Smart Grid Initiative in Singapore

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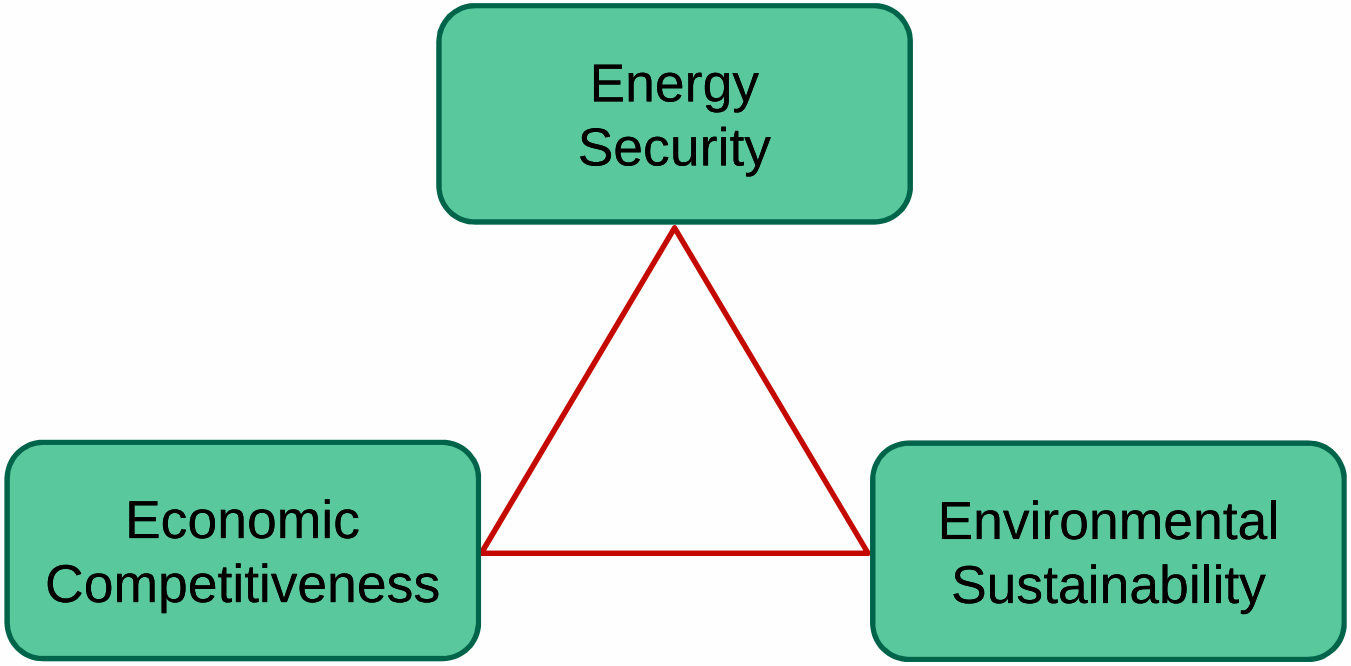
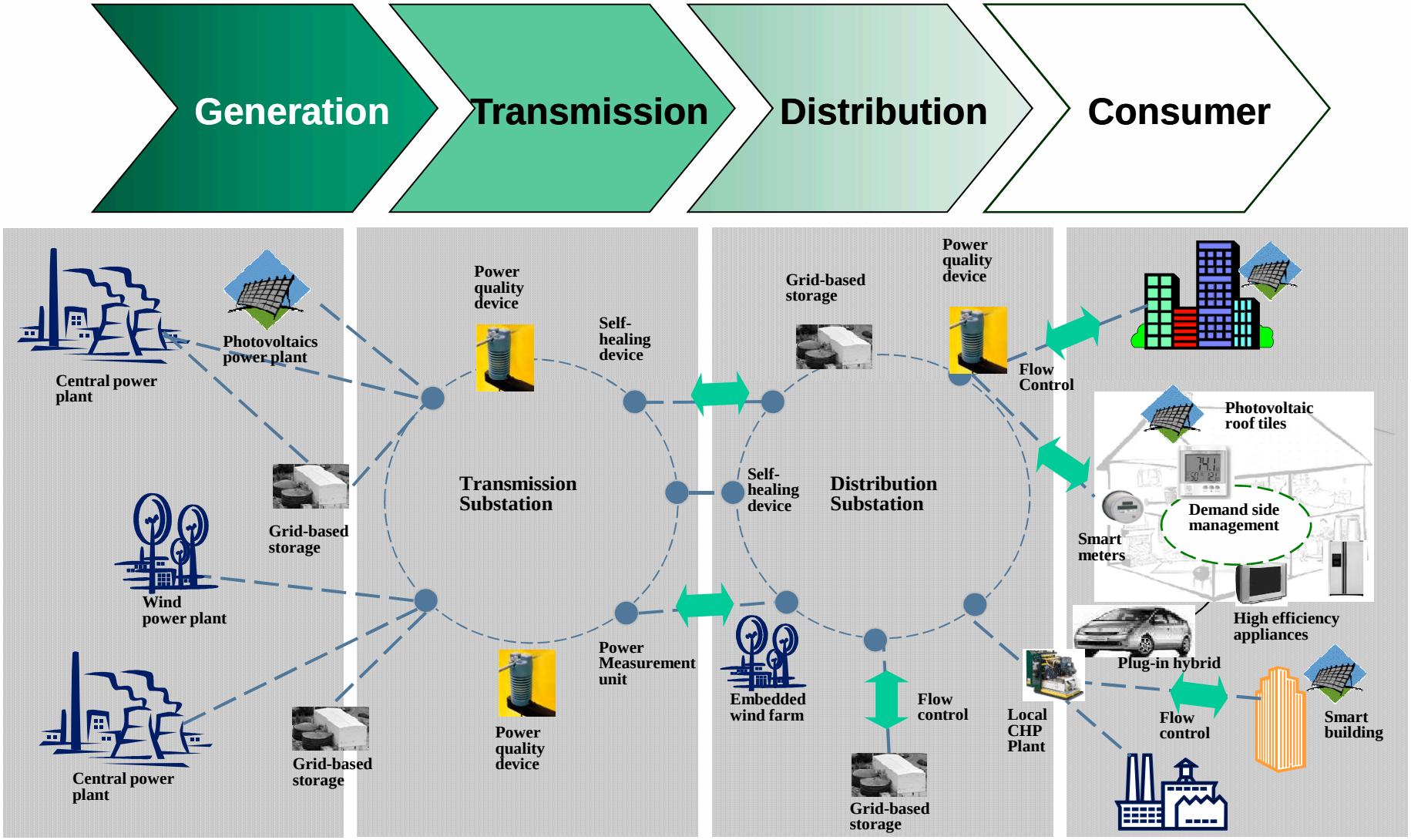
ENERGY MARKET AUTHORITY

Singapore's Energy Tri-lemma

- The need to achieve a balance



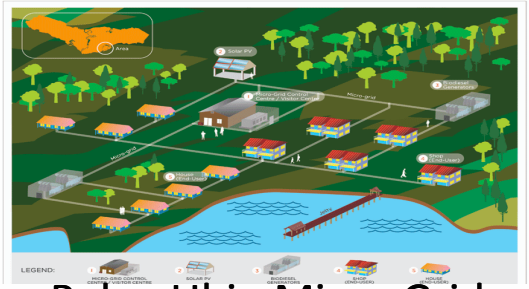
Changing Energy Landscape



Singapore's Smart Community Projects

Clean- Tech Park

Industrial



Pulau Ubin Micro-Grid Test-Bed

Punggol Eco-Town

Residential

Jurong Lake District

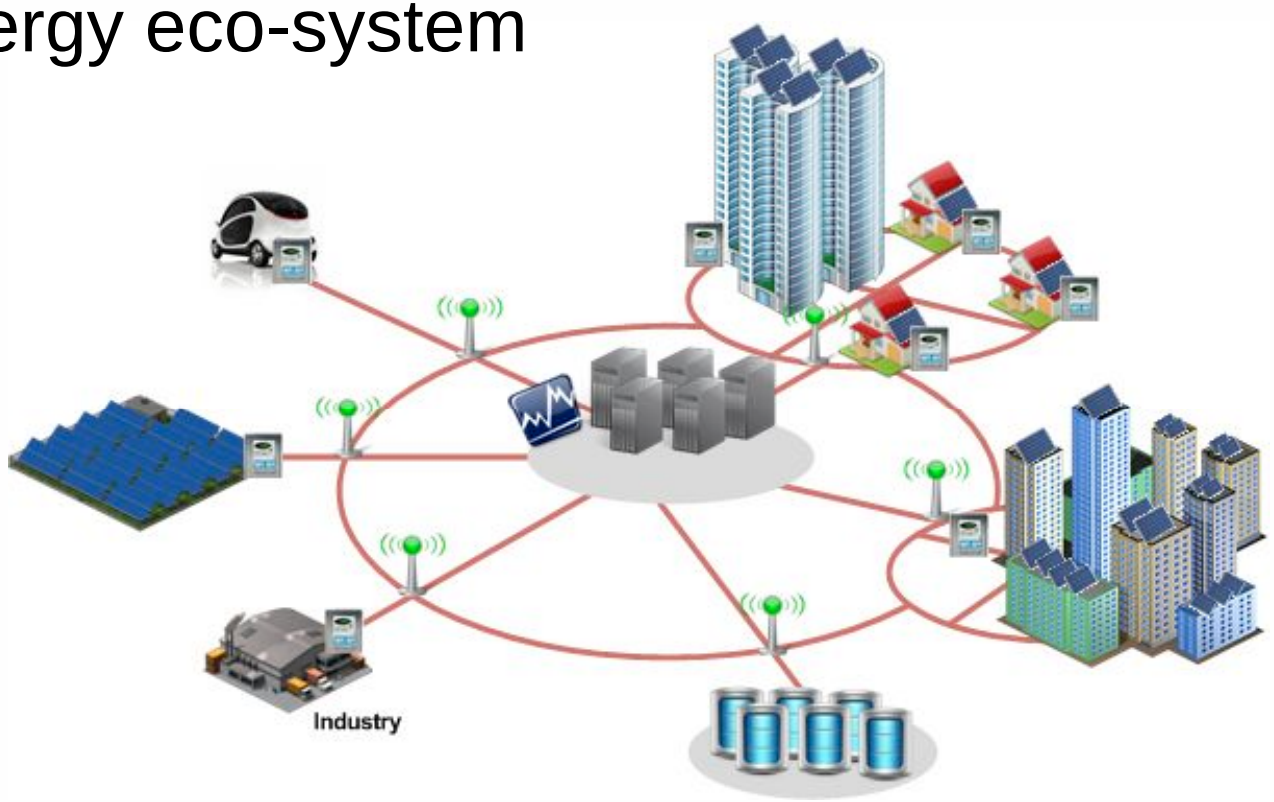
Business & Leisure

EV Test-Bed

Transport

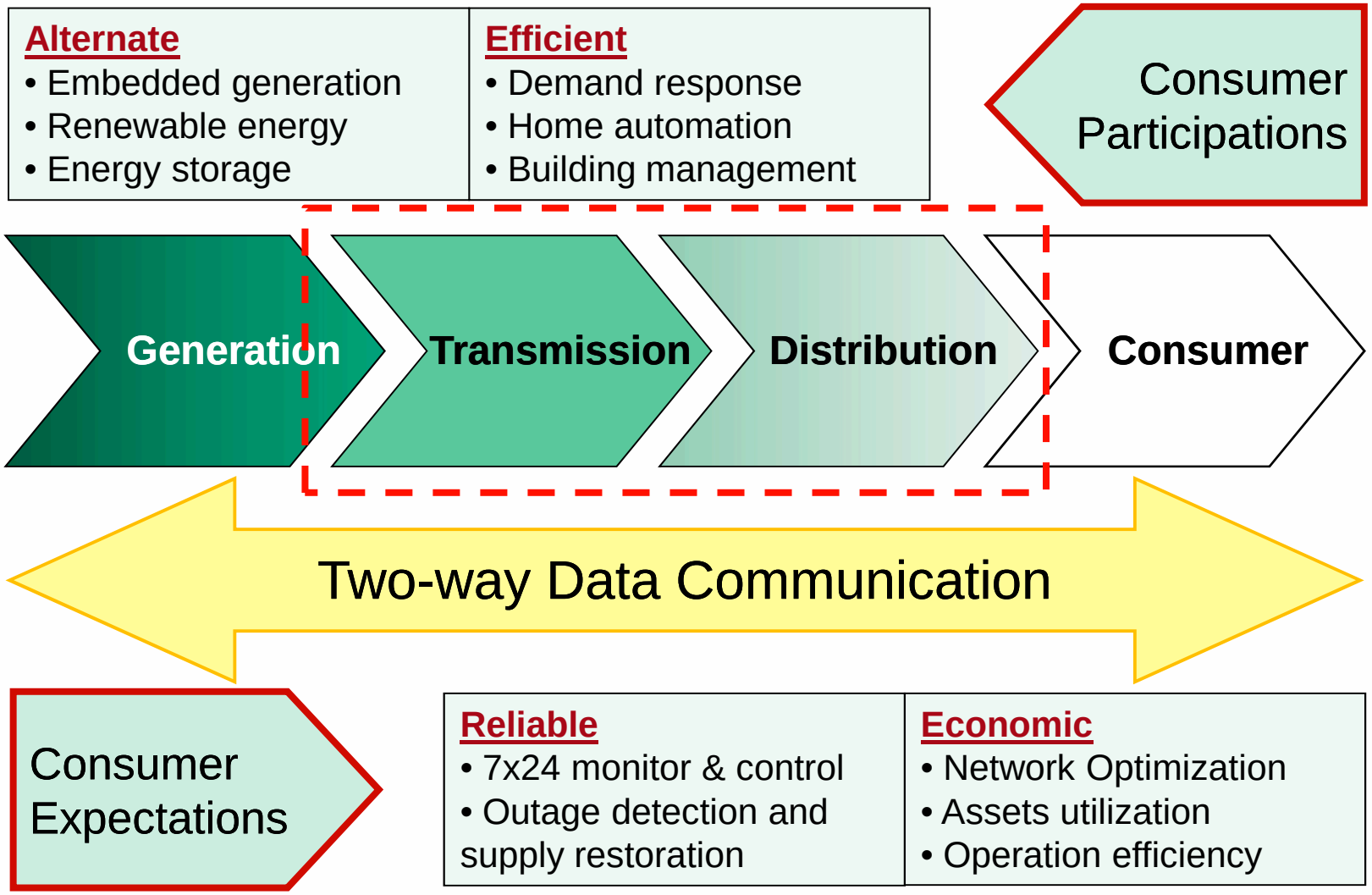
Sustainable Energy Infrastructure

An energy eco-system

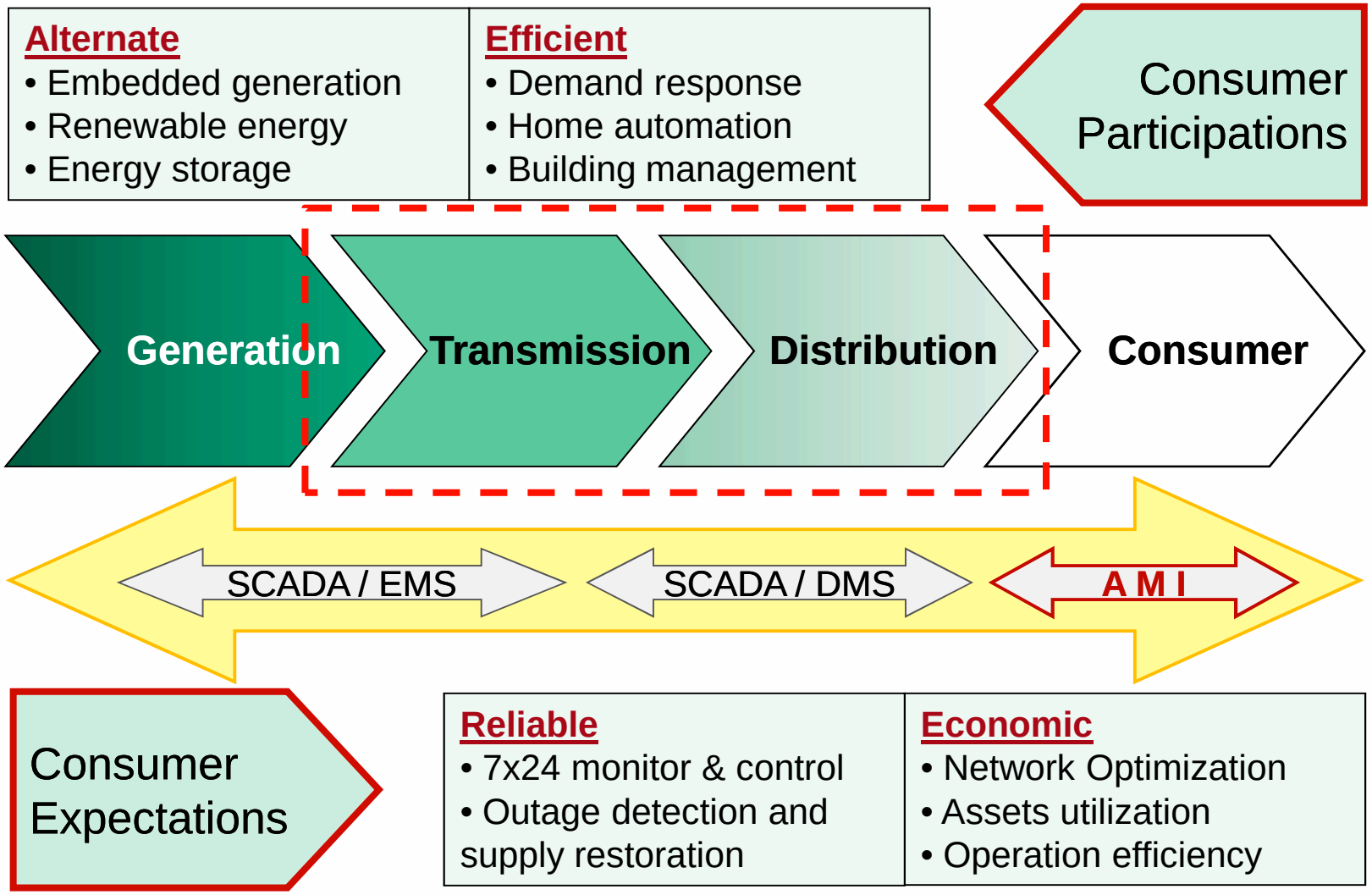


Smart Grid – The Enabler

The Smart Grid



Our Smart Grid Initiative

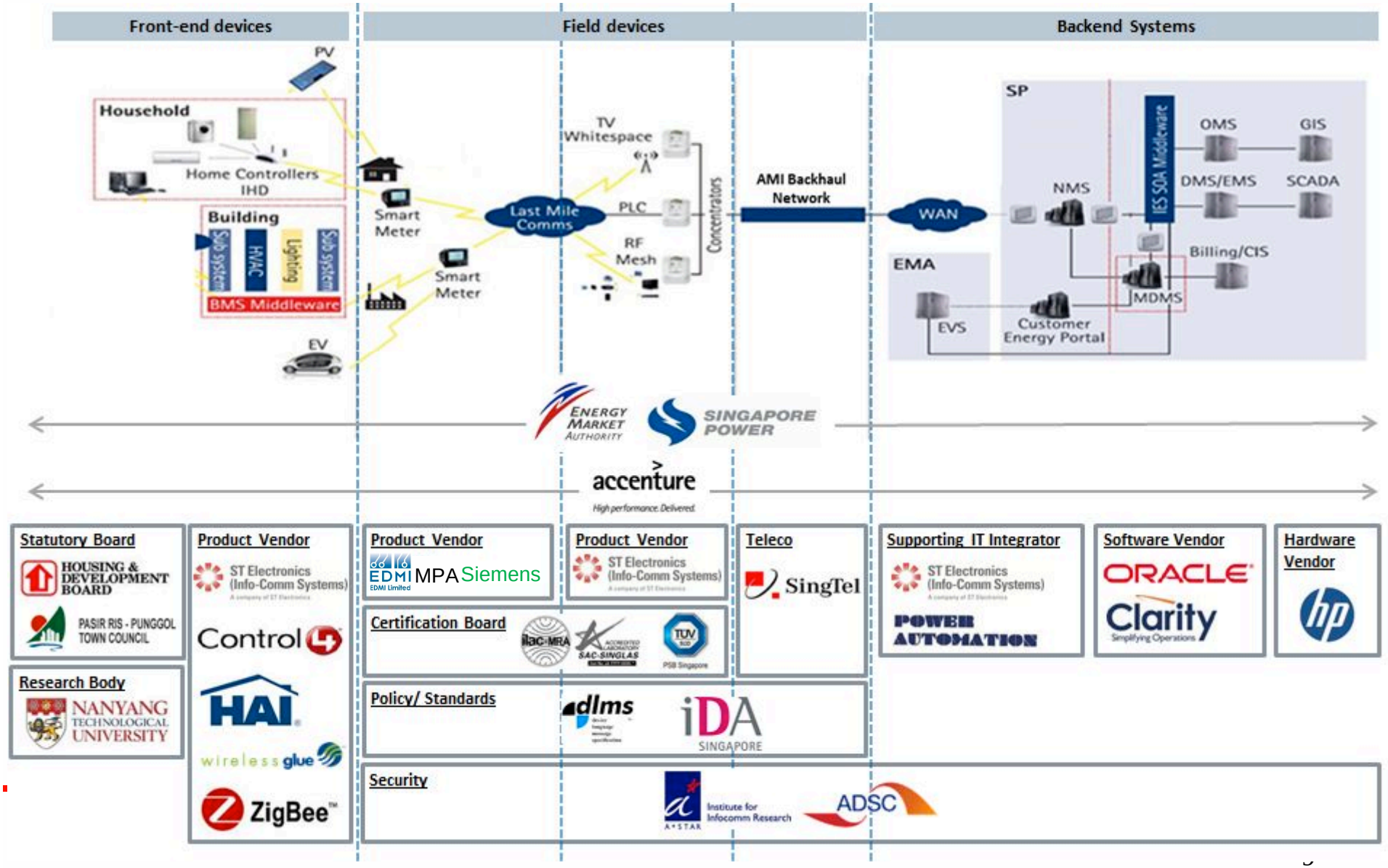


Key Drivers

- ✓ Enable the management of Distributed Energy Resources including renewable and embedded generation

- ✓ Enable the integration of new initiatives such as demand response and energy efficiency applications, support the needs of Electric Vehicles - G2V and V2G

Solution Overview



IES Pilot - Two Phases Approach

Phase 1- Developing the enabling infrastructure (2010-2012)

Infrastructure developed and on schedule

Phase 2 – Rolling out smart meters to assess applications and consumer response (2012-2013)

Scope of trials developed for commercial and industrial consumers and residential households

To Develop an Intelligent Power Grid System, Promote Better Use of Energy and Improve Energy Efficiency in Singapore

Consumer-Side Demand Management

Residential consumers

Applications:

- Smart devices, e.g. In Home Displays, Home Energy Management System, smart appliances

Benefits:

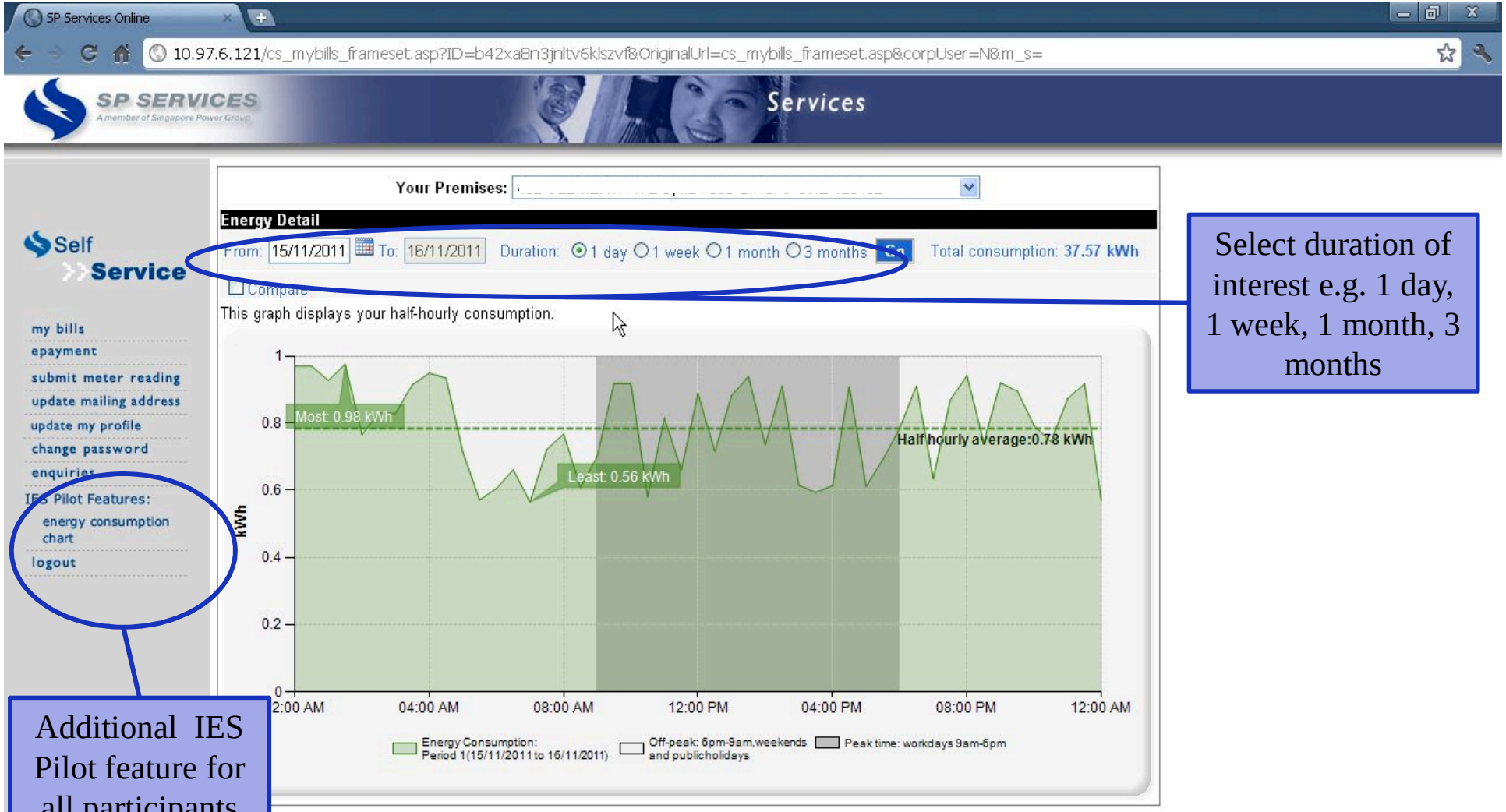
✓Use energy efficiently and reduce consumption by having more information

✓Manage demand profiles by controlling consumption during peak hours

Residential Consumer Trial

- Some 2,000 households in a HDB estate
  - 3 types of last mile communication concept
    - RF Mesh
    - PLC
    - TVWS
  - Some 1,000 IHDs
  - SP Services web-portal
  - Separately, some 10 HEMS will be integrated

Data Available to Residential Consumer



Select duration of interest e.g. 1 day, 1 week, 1 month, 3 months

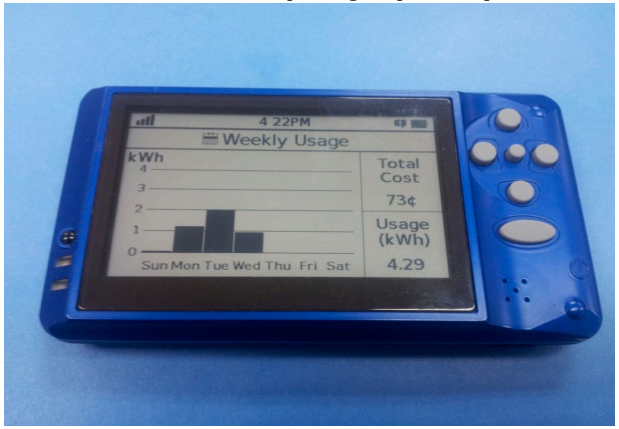
Additional IES Pilot feature for all participants in the IES Pilot

Half-hourly consumption profile over a 24 hour period of a particular day

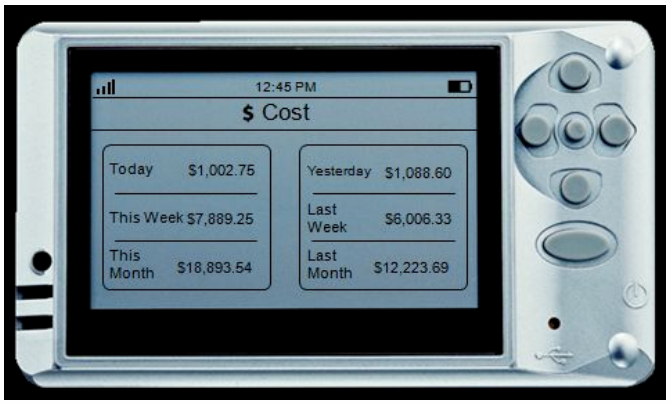
Data Available to Residential Consumer

Smart Meter

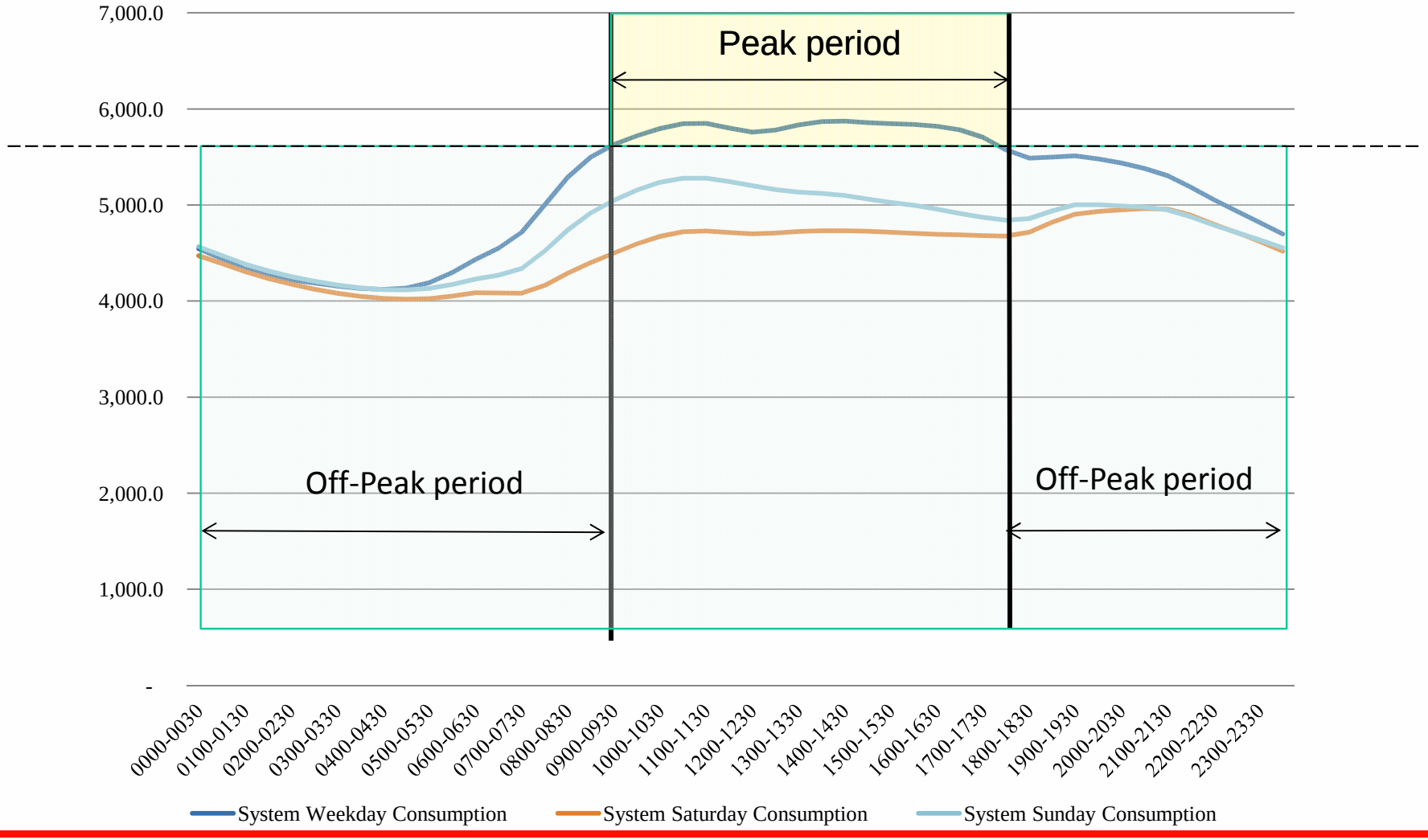
In-Home Display (IHD) unit



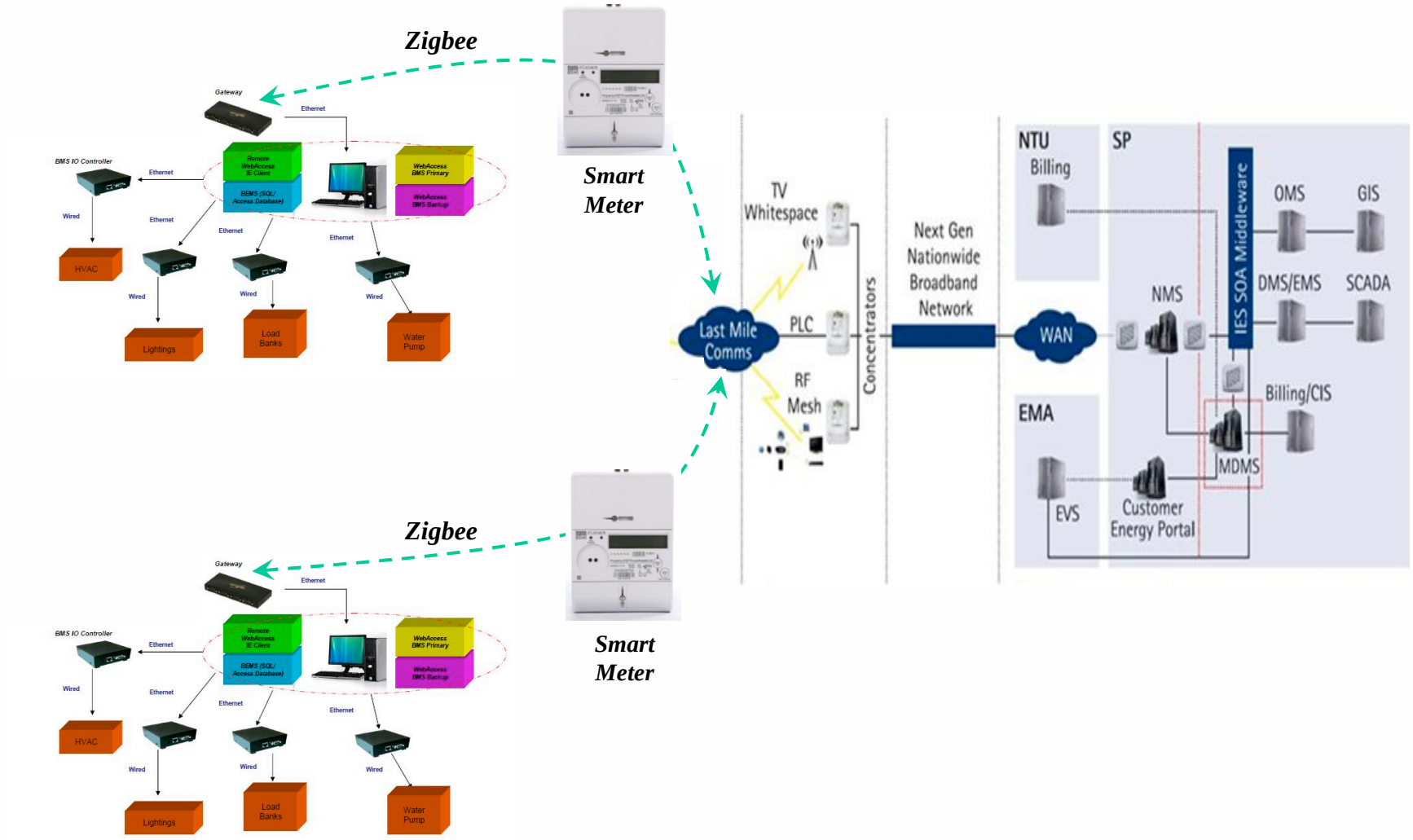
- ✓ **IHD** read energy consumption data directly from the **smart meter**



System Demand (Average for 201X)



BEMS Integration



Consumer-Side Demand Management

Commercial & Industrial consumers

Applications:

- TOU tariff structure
- Deploy smart systems, e.g. Building Management Systems to achieve load optimization and energy efficiency
- Implement Demand Response applications

Benefits:

- ✓Flatten demand profiles by controlling consumption during peak hours
- ✓Use energy efficiently and reduce consumption by having more information
- ✓Monetary benefits from participating in Demand Response program

Conclusion

- Technology assessment to implement scalable, reliable and cost effective end-to-end Advanced Metering Infrastructure (AMI) solutions capable of supporting various applications
- IES Pilot allow roll out of practical solutions