

DSM Task 17 – Phase 4 – Definition Proposal

Responsive prosumer networks

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1 Introduction

Phase 3 of Task 17, applying DG-RES, DR and storage in electricity grids, came with a set of conclusions and recommendations [1]. These pertain to new business models and roles of actors in the electricity value chain, new tariff structures and transaction mechanisms and new ICT technology options, that facilitate user and actor awareness of energy and electricity use.

The Paris treaty regarding reducing worldwide emission of greenhouse gases has accelerated the energy transition. The transition follows the trias energetica with first an increase of energy efficiency, moving to renewable generation and reducing emission for fossil fuels. The energy transition is also reflected by the European commission in November 2016 in the “winter package” of directives for energy [2]. The window of opportunity for applying smaller scale energy resources in the energy system can be seen to become wider in the near future. Traditional retail and commercial consumers are in an evolution process to ‘prosumers’ and traditional electricity commodity retailers have to provide additional services in new business models.

Phases 1-3 of Task 17 have collected a valuable amount of information on technologies important for the current energy transition. Key energy transition components as demand response, distributed generation and storage technologies have been extensively analyzed and assessed from a technological perspective as well as from the perspective of operational or commercial electricity market usage in the grid. Cost/benefit models have been analyzed in several national contexts. However in all phases, it also was observed, only a part of the technical and economic potential can be uncovered.

In the past five years Smart Cities concepts have been attributed a key role bringing together information and communication technology, urban planning and operation, optimization of energy and E-mobility related applications like comfort and energy management in buildings and mobility [3], [4]. On international and national levels research programs have been defined and the first pilot projects have been concluded. This fits in key concepts in further uncovering the potential are more flexible aggregation and energy consumption/generation process integration levels. Information and communication technologies increase aggregation possibilities and low-cost of IoT connected devices increase integration and valuation of the energy process information in the total system.

Phase 4 in Task 17 goes further on the conclusions and recommendations of the previous phases and places them in an extended network perspective viz.

- The electricity system operational and commercial market network context.
- The community aggregation and ICT network context

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- The prosumer/supplier/buyer transaction network context

In this project, aggregation of small and intermediate scale PV systems, electric vehicles, electric and heat storage systems, heat pumps, micro-CHP in combination with energy management systems and second generation smart meters for implementing new transaction and tariff models will be assessed. Besides, the existing experience base of conducted and ongoing pilot projects which combine these aspects will be extended and analyzed. The application and realization of finalized projects in participating countries with respect to the specific regional differences and requirements are in focus.

2 Phase 4

2.1 Scope

The October 2016 ExCo-meeting strategic discussion in the DSM-program did yield a clear requirement for an interdisciplinary approach between technological and behavioral scientists in an innovation eco-system context. Task 17 phase 4 will try to follow this in the DSM-program portfolio by considering three aspects:

- Responsive. Responsive here reflects pro-activity and reactivity of the technological end-nodes but also of the (aggregated) users in providing responsiveness to different types of stakeholders in the energy 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 role of consumers due to the increased electrification with HVAC and electric mobility.
- Networks. The scope of networks considers the role of the physical grid, the aggregator and the, mostly rural, community/smart city dimension.

2.2 Task subdivision

The following subtasks further structure the activities to handle this emerging DG-RES and demand side challenge:

Subtask 14: Context analysis use case and project inventory

Subtask 15: Metering, monitoring and coordination methods required to uncovering prosumer responsiveness

Subtask 16: Coupling to innovative billing and transactive energy schemes

Subtask 17: Conclusions and recommendations

3 Phase 4 process organization

3.1.1 Subtask 14 – Context analysis, use case and pilot inventory

[TODO: subtask description]

[TODO: detailed objectives]

Role and level of aggregator and aggregation.

Country Experts input:

Country experts are requested to provide specific information about ongoing country specific developments (regulatory, energy field, pilot projects).

Operating Agent activities:

The operating agent provides a structured guided discussion and assessment of the country specific inputs. Also international dissemination meetings will be organized and participant country specific activities will be supported.

Deliverables:

IEA-DSM-17.4.14: “Context analysis, use cases and pilot inventory”

The following activities are envisioned and their planning for the country expert and the operating agent (in person hours) is as follows:

Country Expert Activity	Hrs
Smart cities and smart city project context	30
Use case and pilots inventory	20
Sustainability and energy KPIs	30
Sum:	80

Operating Agent Activity	OA/hrs
Compile and assemble use case inputs	100
Extend project database; process KPI analyses	100
Deliverable IEA_17_Phase_4.14 and dissemination	120
Sum:	320

3.1.2 Subtask 15 – Metering, monitoring and coordination methods required to increase prosumer responsiveness

[TODO: subtask description]

e.g. DALI (Distribution Automation Light; grid monitoring to lower levels openADR, EF-I, FPAI. SmartMeter 2.0 and add-ons, IoT

[TODO: detailed objectives]

Country Experts input:

Country experts are requested to provide specific information about ongoing work (status of metering, monitoring and coordination ICT-systems).

Operating Agent activities:

The operating agent provides a structured guided discussion and analysis of the country specific inputs. Also international dissemination meetings will be organized and participant country specific activities will be supported.

Deliverables:

IEA-DSM-17.4.14: “Metering, monitoring and coordination methods required to increase prosumer responsiveness”

The following activities are envisioned and their planning for the country expert and the operating agent (in person hours) is as follows:

Country Expert Activity	CE/hrs
Collect status of country specific metering innovations	32
Collect status of country specific prosumer level monitoring status	32
Prosumer responsiveness coordination methods	32
Sum	96
Operating Agent Activity	OA/hrs
Compile and assemble metering innovations and place in international context	60
Use case monitoring requirements and actual status	60
Integration of prosumer responsiveness coordination methods	60
Deliverable IEA_17_Phase_4.11	70
Sum	250

3.1.3 Subtask 16 – Coupling to innovative billing and transactive energy schemes

[TODO: subtask description]

Smart meter 2.0

e.g. GridWise alliance

[TODO: detailed objectives]

Country Experts input:

Country experts are requested to provide specific information about ongoing work (status of metering, monitoring and coordination ICT-systems).

Operating Agent activities:

The operating agent provides a structured guided discussion and analysis of the country specific inputs. Also international dissemination meetings will be organized and participant country specific activities will be supported.

Deliverables:

IEA-DSM-17.4.14: “Innovative billing and transaction schemes”

The following activities are envisioned and their planning for the country expert and the operating agent (in person hours) is as follows:

Country Expert Activity	CE/hrs
Inventory of tariff structures and billing mechanisms	32
Mapping of electricity wholesale market transactions and T&D charges on individual transactions	32
Transactive energy schemes	32
Sum	96
Operating Agent Activity	OA/hrs
Compile generic billing and transaction model from country contributions	90
Transactive schemes	90
Deliverable IEA_17_Phase_4.14 and dissemination	70
Sum	250

3.1.4 Subtask 17 – Conclusions and Recommendations

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.

Deliverables:

IEA-DSM-17.4.17: “Conclusions and recommendations for applying DG-RES, DR and storage in electricity grids”

The following activities are envisioned and their planning for the country expert and the operating agent (in person hours) is as follows:

Country Expert Activity	hrs
Organize country specific conclusion and recommendation workshops	16
Update of phase 3 results	16
Recommendations (together with local stakeholder resonance group)	16
Sum	48
Operating Agent Activity	TNO/hrs
Country specific workshops	40
Final event	40
Deliverable IEA_17_Phase4.17 and dissemination	120
Sum	200

4 Collaborations and Dissemination

Collaboration with internal and external activities in the field will be initiated:

4.1 IEEE-Standards Association, IEC and Cenelec

OAs currently are within the IEEE-Standards Association Industry Connections.
 {TODO: make more explicit}

4.2 ISGAN

[TODO] Meeting Belgium

4.3 National Stakeholder Groups

An essential pre-requisite is national dissemination of project results. Per participating organization stakeholders resonance platforms are set-up. The following platforms are being composed.

Country	Entity
Austria	National Technology Platform Smart Grids / Industry and utility stakeholder group
Finland	National project consortium and industry stakeholder group
Netherlands	Industry and utility stakeholder Group
Switzerland	Expert Group on Smart Grids

Austria: National Technology Platform Smart Grids / Industry and utility stakeholder group

Netherlands: Industry and utility stakeholder Group

Switzerland: Expert Group on Smart Meter

Finland: National project consortium and industry stakeholder group.

4.4 Other IEA-DSM Tasks

Task 16 Innovative energy services

Task 23 The Role of Customers in Delivering Effective Smart Grids – t.b.d.

Task 24 Closing the Loop – Behaviour Change in DSM: from theory to policies and practice – t.b.d.

5 Time schedule, budget and resources

IEA-DSM TASK 17 - Phase 4	Q3 17	Q4 17	Q1 18	Q2 18	Q3 18	Q4 18	Q1 19	Q2 19
Subtasks								
Subtask 14 - Context								
Subtask 15 - Metering, monitoring and billing								
Subtask 16- Billing and transactive								
Subtasks 17 - Conclusion and recommendations								
Expert meetings								
Biannual country expert meeting								
Workshops								
Workshops with stakeholders and experts								
Reports								
Subtasks reports								
Final report								

The estimated budget and resources needed are summarized below.

Management and feedback on OA-activities:

Country Expert Activity	hrs
Number of occurrences	5

Operating Agent Activity	OA/hrs
Number of occurrences	5
ExCo-meetings (twice a year)	16
Number of occurrences	4
Travel and subsistence (800 Euro per meeting)	7200

Operating agent (cost shared)

Overall summed financial picture

Country Expert Activity	hrs	OA-Activity	OA/hrs
Subtask 3.14	80	Subtask 3.14	320
Subtask 3.15	96	Subtask 3.15	250
Subtask 3.16	96	Subtask 3.16	250
Subtask 3.17	48	Subtask 3.17	200
		Sum (hrs):	1020
Sum (hrs):	336	Travel and subs.:	7200

The administrative efforts for the operating agents are travel costs and personnel costs / resources necessary for editing and analyzing country specific inputs for the reports. Total cost of phase 4 is in the order of 150 k€ and will be covered by task fees per participating country. As in other tasks in the annex, the task fee is defined by the number of participants and a measure of the size of the electricity system of the country. It is assumed that the minimum number of participating parties is 4.

Country experts (Task shared)

The estimated resources needed for the inputs of the committed country experts is 2.5 person months. With an increase of the number of countries, some extra coordination overhead is included.

Total operating agent costs per country				
Number of countries	5	6	7	8
Costs per country	30k€	27k€	24k€	20k€

6 References

- [1] “Task 17 – Integration of Demand Side Management, Energy Efficiency, Distributed Generation and Renewable Energy Sources.” [Online]. Available: <http://www.ieadsm.org/task/task-17-integration-of-demand-side-management/>. [Accessed: 31-Aug-2016].
- [2] European commission, “Commission proposes new rules for consumer centred clean energy transition,” 30-Nov-2016. <http://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition>
- [3] “Digital single market.” . <https://ec.europa.eu/digital-single-market/en/smart-cities>
- [4] Amsterdam municipality, “Smart cities.” . <https://amsterdamsmartcity.com/map>