IEA DSM Task 17:
Integration of DSM, DG, RES and ES

Phase 3

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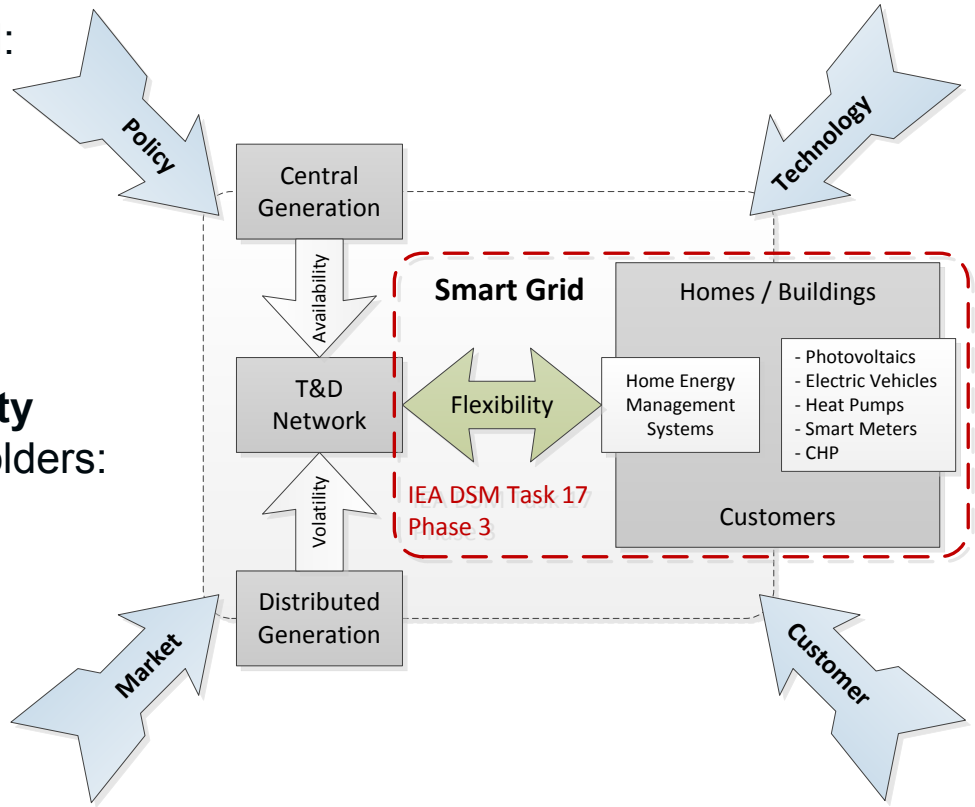
Subtask of Phase 3 - Introduction

Systems view on enabling flexibility in the smart grid

- **Different views** on the Smart Grid:
  - Technology
  - Customer
  - Policy
  - Market

- Focus on the **enabling of flexibility** and the impact of it on the stakeholders:
  - What are the requirements?
  - How do we manage it?
  - How will it effect operation?
  - What are the benefits?



Background and Motivation for Task 17 Phase 3

- **„Empower Demand** - *The potential of smart meter enabled programs to increase energy and systems efficiency: a mass pilot comparison“* vaasaeet for ESMIG, 2011

- „**Shift, not Drift:** *Towards Active Demand Response and Beyond“* – Think, June 2013

- IEC/TR 62746-2 (DRAFT), *Systems interface between customer energy management system and the power management system* – Part 2: **Use cases and requirements,** June 2013

- CEN-CENELEC-ETSI Smart Grid Coordination Group – **Use Case Management Process** – implementation in a standardized way, Nov. 2012

Empower Demand

Results

- About 100 pilots studied – structured into 22 variables
  - IHD can save between 3-19%
  - Good informative billing can save more even IHD is more effective in average
- Five factors which decide success
  - Socio-economic factors (surrounding variables)
  - Participant consumption patterns
  - Program content/structure
  - Supportive technology
  - Household load sources
- What makes a pilot a success or failure?
  - Meet the consumer needs with the program
  - Technology is the enabler
  - „more is more“: segmentation, feedback, pricing, multiple information
  - Meet regional market realities
  - Layered programs

Shift, not Drift

Results

- Consumer centered approach – through contract between consumers and intermediaries
- Comments from project advisors, industry and public consultation
- Recommendations:
  - Guidelines in form of good practice codes and regulations for customer empowerment and protection
  - Transparency rules for pricing, contracts, etc.
  - Pilot projects on contracts – engage consumers
  - Database of pilot studies for dissemination and extrapolation of results
  - Market entry for new players / market access
  - access to data
  - EU wide real time market

CEMS and Power Management System interfaces

IEC 62746 Technical Report Objective

Use cases and requirements for the interface between the power management system of the electrical grid and customer energy management systems for residential and commercial buildings and industry.

- User stories → use cases → data model → information content & structure

- Examples:
  - The user wants to get the laundry done / EV charged by 8:00pm
  - Grid recognize stability issues
  - CEM feeds own battery pack energy into own network or into the grid
  - Heat pump and Photovoltaic Operation with Real-Time Tariff

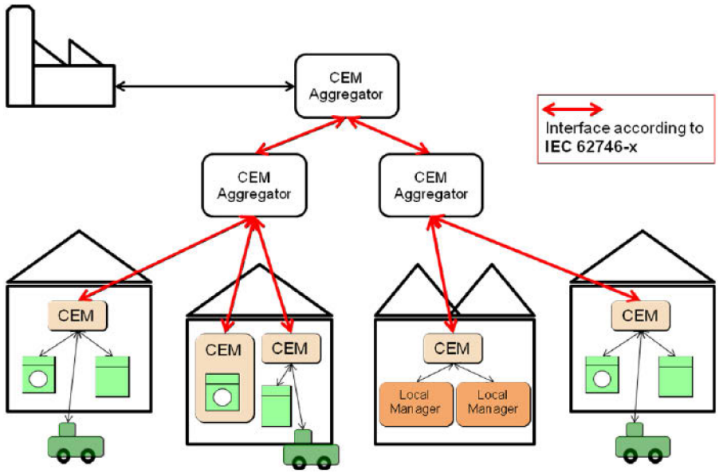


Figure 6: Cascaded CEM architecture

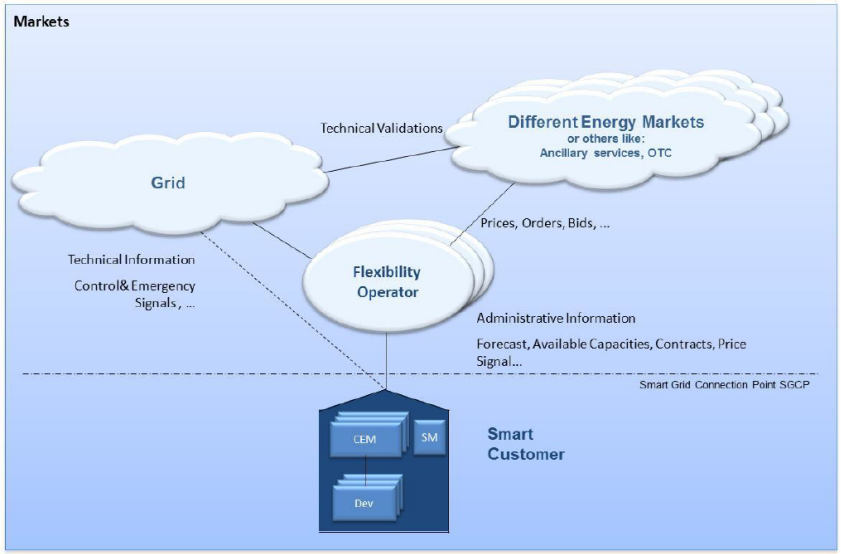
Smart Grid Coordination Group – Sustainable Processes

CEN, CENELEC and ETSI - M/490

The "Smart Grid Use Case Management Process" essentially describes the implementation of use cases in the standardization environment.

- Flexibility concept, understand demand response, Smart Grid & EV
- → Flexibility functional architecure
- → Use Case collection

- Examples:
  - Customer Energy Manager (CEM)
  - Market roles and interaction
  - Assessing impact of flexible resources on the grid (traffic light)
  - Flexibility operator



Subtask of Phase 3 - Introduction

Differences to on-going initiatives and working groups

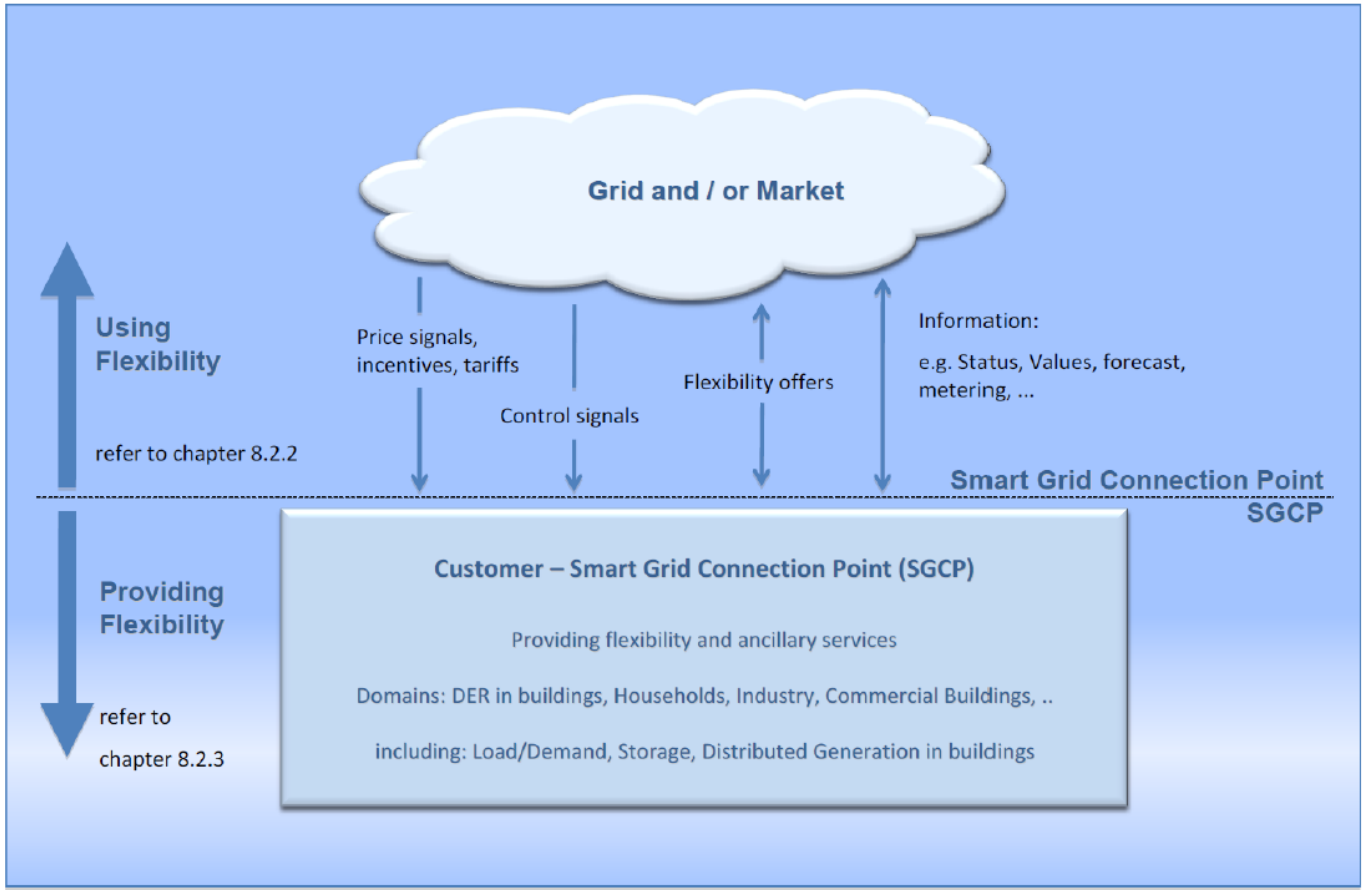
- Phase 3 is **not about**:
  - Standardisation
  - SG Reference Architecture
  - Interoperability – protocols and formats
  - Business models
  - Use case repository
  - Cyber security

- Phase 3 is **about** analysing:
  - Existing implementations, prototypes, pilot projects
  - Gap between theory and practice
  - Applicability to different countries, regions and regulatory frameworks

Subtask of Phase 3 - Introduction

Systems view on enabling flexibility in the smart grid

- **Technical Interfaces** CEN-CENELEC-ETSI Smart Grid Coordination Group



Subtask of Phase 3 – Overview of the Subtasks

Systems view on enabling flexibility in the smart grid

- **Subtask 10:** Role, and potentials of flexible prosumers (households, SMEs, buildings)
- **Subtask 11:** Changes and impact on stakeholders operations
- **Subtask 12:** Sharing experiences and finding best/worst practices
- **Subtaks 13:** Conclusions and recommendations

Subtask of Phase 3 – Subtask 10

Role, and potentials of flexible prosumers (households, SMEs, buildings)

- Controllability requirements (generation and consumption)
- Opportunities, challenges and barriers for flexibility services (providers and technologies)
- Energy and power balancing potentials
- Smart technologies (SM and Customer Energy MS)
  - VPPs
  - EV charging
  - DG-RES integration and storage
  - Integrating heat pumps and thermal storages

Subtask of Phase 3 – Subtask 11

Changes and impact on stakeholders operations

- Methodology development for assessing/quantifying impact
- Grid, market and customers (prosumer/consumer)
- Sharing common benefits/losses
- Optimization potential (eg. DR building audits and customer requirements)
- Regulatory and legislative requirements
- Comparison costs vs. delayed investments

Subtask of Phase 3 – Subtask 12

Sharing experiences and finding best/worst practices

- Collection of data
  - Workshops
- Lessons learned from existing pilots
  - EcoGrid-EU Bornholm, PowerMatchingCity I and II, Linear, Greenlys, Building2Grid, SmartCityGrid: CoOpt, eEnergy, …
- Country specifics
  - differences in the implementation
  - applicability
- Extrapolation of the results from previously collected projects on applicability

Subtask of Phase 3 – Subtask 13

Conclusions and recommendations

- Based on the experts' opinion
- Will provide a ranking based on
  - Impacts
  - Costs
  - Future penetration of the technologies

Experiences from pilots and field tests

Sharing best and bad practices and defining use cases

ISGAN

Annex 1	Global Smart Grid Inventory
Annex 2	Smart Grid Case Studies
Annex 3	Benefit-Cost Analyses and Toolkits
Annex 4	Synthesis of Insights for Decision Makers
Annex 5	Smart Grid International Research Facility Network (SIRFN)
Annex 6	Power T & D Systems
Annex 7	Smart Grid Transitions

Collaboration with ISGAN

Contributions and exchange of results with focus on DSM technologies

Collaborations on **DSM specific focus**:

- Common workshops
- Contribute to ISGAN reports

Annex 1:

- Requirements for enabling flexibility

Annex 2:

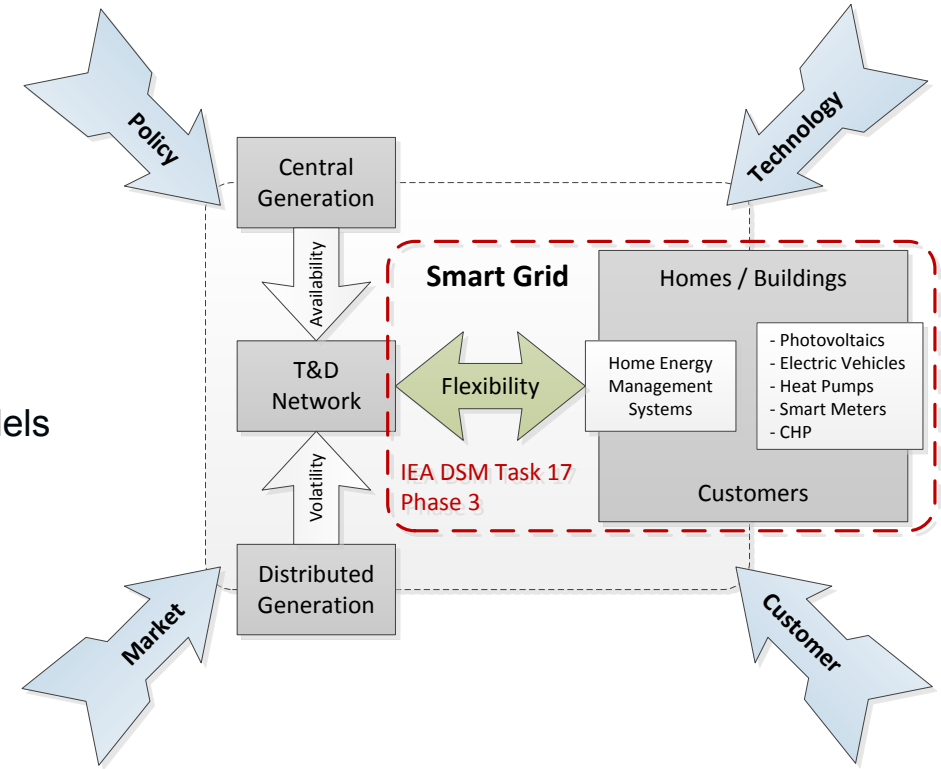
- Use Cases and implementation models
- Best and bad practices

Annex 3:

- Impact on stakeholders
- Cost and benefits

Annex 4:

- Recommendations



Collaboration with IC-CSHBA

Contributions and Exchange

IEEE-Standards Association *Industry Connections - Convergence of Smart Home and Building Architectures* (IC-CSHBA):

- Common workshops
  - Exchange experiences
- Implementation Guide white paper
  - Use Cases and implementation models
  - Best and bad practices
  - References
- Recommendations

Outlook

IEA-DSM Task 17 – Phase 3

- **Start:** January 2014

- **Collaborations**
  - ISGAN
  - IEEE IC-CSHBA
  - EC SG-Expert Group on Interoperability
  - IEEE IES TC SG

- **Next steps**:
  - Define workplan
  - Commitment from participating countries
  - Kick-off

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