Smart Energy Meter specification

Need for a Review

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What is a standard?

A standard is a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose.

Expectation from standard:

- To ensure That product and service are
  - Reliable and Safe
  - Optimum cost but Good quality
  - Understand user need and have Long useful life - interoperability
  - No adverse impact on society, environment.
  - In line with practices and technology

Compliance of standard give confidence in a product

Standard Vs Specifications

Standard are different from specification.

Standards are basically minimum requirement. Specification can have requirement beyond standard.

Normally same standard is followed by mass, but specification can very from user to user

Standard are more towards reliability and basic functionality, where as specification covers additional - much more than that.

Incase of energy meter – standard is more towards Active energy, where as specifications talk about other features, need, objective and functionality.

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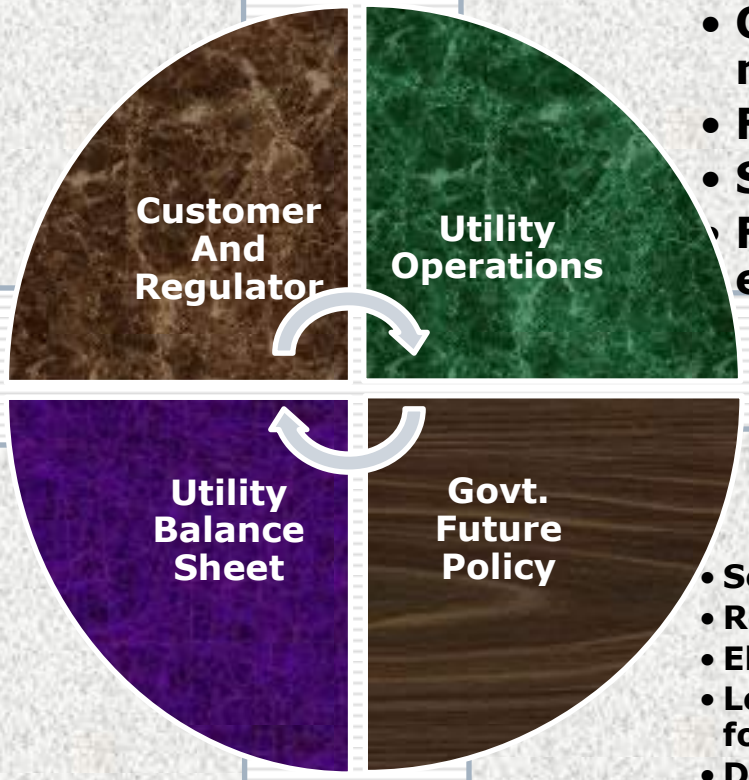
Various role Energy Meter

- Tariff compliance
- SLA compliance
- Information to customer
- Supply quality
- Billing dispute
- Street lights

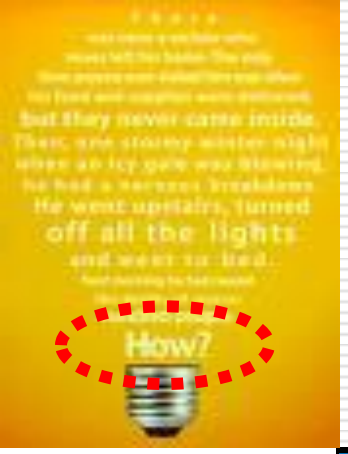


- Network health
- Network Planning
- Outage management
- Fault prediction
- Supply quality
- Field team efficiency

- Cash box
- Theft control
- Prepayment system
- Non payment – disconnect
- Revenue cycle
- Other business

- Service level norms
- Renewable integration
- Electric vehicles
- Load growth forecasting
- DSM & EE
- Other services

Need a review of Meter Standard and specification with respect to New Role of Energy Meters.



Building block of EM specifications

1 Standard

National standard,

CBIP

CEA Guidelines

2 Basic functionality

- Active energy
- Tariff requirement

3 Measurement

- Basic functionality
- Instant parameters
- Tariff requirement
- Load survey

4 Revenue protection

- Anti theft feature
- Theft detection

5 Memory & display

What in memory
And what all
to display

6 Special features

- Communication
- Relays
- Logics

Needs, Expectations, concerns and technology changes very fast.
Thus it require continious review of Specifications

Energy Meter specification – How we make

One need far lower effort if logical and good specification are made

Present Test – Relevance with new technology

No Load Test are routine tests

Used to be calibration point

Technology upgraded: Still No Load Test is routine test.

May be applicable for Analog chips

Advanced Technology : No modifications in standard.

New ASIC ensure- no load No recording

Are manufacturer really testing 100% meters for No load test as per IS ??

Is it really required ?? Should we spend hrs for test ??

Any Recommended Faster Alternate Test ??

Present Test – Relevance with New Technology

- **No Load Test**
  - Latest ASIC ensures same in design
  - No load Test requires lot of time i.e. upto 200 Minutes.
- As a practice
  - Manufacturers any how ensuring by alternate methods

One Recommendation – Make it as Type/ Acceptance test.

Additional Test need to be reviewed

- **Repeatability Test**
- **Interpretation of Test Results**
- **Reverse Phase Sequence**

Are these test/ limits still relevant ?

Suggestion for new specification

Need to redefine what is routine test/ lot test . Technology has changed a lot. It impact productivity and thus cost

Technology and capability is changing – many specs are irrelevant. Do not carry luggage

Try to exploit new features and capabilities.. May not be advisable to carry old, existing and new features in new product

Same specification need to carried due to national standard and prevailing practice. Bring in notice but comply till amended.

With new technology think differently considering functionality/ purpose and usage. Also one need new test to ensure reliability of new features. Too many features can affect the cost and reliability

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Review Of Anti Theft features -- Smart energy meter specification

In India, Anti theft feature dominate the meter specifications. Do we need all anti theft feature as we have in static meters ??

There are thousand of theft methods. Irrespective of theft method, theft happens by

- **Affecting energy measurement**
- **Switching off meter/ micro**
- **Changing data**
- **By pass.**

Smart meter can :

- ***Measure multiple parameters***
- ***Can generate alarm based on defined logic***
- ***Can send alarm if V low, abnormal wiring, neutral missing, power/ micro off,***
- ***can detect data change***

Do we still need all anti theft feature needed in static meters or need smart logics and quick actions

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Anti theft features - Review

Anti theft feature	cost impact	Smart meter - review
Neutral missing sph	Yes	Not recommended – Power outage alarm
Magnetic test	Yes	Only protection of current sensor required.
ESD/ spark test	yes	Mainly result to power / micro off and data change .. Smart meter can detect.
CT in PH and neutral	Yes	Recommended to continue
Theft logging	Cost of memory	Events can be reduced.

Theft by wiring manipulation, lower voltage, relay/switch etc can be easily detected in smart meter. Further smart meter can be programmed to switch during any abnormal activity / measurement to avoid theft.

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Power to compare with neighbor

On line Energy audit

Review Of memory and display -- Smart energy meter specification

More information in memory and display .. Higher will be the cost

What about alarm LEDs ?

If read remotely who will look into display.. ??

When data is communicated periodically – why so large historical data

Smart meter cost is a challenge :

- ***Historical data is asked with a fear if meter does not communicate for long !!***
- ***Is this acceptable ??***

Only solution is ensure meter ***s on data usage rather data collectio*** ***rm LED rather communicate alarm.***

Need for costly display if consumer display is separate ?? In fact do we need one in meter ?
Presently YES as asked by standard !!

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Review Of "Highly precision and remote programmable features" -- Smart EM specification

- Integration period …30 or 5 min?
- Accuracy cl1.0 or cl0.2 ?
- Remote programmable capability – more will give more flexibility ?

- Cost, effort, life vs gain and need.
- Programming Vs Security

Remote programming:

- ***Why it is needed ?? Flexibility or uncertainty ?***
- ***Cyber security ??***
- ***If utility can change parameters – why cannot some one else ??***

Flexibility is desirable but considering meter as cash and information box , it is critical to ensure same cannot be tempered !!

Two option – restriction and logging of all write event.

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Review Of RTC and RTC battery -- Smart energy meter specification

Static meter need RTC and RTC battery to ensure clock working even during power OFF

Do we need RTC to work during power off ?/
Or correct clock during Power On only

Smart meter communication capability is important:

- ***What if meter get time sync as soon as it is switched ON ??***
- ***Do we need separate RTC and battery***

Need a review .. Seems not required if sure about communication.

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Review Of Data communication capability-- Smart energy meter specification

Few Options :

- **Need of optical port/ wired port**
- **RF or GPRS or hybrid**
- **Integral/ external or modular**

One simplest way is ask for all. It will affect cost a lot..

Smart meter communication capability is important:

- ***It depends upon once confidence and SLA agreement with communication service providers***
- ***Back up arrangement is good – but costly***

Remember even if communication fail --- meter will still work, but may be you are dependent so may prefer Hybrid… Objective.

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Review Of Construction features-- Smart energy meter specification

In static meters:

- **Top cover open and sensor**
- **Terminal cover and wiring issues**
- **Box and optical chord issue**

When smart meter have consumer display .. Or consumer data can be seen on web .. Why cannot be meter located as in assessable location ??

Need for assess ability

- ***For consumer to see display***
- ***For utility to take meter data and for meter servicing***

But meter get tempered since assess able. Since above requirement are otherwise taken care by smart meter, so one should review location and thus construction of meter while making specifications.

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Review Of "Connect Disconnect capability" -- Smart energy meter specification

Few Options :

- **With connect disconnect**
- **With out connect disconnect**
- **Mix**

On one hand :
meter with out connect disconnect feature can be smart ??

If not than whether LT CT or HT meter can be smart ??

Connect disconnect features are desirable:

- ***But if for particular application/ objective if we are sure, that connect disconnect is not required can be avoided Ie MIX.***
- ***If nothing cannot be said – better with connect disconnect***

Remember connect disconnect feature has high cost and may affect failure rate !!

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Review of Indian Standard ……

In Indian Standard, **Functionality/ correctness** need to be checked after various test

E.g. Short time over current

Short Time over current shall not damage the meter and meter shall perform corre… when back in n…

The varia… values shown…

Is it gap of definition or interpretation by test labs..

What if memory / RTC/ Historical data get corrupted.

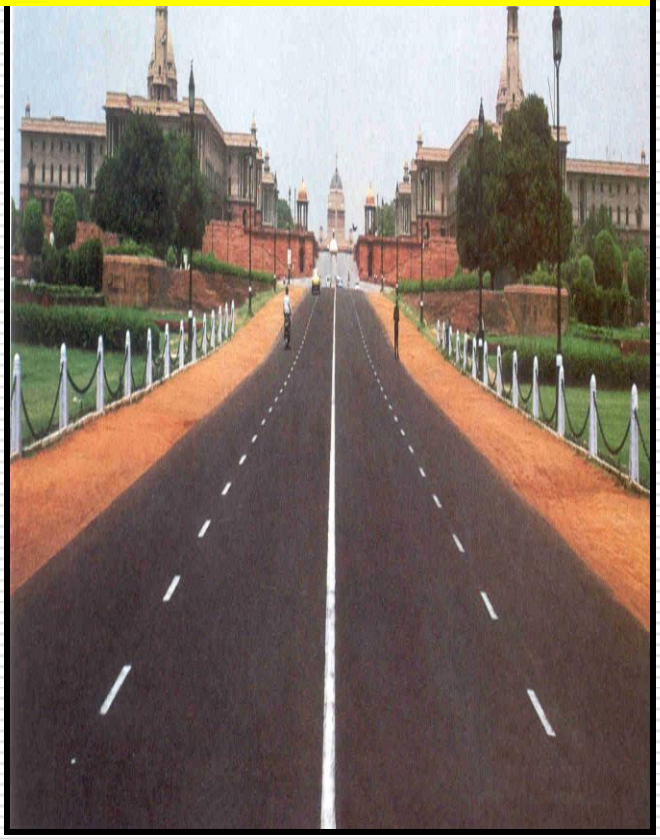
Normally Fur… recording energy co… …meter …ergy Register.

The meaning of word " **Correctly**" need to be defined /reviewed and standardized. Does It mean only accuracy / energy registering or **beyond**

Conclusion ……

- The guiding parameters for making specifications shall be need/ expectations and concerns of stakeholders
- Being new technology, it is equally important to remove old / existing specs before you continue same even for smart meters
- Your smart meter project can get delayed due to over specification and thus over prize
- It is important to educate other stake holders including customer, legal etc to avoid old un-desireable practices.

Specification helps in journey



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Thank You

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