Power Process Maturity

Questionnaire for Stakeholders
Power Process Maturity

Infrastructure
1.1 Infrastructure

1.1.1 Power Infrastructure

a) Age of Power Infrastructure
1. > 20 Years
2. 20 to 15 Years
3. 15 to 10 Years
4. 10 to 5 Years
5. < 5 years

b) Typical loading level of the transformers
1. < 50%
2. 50 to 70%
3. 70% to 90%
4. More than 90%

1. Power supply is available for less than 8hrs a day to some of the consumers
2. Power supply is not available for 8hrs a day to some of the consumers
3. Average load shedding duration is 4hrs
4. Load shedding is for less than 2hrs
5. Power supply is available to all consumers for more than 23hrs a day

1. Varies between +/−50% of rated value for some period in a day
2. Within +/−15% of rated value for 23hrs and +/−20% for 1 hr
3. Within +/−10% of rated value for 23hrs and +/−15% for 1 hr
4. Within +/−10% of rated value for 24 hrs
5. Mechanism in place to manage reactive load

1. < 25%
2. 25 to 50%
3. 50% to 75%
4. > 75%

f) Condition based maintenance of assets
1. < 25%
2. 25 to 50%
3. 50% to 75%
4. > 75%
1.1.2 Power Infrastructure

a) Network Details
1. In your utility what is the typical ratio of power infrastructure HV : MV?
2. In your utility what is the typical ratio of power infrastructure LV : MV?
3. Percentage of network that is overhead
4. Percentage of Network that is underground
5. Network age ≤ 2 years whose condition is good
6. Network age < 2 and ≥ 5 years whose condition is good
7. Network age < 5 and ≥ 7 years whose condition is good

b) Network Protection
1. Fuse
2. Graded Fuse
3. Graded Relays
4. Numerical Relays

Response

b) Network Protection
1. Jumpers
2. GO
3. Manual CB
4. Auto CB

c) Network operating switches
1. Jumpers
2. GO
3. Manual CB
4. Auto CB

d) DT LV bus interconnectivity
1. None
2. Cable connected with auto switch
3. Connectivity via n/w switch
4. Ring network
5. Ring network with AI

e) LV feeders interconnectivity
1. None
2. Cable connected with auto switch
3. Connectivity via n/w switch and AI
4. Ring network
5. Ring network with AI
1.1.3 Power Infrastructure

a) Pole mounted FPIs
   1. None
   2. Critical Points
   3. More coverage
   4. Incremental coverage
   5. 100%

b) FRTUs / RMUs
   1. None
   2. Critical Points
   3. More coverage
   4. Incremental coverage
   5. 100%

c) AMR meters for DT
   1. None
   2. Critical Points
   3. More coverage
   4. Incremental coverage
   5. 100%

d) GIS LV network mapping
   1. None
   2. Critical Points
   3. More coverage
   4. Incremental coverage
   5. 100%

e) DMS LV network
   1. None
   2. Critical Points
   3. More coverage
   4. Incremental coverage
   5. 100%

f) Sectionalizer for fault isolation
   1. Manual
   2. Remote operated
   3. Auto reclosure type
   4. Incremental coverage
   5. 100%

g) Devices and Equipments with RFID
   1. None
   2. Critical Points
   3. More coverage
   4. Incremental coverage
   5. 100%
1.2 Infrastructure

1.2.1 IT Infrastructure

a) What is the typical PC:Person ratio in utility office?
   1. zero
   2. Less than or equal to 1:2
   3. Between 1:2 and 1:1
   4. 1:1

b) What is the availability of IT systems to carry out business processes?
   1. PC
   2. LAN
   3. WAN
   4. Cloud applications

c) What is the level of use of IT systems to carry out business processes?
   1. no dependency
   2. <50% dependency
   3. >50% dependency
Power Process Maturity

Distribution
### 2.1 Distribution

**a) Meter Reading**

1. Basic meters which record the units of energy consumed. The meters are read physically by meter readers.

2. Automated Meter Reading (AMR) is deployed. All the meters are read via hand held units or drive-by vehicles, which transfer data to the control centre on synchronization.

3. AMI is deployed. All the meter readings are read regularly (say, every 15 min) remotely and the data is logged on a central server where it can be used for billing as well as supporting DR event in real time for 'Negawatt' generation.

**b) Tariff Schemes - Time of Use TOU/Critical Peak Pricing (CPP) etc.**

1. A simple fixed flat rate tariff is used which is multiplied by the no. of units consumed to get the bill amount.

2. The consumption level is divided into slabs and the tariff rate changes as the slab changes.

3. Basic time of use (ToU) tariff implemented with pre-defined time blocks in the day and the applicable tariffs known to users in advanced.

4. Along with the ToU, critical peak pricing (CPP) is also implemented and during the peak periods the prices are communicated to the consumer.

5. Time of Use (ToU), critical peak pricing (CPP) tariff mechanisms are implemented. The realtime time prices are displayed on the smart meter, based on which the consumer can resechdule the demands.

**c) Power quality & Reliability - Power Quality Management (PQM)**

1. No system

2. Voltage profile available for DTs

3. Voltage profile for all DTs and harmonics levels at select DTs

4. Corrective actions are taken manually on near real time basis

5. Automated system for quality control

**d) Energy Accounting/Audit (EA)**

1. No mechanism

2. Ring fencing done for energy audit

3. Energy Audit on periodic basis

4. Energy Audit to identify theft on regular basis

5. System established for real time energy audit that captures the network reconfigurations
2.2 Distribution

**a) SCADA/Distribution Management System (DMS)**

1. There is no SCADA center for the discom.
2. Basic SCADA system is in-place and it is configured to receive the metering data from the field and display it accurately for monitoring.
3. The control feature is added to the SCADA system, where in the operator from SCADA center control room sends remote commands to re-configure the distribution network.
4. The DMS system is integrated with SCADA system and the network is extracted from SCADA system to DMS for off-line planning and scheduling purposes.
5. SCADA and DMS systems are integrated and process the distribution network model in near-realtime. Measures to operate the system securely and reliably are defined from analysing the model and system is operated accordingly.

**b) Outage Management System (OMS)**

1. Outage management is not implemented. The information about outage of any element is known to the operator when the customer complains.
2. The end consumer is mapped to the distribution transformer (DT) and feeder from where the supply is received. This helps in faster identification of outaged component.
3. The information of any outage event is extracted from the SCADA system and is processed by outage management system to quickly determine the outaged sections of the network.
4. Technologies such as auto-reclosures installed to restore power in case of minor disturbances. In case of persistent faults, the restoration workforce team is alerted for immediate action to initiate system restoration.
5. OMS system is fully implemented and integrated with the GIS, SCADA and DMS systems. Accordingly, the outage of any part of the network is known through the metering and suitable corrective actions are carried out.

**c) Demand Side Management (DSM)**

1. No Demand Side Management mechanism in place.
2. DSM based on day ahead forecasting and scheduling.
3. Utility signs agreement with user for remote control (cutoff supply during peak periods) of certain loads by utility(meters facilitated with remote connect/disconnect feature); superceding the load curtailment by user not allowed.
4. Utility controlled DSM. Superceding the load curtailment by user allowed.
5. Integration of DSM and operation of the distribution generation (DG).

**d) Demand Response (DR)**

1. There is no concept of DR.
2. Basic DR is implemented with utility announcing the prices during the peak hours and off peak hours. Accordingly the consumer is expected to shift load to off peak hours.
3. DR is automated and the smart meter at the customer premises receives the price signal and accordingly controls the home appliances.
4. More advanced version of DR is implemented where the effect of shifing of the loads on prices is also considered and the overall optimization.
5. Full fledged DR system for the entire distribution grid, integrated to the SCADA and DMS system to identify the most optimal source of DR to use for stable and reliable operation of the grid.
2.3 Distribution

a) Load Forecasting
1. No load forecasting. The expected load is predicted based on the similar day approach from historical data.
2. Basic forecasting tools such as time-series analysis, regression models are used to predict the load.
3. Forecasting methods to improve the accuracy, by integration of various other sources of data such as weather.
4. Forecasting methods incorporating error correction techniques.
5. Advanced load forecasting algorithms implemented, with long term and short term forecasting of the demand.

b) Connection Management
1. consumer physically goes to designated utility office to apply for connection
2. consumer goes to any of the utility's office physically to apply for connection
3. consumer can online apply and submit at the nearest convenient utility office.
4. consumer can submit applications online
5. consumer can select utility from where s/he wants connection

(c) Asset Management
1. No proper asset management strategy.
2. Identifying the critical equipment items and systems.
3. Maintaining an updated database of all the assets and critical maintenance parameters.
4. Asset Management Database integrated with other system applications.
5. Proper Policies like Safety Policy, Inspection Policy, Maintenance Policy, Competency Policy in place.

d) Field Work and Workforce Management
1. Manual registers
2. computerised MIS
3. Web based applications
4. System generated alerts for field work and workforce management

(e) Storage
1. No storage
2. Storage associated with renewable generation
3. Distributed storage that can be remotely controlled
4. EVs for storage and pumping energy into grid to manage peak load
2.4 Distribution

**a) Power Purchase**
1. Passive role
2. PPAs in place
3. Participate in power trading
4. Power trading integrated with DSM to optimise cost of service

**b) Customer Care Centre (CCC)/Call Centre?**
1. There is no call center; the consumers can call the respective section offices to lodge complaints or inquire about the procedures.
2. A central call center is implemented to take the complaints of the consumers and the complaints are forwarded to the concerned section offices for their action.
3. The central call center is linked to the central consumer database. Based on consumer ID all the relevant details of the consumer can be displayed to the operator.
4. The workforce management system is also integrated to the call center and consumer database. This helps in co-ordinating the restoration of supply.
5. Geographical Information System (GIS) is also integrated to the call center, workforce management and central database. This will ensure that customer care operator knows about the outage even before the customer calls, and is able to mention when the supply can be restored.

**c) Peak Load Management (PLM)**
1. Load shedding at feeder level
2. ToD tariff for bulk consumers for peak load management
3. Agreements with Bulk consumer that voluntarily shed load to facilitate PLM
4. Utility controlled DSM. Superceding the load curtailment by user allowed.

**d) Distribution System Planning**
1. No fixed procedure
2. Based on software study
3. Linked with town planning
4. Integrated with connection management

**e) Operations Planning**
1. No fixed procedure
2. Planned load shed to meet day ahead schedule
3. Load shed information is published on consumer portal
4. Manage Brown-Out in place of Blackouts
Power Process Maturity

End Consumer Perspective
a) Connection Management

1. Consumer physically goes to designated utility office to apply for connection
2. Consumer goes to any of the utility's office physically to apply for connection
3. Consumer can go online to access application and submit the same at the nearest convenient utility office
4. Consumer can submit applications online.
5. Consumer can select utility from where s/he wants connection.

b) Commercial-billing and payment

1. Physically visit the discom and pay the bill at a cash counter.
2. Consumer can login to the discom secure website and view the current bill and the past few months bills.
3. Consumer can view and pay the bill online using various secure payment options.
4. The consumer can choose the billing cycle as per weekly, monthly or bi-monthly as per his/her convenience. The consumer can log-in, generate bill and pay.
5. Pre-paid payment of the bills, with meters equipped with remote disconnect and connect switch based on the amount of balance available.

1. There are no reliability or quality parameters assigned to the supply except for the minimum and maximum parameters.
2. Reliability and quality parameters are identified and being calculated.
3. Stricter grid codes introduced with tighter limits on quality parameters such as voltage, total harmonic distortion (THD), flickers, dips etc.
4. Reliability indicies such as SAIFI and SAIDI(including load shedding), voltage profiles at DT are evaluated based on the historical data and reported from time to time.
5. The reliability and quality of supply are continously monitored in realtime and the stakeholder is alerted when a predefined quality parameter limit has been crossed.

1. Consumer receives a monthly bill which is the only source of information on total units consumed, bill amount and due date.
2. Consumer gets detailed report of consumption at the end of the month.
3. Consumer gets weekly, daily, and even real-time consumption information on dynamic and secure webpages after logging in.
4. Consumer can buy/subscribe to various third party energy efficiency analytics applications to manage his/her electricity consumption for minimizing the bill.
5. When the consumer moves from one house to other house, s/he can retain the consumer ID and hence the past data follows to the new house and new meter.

3.1 End Consumer Perspective

<table>
<thead>
<tr>
<th>a) Connection Management</th>
<th>b) Commercial-billing and payment</th>
<th>c) Electricity supply reliability and Quality</th>
<th>d) Energy efficiency-and consumption pattern management</th>
</tr>
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<td>5. Consumer can select utility from where s/he wants connection.</td>
<td>5. Pre-paid payment of the bills, with meters equipped with remote disconnect and connect switch based on the amount of balance available.</td>
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### 3.2 End Consumer Perspective

#### a) Web Self Service
1. No Web Self Service facility.
2. The consumer can access a static website of the utility providing information about services and downloadable forms.
3. The consumer can create an online account with a unique ID where the consumption information of the consumer is shown securely.
4. The consumer gets a range of facilities for accessing and analysing the consumption data and other services.
5. Complete facility of online web self-service of all activities related to purchase, consumption, injection, metering, billing and payment, without the need for visiting any office.

#### b) Prosumers
1. No facility for consumer to produce and inject power into the grid.
2. Consumer can install renewable generation sources such as PV, fuel cell or Wind and start using for local consumption.
3. Installation of sufficient capacity of local generation and storage. Installation of metering and protection equipment to support bi-directional flow of power.
4. Regulatory and commercial provisions in place for injection of power into the grid at LV level.
5. Scenario where consumer fully becomes a prosumer and is freely able to generate power and on need basis exchange power with the grid.

#### c) Demand Response
1. No demand response. The end consumer does not participate in a DR.
2. Home automation system based on time of the day price signal/supply frequency received by smart meter from utility.
3. Facility for direct control of home appliances with signal from utility, based on predefined settings from consumer.
4. Building automation system to carry out demand response at building level, with scope of larger amount of DR capability.
5. Integrated operation of home automation system, building automation system, direct control of home appliances by utilities depending on predefined settings.

#### d) Electricity Purchase contracts/Open Access: realtime purchase
1. There is no open access contract. The consumer gets power from the discom on a defined tariff.
2. The consumer has choice of buying power for the billing period between competing retail distribution companies.
3. The consumer can shift between the retail companies depending on the short term prices offered by all.
4. The consumer can make bilateral contracts with distant generators and the distribution company is paid only the power transmission service charges.
5. The consumer can enter contracts for purchase of power under open access through an online market platform.
3.3 End Consumer Perspective

**a) Local Storage (Inverter/Battery)**
1. The consumer does not have any storage.
2. The consumer has inverter & battery to meet household demand during power cuts.
3. The consumer has excess capacity of inverter & battery and can also supply to a few neighbours during power cuts.
4. The consumer can enter into contract with discom to supply stored energy back to the grid to meet the peak demand.
5. The consumer also adds local renewable generation to the inverter & battery to achieve self sufficiency and have limited exchange with the grid.

**b) Load Research**
1. The consumer only sees the total consumption as a single number in the electricity bill generated at the end of the month.
2. The consumer gets a detailed report of the daily/hourly consumption with the electricity bill.
3. The consumer carries out certain scheduling and planning activities based on the consumption pattern to reduce the bill.
4. The consumer receives realtime data of consumption pattern on an in-home display panel along with the meter.
5. The consumer runs realtime analytics on the consumption of power with objective of optimizing the energy usage of the household in a most cost effective way.

**c) Electrification**
1. Access of power to less than 50% of households.
2. Various programs in implementation to extend electrification to remote areas in phased manner.
3. Use of micro grids and renewable sources for supplying remote villages far from grid.
4. Provision of connectivity of the isolated microgrids to the grid for increased reliability.
5. 100% electrification of all villages and households with power supply for more than 22hrs each day.

**d) Pre-payment**
1. No facility of pre-payment.
2. Pre-payment facility available for select consumers.
3. Pre-payment facility available for all consumers.
4. Switching between pre-payment and post payment options.
5. The consumer can pre-pay online and the smart meter monitors consumption against the balance and disconnects when the balance expires.
3.4 End Consumer Perspective

a) Captive Power Generation Capacity Utilization/pump back into system
   1. No facility of bringing captive power to the grid. Captive power can only be used within the consumer premises.
   2. Regulatory approval for pumping back of captive power into the grid. Installation of metering infrastructure for supporting bi-directional flow.
   3. Consumer can enter into contract with utility to sell excess power to the grid as per the availability of the power.
   4. Consumer can participate in demand response program where a certain capacity of captive power is allocated for providing DR functionality.
   5. The consumer can sell the captive power through online realtime market.

b) Demand Side Management (DSM) with Distributed Generation (DG)
   1. No Demand Side Management mechanism in place.
   2. DSM based on day ahead forecasting and scheduling.
   3. Utility signs agreement with user for remote control (curtail supply during peak periods) of certain loads by utility (meters facilitated with remote disconnect feature); superceding the load curtailment by user not allowed.
   4. Utility controlled DSM. Superceding the load curtailment by user allowed.
   5. Integration of DSM and operation of the distribution generation (DG).

c) Local Generation - load balancing: near off grid
   1. No mechanism of load balancing of local generation and load.
   2. Basic infrastructure such as SCADA system in the large (industrial) consumer premises to monitor the load and generation scenario in real-time.
   3. Preliminary EMS functions to manage the local generation or load. Storage systems would be useful for such cases.
   4. The combined operation of generation facilities (typically from multiple renewable sources) and loads in the form of microgrid.
   5. Integration of local generation and load balancing system and market platform, with the utility distribution management system for automation to achieve optimization at the discom level.
Power Process Maturity

Bulk Generation
4.1 Bulk Generation

a) System Planning and Project Management
   - 1. Manual System
   - 2. Computerised MIS
   - 3. Standalone computer application
   - 4. Web based application for team collaboration
   - 5. Integrated application with external inputs from external stakeholders

b) Generation Management
   - 1. Generation is scheduled based on the availability of the generation unit and the fuel.
   - 2. Generation management done on the basis of cost to generate
   - 3. Generation scheduling is integrated with markets and scheduling and generation management is carried out with advanced analytics

c) Generation Forecasting
   - 1. Manually based on past data
   - 2. IT application for forecasting
   - 3. BI tools for forecasting
   - 4. Integrated application with Weather forecasting inputs

d) Plant Control System
   - 1. SCADA system in place in switchyard
   - 2. DCS/DDCIS in place
   - 3. All control systems are integrated with each other
   - 4. Centralised control system for the whole power plant
   - 5. Centralised Control system with ERP integration
4.2 Bulk Generation
4.3 Bulk Generation

a) Plant Performance Management System

1. PLF management
2. PLF, Heat rate and efficiency management
3. Monthly and annual assessment of PLF, Specific oil consumption, Auxiliary Consumption, Heat rate, Coal Quality
4. Cost to serve is managed
5. Cost to serve is optimised with continuous improvements in Business Processes

b) Operations-Scheduling

1. No scheduling
2. Scheduling is based on availability of generation planned on day ahead basis
3. Penalty mechanism in place for violation of planned schedule
4. Scheduling based on real time basis with optimisation of cost to generate

b) Operation Planning

1. Based on the past data and forecasted data.
2. Minimum target set by CEA, achieving maximum
3. State estimation, voltage security analysis, contingency analysis, re-configuration for loss reduction or reliability maximization

b) System Operation

1. Carried out on the basis of operator experience
2. Carried out manually on the basis of past data
3. Carried out manually on the basis of suggestions from the control system
4. Carried out both manually and automatically by the control system
5. Carried out automatically by the control system with an option of manual override
a) Settlements
- 1. Manual System
- 2. Weekly reconciliation
- 3. Daily settlement thru online transactions

b) Market Operations - PPA/Trading
- 1. Only long term PPA
- 2. Short term bilateral agreements
- 3. Day ahead load forecast vs schedule information is available to stakeholders for trading
- 4. Transmission capacity for open access is also available on day ahead basis
- 5. Alerts for system augmentation generated based on congestion signals

c) Asset Management
- 1. Breakdown maintenance
- 2. Schedule based preventive maintenance
- 3. Computerised Inventory Management System (CIMS)
- 4. Pro-active maintenance, to improve system efficiency and adopt better processes
- 5. Condition Based Maintenance and product lifecycle management

d) Work orders for maintenance activities in the plant
- 1. Outsourced by open tendering
- 2. Work orders are managed thru manual registers
- 3. Work orders managed thru ERP applications
- 4. Condition Based Maintenance system also to generate work orders

е) Business Process Management for finance, HR,
- 1. Manual System
- 2. In house applications
- 3. Department wise centralised applications
- 4. Enterprise wide Integrated application
- 5. Integrated application for core process and business process with external stakeholder interface
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5.1 Transmission
### 5.2 Transmission

#### a) Operations Planning
1. On schedule basis including inputs from maintenance programmes
2. On schedule and real time basis
3. Planning and monitoring is automated, with manual control to exercise the plan
4. Planning, Monitoring and operation control is automated with provision for manual override
5. Follow merit order and conserve fuel by reducing or shutting down high cost generators including IPPs.

#### b) SCADA/Energy Management System (EMS)
1. There is no SCADA/EMS in place
2. Basic data acquisition system is in-place and it is configured to receive the remote data from the field and display it accurately for monitoring.
3. Both SCADA and EMS are in place, suggestions are received from the system for system control with operator exercising manual (telephonic) control.
4. SCADA/EMS in place with remote control facility to the operator

#### c) Sub- Station Automation (SSA)
1. All operations are manual
2. Auto reclosure is there
3. Breakers are controlled remotely
4. All operations are controlled remotely
5. SCADA/EMS in place with software control along with remote control facility to operator

#### d) Grid Stability
1. Manual system
2. SCADA system for monitoring
3. SPS for grid stability based on historical data
4. WAMS applications for optimal asset utilisation

#### e) Peak Load Management (PLM)
1. Manual system
2. Under Frequency relays on transmission lines
3. Control like ABT mechanism for self regulation
4. WAMS applications for optimal asset utilisation

#### f) Asset Management
1. No proper asset management strategy.
2. Identifying the critical equipment items and systems.
3. Proper Policies like Safety Policy, Inspection Policy, Maintenance Policy, Competency Policy in place.
4. Maintaining an updated database of all the assets and maintenance parameters.
5. Asset Management Database integrated with other system applications.
a) Field Work and Workforce Management
1. Manual registers
2. Computerised MIS
3. Web based applications
4. System generated alerts for field work and workforce management

b) Metering
1. Manual readings
2. Remote readings
3. Software applications for billing

C) Billing: tariffs and settlements
1. Manual system
2. Tariffs based on PPA
3. PoC charges to make the tariffs distance sensitive
4. Real time congestion charges also included ???

d) System Planning
1. No proper system planning strategy in place
2. System planning done for upcoming generation evacuation
3. System planning done for upcoming generation evacuation and for system strengthening
4. Apart from upcoming generation evacuation and system strengthening, operational feedback from LDCs received
5. System planning considering renewable sources of energy

e) Customer Care Centre (CCC)/Call Centre?
1. Not established
2. Established

f) Leasing out Transmission infra?
1. Not established
2. Established

g) Open Access support
1. Not established
2. Established
6.1 Renewable Integration

a) Forecasting and scheduling?/storage

1. Unpredicted
2. Prediction accuracy less than 50%
3. Prediction accuracy less than 70% and more than 50%
4. Prediction accuracy more than 70%
5. Generation and storage optimised to meet forecast prediction for more than 70% accuracy

b) Integration of Bulk and Distributed Generation - Network Stability

1. Unmanaged
2. Network Stability managed thru PMU based advanced analytics
3. Network Stability managed by mapping the unpredictability of renewables thru precise load control via DSM

c) Tariff schemes and incentives

1. No tariff
2. Feed-in tariff notified by regulators
6.2 Renewable Integration

Electric Vehicles

a) Charging ecosystem
1. There is no charging infrastructure ecosystem for electric vehicles.
2. Electric vehicle ecosystem is fully established and integrated with market. The scheduling of EV charging and discharging is aligned with the requirements of grid.

b) New Category of "prosumers"
1. No provision for prosumers
2. Regulatory provisions in place for prosumers
3. Metering system in place to facilitate prosumers and feed in tariff

c) Tariff - Billing and Settlements
1. There is no special EV billing.
2. Separate tariff for boost and trickle charge
3. Tariff for V2G is also notified

6.3 Renewable Integration
Micro-Grids

a) Generation and Load forecasting
   1. Unpredicted
   2. Prediction accuracy less than 50%
   3. Prediction accuracy less than 70% and more than 50%
   4. Prediction accuracy more than 70%
   5. Generation and storage optimised to meet forecast prediction for more than 70% accuracy

b) Energy Storage
   1. No storage
   2. With storage, off grid
   3. With storage and grid connected
   4. Grid connected micro grid can autoisolate with select load in case of grid disturbance

b) Local Tariff schemes
   1. No tariff
   2. Community decided tariff
   3. Feed-in tariff notified by regulators
   4. Grid connected micro grid can autoisolate with select load in case of grid disturbance

b) Power Quality Management (PQM)
   1. No mechanism
   2. Voltage profile managed
   3. Harmonics level managed

b) System Asset Management
   1. Breakdown maintenance
   2. Preventive maintenance
   3. Periodic maintenance