

# IEA DSM Task 17

## Phase 4: Responsive Prosumer Networks

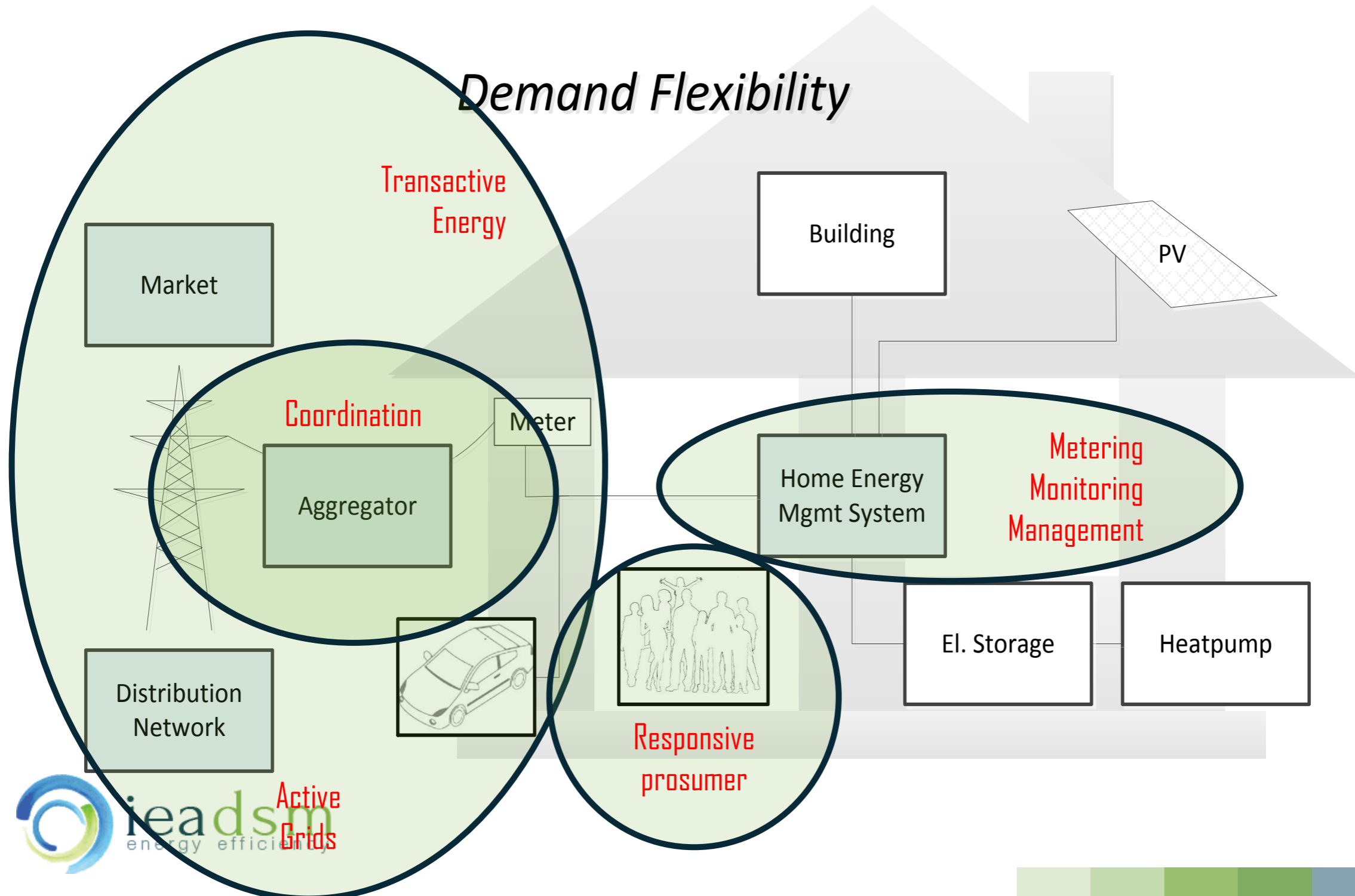
Workshop IEA DSM Task 17: Responsive consumers and value of flexibility  
23 May, Brussels

*Anna Kosek, TNO*

## *Task 17: Integration of Demand Side Management, Energy Efficiency, Distributed Generation and Renewable Energy Sources (previous phases)*

- Phase 1 (VTT: 2008-2010): Information collection on technologies and analysis
- Phase 2 (VTT: 2011-2013): Projects inventory, qualitative analysis and maturity assessment
- Phase 3 (AIT/TNO 2014-2016): Potentials, business models and quantitative analysis (US, Copper Alliance, S, CH, A, NL)

# Overview: Deployment view : one step further



*Phase 4; Demand Side  
Management → Integration*

ENERGY TRANSITION

- Metering → Monitoring → Context awareness
- Control → Coordination → Participation
- Passive → Active grids → Pre-emptive grids
- Tariffed → Microtransactions → Transactive Energy, P2P

## *Responsiveness via incentives*

### ENERGY TRANSITION

- Metering → Monitoring → Inform, analyse and verify
- Control → Coordination → Emergent behaviour
- Passive → Active → Larger flexibility potential
- Fixed Tariffs → Flexible tariffs → Incentive v punishment, smart P2P contracts

# Prosumer

## ENERGY TRANSITION

- Passive → Active
- Monthly/yearly energy demand → Demand per hour/minute
- Manual control → Home automation and remote control
- Economical → Environmentally friendly
- On demand consumption → Sustainability and self-consumption
- HEMS Internal optimization → Smart Communities/ Smart Cities

# Networks

## ENERGY TRANSITION

- Operation mode: Top-down → More bottom-up
- Investments: Asset driven (30+ y) → Risk driven (10-15 y)
- Tariffs Capacity (max. kW/y) → Real time (kW(t))
- Monitoring Primary substation → Secondary substation

## *Project scope*

### Responsive

- Responsive here reflects pro-activity and reactivity of the technological energy producing or consuming end-nodes but also of the (aggregated) users in providing responsiveness to different types of stakeholder requests in the energy commercial system and physical infrastructure.

### Prosumer

- Prosumer, here, reflects part of the energy transition viz. the increased and, from a grid stability perspective, possibly disruptive production capabilities of small dispersed producers and also the increasing use of the electricity grid due to the increased electrification with HVAC (heat pumps) and electric mobility (EVs).

### Networks

- The scope of networks considers the role of the physical grid, the aggregator and the, mostly rural, community/smart city dimension. Physical aggregation as well as virtual aggregation are considered.



# Subtasks

## Subtask 14:

- Context analysis, use cases and Smart City pilots positioning

## Subtask 15:

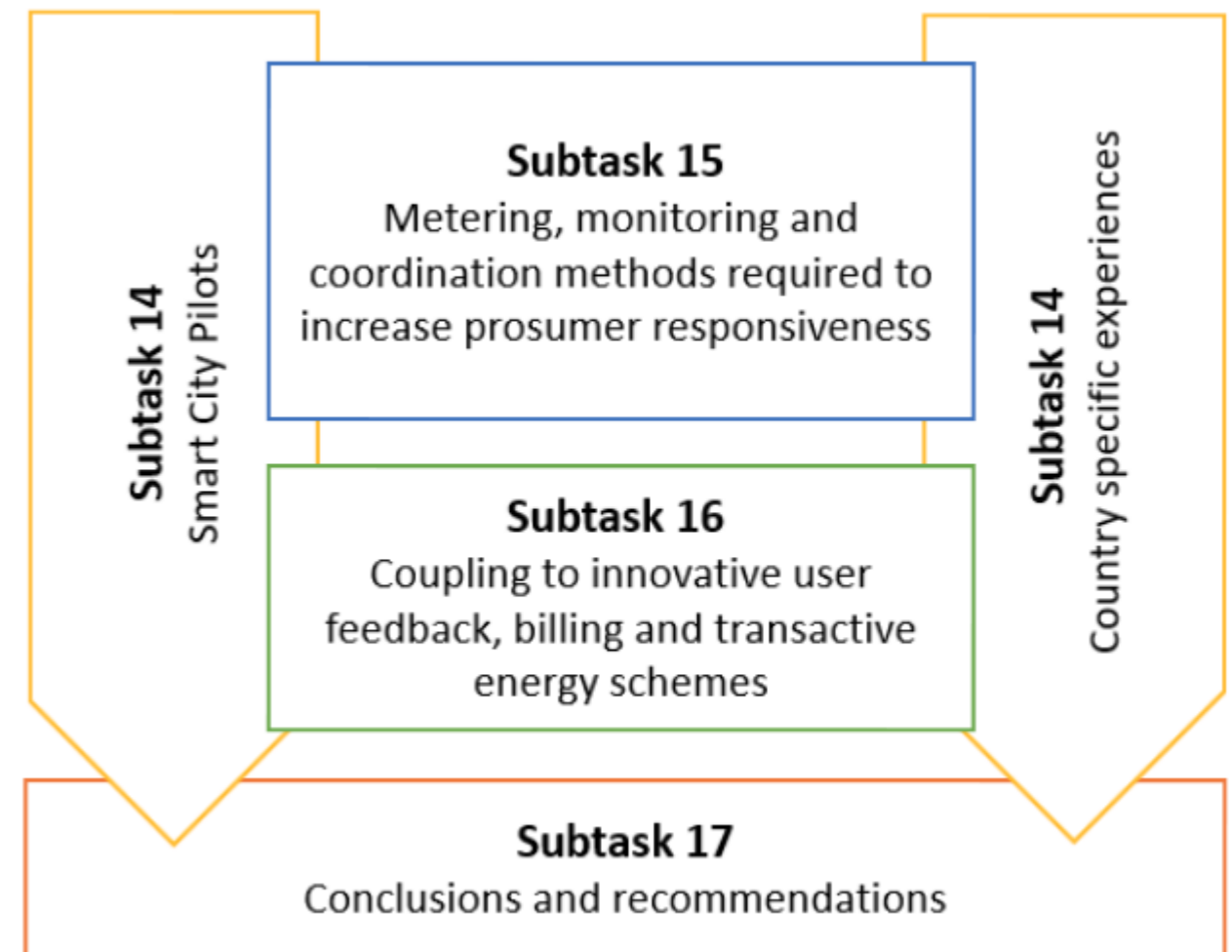
- Metering, monitoring and coordination methods required to increase prosumer responsiveness

## Subtask 16:

- Coupling to innovative user feedback, billing and transactive(P2P) contract schemes

## Subtask 17:

- Conclusions and Recommendations



## *Subtask 14 : Context analysis, use cases and Smart City Pilots*

### **14.1 Smart city projects scan**

- Scan of Smart city and Smart grid pilots of DSM
- Critical success factors for smart city projects including acceptance and impact
- Bottlenecks in upscaling successful pilots
  - How to increase technology readiness levels?

### **14.2 Granular large scale electricity monitoring**

- Use of smart meter data and other available data sources (big data)
- Analyze the end-user behavioral characteristics and their relation to system operation.
- Identify all sources of information that can help with assessing user behavior
- Classify and analyze behavioral changes that occur with customer energy transition, observed via metering and interviews.

### **14.3 Aggregator composition and control schemes**

- Portfolio (flexibility, curtailment, up- and down-regulation)
- Topology and level
- Operational requirements
- Control type (direct, indirect, transactional)

## *Subtask 15: Metering, monitoring and coordination methods required to increase prosumer responsiveness*

### **15.1 Commercial tariffs for flexible prosumers**

- Develop a better mapping of commercial tariffs to customer behavior
- Rewarding flexibility and responsiveness on individual basis
- Overview of advantages for the prosumer to offer small scale flexibility to other actors in the electricity system (e.g. aggregators).
- Assess the relation between tariffs and to already existing and future automated control schemes.

### **15.2 Distribution grid tariffs for flexible prosumers**

- Inventory of current and possible future distribution grid asset management, operation modes and associated tariff scheme components

### **15.3 Subsidies and taxes rewarding responsive prosumers**

- Possible new tax and subsidy schemes to accelerate energy transition

## *Subtask 16 :Coupling to innovative user feedback, billing and transactive energy schemes*

### **16.1 Existing feedback and billing**

- Make an inventory of existing feedback, reconciliation and billing systems for electricity
- Assess a number of pilots, that have been implemented with alternative approaches:
  - Transactive energy
  - P2P
  - Energy communities

### **16.2 Billing innovation**

- Develop common view on feedback and billing innovation (e.g. Ethereum/smart contracts)
- Analyze the influence of instant feedback and microtransactions on user behavior and responsiveness

## *Subtask 17: Conclusions and Recommendations*

Conclusions from the Smart City pilot scan focusing on responsiveness of prosumers

Recommendation for tariffs, subsidies and taxes activating responsive prosumers

Recommendations for policies for billing innovation rewarding flexible prosumers

## *Collaborations*

- IEEE, IEC and CENELEC standards committees
- ISGAN (SmartGrids)
  - Several annexes
- National stakeholder groups
  - NL/TKI Urban energy
- EERA JP Smart Grids
- DERLabs HESI-facility
- IEA/TCP
  - ECES (Storage)
  - HPT (Heat pumps)
  - PVPS (photovoltaic)

## *Project practical overview*

- **Project type:** Overview, knowledge extraction and recommendation
  - Operating Agent leads a team of experts from each participating country
- **Duration:** 2 years
- **Includes:**
  - 4 country expert meetings (biannually)
  - 2 stakeholder and expert meetings (annually)
  - Results disseminated via several national international workshops and conferences
- **Finances:**
  - Dependent upon the number of participating countries (>4); **32-24k€** for 2 years in total
  - In kind country expert contribution **200-300 hours** over 2 years in total

*Questions?*

anna.kosek@tno.nl

*More information?*

<http://www.ieadsm.org/>