Annual Report 2018

DEMAND SIDE MANAGEMENT TECHNOLOGY COLLABORATION PROGRAMME (DSM TCP)

JANUARY 2019
**Foreword**

This report is the twenty-fifth Annual Report of the DSM Technology Collaboration Programme (DSM TCP) on Demand-Side Management Technologies and Programmes, summarising the activities of the twenty-fifth year.

The report is published by the Executive Committee, supported by the Executive Committee Secretariat, with contributions from the Chair and the Operating Agents.

**Disclaimer**

The DSM TCP is organised under the auspices of the International Energy Agency (IEA) but is functionally and legally autonomous. Views, findings and publications of the DSM TCP do not necessarily represent the views or policies of the IEA Secretariat or its individual member countries.
# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>2</td>
</tr>
<tr>
<td>Contents</td>
<td>3</td>
</tr>
<tr>
<td>Chair’s Report</td>
<td>4</td>
</tr>
<tr>
<td>The future of DSM TCP: New Tasks under development in 2019</td>
<td>6</td>
</tr>
<tr>
<td>Global Observatory on Community Self-Consumption and Peer-to-Peer Energy Trading</td>
<td>6</td>
</tr>
<tr>
<td>Social Licence to Automate DSM</td>
<td>6</td>
</tr>
<tr>
<td>Energy-sector Behavioural Insights Platform</td>
<td>6</td>
</tr>
<tr>
<td>Hard to Reach Energy Users</td>
<td>6</td>
</tr>
<tr>
<td>Overview of the IEA and the DSM Technology Collaboration Programme (DSM TCP)</td>
<td>7</td>
</tr>
<tr>
<td>The International Energy Agency</td>
<td>7</td>
</tr>
<tr>
<td>Demand-Side Management Technology Collaboration Programme (DSM TCP)</td>
<td>8</td>
</tr>
<tr>
<td>Member Countries</td>
<td>8</td>
</tr>
<tr>
<td>Sponsors</td>
<td>8</td>
</tr>
<tr>
<td>Membership</td>
<td>10</td>
</tr>
<tr>
<td>Changes in Country membership in 2018</td>
<td>10</td>
</tr>
<tr>
<td>Changes in Executive Committee membership in 2018</td>
<td>10</td>
</tr>
<tr>
<td>Executive Committee members’ details</td>
<td>10</td>
</tr>
<tr>
<td>Sponsors</td>
<td>13</td>
</tr>
<tr>
<td>Executive Committee Support</td>
<td>13</td>
</tr>
<tr>
<td>Task Support</td>
<td>15</td>
</tr>
<tr>
<td>APPENDIX – Task Reports</td>
<td>16</td>
</tr>
<tr>
<td>Task Report – Task 16: Energy Services</td>
<td>16</td>
</tr>
</tbody>
</table>
Chair’s Report

The IEA Efficient World Scenario assesses the global potential of energy efficiency. It finds that the global economy could double between now and 2040 with little increase in energy demand and in the process unlock multiple benefits across all end-use sectors. The IEA Energy Efficiency market report however notes that realising this potential is proving challenging, as economic growth is outstripping efficiency gains and many cost effective measures go unimplemented. Efficient technologies can only deliver benefits if users adopt them and use them as intended. Energy efficiency is energy use per unit service delivered – and technologies that aren’t adopted and used as intended don’t deliver the services or energy savings envisaged. Put simply, the value and usability of technologies and services to users is as integral to their efficiency as their engineering.

The DSM TCP is focused on the needs and roles of users throughout the energy system. Our Tasks are focused on finding ways of reaching them, understanding their needs, earning their trust, and engaging them by delivering services they find valuable and useable. This work is essential to realising the multiple benefits energy efficiency can bring for security and sustainability.

This has been a year of transformation for the DSM TCP. Having started 2018 in a state of flux, we end it with a clear sense of strategic direction and new momentum with a suite of new Tasks emerging around the fundamental issues of access, trust, value, service and engagement. We commissioned an external review of the TCP’s strategy and management and were granted a one-year extension to our mandate in which to implement the recommended changes. This will lead us into 2019 with new momentum and a fresh strategic plan for 2020 to 2025. The transition will continue throughout 2019, but we are now well-placed to begin a new phase of the TCP in 2020.

These developments gave us the opportunity to pause and reflect upon the tremendous opportunity offered by the DSM TCP and the changes needed for us to take advantage of that potential. Dedicated Executive Committee members have pushed forward new proposals and engaged enthusiastically in the process of refreshing our management practices.

The Executive Committee has certainly been busy in 2018. We met six times in all: in Bergen, Norway in April; in London, UK in October; and four times via teleconferences. In Bergen, we agreed to begin a new phase of Task 25, focussed on Business Models for DSM; this was a significant moment, as no new projects had been funded since 2015. We also welcomed Australia to the DSM TCP as our 16th member country and 19th contracting party. Our Australian delegates have brought fresh ideas to the TCP which have been warmly welcomed.

In London, we bade farewell to two of our most successful Tasks and agreed to take four new Task ideas to full proposal in 2019. Task 16 on Competitive Energy Services came to a natural end after four phases over a period of a decade during which the Task’s Think Tank developed a series of innovative measures to support the energy services sector. Task 24 on Behaviour Change in DSM completed a second phase focussed on helping the behaviour changers, winning awards for the application of its Behaviour Changer Framework.

The new Tasks being developed point to the exciting new strategic direction for the DSM TCP. All of them are focussed around the interaction between people and technology. With digitalisation changing the possibilities of what energy services can mean, and end-users becoming central to the energy transition, this is one area in which the DSM TCP can add value. New tasks on peer-to-peer energy trading and the social licence to automate will examine key issues where technology is enabling consumers to become producers of energy services. Meanwhile, further new Tasks will examine the take-up of DSM technologies amongst hard-to-reach consumer segments, drawing upon the work of Task 24, and provide a platform for government practitioners, applying behavioural insights to policy in the energy sector. Each of these touch on core issues of access, trust, value, service and engagement that stand at the heart of placing users at the heart of the transforming energy system. Details of the new Tasks under development are set out in the next section of this Annual Report.
We began the year having been without a Chair or ever having had an Operating Agent. At our London Executive Committee meeting, I was honoured to be elected as the TCP’s new Chair, and the Executive Committee has also approved and appointed an Operating Agent, Sam Thomas, for one year. The management structure of the TCP has now been considerably strengthened, with a Chair, a Vice-Chair Finance (Even Bjørnstad), and an Operating Agent joining our invaluable secretary Anne Bengtson. We also established an Operating Agent selection subcommittee (Josephine Maguire; Gerdien de Weger; Kajsa-Stina Benuic; Tony Fullelove and myself), and a Finance Subcommittee (François Brasseur; Simone Maggiore; Maria Bürgermeister-Mähr). Special thanks also go to Josephine Maguire for providing additional support and advice to the ESC throughout the year and for leading on communications issues.

I am very grateful to the support I’ve received from both my predecessors in the role of Chair: Rob Kool, who continued to provide a guiding hand to the DSM TCP ship during the first half of the year; and Hans Nilsson, who more than anyone, formed the first successful incarnation of the DSM TCP, as Chair and then Adviser over many years. In the DSM University, Hans created an asset that we are fortunate to be able to continue developing, ensuring the dissemination of high quality research and analytical findings to the wider DSM community. Now as Chair myself, I look forward with optimism for the next phase of the TCP as a new set of Executive Committee members grasp the challenges ahead.

In a year’s time, I expect to be writing this report, reflecting upon another year of transition, one in which we have agreed new projects and processes, and we are looking forward to a successful five-year term, beginning in 2020.

David Shipworth (Chair)
Global Observatory on Community Self-Consumption and Peer-to-Peer Energy Trading

The DSM TCP Global Observatory on Community Self-Consumption and Peer-to-Peer Energy Trading is an international forum for understanding the policy, regulatory, social and technological conditions necessary to support wider deployment of these market models. The Observatory’s aim is to support all stakeholders in the peer-to-peer and community self-consumption field through being technology-neutral and applying open innovation principles to pre-competitive and early-stage research. It brings together the leading organisations researching the design and implementation of such models across the world to draw lessons from the international comparison of field trials operating under different regulatory regimes and in different social and technical contexts. For policy makers and regulators, the Observatory will deliver learnings on the extent to which existing policies and regulations support or frustrate application of such models in their country, and how to design such systems to deliver different policy objectives while minimising potential adverse impacts. For businesses, lessons will be drawn on how the environment in different countries shapes the design and viability of possible business models. For researchers, the Observatory provides a route to research impact, a collaborative platform with business and government, and a global community of researchers. Findings will be designed for dissemination through IEA publications and global forums such as the Clean Energy Ministerial.

Social Licence to Automate DSM

This Task will collate global experience of automating DSM implementation. Given the very early stage of the growth of the automated distributed energy resources sector, we propose identifying key emerging research in social sciences, technology and policy to investigate customer barriers and drivers for the uptake of other similarly challenging consumer facing technologies, to ensure that the regulatory and commercial environment created by policy and industry actors is conducive to delivering network and system-wide benefits. The project will also consider the implications of increasing automation for:

- the policy environment broadly, to ensure wider network, environment, and social benefits are met and appropriate safety nets are maintained; and
- the need for a “Social Licence to Operate” automated DSM systems so as to pass through the maximum value from utilities to customers. This social licence to automate in the energy sector requires shared insights and lessons from around the world, given the novelty of the challenge we face.

Energy-sector Behavioural Insights Platform

This Task will bring together government officials applying behavioural insights to energy sector policy issues and researchers working in the field. Participants will share experiences and expertise, develop guidance and build capacity amongst participating countries and the wider policy making community. Experience in the use of randomised control trials, mixed methods studies, behavioural needs analysis and the scaling up of pilots to full interventions are all potential capacity building topics.

Hard to Reach Energy Users

This Task will apply the Task 24 Behaviour Changer Framework developed by the DSM TCP to the issue of policy aimed at energy users that are “hard to reach”, in the residential (e.g. the fuel poor), commercial (e.g. SMEs) and transport (e.g. new EV users) sectors. Experts from government, industry, research and the voluntary sector will come together to identify how such energy users are defined and have been addressed in their countries and sectors in the past. Based upon the learnings from each other’s programmes and case studies, guidance will be developed on how best to target measures to hard-to-reach consumers, how to run engagement trails and how best to monitor and evaluate outcomes, using field research pilots.
Overview of the IEA and the DSM Technology Collaboration Programme (DSM TCP)

The International Energy Agency

The International Energy Agency (IEA) is an autonomous agency established in 1974. The IEA carries out a comprehensive program of energy co-operation among 28 advanced economies, each of which is obliged to hold oil stocks equivalent to 90 days of its net imports. The aims of the IEA are to:

- Secure member countries’ access to reliable and ample supplies of all forms of energy; in particular, through maintaining effective emergency response capabilities in case of oil supply disruptions.
- Promote sustainable energy policies that spur economic growth and environmental protection in a global context – particularly in terms of reducing greenhouse-gas emissions that contribute to climate change.
- Improve transparency of international markets through collection and analysis of energy data.
- Support global collaboration on energy technology to secure future energy supplies and mitigate their environmental impact, including through improved energy efficiency and development and deployment of low-carbon technologies.
- Find solutions to global energy challenges through engagement and dialogue with non-member countries, industry, international organisations and other stakeholders.

To attain these goals, increased co-operation between industries, businesses and government energy technology research is indispensable. The public and private sectors must work together, share burdens and resources, while at the same time multiplying results and outcomes.

The multilateral technology initiatives, Technology Collaboration Projects (TCPs) supported by the IEA are a flexible and effective framework for IEA member and non-member countries, businesses, industries, international organisations and non-government organisations to research breakthrough technologies, to fill existing research gaps, to build pilot plants, to carry out deployment or demonstration programs – in short to encourage technology-related activities that support energy security, economic growth and environmental protection.

More than 6,000 specialists carry out a vast body of research through these various initiatives. To date, more than 1,000 projects have been completed. There are currently 41 Technology Collaboration Projects working in the areas of:

- Cross-Cutting Activities (information exchange, modelling, technology transfer)
- End-Use (buildings, electricity, industry, transport)
- Fossil Fuels (greenhouse-gas mitigation, supply, transformation)
- Fusion Power (international experiments)
- Renewable Energies and Hydrogen (technologies and deployment)

The TCPs are at the core of a network of senior experts consisting of the Committee on Energy Research and Technology (CERT), four working parties and three expert groups. A key role of the CERT is to provide leadership by guiding the TCPs to shape work programs that address current energy issues productively, by regularly reviewing their accomplishments, and suggesting reinforced efforts where needed. For further information on the IEA, the CERT and the TCPs, please consult www.iea.org/techinitiatives

The Implementing Agreement on Demand Side Management Technologies and Programmes (DSM TCP) belongs to the End-Use category above.
Demand-Side Management Technology Collaboration Programme (DSM TCP)

The Demand-Side Management Technology Collaboration Programme (DSM TCP), which was initiated in 1993 and comprises 16 member countries, and three Sponsors:

**Member Countries**

<table>
<thead>
<tr>
<th>Australia</th>
<th>Ireland</th>
<th>Spain</th>
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<td>Austria</td>
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<td>Switzerland</td>
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**Sponsors**
The Regulatory Assistance Project (RAP)  
The European Copper Institute (ECI)  
EfficiencyOne, Nova Scotia

DSM TCP has undertaken 25 Tasks since its inception, many of which have been long-running and substantial work programmes in their own right. In addition, the DSM University disseminates the work of the TCP and its members through a series of webinars focused on different aspects of the DSM landscape.

**Task 1** – International Database on Demand-Side Management & Evaluation Guidebook on the Impact of DSM and EE for Kyoto’s GHG Targets – *Completed* Harry Vreuls, NL Agency, the Netherlands

**Task 2** – Communications Technologies for Demand-Side Management – *Completed* Richard Formby, EA Technology, United Kingdom

**Task 3** – Co-operative Procurement of Innovative Technologies for Demand-Side Management – *Completed* Hans Westling, Promandat AB, Sweden

**Task 4** – Development of Improved Methods for Integrating Demand-Side Management into Resource Planning – *Completed* Grayson Heffner, EPRI, United States

**Task 5** – Techniques for Implementation of Demand-Side Management Technology in the Marketplace – *Completed* Juan Comas, FECSA, Spain

**Task 6** – DSM and Energy Efficiency in Changing Electricity Business Environments – *Completed* David Crossley, Energy Futures, Australia Pty. Ltd., Australia

**Task 7** – International Collaboration on Market Transformation – *Completed* Verney Ryan, BRE, United Kingdom

**Task 8** – Demand-Side Bidding in a Competitive Electricity Market – *Completed* Linda Hull, EA Technology Ltd., United Kingdom

**Task 9** – The Role of Municipalities in a Liberalised System – *Completed* Martin Cahn, Energie Cites, France

**Task 10** – Performance Contracting – *Completed* Hans Westling, Promandat AB, Sweden
Task 11 – Time of Use Pricing and Energy Use for Demand Management Delivery – Completed Richard Formby, EA Technology Ltd, United Kingdom

Task 13 – Demand Response Resources – Completed Ross Malme, RETX, United States

Task 14 – Market Mechanisms for White Certificates Trading – Completed Antonio Capozza, CESI, Italy

Task 15 – Network-Driven DSM – Completed David Crossley, Energy Futures Australia Pty. Ltd, Australia

Task 16 – Competitive Energy Services (Energy Contracting ESCo Services) Phase 4 – Completed Jan W. Bleyl, Graz Energy Agency, Austria

Task 17 – Integration of DSM, Energy Efficiency, Distributed Generation, Renewable Energy Sources and Energy Storages, Phase 1–3 – Completed Seppo Kärkkäinen, Elektroflex Oy, Finland, Matthias Stifter, AIT, Austria, René Kamphuis, TNO, the Netherlands

Task 18 – Demand Side Management and Climate Change – Completed David Crossley, Energy Futures Australia Pty. Ltd, Australia

Task 19 – Micro Demand Response and Energy Saving – Completed Linda Hull, Barry Watson, John Baker, EA Technology Ltd., United Kingdom

Task 20 – Branding of Energy Efficiency – Completed Balawant Joshi, ABPS Infrastructure Private Limited, India

Task 21 – Standardisation of Energy Saving Calculations – Completed Harry Vreuls, NL Agency, the Netherlands

Task 22 – Energy Efficiency Portfolio Standards – Completed Balawant Joshi, ABPS Infrastructure Private Limited, India

Task 23 – The Role of the Demand Side in Delivering Effective Smart Grids – Completed Linda Hull, EA Technology, United Kingdom

Task 24 – Phase I: Behaviour change in DSM: From Theory to Policies and Practice – Completed Sea Rotmann, New Zealand, and Ruth Mourik, the Netherlands

Task 24 – Phase II: Behaviour change in DSM: Helping the Behaviour Changers – Completed Sea Rotmann, New Zealand, and Ruth Mourik, the Netherlands

Task 25 – Business Models for a more Effective Market Uptake of DSM Energy Services Ruth Mourik, the Netherlands and Renske Bouwknegt, the Netherlands

Task 25 – Phase II: Energy service business model strategies and conducive contexts

DSM University – a series of 44 webinars delivered by experts in the field, including 7 new webinars in 2018.

The DSM University, run by Leonardo ENERGY, disseminates the work of the TCP and related work by its members. The project is targeted at:

- Policymakers interested in learning about the costs and benefits of Demand Side Management and its impact on energy systems.
- Managers keen to learn more about Organisations, Governance, Planning, Programme Structuring and Implementation Methods.
- Programme Implementers wanting “Tricks of the Trade.”
For additional information contact the DSM TCP Operating Agent Sam Thomas
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anne.bengtson@telia.com.

Also, visit the IEA DSM website: www.ieadsm.org

Membership

Changes in Country membership in 2018

7 June 2018 – Australia joined the DSM TCP.

Changes in Executive Committee membership in 2018

24 January 2018 – Gerdien de Weger was appointed primary Executive Committee member for the Netherlands and replaces Rob Kool.
7 June 2018 – Kajsa-Stina Benulic was appointed primary Executive Committee member for Sweden and replaces Maria Alm.
2 July 2018 – Tor Brekke, was appointed alternate Executive Committee member for Norway.
10 October 2018 – Maria Bürgermeister-Mähr was appointed primary Executive Committee member for Austria and replaces Boris Papousek.
10 October 2018 – Sabine Mitter, was appointed alternate Executive Committee member for Austria.

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Task 16 – Energy Services – Phase 4

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APPENDIX – Task Reports

Task Report – Task 16: Energy Services

Introduction
In Task 16 “Energy Services”, energy service experts from countries around the world have joined forces to advance know how, experience exchange and market development of (mainly performance-based) energy services. We view energy services not as an end for itself but as a proven ‘delivery mechanism’ in order to implement demand-side energy efficiency, renewable energy and demand response projects. This may be in the context of market-driven instruments but likewise to overcome well known barriers in order to meet energy policy and climate change goals.

The Task 16 Think Tank has served as our common research platform with key publications such as Multiple Benefits of Deep Energy Retrofits on project level; ‘Simplified Measurement & Verification’ of energy savings; the Project and Market ‘Facilitator’ concept, the ‘Integrated Energy-Contracting’ business model to combine energy savings and supply projects or Financing options for ESCo projects. Other subtasks are an Energy Services Expert Platform for mutual exchange and support of country-specific National Implementation Activities as well as national and international dissemination activities including the DSM University.

Task 16 was active since July 2006 has formally ended in June 2018. This contribution to the TCPs annual report gives an overview of key outputs of the Think Tank over the entire work period. For a more detailed activity and management report, please refer to the bi-annual Task Status Reports to the ExCo.

For an overview of participating countries and experts please refer to section 8.

For more information or to explore options for future collaborations, please feel free to con-tact the Operating Agent Jan W. Bleyl @ +43 650 7992820 or EnergeticSolutions@email.de.

Energy Services: A ‘Delivery Mechanisms’ for energy policy goals and project implementation

The success of further increasing energy efficiency and sufficiency in all sectors of consumption will play a vital role in coping with the challenges of our common energy future. Avoiding energy consumption by increasing end-use efficiency is a highly effective means to meet all three key targets of energy policies: Security of supply, affordable costs of energy (services) and environmental soundness.

Energy Efficiency (EE) has found its way up on the political agendas over the course of the last years and is now often referred to as a ‘first fuel’ (IEA). Worldwide, concrete saving targets for CO₂, Renewables and Energy Savings have been declared, although often indicative in the case of energy efficiency.

But what are the appropriate ‘delivery mechanisms’ to bring energy efficiency and demand response to the end-users? Now and for the foreseeable future there is an urgent need to join forces and to conclude and support all suitable political, regulatory and market-based instruments for the implementation of Energy Efficiency, Renewables and CO₂-reductions.

Performance-based energy services (ES) - also referred to as Energy-Contracting or ESCo service - is not a ‘silver bullet’ but a many a times proven ‘delivery mechanism’ for implementing energy efficiency measures such as re-lighting, HVAC or other demand-side EE- and RE-measures. An ESCo takes over the technical and economical implementation risks and provides performance and output guarantees for the results. ES are also well suited to implement renewable energy systems with guaranteed outputs as displayed in figure 2 (c.f. 4.2). Yet potentials but also limitations, pros and cons and added values of ESCo products in comparison to in-house implementation are often not very well understood.

Furthermore, the increasing integration of fluctuating renewable supply sources into (‘smart’) electricity networks will need to be accommodated by growing balance energy/capacity or other types of markets, which may in part be provided by demand response sources provided by energy service providers (ESP) and aggregators.
**Task Objectives**

Task 16 is working to contribute to know how, experience exchange as well as project and market development of performance-based energy services. Thus we:

1. Develop and implement innovations in energy service and financing models and publish these *(Think Tank)*,
2. Maintain an IEA DSM Energy Service Expert Platform for exchange and mutual support of experts, partners & invited guest,
3. Support and follow up country specific National Implementation Activities (NIAs) in order to foster national ESCo project and market development,
4. Use the Task’s Energy Service Expert Platform as a competence center for international and national dissemination and consultancy services (e.g. workshops, coaching, trainings …) and to contribute to the “DSM University”

The underlying goal is to increase understanding of value propositions, potentials and limitations of performance-based ES as a ‘delivery mechanism’ to implement energy efficiency and renewable policy goals and projects.

**Structure of the work and subtasks**

The following scheme illustrates the general structure of the Task:

![Figure 1 Task 16: Work structure and subtasks](Source: Task 16 2015)

The four operational subtasks are:

1. IEA DSM Energy Services Expert Platform (ES-Platform)
2. Innovative Energy Services Think Tank (TT)
3. Support and coaching of individual National Implementing Activities (NIAs)
4. Dissemination and cooperation

In the left pillar, the ‘National Implementing Activities’ (NIAs) such as capacity building or project and market development activities take place according to the individual needs and resources of the participating country.

The Think Tank is the common research platform with key publications like ‘Simplified Measurement & Verification’ of energy savings, the ‘Facilitator’ concept, Comprehensive Refurbishment (‘Deep Retrofit’)
business models, Demand Response Services: Economic Pre-Feasibility Model and Case Studies for Austria or the ‘Integrated Energy-Contracting’ business model. Current topics are Life-cycle cost appraisals, (Crowd)-Finance, Simplified M&V (continued) and ES Taxonomy.

The IEA DSM Energy Services Expert Platform (ES platform) serves as the link between the two pillars and is our internal as well as external communication hub. The results of Task 16 are disseminated in a series of stakeholder workshops, presentations at conferences or workshops, through publications and in webinars. Furthermore, we have co-operated with a number of other national and international projects and organizations.

**Positioning of the Task – v.s. other bodies**

Task 16 has not developed any particular energy technologies, however it has advanced and disseminated innovative and performance-based energy service business models, value propositions and facilitation mechanisms for technology implementation.

Generally, performance-based energy services apply whatever efficiency and renewable end-use technologies are available on the market. Accordingly, successful examples are available in all sectors of efficiency technologies such as indoor and street lighting, heating, electric motors, ventilation and air conditioning (HVAC-technologies), combined heat and power systems (micro-CHP) or comprehensive refurbishment of buildings (Deep Energy Retrofits) and others. Future topics also encompass demand response services. As a general prerequisite, the technology must have reached a commercial development status in order to be able to guarantee its outputs.

Furthermore Task 16 members are facilitating concrete project and market development activities to implement and deploy various kinds of end-use efficiency or renewable technologies with market-based instruments.

Task 16 is a unique Task in providing an international expert platform for Energy-Contracting experts, developing innovative energy service business models, initiating and mutually supporting national implementation activities and disseminating results to national and international stakeholders.

Other collaborations are related to teaching and research in academia, e.g. for regular lectures in Austria TU Vienna and FH-Pinkafeld or research collaboration with the Linköping university. Another area of collaboration is international development aid work, e.g. with GIZ and KfW, Germany.

**Think Tank key results of Phases 1-IV**

The Task 16 Think Tank has worked on a broad range of topics concerning basics and innovations in performance-based energy services. The following subchapters provide a short overview and “teasers” of key results of the Think Tank for further reading and exchange. Related publications are also listed in section 5.

**Financing of demand-side EE, RE and ESCos**

1. Financing options of Energy Efficiency and ESCos and good practice examples

   **Financing Options for Energy-Contracting Projects – Comparison and Evaluation.**
   A Manual for ESCos, ESCo Customers and ESCo Project Developers including national Good Practice Examples.
   Task 16 discussion paper, Aug. 2010
   Download available from [www.ieadsm.org](http://www.ieadsm.org) => Task 16
2. Crowdfunding for Energy Efficiency (CF4EE)

CF4EE - Crowdfunding for Energy Efficiency.
Can Debt or Equity Crowdfunding contribute to scaling up Energy Efficiency in Developing Countries?
Published by GIZ Oct. 2016
Download available from www.ieadsm.org => Task 16

In close collaboration with Konrad von Ritter, Kritter Advisory Services and German Development Cooperation, GIZ.

What is Energy-Contracting?

ESCo value proposition to clients: Integrated service package with output guarantees:

Technology
Suppliers, construction, operation & maintenance ...

Know-How
Managers, consultants, engineers, architects, ...

Energy Carriers
Gas, fuel oil, solar, woodchips ...

Finance
TPF, equity, banks, leasing, subsidies ...

Legislative Framework
Procurement, laws, norms, technical rules ...

Energy Service Company (ESCo)
Supply (MWh) or Savings (NWh) incl. function, performance + price guarantees

ESCo Client
Source: after [Boyd 2010]

Figure 2: What is Energy-Contracting/ESCo?
An integrated service package with output and performance guarantees for the client (=> value proposition)
Discussion paper on definitions, basic business models and value propositions of performance-based Energy-Contracting:

Also includes definitions of 3 basic categories of energy services and discussion of client perspective: 'Make or buy'.

What is Energy-Contracting (ESCo or Energy Efficiency Services)?

Categories of Energy Services, Concept, Definition and Two Basic Business Models

Task 16 Discussion Paper (Rev. 4), Nov 2013

Download available from www.ieadsm.org => Task 16

Comprehensive Refurbishment of Buildings with Energy Services

General planner, general contractor and EPC-light business models:

![Figure 3: Comprehensive Refurbishment EPC Model selection Flow-Chart](image-url)
Introduction of the three deep renovation approaches in the literature:

Urban Energy Transition
From Fossil Fuels to Renewable Power
2008, Pages 387-406

Chapter 17 - “Energy-Contracting” to Achieve Energy Efficiency and Renewables using Comprehensive Refurbishment of Buildings as an Example: A Guide for Building Owners and ESCos
Jan W. Bleyl-Androschin 1, Daniel Schinnerl 2

Also published as peer reviewed paper in eceee Summer Study 2007, paper ID# 5039 Nizza.

Residential Sector

Peer reviewed paper on Energy-Contracting in the Residential sector:

Energy Contracting: How much can it Contribute to Energy Efficiency in the Residential Sector?
Transaction and Life Cycle Cost Analyses, Market Survey and Statistical Potential
in 10th International Association for Energy Economics (IAEE) European Conference, Vienna 2009
by Bleyl; Eikmeier; Seefeldt

In collaboration with Dr. Bernd Eikmeier, Bremer Energie Institut and Friedrich Seefeldt, Prognos AG.

Demand Response Services

Aman; Amann; Bleyl;
Demand Response Services:
Economic Pre-Feasibility Model and Case Studies for Austria
Task 16 discussion paper, Sept. 2015

Download available from www.ieadsm.org => Task 16

Discussion paper on demand response services:
In close collaboration with Christof Amann and Stefan Amann, both e7, Austria.
Demand side and clients perspectives on energy service markets: ‘Facilitators’ needed to enable project and market development

Key roles of Project and Market Facilitators (EE-Architects):

**Supply side:**
ESCos

**Markets**

**Project Facilitators**

**Demand side:**
Clients

![Diagram showing key roles of facilitators to enable project and market development](image)

Figure 4: Key Roles of Facilitators to enable project and market development

=> Lesson learned: Potential clients need support and ‘hand holding’ to structure EE and RE projects in order to create a demand pull on the market.

Introduction of the roles of Market and Project Facilitators in the literature:

**ESCo Project and Market Development: A Role for ‘Facilitators’ to Play. Including National Perspectives of Task 16 Experts**

*by Adilipour; Bareit; Bleyl; Coolen; Jang, Hye-Bin; Kempen; Ungerböck with guest contributions by Lohse, KEA; Borchard, Zellner, GIZ*

Task 16 discussion paper, May 2014

Download available from [www.ieadsm.org](http://www.ieadsm.org) => Task 16

Also published as peer reviewed paper in eceee Summer Study, paper ID 3-472-13, Belambra Presqu’île de Giens, France June 2013.
Integrated Energy Contracting: A new Business Model to combine Savings and (Renewable) Supply

Development and implementation of a new ESCo business model to combine savings and supply:

1. Building on simpler ESC model
2. Expand scope to savings in entire facility (HVAC, user motivation, building shell ...)
3. Simplified M&V: Savings calculations + quality assurance

The IEC model has been piloted several times in Austria and other countries.

Introduction of the IEC model in the literature:
Also published as peer reviewed paper in eceee Summer Study, in eceee Summer Study, paper ID 1-485, Belambra Presqu’île de Giens, France June 2011.

Integrated Energy Contracting (IEC)
A New Energy Service Business Model to Combine Energy Efficiency and (Renewable) Supply
Task 16 discussion paper, July 2012

Download available from www.ieadsm.org => Task 16
Simplified Measurement & Verification of Savings

Development and piloting of a simplified methodology for quality assurance and verification of demand-side savings. Applicable for ESCo and in-house implemented projects:

Bleyl, Jan W. et.al

*Simplified measurement & verification + quality assurance instruments for energy, water and CO₂ savings. Methodologies and examples* accepted for publication at ECEEE Industrial Summer Study, paper ID 1-088-14, Arnhem, the Netherlands June 2014

by Bareit; Bleyl; Sattler and with inputs from Task 16 experts

dena (German Energy Agency)

*dena-Praxishilfe Einsparnachweise im Energiespar-Contracting (M&V for Energy Services, focus on simplified approaches)*

by Bleyl; Holz; Schenker, March 2015

=> builds on our ECEEE 2014 paper, with reference to Task 16

A peer reviewed journal publication is still under preparation in close cooperation and with substantial inputs from EfficiencyOne, Nova Scotia, Canada.
Multiple Project Benefits Methodology and its application to Office Building Deep Energy Retrofit

Development of a Multiple Benefits (MB) methodology on project level: Classification of multiple benefits according to primary beneficiaries => Multiple Beneficiaires of MBs:

Peer reviewed journal publication and webinar:

**Bleyl, Jan W. et al.**
*Office building deep energy retrofit: life cycle cost benefit analyses using cash flow analysis and multiple benefits on project level,* “Energy Efficiency” special journal 2018:
https://doi.org/10.1007/s12053-018-9707-8

by Bareit; Bleyl; Casas; Chaterjee; Coolen; Hulshoff; Lohse; Mitchel; Robertson; Ürge-Vorsatz

**Leonardo ENERGY Webinar (DSMU#36):**
https://www.youtube.com/watch?v=j344zdQTL4I&feature=youtu.be

Also published as *Building Deep Energy Retrofit: Using Dynamic Cash Flow Analysis and Multiple Benefits to Convince Investors* in eceee Summer Studies, paper ID # 6-369-17, Belambra Presqu’ile de Giens, France, June 2017.

This latest Task 16 work has received substantial feedback from the expert’s community and has also been recognized by the IEA secretariat.
Key publications and contributions to the DSM University

The Think Tank work and collaborations with partners have led to a number of peer reviewed publications and discussion papers. A selection of Task 16 key publications is listed below (in chronological order):


- **Financing Options for Energy-Contracting Projects – Comparison and Evaluation. A Manual for ESCos, ESCo Customers and ESCo Project Developers including national Good Practice Examples.** Task 16 discussion paper, Aug. 2010,


- **ESCo Market Development: A Role for Facilitators to play** in eceee Summer Study, paper ID 3-472-13, Belambra Presqu’île de Giens, France June 2013

- **What is Energy-Contracting (ESCo or Energy Efficiency Services)? Categories of Energy Services, Concept, Definition and Two Basic Business Models** in Task 16 Discussion Paper (Rev. 4), Nov 2013


- **Demand Response Services: Economic Pre-Feasibility Model and Case Studies for Austria** in Task 16 Discussion Paper, Sept. 2015

- **CF4EE - Crowdfunding for Energy Efficiency. Can Debt or Equity Crowdfunding contribute to scaling up Energy Efficiency in Developing Countries?** Published by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Eschborn 2016, Oct. 2016


The majority of the above publications are available for download from [www.ieadsm.org](http://www.ieadsm.org) => Task 16 (subject to publishing rights).

Task 16 has also contributed to the DSM University with three Leonardo ENERGY Webinars:

- **DSMU#1. ESCo market development: A role for Facilitators to play.**
- **DSMU#18. Simplified Measurement & Verification for Energy Savings – the Task 16 approach.**
- **DSMU#36: Building Deep Energy Retrofit: Using Dynamic Cash Flow Analysis and Multiple Benefits to Convince Investors.**

All IEA DSM University webinars can be accessed [here](http://www.ieadsm.org).
Opportunities for follow up work

Based on the feedback of national experts and ExCo members, the following topics (but not limited to) would be of interest for future work:

1. Multiple Benefits on project level (MPB) (cont’d):
   i. Applying the methodology developed to other end-use sectors such as residential, industrial or public as well as other case studies / business cases.
   ii. How to best integrate MPBs into Life Cycle Cost Benefit and bankable investment Analyses?
   iii. How to make use of Multiple Project Benefits (MPB) to promote Energy Efficiency and EPCs?

2. The role of the government as a “Market Facilitator” to promote performance-based energy services (based on ‘Facilitator’ paper):
   i. Collection of best practices and lessons learned for future policy implementation
   ii. Communication strategy: How to better sell EPCs? Learning from good practice.

3. Business model refinement for Energy Performance Contracting:
   i. EPCs in SMEs e.g. hotels and business parks
   ii. Tackling the landlord-tenant dilemma

4. Simplified M&V (sM&V) (cont’d):
   i. Application of the sM&V concept in different end-use sector and its integration in performance-based business models.
   ii. Introduction of sM&V in national good practice guidelines for M&V.
   iii. Continuing the exchange with the IPMVP technical committee and other stakeholders

ExCo members are requested to discuss and provide guidance on future work, if so desired.
PARTICIPATING COUNTRIES, EXPERTS AND FINANCIERS OF PHASES I - IV

The following institutions, national experts and financing partners have actively participated in Task 16 (in alphabetical order):

**Participating Institutions**

**Austria**
Energetic Solutions (since 07/2012)
es7 [www.e-sieben.at](http://www.e-sieben.at) (since 01/2014 until 06/15)

Grazer Energieagentur [www.grazer-ea.at](http://www.grazer-ea.at) (until 06/2012 and again 01/2014 until 06/15)

**Belgium**
Fedesco: [www.fedesco.be](http://www.fedesco.be) (until 06/2012)

**Canada** (since 07/2015)
EfficiencyOne [http://efficiencyone.ca/](http://efficiencyone.ca/)

**Finland** (until 06/2009)
Motiva Oy: [www.motiva.fi](http://www.motiva.fi)

**GIZ Germany** (since 07/2013 until 04/2016)
Deutsche Gesellschaft für Internationale Zusammenarbeit: [www.giz.de](http://www.giz.de)

**India** (until 06/2012)
Bureau of Energy Efficiency: [www.bee-india.nic.in](http://www.bee-india.nic.in)

**Japan** (until 06/2009)
Japan Facility Solutions, Inc.: [www.j-facility.com](http://www.j-facility.com)

**Korea** (since 07/2012 until 06/2015)
Korea Energy Management Cooperation: [www.kemco.or.kr](http://www.kemco.or.kr)
Korea Association of ESCO: [www.esco.or.kr](http://www.esco.or.kr)

**Netherlands**
Netherlands Enterprise Agency: [www.rvo.nl](http://www.rvo.nl)
Essent Retail Services BV (until 06/2012): [www.essent.nl](http://www.essent.nl)
ESCOPLAN (until 05/2015): [www.escoplan.nl](http://www.escoplan.nl)
AHB Consultancy (since 06/2015): [www.ahb-consultancy.nl](http://www.ahb-consultancy.nl)

**Spain** (until 06/2012)
Red Eléctrica de España: [www.ree.es](http://www.ree.es)
Hitachi Consulting (until 06/2012): [www.hitachiconsulting.com](http://www.hitachiconsulting.com)

**Sweden** (since 07/2012)
Swedish Energy Agency: [www.swedishenergyagency.se](http://www.swedishenergyagency.se)

**Switzerland** (since 07/2012)
Swiss Federal Office of Energy SFOE: [www.bfe.admin.ch](http://www.bfe.admin.ch)
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**GIZ Germany (since 07/2013 until 04/2016)**

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www.bee-india.nic.in

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Switzerland (since 07/2012)  
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Financing Partners

**Austria** (until 06/2012 and again 01/2014 - 06/2015)
Federal Ministry of Transport, Innovation and Technology  
www.bmvit.gv.at  www.energytech.at

**Belgium**
Federal Public Service Economy, S.M.E.s, Self-Employed and Energy  
Energy – External relations  
http://economie.fgov.be/

**Canada** *(in kind contribution since 07/2015)*  
EfficiencyOne  
http://efficiencyone.ca/

**Finland** *(until 06/2009)*  
Tekes – the Finnish Funding Agency for Technology and Innovation  
www.tekes.fi

**GIZ Germany** *(since 07/2013 until 04/2016)*  
Deutsche Gesellschaft für Internationale Zusammenarbeit: www.giz.de

**India** *(until 06/2012)*  
Bureau of Energy Efficiency  
Ministry of Power  
www.bee-india.nic.in

**Japan** *(until 06/2009)*  
Tokyo Electric Power Company  
www.tepco.co.jp/en/index-e.html

**Korea** *(since 07/2012 until 06/2015)*  
Korea Energy Management Corporation  
www.kemco.or.kr

**Netherlands**
Rijksdienst voor Ondernemend Nederland (RVO.NL)  
(Netherlands Enterprise Agency)  
http://www.rvo.nl/

**Norway** *(since 01/2016)*  
Enova SF  
www.enova.no

**Spain** *(since 07/2009 until 06/2012)*  
Red Eléctrica de España  
www.ree.es

**Sweden** *(since 07/2012 until 06/2015)*  
Swedish Energy Agency:  
www.swedishenergyagency.se

**Switzerland** *(since 07/2012)*  
Swiss Federal Office of Energy SFOE  
www.bfe.admin.ch/

All Task 16 project partners wish to explicitly thank the IEA DSM ExCo members of the participating countries and their financing partners for their much appreciated support.
Task Report – Task 24 Behaviour Change in DSM: Helping the Behaviour Changers. Phase II

Description
There is no behaviour change ‘silver bullet’, like there is no technological silver bullet that will ensure energy efficient practices. Designing the right programmes and policies that can be measured and evaluated to have achieved lasting behavioural and social norm change is difficult. We believe that this Task, and its extension, helped address these difficulties by developing guidelines, recommendations and examples of best (and good) practice and learnings from various cultures and contexts. We rely on a large, global network of sector-specific experts (researchers, implementers and policymakers) from participating and interested countries to engage in an interactive, online and face-to-face expert platform and contribute to a comprehensive database of a variety of behaviour change models, frameworks and disciplines; various context factors affecting behaviour; best (and good) practice examples, pilots and case studies; and guidelines and examples of successful outcome evaluations. Phase I of this Task is now looked at the theory behind behaviour change interventions and Phase II (How to help the Behaviour Changers) has been taking the theory into practice.

Building on the solid theoretical foundations of Phase I, in Phase II we look at the:
- What?
- Who?
- How?
- Why? and
- So What?

We use a Collective Impact Approach in a Participatory Action (field) Research (PAR) setting and storytelling as the overarching language and bring together Behaviour Changers from all sectors (industry, government, research, middle actors and the third sector) with the end users whose behaviour they are ultimately trying to change.
Task Aim and Objectives

The main objective of this Task is to take good theory (from Phase I) into practice to allow ‘Behaviour Changers’ (from government, industry, intermediaries, research and the third sector) to:

- Engage in an international expert network (‘THE EXPERTS’)
- Develop the top 3 DSM priorities to identify the most (politically, technologically, economically and societally) appropriate DSM themes to focus on (‘THE ISSUES’)
- Identify and engage countries’ networks in the 5 Behaviour Changers sectors for at least one of the top 3 DSM themes to develop a collective approach (‘THE PEOPLE’)
- Use and test a Collective Impact Approach to develop shared methodologies, guidelines and a common ‘language’ based on narratives to aid Behaviour Changers’ decision-making of how to choose the best models of understanding behaviour and theories of change (a ‘toolbox of interventions’) (‘THE TOOLS’)
- Standardise how to evaluate behaviour change programmes ‘Beyond kWh’ and ‘Beyond Energy’ including multiple benefits analysis (‘THE MEASURE’)
- Collate national learnings into an overarching (international) story to understand, compare and contrast the different behaviour change approaches, risks and opportunities and which recommendations can be universally applied (‘THE STORY’).

Subtask 5

Objectives

- Expert platform continually growing and getting used
- New content including presentations, videos and reports uploaded
- Continue publicising and dissemination of Task 24, including at international conferences

Deliverables

D 6: Social network expert platform and meeting place for (invited) DSM and Behaviour Changers and implementers.

D 7: At least one international conference for all Behaviour Changers involved in Task 24.

Work carried out

The usefulness of the Ning Expert Platform has come to a natural end, as most information is now on the IEA DSM Task website and expert collaboration is undertaken via emails or in-face-to-face or skype meetings. We use the IEA DSM Events page to advertise workshops and conferences now. We added another 40 experts from North America when CEE joined in Year 3 to our expert network. All reports are now on the IEA DSM website, which has been divided into Phase I and Phase II. We continue having great successes in matchmaking experts, with several spending time at each other’s Universities, for example, or developing new research collaborations. Dr Katy Janda, from University College London, an expert on green leasing, has partaken in three Swedish Task 24 workshops and co-published several papers with Task 24, including co-editing a Special issue on storytelling in energy and climate change research. Our introductory paper of this Special Issue has taken the top spot of most downloaded papers in ERSS in 2018. Our work on storytelling has probably been the single-greatest academic contributor and is regarded as cutting-edge work by world-leading social scientists such as Dr Paul Stern.

With the support of the 2018 BEHAVE and BECC conferences we held two more international Task 24 workshops and sessions (on top of the 2016 BEHAVE and Energy Cultures conference workshops and the 2015 BECC workshop). Thus, we have held 5 international Task 24 workshops as part of the most prominent international expert conferences in our field. We also presented two of our award-winning Subtask 6&7 Projects - the SEAL-funded Home Energy Saving Kit programme evaluation (at BEHAVE and BECC) and the Atrium Health case study (ACEEE summer study), in 2018.
Subtask 6

Objectives

• Building on work from Subtasks 2 and 4, develop lists of common top 3 DSM implementable issues and their potentials in each country
• Use the Collective Impact Approach and the Task 24 Expert Platform to research and review current approaches and practices, nationally and internationally, on these top issues
• Feed these cases, and the ones analysed in Subtask 1 and 2 into a Toolbox of Interventions (ST 8)

Deliverables

D 8: List of top 3 DSM issues, including analysis of case studies elsewhere and their approximate contribution to each participating country’s load management (economic, technological, political and societal potentials)
D 9: Continued collection and analyses of case studies and stories to add to the ‘Monster’ Wiki (ST 1 & 8)

Work carried out

Task 24 has held over 30 workshops, in Ireland (3 workshops), the US (5 workshops), Sweden (4 workshops), New Zealand (4 workshops), the Netherlands (3 workshops), Canada (2 workshops), Austria (3 workshops) and Task 24 workshops at the ECEEE Summer Study (twice), and the Energy Cultures, BECC (twice) and BEHAVE (twice) conferences. We have been collecting lists of DSM interventions and energy efficiency and behaviour priorities in each of the participating countries. We have discussed the top 3 issues in each of these countries during workshops. All workshops have extensive reports and a combined workshop report (for funders only) comprises over 300 pages of information.

We have discussed the top 3 issues during workshops and have decided on the following main topics, some of which have led to real-life interventions:

- Powering tomorrow’s neighbourhoods via smart grid sharing and Home Energy Audit Toolkits (HEAT kits) in New Zealand;
- Supporting building management operators in hospitals to produce better documentation and communication of energy savings in Canada (on hold as the funding didn’t eventuate);
- Empowering building operators in hospitals to re-set Building Automation System set-point overrides in Charlotte, North Carolina (participant of Subtask 11);
- Landlords and tenants co-designing green leases in commercial buildings in Sweden;
- Promoting better use of ICT in universities in the Netherlands;
- Using libraries as Middle Actors to distribute energy-saving kits in Ireland;
- Evaluation methodologies, credibility and persistence in US and Canada;
- Including better evaluation regimes as well as non-energy benefits into the new Austrian energy efficiency legislation and
- How to improve uptake in shared mobility platforms with the goal to reduce fine air pollution, also in Austria.

Looking at the wide spread of sectors and behavioural issues above, we have shown that our tools and approaches are widely applicable to all domains we have studied in Phase 1 (building retrofits; smart technology; SMEs; transport) – and we added a few new sectors: hospitals, universities, office buildings, energy utilities and libraries. We have also undertaken in-depth case study reviews on some of these interventions: the Dutch ICT case in higher education was contrasted with another Dutch University and Cambridge University, UK; green leases in Swedish office buildings were compared with green lease insights from the UK, Australia, Ireland and Norway; and energy saving kit programmes using libraries as Middle Actors were compared between New Zealand, Australia, the US, Canada and Germany. The US hospital case study was supported by an international expert panel comprising 4 countries (NZ, US, CA and UK).

Subtask 7

Objectives

- Identify, with the help of the ExCo, National Experts and existing Expert Platform the most appropriate Behaviour Changers focusing on at least one of the top 3 DSM issues chosen by each participating country in Subtask 6
- Use the Collective Impact Approach to initiate discussions between different disciplinary perspectives and sectoral contexts.
- Develop national Behaviour Changer dialogues in each participating country by holding (bi) annual workshops (1-2 days per country per year, all up maximum of 6 days per country - note some of this time includes work from ST 6 and 8)
- Foster mutual engagement, collaboration and shared learning amongst Behaviour Changers, enable them to build relationships on neutral, trusted ground
- Backbone support to set a common agenda, measurement systems, mutually reinforcing activities and ongoing communication between the Behaviour Changers
- Collect Behaviour Changers’ impressions on the effectiveness of the Collective Impact Approach and use of narratives as a common language to overcome barriers
- Collect examples of successful matchmaking stories.

**Deliverables**

D 10: National networks of Behaviour Changers from all 5 sectors (government, industry, research, intermediaries, the third sector) in at least one of the top 3 DSM focus areas (chosen in ST 6)

D 11: Evaluation based on in-depth stakeholder analyses on the effectiveness of the Collective Impact Approach and use of narratives as a common language to overcome barriers (see combined workshop report)

**Work carried out**

Behaviour Changers have been identified for the top issues decided on in Subtask 6 for participating countries and 25 successful workshops have been held. Their sector stories have been told during workshops and we have initiated deep discussions around relationships, mandates, stakeholders, restrictions and value propositions for each of the Behaviour Changers using the ‘Behaviour Changer Framework’ during workshops. Subtasks 6 and 7 were reported together. A 300+ page Workshop Minutes document is available to all project funders. This includes all stakeholder feedback and evaluations. They were predominantly positive, with storytelling being voted the most enjoyable Task workshop experience, followed by the Behaviour Changer Framework (“magic carpet”) exercise. Out of >100 completed feedback forms, not one reported the Task 24 workshop not having been useful, with >80% giving the highest marks (“very useful”).

**Subtask 8**

**Objectives**

- Use the Collective Impact Approach to unite Behaviour Changers from all 5 sectors on a specific DSM issue (both chosen in ST 6 & 7) and develop, in collaboration, a common agenda, shared measurement indices, mutually reinforcing activities (a ‘roadmap’), continuous communication and the backbone support function necessary to make it happen.
- Collect information for a Decisionmaking Tree to pick the most appropriate case studies and models of understanding analysed by Task 24 and test its usability with the Behaviour Changers
- Develop the common language of storytelling further and provide different examples of using storytelling and narratives in practice and how to best do it in the specific areas of focus and each of the Behaviour Changers’ sectors
Identify all the tools in each Behaviour Changer’ toolbox, analyse their pros and cons, risks and opportunities, where they fall short and how another tool from another Behaviour Changer could overcome this deficit

Continued testing and development of the Evaluation Tools (ST 3) that can prove if a (toolbox of) intervention/s leads to actual, ongoing behaviour changes in practice. The Behaviour Changers will feed back on its potential applicability, risks and additional needs by working through (hypothetical or real life) examples chosen in ST 6 and using double-loop learning approaches to assess multiple benefits of interventions

Collaborative development of a testable Toolbox for Behaviour Changers for each top DSM focus area, where each Behaviour Changer sector has clearly identified and measurable roles and responsibilities. This intervention may then be taken into a real-life setting and trialed in practice (either as ST 11 or outside of Task 24)

The toolbox is built on national and sectoral context specificities but will be synthesised and tested (e.g. in the international conference (ST5)) for the general aspects that are of international validity (ST10 - the overarching story).

**Deliverables**

D 12: Testable toolbox of interventions of each country and their top areas of DSM focus.

**Work carried out**

The Special Issue on Storytelling for the Journal of Energy and Social Science Research provides a very detailed and in-depth overview of cutting edge research on storytelling, including our own use of the fairy tale story spine. Our ‘Behaviour Changer Framework’ collaboration tool was published at the ACEEE summer study and the BEHAVE conference and won an award at the ECEEE Summer Study last year. We have successfully trialled design charrettes to co-design a pilot intervention in the 2nd largest hospital network in North America, CHS, as part of Subtask 11. This was just published at the ACEEE summer study 2018. The Decision-making Tool has been drafted by Duneworks and we collected insights on multiple benefits of interventions in each of our country workshops. The final Subtask 8 Toolkit for Behaviour Changers is now available as an easily-viewed 70 slide deck which contains links to all final reports and Task outputs.

**Subtask 9**

**Objectives**

- The goal of this research was to develop and validate a set of tools and metrics that can be used consistently for the evaluation of behaviour-based energy programmes including but not limited to eco-feedback, home audits, information and rebate programmes, and social games
- An in-depth assessment of current (best) practice, cultural and disciplinary idiosyncrasies, country drivers and needs and the best possible international standard (along the lines of psychometric tools like the IQ test - arguably not a perfect indicator of intelligence, but valuable in terms of enabling measurement and comparison).

**Deliverables**

D 13: An internationally-validated set of tools and metrics for evaluating behaviour-based energy programmes ‘beyond kWh’.

**Work carried out**

Karlin (the Principal Investigator of this Subtask) et al. have published papers at the IEPEC conferences in August 2015 and 2016. These peer-reviewed papers outline the basics of the Beyond kWh toolkit they have developed for Subtask 9. The results from the psychometric testing were published by the IEA DSM Task 24. This work was co-funded to the tune of ~US$100,000 by PG&E and Southern California Edison. The tool was not able to be validated in each of the participating countries as only 3 countries paid to contribute (instead of the 4 needed for the contract). However, the tool has been tailored and tested on the highly-relevant residential energy-savings kit trial in Ireland and by CEE sponsor Efficiency Vermont. We have modified it to fit commercial office buildings for the Swedish Energy Agency and have received interest at the BEHAVE conference to utilise it in a Swiss study on uptake of electric vehicles. This tool will form part of a standardised, internationally-validated process of how to do behaviour change from design to dissemination.
Subtask 10

Objectives

- Collate, analyse and distil all information collected in Subtasks 6-9. Develop an international, interactive handbook with guidelines and recommendations.

Deliverables

D 14: Handbook with Policy Briefs from each participating country.

Work carried out

All country policy briefs will be collated to form the Subtask 10 collection. This will be finalised with the US Policy Brief, which will be available end of 2018.

(Voluntary) Subtask 11

Objectives

- Provide continual assistance during implementation and evaluation of collaboratively designed policies, programmes or pilots in order to iterate them, if necessary.
- Report-back outcomes from each country’s intervention and main learnings and stories.

Deliverables

D 15: Support on design, implementation, evaluation and iteration of national policies, programmes or pilots.

Work carried out

We undertook field research on this Subtask with the largest hospital network in North America (Atrium Health). We started the work with a workshop in October 2016 where we finalised the issues definition. In February 2017, we participated in an international evaluation panel convened by the hospital network and held another workshop. The collective impact process we used to co-design the intervention with hospital building operators was published end of 2017, including a DSMU webinar. A final workshop with the expert group took place in March 2018 and the award-winning work was published in the ACEEE summer study.

Activities completed in 2018

We finalised almost 100 publications in this Task, including primary literature publications in two highly impactful journals. We got three major international behaviour change conferences to support Task 24 by joining with us to hold our workshops. In addition, we co-edited a highly-lauded Special Issue on storytelling. Phase II will be finalised with the US Report and Policy Brief and the Subtask 10 collection of Policy Briefs.

Activities planned for 2019

Development of Task 24 extension proposal on hard-to-reach energy users.

Meetings, conferences, lectures etc. held in 2018

Outreach of this Task was highly successful and manifold, with publications, special sessions and workshops held at all major international expert conferences in our field. All Task workshop activities have now concluded. The last workshop was a 2-day workshop at the US Department of Energy, following a special session at the BECC conference in October 2018.

Seminars/Conferences/Lectures

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Meetings planned for 2019
No more meetings are planned in Phase II of this Task.

Publications produced in 2018
- 3x IEA DSM Spotlight Issues
- 2x IEA DSM blogs
- Combined workshop minutes report
- 6x ST6&7 Final Country Reports
- Final Report to Funding Agency (Austria)
- 2x peer-reviewed conference papers (BEHAVE and ACEEE Summer Study)
- ST6 Cross-country case study comparison on Energy Saving Kits, plus database (for Ireland)
- ST6 HEAT kit analysis (New Zealand)
- ST6 Collaboration on Green Leasing case study (Sweden)
- ST8 report on Storytelling from A-Z
- ST8 report on Decision-making tool
- 3 ST8 reports on case study, focus group and survey & interview templates
- ST8 Toolbox for Behaviour Changers
- ST9 Beyond kWh evaluation of Home Energy Saving Kits (Ireland)
- 6x ST10 Policy Briefs
- ST10 Report

Publications planned for 2019
Two eceee Summer Study papers, one ERSS conference paper.

Dissemination of results
Everything is on the IEA DSM website and Task 24 Wiki, as well as the Task 24 Ning site. All outputs of Task 24 can be found in the Appendices. We have disseminated this Task in almost 100 conferences, lectures and seminars, over 60 workshops and several peer-reviewed conference proceedings and journals. Almost 100 Task 24 publications are available on the IEA DSM website.
Involvement of Industry and other Organisations
A number of industry players, NGOs, intermediaries and consultants were actively participating in Task 24, including providing case studies, being represented on our expert network and coming to Task 24 workshops. PowerCo, NZ second largest lines company, sponsored the NZ ST2 report and is co-funding the NZ participation for Phase II, as is Auckland Council. The Netherlands worked with the retailer Essent, and industry parties such as DNVGL, KEMA and smaller industrial partners also contributed with their case study PowerMatching City. Several industry organisations expressed great interest in the ESCo Facilitators report for Task 16 which was translated into German and showcased on DENA’s website. It has also been published by the EE-IP, the largest energy efficient industry social network. Opower came to the Oxford and Milan workshops. The UK’s Energy Savings Trust and Sheffield University Hallam have bid for Horizon 2020 proposals with Task 24 and we are involved with the ClairCity H2020 programme. Our storytelling work has been utilised by Duneworks in SHAPE ENERGY, another H2020 programme. PG&E and Southern California Edison, some of the largest utilities in the US co-fund Subtask 9 and we got another 9 major North American utility sponsors with the Consortium for Energy Efficiency (CEE). Energy Efficiency Nova Scotia has participated in the Canadian work to date, as are University Health Network, Toronto; in Sweden we have several commercial landlords via BELOK and major tenants such as Årlanda Airport and Vasakrona; in New Zealand we also had most major utilities, NERI as well as the Smart Grid Forum involved; in Ireland it is CODEMA Dublin; in Austria Nissan, Family of Power, das Lastenrad and Holding Graz; and in Charlotte, we have the largest hospital network in North America involved, Atrium Health, as well as Duke Energy and several major industry consultants.

Positioning of the Task vs other bodies
Task 24 continues to support the Secretariat where needed. We are in contact with the Australian Annex of 4E and EBC Annex 66. Several ‘Nudge Units’, including the American, Canadian and British one are interested, and actively participating in workshops of our Task. The G20 Transport Working Group is interested in our work going forward.

Outreach of the Task – Success stories
The Behaviour Changer Framework (our ‘magic carpet of behaviour change’ as PG&E coined it at the 2015 BECC conference) of understanding the energy system, has received highly positive feedback by academics, policymakers and industry representatives around the world. It won best project at the ECEEE summer study. We receive very positive feedback from all of our workshops by participants. Our use of narratives and storytelling in its many different forms is being regarded as something of a trailblazer and has been copied by highly reputable experts in research and industry. We often get told that our work and our workshops are a lot of fun and people enjoy taking part in the Task as they can be creative and bring their various interests and expertise to the table. The Task is very inclusive and brings highly reputable, and skilled experts together with young students just starting out in the field. One of the greatest successes of this Task are the many examples of successful matchmaking where we have brought people from all over the world, different sectors and disciplines together to work outside of Task 24, and build strong friendships, collaborations and alliances. We have some highly committed experts (who are not the national experts in most parts) who have done 100s of hours of in-kind work for the Task. Without all of them, this Task would not have been what it is - the best-known and most highly-disseminated IEA DSM Task.

Activity Time Schedule
Based on 4 participating countries.

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### Phase II – Expert and stakeholder meetings

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## Phase II – Seminars, lectures and conferences

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Phase 2 publications
(not highlighted are reports for National Expert use only or yet-unpublished reports):

Subtask publications:

- Task 24 – Phase II: Work Plan
- Subtask 6&7 – Draft Report The Netherlands: Executive Summary plus Annexes
- Subtask 6&7 – Case Study Analysis – ICT Use in Higher Education – The Netherlands
- Subtask 6&7 – Final Report New Zealand
- Subtask 6&7 – Case Study Analysis – Home Energy Audit Tool (HEAT) kits in New Zealand
- Subtask 6&7 – Final Report Sweden
- Subtask 6&7 -Background for Green Leases in Commercial Office Buildings – Sweden
- Subtask 6&7 – Collaboration and Green Leasing: A case study of the Swedish Energy Agency’s new office building in Eskilstuna
- Subtask 6&7 -Background for Green Leases in Commercial Office Buildings – Sweden
- Subtask 6&7 – Cross-Country Case Study Analysis Home Energy Saving Kit Library Programmes – Ireland
- Subtask 6&7 – Cross-Country Case Study Comparison Ireland – Database of Energy Saving Kit Programmes
- Subtask 6&7 – Draft Report USA
- Subtask 6&7 – Final Report Austria
- Final Report to Funders Austria [in German]
- Policy Brief Austria
- Policy Brief the Netherlands
- Policy Brief Ireland
- Policy Brief Sweden
- Policy Brief New Zealand
- Policy Brief USA
- Subtask 8 – How to Create a ‘Magic Carpet’ for Behaviour Changers
- Subtask 8 – Toolbox for Behaviour Changers
- Subtask 8 – The A to Z of Storytelling in Task 24
- Subtask 8 – Template for Focus Groups in Task 24
- Subtask 8 – Case Study Templates in Task 24
- Subtask 8 – Decision-making Tree for Subtask 1 “Monster” case study analysis
- Subtask 9 – Using Bayesian Modelling to test the “beyond kWh” toolkit on Irish residential energy saving kits programme
- Subtask 10 – Overarching story (to be published)
- Subtask 11 – CHS case study: Designing a successful behaviour change programme for hospital building staff

Peer-reviewed publications:

- Subtask 8 – S. Rotmann (2016a), How to Create a ‘Magic Carpet’ for Behaviour Change’, ACEEE Summer Study Proceedings, Monterey, USA.
- Subtask 8 – S. Rotmann (2016b), How to Create a ‘Magic Carpet’ for Behaviour Changers, BEHAVE Conference, Coimbra, Portugal.
• Subtask 8 – S. Rotmann (2017a), “Once upon a time…” Eliciting energy and behaviour change stories using a fairy tale story spine, Energy Research and Social Science, Special Issue on Storytelling in Energy and Climate Change Research.

• Subtask 8 – S. Rotmann (2017b), Task 24: Co-creating behaviour change insights with Behaviour Changers from around the world, ECEEE Summer Study Proceedings, Hyéres, France.

• Subtask 8 – Special Issue on “Narratives and Storytelling in Energy and Climate Change Research”, ERSS Volume 31, September 2017.

• Subtask 8 – M. Moezzi, K. Janda and S. Rotmann (2017), Using stories, narratives, and storytelling in energy and climate change research, Energy Research and Social Science, Special Issue on Storytelling in Energy and Climate Change Research.


Articles, blogs, Spotlight etc:

• Task 24 – Phase II Flyer

• Task 24 Policy Brief

• Spotlight September 2015 – Task 24: Helping the Behaviour Changers

• Spotlight December 2015: New Publication – Task 24 Subtask 2: The ‘Energy Hunt’ in Austria

• Spotlight June 2016 – Task 24 and Annex 66: A beautiful collaboration is emerging

• Spotlight March 2017 – Task 24: Creating ‘Magic’ with non-state actors

• Spotlight June 2017 – Dr Sea Rotmann: DSM Day in Dublin – Behavioural insights on energy efficiency in the residential sector

• Spotlight Sept 2017 – Hot of the Press! A new Special Issue on Storytelling

• Spotlight June 2018 – Task 24 studies Energy Saving Kit Programmes in Ireland and NZ

• Spotlight September 2018 – Task 24’s latest participants: the US and Canada via the Consortium for Energy Efficiency

• Energy News – Energy Projects need to center on End Users

• University Health Network (UHN) Toronto: Talkin’ Trash with UHN

• Energy in Demand – IEA DSM collaboration programme’s Task 24 Gets Published in Special Issue on ‘Storytelling and Narratives in Energy and Climate Change Research’

• Task 24 – Final Flyer

• eceee News – Special issue of the ERSS journal discusses narratives and storytelling, as a supplement to traditional scientific methods

Workshop Minutes:

• Subtask 6 and 7 – eceee Summer Study Task 24 workshop minutes (2015 and 2017)

• Subtask 6 and 7 – BECC conference Task 24 workshop minutes (2015)

• Subtask 6 and 7 – BEHAVE conference Task 24 workshop minutes (2016 and 2018)

• Subtask 6 and 7 – Canada Workshop minutes

• Subtask 6 and 7 – Sweden workshop minutes

• Subtask 6 and 7 – Ireland workshop minutes

• Subtask 6 and 7 – Netherlands workshop minutes

• Subtask 6 and 7 – New Zealand workshop minutes

• Subtask 6 and 7 – Carolinas Health Services workshop minutes (USA)

• Subtask 6 and 7 – CEE workshop minutes (USA)

• Subtasks 6 & 7 – Combined workshop minutes
Online sharing and administration of Task 24

- Via @IEADSM on twitter (also @DrSeaRotmann), IEADSM facebook group; ECEEE and EEIP columns
- Weekly publication of Behaviour Change & Energy News by Dr Sea Rotmann
- Expert platform www.ieadsmtask24.ning.com
- Task 24 dropbox (www.dropbox.com) to share templates and collected models etc.
- Task 24 wikipedia (www.ieadsmtask24wiki.info)
- Task 24 youtube channel
- Task 24 slideshare (http://www.slideshare.net/drsea)

Description
This Task in a first phase focused on identifying existing business models and customer approaches providing EE and DSM services to SMEs and residential communities, analysing promising effective business models and services, identifying the role of national energy ecosystems in which these business models operate and provide guidelines to remove barriers and solve problems, and finally working together closely with both national suppliers and clients of business models.

The Task’s research in phase 1 was not comprehensive, but did allow for the exploration and identification of interesting business models and strategies for energy efficiency focused services and how these could be supported by policy and or other institutional arrangements. What the Task accomplished thus far is just the starting point for understanding what the business models delivering energy efficiency services need to do to be successful, which sectors need what type of models, and what is needed from policy makers or other institutional players in terms of support. In sum, much more research and other activities are needed. This is why a second phase is planned.

Task Aims & Objectives
What will we do?
The contours of matches between the Task’s four business model strategies and specific sectors are emerging. To increase this understanding and keep up with the emerging trends a focus will be on new categories of energy efficiency business models and further developing our understanding of business model strategies for these categories:

- Demand response energy services
- New actors driven energy services such as community energy, community VPPs, peer2peer
- All electric and or district heating business models

The role of agencies, governments (i.e., context players) in stimulating market uptake of energy services, especially for smaller companies and co-create potentially more supportive policies and strategies with them. Participants will conduct a comprehensive analysis of which kinds of policy support would best support the four models and strategies we identified in phase 1.

One key finding from phase 1 of Task 25 is that it is imperative to transfer the knowledge gained and the findings to the relevant actors in different countries and settings. And, simply communicating this information through a webinar or presentation is insufficient. This type of knowledge needs to be experienced and worked with in a real life setting, investigating real business models, real policies and real users. Therefore, the Task will set-up a strong training system, organize user centered business modelling interventions, involve end-users in a living lab setting, develop an online course (consisting of multiple webinars) in close cooperation with the DSM University as well as perform the more standard dissemination at conferences, in journals, etc.

Activities completed in 2018
This Task phase 2 was approved at the Exco in Bergen-Norway in April 2018 and then contract negotiations started with all countries. Work for this Task phase 2 only just started before summer for the Netherlands and Sweden, and has not yet started for Australia. We had a first national expert meeting in London, the 30th of September to officially kick-off the work and discuss the objectives for the next 6 months. At the ExCo meeting an extension was approved until the fall ExCo in 2020, to accommodate the late start of the project.
Subtask 1: Task Management
Start date: month 1, end date month 30

Activities
- Overall project coordination and management, including contact relationship management
- Attendance of ExCo meetings, conferences and reporting to IEA DSM ExCo

Deliverables
- Half-yearly Task status reports
- Annual reports

Progress
- The operating agent(s) have participated in the ExCo meeting in Bergen-Norway in April and the ExCo meeting in London in October 2018 and presented both at the DSM days and at the ExCo meetings.
- A half-yearly Task status report was written and this Annual report.
- Discussions are on-going with potential new countries.

Subtask 2a: Increasing our comparison, including other categories of energy services
Start date or starting event: Month 1, End date: Month 24

Activities
- Developing an overview (case analysis, literature review and interviewing) of at least one, possibly two energy service business models in the participating countries for the chosen categories.

Deliverables
- None in this period

Progress
- The operating agents have started with the literature review on business models for demand response services and for new actors driven/community energy services. A first draft of the report is expected by the end of 2018 in the form of a book chapter for Elsevier.

Subtask 3a: Deepening our understanding of the actors and issues explaining the inertia of energy service uptake
Start date or starting event: Month 1, End date: Month 28

Activities
- Investigating the different kinds of policy support are that are available and what might be potential valuable support for the four models

Deliverables
- None in this period

Progress
- The literature review performed under subtask 2 is also used to investigate policy support available to the business models.

Subtask 4a: Training, engaging, disseminating
Start date or starting event: Month 1, End date: Month 24

Activities
1. Set up a training road-show, with one training event per participating country and a training of participating country to enable them to give the training themselves.
2. Traditional dissemination to external stakeholders and academia
Deliverables

- D9: Training road show
- D10: Outreach and dissemination material, including at least 2 academic/journal publications, MOOC, and other outreach material highlighting the Task’s work.

Progress
See publications so far in chapter 7.

Activities planned for 2019
The objectives listed below will be started but not finalised in the next 6 months.

Subtask 1: Task Management
Start date: month 1, end date month 24

Activities

- Overall project coordination and management, including contact relationship management
- Attendance of ExCo meetings, conferences and reporting to IEA DSM ExCo

Deliverables

- Half-yearly Task status reports
- Annual reports

Progress

- Participation in the Exco and DSM day in October in London-UK
- Preparing the Annual Report for 2018 for Task 25

Subtask 2a: Increasing our comparison, including other categories of energy services
Start date or starting event: Month 1, End date: Month 18

Activities

- Developing an overview (case analysis, literature review and interviewing) of existing energy service business models in the participating countries for the chosen categories, including all the deepening questions listed in the text earlier
- Comparative analysis of business models in different countries. Further testing our hypothesis on the four strategies for both business model and context interaction, including all the deepening questions listed in the text earlier
- Organising one country workshop with business representatives and other relevant stakeholders to discuss the cases, i.e. in the Netherlands, and Sweden, Australia potentially to be done in conjunction with an exco meeting.

Deliverables

- D7: overview of business model strategies (business model, entrepreneurial capabilities and context stretch or fit actions) for each investigated sector or type of business, including a comparative analysis across countries.

Subtask 3a: Deepening our understanding of the actors and issues explaining the inertia of energy service uptake
Start date or starting event: Month 1, End date: Month 22

Activities

- Investigating the different kinds of policy support are that are available and what might be potential valuable support for the four models
- Organising a dialogue on a national scale on the system innovation failure and the role of different context stakeholders in setting up a more conducive context for service models.
Developing sector and business model type sensitive recommendations for policy makers and other institutional stakeholders where relevant.

**Deliverables**
- D8: Overview of the different types of policy and institutional support available to the different types of business models, where relevant country context and sector context sensitive. Including a national dialogue.

**Subtask 4a: Training, engaging, disseminating**
Start date or starting event: Month 1, End date: Month 24

**Activities**
- Set up a training road show, with one training event per participating country and a training of participating country to enable them to give the training themselves.
- Traditional dissemination to external stakeholders and academia

**Deliverables**
- D9: Training road show
- D10: Outreach and dissemination material, including at least 2 academic/journal publications, MOOC, and other outreach material highlighting the Task’s work.

**Meetings held to date 2018**

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<td>INTERREG Community Virtual Power Plant Interreg project meeting</td>
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<td>Dutch Association for Installers (Uneto/VNI)</td>
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<td>Aix-Les-Bains</td>
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<td>Sustainable Places conference, special workshop on user centered businessmodels organised by a consortium of projects (the H2020 project DrBoB, Task 25 and the H2020 Mobistyle project).</td>
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<td>Workshop on designing user centered energy services at the Innovation Expo-Topsector Energie_TKI Urban Energy_MVI energie workshop.</td>
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</table>
Meetings planned for 2019

Experts meetings/seminars/conferences
We plan to hold a workshop in the Spring in the Netherlands, perhaps one before the Summer in Sweden, and otherwise after Summer, and an informal meeting at the eceee Summer Study in France, June 2019.

Publications produced in 2018

Academic publications
- Due to timing issues, and in spite of an almost finalised peer review (paper was accepted and some final editing was to be performed) the submission on the phase 1 results to the journal Energy Efficiency was cancelled and we are now submitting the paper to a different journal.

Non-academic outreach
- Two spotlight articles were published: Spotlight March 2018 and Spotlight June 2018. The European Commission (Paul Hodson) contacted us with a request for further information on the Task, through Twitter in response to the spotlight articles.
- Ideate is creating an animation video on the findings in Phase 1
- In 2018 the EGRD published a report on the workshop held in the fall of 2017 called “Towards a Consumer-Driven Energy System. Understanding Human Behaviour” also highlighting the work of Task 25.
- We provided input on energy services to UNETOVNI as input to the Climate Agreement formation in the Netherlands
- The fall newsletter of Topsector Energie (TSE) published an interview with Ruth Mourik about the IEA work (published September 24th).
- We provided presentation material to be presented by our Vice Chair of the IEA DSM TCP at the G20 meeting in Paris, September 2018, and at a workshop on ‘Behaviour Change for Energy Efficiency: Opportunities for International Cooperation’ which will take place 12 September 2018 in Paris on the margins of the annual meeting of the Working Party on Energy End-Use Technologies (EWUP).
- In conjunction with a small project for the Dutch Innovation Agency Topsector Energie, Kennis Innovatie Urban Energy (TKI-UE) and MVI-E, Task 25 provided a training workshop at the TSE conference October 4th in the Netherlands for policy makers, entrepreneurs and researchers.

Publications planned for 2019
Next to the already performed types of outreach, such as Spotlight contributions, papers etc., based on the work for Task 25, we have been asked to provide a chapter in a book called “Energy and behaviours: Challenges of a Low-Carbon Future” to be published by Elsevier. The tentative title for the chapter is: “Democratising business models, energy services and community energy: best practices, challenges and opportunities.

Involvement of Industry and Other Organisations
The Industry partners are explicitly represented in our Task, we involve them in the analysis (they are our unit of analysis), in the dissemination (they represent the majority of stakeholders for our newsletters), and in our workshops they are a key stakeholder. In each country where we held workshops we had or plan to have attendance of industry representatives, including agencies responsible for industry.

Positioning of the Task – v.s. Other Bodies
Other DSM TCP Tasks
This Task is the only running Task in the IEA DSM TCP. When new Tasks will be up and running synergy will be sought.

Collaboration with other TCPs
Based on experiences in Phase 1, we plan to seek collaboration with ISGAN and other TCPs. We will do this once we have concrete results to share.
Outreach of the Task – Success Stories
The output of Phase 1 has been very successful. The analysis framework and conceptual framework that allows for a perspective on the energy transition and the servitisation transition as well has been very successful. We received very good feedback from the interviewed entrepreneurs and those participating in the workshops, stating that our interventions generated relevant learnings for them. The project website on the Duneworks website is visited frequently by numerous visitors each month. We were increasingly invited to contribute to programmes focused on business models. For example we supported the development of business models of Team FAST of the TU/e and have been asked to share our learning with the Dutch TopSector Programme, and present at the EGRD meeting in Copenhagen. Phase 2 only just started, but strong cooperation has taken place already in the context of two projects: the H2020 Dr BOB project, and the INTERREG project cVPP.

Activity Time Schedule
Timeschedule for last 6 months

<table>
<thead>
<tr>
<th>month</th>
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<th>2</th>
<th>3</th>
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<td>1.2 Exco meetings</td>
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<td>1.3 Overall project management and financial and administrative duties</td>
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<tr>
<td>1. Identifying and selecting business models in participating countries</td>
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<td>2. Creating customer journeys</td>
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<td>3. In-depth comparative analysis</td>
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<td>4. Country workshop</td>
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<td>5. Reporting results</td>
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<td>Subtask 3a</td>
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<td>1. Investigating policy support types</td>
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<td>2. Developing sector and business model type sensitive recommendations</td>
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<td>Subtask 4</td>
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<td>1. Set up a training roadshow</td>
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<td>2. Developing a MOOC</td>
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<td>3. Set up an business model intervention involving real end users</td>
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<td>4. Traditional dissemination</td>
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## Timeschedule for next 6 months

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<td>Feb-19</td>
<td>Mar-19</td>
<td>Apr-19</td>
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### Subtask 1:
Management of the Task

1.2 Exco meetings

1.3 Overall project management and financial and administrative duties

### Subtask 2a

1. Identifying and selecting business models in participating countries
2. Creating customer journeys
3. In-depth comparative analysis
4. Country workshop
5. Reporting results

### Subtask 3a

1. Investigating policy support types
2. Developing sector and business model type sensitive recommendations

### Subtask 4

1. Set up a training roadshow
2. Developing a MOOC
3. Set up a business model intervention involving real end users
4. Traditional dissemination
Participating countries Phase II

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