IEA DSM Task 17
Phase 4: Responsive Prosumer Networks

Workshop IEA DSM Task 17: Responsive consumers and value of flexibility

23 May, Brussels

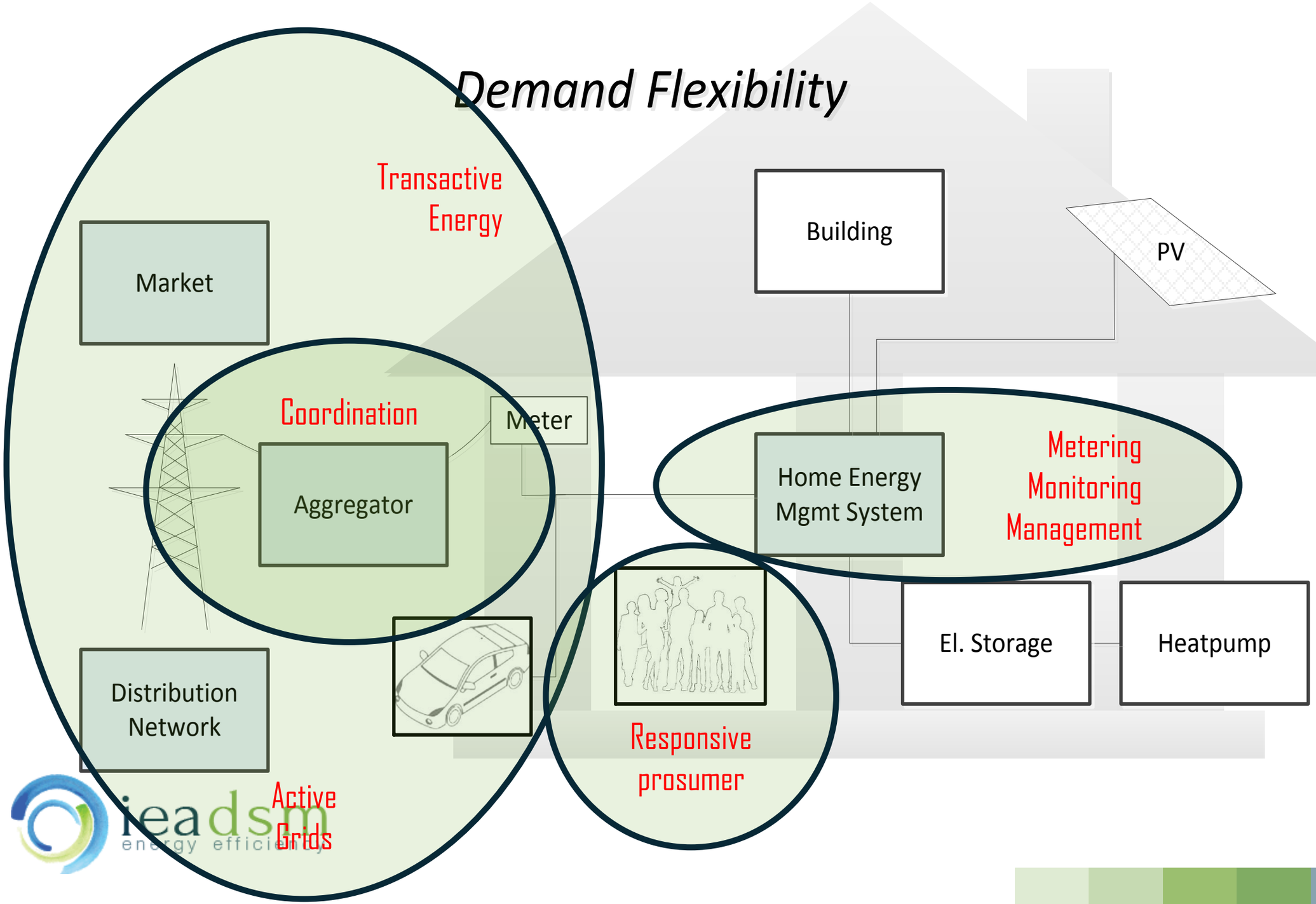
Anna Kosek, TNO

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)

ieadsm
energy efficiency

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

ieadsm energy efficiency

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

ieadsm energy efficiency

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

ieadsm energy efficiency

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

ieadsm energy efficiency

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.

ieadsm energy efficiency

Subtasks

Subtask 14:

- Context analysis, use cases and Smart City pilots positioning

Subtask 15:

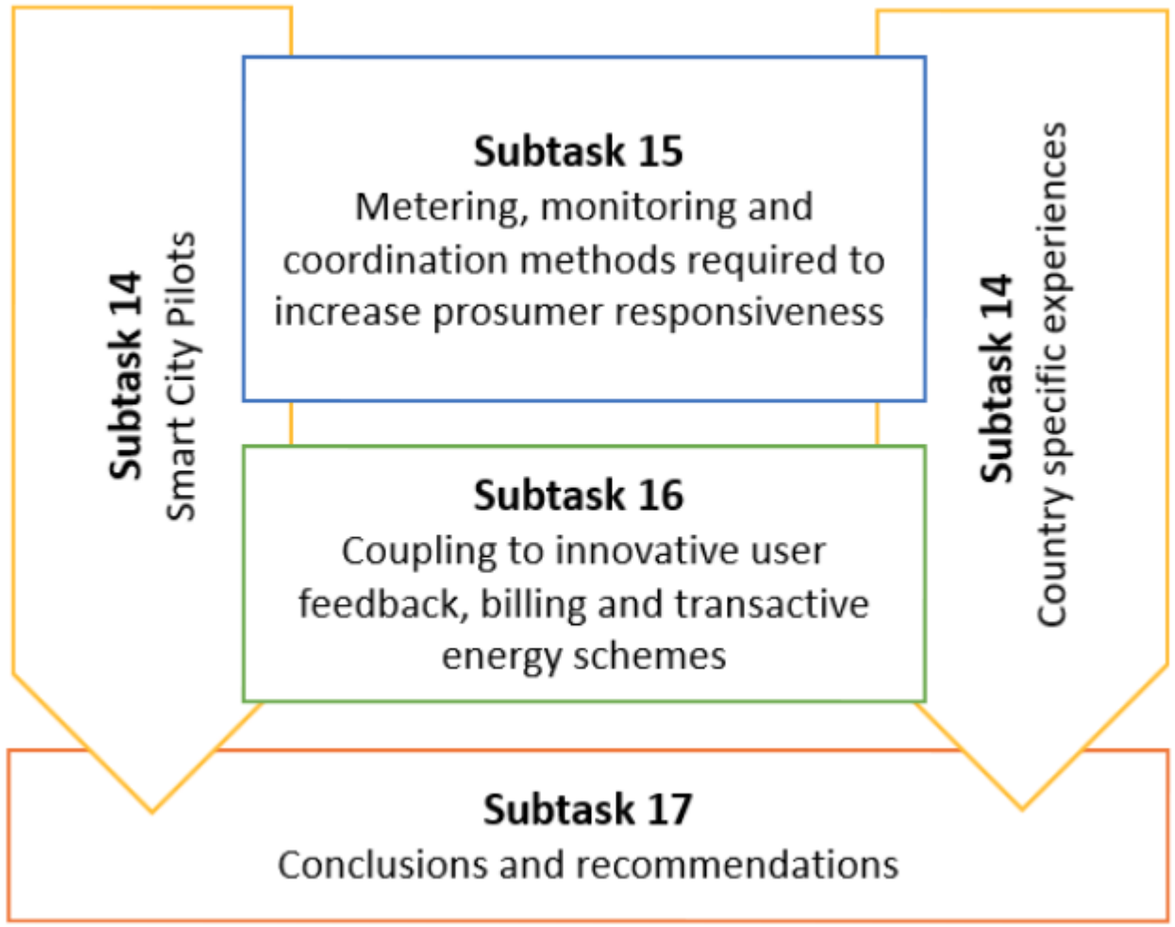
- Metering, monitoring and coordination methods required to increase prosumer responsiveness

Subtask 16:

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

Subtask 17:

- Conclusions and Recommendations



ieadsm
energy efficiency

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

ieadsm energy efficiency

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

ieadsm energy efficiency

Subtask 17 : Conclusions and Recommendations

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

Recommendation for tariffs, subsidies and taxes activating responsive prosumers

Recommendations for polices for billing innovation rewarding flexible prosumers

ieadsm
energy efficiency

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)

ieadsm
energy efficiency

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

ieadsm
energy efficiency

Questions?

anna.kosek@tno.nl

More information?

http://www.ieadsm.org/

ieadsm energy efficiency