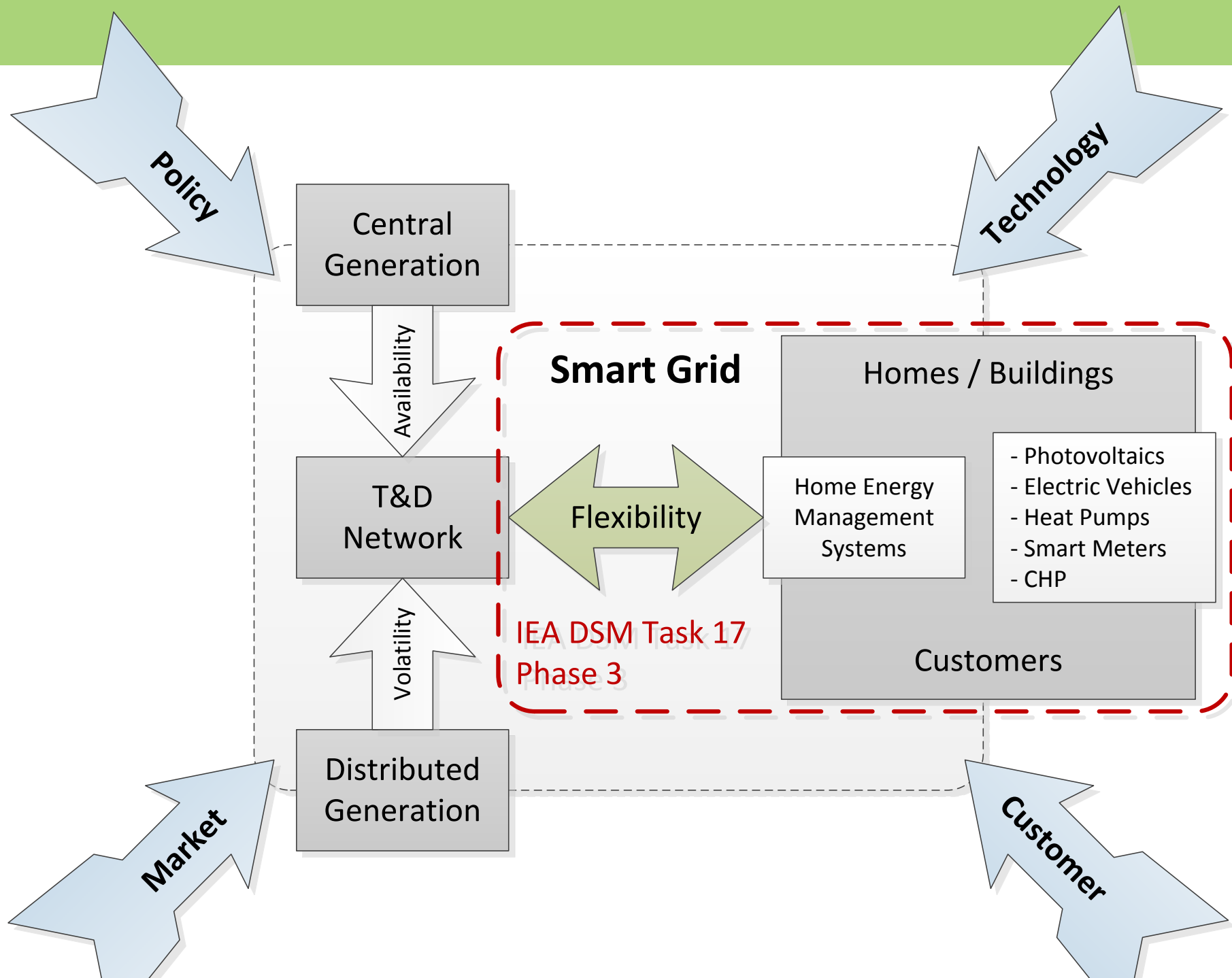


IEA DSM Task 17 (on DG, DSM and Storage) **Status ExCo Meeting Brussels**

René Kamphuis, TNO

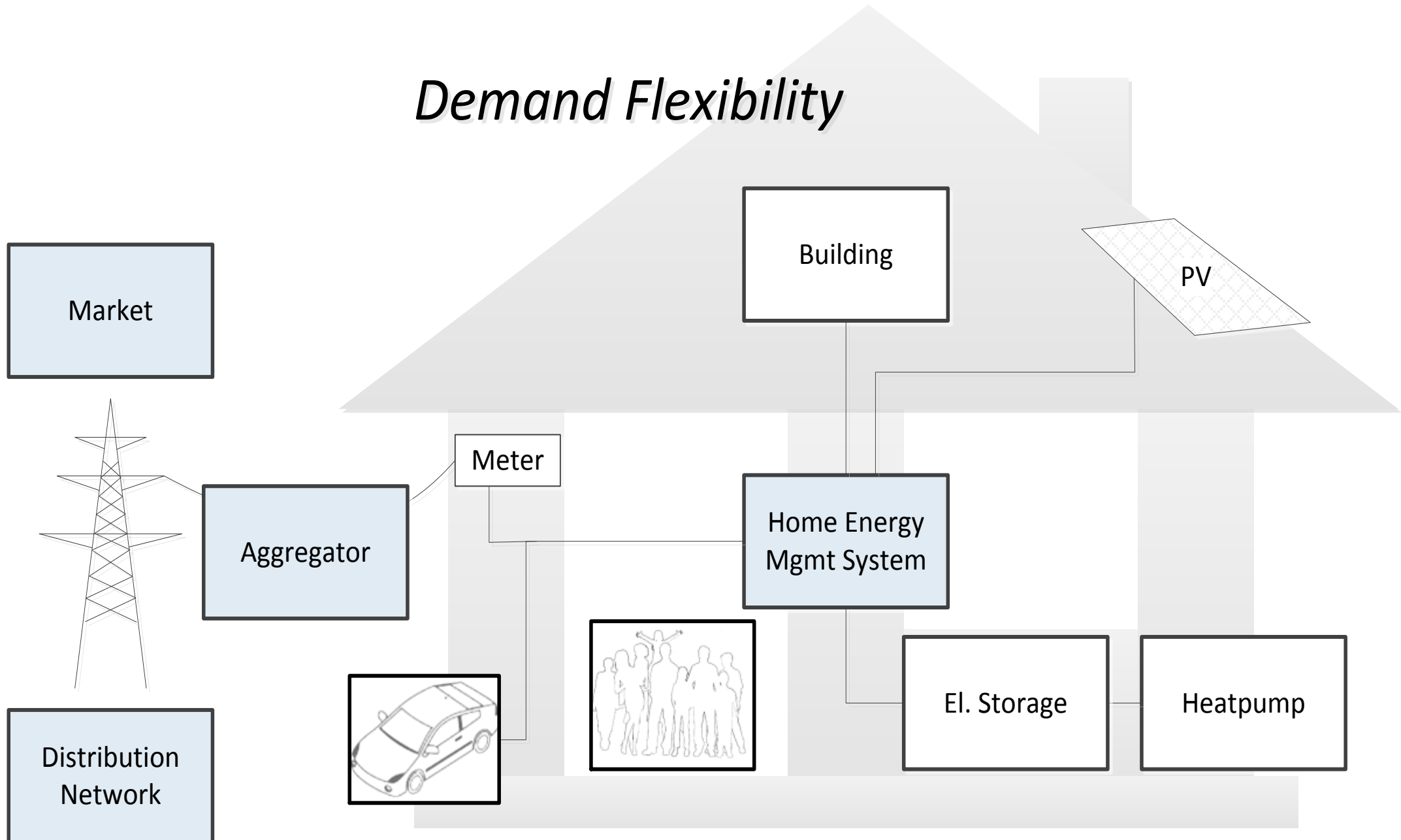
Matthias Stifter, AIT

Overview: Systems view



Overview: Deployment view

Demand Flexibility



Outweighing flexibility (Demand response <> Generation uncertainty)

End-user flexibility

- What technologies and potentials are there (ST-10)
 - Theoretical potentials per technology type
 - Roles of consumers and producers
 - Mechanisms to uncover potential ; non-automated <> automated

Roles and Potentials of Flexible Consumers and Prosumers

Demand Flexibility in Households and Buildings

IEA DSM Task 17

Matthias Stifter, René Kamphuis, Matthias Galus, Marijn Renting, Arnoud Rijneveld, Roman Targosz, Steve Widergren, Lars Nordstrom, Daniel Brodén, Tara Esterl, Stephanie Kaser, Pekka Koponen, Stephen Galsworthy, Werner Friedl, Suryanarayana Doolla

End-user flexibility

- What technologies and potentials are there (ST-10)
 - Theoretical potentials per technology type
 - Roles of consumers and producers
 - Mechanisms to uncover potential ; non-automated <> automated
- Peak load reduction potential up to 30 %
- CPP needs considerable incentive to invoke response
- Innovative/ automated schemes enable more efficient harvesting of DR

Outweighing flexibility (Demand response <> Generation uncertainty)

End-user flexibility

- How can flexibility be uncovered and valorised (ST-11)
 - Communication and metering
 - Commercial use on electricity markets <> Usage during grid operation
 - Aggregation
 - Cost-benefits analyses

Valuation Analysis of Residential Demand Side Flexibility

Demand Flexibility in Households and Buildings

IEA DSM Task 17

Tara Esterl, Stefanie Kaser, Matthias Stifter, René Kamphuis, Matthias Galus, Marijn Renting, Arnoud Rijnveld, Roman Targosz, Steve Widergren, Lars Nordstrom, Daniel Brodén, Stephen Galsworthy

Outweighing flexibility (Demand response <> Generation uncertainty)

End-user flexibility

- How can flexibility be uncovered and valuated (ST-11)
 - Communication and metering
 - Commercial use on electricity markets <> Usage during grid operation
 - Aggregation
 - Cost-benefits analyses
- Actor interplay differs per country
- Current CBA methodologies (NL, EU, US, AU) emphasize different aspects
- Refinements and constraints
 - Asset investment <> Operational cost
- Valuation at macro, meso, micro and nano level
- Innovative instruments needed for providing proper incentives
 - Transactive energy schemes

Outweighing flexibility (Demand response <> Generation uncertainty)

End-user flexibility

- What are the practical experiences (ST-12)
 - Pilot studies
 - Best practices
 - Practical potential per technology type

Pilot Studies and Best Practices

Demand Flexibility in Households and Buildings

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Outweighing flexibility (Demand response <> Generation uncertainty)

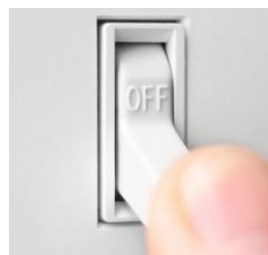
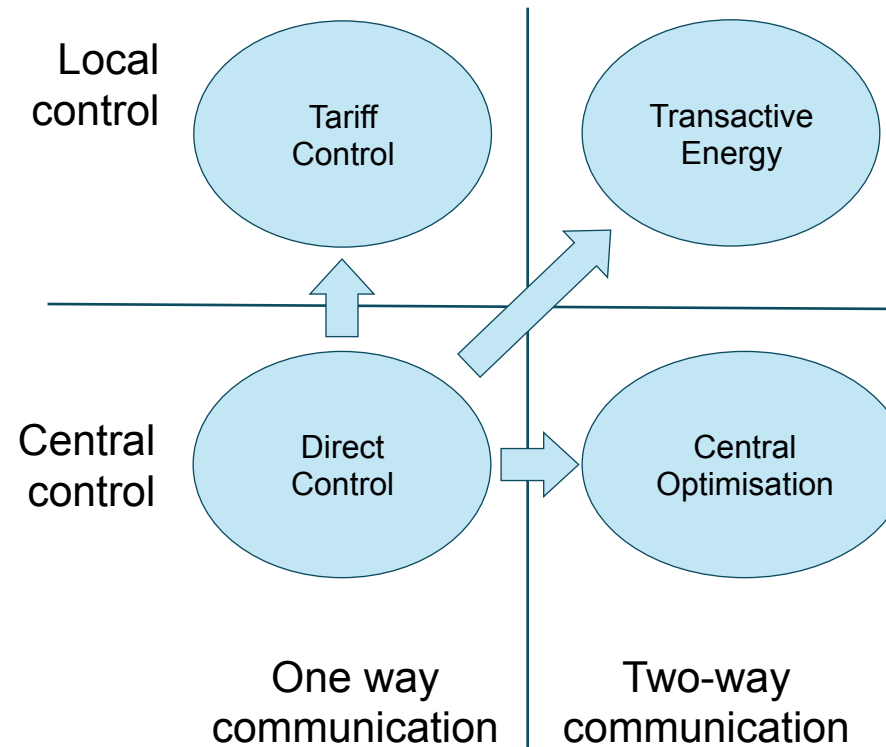
End-user flexibility

- What are the practical experiences (ST-12)
 - Pilot studies
 - Best practices
 - Practical potential per technology type
 - ICT architecture of living lab tests
 - Measured response per technology type
 - Wet appliances, DHW
 - TCL (thermostatically controlled loads)
 - EV chargers
 - Scaling-up technologies at affordable cost
 - 20-40 Euro/yr benefits in current markets
 - Mobile ICT-technology developments increase low-cost connectivity
 - Computing cloud implementations bring cost down and simplify system management
 - Local footprint reduced to only a gateway

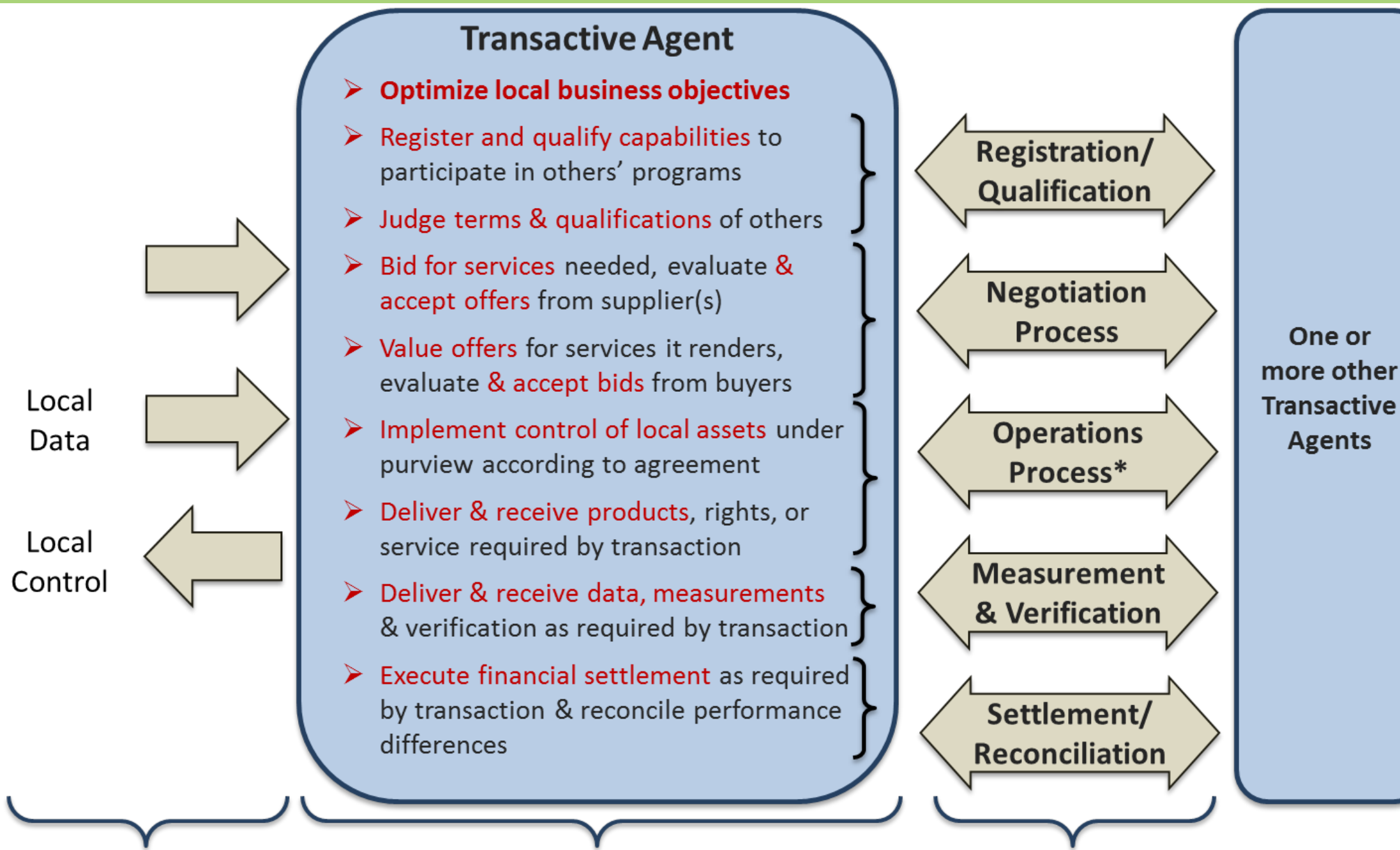
Possible interaction topologies

- **Direct (Top-Down) Control**
 - Top-level Actor switches devices
 - No local information used
- **Central Control and Optimization**
 - Optimisation and control from a central point
 - Relevant local information has to be communicated to a central point
- **Tariff Reaction for control**
 - Prices are transmitted to customers and/or their automated devices
 - No local information is communicated
- **Transactive Energy (TE)**
 - Automated devices are participating in market interactions
 - Information exchange on the basis of quantity (e.g., kW and kWh) and price

DAY	2	4	6	2	1	8	kWh
NIGHT	1	4	6	2	6	8	kWh
ESB 12345678							RM 513



Transactive grid interactions



Outweighing flexibility (Demand response <> Generation uncertainty)

Summary

Conclusions and recommendations

Conclusions and Recommendations

Demand Flexibility in Households and Buildings

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Outweighing flexibility (Demand response <> Generation uncertainty)

End-user flexibility

- Conclusions and recommendations (ST-13)

- Market design
- Incentives/ disincentives
- Policy/ regulation

- Use tariffs with clearer mapping of impact of supply and demand on grid
- Connection capacity fees to real-time power distribution tariffs
- From a regulatory perspective, allow for market driven usage of flexibility; prosumer is flexibility consumer
- Set clear nondiscriminatory rules for using the network.
- Design rules on how and when to intervene into markets (e.g. USEF)
- Avoid creating barriers for using flexibility

End-user flexibility

- Conclusions and recommendations (ST-13)

- Market design
- Incentives/ disincentives
- Policy/ regulation
 - Set simple rules for optimizing at self-consumption and community
 - Use end-user flexibility for efficient network planning and expansion
 - Allow actors to make the transition into their new roles (e.g. USEF)
 - Design attractive energy dashboard products using social media
 - Use Internet marketing logics to attract consumers and prosumers
 - Enforce privacy and data security by the design of the hardware and software

Expert meetings

Experts meetings

Date	Place	# of Experts	Type of meeting	Government	Industry	Acad
2016-03-08	Webmeeting	8	Web	1	2	
2016-05-10	Linz/Austria	6	Real	0	1	
2016-07-28	Webmeeting	6	Web	1	0	
2016-08-26	Webmeeting	8	Web	1	2	

Seminars

Seminars/Conferences

Date	Place	Participants	Type of meeting	Government	Industry	Academics
16-05-09	Linz/Austria	~40	IEA Joint Symposium	10	15	15
16-09-28	Australia	30	Lecture on DR	5	5	20
16-09-15	Netherlands	~100	Meeting Dutch Power association; National Dissemination	10	70	20

Progress/Budget

EA-DSM TASK XVII - Phase 3	Q2 14	Q3 14	Q4 14	Q1 15	Q2 15	Q3 15	Q4 15	Q1 16	Q2 16
Subtasks									
Subtask 10 - Role and potentials of flexible consumers									
Subtask 11 - Changes and impact on the grid and market operation									
Subtask 12 - Sharing experiences and finding best practices									
Subtasks 13 - Conclusion and recommendations									
Expert meetings									
Biannual country expert meeting									
Workshops									
Workshops with stakeholders and experts									
Reports									
Subtasks reports									
Final report									

AIT

TNO

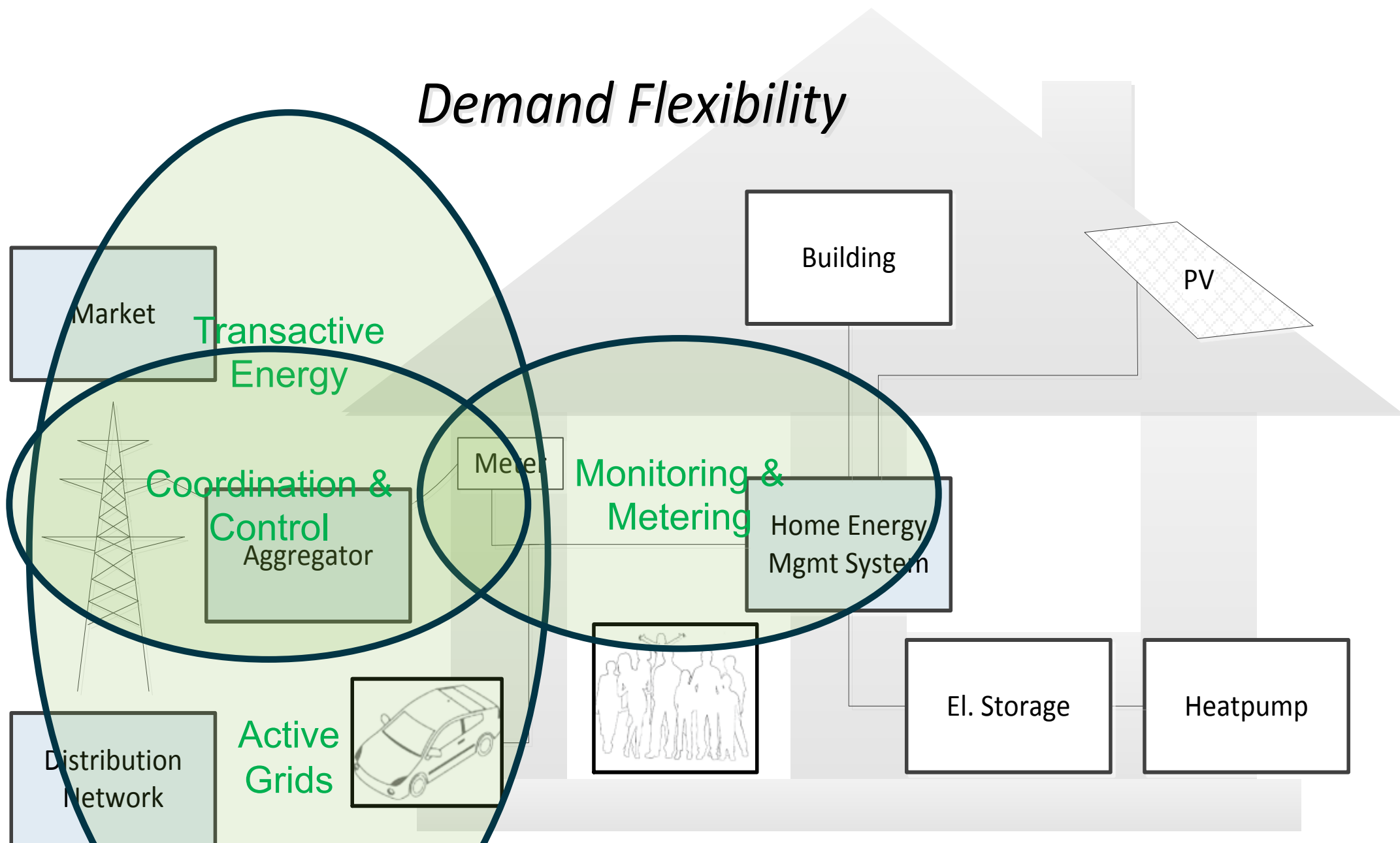
Approx. 85 kEuro realized / 81 planned

Approx. 86 kEuro realized / 81 planned

Participating (S, NL, ECI, US, CH, A)

Phase 4: One step further

Demand Flexibility



*Phase 4; DemandSideManagement ->
DemandSideIntegration (based on conclusions phase 3)*

Metering -> Monitoring

Control -> Coordination

Passive -> Active (distribution) grids

Tariffed -> Transactive Energy

Questions

AIT Austrian Institute of Technology	TNO Netherlands organization for science and technology
Matthias Stifter	René Kamphuis
Energy Department Electric Energy Systems	Energy efficiency program Monitoring and control systems
Giefinggasse 2 1210 Vienna Austria T +43(0) 50550-6673 M +43(0) 664 81 57 944 F +43(0) 50550-6613 matthias.stifter@ait.ac.at http://www.ait.ac.at	Eemsgolaan 3, 9727 DW Groningen T +31 (0) 621134424 PO Box 1416 9701 BK Groningen The Netherlands rene.kamphuis@tno.nl www.tno.nl