IEA DSM Task 17

Status ExCo Meeting Halifax

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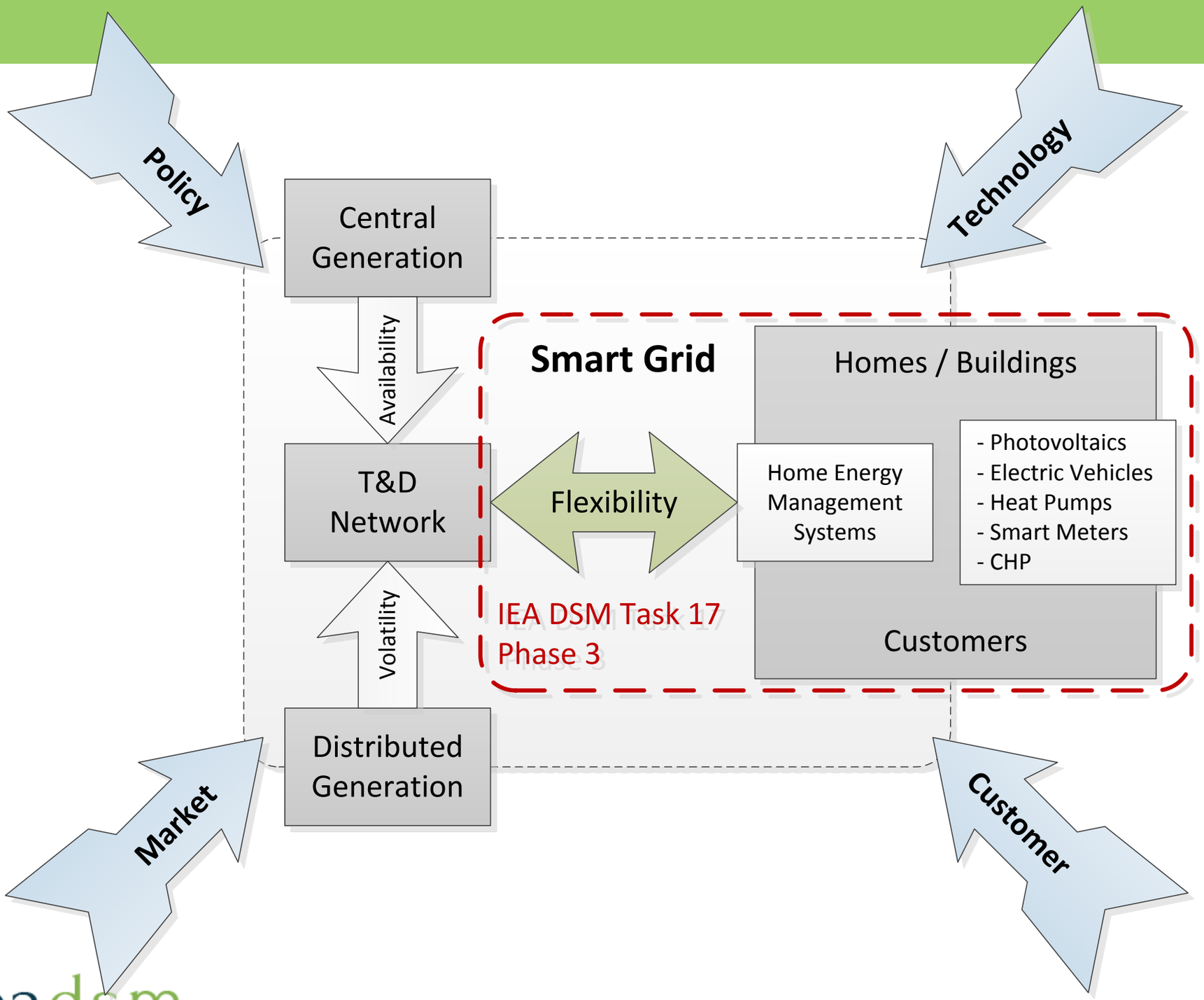
ExCo Meeting Halifax (Canada)

October 22-23, 2015

Overview: Systems view on enabling the Smart Grid



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Outweighing flexibility (Demand response <> Generation uncertainty)

- Focus on the **enabling of flexibility in electricity production and consumption** 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?

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Subtask 10 - Role and potentials of flexible consumers

- **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

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Subtask 11 - Changing to new roles for actors

- Methodology development for **assessing / quantifying impact**
- Grid, market and customers (prosumer/consumer)
- Sharing common benefits/losses
- **Optimization** potential (e.g. building management system)
- **Regulatory** and **legislative** requirements
- Cost Benefit Analysis for DR

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Subtask 12 - Sharing experiences / finding best practices

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

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Subtask 13 - Conclusions and recommendations

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

Progress of Subtasks

Progress Subtask 10 - Role and potentials of flexible consumers

Objectives

- Assess the concepts and implementations of customer and home energy management systems (CEMS/HEMS), possibly linked to the smart meter, in different (participating) countries

Deliverable

- Roles, Potentials and Interactions of Flexible Consumers and Prosumers

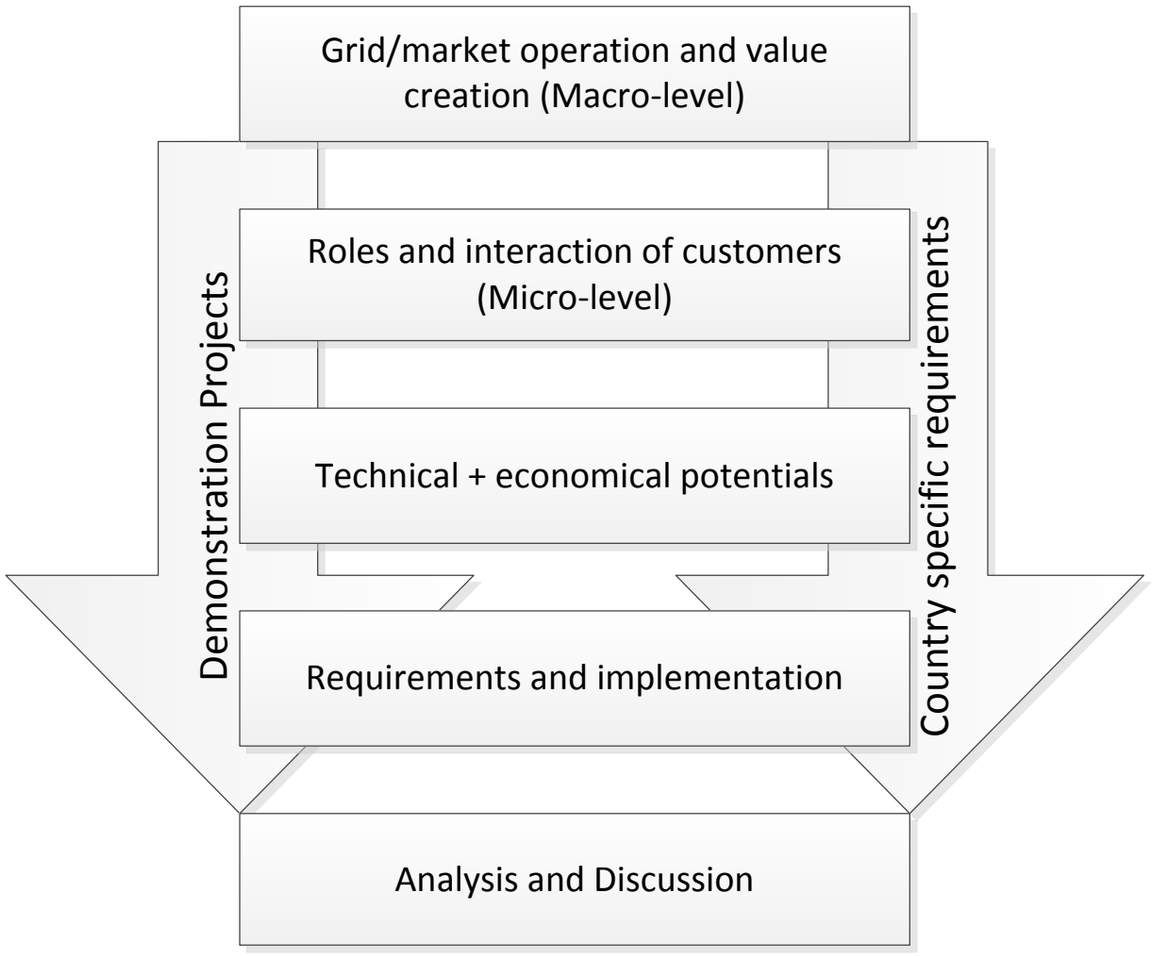
Progress:

- Decent discussion of the document structure and content
- Comments from experts have been incorporated
- A second draft has been commenced and is expected to be shared for comments and inputs at mid October.

Progress Subtask 10 - Role and potentials of flexible consumers

Approach

- Requirements for processes from the **micro** and **macro perspective**. The macro perspective includes power distribution and commercial operation.
- An important aspect of this is the virtual **aggregation** and **service** provisioning.
- Analysis of **demo projects**
- **Country** and **regional** specific differences



Progress Subtask 10 - Role and potentials of flexible consumers

Structure

- Introduction
  - Actors
  - Energy System
  - Demand Response
- Role of distributed DR
  - Services and value creation
  - Barriers and Risks
- Distributed DR Resources and Potentials
  - Resources
  - Characterization
  - HEMS
  - Aggregation
  - Potentials
  - EM&V

Progress Subtask 11 - Changes and impacts on grid and market operation

Objectives

- Assess the impact on grid and market operation based on technology penetration scenarios developed in subtask 5 and 9 (developed in phase 2).

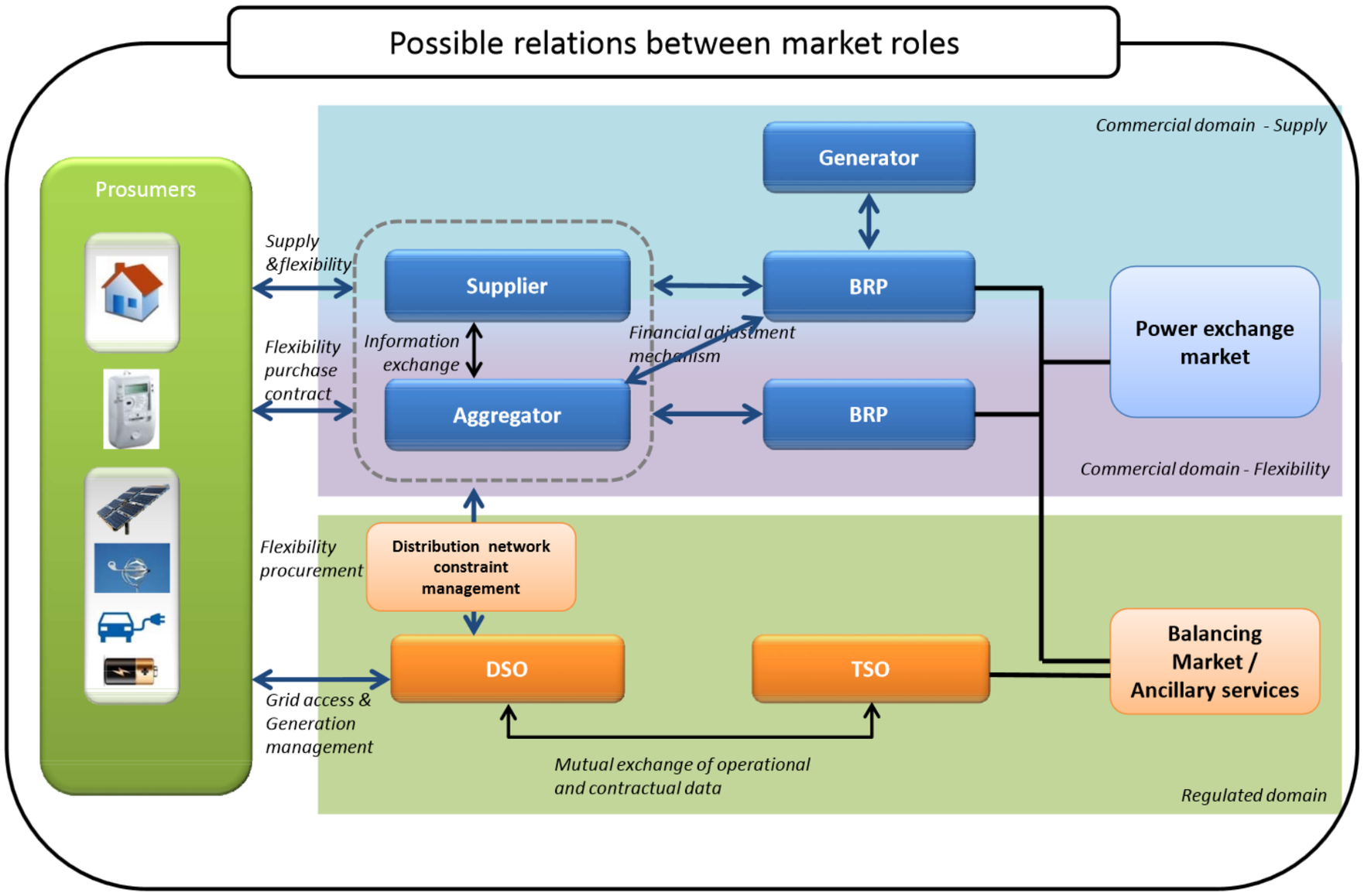
Deliverable

- Financial and maturity assessment of technologies for aggregating DG-RES, DR and electricity storage systems

Progress:

- Inputs from the experts, studies and workshop participants have been received by the OA.
- Experts contribution to Cost Benefit Analysis of DR
- First draft is prepared for mid October.

Progress Subtask 11 - Changes and impacts on grid and market operation



SGEG3 – Regulatory Recommendations for the Deployment of Flexibility

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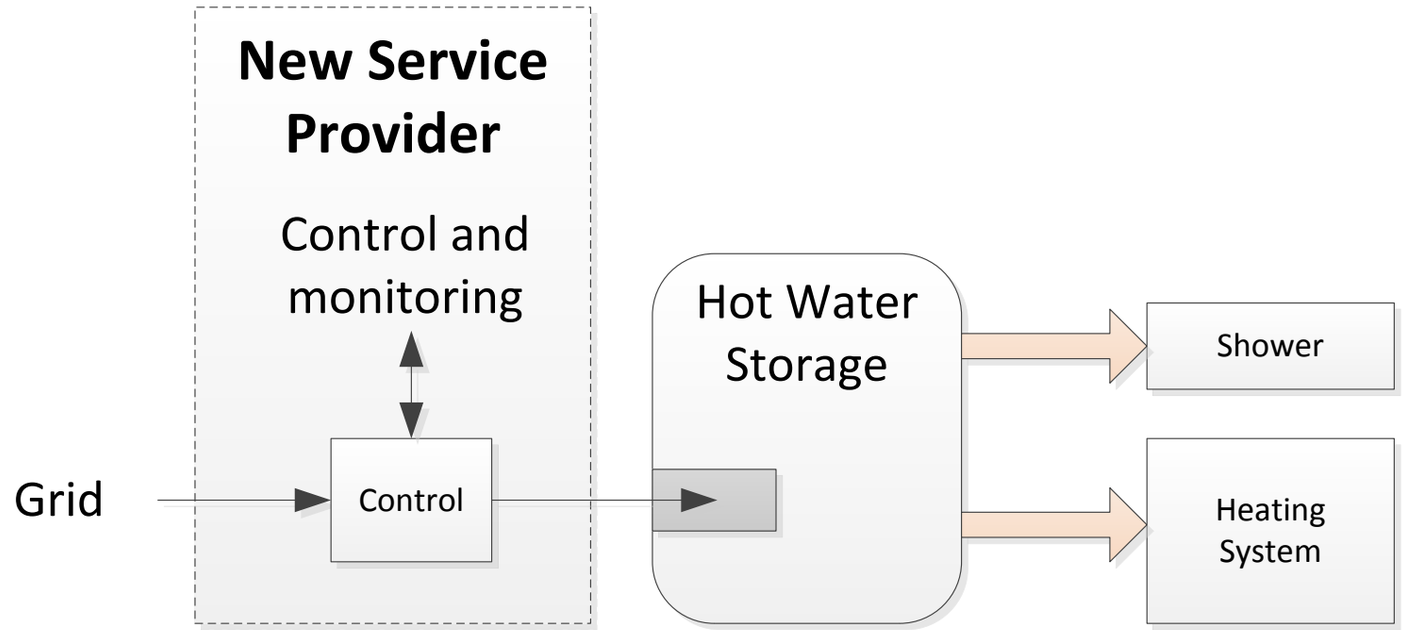
Progress Subtask 11 - Changes and impacts on grid and market operation

Example for DR Resource and Business Case

- Shifting water heating to optimize with volatile generation
- No customer impact, preserve comfort
- Pooling of „very small units“
- Boiler prepared and can be upgraded with GPRS connectivity
- System control and permanent monitoring (status of storage)
- New market player deals with data, security, customer involvement



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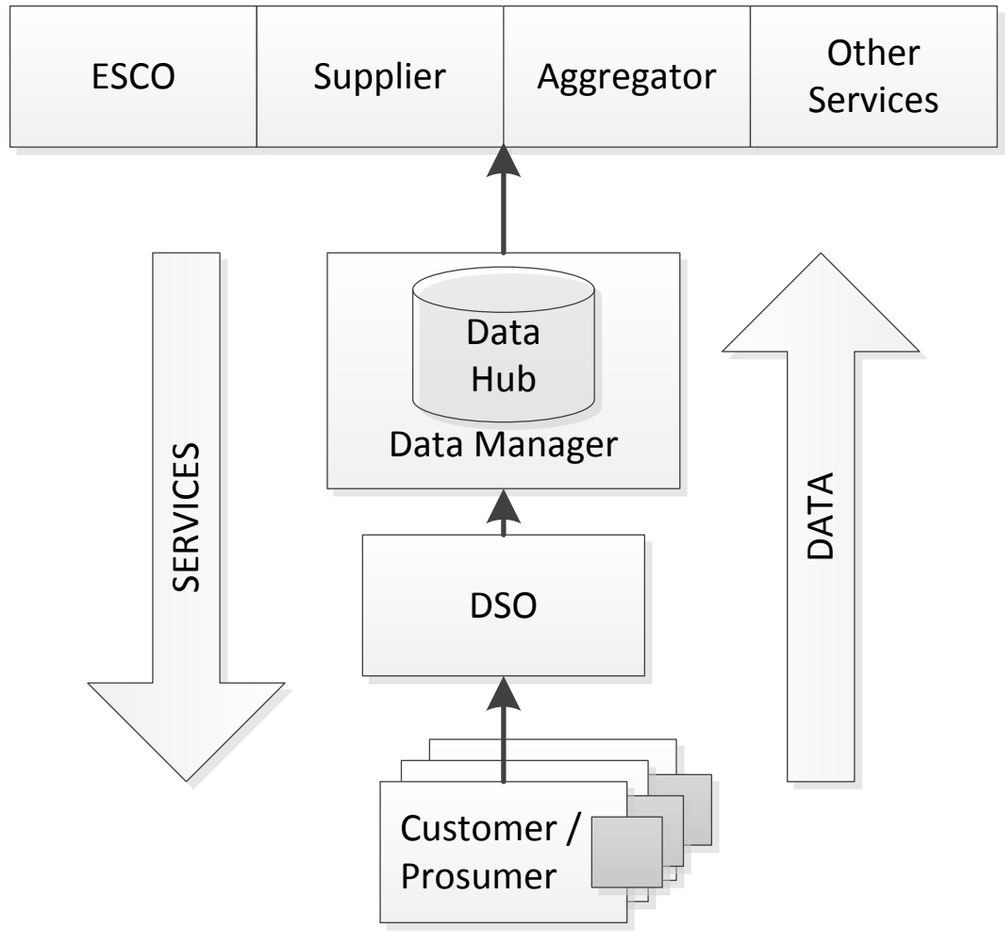
Customer Data Management to enable Flexibility

- DataHub for enabling new business models and services
  - Virtual Power Plants / Aggregator
  - Flexibility Operators / Demand Response
  - ESCO / Energy efficiency
  - Smart Homes



Progress Subtask 12 - Sharing experiences and finding best practices

Objectives

- Based on the collected **pilots** and **case studies** from the previous subtasks, the results and findings of the finished projects in term of **successful implementations**, **barriers** and **effectiveness** will be analyzed.

Deliverable

- Best practices in applying aggregated DG-RES, DR and Storage for retail customers

Progress:

- Important and representative projects have been collected from the expert's presentation and inputs.
- Interviews to specific projects have been carried out and results have been analyzed
- The selected pilot projects are taken for the analysis part of the deliverable from Subtask 10.
- Additional input from international workshops have been gathered and compiled for the document.

Progress Subtask 12 - Sharing experiences and finding best practices

Projects

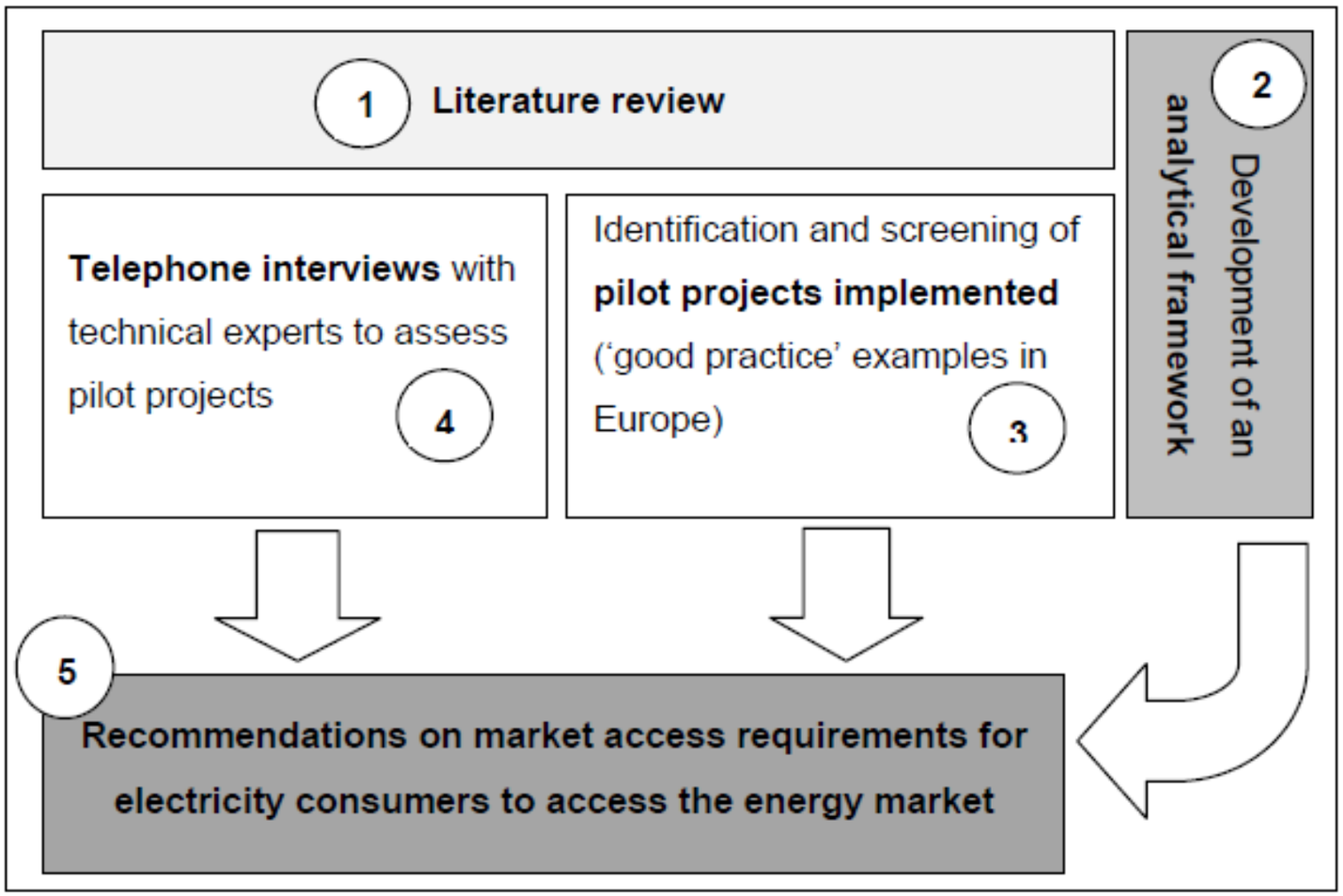
- HiT – Buildings as interactive participants in the grid
- EcoGridEU
- gridSmart
- PowerMatcher
- …

Master thesis

- *"Lessons learned from European pilot projects"*
  (Julia Schmidmayer, AIT)

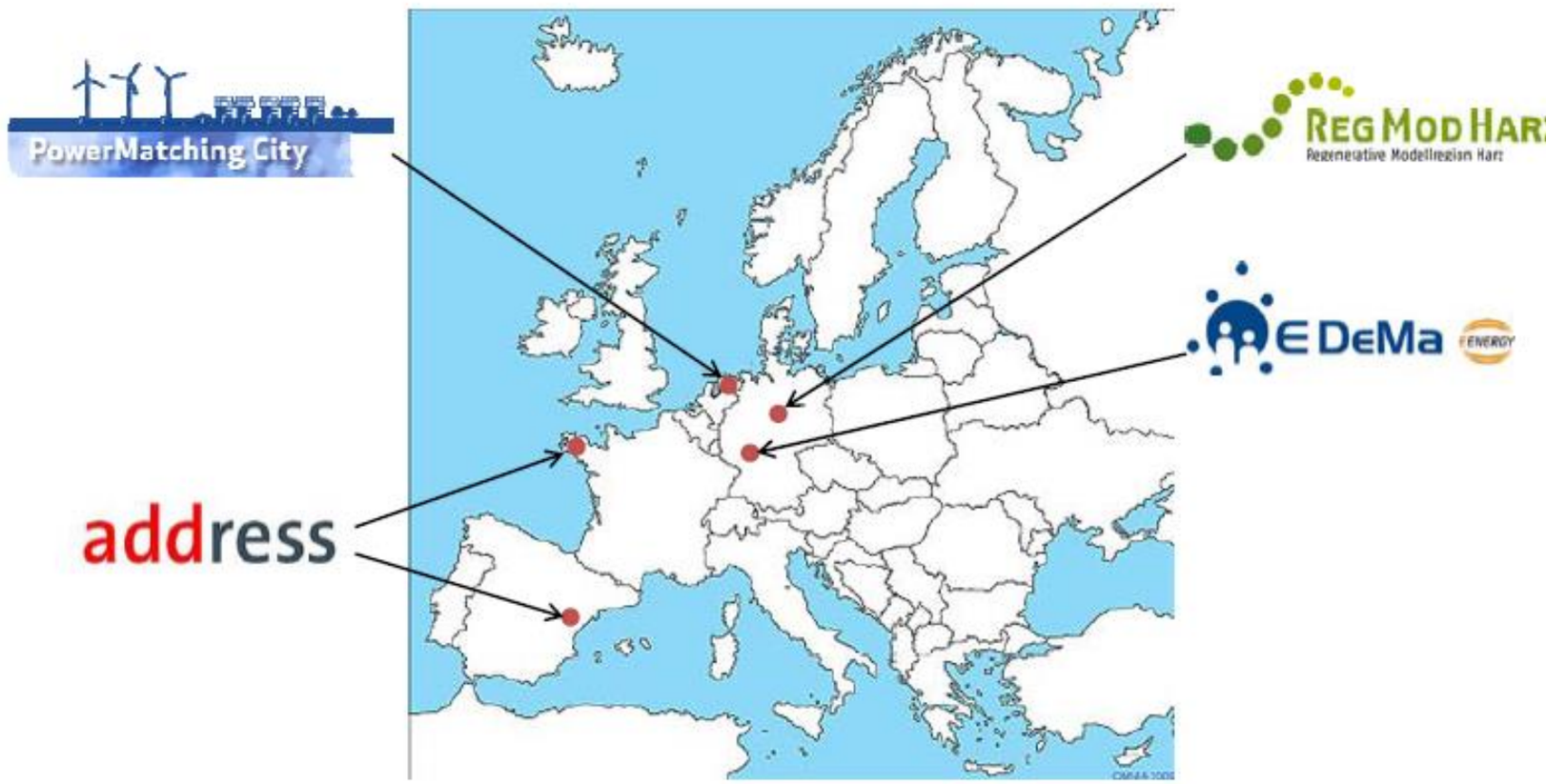
Progress Subtask 12 - Sharing experiences and finding best practices

Methodology approach



Progress Subtask 12 - Sharing experiences and finding best practices

Projects



Progress Subtask 12 - Sharing experiences and finding best practices

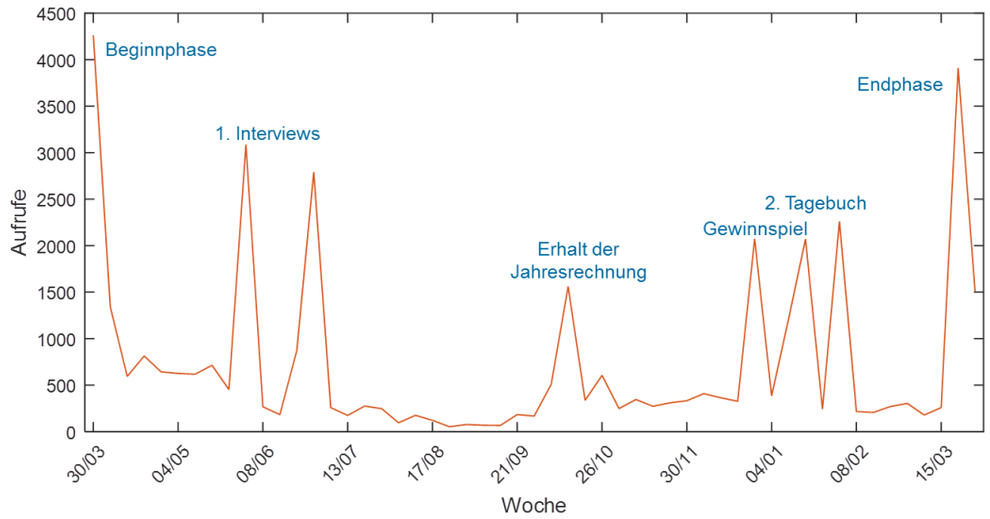
Analytical Framework

Assessment of pilot projects along a set of indicators grouped in four categories

- **Participation and acceptance of consumers** (e.g. user activation, access to information, data security & privacy)
- **Institutional and regulatory framework** (e.g. definition of roles and responsibilities of market players, formalization of interactions between different parties)
- **Economic and financial aspects** (e.g. business models, profitability)
- **Technical aspects** (e.g. data communication standards, enabling technologies, interoperability)

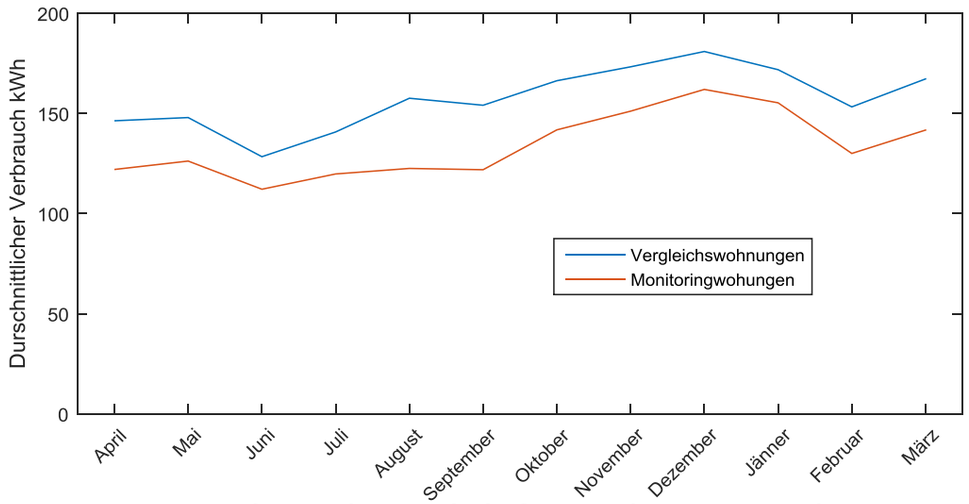
SGMS-HiT - Consumer Evaluation

- Usage of *Smart Center*



Activity only triggered by external events

- Energy consumption
  - EcoButton is used
  - Dish washer shiftable
  - Cooking not shiftable
  - Comfort for consumption



Energy savings through information campaign.

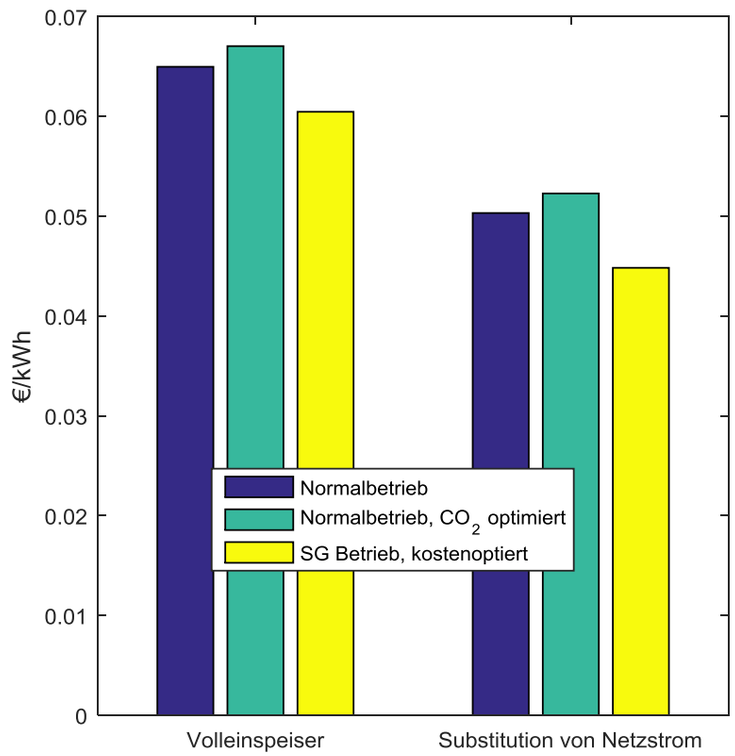
SGMS-HiT – Evaluation of automated DR

- Potentials of automated load shifting:

Heat source	Red	Yellow	Green
CHP	+17 %	-11 %	-6 %
HP	-12 %	+9 %	+3 %

Price forecast for the next 12 hours

- Cost savings



Blue: Normal operation
Green: Normal + CO2 optimized
Yellow: Smart Grid – cost optimized

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Progress Subtask 13 - Recommendations

Objectives

- Recommendations will arrived at in close interaction with the experts' opinions and will at least provide a ranking based on impacts, costs and likely future penetration of the technologies.

Deliverable

- Final recommendations.

Progress Subtask 13 - Recommendations

1. **Community creation supports user activation** as the sense of belonging to a community influences the engagement and participation
2. **Variable tariff models need to offer an added value** for an acceptable price to attract consumers
3. Based on the visualized electricity consumption data **consumers can be incentivized with premiums and other rewards** to participate in DR programs
4. **Data protection, privacy & security aspects need to be considered** when ICT infrastructures and systems are designed and participation agreements with consumers concluded
5. The institutional and regulatory transformation of the energy market requires the **introduction of new market players** that develop services attractive for consumers
6. **Detailed cost-benefit-analyses** are crucial for defining the added value of business models; financial advantages for consumers are quite low. Thus, aggregators respectively companies, who offer aggregation services, need to concentrate on key messages on a broader level in order to attract consumers
7. **Standardization and interoperability of technologies proved to be a basic condition** for interaction of technical appliances and enabling technologies.

Status, Outreach and Planning

Meetings

Date	**Place**	**# of Experts**	**Type of meeting**	Government	Industry	Academic
13.3.2015	Webconference	7	Web Meeting	0	3	4
09.06.2015	Webconference	7	Web Meeting	1	2	4
29.06.2015	Expert Meeting	13	Task Meeting	2	3	8

Meetings and Seminars

Seminars

Date	**Place**	**Partcipants**	**Type of meeting**	Govern-ment	Industry	Academic
29.06.2015	Eindhoven, NL	100+	Workshop (organizer)	20	35	45
10.9.2015	EPFL, Lausanne, CH	100+	Conf. (public)	20	40	40
11.9.2015	EPFL, Lausanne, CH	25	Workshop (invited)	5	10	10
30.9.2015	Australia	20	Lecture	0	12	3
15.10.2015	Webinar	50-100(?)	Webinar	20%	40%	40%

Objectives for the upcoming months

Reports

- **Subtask 10 - Role and potentials of flexible consumers**
  - Deliverable of Subtask 10: *Current role and potentials of flexible consumers and producers in commercial segments, households, communities and buildings*
  - The final discussion and finishing of the document is expected for the next expert meeting at the end of 2015.
- **Subtask 11 - Changes and impacts on grid and market operation**
  - Prepare and Discuss Deliverable of Subtask 11: *Financial and maturity assessment of technologies for aggregating DG-RES, DR and electricity storage systems*
- **Subtask 12 - Sharing experiences and finding best practices**
  - Update and Analyse projects.
- **Subtask 13 – Recommendations**

Publication

- Conference or Journal

Planned Meetings and Seminars

Meetings

Date	Place
November 2015	Expert Meeting
Spring 2016	Expert Meeting
Summer 2016	Final Expert Meeting

Seminars

Date	Place
30.9.2015	Lecture on IEA Task 17 (Australia)
15.10.2015	Leonardo Webinar on DR Task 17
Summer 2016	Final public Workshop/Conference Maybe in conjunction with other IEA ETIs / Tasks

Outreach

- **IEEE Panel Session on DR**: Dream or Reality – IEEE PowerTech Eindhoven
- Ongoing exchange with potential new participating countries
  - Contact with Australian Expert – Lecture on Task 17 / Joining highly possible
  - Contact with Serbia – no funding but high interest
  - Contact with experts from Finland → Highly probable to join in Spring 2015
- Member of the *'Flexibility in Power Systems Advisory Panel'* for Ecofys study (Matthias) – Flexibility Roadmap published.
- **Leonardo Webinar** - Integrating renewables and enabling flexibility of households and buildings – IEA DSM Task 17
- Presentation at the Workshop **DEMAND-SIDE FLEXIBILITY FOR ENERGY TRANSITIONS** (EPFL Energy Center and International Risk Government Council)

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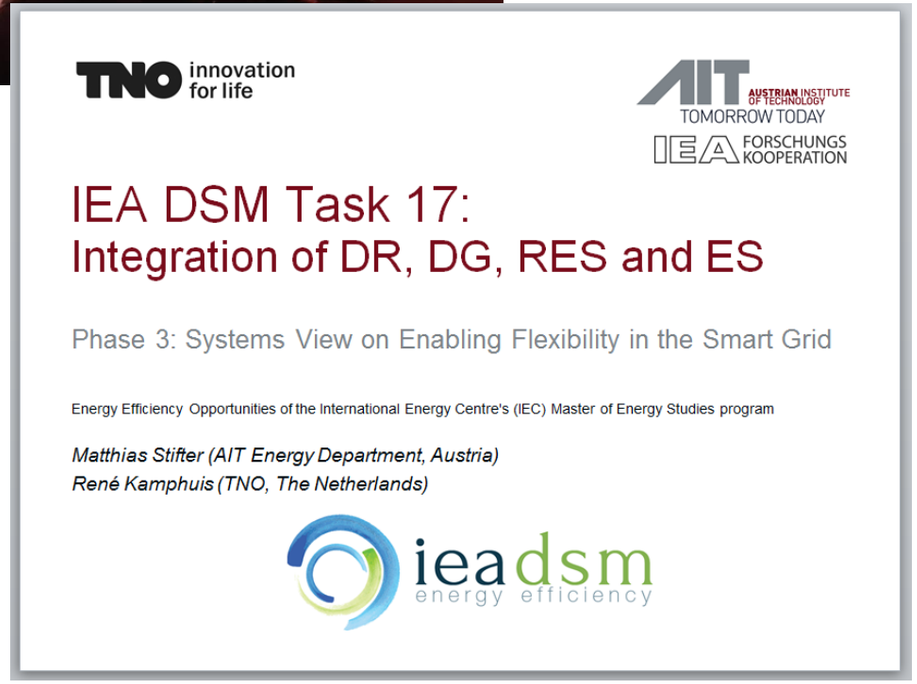
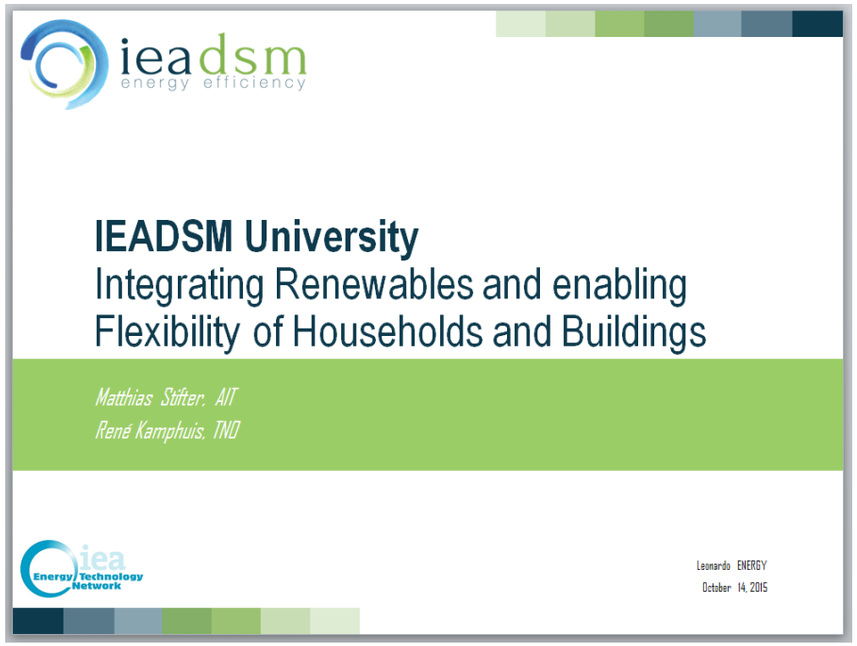
Outreach

- Panel Session on DR

- Lecture on DR



- Webinar on DR



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Participation

Country	Commitment
Austria	Y
Switzerland	Y
Swede	Y
Copper Alliance	Y
The Netherlands	Y
USA	Y
Italy	N
Belgium	N
Serbia	N
India	N
Germany	N
Finland	N
Australia	N

Joint IEA Expert Meeting

IEA Energy Experts Exchange on Demand Response and Flexibility

Smart Grids Week Austria May 2016

IEA Demand Side Management – Task 17: Integration of Demand Side Management, Distributed Generation, Renewable Energy Sources and Energy Storages

IEA DSM - Task 24 Closing the Loop: Behaviour Change in DSM – From Theory to Practice

IEA DSM - Task 25 Business Models for a more effective market uptake of DSM energy services

IEA HPP Heat Pump Program – Annex 42: Heat Pumps in Smart Grids –

IEA ECES Energy Conservation through Energy Storage – Annex 28: Distributed Energy Storage for the Integration of Renewable Energies“ (DESIRE)

IEA ECB Energy in Buildings and Communities - Annex 58 – Reliability and Energy Performance

IEA ECB Energy in Buildings and Communities - Annex 67 – Energy Flexible Buildings

ISGAN – Annex 6 Power T&D Systems

IEA PVPS - Task 14 High Penetration of PV Systems in Electricity Grids

IEA Hybrid & Electric Vehicle – Task 28: Home grids and V2X technologies

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Questions

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