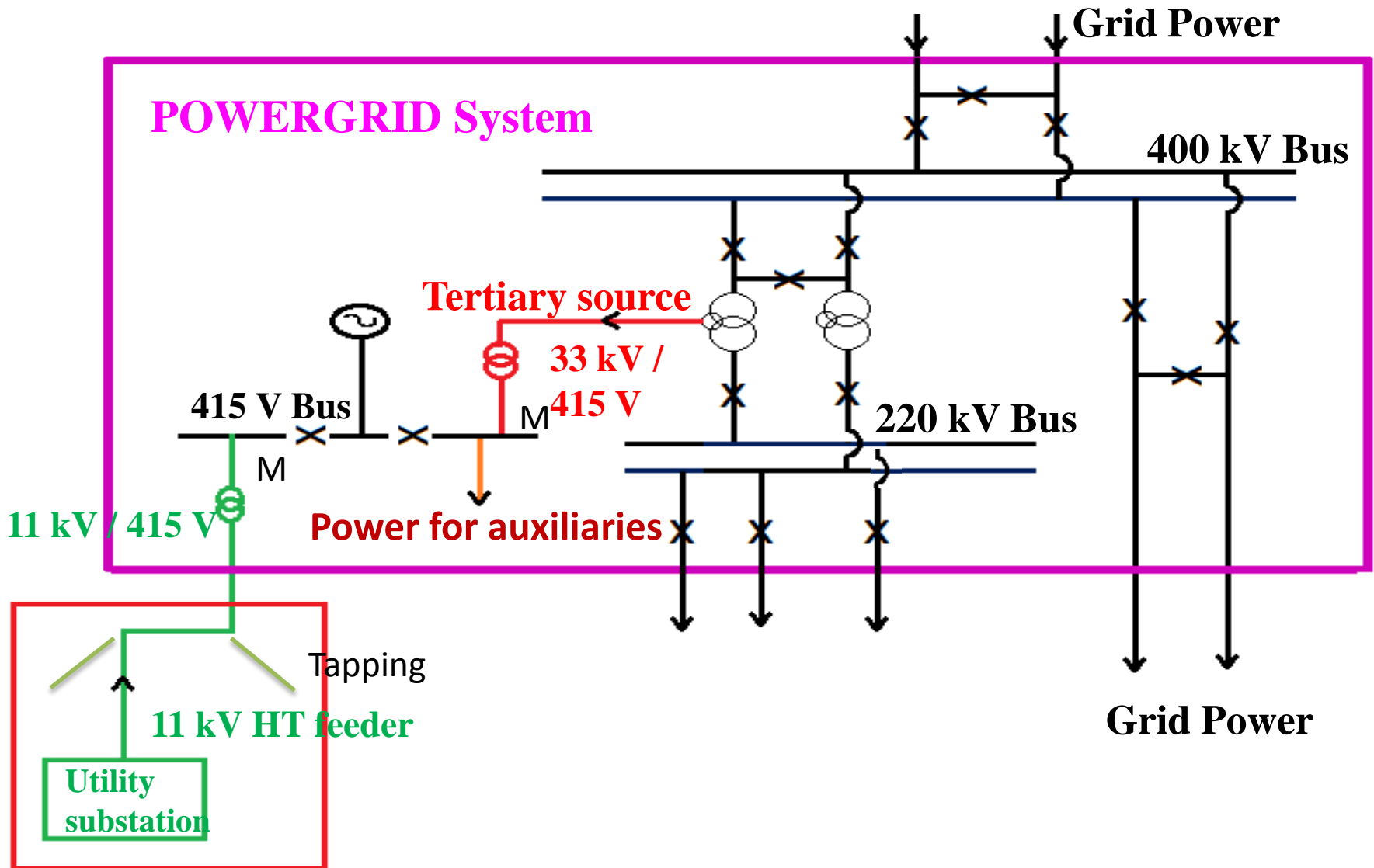
Major issues on source of auxiliary supply from state utility

- Most of POWERGRID substations are having only **one connection** from state utility as there is no second independent source available either at 33 kV or 11 kV level nearby
 - Non-compliance of CEA Regulation
 - System remains vulnerable (breakdown of this single source)
- **Poor Reliability and availability** of auxiliary power feeder from utility
 - Multiple tapping taken from the feeder of auxiliary power by the state utility for supplying power to their adjoining locality making the same unreliable.
 - Very high number of interruptions, some cases it is as high as 500 - 600 per month.
 - Very low reliability and availability (Number of cases availability remains around 40% and some cases it is as low as 20%) and some utilities expressed their inability to improve further.

Major issues on source of auxiliary supply from state utility

- Even if **second feeder** is arranged from a remote utility substation, it **may not provide reliable supply** because it is likely to be prone to frequent tripping due to its passage through villages, forest areas etc.
- Frequent tripping and low availability of the HT feeder is forcing POWERGRID to **depend on DG set**. Running of DG set for longer duration is neither reliable nor cost effective and environment friendly.
- Interruption of auxiliary power supply due to **internal problem** of the utility organisation.
- **Poor quality** of auxiliary power supply e.g. sudden dip in voltage.
- This reiterates criticality of auxiliary power supply in various POWERGRID substations in terms of its reliability & availability
- Thus necessitated **drawl of auxiliary power from tertiary winding of the 400/220/33 kV ICT installed in POWERGRID substation for maximising reliability and availability of quality auxiliary power.**

Source of Auxiliary power in a typical substation



Sourcing of auxiliary power supply through tertiary of ICTs

- Compliance of CEA Regulation on auxiliary power supply from two independent sources
- CEA also endorsed using tertiary of ICT as main source
- Higher availability and reliability (Almost 100%)
- Quality power
- Minimum interruption – less running of DG set, less pollution and cost effective.
- No effect of external disturbances of any sort / utility

Issues of availing power through tertiary of ICT

- State level Tariff Regulation is there for HT feeder connection from utility substation but there is no specific Tariff Regulation in case power is drawn directly from the grid through tertiary of the ICT installed by POWERGRID in their own substation without utilising state utility assets.
- There is wide variation in mechanism of recovery of charges in different states
- HT feeders from state utility
 - Capacity charges (As per contract agreement) + Energy Charges (As per actual meter reading)

Auxiliary power charges

Utility to utility wide variation in deriving Capacity Charge

- Some utility levy capacity charge twice (one for tertiary and another for HT feeder) for same substation
- Some utility levy single capacity charge for both the connections as per contract agreement.

Total charges for auxiliary power in different states

Broadly

- (i) Capacity charges for HT feeder + Capacity charges for Tertiary + energy charges for total energy consumed as per the meter reading of both the connections
- (ii) Maximum demand charge (Capacity) as per MoU + energy charges for total energy consumed as per the meter reading of both the connections

Background

- The HT feeder is constructed by POWERGRID at the time of construction of new substation and its O&M is carried out by the state utility.
- Auxiliary power drawn through tertiary of ICT installed in POWERGRID substation and power is directly from generating station to auxiliaries without availing any network of the state transmission / distribution system. Hence no capacity charges be levied on POWERGRID for this.
- In view of the above POWERGRID approached Hon'ble Central Electricity Regulatory Commission (CERC) under the removal of difficulties

CERC Order dated 28.2.2017

- The Hon'ble Central Commission while taking cognizance of the submission of POWERGRID and suggestions of CEA issued Order dated 28th Feb 2017 with salient points as under
- POWERGRID may draw auxiliary power requirement through tertiary winding of the ICTs installed in their AC substations.
- POWERGRID may approach the Ministry of Power, Government of India for allocation of power from any one or more of the Central Sector Generating Stations for its AC substations.
- Till the time of allocation of auxiliary power supply from the Central Sector Generating stations is made, power will be drawn through tertiary of the ICT and directed for taking up the matter with Forum of Regulators for uniform method of charging.

Sourcing of auxiliary power supply through tertiary of ICTs

- Since state utility had not made any capital investment in the network to facilitate drawl of auxiliary power supply from tertiary of ICT in POWERGRID substation, utilities should not claim capacity charges two times (one for State HT feeder and other from Tertiary of the ICT installed in POWERGRID Substation) on the energy drawn through such arrangement which is corroborated in CEA document as well
- CEA also opined uniform treatment towards billing of energy drawn by POWERGRID through the tertiary of the ICT for meeting the auxiliary supply and suggested to take up the issue with Forum of Regulators.

POWERGRID's proposal

- Payment of HT connections taken from State Power Utility will be made as capacity charge as per the contract agreement and energy charge as per the actual consumption.
- No capacity charge for drawl of power through tertiary of the ICT installed in POWERGRID substation.
- POWERGRID proposes uniform mechanism across the country for payment of auxiliary power consumption considering capacity charge as per contract agreement in respect of HT feeder together with energy charge for the total energy drawn through HT feeder of utility and tertiary winding of POWERGRID ICT.

Thank you

Electricity Demand Pattern Analysis

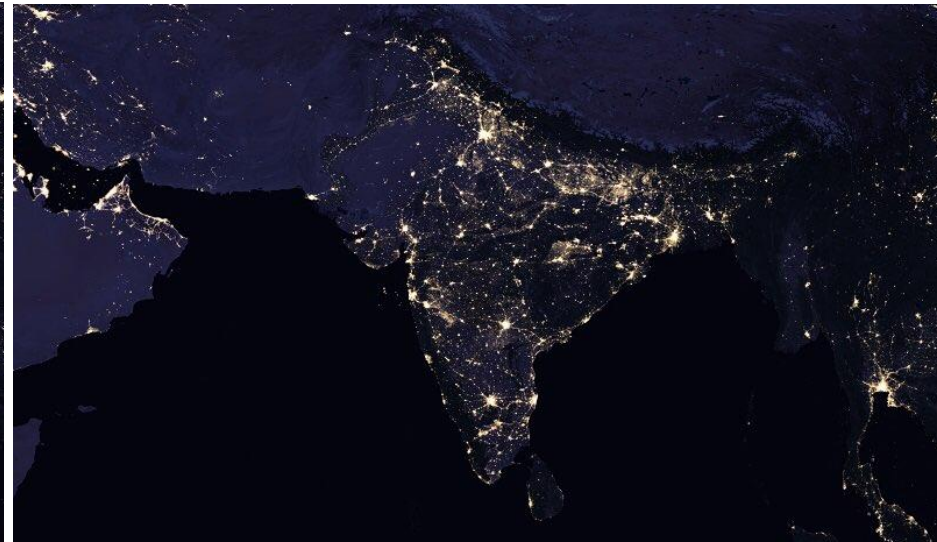
“Study the past, if you would divine the future”
....Confucius



**Past
(2012)**



**Present
(2016)**

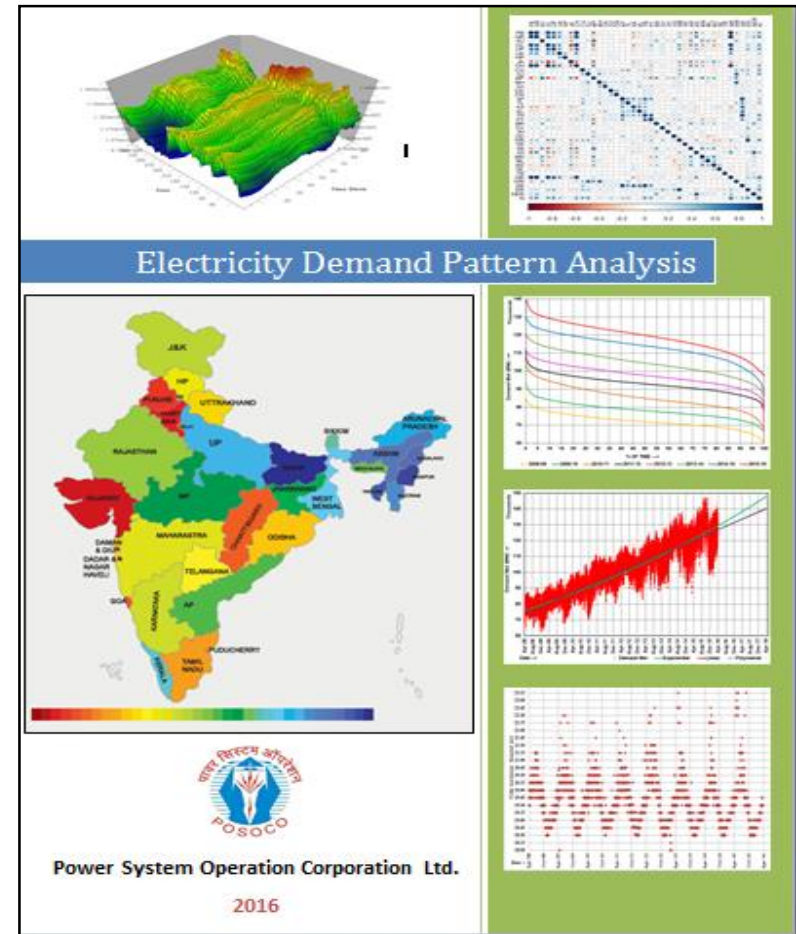


Future ?

I have seen the future and it is very much like the present, only longer - Kehlog Albran

Demand Pattern Analysis

- Big Data Analysis
 - Multi-year, demand pattern analysis
 - Five minute data for eight (8) years considered
 - Diurnal, seasonal, monthly, yearly analysis
 - Pattern to be extracted
 - Data – Information – Knowledge – Wisdom
 - Every graph has a story to tell
 - Tacit knowledge



<https://posoco.in/reports/electricity-demand-pattern-analysis/>

Source of Data : **SCADA and Daily Report**

Total no.of Charts : **1065**

Total type of different charts : **50**

Total no. of Samples used : **> 38 Million**

State Level Electricity Demand Pattern Analysis

North

Chandigarh

Delhi

Haryana

Himachal Pradesh

Jammu & Kashmir

Punjab

Rajasthan

Uttarakhand

Uttar Pradesh

West

Chhattisgarh

Dadra and Nagar Haveli

Daman and Diu

Goa

Gujarat

Madhya Pradesh

Maharashtra

South

Andhra Pradesh and Telangana

Karnataka

Kerala

Puducherry

Tamil Nadu

East

Bihar

DVC

Jharkhand

Odisha

Sikkim

West Bengal

North-East

Arunachal Pradesh

Assam

Manipur

Meghalaya

Mizoram

Nagaland

Tripura

All India and Region-wise

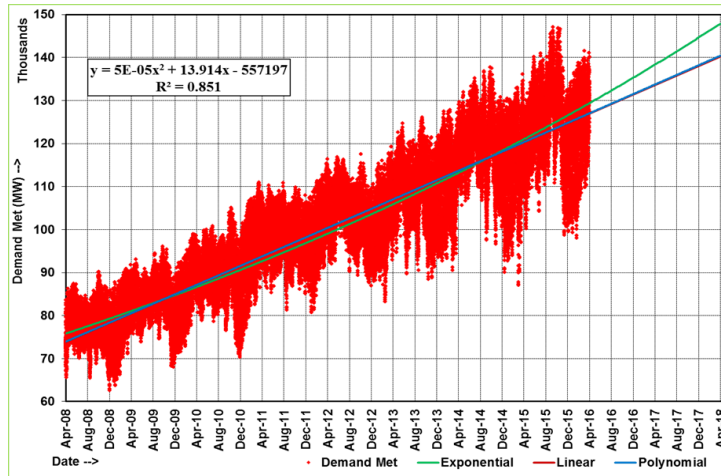
"Forecasting is the art of saying what will happen, and then explaining why it didn't!" - Anonymous

Answers we seek from analysing the past

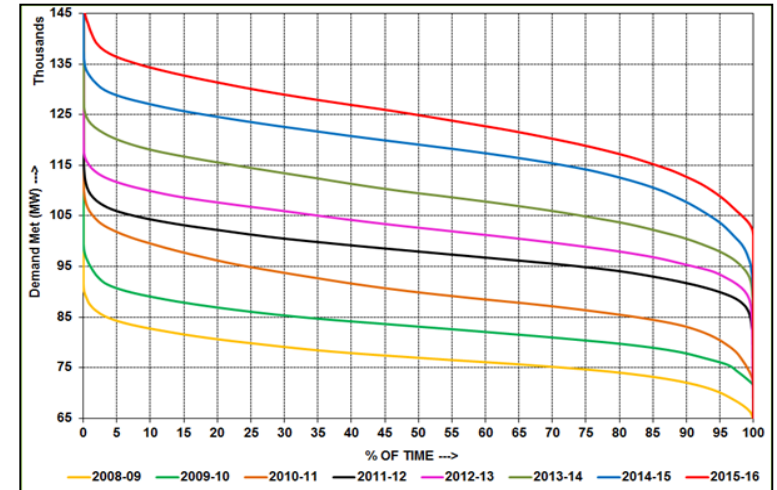
- Growth story and its likely trajectory (future investments)
 - Lifestyle Changes
 - Seasonal and Diurnal Pattern
 - Alignments with sunrise, sunset and duration
 - Manifestation of society
- Power procurement strategies to be adopted
 - Base load, peak power, seasonal effect
 - Flexibility and need for Demand Response
 - Trade Opportunities
- How can load complements solar power complement?

Forecasting future events is often like searching for a black cat in an unlit room, that may not even be there --Steve Davidson

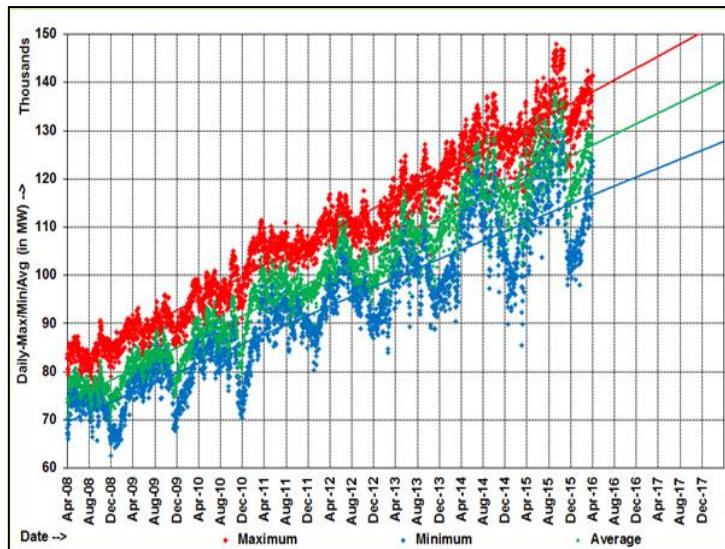
Types of patterns used for analysing demand



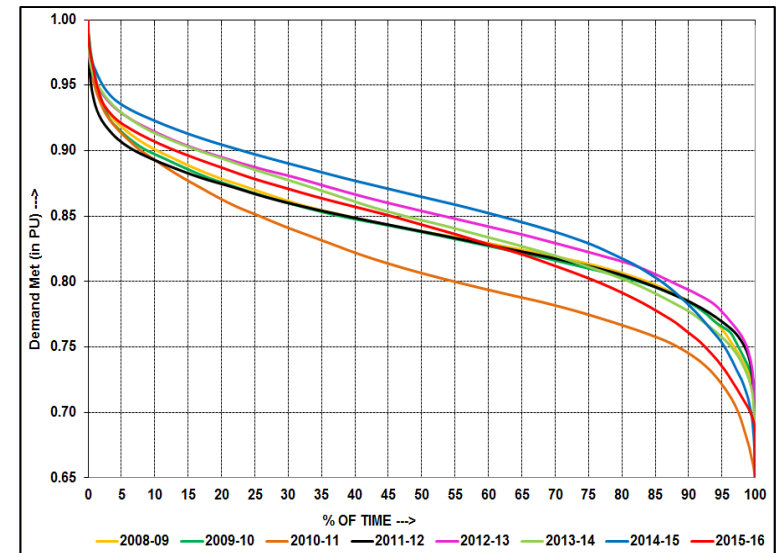
Hourly demand met pattern



Load duration curve



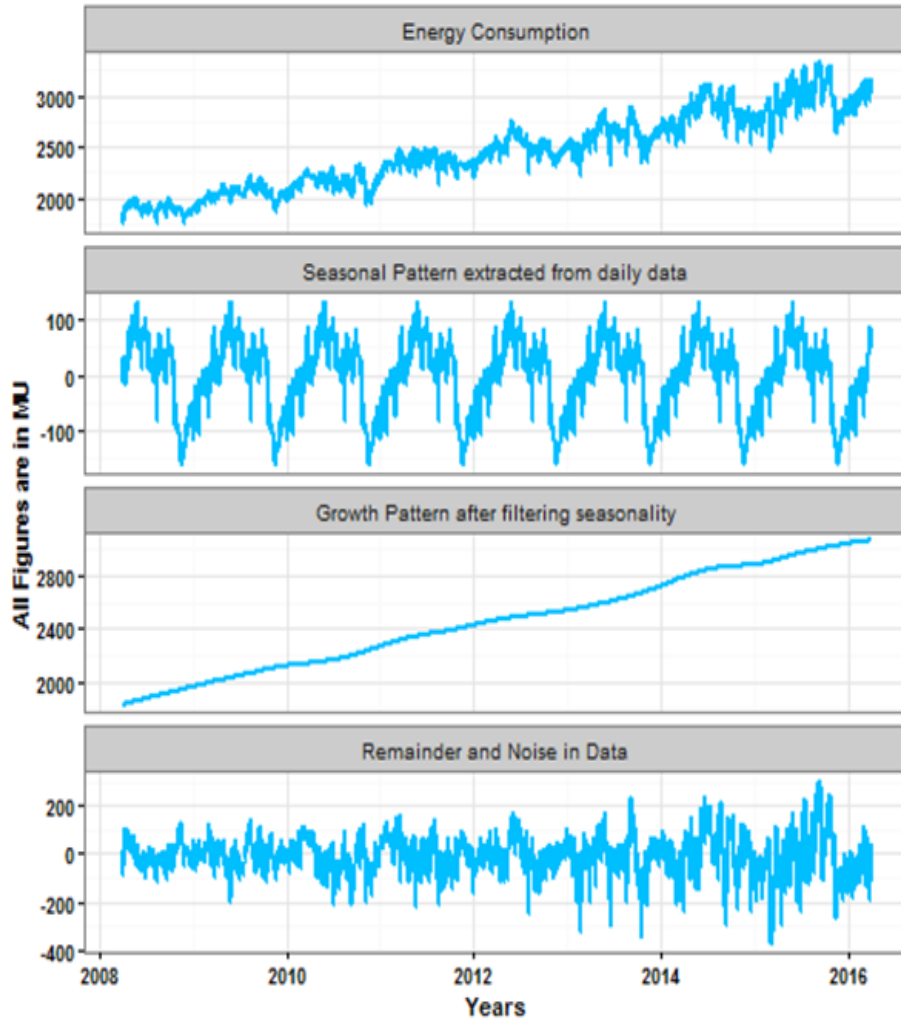
Maximum, Minimum and Average Demand met pattern.



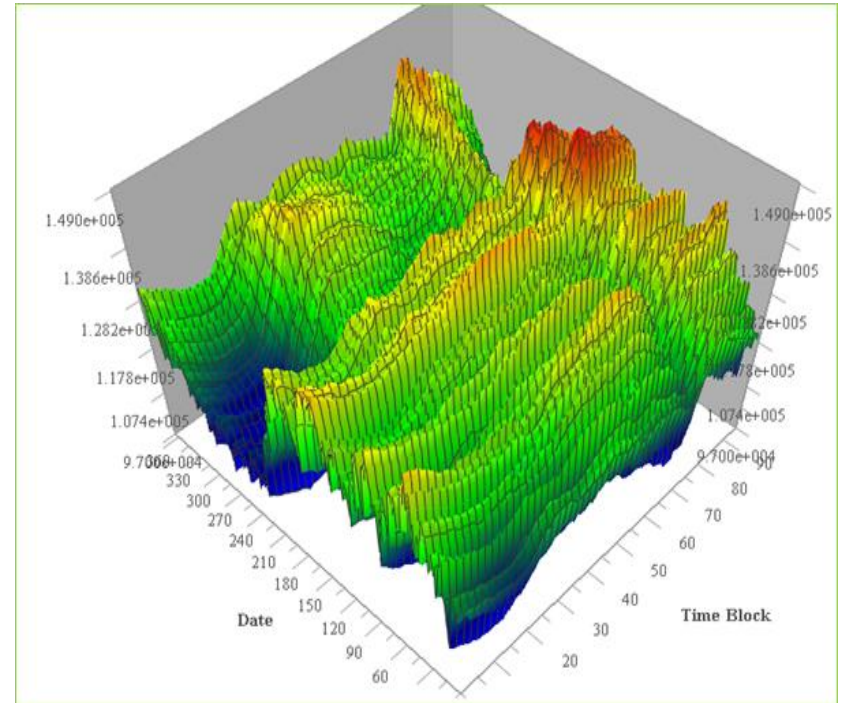
Load duration curve normalized with respect to maximum demand

"Data matures like wine, applications like fish." – James Governor

Trend and Seasonal pattern



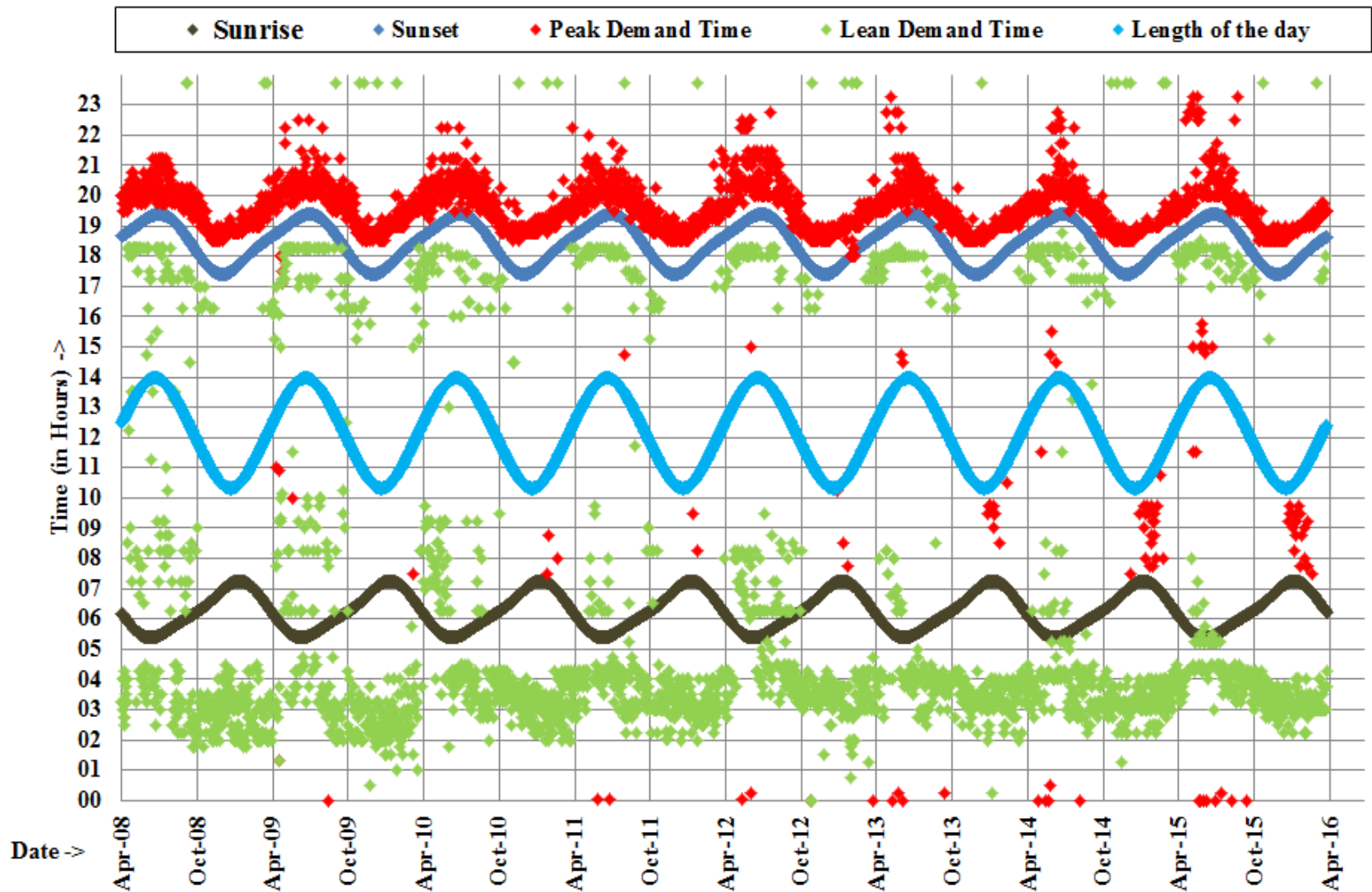
Diurnal and seasonal pattern



3-D Annual Demand plot (2015-16)

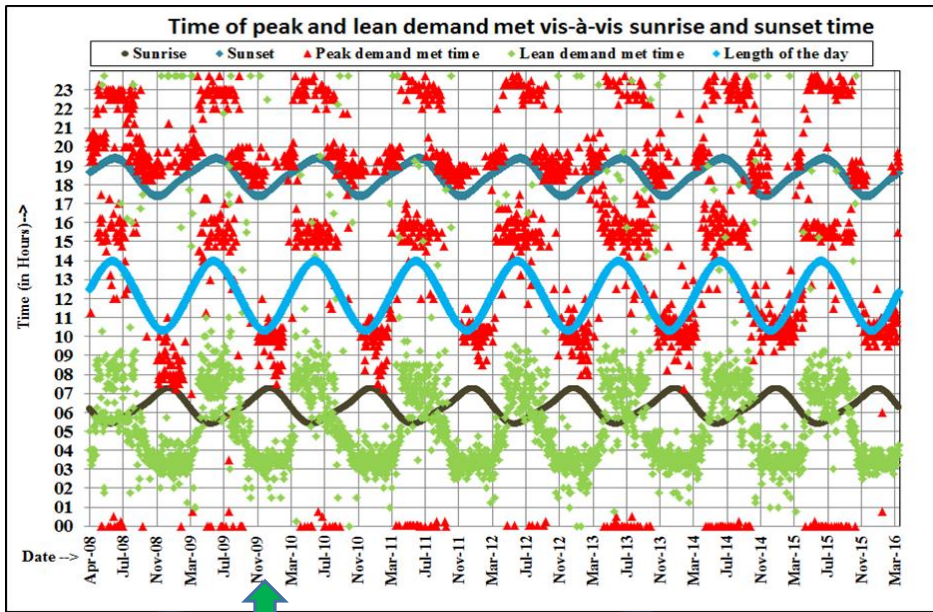
"You can have data without information, but you cannot have information without data." -
Daniel Keys Moran

Time of peak and lean demand met vis-à-vis sunrise and sunset time



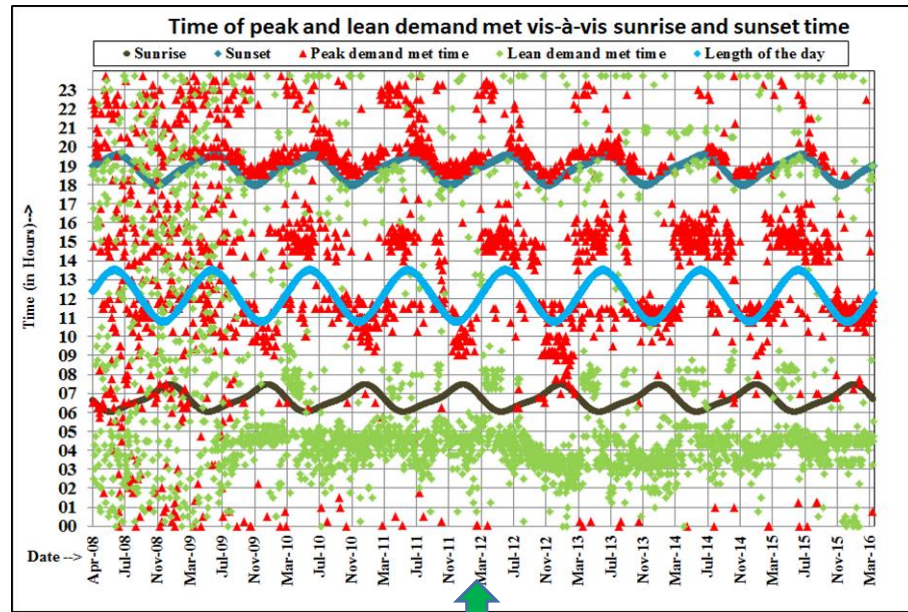
“The goal is to turn data into information, and information into insight.” – Carly Fiorina

Diurnal Patterns



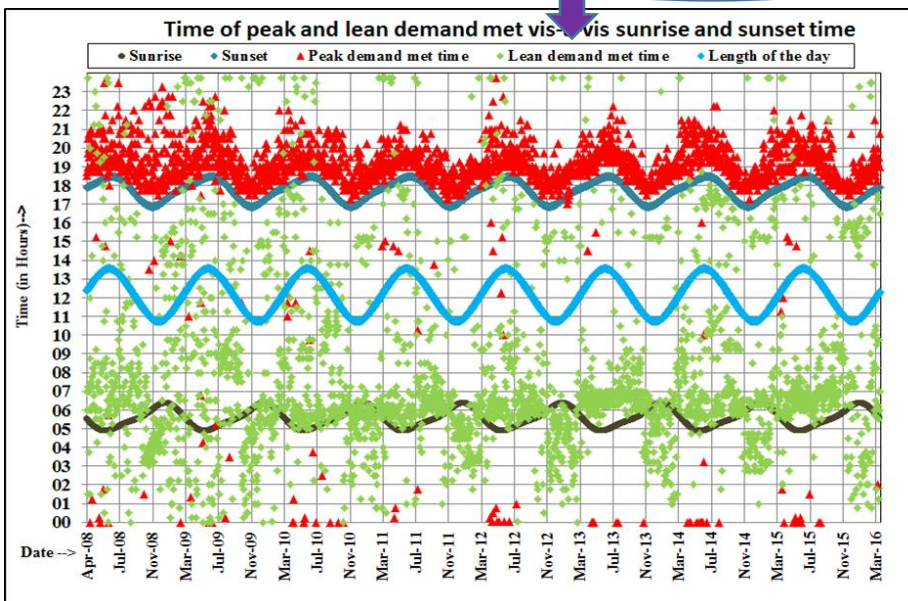
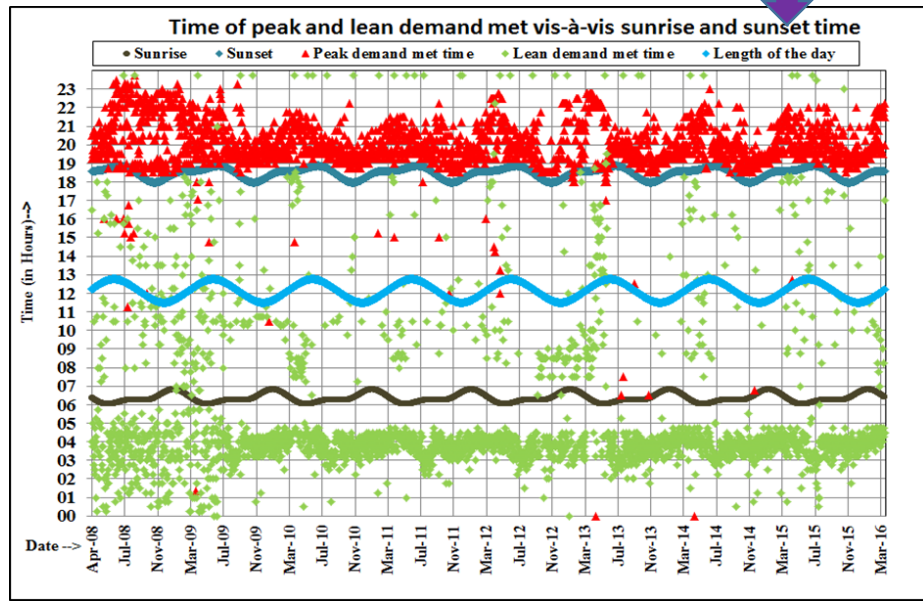
DELHI

KERALA

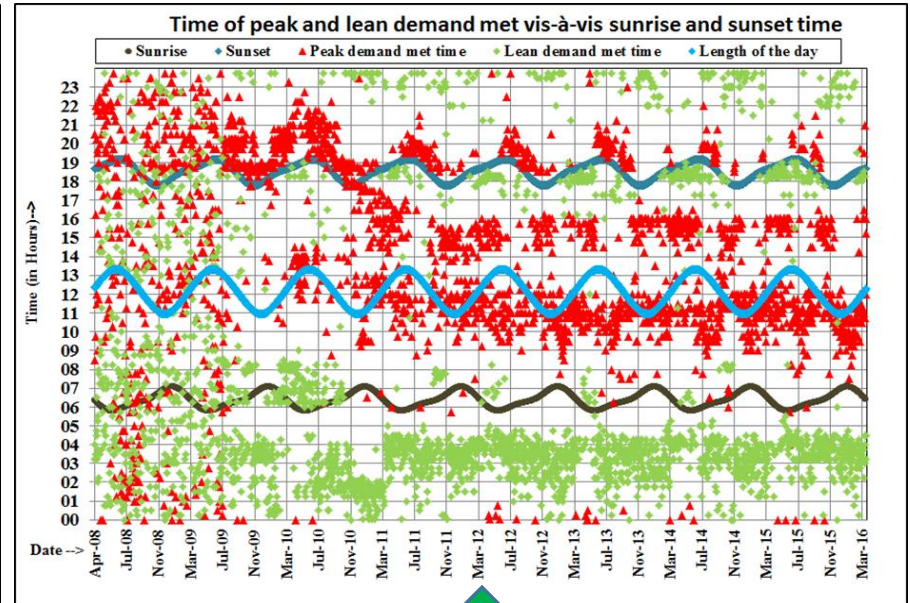
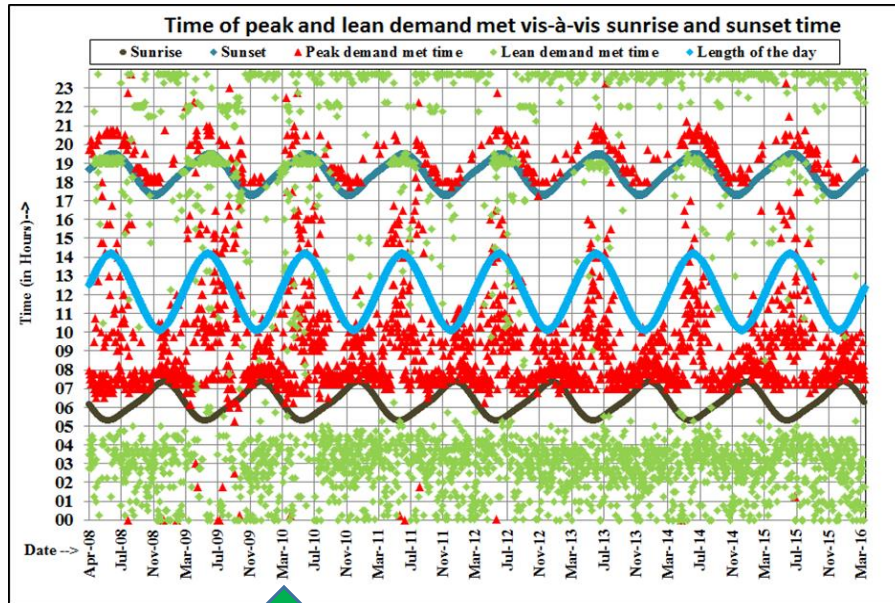


GUJARAT

WEST BENGAL



Diurnal Patterns

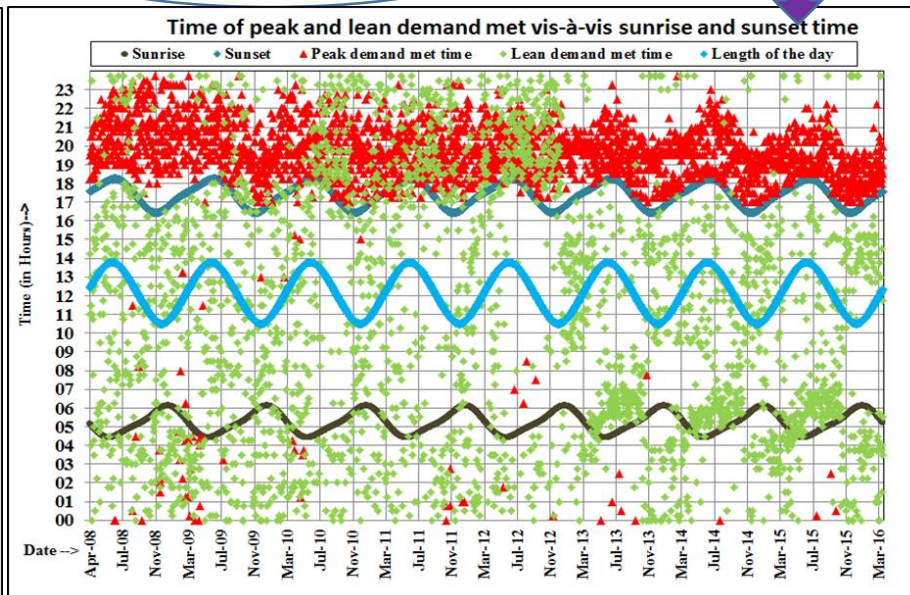
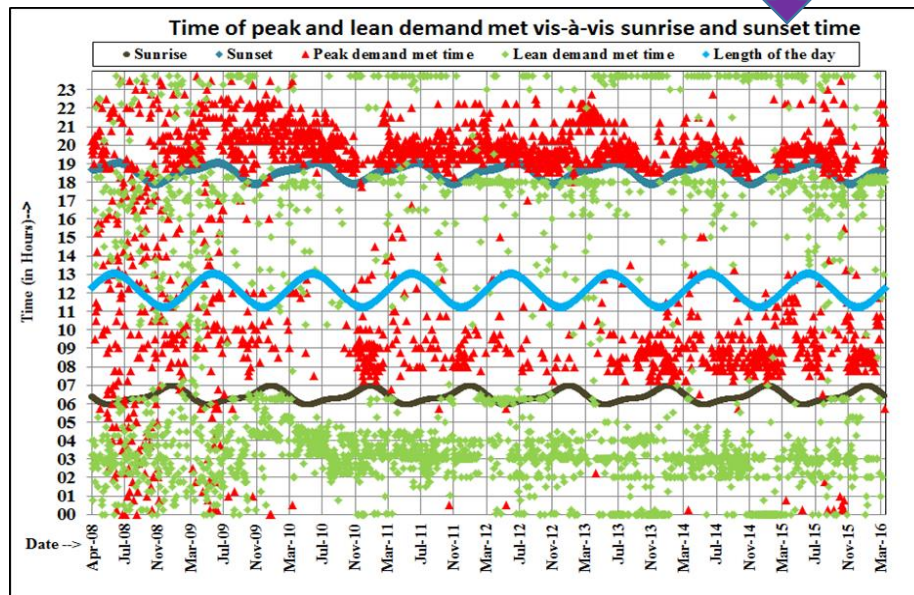


HIMACHAL
PRADESH

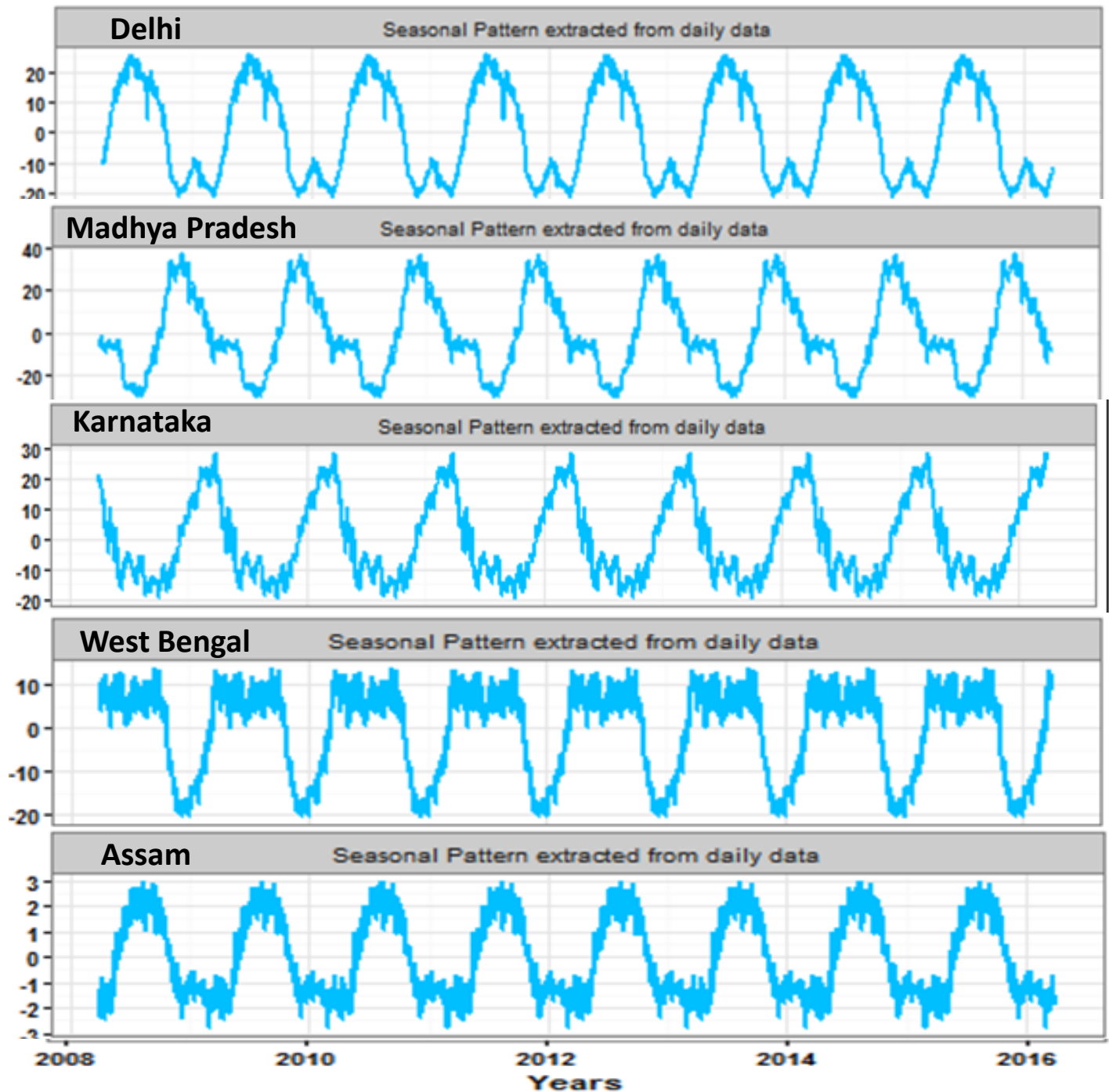
KARNATAKA

MAHARASHTRA

ASSAM

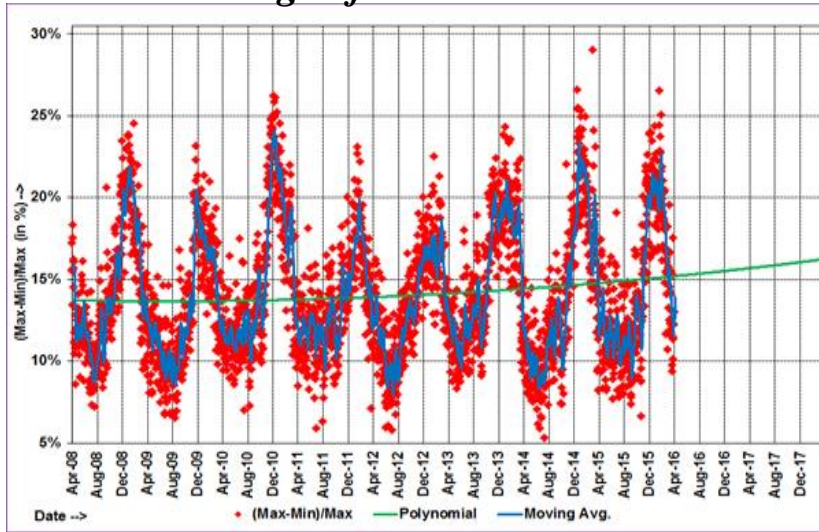


Seasonal Patterns

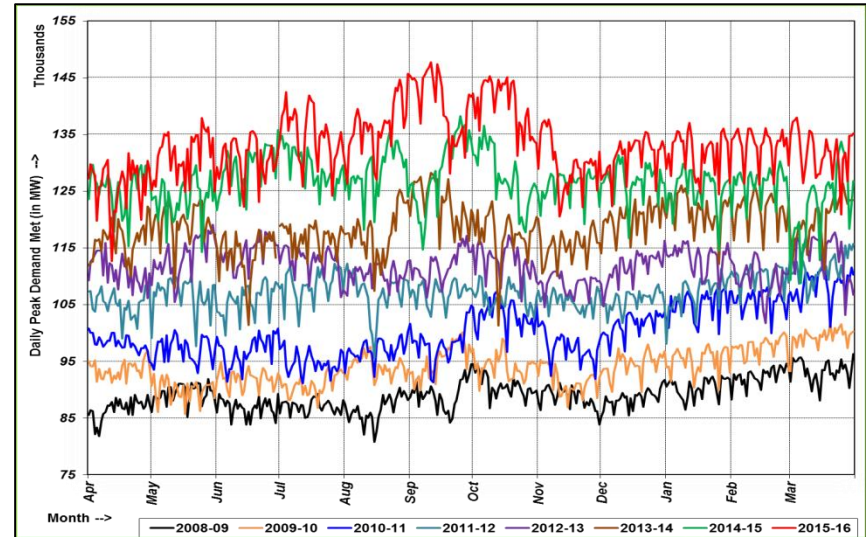


Changing patterns

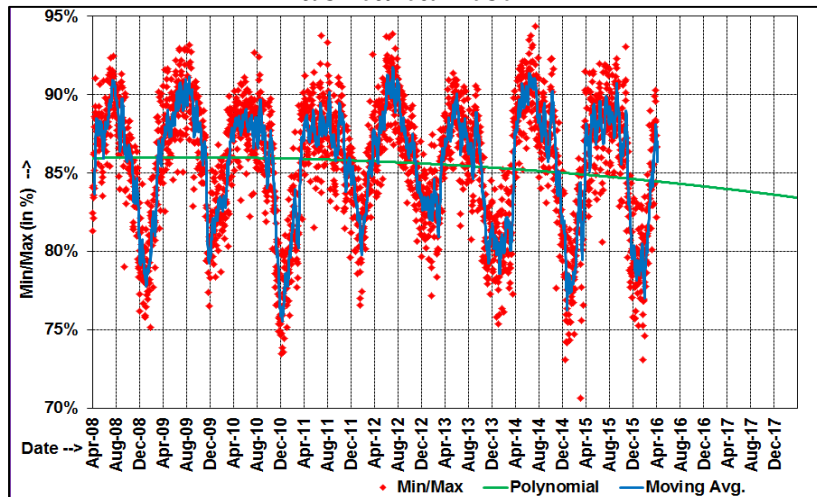
Daily difference of Peak and Lean as a Percentage of Peak demand met



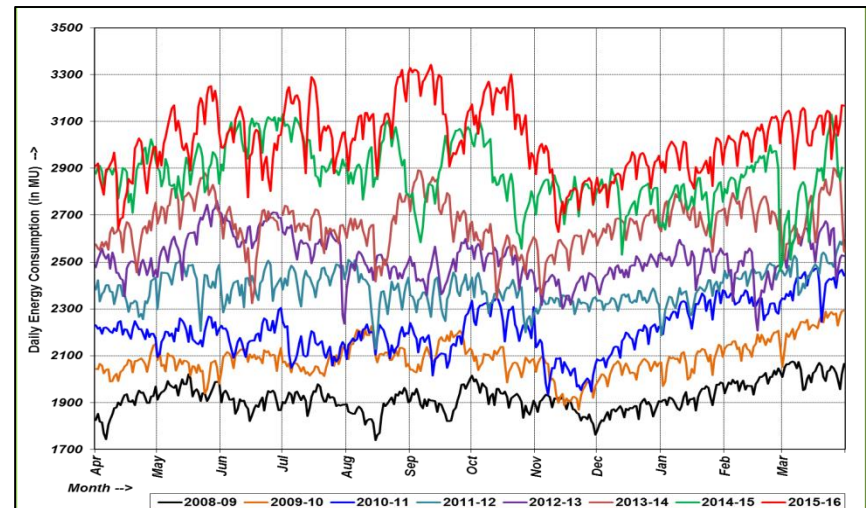
Daily peak Demand met



Daily Lean demand as a Percentage of Peak demand met

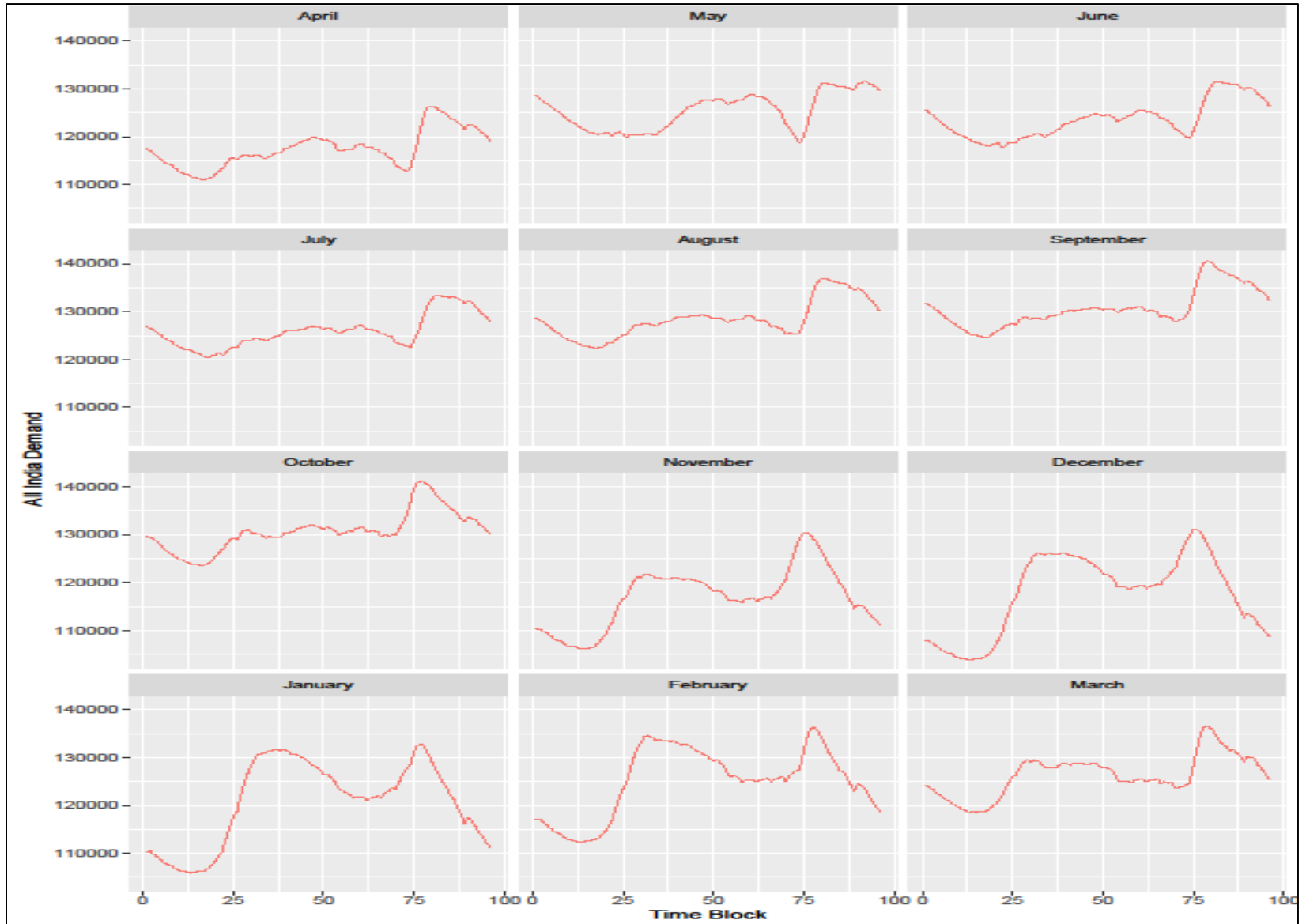


Daily Energy Consumption



"The world is one big data problem." – Andrew McAfee

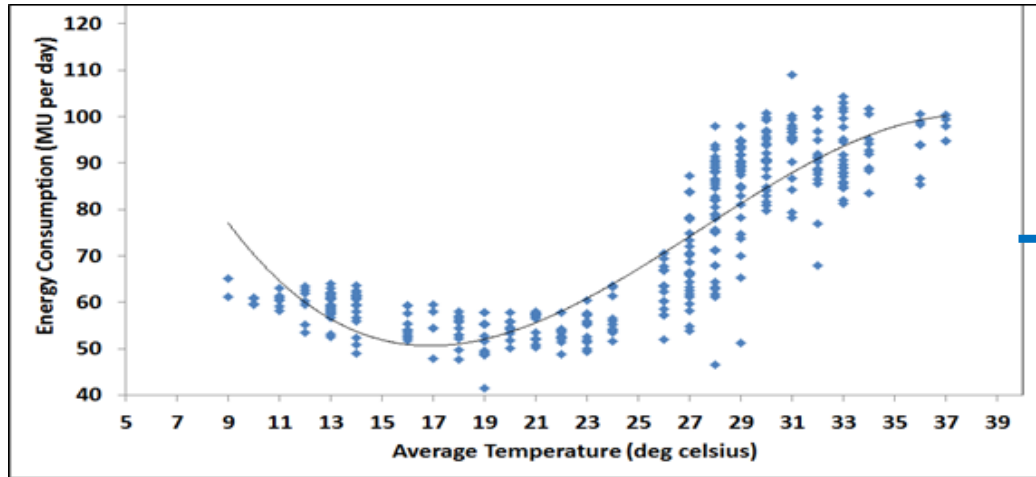
Typical All India Monthly Load Curve



“I keep saying that the best job in the next 10 years will be statisticians, and I’m not kidding.” – Hal Varian

Factors Affecting Demand Met Pattern

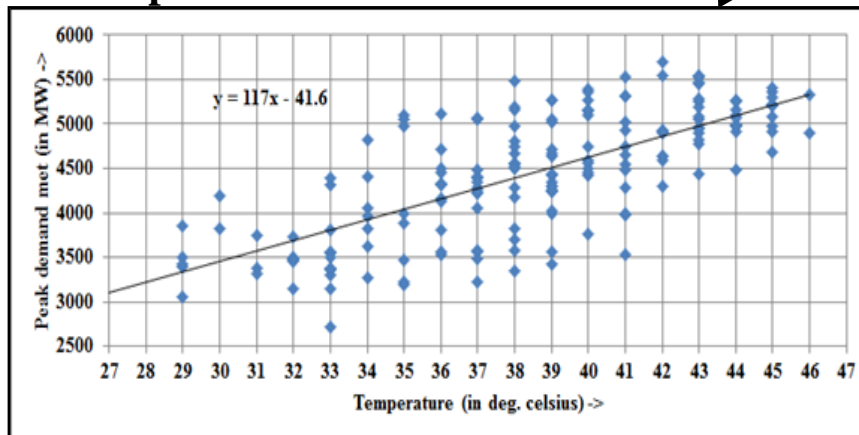
Weather Conditions: Temperature



- ✓ -shaped energy vs. temperature curve for Delhi

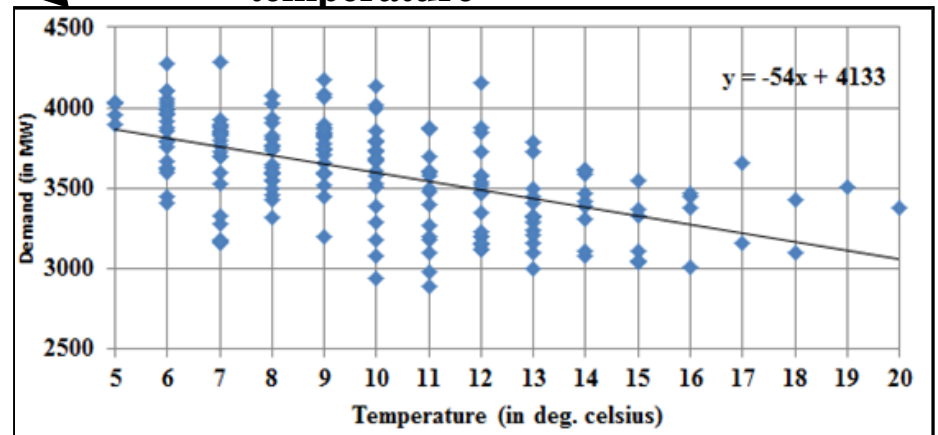
Summer (April-June)

- Demand increases with increase in temperature.



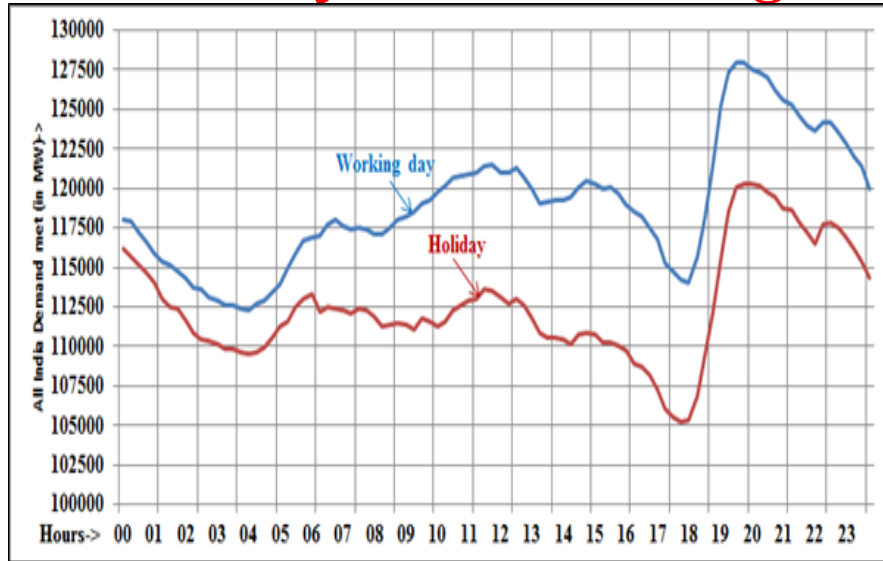
Winter (December-February)

- Demand decreases with increase in temperature

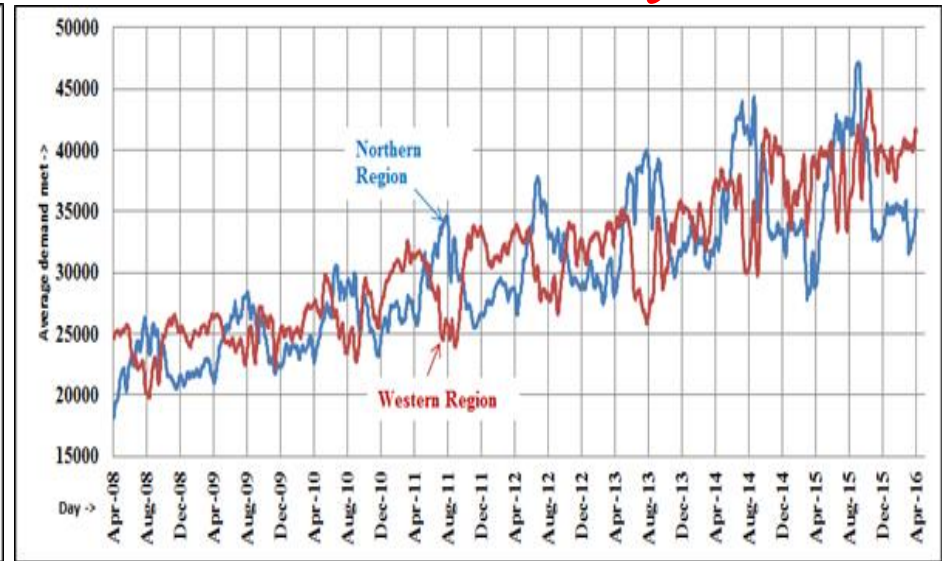


“To expect the unexpected shows a thoroughly modern intellect.” - Oscar Wilde

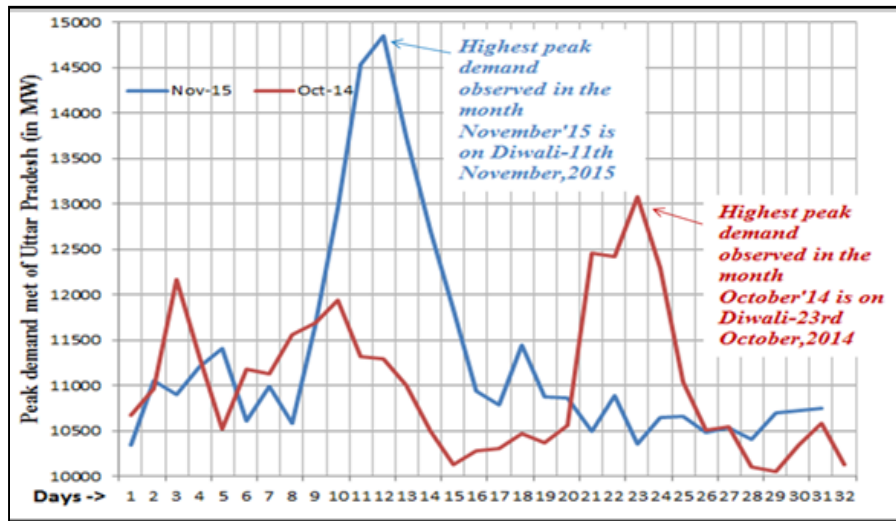
Holidays-Vs- Working



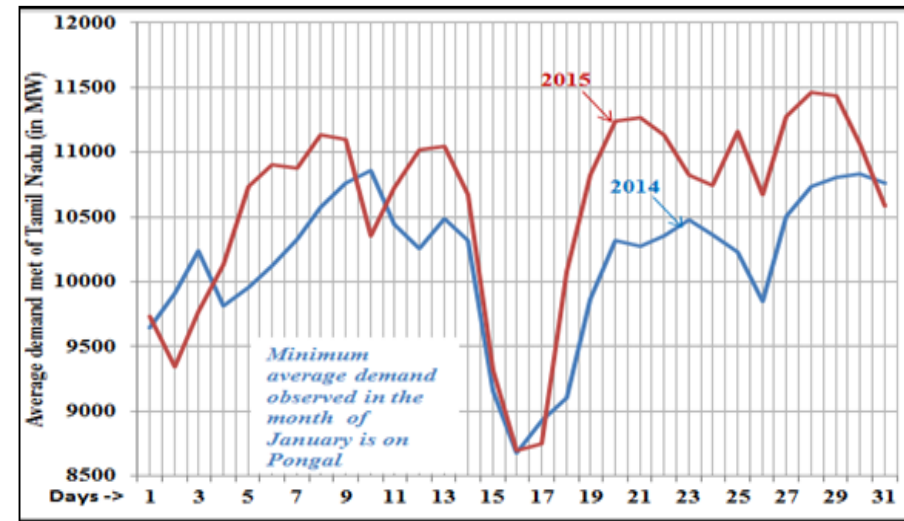
Diversity



Festivals



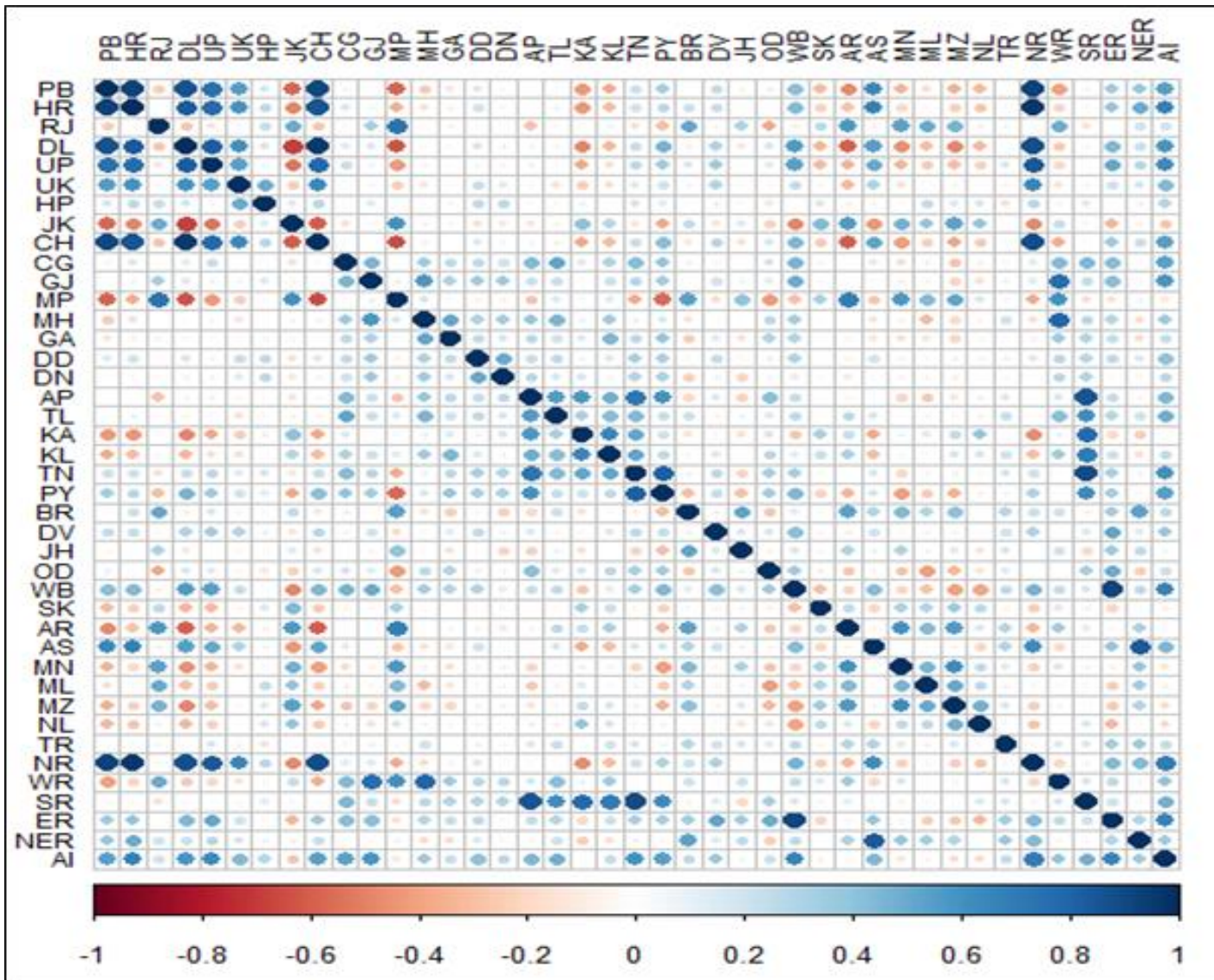
Deepawali



Pongal

“It is said that the present is pregnant with the future.” - Voltaire

Correlogram



- The scale is from **-1** (Dark Red) to **+1** (Dark Blue)
- Negative correlation between two states shows that demand of one state is increasing while the other is decreasing.

“The herd instinct among forecasters makes sheep look like independent thinkers.” - Edgar R. Fiedler

Something to take home for everyone

- Policy makers – Type of resources, public policy
- Regulations – TOD, Bringing change in load
- Generation - Outage planning – likely buyers
- Utility – Portfolio management
- Market – signal for pairing, likely procurement
- Impact Analysis of policies and Regulations
- Future Course Corrections and new policies & regulations
- Operators to look forward and extrapolate
- Signals for infrastructure developments
- Signal for planners

“Without big data, you are blind and deaf and in the middle of a freeway.” – Geoffrey Moore

ధన్యవాదాలు ధన్యవాదం
ధన్యవాదములు గాని పరిశ్రమ ధన్యవాదములు ఆమోదితమైనవి కనబడ
గలవారికి ఆమోదితమైనవి గాని ధన్యవాదములు గాని
పరిశ్రమ ధన్యవాదములు గాని ఆమోదితమైనవి పరిశ్రమ
గాని గాని **THANK YOU** ధన్యవాదములు
పరిశ్రమ ధన్యవాదములు గాని పరిశ్రమ ధన్యవాదములు ధన్యవాదములు
ధన్యవాదములు ఆమోదితమైనవి ధన్యవాదములు గాని
ధన్యవాదములు గాని పరిశ్రమ ధన్యవాదములు ఆమోదితమైనవి



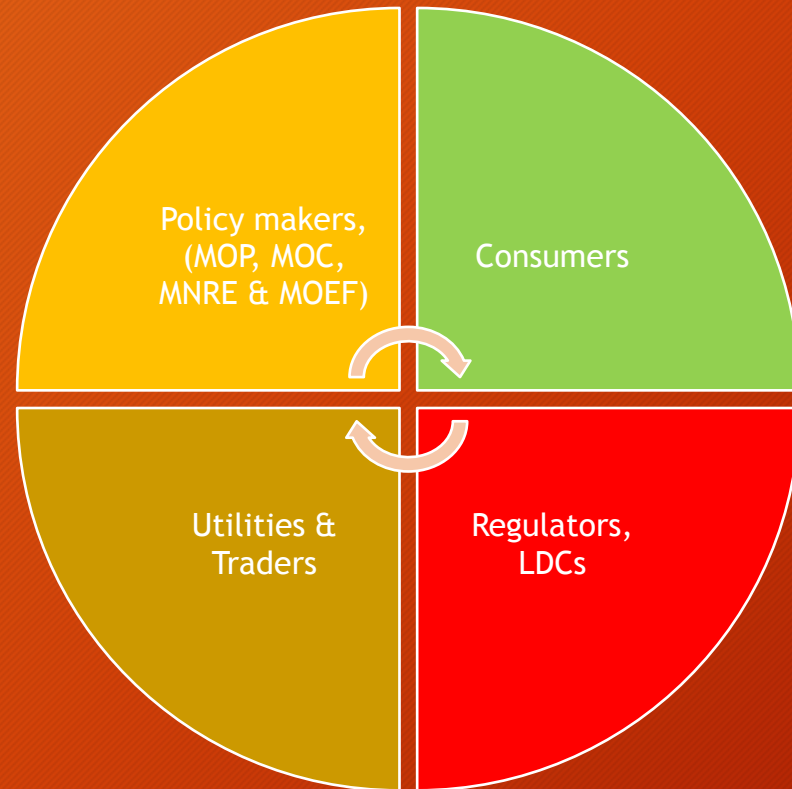
Power Sector Issues

Power Sector Issues



- 24 X 7 quality power supply for all
- Consumer focus approach
- Accommodation of RE generation and compliance of new environment norms

Integrated Approach



24 X 7 quality power supply for all



- Need of healthy DISCOMs
- Extension of distribution network to non-electrified area.
- Formation of isolated micro grids in remote areas through PPP model
- Engagement of Franchisee for quality power & AT&C loss reduction.
- Extension / Strengthening of transmission network.
- Encouragement for DSM and Smart grid.
- Encouragement for energy efficient lights, appliances & pumps
- Encouragement in roof top solar generation
- Encouragement for solar pump sets at Agriculture

Consumer focus approach



- Optimization in cost of generation.
- Reduction in power purchase cost by 25% to make it affordable for Industry & make in India successful.
- Reduction in AT & C losses below 10%
- Implementation of best practices in Generation, Transmission and Distribution Sector
- 24X7 quality power supply & Help line.
- Reaching out to consumers through NGO for educating them both for the rights & responsibilities including prevention of theft & quality power.
- Installation of Smart meters & central data centre for billing, etc in line with UDAY.

Accommodation of RE generation and compliance of new environment norms



Myth : Increase cost of thermal power to make RE power competitive

Required : Cost of thermal generation to be reduced to accommodate infirm RE generation

- Conventional coal based generation modulation to be done at the best possible way to accommodate RE generation.
- Separate operating norms for two shift operation.
- Separate operating norms for sliding operation
- Up gradation of conventional thermal units more than 25 years old is required for handling two shift operation.
- Up gradation of units for quick start up and ramp up for 15-25 years old plants.

Accommodation of RE generation and compliance of new environment norms



- Up gradation of conventional thermal units less than 15 years old plants to operate without oil support up to 20% of its capacity.
- To fix up Operation and Maintenance strategy, to ensure highest reliability and low load operation for two shift operation.
- Direct subsidy of 30% by MNRE to State DISCOMs in place of prosumer on installation and synchronization of Roof Top Solar.
- Installing Smart meters for Roof Top Solar and integrating them at DISCOM's control room through proper communication network & IT support for forecasting and control.
- Environment norms to be fixed on annual aggregated basis in case of old coal based generation is modulated to accommodate RE generation depending on their PLF.

Reduction in cost of generation



- Coal cost has to be determined on market price i.e. Deemed export price
- 100% sized < 50 mm and beneficiated coal supply to thermal Plants
- Independent 3rd party sampling both at loading & unloading points to be ensure no grade slippage from Billed grade
- Ensure availability of coal
- Swapping of coal linkages
- Railway freight is to be rolled back to class 100 from present class 145.
- Clean coal cess to be rolled back.
- Railways to deliver the same quantity of coal which has been loaded at mine end with some minor transit loss limited to 0.3%.

Reduction in cost of generation



- All the additional cost like loading charges, unloading charges, S Tax on freight etc. Are to be rolled back.
- Railway to deliver the same quantity of coal which is loaded
- Pump storage facility like Purulia to be increased to support evening peak demand
- To accommodate RE generation and Ancillary Support system, further reduction in cost by 10%
 - ✓ Adaptation of best O&M practices.
 - ✓ Alternate use of Assets for additional income to subsidize tariff



THANK YOU