Demand Side Management Technology Collaboration Programme (DSM TCP)

Fifty Fourth Executive Committee Meeting

Pre-Meeting Document (PMD) – Part 2

21 – 25 October 2019

Melbourne/Sydney, Australia

Technology Collaboration Programme
by iea

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- **Approve** proposal to become an Annex

AGENDA

Demand-Side Management Technology Collaboration Programme (DSM TCP)
Fifty-Fourth Executive Committee Meeting and associated events
21 - 25 October 2019; Melbourne and Sydney, Australia

Monday 21 October 2019 *ExCo meeting (ExCo delegates only) (Operating Agents meeting in evening), Monash Conference Centre, Melbourne*

Evening 21 October **Operating Agents Meeting,** venue to be confirmed

Tuesday 22 October 2019 *ExCo meeting (including Operating Agents and observers), Monash Conference Centre, Melbourne*

09:00 **3. TASKS / ANNEXES (continued)**

The items on each of the TCP's current four annexes will feature two sub-items (i) a Task Status Report; and (ii) concrete policy actions that may arise from their findings.

09:00 **3c. Setting the scene for the User-Centred Energy work Systems TCP programme** – *David Shipworth*

09:30 **3d. Energy Service Supporting Business Models and Systems (Task 25 – Phase2)** – *Ruth Mourik, DuneWorks, Netherlands* DOC **L** Part 2

09:30 (i) Task Status Report

10:00 (ii) Policy Discussion

10:30 **Coffee**

11:00 **3e. Global Observatory on Peer-to-Peer Energy Trading and Community Self Consumption** - *Alexandra Schneiders, University College London, United Kingdom* DOC**M** Part 2

11:00 (i) Task Status Report

11:30 (ii) Policy Discussion

12:00 **3f. Operating Agents meeting report** – *Even Bjørnstad*

12:30 **Lunch**

13:30 **3g. Social Licence to Automate** – *Declan Kuch, University of New South Wales, Australia* DOC **N** Part 2

13:30 (i) Task Status Report

14:00 (ii) Policy Discussion

14:30 **3h. Hard to Reach Energy Users** - *Sea Rotmann, Sustainable Energy Advice, New Zealand* DOC**O** Part 2

14:30	(i) Task Status Report	
15:00	(ii) Policy Discussion	
15:30	**Coffee**	
16:00	**3f. Energy Sector Behavioural Insights Platform** – Annex Proposal, *Jeremy Sung, International Energy Agency*	DOC **P** Part 2
16:45	**3g. Best Practices in Designing and Implementing Energy Efficiency Obligations and Auction** – Annex Proposal, *Sam Thomas, Regulatory Assistance Project*	DOC**Q** Part 2
17:30	**4. OTHER BUSINESS**	
18:00	**Meeting ends**	
Evening	**Bilateral Meetings with interested parties,** venue to be confirmed	

Document J

The two following Concept papers will be presented to the ExCo on 21 October in Melbourne.

(Concept paper) SOCIO-TECHNICAL GENDER, ENERGY AND THE FRAMING OF NEW ENERGY PATHWAYS

Martin Hultman, Anna Åberg & Felicia Söderqvist

Premise: Two major issues in tackling problems such as climate change is that the gap in energy access remains vast across the globe, and the inertia of our large socio-technical energy systems. The lack of access to modern energy systems results in that people and countries with relatively less development and economical means will have to choose between human wellbeing and development. This restricts the forms of energy systems that can be adopted (Banuri & Hällström 2012). Among the most affected are socially marginalised groups where women, due to patriarchal societal structures affecting socioeconomic disposition, can be especially vulnerable (Ahlborg 2009; Kim & Standal 2019). And yet, studies have shown a tendency that women practice energy saving and long-term thinking to a greater extent than men, (Räty & Carlsson-Kanyama 2010; Kall & Hultman 2018). Where women have been empowered to contribute there are examples of debate and knowledge shifts towards more sustainability and energy saving considerations (Kall & Hultman 2018; Permana, Aziz & Siong 2015; Gray et al. 2019). This raises the question not only of the empowering of women, but also of identifying and exploring alternative energy pathways and how gender structures and identities frame policies and energy systems both in use and under consideration.

Energy and gender dynamics

Energy transition is one of society's main issues ahead, and this challenge has been acknowledged at least since the late 1970's. Despite this acknowledgement, inertia in several energy sectors make these transitions difficult. In order to come to terms with this inertia we need to unpack social factors that contribute to making the energy sector resistant to change. One such factor is the gender imbalance in the sector. Historically, energy has up until this day been a very unequal sector dominated by men as showed not least by state agencies such as the Swedish Energy Board and public-private analysis of late (Energimyndigheten 2015; Tam 2017; C3E 2017; Barnholt 2017). Looking more closely into this domination, it is historically a certain form of masculinity, called industrial/breadwinner, which has dominated the socio-technology of energy during modern times (Hultman & Pulé 2018). In particularly this can be seen in extractive industries such as coal, gas and oil, hydropower developments as well as in the nuclear industry (Filteau 2014; 2015; Anshelm 2000; Öhman 2007). These are all areas of concern for sustainability and energy access in policy making.

Further, research into patterns of energy use has shown that the actions of men in general are one significant cause of the low pace in energy transitions. Especially the fact that affluent men travel more, eat more meat and engage in energy intensive activities such as driving large cars has brought male action patterns to attention. Men also have a tendency towards being both the leaders of and workers in extractive industries and large scale energy systems (Hultman 2017; Connell 2017). This statistical difference between the behaviour of men and women is connected to economic structures and cultural norms, dictating the frames of possible actions by different genders. For example, in the west, the narratives of what it means to be a man have focused on being strong, the rejection of emotions and taking charge. Feminine narratives by comparison have instead incorporated emotions and care towards others, contrasting masculine doctrines. As an example of how this has affected policy directly, in Swedish politics, the potential negative and destructive effects of nuclear power were not brought to attention until emergent female actors introduced it and transformed it into a political policy concern in the 1970s. Due to this debate, nuclear power did not acquire a solid foothold in Sweden (Kall & Hultman 2018). One should thus consider the potential of alternative gender pathways and constructions, such as 'ecological masculinities', incorporating sustainable caring aspects (Hultman & Pulé 2018).

The basic summary of research in this field is that any successful transition needs to take gender inequality into account. Thus, by analysing gendered patterns both on an individual level and in the industry, such as but not limited to masculinities and femininities of energy use, this task will result in the development of new (or the re-imagining of old) practices and technologies leading to energy saving and a more equal energy system. In parallel, the task would assess how gendered patterns of policy making decisions support or hinder the development of a more efficient and equal socio-technical energy system. By intertwining gender, energy practices and policy making, we can find implementation pathways on a national and international level, comparing countries, regions and forms of organisations. This would include a focus on how and what is distributed in terms of policies by policy making agencies and corporations, and also the effects thereof. Considering the differences both in energy use and gendered norms in different countries, a comparative stance is vital for this task, and such comparison must include both emerging and developed economies.

Pathways to impact

One of the main issues facing policy actors working with transition processes is the existing socio-technical systems that have created path dependencies, hindering the implementations of new technologies as well as new economic and consumption patterns. These path-dependencies include inertia within organisations as well as among the actors and networks that surround a system, where alternative technologies and behaviours may exist but are not chosen for cultural and organisational reasons. Today, as shown above, there are clear gendered patterns to this inertia. However, these patterns (especially the masculinities described above) are often not made explicit in energy and environmental policy. Instead gendered issues are often only made visible in policies explicitly regarding equality and social issues. There is thus a gap in policy between the so called “hard” policy decisions regarding energy use- and production, and the “soft” policy decisions regarding gendered inequality. If we are to come to terms with the inertia of the current energy system, this gap needs to be bridged. The research proposed in this task will specifically contribute to policy action in two important ways.

1: By gathering empiric, international cases of gendered-base patterns of energy use- and production from different national contexts, the task will provide policy makers with evidence-based knowledge on how energy policy has and has had gendered implications, and which ones they have been. This includes knowledge regarding how certain policies may be resisted or not enacted due to such patterns which have not been taken into account specifically in energy policy. In particular, some energy policies may have very different effects in different national contexts specifically due to its gendered implications. This knowledge can then be used to assess past and future energy policies.

2: In addition, we will use this knowledge to suggest new policies going forward which bridge the gap between energy policy making and equality policy making. As noted above, a higher equality and representation of different gender patterns in decision-making have historically led to new and more sustainable energy policies. The knowledge gathered during this task, will similarly lead to new policy suggestions, which will further include special consideration for different national contexts.

Further, in terms of technical development, the study will contribute to assessing gendered use of energy technology, as well as how gendered patterns influence the technological and behavioural choices made not only by individuals, but also by companies and large institutions. This will open up for a broader base of assessment for new energy technology and its implementation.

Knowledge and research networks

This proposal is in line with calls for cross-disciplinary studies that integrate social and behavioral sciences in energy research (Ellsworth-Krebs, Reid & Hunter 2015; Sovacool et al., 2015) as well as calls for gender studies of energy (Sovacool 2014). The applicants have engaged in such research during their whole scholarly life first as part of a Phd program under the Swedish energy Agency, and later in the research projects Gender & History, Scrutinizing Climate Change Denial, Ecological Masculinities (Hultman) and Petrocultures (Åberg) funded by the Swedish Energy Agency with specific aims to add to the energy-SSH and gender contributions to the energy transition in

Sweden. Felicia Söderqvist has studied how energy, transport and the environment have been covered by the IEA in the World Energy Outlook publications historically. The applicants are based at the STS-division at Chalmers University of Technology in Sweden, were researchers have long experience in working with policy makers within their respective fields of expertise, including the fields of Energy technology, Gender Studies, History of Technology, Environmental Humanities, Science and Technology Studies, Policy Studies, Industrial Dynamics and Ethics.

The applicants are also part of an international network of scholars engaging in these issues, and our aim is to enroll this network for task-sharing in this task. Examples of researchers we are interested in engaging with are:

- Dr Sherilyn MacGregor; Sustainable Consumption Institute (Core)Sustainable Consumption Institute School of Social Sciences, Manchester University, UK
- Dr. Cara Daggett, Energy Humanities, Virginia Tech, US
- Elizabeth Cecelski, ENERGIA.
- Prof. Joy Clancy, Institute of Development Studies, Twente, Neatherlands
- Prof. Greta Gaard, University of Wisconsin River Falls, US
- Katarina Barnholt Klepper, Nordic Energy Research
- Dr. Margaret Skutsch, Twente, Netherlands
- Prof. Benjamin Sovacool, University of Sussex, UK
- Dr. Jamie Woodworth, University of Colorado, US.
- Associate Professor Janet Stephenson, Centre for Sustainability, Otago University, New Zealand
- Prof. Håvard Haarstad, Centre for Climate and Energy Transformation, University of Bergen, Norway

This Task is also committed to communicating its results to the civil society as well as state agencies; a commitment the applicant Martin Hultman has pursued as part of his scholarship for a long time and in different ways. In addition to usual communication channels (mass media, public lectures, popular science) he is currently working in partnership with GeMiNi, Women in Nordic energy sector and Women in Clean Energy. GeMiNi is a co-creation platform which since 2016 brings together Swedish government agencies such as SIDA and the Nature Protection Agency, with civil society actors such as for example, Greenpeace and Woman to Woman. Women in Nordic energy sector is a newly launched collaborative platform making women visible in the Nordic energy sector in which and Women in Clean Energy is a global initiative promoting women in the sector; both of which Hultman contribute to as energy gender expert. Åberg has recently contributed to the collected volume “Advancing Energy Policy: Lessons on the integration of Social Sciences and Humanities”. The volume was a part of the H2020 project SHAPE Energy, which had as its mission to create a platform for advancing Energy-SSH in energy policy research and practice.

Adopting a gender perspective on policy in this manner could thus reveal more sustainable policy pathways that would otherwise be left in the periphery, while it at the same time provides a better understanding of how policy and policy implementation affect and are affected by gender structures in various contexts. The applicants possess both expertise and experience in dealing with research related to these questions and are part of a considerable research network that can be approached for Task-sharing.

DOCUMENT K

(Concept paper) NEW DEMAND RESPONSE (DR) SERVICES AND PRODUCTS FOR FLEXIBILITY MARKETS

DI Christof Amann, e7 energy innovation & engineering, Walcherstraße 11, A1020 Vienna

Introduction

The Paris Agreement on Climate Protection aims at limiting global warming to well below 2°C and pursuing efforts to limit it to 1.5°C. **Decarbonisation** of the global economy and society is one of the major challenges of mankind in the coming decades. For the electricity system the use of **renewable resources** will have to increase significantly. Wind power and photovoltaics will contribute to this change of the energy system but due to their **volatility** operation of the electricity system will **increasingly need flexible production units or demand response (DR)** activities to be traded on (different) flexibility markets.

Furthermore, with the **decline of fossil fuel power plants** (e.g. phasing out of coal power stations, but also CHPs), relevance of flexibility on the demand side will grow dramatically in the coming years. **Technical potential for the participation of consumers (prosumers) is large,** but market development is still weak facing **barriers in the field of regulation, technology but also energy market structure.** This is particularly true for flexibility of small and medium loads (incl. distributed production and storage).

Beside Energy Efficiency (EE) the development of Demand Response (DR) products and services that offer flexibility to the (future) energy system can be considered a high priority challenge. So far, DR activities focused on industry, now it is time to **use the most innovative technologies in order to raise the huge existing potential and to integrate energy consumers** and prosumers with small and medium loads into the energy transition.

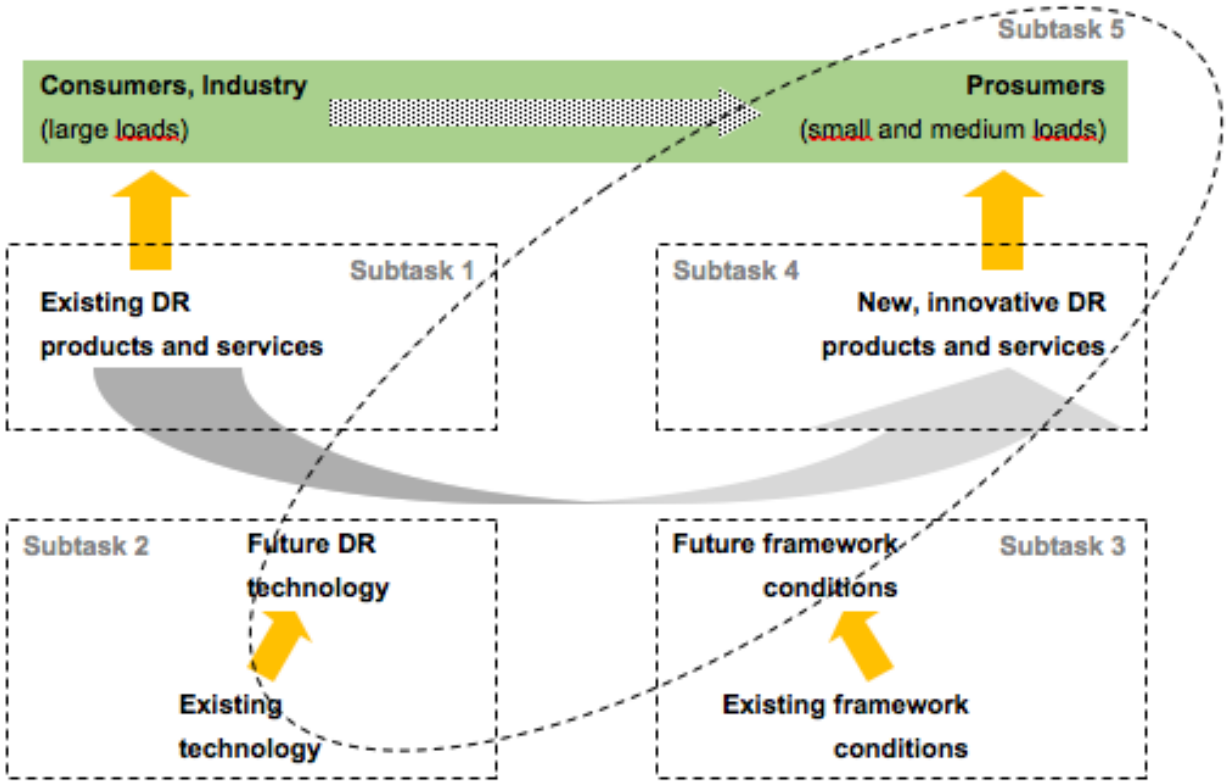
Aim and Objectives

The aim of this Task is to **integrate energy consumers with small and medium loads** (including distributed energy production and storage) by developing **innovative demand response services and products** that can be traded on flexibility markets. This is done by assessing existing **innovative and future technology developments** that allow to reduce cost by a high level of automatisation on the consumer's side and by proposing **regulatory framework conditions** helping to **reduce major entrance barriers** for interested consumers (e.g. upfront costs, contractual structure, M&V, data management).

Even though this Task will be **built upon existing experiences for DR** in several countries in the world (e.g. US, France, Ireland, United Kingdom), **future DR products and services for consumers** will only be available with the **application of new innovative technologies** (e.g. BEMS, smart meters, blockchain, smart appliances, IoT) and with **adapted regulatory framework conditions** (e.g. electricity market, privacy) which clearly go beyond requirements for energy efficiency.

Approach

The following Subtasks are proposed in order to achieve the objectives of this Task:



Project Structure

Subtask 0: Task management and task definition

In this Subtask a detailed workplan will be defined by Task partners. This Subtask deals with project co-ordination and management, including exchange with the ExCos and reporting.

Subtask 1: Market analysis

This subtask gives an overview on **existing DR products, offers and services** all around the world and documents best practice examples with the clear potential to transfer existing experiences into new and futureproof DR services and products. The focus of the work will be on the **integration of small and medium loads,** where only a few relevant examples exist (in comparison to industry applications).

Subtask 2: Technology assessment

Demand Response for small and medium loads rely on the **availability of innovative technologies, e.g.** smart appliances that can easily be integrated into the system without large costs. The market analysis also analyses the expected further **development of technologies** with high relevance for demand response, like blockchain, smart meters, and smart appliances (BEMS, white goods, smart plugs, ...).

Subtask 3: Regulatory Framework

This subtask is strongly related to the market analysis and the technology assessment. Regulatory framework conditions vary to a large extent internationally but have to be considered one major barrier - or enabler - for further market development. Obviously, **further development of**

regulatory framework conditions (like in the European Union) may lead to a major step towards gaining the existing potential on Demand Response. Special focus will be on success factors in countries with a more **developed market for demand response** in their energy market (e.g. US, certain EU countries like FR, UK, IE).

Subtask 4: New business models for flexibility

It can be expected that with the changes in the framework conditions (e.g. recast of the EC Directive on Electricity Markets), **new products (services or products)** will emerge on the energy market. Built on existing **examples in various countries** new business cases will be designed in order to enhance the market for flexibility.

The development of DR business models will have to take into account the very specific **market requirements of the different flexibility markets** (control energy, congestion management, wholesale market, balancing market etc.). It further requires a high level of **participation of consumers and stakeholders.**
One critical issue is to develop **methodologies for measurement and verification (M&V)** that are in line with needs of consumers, with regulation requirements and with privacy issues.

Subtask 5: Integration of Consumers, Stakeholder Involvement and Recommendations

Successful definition of business cases and the formulation of recommendations and implementation for **future framework conditions** in favour of **new DR business cases** are highly depending on **consumer and stakeholder involvement.** Hence, consumers (incl. their associations), policy makers, regulatory bodies, grid operators, energy providers, aggregators and other market participants will be brought together within this task, preferably on the **level of national states,** where product development and regulation are implemented. However, exchange between these stakeholders on an **international level** will help to integrate best practices.

Expected Results

- Analysis of success factors for market development (energy market, regulation, ...) for DR products and services
- Assessment of existing DR technologies and definition of future requirements
- Definition of new DR business models for the integration of small and medium loads (and distributed energy production, storage) for different flexibility markets
- Integration of consumers and stakeholders
- Recommendations for adapted framework conditions
- ...

Matters for the ExCo

Suggested project financing model: **Task Shared model**

Overlaps towards Task 25 (Task duration from May 18 to October 2020): This new proposed Task directly builds on the work done in Task 25. Especially the structural proposals for the development of new products and services can directly be integrated in the work. However, even though there are some overlaps, the focus of this new Task is on the flexibility markets rather than energy efficiency markets (e.g. EPC) and therefore has to deal with a completely different stakeholder group and much more complex regulatory framework conditions. Energy efficiency and flexibility are two main challenges of the energy transition but - in some cases - they are not partners always but deal with different problems and have contradictory effects (on the consumer's side, not on the system's side).

Task xy on "Social Licence to Automate" tackles an important question of DR products and services development with growing relevance. The results of this Task will be directly integrated in the work of the proposed Task. Close co-operation right from the beginning will help to define synergies.

Possible Partners

Potentially, e7 is involved in several European projects with a long list of highly qualified partners that potentially could participate in the proposed task. However, this will be verified in the coming weeks.

- CERTH, Greece (Technology development, research; information technology)
- HYPERTECH Energy Labs, Greece (Technology development)
- Checkwatt AB, Sweden (Smart solutions for consumers)
- IERC, Ireland (University)
- JRC, Italy/Belgium (EC Research Institute)
- University of Cyprus

Countries that could be interested (based on information from the operation agent), tbd.:

- Australia
- United States
- Canada
- Japan

DOCUMENT L

TASK 25 PHASE 2, ENERGY SERVICE SUPPORTING BUSINESS MODELS AND SYSTEMS

Operating Agent: Ruth Mourik, DuneWorks, Netherlands - info@duneworks.nl

SUMMARY

In this Task we analyse multiple case studies on innovative energy service business models in Sweden, The Netherlands, Australia and Ireland. The services we focus on range from microgrids, community virtual power plants, community sustainable districts, light as a service, PV as a service, demand response and flexibility services, to heat as a service type of business models. The research questions we have in mind are:

- ✓ how do these innovative energy services fare in terms of successful uptake and or scaling up
- ✓ how are their business models and entrepreneurial journeys shaped by the institutional context and other system factors, especially by the specific characteristics of the energy transition context they operate in
- ✓ how do these enterprising stakeholders deal with the system around them, and how are servitisation dynamic capabilities (sensing, conceptualising, orchestrating, scaling and stretching) impacting on their journey in the context of the energy transition.
- ✓ And finally, what are system conditions that either limit or facilitate the flourishing of energy services, especially those that are potentially important for the energy transition; and what instruments or other means are available to meet these needs, or need adjusting or need to be developed?

See www.ieadsm.org for publication on findings of the Task

OBJECTIVES FOR THE LAST SIX MONTHS

Subtask 1 Task Management

This subtask comprises overall project coordination and management, including contact relationship management and attendance of ExCo meetings, conferences and reporting to IEA DSM ExCo.

Progress towards Subtask objectives

In last six months we attended (virtually) the Bern ExCo meeting and the DSM conference in Bern and provided the necessary reporting to the ExCo, including a discussion paper on first findings of the Task. In addition we had an expert workshop in Bern in March 2019, and another expert workshop in Amersfoort The Netherlands on September 30th-October 1st 2019.

Subtask 2: cases analysis

This subtask aims at developing an overview (case analysis, literature review and interviewing) of existing energy service business models in the participating countries for chosen categories.

Progress towards Subtask objectives

In the last six months we analysed the following cases, including necessary literature review and interviews with business developers and system stakeholders:

***Cases in the Netherlands**:*

1. *A sustainable district case: Talis*
2. *An all-electric district case: Hoogdalem*

3. *A community Virtual Power Plant case: Loenen*
4. *A case on optimisation of heat transport (de Vreugd)*
5. *A case on heat as a service (Schouten)*
6. *An ESCO case on heat (Zegwaard)*
7. *An second ESCO case on heat (Van Hout)*
8. *A third ESCO case on heat (ST warmte)*

Cases in Ireland:

1. *A community Virtual Power Plant case: Community Power*
2. *Solar Stream: EPC service business related to PV roof space for businesses*
3. Veolia Dublin Mater hospital: EPC service and fund for hospitals
4. Urban Volts ESB: Light as a service for industry
5. Solo Energy: VPP, Storage, P2P, flexibility services
6. Grid Beyond: total solution for flexibility commercial and industry

Cases in Sweden:

1. Citizen-driven innovation platform that aims to create a climate friendly district: Hammersby Electricity
2. Smart Front: Upgrading façade, indoor climate and insulation in one go
3. Ochno: Smart power and communication infra for offices, full control of connected things.
4. Negnic: smart thermostat delivering flexibity services

Cases in Australia:

5. Microgrid case Monash Univeristy Campus
6. Microgrid case Island of Bruny
7. Microgrid citizen driven in Yackadanda

Subtask 3: institutional analysis

The aim of this subtask is to investigate the different kinds of policy support are that are available and what might be potential valuable support for the business models investigated, and how the energy transition, the entrepreneurial capabilities and servitisation context impact the development of the businesses.

Progress towards Subtask objectives

In the last six months we performed an institutional analysis through the lens of the interviewed entrepreneurs and system stakeholders.
We reviewed relevant literature on transition theories, innovation management, business development, servitisation and institutional entrepreneurship.

Subtask 4: training, engaging, disseminating

In this subtask we aim to set-up one training event per participating country in such a manner that it enables them to give the training themselves; and in addition we develop more traditional dissemination to external stakeholders and academia, including at least 2 academic/journal publications being drafted, potentially set-up a MOOC, and other outreach material highlighting the Task's work.

Progress towards Subtask objectives

- In the last six months we revised a paper that was submitted to the journal Renewable & Sustainable Energy Reviews, to be resubmitted.
- We finalised a chapter to a book on energy democratisation, to be published by Elsevier November 2019.
- We wrote a paper and presented it at the 2019 Sustainable Places Conference on cVPP business models.

Experts meetings/seminars/conferences held in past six months

These tables are important for our report back to the EUWP, including the number of attendees and what sector they represented.

Experts meetings

Date	**Place**	**# of Experts**	**Type of meeting**	Govern-ment	Industry	Academic
March 2019	Bern	8	Internal Expert meeting	na	na	na
May 17th 2019	Vitual	3	Expert meeting Dutch University Nyenrode			x
September 2019	Amersfoort	10	Internal Expert meeting	na	na	na

Seminars/Conferences

Date	**Place**	**Partcipants**	**Type of meeting**	Govern-ment	Industry	Academic
March-April 2019	Bern	50-100	DSM day	X	X	X
May	Eindhoven	20	The Future of Energy Seminar Enexis (DSO)	x	x	x
June and July	Belgium	50	Inspiration days for potential cVPP initiatives, in collaboration with the cVPP Interreg project		X+ citizens	
Juli 2019	Sicily	50-100	conference	x	x	x
September 2019	The Hahue	2	Dissemination to DSO and industry	x	x	

Reports produced in the past six months

- *Article on energy services, business models and entrepreneurial capabilities, for the RSER Journal*
- *Book Chapter on institutional contexts in Ireland and the Netherlands and how these impact the development of cVPP business models*
- *Conference paper on cVPP business models*
- *Discussion paper on first findings from the case analysis across participating countries*

OBJECTIVES FOR THE NEXT SIX MONTHS

Subtask 1:

On-going project management

Subtask 2

Finalising case analysis and comparative analysis.

Subtask 3

Performing final interviews with system stakeholders and finalising institutional analysis.
Developing sector and business model type sensitive recommendations for policy makers and other institutional stakeholders where relevant.

Experts meetings/seminars/conferences planned in the next six months

Planned Experts meetings

Date	Place
November/december 2019	Netherlands- workshop and dialogue session with external experts
Spring 2020	Sweden- workshop with external experts
Spring 2020	Ireland- workshop with external experts
Exco spring	Internal expert meeting

Planned seminars/conferences

Date	Place
23-24 October	Energy Efficiency Expo in Melbourne on
December 12th 2019	DSM webinar
Summer 2020	Industrial Summer Study eceee

Reports planned for the next six months

We plan to develop a variety of outreach and dissemination reports and presentations and perhaps animations to communicate the findings from subtask 2 and 3.

OUTREACH

See above.

IDEAS FOR NEW WORK

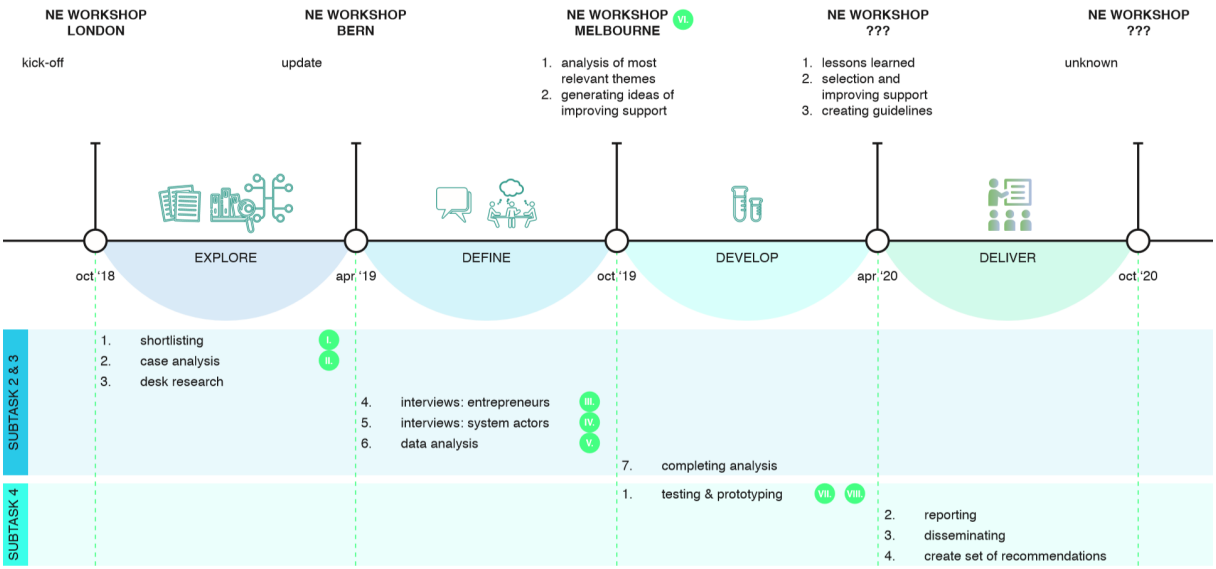
NA

FINANCE

Netherlands has paid 75% of total budget
Sweden has paid 100% of total budget
Australia has paid 100% of total budget
Ireland has paid 50% of total budget

In terms of staff costs we spent approximately 71% = 1000 hours
In terms of travel budget we spent approximately 5000 euro. We expect these travel costs to grow when we will do the workshops in Sweden and Ireland. What remains of the travel budget will be spent on staff costs to increase hours.

ACTIVITY TIME SCHEDULE



MATTERS FOR THE EXCO

Recommend the ExCo to approve the Task Status Update Report.

PARTICIPATING COUNTRIES

Netherlands, Sweden, Australia, Ireland

DISCUSSION PAPER

Energy Services Supporting BusinessModels and Systems

Operating agents:
Ruth Mourik

National experts:
Renske Bouwknegt, Lotta Bångens, Jo Southernwood, Matthew Kennedy, Tony Fullelove with support from Yvette Jeuken, Daan Picavet.

INTRODUCTION

In this discussion paper we set out a few initial thoughts and findings which will be further developed and updated following the NE meeting September 30th and October 1st. These updated findings and thoughts will be presented with our presentation at the ExCo meeting in Melbourne. In this paper we end with emerging policy questions that ExCo delegates might consider before the meeting. For an introduction to the findings from the first research phase, findings we build on in this second phase, please see Annex 1.
In the past year we analysed multiple case studies on innovative energy service business models in Sweden, The Netherlands, Australia and Ireland and identified useful conceptual frameworks to understand our findings. The services we focused on range from microgrids, community virtual power plants, community sustainable districts, light as a service, PV as a service, demand response and flexibility services, to heat as a service type of business models.

The research questions we had in mind were:

- how do these innovative energy services fare in terms of successful uptake and or scaling up
- how are their business models and entrepreneurial journeys shaped by the institutional context and other system factors, especially by the specific characteristics of the energy transition context they operate in
- how do these enterprising stakeholders deal
- with the system around them, and how are servitisation dynamic capabilities (sensing, conceptualising, orchestrating, scaling and stretching) impacting on their journey in the context of the energy transition.
- And finally, what are system conditions that either limit or facilitate the flourishing of energy services, especially those that are potentially important for the energy transition; and what instruments or other means are available to meet these needs, or need adjusting or need to be developed?

INITIAL FINDINGS AND THOUGHTS

In our case analysis across the countries we were able to validate and further finetune the four archetypes of energy service business models already found in the previous research phase.

Using the role of the system in the energy transition as a lens to further investigate these archetypes provided a deepening of our understanding of the business models, their relevance to the ecosystem of innovation and innovators needed in the energy transition, the relevance of the

dynamic servicing capabilities and the way the entrepreneurial stakeholders deal with the system around them.

The context energy service business developers are working in has several key characteristics due to the energy transition taking place where change to the existing sociotechnical configuration[1] is aimed for (Geels 2002; Kemp, Loorbach en Rotmans, 2009; Kolko, 2012; Loorbach, 2007; Raven, 2015; Schot, 2018; Verbong, 2008). We categorized these below into 5 characteristics, and detailed them with a selection of findings from our cases:

1. Systems-in-systems in transition are ripe with complexity due to interwovenness or interrelatedness of actors, perspectives, dimensions, factors etc.

- Especially also in the energy system, the system is comprised of many interlinked systems, at different levels, that all impact on each other. And these systems within systems hardly orchestrate their actions on an overarching
- Complexity and interrelatedness is not yet embraced in policy and instruments that aim to stimulate innovation. Most funding, subsidy as well as other forms of support like rules and legislation, are still developed to support the creation and uptake of single products and technologies, not system integration, nor to support the change processes. Too much is left to chance and market dynamics.
- Certification and standardisation is often aimed at individual components, not system integration.
- Subsidies and other instruments do not sufficiently support and finance processes aimed at system integration, or aligning of interests, values.

2. Many actors refer to The System as one technocratic block when it comes to how they try to market their innovative energy service or even when they run their daily business. This is especially the case for those business models that aim to serve the system (providing societal value). To them, the system responds as a bureaucratic monster, instead of operating as one client.

1. A sociotechnical configuration comprises of 1) technologies and physical elements; 2) social practices: ways of doing (e.g. at household and community level, but also roles of the local community members, the local organizational structure, and other important actors (e.g. DSO, TSO, aggregator, ICT and platform providers), 3) policies (e.g. local, national, EU level), 4) infrastructures (energy network; ICT infrastructure), 5) knowledge and know-how (technical; etc.), 6) cultural and symbolic meaning.

3. **Transitions are processes characterized by dynamic, uncertain technological and societal outcomes.**

However, they are not -explicitly- framed as such uncertain processes. This leads to a too narrow view on experiments, pilots and innovation:

- Our cases encounter for example issues of temporal mismatches between what entrepreneurs need as clear directions from authorities to make decisions and what policy dares make as choices (bureaucracy vs commercial interests).
- The energy market is organized in a way (legally, market rules etc.) that limits the possibility for small scale retailers such as communities to participate in the wholesale market for example. As long as the experiment takes place in a sandbox type of environment it works, but beyond that participation from small-scale actors is too much of a financial, time and expertise and other capabilities burden.
- Subsidies or other financing mechanisms for experimenting is too much focused on guaranteed outcomes and results. Controlled failing aimed at learning in experiments, where successful outcomes are not guaranteed, are not sufficiently facilitated. Failure to learn from as an outcome is not accepted. Learning risks related to being the first that works towards changing the system, and has to face the system tensions individualized and born by entrepreneurs instead of by the system.
- Experimenting, controlled failing aimed at learning, is insufficiently facilitated. Funding for pilots and experiments don't explicitly take this process frame as a starting point, do not count failure as a possible outcome. Also, continuously monitoring and evaluating pilots at an integrated (system) level is absent, let alone that the learnings of these evaluations are applied to new iterations. Instead learning and system risks are individualized and born by entrepreneurs instead of by the system.
- In addition a lot of the initiatives are set-up with a lot of time, resources etc. from bottom-up levels, whereas the impact is societal. This distribution of costs and benefits is not doing justice to the fact that we are all involved in this transition.
- In light of the uncertain end game of the transition, it is imperative to collaboratively and collectively learn about the services in their use phase, but this is not supported by the system since that phase is considered ' commercial'.

4. Transitions, due to the complexity, interrelatedness and uncertainty, lacks a consistent sense of urgency across stakeholders, and lacks the type of governance or orchestration aimed at coherence across actions. A process also called organized irresponsibility (Beck, 1992).

- Old or traditional hierarchies no longer work because of this, for example the traditional relationship between contractors and installers is not equipped to deal with the necessary and different collaboration when it comes to integrated services.
- National and regional and local policies often conflict due to lack of orchestration across levels, visions, narratives, policy goals and measures.
- Authorities could be very effective leaders in terms of becoming launching customers However, public procurement does not often allow learning by doing, or failure, and because of this these actors cannot take a leadership role in innovations.
- The risks and impacts of innovations are often not bound to national boundaries, and as such authorities are hesitant in taking responsibility for a direction, picking technological winners so to say.

5. The energy transition is also ripe with politics and contestation as to what counts as relevant knowledge, how things are framed, what counts as expertise, and what facts are true. A conflict of emerging potential new paradigms is taking place (lost in translation), and many institutions and stakeholders revert to continuing their familiar paradigm as a reaction.

- Entrepreneurs therefore experience great tensions between sustainability versus affordability, between scalability and replicability versus learning about best ways forward.
- Many institutions such as insurances, banks, accountants operate according to the old paradigm, because of which innovative business models have a hard time finding capital or cannot easily be insured or accountant for.,
- Educational systems, especially for applied work, stick to old knowledge and educational means, and as such are not delivering the workforce needed, with new skills and new knowledge. This holds especially true for the energy sector.
- This contestation is felt in extreme by end-users, households, who do not know what to pick, and as a result do not engage in innovative approaches but opt for safe.
- Different 'languages' exist in different elements of the innovation chain, in particular with respect to scalability, replicability, affordability, solvability. This makes the initiation phase of innovations very hard and skews innovations towards safety instead of experimenting.
- And different framing is used by different actors with different interests. But the framing used impacts business cases. Due to the uncertain end point there is a by definition a blurred boundary between for example what is considered public infrastructure and commodity or market realm. This applies to storage technology, but also VPP technology, even flexible loads. As a consequence costs are born (paid by) by individuals whilst benefits are accrued societally. This severely impacts the business case of services using these elements.

What we found is that energy service business model developers have different ways of dealing with the influence of the system on their business model. Especially with respect to the characteristics of the energy system and tensions and controversies listed above:

- There are the big enterprises of course, the (multi)nationals that define the system and aim for continuity or optimization of the sociotechnical energy system. (for this task they are out of focus)
- There is an entrepreneurial type that accepts the system, that being aware of inhibiting factors and tensions or contradictions in the system manages to deal with it and still develop their business model more or less as innovative as they aimed for, but do not feel capable or 'big' enough to reconfigure or influence the system.
- There is a type of entrepreneurs that feels as if it is fighting the system, they feel the system (deliberately) inhibits their business model and that they cannot develop as innovative a service or business model as they would like.

However, we also witness the rise of a type of enterprising stakeholder with potentially much value for the energy transition. These entrepreneurs develop business models that very much resemble the servicing archetype we identified in the previous phase, but take it to a new level. They are able to align their user centeredness with system (societal/ or e-transitional) centeredness. The servicing capabilities these entrepreneurs master are enriched with transition competencies such as: systems thinking; anticipatory competences, strategic competences, normative competences and interpersonal competences (Wiek et. al., 2011; Wiek and Kay, 2015, Hekman et al., 2017).

With these competences these entrepreneurial stakeholders are attempting to design business models that make business out of the energy transition characteristics and accompanying system contradictions or tensions:

- Instead of fighting the complexity they embrace and unravel the system. They are able to establish valuable relations with relevant individual actors within the system. They conceptualize valuable propositions that support the uptake of their business;
- They initiate processes of business and service development that make use of negotiation, multi-stakeholder co-creation, visioning, and flexible iterative outcomes. Collaboratively paving the way and conceptualizing propositions built on this uncertainty, legitimizing new ways of doing.
- They take leadership, orchestrating roles, filling intermediary roles.
- They acknowledge the diversity and contestation of knowledge and conceptualise propositions that mediate across, or span across multiple interests, negotiating multiple values.

This type of entrepreneur is what two fields of research (institutional theories and entrepreneurship) have labelled institutional entrepreneurship (Jolly, Spodniak and Raven, 2017; Garud et. al., 2007). An addition to these fields from our research is that these type of entrepreneurs fulfill a specific regional orchestration role, explicitly intermediating to alleviate the transition characteristics. These types of entrepreneurs are very valuable since they can have an active contribution to transition processes, processes of reconfiguration of socio-technical systems such as the energy system. They can help building legitimacy towards new ways of doing things.

These are the type of enterprising stakeholders (SMEs, public parties such as universities, but also cooperatives, or other collaborations) that develop business models that for example aim to create a new role in the system that is able to mediate between all these interrelated and complex system elements (the MEMO monash case for example) or that aim at advancing different configuration of the energy system (such as the Dutch sustainable district case, or the community heat districts, or the Australian microgrid cases and the Dutch and Irish cVPP cases). But is also includes cases that aim at supporting a more resilient energy system (such as the Swedish Ngenic case), or system integration on building or even district level.

However, the energy transition also needs the other entrepreneurial types, all are necessary, but a more coherent ecosystem of entrepreneurial types, that learn from and with each other is key and needs to be more effectively addressed.

TOWARDS A SERVICE AND INSTITUTIONAL ENTREPRENEURSHIP SUPPORTING SYSTEM

Developing the right business model and having the right servicing and transition capabilities is however not always enough to meet with successful market uptake and scaling up. Both service- and product-oriented business models and ‘normal’ and ‘institutional’ entrepreneurs operate in a broader transition context that influences their chances. This system consists of many stakeholders, like policy makers, regulators, researchers, financing institutions, influencers, competitors, end users etc.. And these stakeholders also play an important, sometimes even decisive role in both the creation and uptake of energy service business models. At the moment this system is not yet ‘ fit to serve’ energy services, let alone the institutional entrepreneurs delivering energy services with the aim of reconfiguration the socio-technical system.

Transitions ask for different forms of leadership and cannot be managed in business as usual ways. The defining characteristics of the energy transition required new governance forms. waysch innovation system is constantly being shaped by policies and other traditional ways public authorities can nurture small and medium enterprises (SMEs) such as through education, information and awareness creation and through regulatory and fiscal and incentive frameworks.

Many of these instruments and measures need to be adjusted or renewed to become what they aim to be: a service and institutional entrepreneurship supporting system (Castaldi et al. 2018). And in addition the system can become more service and institutional entrepreneurship supportive if it diminishes some of the system tensions or controversies listed in this paper.

Of course, for the different entrepreneurial types and business model archetypes different approaches are useful. Approaches that either improve the way they supply services, or improve demand for and adoption of their services from the system. This project will elaborate these differentiated approaches in more detail.

EMERGING POLICY QUESTIONS FOR EXCO DELEGATES

- What new forms of governance are possible, forms that aim at facilitating new relationships, processes and collaboration that removes the uncertainty, embrace the complexity but with actionable interventions, and removes the lost in translation elements?
- How can the current situation of individualization (born by individual entrepreneurs) of risks of the necessary entrepreneurial and institutional learning about energy services in face of the transition and inherent uncertainty be socialized more effectively?
- How can transfer of knowledge and learning about the actual use phase of the services be facilitated such that the ecosystem of entrepreneurs and institutional actors can learn, instead of only the service provider.
- What changes (e.g. with respect to impact metrics and success criteria) are possible in the subsidy and other incentive systems in order to allow for actual learning and failing? (do more justice to the process and uncertain transition characteristics?)How can the sharing of learning about the best way to design innovative energy service business models be more effectively orchestrated? E.g. how can policy contribute to the creation of a learning ecosystem across the different types of entrepreneurs, so that the creation of more institutional entrepreneurship is supported?
- How can policy contribute more effectively to the collaborative identification of and addressing of system tensions and controversies that hinder the coming into existence of successful innovative energy services that aim for system reconfiguration?
- How can authorities take a leadership role as launching customers for learning about and experimenting with innovative (institutional entrepreneurship) energy service models?
- Not aimed at picking winners, but aimed at creating trust, direction, qualifying the market?

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TASK 25 PHASE 2 – MID-TERM EVALUATION

Task 25 Phase 2:
Energy services supporting business models and systems

Mid-Term Evaluation

Performed by Anne Bengtson with appreciated support from David Shipworth

This Mid-Term Evaluation for Task 25 Phase 2: Energy service business model strategies and conducive contexts is submitted to the DSM TCP Executive Committee in Melbourne, Australia, with a request for the Executive Committee to:

Note the result and take necessary actions on recommendations.

In summary, the Task is proceeding well and has really picked up in the past six months with members gaining value from their participation. The objectives of the Task were clear, and members considered there was a high probability that these objectives would be realized despite the low number of countries participating. Although no clear milestones have been established this is in part due to the design approach employed on the project and the consequent iterative way of working. Such 'agile' methods make the setting of measurable goals more challenging.

Overall, the expertise of participants and the Operating Agent is considered to be appropriate in respect of the Task's objectives although the low number of countries limits the sharing of best practices.

On the positive side, the management by the Operating Agent and the level of effort that the OA is putting in to the Task is welcomed and it is recognized that pulling together a multi-disciplinary team is a challenge.

In terms of the impact of the outcomes of the Task to date, participants judged that it was too early to judge the impact ahead of dissemination of the results.

Recommendations:

1. Where opportunities arise, additional Task participants should be encourage to join the Task conditional on permission of existing Task members and delivery of the work-plan.
2. Given the design approach and iterative way of working employed on the project, consideration could be given to using progress tracking methods for agile project management working processes such as SCRUM.
3. The Task should start to plan how it can most effectively disseminate its findings as they emerge and judge their impact.

Mid-Term Evaluation Summary

Task 25 Phase 2: Energy services supporting business models and systems

A Mid-term Evaluation was conducted for Task 25 Phase 2: Energy services supporting business models and systems in September 2019.

All four participating experts responded. Responses were also received by the Operating Agent and one Executive Committee member.

The **expected results and impacts are acceptably described** (50%) to **well described** (50%) in the Task Concept Paper, Task Annex to the Implementing Agreement and Task Work Plan. Two responders provided the following responses: 1) There has been a strong increase in activity in the last six month period; and 2) The concept paper is well defined and the objectives in terms of business models focused on energy as a service are well articulated.

The **reasons to undertake this Task work** are **acceptably stated** (33,33%) to **well stated** 66,67%) in the Task Concept Paper, Task Annex to the Implementing Agreement and Task Work Plan. One responder stated that the Task remains well aligned with the strategic direction of the TCP and the interests of Australia. Another responder stated that the objectives are well documented.

The **approach to accomplish the Task work** is **adequately described** (50%) to **well described** (50%). Two reviewers provided the following responses: 1) The proposed approach has been clearly articulated, especially in the last 6 months of the report; and 2) The methodological approach to conducting the interview as part of the Task's activities is very detailed. It may not be appropriate for all jurisdictions but the approach is well understood.

The **objectives** are **adequately stated** (66,67%) to **well stated** (33,33%) and the objectives are **somewhat appropriate** (33,33%) to **appropriate** (66,67%). One responder commented that the lack of member countries in the Task is a concern. The responders thought the objectives will **probably** (66,67%) to **definitely** (33,33%) be achieved when the Task is over. Three responders commented as follows: 1) I believe so, with acceleration of the reports and knowledge sharing; 2) Somewhat achieved, having a low number of countries in the Task means that sharing of best practice is limited. There are obvious gaps to the member countries active versus those represented on the ExCo; and 3) It depends on the interpretation of words like "strong", "well described", "increasing understanding" etc. But yes, we will know a lot more on the subject when finished.

The **milestones are poorly** (16,67%), **adequately** (50%) to **well stated** (33,33%). Three responders provided the following comments: 1) There was some evolution of the milestones but they are now clear; 2) no milestones, only deliverables are provided; and 3) we have "outcomes" and "deliverables" stated. They are well stated, but how much effort you put in the different tasks is harder to agree on. Further, the **milestones for the planned work** are rated **adequate** (66,67%) to **most appropriate** (33,33%). Two responders replied: 1) The Task has a clear agenda for the 2-year program; and 2) No milestones, only deliverables. The milestones are **with great difficulty** (50%), **probably** (16,67%) to **easily** (33,33%) measurable, and one respondent commented: due to the design approach and the iterative way of working, it's hard to set measurable goals.

The **technical and professional quality** of the Task products are considered to be **average** (50%) to **excellent** (50%). One respondent commented that the quality seems acceptable but would benefit from greater regional/country differentiation, while two other respondents comments that the products are not finished yet and it is too early to tell.

The **level of effort of the Experts** ranged between **inadequate** (16.67%), **adequate** (66,67%) and **very adequate** (16,67%). One respondent said that it took a while to get started, but we're

making good progress, and a second respondent said, yes, although there has been a resource gap in Australia for the national expert. The **level of effort of the Operating Agent** ranged between **adequate** (33,33%) to **very adequate** (66,67%). Respondents stated that here has been a lot of effort put into the Task and support of the local national experts. The Operating Agent should liaise with the ExCo to try to reinvigorate the Task and increase member country participation.

The **collective expertise of Experts** with respect to the objectives ranged between **adequate** (66,67%) to **very adequate** (33,33%). The **Operating Agents level of expertise** was considered **adequate** (33,33%) to **very adequate** (66,67%) with a respondent stating that the expertise in the Operating Agent area has never been in doubt.

The **involvement of the intended users** is considered **appropriate** (66,67%) to **very appropriate** (33,33%). Three respondents commented: 1) the direct interviewing of the case study participants has been to engage end users; 2) so far ok, but we have tasks left to do on this; and not yet involved, will be involved in 2020. The **involvement of intended users** was rated **adequate** (83,33%) to **very adequate** (16,67%) and one respondent said that it will be at the end of the Task, he/she thinks.

The **Operating Agents management** was rated **could be improved** (33,33%), **competent** 50%) to **excellent** (16,67%). One respondent said: It is (always) hard to run a project with people involved from many countries. The management has improved since the Task started. Now deadlines etc. are clearly stated.

66.67% of the reviewers agreed that **maximum value** has been obtained from the money invested in the Task and 33,33% think it **could be improved**. One respondent replied: 1) based on expansion of participants; and a second respondent stated 2) that the Operating Agent has stepped in to help Australia that have had some resourcing issues.

When asked whether the **early Task results are being used and have they had any impact,** the respondents all thought it is **too early to judge** (100%). One respondent replied: We think and expect it will have an impact, however it's too early now. When asked whether the **early results have got to those who need them in an effective and efficient manner** responses ranged between **too early to judge** (66,67%) and **effective dissemination** (33,33%) respondents stated 1) although may be too early to tell; and 2) there seems to be a formal dissemination through book chapters/journals.

The questionnaire was answered by:
4 (out of 4) Experts
1 Operating Agent
1 Executive Committee member

DSM Technology Collaboration Programme
Task 25 Phase 2: Energy services supporting business models and systems

Evaluation questionnaire

Expectations	**Are the expected results and expected impacts of the Task work well described in either the Task Concept Paper, Task Annex to the Implementing Agreement, or the Task Work Plan?**
Answers:	Acceptable described 50% Well described 50%
Comments:	-There has been a really good pick up in the last 6 month period. -The concept paper is well defined and the objectives in terms of business models focused on energy as a service are well articulated.
Motives	**Are the reasons to undertake this Task or why it was important to undertake this Task clearly stated in any of the above documents?**
Answers:	Acceptably stated 33.33% Well stated 66.67%
Comments:	-This fits very well still in the direction of the TCP and the interests of Australia. -The objectives are well documented.
Approach	**Is the approach proposed to accomplish the Task work logical, appropriate, and/or well defined, in any of the above documents or as being implemented?**
Answers:	Adequately described 50% Well described 50%
Comments:	-This has been clearly articulated especially in the last 6 months of the report. -The methodological approach to conducting the interviews as part of the Task's activities is very detailed. It may not be appropriate for all jurisdictions but the approach is well understood. -The approach is also a co-creation approach, which means we are learning by doing and tailoring the approach to the findings and needs of experts.
Objectives	**Are the objectives clearly stated?**
Answers:	Adequately stated 66,67% Well stated 33,33%
Comments:	-Yes. -Yes.

Are the objectives appropriate?

Answers: Somewhat appropriate 33,33%
Appropriate 66,67%

Comments: -Yes.
-Yes, the lack of member countries in the Task is a concern

In your opinion, are all of the objectives likely to be achieved when the Task is over?

Probably 66,67%
Definitely 33,33%

Comments: -I believe so, with acceleration of the reports and knowledge sharing.
-Somewhat achieved. Having a low number of countries in the task means that sharing of best practice is limited. There are obvious gaps to the member countries active versus those represented on the EXCO.
-I depends on words like "strong", "well described", "increasing understanding" etc. But, yes, we will know a lot more on the subject when finished.

Milestones

Are the milestones clearly stated?

Answers: Poorly 16,67%
Adequately 50%
Well 33,33%

Comments: -There was some evolution of the milestones but now clear.
-No milestones, only deliverables.
-We have "Outcomes" and "Deliverables" stated. They are well stated but how much effort you put in the different tasks is harder to agree on.

Are the milestones appropriate for the planned work?

Answers: Adequate 66,67%
Most appropriate 33,33%

Comments: -It has set a clear agenda for the 2 year program.
-No milestones, only deliverables.

Are the milestones measurable?

Answers: With great difficulty 50%
Probably 16,67%
Easily 33,33%

Comments: -Yes.
-Due to the design approach and the iterative way of working, it's hard to set measurable goals.
-No milestones, only deliverables.

Quality

What is the technical or professional quality of the Task products?

Answers: Average 50%

Excellent 50%

Comments:
-Too early to tell.
-The quality seems acceptable but would benefit from greater regional / country differentiation.
-We have not finished the “products” yet.

Participation

Is the level of effort of the experts adequate with respect to the objectives?

Answers:
Inadequate 16,67%
Adequate 66,67%
Very Adequate 16,67%

Comments:
-Yes, although there has been a resource gap in Australia for the National expert.
-It took a while to get started, but we're making good progress.

Is the level of effort of the Operating Agent adequate with respect to the objectives?

Answers:
Adequate 33,33%
Very adequate 66,67%

Comments:
-There has been a lot of effort to support the local National Experts.
-The Operating agent should liaise with the EXCO to try to reinvigorate the task and increase member country participation.
-We both put a lot of effort in this task.

Was the collective expertise of the experts appropriate with respect to the objectives?

Answers:
Adequate 66,67%
Very adequate 33,33%

Comments:
-Yes.

Was the expertise of the OA appropriate with respect to the objectives?

Answers:
Adequate 33,33%
Very adequate 66,67%

Comments:
-The expertise in the OA area has never been in doubt.

Industry

Is the involvement of the intended users appropriate?

Answers:
Appropriate 66,67%
Very appropriate 33,33%

Comments:
-The direct interviewing of the case study participants has been to engage end users.
-Not yet involved, will be involved in 2020.
-So far ok, but we have tasks left to do on this.

Is the involvement of the intended users adequate?

Answers:
Adequate 83,33%
Very adequate 16,67%

Comments:	-Yes. -It will be at the end of the Task, I think.
Management	**How effective if the Operating Agent's management?**
Answers:	Could be improved 33,33% Competent 50% Excellent 16,67%
Comments:	-Yes. -It is (always) hard to run a project with people involved from many countries. The management has improved since the task started. Now deadlines etc. are clearly stated.
Cost effectiveness	**Has the maximum value been obtained from the money invested in this Task?**
Answers:	Could be improved 33,33% Yes, it has 66.67%
Comments:	-The Operating Agent has stepped in to help Australia that have had some resourcing issues. -Based on expansion of participants.
Impact	**Are the early Task results being used and have they had an impact?**
Answers:	Too early to judge 100%
Comments:	-Too early to judge. -We think and expect it will have an impact, however, it's too early.
Dissemination	**Did the early results get to those who need them in an effective and efficient manner?**
Answers:	Too early to judge 66,67% Effective dissemination 33,33%
Comments:	-Although may be too early to tell. -There seems to be a formal dissemination through book and chapters/journals.

DOCUMENT M

GLOBAL OBSERVATORY ON PEER-TO-PEER, COMMUNITY SELF CONSUMPTION AND TRANSACTIVE ENERGY MODELS (GO-P2P)

Operating Agent: Alexandra Schneiders, a.schneiders@ucl.ac.uk

SUMMARY

The DSM TCP Global Observatory on Peer-to-Peer, Community Self-Consumption and Transactive Energy Models ('The Observatory') is an international forum for understanding the policy, regulatory, social and technological conditions necessary to support the wider deployment of these market models. The Observatory's aim is to support all stakeholders in the peer-to-peer, community self-consumption and transactive energy fields 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 policymakers 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.

OBJECTIVES FOR THE LAST SIX MONTHS

The Task was officially launched on 2-3 September 2019 in London, United Kingdom. In the months preceding this, sub-tasks leads were found, and the event was organised. The launch was attended by 108 stakeholders from a range of sectors, i.e. national and international policymakers, industry, start-ups, utilities, non-profits, academics etc. Up to 15 countries were represented, mainly from Europe but also Asia, Australia, North America and South America.

The event was made up of two days. The first day consisted of an international symposium open to all stakeholders active in the peer-to-peer/transactive energy and community self-consumption fields. The second day was the first working meeting of the Observatory, open to researchers from DSM TCP member countries, during which the work for the coming six months was discussed. The aim of both days was to explain what the Observatory's aims are and how to join, as well as introduce the sub-task leads (see list below). Researchers from non-DSM TCP member countries were able to participate on Day 2 as observers. Those from countries such as Germany, Colombia and Portugal expressed an interest in joining the Observatory. Researchers from DSM TCP member countries such as Ireland and Spain also had an interest in joining.

The event generated a considerable amount of interest at international level, with organisations such as the Energy Web Foundation (EWF), International Renewable Energy Agency (IRENA), National Energy Ombudsmen Network (NEON), European Commission, Alliance for Internet of Things Innovation (AIOTI), SolarPower Europe and European Federation of Renewable Energy Cooperatives (REScoop) expressing interest in becoming involved. Coverage of the event on social media was widespread, with 95 tweets covering the event on Twitter (and 172 re-tweets) across Europe and South America. On Linkedin, 5 posts were dedicated to the event ('liked' 130 times), by persons based in Europe and Africa. Photos of the event can be seen below.

List of secured sub-task leads:

- ST1 Power system integration: Delft University of Technology (Netherlands)
- ST2 Hardware, software & data: SLAC National Accelerator Laboratory (United States)
- ST3 Transactions and markets: Carnegie Mellon University (United States)
- ST4 Economic and social value: University of New South Wales (Australia)
- ST5 Policy and regulatory: European University Institute/Florence School of Regulation (Italy)

Day 1- International symposium (104 participants):

Day 2- Internal meeting of researchers (64 participants):

Experts meetings/seminars/conferences held in past six months

The launch event is the only event that has taken place in the past six months.

Date	Place	# of Experts	Type of meeting	Govern-ment	Industry	Academic	Non-profits
2-3 September	London, UK	108	Launch of the Task	4	29	52	20

Reports produced in the past six months

Following the launch event, a summary briefing of discussion outputs was produced for all attendees and those that were not able to attend in person.

OBJECTIVES FOR THE NEXT SIX MONTHS

The next six months will be the 'Task Establishment' phase of the project. The aim of this first phase is to establish the necessary research architecture to ensure that robust and policy relevant research is undertaken. The main tasks undertaken in parallel during this phase will be:

1) Undertaking concept mapping and scope definition;
2) Undertaking policy epistemology interviews;
3) Developing the research design; and
4) Start sub-task targeted literature reviews.

The emphasis in the next six months will also be placed on finding participants, in close communication with DSM TCP ExCo delegates from the respective countries joining the Task. Furthermore, the Task logo will be developed in accordance with the new TCP visual identity, and the website will be further populated.

Subtask 1: Concept mapping and scope definition

Task: Concept mapping and scope definition

Research question: How do different countries define P2P/TE/CSC trading?

A common definition is needed of P2P/TE/CSC for the selection and analysis of case studies (in the next phase of the project). The result of this sub-task will be an output, such as a policy briefing note or conference/journal paper, assessing how these models are defined in different countries and providing a working definition for use in the Task.

Subtask 2: Policy epistemology report

Task: Policy epistemology report

Research question: What evidence is needed to inform policy and regulation in different countries?

Outputs will have greater impact if they are presented in a format most useful to policymakers and their existing policymaking processes. Policymakers' evidence needs will be collected through

semi-structured interviews to help develop a complete picture of developments in this rapidly changing field. The result of this sub-task will be a policy briefing note or conference/journal paper providing an international comparison of policymakers' and regulators' evidence needs. It will also identify the type and format of evidence required to inform policy.

Subtask 3: Research Design master document

Task: Research Design master document

Research question: What methods are best for delivering defensible evidence of the type most useful for policymakers?

In future phases of the project, an international comparative analysis seeking to understand the relationships and inter-dependencies between the power system, policy and regulatory, social and economic as well as environmental conditions supportive of the uptake of P2P/TE/CSC models in different countries will be undertaken using the data collected from case studies. A 'Readiness Index' will also be developed, identifying the factors leading to the successful uptake of these business models in different countries.

We want the research underpinning these deliverables to be well-designed and defensible, in order for it to have more uptake and impact. Therefore, the result of this sub-task will be a report reviewing the best methods for international comparative analysis (e.g. Qualitative Comparative Analysis, QCA), development of readiness indices and templates for collection of case study data.

Subtask 4: Sub-task layer targeted literature reviews & 'Key Factors' reports

Task: Sub-task layer targeted literature reviews & 'Key Factors' reports

Research question: What are the key factors in each sub-task layer constraining or shaping the design of P2P/TE/CSC business models?

During months 1-15 of the Task, literature reviews identifying current key factors in each sub-task area influencing the design and implementation of P2P/TE/CSC business models will be undertaken. These will cover the academic literature and grey literature and will apply a theory-driven systematic review framework (Pawson & Tilley 1997 & 2004) and systematic evidence review methods (Grant & Booth, 2009). While outside the scope of the formal systematic review, alternative media sources such as podcasts, videos, and social media will also be drawn upon.

The rationale behind conducting the literature reviews is that it is necessary to identify the key environmental (technical, social, economic, policy and regulatory) factors shaping the design of, or supporting/constraining the uptake of these models in each country. The reviews will be started during the next six months.

Experts meetings/seminars/conferences planned in the next six months

Meetings with sub-task leads have been planned to discuss the programme of work and next deliverables. The Task Management Group (responsible for ongoing operational management), made up of sub-task leads and the Operating Agent, will meet every six weeks either in person during the bi-yearly Task meetings or by telco. Other virtual communication tools, such as Slack, will be used to keep in touch with sub-task leads and Observatory participants. The Task Steering Committee (responsible for overall task governance), made up of ExCo representatives of Task Contracting Parties, will meet every 3 months either in person during ExCo meetings or by telco.

The next Task meeting will likely be hosted by the European University Institute (Italy) in Spring 2020.

Expert meetings:

Date	Place
March/April 2020	Florence, Italy

Reports planned for the next six months

The main reports planned for the next six months will be those detailed above; namely reports on concept mapping and scope definition, policy epistemology, research design, and (start of) literature reviews/key factors reports.

In parallel to the main Observatory deliverables of international comparative analysis reports and readiness indices, participants to the Observatory will be encouraged to collaborate on additional outputs such as journal special issues, books, reports and joint conference sessions/papers.

OUTREACH

Aside from the positive social media coverage of the launch event (detailed above), the Observatory was mentioned and discussed during presentations given at events organised by international organisations and research institutions. These include the 'OECD Global Blockchain Policy Forum' (12-13 September, Paris) and the workshop 'Digital Energy Marketplaces: The role of smart contracts in the definition and coordination of investments, architectures and governance' jointly organised by the European Commission and the Florence School of Regulation (17 September 2019, Florence). Furthermore, the Observatory was widely discussed during a visit by University College London researchers to Medellin (Colombia) as part of the 'Transactive Energy Colombia Initiative' research project with EIA University.

IDEAS FOR NEW WORK

As detailed above, Observatory participants will be encouraged to collaborate on additional outputs such as journal special issues, books, reports and joint conference sessions/papers. It will become clear in the next few months, as each sub-task starts its work, what these outputs will be.

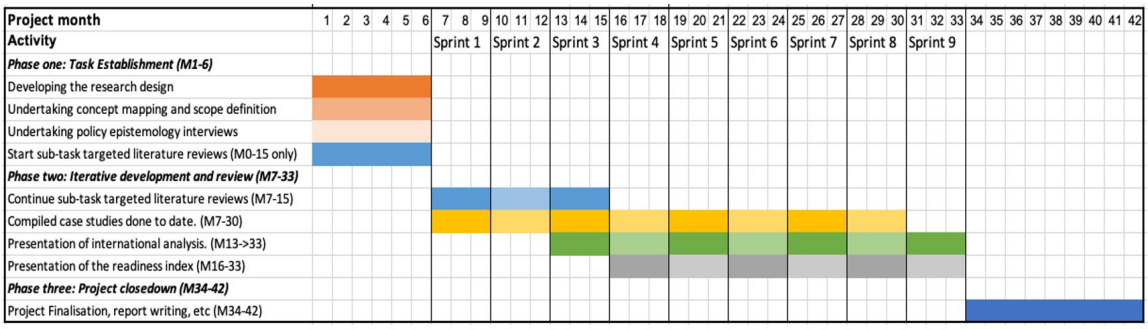
FINANCE

The work will be based on a 100% Task-share arrangement. We are currently in discussions with the UK Foreign & Commonwealth Office (FCO) about funding future Task meetings.

ACTIVITY TIME SCHEDULE

The time schedule of activities has not changed and is the same as that included in the full task proposal submitted to the Bern ExCo meeting in April 2019. The Task Gantt Chart, setting out the timeline of activities, can be seen below.

Task Gantt Chart



MATTERS FOR THE EXCO

Recommend the ExCo to approve the Task Status Update Report. Please also refer to the attached discussion paper.

PARTICIPATING COUNTRIES

National participation plan letters are in the process of being secured from the following countries:

- Australia
- Belgium
- Italy
- Switzerland
- United Kingdom
- United States
- The Netherlands

DISCUSSION PAPER

Consumer rights in peer-to-peer energy trading and community self-consumption

Alexandra Schneiders, Operating Agent of GO-P2P Task
Melbourne, October 2019

During the launch event of the Global Observatory on Peer-to-Peer, Community Self-Consumption and Transactive Energy Models on 2-3 September 2019 in London, participants discussed priority research areas around the P2P/TE/CSC models.
Consumer rights was one of the topics most often mentioned. Questions were raised such as:

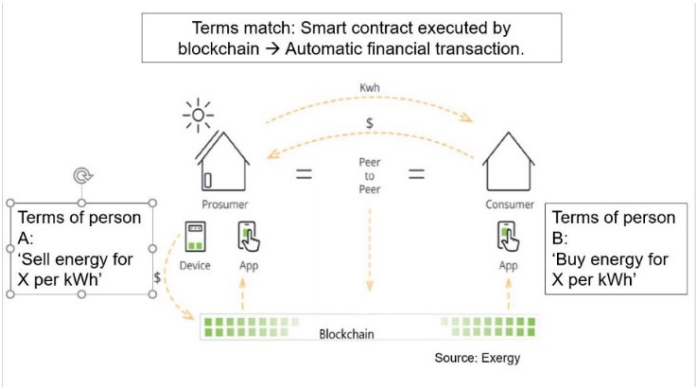
- What should be the status of a consumer producing and selling energy to other consumers: energy producer or consumer?
- Should they retain their rights as consumers, or have to meet the obligations currently met by suppliers vis-à-vis consumers?
- How should the data of consumers (i.e. collected by smart meters for trading) be protected?

Some context on peer-to-peer energy trading is provided below, followed by a description of the two main issues for discussion.

Peer-to-peer energy trading

A rise in energy consumers producing their own energy ('prosumers'), thanks to the accessibility of cheaper renewable energy technologies, has been paralleled by a growing interest in the sharing of self-produced energy within communities. Through peer-to-peer (P2P) energy trading, energy prosumers are able to sell surplus energy from their renewable energy installation to other energy consumers ('peers') in their neighbourhood or more widely. The trading is, in many ongoing trials, being facilitated by blockchain technology. This is thanks to the added functionality of 'smart contracts' on the blockchain.
A smart contract is a transaction that self-executes once parties' terms, pre-programmed into computer code, are met. Once executed, it become visible to all blockchain participants and cannot be destroyed nor tampered with. In the context of energy trading, smart contracts function in the following manner: terms are programmed by members[1] of an energy community, connected by the public energy grid or a microgrid, by using a blockchain interface linked to their smart meter such as an app. Parties' terms specify the conditions under which the sale, purchase or donation of energy is to take place. For instance, an individual wants to purchase energy at X price once it is made available on the grid, while another will want to sell energy for Y price. Also, someone else may wish to donate excess energy to a person with an income below X or living on benefits. Once the blockchain finds matching terms, the 'smart contract' is executed, with a financial transaction automatically taking place whenever two traders' terms match (see image below).

[1] https://lo3energy.com/wp-content/uploads/2018/04/Exergy-BIZWhitepaper-v11.pdf, p. 14



Discussion points

a) Recognition of trading prosumers

In peer-to-peer energy trading, anyone having access to the Internet and a smart meter can become an active consumer and sell energy for profit. In this scenario the line between traders and consumers becomes blurred. It is unclear at which point consumer law, which is designed to protect the consumer in business-to-consumer (B2C) transactions, becomes applicable.
Clarity on the legal status of prosumers trading energy is necessary, since consumer law imposes significant obligations on traders in business-to-consumer transactions. Individual consumers do not have the same organisational, technical and legal resources as a traditional company. On the other hand, it could be argued that those selling energy to consumers should be liable for a failed energy transaction and the ensuing damage. It has been suggested that the central entity running the trading platform, such as an energy supplier, could be liable for failed transactions between consumers.
Discussion question(s):

- Should prosumers be held liable for failed energy trades?
- If not, which entity (e.g. energy supplier, community energy group, social media company, or new form of entity?) should be responsible for mediating trade disputes and protecting consumers?
- On a side note (regarding acceptability), do you think that consumers would be motivated to trade energy with others in their neighbourhood (or wider region)? What would be the motivating factors driving adoption of peer-to-peer energy trading by consumers?

b) Data privacy

As stated above, 'smart contracts' used to trade energy on the blockchain are immutable. This means that the contract and trading information, such as the consumer's smart meter data, is almost impossible to remove from the blockchain. This presents a challenge when it comes to respecting the data privacy rights of participating consumers. Rights in recent laws such as the General Data Protection Regulation (GDPR), applicable in all European Union countries (and in non-EU countries if their companies handle the data of EU residents), such as the 'right to be forgotten' cannot be implemented. The 'right to be forgotten' stipulates that an individual has the right to ask an entity to delete all of the data it holds relating to that person. These provisions grant the consumer more say over how their personal data is held and processed.
On the other hand, one could argue that such rights are burdensome for the successful rollout of smart energy services, as the more energy data is obtained (i.e. granularity) from consumers, the better the services granted to them can be.
Discussion question(s):

- How can a balance be struck between ensuring consumers' data privacy and offering tailored energy services to consumers?
- Should energy data become a monetised asset that consumers can charge for its use by companies?

Document N

SOCIAL LICENCE TO AUTOMATE

Operating Agents: Dr Declan Kuch d.kuch@unsw.edu.au and Dr Sophie Adams s.adams@unsw.edu.au

SUMMARY

The DSM TCP (Demand Side Management Technology Collaboration Programme) Social License to Automate will be a task that analyses leading automated DSM projects to understand key social, organizational, economic and regulatory determinants of successful customer engagement, implementation and transitions of institutional regimes. Participating countries will document how end-user trust to automate is built and maintained across different national contexts.

OBJECTIVES FOR THE LAST SIX MONTHS

Subtask 1: Development of key parameters

This sub-task will review relevant reports, regulations and other publications relating to failed and successful automation; secondary documents that may help anticipate how trust and technology acceptance could be gained and maintained. The first sub-task will therefore develop a shared definition of the elements of social license in DSM automation.

Progress towards Subtask objectives

We have accomplished the following during this first stage of the project:

- Ran a workshop in Zurich with key experts (Netherlands, Sweden, Switzerland, Austria) in April 2019 to discuss the scope of the task and terms of their participation. Participants were Dr. Cecilia Katzeff, Dr. Christian Winzer, Dr. Selin Yilmaz, Prof Zofia Lukszo, Tara Esterl, and Johann Schrammel.
- The Swiss and Austrian experts are currently centrally involved in trial automation projects that will provide central empirical material for the task. We anticipate conducting in-depth analysis of at least 6 major pilot projects at community or SME and household scale.
- Prof Lukszo will be leading EU policy analysis with her students at TU Delft and leverage links with the EU Joint Research Centre.
- Participation of Norwegian experts (leading experts at Norwegian University of Science and Technology), and USA (Centre for Energy and Society, Arizona State University) is pending final confirmation.
- In-principle support to participate has been received from with Danish, Singaporean and UK experts to expand analytical capacity and potentially provide further case study material.
- Completed a draft critical review of academic articles relevant to the topic of household-level automation and trust. This will be submitted to a leading journal at the end of the 2019.
- Established a draft framework for data gathering, based around testing the following hypotheses:

    1. **Context is critically important:** Users are open to some modes of engagement more than others, or only in specific conditions. A lack of receptiveness to automation can stem from resistance to the forms of engagement required of users (likely to be more important than from the principle of automation in itself).
    2. **Time frames matter:** Users accept automation as a means to achieve load flexibility of only some energy consumption practices and within some time frames.
    3. **Preference for levels of 'visibility' will vary:** Direct load control may in fact be the

preferred form of automation for some users where it can keep load shifting and shaving 'invisible' or imperceptible

4. Ability of users to **retain control** will impact receptiveness to automation
5. **Compensation** through money or recognition will influences users' willingness to cede control
6. **Why:** Transparency about the rationale for automation in DSM, as well as about the ways in which different actors may benefit from it, can increase receptiveness to automation.
7. **Ownership (in broadest sense) matters:** A sense of a stake in successful DSM, and ownership over how it is undertaken, can increase receptiveness to automation.
8.

Subtask 2: Desktop and Case Study Data Collection and Analysis

Target projects and already published reports from the core member states will be selected to understand the key variables in each case study and shape up country profiles. Desktop analysis will be conducted to infer the social variables, practitioner variables institutional and structural components that affect a 'social license'. An international comparative framework will be constructed based on the hypotheses listed above.

Progress towards Subtask objectives

- *First draft of the comparative framework has been drafted*
- *Key case studies for in-depth analysis have been selected*
-

Subtask 3: Understanding trust to Automate: social, economic and technical factors

This subtask captures the work of identifying common social (including regulation and norms), economic, technical factors across cases that are required for successful adoption of automation.

Progress towards Subtask objectives

This subtask aligns broadly with the analysis phase of the project. We anticipate findings be delivered during 2020.

Subtask 4: Country profiles and policy relevant body of knowledge

This subtask will involve the construction of individual country profiles which outline the context-specific insights from key trials as they relate to social factors in each country. The profiles will document the distinctive factors that manifest in the case studies in order to distil lessons for future consumers and project proponents. Second, we will build a generic, guiding framework identifying key dimensions of trusted automation in DSM.

Progress towards Subtask objectives

This subtask is due to commence in the final 6 months of the project.

Experts meetings/seminars/conferences held in past six months

Experts meetings

Date	Place	# of Experts	Type of meeting	Govern-ment	Industry	Academic
April 2019	ZHAW, Zurich, Switzerland	12	Initial meeting for the task	1	0	11
Sept 2019	Salzburg, AT	~240	Energy2050 Conference	40	170	50
July 2019	Hobart, Australia	20	Expert workshop hosted by Prof Heather Lovell	2	5	13

Seminars/Conferences

Date	Place	Partcipants	Type of meeting	Govern-ment	Industry	Academic
Sept, 2019	New Orleans, Louisiana, USA	1800	Social Studies of Science Society Conference			Operating Agents attended a number of sessions on automation, energy transitions and trust

Reports produced in the past six months

Internal drafts only

OBJECTIVES FOR THE NEXT SIX MONTHS

Subtask 1

- Refine hypotheses and analytical framework
- Confirm participation of experts
-

Subtask 2 and Subtask 3

- Commence primary data gathering on trials
- Commence policy analysis with TU Delft students
- Conduct the detailed workshops with national experts

Selected experts meetings/seminars/conferences planned in the next six months

Planned Experts meetings

Date	Place
October 22-23, 2019	Melbourne, All Energy Conference
October 25 2019	Sydney Task launch, UNSW

Planned seminars/conferences

Date	Place
3-5 Dec 2019	Canberra, Asia-Pacific Solar Research Conference
Feb 2020	Austrian Workshop (tentative) and First Issue Workshop
Mar-Apr 2020	Swiss National Workshop (tentative) and Second Issue Workshop

Reports planned for the next six months

- Publication of general audience piece on automation to coincide with Task launch in October 2019
- Review article on social license to automate and accompanying blog article for a general audience.

OUTREACH

We will be developing an outreach strategy over the coming 6 months. This will include participating in relevant podcasts, working with the secretariat to publish relevant reports

IDEAS FOR NEW WORK

We will be working closely with national experts over the next 3 months to refine the content of the first issue-specific workshops, to be held in 2020. This project will bring together leading experts from around the world and we look forward to bringing methodological innovation and rigour to the task with them.

FINANCE

This is a task-share Task

ACTIVITY TIME SCHEDULE

October: Official launch activities for the task in Melbourne and Sydney, Australia
November: Complete draft paper, 'Social License to Automate' and conduct first round interviews with key Task participants as per Subtask 2
December-January: Finalise schedule for national and issue-based workshops in Quarter 1 2020. These will bring together key experts around thematic issues such as EU energy policy and regulation, Device design and user-participation, EV integration, building management.
February: Workshop 1
March: Analysis and writing up of workshop 1

MATTERS FOR THE EXCO

Recommend the ExCo to approve the Task Status Update Report

PARTICIPATING COUNTRIES

Current: Austria, Australia, Netherlands, Norway, Sweden, Switzerland
Pending: Denmark, Singapore, USA

DISCUSSION PAPER

The challenges of a social license (excerpt of draft paper, 'Social License to Automate: A Critical Review')

Key Hypotheses tested under the Task:

1. **Context is critically important:** Users are open to some modes of engagement more than others, or only in specific conditions. A lack of receptiveness to automation can stem from resistance to the forms of engagement required of users (likely to be more important than from the principle of automation in itself).
2. **Time frames matter:** Users accept automation as a means to achieve load flexibility of only some energy consumption practices and within some time frames.
3. **Preference for levels of 'visibility' will vary:** Direct load control may in fact be the preferred form of automation for some users where it can keep load shifting and shaving 'invisible' or imperceptible
4. Ability of users to **retain** control will impact receptiveness to automation
5. **Compensation** through money or recognition will influences users' willingness to cede control
6. **Why:** Transparency about the rationale for automation in DSM, as well as about the ways in which different actors may benefit from it, can increase receptiveness to automation.
7. **Ownership (in broadest sense) matters:** A sense of a stake in successful DSM, and ownership over how it is undertaken, can increase receptiveness to automation.

Achieving flexibility for demand side management

Consumer flexibility has become a key concept in smart grid imaginaries, in which it is seen as a key tool for managing demand (Ballo 2015; Throndsen 2017; Schick and Gad 2015; Smale et al 2017). Demand side management (DSM) through load shifting and shaving depends upon flexibility: a capacity and willingness to adjust the timing and/or size of the household load, and along with it the practices and values (including e.g. comfort and convenience) that are associated with energy consumption. Dominant perspectives of DSM 'situate "flexibility" either as a matter of consumer choice or as something that suppliers can achieve, behind the scenes' (Shove and Cass 2018) – with the former referring to manual or behavioural demand response, and the latter achieved through automation. These modes of pursuing flexibility reflect two strands of energy research observed by Harold Wilhite: the first and original of which is interested in delegating to technology the resolution of governance challenges, while the second – which emerged in the mid-1980s as an alternative paradigm – focuses on the mobilisation of user agency through behaviour change (2008).

Automation is in this sense seen by DSM program designers as a way to 'negate' user apathy, by making demand response 'sufficiently effortless that little or no engagement is required by the user' (Goulden et al 2018: 181). Automation is presented as a means to overcome the **'engagement deficit'** observed as behavioural change strategies have failed to fulfil their promise (Ballo 2015). It is thought that where 'automation takes over for providing load flexibility, we will not have to rely on the particularities of the individual users in order to achieve it' (Throndsen 2017: 288), while users for their part may simply 'set it and forget it' (Cappers et al 2012) – whether by signing up to a Direct Load Control scheme or programming their energy consumption preferences in the smart home. However, as Yolande Strengers has argued, the 'seemingly contradictory' impulses of active consumption and passive automation in fact constitute a 'united vision' of the energy consumer she describes as 'Resource Man' (2014). Far from bypassing the need for user engagement, automation depends no less on engagement, instead necessitating different kinds of engagement. A growing critical literature has observed how the construction of disengagement associated with

automation ignores the kinds of engagement required for automation to succeed and neglects the ways that automation affects the home (Goulden et al 2018).
Reports from trials of automation for DSM indicate that energy users may resist the forms of engagement that it requires, with some users expressing 'fears about the time and energy required' to manage the automation technologies themselves (Paetz et al 2012). More broadly, engagement in DSM initiatives depends on a willingness to reconsider and reconfigure energy consumption practices to achieve the flexibility necessary for load shifting and shaving (Verkade and Hoeffken 2017). The practice theoretical literature on energy consumption has also contributed analysis of different energy practices and how some are more malleable and available to rearrangement than others (Powells et al 2014). It has illustrated the ways in which 'daily and weekly schedules are defined by collective social and temporal rhythms, not by individual choice', implying that 'people are not free to re-arrange the timing of energy demand at will' (Shove and Cass 2018: 2; emphasis in original; see also Strengers 2011; Strengers 2013; Shove and Walker 2014; Goulden et al 2014). These literatures have pointed to the limits of the flexibility of household energy load, suggesting that such limits exist where people perceive that energy use – at least at specific times and for specific functions – is necessary and non-negotiable (Fell et al 2014).

Many studies report that at least some of the householders participating in existing DSM programs have experienced the changes to their household practices associated with load shifting as inconvenient and disruptive (Pallesen and Jenle 2018), while focus group participants in studies exploring perspectives on the prospects of automation have raised concerns about possible disruption to important practices such as family mealtimes (Murtagh et al 2014; Paetz et al 2012). Practice theorists have observed that the use of smart appliances including washing machines and dishwashers allow householders to pre-program the cycles of these appliances for off-peak periods such as the middle of the night, for example, but also requires alterations to practices with often unpredictable indirect implications. Possible effects of the use of the washing machine in the middle of the night, for example, that are of concern to householders include changes to the busy weekday morning routine associated with the additional task of hanging out laundry, the disturbance associated with noise during the night, and the possibility of bacterial growth and unpleasant smell of newly washed laundry left in the washing machine for several hours (Christensen and Friis 2016). These experiences suggest that the acceptability of automation in DSM depends on the perception that automation will not cause disruption or other detrimental effects in households.

The experiences of load shifting initiatives, whether manual or automated, also indicate that people are more open to reducing or rescheduling the consumption of energy associated with some household practices than others. The practices that are more widely or more successfully rescheduled for non-peak demand periods include laundry, household chores and dishwashing, while entertainment, lighting and cooking – of the evening meal in particular – are considered to be less flexible (Paetz et al 2012; Powells et al 2014; Goulden et al 2014; Smale et al 2017). Some practices are considered more essential or more time-dependent than others, reflecting that **'demand was high at certain times for a reason'**, as pointed out by respondents in a study by Fell and colleagues (2014). Focus group participants have expressed greater openness to temporary household load limits when presented with the possibility to exclude times of the day or practices considered 'essential', for example (Naus et al 2015). Austrian national experts Tara Esterl and colleagues recently refered to a 'Lasagne Effect' whereby some load shifting, such as using an oven earlier in the day to precook dinner, is detectable through appropriately designed tariffs. These findings suggest that the potential for various forms of automation and semi-automation to enable some degree of load flexibility may be applicable to only some energy consumption practices and time frames.

Indeed, to the extent that energy users are most open to load shifting and shaving where it involves the least reconfiguring of practices and associated sacrifice of comfort or convenience (Goulden et al 2014), there appears to be a role for automation. It is considered to have the potential to allow people to maintain their daily rhythms and routines while their smart appliances respond to changing network conditions, including to real time tariffs that change too frequently and unpredictably to respond to (Paetz et al 2012). It is for these reasons that the form of automation that is designed to keep load shifting and shaving imperceptible to the user – the direct load control of refrigeration, airconditioning and electric vehicles – is seen to have a part to play in DSM (Shove

and Cass 2018). Studies of existing trials and of focus group perspectives have observed that Direct Load Control may be deemed acceptable if it successfully relieves load at any given time **without resulting in any perceptible changes in temperature or other measures of comfort and convenience** (Strengers 2010; Fell et al 2014; Buchanan et al 2016).

These observations seem to bear out the expectation discussed above that automation technologies – particularly those that make DSM 'invisible' – may circumvent the need for user engagement and flexibility. However, the success of automation for DSM depends no less on the willing engagement of the user. These studies in practice theory suggest that semi-automation through smart appliances can achieve household load flexibility in some conditions, but that it also necessitates **new forms of flexibility on the part of the user** (Smale et al 2017) – such as the flexibility to hang out laundry in the morning following an off-peak washing machine cycle, for example. Direct Load Control hinges less on the flexibility of user but, as discussed in the following section, encounters other challenges where householders perceive it as encroachment on their control over energy use in the home.

Questions for discussion:

- What do proponents cite as the main reasons for proposing direct load control? (these may include voltage or frequency control, Wholesale market participation, supply constraints around peak demand ['duck curves' etc.])
- Which proponents of automation in your jurisdiction have been most successful in engaging with energy consumers?
- How have they maintained a sense of trust and control about energy decision-making? (This may encompass receptiveness to feedback about how they run their business, accountability in decision-making, other institutional and cultural factors, or political circumstances).

Document O

HARD TO REACH ENERGY USERS IN THE RESIDENTIAL AND COMMERIAL SECTOR

SEA - Sustainable Energy Advice Ltd, Wellington New Zealand drsearotmann@gmail.com

SUMMARY

We believe that there may be a significant percentage of the human population (>30%) that is currently not engaged or informed by our many efforts to elicit change in their energy-efficient technology uptake and energy consumption. This is even more so the case once you expand from hard-to-reach individuals and groups in the residential, to those in the commercial sectors, and across all fuels and energy services, including mobility. This, potentially very large energy user group is the focus of this new DSM TCP Task.

OBJECTIVES FOR THE LAST SIX MONTHS

This Task commenced on June 1, 2019 so has only been underway for a little under 4 months at the time of this report.

Subtask 0 - Admin

- Work plan definition, country and national expert participation;
- Overall project coordination, including relationship and risk management;
- Attendance of ExCo meetings, DSM TCP conferences and reporting to DSM TCP ExCo;
- Project management, including time tracking, financial, legal and other administrative issues.

Progress towards Subtask 0 objectives

- Work Plan completed and signed off by ExCo;
- Three participating countries (SE, NZ, US), with three more (UK, Spain, Canada) looking for funding;
- All participating countries have chosen National Experts;
- ExCo reporting and meeting attendance underway;
- Project management system called TeamWork set up and all NEs inducted. Time tracking is underway;
- Legal Annex finalised;
- Two countries have paid (NZ outstanding).

Subtask 1 - Expert network and dissemination

- Combine and grow our international expert network particularly in the field of HTR energy users;
- Widespread dissemination of this Task and its outputs;
- Continued ‘matchmaking’ and promotional / supporting activities for members of the expert network.

Progress towards Subtask 1 objectives

- Kick-off session at eceee summer study;
- International Expert Network at 120+ experts from 25 countries, with another 200 UK Fuel Poverty Experts via Chief Science Advisor;
- Task Website and Flyer completed and published;
- Task published in eceee blog, Energy in Demand blog, LinkedIn and on SEA’s, SHU’s, CEE’s and SCI’s websites;
- Several matchmaking activities already underway, especially in US and Canada.

Subtask 2 - HTR Definition and Case Studies

- Overarching Task definition of HTR that encompasses the residential and commercial sectors and all audiences;
- Individual country definitions of HTR in the two sectors;
- Literature Review;
- Participating countries: case study analyses, stakeholder and energy user interviews and / or surveys;
- Deciding on top HTR focus group in each sector for all participating countries.

Progress towards Subtask objectives

- Task definition work underway;
- Two surveys (one informal at eceee summer study, one formal Qualtrix survey) sent out, over 130 experts from 20 countries completed it;
- High-level survey analysis underway (see discussion paper);
- Stakeholder interviews underway;
- Access to over 1000 papers via NEs;
- Mendeley shared library started;
- Several hundred HTR papers and technical reports tagged in library;
- Literature review concept mapping done;
- UK residential literature review completed;
- Case study collection started.

Subtask 3

- Develop a standard, internationally-validated research process for behavioural interventions and field research pilots on HTR energy users in the residential & commercial sectors;
- Provide a standardised process to undertake cross-country case study comparisons.

Progress towards Subtask objectives

- Process has been developed and is written up to be published;
- Process has been used to design initial field research pilots (Subtask 4).

Subtask 4

- Proof-of-concept of the research process developed in Subtask 3 in the field;
- Evaluation of success of interventions and (shared) learnings;
- Using a Collective Impact Approach to facilitate multi-stakeholder collaboration;
- Engaging the hard-to-reach and connecting them with the relevant organisations and individuals, policies and programmes that can help them improve their energy use and consumption.

Progress towards Subtask objectives

- Two field research pilots under development in Canada using the HTR process;
- Needs and Opportunities Assessment for BEST course completed;
- At least another two potential field research pilots (in the US and NZ) identified.

Experts meetings/seminars/conferences held in past six months

Experts and stakeholder meetings

Date	Place	# of Experts	Type of meeting	Government	Industry	Academic
Aug 2019	Wellington	5	SH	4		1
Sep 2019	Wellington	4	SH	3		1

Sep 2019	Online	8	NE		3	5
Oct 2019	Online	8	NE		3	5

Seminars / Conferences (to be held after this report is due)

Date	Place	Participants	Type of meeting	Government	Industry	Academic

Reports produced in the past six months

- Workplan
- Task Flyer
- Blogs
- eceee summer study informal session (meeting report)
- Year 1 Quarter 1 update (US stakeholder report)
- UK fuel poverty report (technical report)
- Needs and Opportunities Assessment (BEST course technical report)

OBJECTIVES FOR THE NEXT SIX MONTHS

Subtask 1

- Stakeholder survey and interview analysis completed.

Subtask 2

- Literature review underway;
- Case study analysis underway.

Subtask 3

- Process published.

Subtask 4

- First field research pilot (BEST - Behaviour, Energy & Sustainability course for commercial Energy Managers and Building Operators) completed;
- Start of BC Hydro commercial energy saving tips library project.

Experts meetings/seminars/conferences planned in the next six months

Planned Experts meetings

Date	Place
Nov 20-21	Sacramento, US
Feb 2020	Online

Planned seminars/conferences

Date	Place
Oct 23-24	Melbourne, EE Expo
Nov 18	Sacramento, BECC conference

Reports planned for the next six months

- Year 1 Quarter 2 US report (ST0);
- Survey and interview analysis (ST1);

- Report or scientific paper or white paper on research process (ST3);
- Field research pilot report (ST4).

OUTREACH

Wide social media outreach during eceee summer study and BECC conference; got HTR twitter group with academics working in the field; blogs on eceee website and Energy-in-Demand (EiD); first newsletter to experts sent in August 2019. Lots of positive responses and interest from experts. Very high survey completion (n>130).

IDEAS FOR NEW WORK

Too early to say but there are a lot of very exciting field research pilots and collaborations in the works! We will prove that reaching the hard-to-reach isn't just doable, it's essential.

FINANCE

Budget is on track, have received NZD100,000 out of NZD150,000 (New Zealand payment is still outstanding). Significant in-kind support and field research co-funding to the tune of >CAD200,000 in the works (CAD 45,000 have been signed off for BEST course, with second iteration in 2020 already green-lit).

ACTIVITY TIME SCHEDULE

No changes to initial timeline. Detailed Gantt charts can be found on *TeamWork*.

MATTERS FOR THE EXCO

Recommend ExCo approve this Task Status Report.

PARTICIPATING COUNTRIES

USA
New Zealand
Sweden

In kind:
UK
Spain
Canada

DICUSSION PAPER

Background

This Task will provide country participants with the opportunity to learn and share successful approaches how to identify and engage "hard to reach" energy users in the residential and commercial sectors. The Task will facilitate the development of robust social science-based guidance for designing programmes (e.g. national, municipal, utility-driven) that are more tailored to specific HTR audiences. It will also help identify effective approaches for improving existing programmes to increase uptake among specific HTR segments. To summarise, this Task serves four main objectives:

1. Identify and analyse who the HTR energy user segments are in the residential and commercial (including industrial and service) sectors; including how to best find and approach them.
2. Review past and potential behavioural techniques and interventions, assessing what has worked well (and not-so-well) to engage HTR customers across participating countries and varying sectors, fuel types, services and contexts.
3. Leverage insights from participating countries' programmes and case studies to develop practical guidance for how to reach the HTR customers in energy efficiency and DSM interventions, run better engagement trials, and monitor / evaluate outcomes.
4. Provide policy and programme recommendations for the design, implementation and evaluation of energy efficiency and behavioural-oriented interventions for the HTR in participating countries.

This discussion paper will focus on the first objective - defining the HTR audience.

Differing definitions of HTR in the residential and commercial sectors

The focus on, and definitions of energy users that are hard-to-reach will very likely differ between countries, but also between sectors within countries. We will work together with our participating country experts to create an overarching, broad definition like our IEA DSM Task 24 definitions on energy behaviour and behaviour change. For now, we propose this draft definition of hard-to-reach energy users for this Task:

> *"In this Task, a hard-to-reach energy user is an energy user from the residential and commercial sectors who uses any type of energy or fuel and energy services, including mobility, and who is typically either hard-to-reach physically, underserved, or hard to engage or motivate, for a variety of reasons. These could include lack of access to information, lack of government or industry policies and programmes targeting such user groups, lack of financial means, lack of confidence, vulnerability, or being a new type of user (e.g. new technology owner) who has not yet been identified or engaged by the relevant agency."*

Through this HTR Task, this initial draft definition will be refined, and several subsets within each sector will be identified to specifically address through this work. Although this Task will begin with a broad definition that captures the breadth of what is included under the "Hard to Reach" umbrella, definitions of smaller subsets will also help identify which HTR audiences may be the most promising to address through this international collaboration.

Previous Task 24 work on this topic, in collaboration with the U.S. Consortium for Energy Efficiency (CEE), has shown just how divergent the definitions of HTR customers can be. US and Canadian utilities interviewed during the last year of Task 24 Phase II defined "hard-to-reach" customers as:

- Low income or from lower socio-economic groups
- In energy hardship or fuel poverty ("vulnerable customers")
- Rural, isolated or physically hard-to-reach communities
- Hard to motivate or engage customers
- Underserved customers
- Tenants in multi-family apartment buildings (where the landlord paid the utility bills)
- Not connected to internet or smartphone
- Disadvantaged communities, e.g. indigenous or immigrant communities
- Small to medium businesses.

Residential sector

Work in the UK also includes Citizens Panels with the hardest-to-reach (and most vulnerable), including people who are: Recently out of homelessness; recently released from prison; users of food banks; suffer poor mental and physical health, etc.

OR, the hardest-to-reach can be grouped as:

- The chaotic, because of drink and drug problems;
- The scared, because they do not want to bother their landlord;
- The hidden, because they are in such poverty, they only just exist, so any change could make matters worse. Thus, it is better to avoid all change. They have consistently been treated badly by the utilities, so they do have personal experience to enforce their distrust;
- The ill, those with mental ill health or disabilities;
- The stoic, 'I'm not complaining' group;
- The proud, "I know everything in this field and I am doing everything it takes". They may know a lot but not everything, and they are not connected to the decision makers and so they tend to complain about the government's lack of progress; and
- The skeptic, who don't believe they can do any improvements, perhaps because they don't have the money / time to invest or it is not their priority or they think it is too difficult to engage their partners / community / co-workers.

Brenda Boardman (e.g. Boardman, 1991), who has studied fuel poverty for 5 decades says: "They will never self-identify, or self-refer. You might get some through health links, but even then they would probably refuse assistance. A pepper-potting, individual targeting approach will never reach them all. The ONLY way to get them involved is when they want to be helped and I think this might happen best through their neighbours and community."

Commercial sector

Pacific Gas & Electric (PG&E, 2001) also did work on this subject in the commercial sector in California and described the hardest-to-reach customers as such:

1) Small business customers that have fewer than 10 employees;
2) Businesses in leased space;
3) Rural business customers;
4) Strip malls;
5) Local chain or single-location restaurants;
6) "Mom and pop" restaurants and stores; and
7) Convenience stores.

HTR Surveys

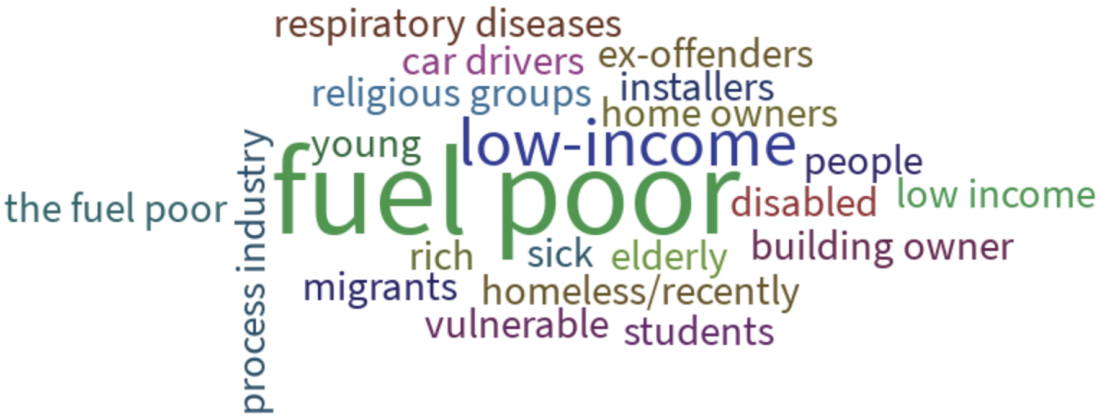
Survey 1 - eceee Summer Study live poll

We have undertaken two surveys with international experts, one live poll during the informal kick-off session of this Task at the eceee summer study (n=30 from 15 countries) and one Qualtrics survey

that ran for 2 months and was sent to experts identified by the Operating Agent and National Experts (n=111 from 20 countries).

Outcomes and Implications:

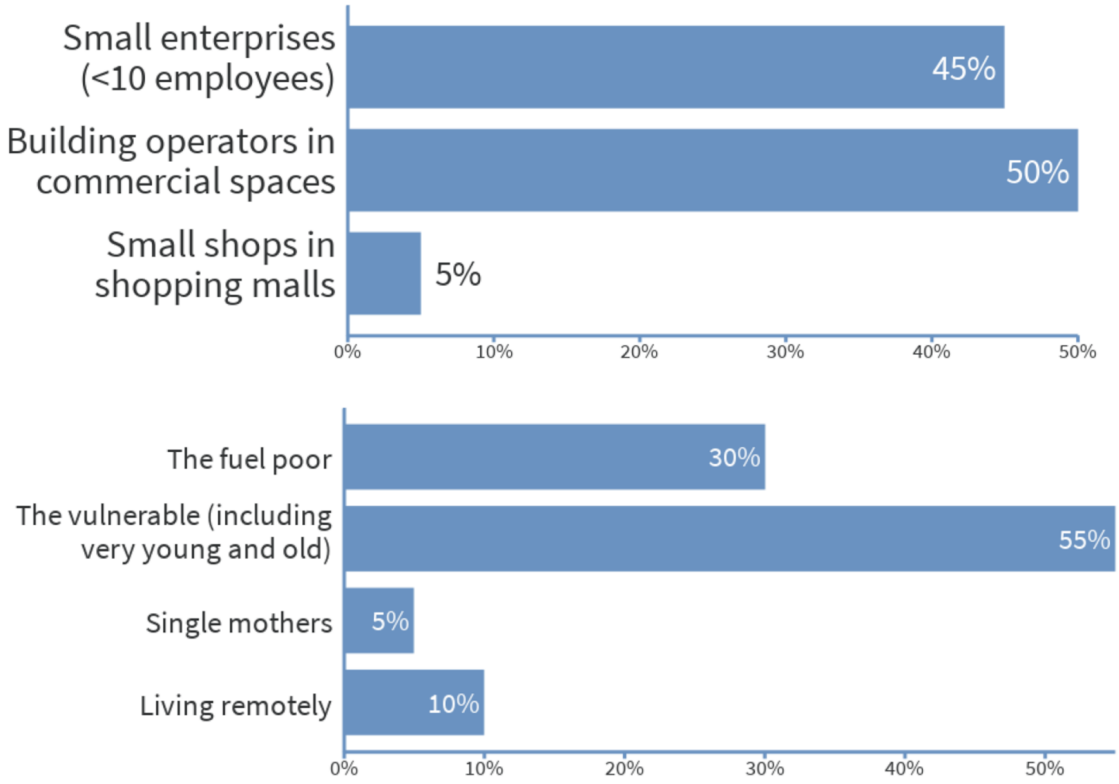
- The draft survey that was later revised and distributed broadly to international HTR collaborators and CEE member organisations (see Survey 2 below) was piloted and completed by eceee Informal Session attendees in real-time.
- The list of possible HTR groups that had originally been developed by CEE sponsors was expanded based on the additional feedback received during eceee (see Figures below); international input informed the development of the final set of HTR categories that were ultimately included in the HTR survey through Qualtrics.



Word cloud depicting the most commonly-mentioned residential HTR groups

Word cloud depicting the most commonly-mentioned commercial HTR groups

When asked which groups they would prioritise, these were the most common answers: building operators and SMEs in the commercial sector, and the vulnerable and fuel poor in the residential sector.



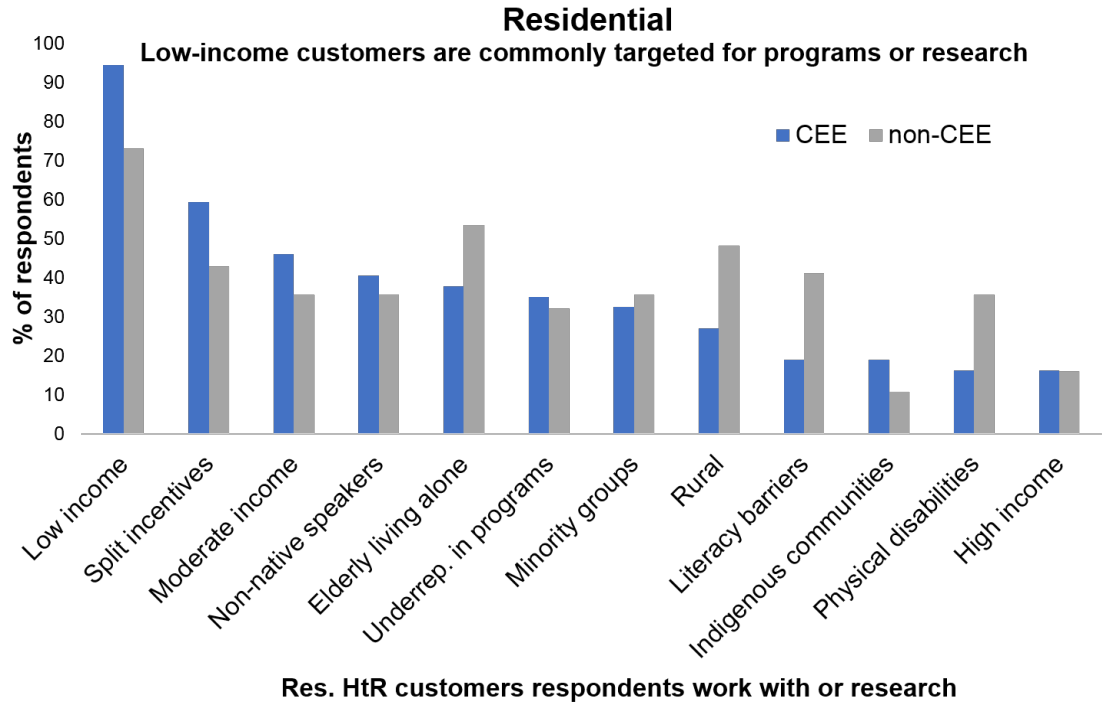
Survey 2: Synthesis of survey results

The CEE Qualtrics survey asked questions about HTR definitions in both residential and commercial sectors, which HTR audience categories international collaborators had aimed to reach with programmes, and what case studies they could share. The survey was sent to nearly 200 Task 24 experts, 200 UK fuel poverty experts, and 71 CEE member organisations (mostly US and Canadian utilities). It was also disseminated via an eceee column, Energy in Demand blog, and the BECC linkedin group (covering several thousand global energy efficiency experts). We received responses from 39 CEE members and 73 non-CEE organisations.

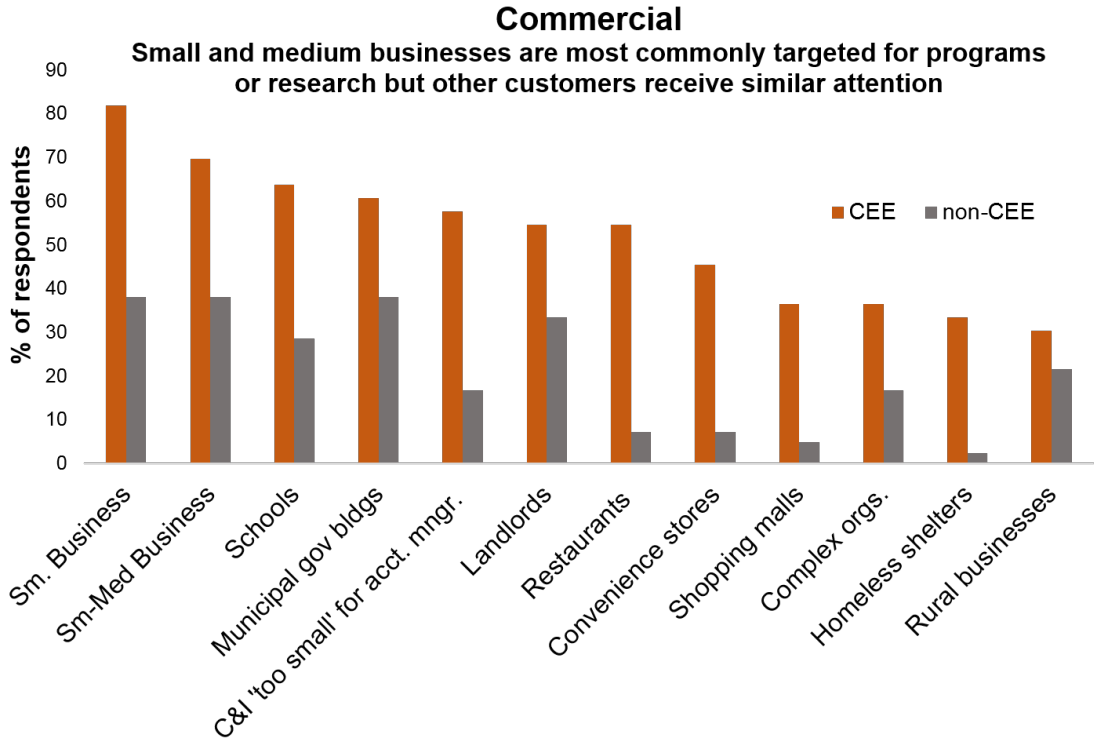
In addition, a draft interview template for stakeholder interviews (to be conducted in Q2) was developed.

Outcomes and Implications:

- Initial survey results indicate that people most often define HTR as low-income in the residential sector and as small businesses in the commercial sector.
- Other than low-income and small businesses, definitions varied widely both within and between CEE and non-CEE responses. This suggests the concept of HTR customers is widely recognised but loosely defined.
- CEE member responses indicated low-income, small and medium businesses, non-native speakers, and rural dwellers are of highest interest to their organisations.
- Although there is some overlap, overall the customer categories most survey respondents consider HTR are not necessarily the customers organisations tend to target for HTR programmes or research.



Res. HtR customers respondents work with or research



Comm. HtR customers respondents work with or research

Discussion questions

Some of the questions that would be good to discuss are:

1. How would / did you define a HTR energy user in the residential sector?
2. How would / did you define a HTR energy user in the commercial sector?

3. How would / did you suggest to prioritise which HTR energy users to focus on for a behavioural intervention?
4. Why do you think the HTR audiences you are targeting are HTR? Why do you think your programme(s) or interventions will be able to "reach" those customers?
5. What behaviours, context and/or motivational factors would / did you focus on, based on your priority definitions of the HTR?
6. How would / did you uncover behavioural, contextual and/or motivational factors facing these HTR energy users?

Document P

PROPOSAL: ENERGY SECTOR BEHAVIOURAL INSIGHTS PLATFORM

Jeremy Sung, IEA

This proposal is for a new project ('Task'[2]) under the User-Centred Energy Systems Technology Collaboration Programme (Users TCP), the *Energy Sector Behavioural Insights Platform* (the Platform). The Platform would bring together government policy makers and other experts working on the application of Behavioural Insights to energy policy. It would enable the sharing of knowledge and experiences, and potentially, the development and dissemination of guidance for policy makers.

Background

Why behaviour matters for energy demand

Although technologies are important determinants of energy demand[3], people's decisions about which technologies they use, and how they use them (amongst others), ultimately determine energy use. This is true for all sectors.

In the buildings sector, while estimates of the impacts vary, there is wide agreement amongst the literature (Lopes, Antunes, & Martins, 2011) that several opportunities exist for optimising building sector energy use through behavioural interventions. Moreover, technology and behavioural interventions are mutually reinforcing (Lopes, Antunes, & Martins, 2011). At the global level, one study has estimated that around 29% of building sector GHG emissions could be avoided through behavioural change (Ürge-Vorsatz, Novikova, Köppel, & Boza-Kiss, 2009).

While much of the literature has focused on buildings, the transport sector also holds promise for energy savings through relatively simple changes. For example, a study of the effects of monetary rewards to encourage efficient driving behaviours among bus drivers showed an average improvement of 10% after the introductions of such rewards (Lai, 2015).

Identifying ways to influence human behaviour, in all sectors, will therefore be an important ingredient in clean energy transitions globally. Building on existing knowledge and experience to incorporate behavioural science throughout the policy cycle will ensure that energy policies are designed to work with people's likely behaviours, reducing the risk of ineffective or counterproductive outcomes.

What are Behavioural Insights?

Behavioural Insights (BI) constitute the evidence-based approach to integrating insights and methodologies from the behavioural sciences in public policy to provide better and more effective public policies (OECD, 2019, p. 44).
BI draw lessons from the fields of behavioural economics, psychology and other behavioural sciences which seek to explain people's behaviour. Research from these fields has shown that behaviour is often not rational and that habits are often guided by automated cognitive processes, which can involve misperceptions (Lopes, Antunes, & Martins, 2011). For example, people tend to view losses as being more significant than gains (a phenomenon known as 'loss aversion'). This is a natural outcome of the brain's capacity to develop mental shortcuts for accomplishing habitual actions, which, while useful in many situations, sometimes results in the persistence of erroneous actions (UK Cabinet Office, 2010). BI aims to take such factors into account when designing

2 In the language of IEA TCPs, projects are referred to as 'tasks'.

3 Throughout this paper, the 'demand side' refers to energy consumption as well as small-scale (household) distributed generation and storage

policies, offering policy makers a data-driven and nuanced approach to policy making based on what actually drives citizens' decisions rather than relying on assumptions about how they should act (OECD, 2019).

BI can be used to influence both conscious and unconscious decision making

Broadly speaking, most policy is designed to change human behaviour, with interventions directed towards influencing conscious or unconscious actions. In the former case, attempts are made to influence rational choices, by providing information or changing the cost of an action, (for example, through subsidies). Typical policy interventions targeting conscious decisions might include labelling to display their energy performance of appliances or subsidies to reduce the cost of energy efficient appliances.

Influencing *unconscious* actions proceeds from the assumption that choices are not always rational or consistent and instead, depend on context. For example, an intervention might seek to influence consumers' appliance purchasing decisions by delivering information on appliance energy efficiency through specially selected messengers, or changing the way the lifetime cost of an efficient appliance is displayed on an online shopping website so that consumers find the information easier to digest.

BI is often applied to influence unconscious decision making. Applying BI principles in the design of policies that target *conscious* decisions is also important, and may be crucial to ensure policies succeed in what they set out to achieve. Research has shown that many of the existing policy programmes which governments have put in place to reduce carbon emissions fundamentally rely on changing behaviour. For example, studies (Fowlie, Greenstone, & Wolfram, 2015; Allcott & Greenstone, 2017; James & Ambrose, 2017) have shown that the uptake, and effectiveness, of retrofit policies are strongly influenced by human behaviour.

The emergence of Behavioural Insights in government

Over the last decade, several countries have set up specialised teams to incorporate BI within policy development and implementation processes (Afif, Islan, Calvo-Gonzalez, & Goodnow, 2019). Different institutional models have been used. For example, in some countries, dedicated BI teams have been established within energy or environment departments. In others, BI teams are established in central agencies to apply BI across a portfolio of issues, including energy. In others still, BI analysis has been conducted by private or semi-private organisations, with government as the primary client.

Who are the global leaders?

Many global leaders in the application of BI to national-level energy policy are members of the Users TCP. For example:

- United Kingdom: former Cabinet Office team and now social enterprise, the Behavioural Insights Team, and teams embedded within the UK energy department (BEIS) and energy regulator (Ofgem) that form part of the cross-Government Behavioural Insights Network;
- United States: home to academics such as Nobel Prize winner Richard Thaler and Dan Ariely as well as the former head of the US Government BI unit, Mayar Shankar (now Global Head of Behavioural Science at Google).
- Australia, Ireland and the Netherlands have each established BI teams within government agencies responsible for energy policy.
- Switzerland: Home of Ernst Fehr, a major contributor to the field of behavioural economics.

In addition to these Users TCP member countries, Japan has established a cross-ministerial Behavioral Sciences Team (BEST), for sharing best practices in BI across government. Its Ministry of Environment hosts a BI unit called "Platinum" and its Ministry of Economy Trade and Industry, (responsible for energy policy), has also recently established a BI unit.

The need for a global platform on BI for energy

There is a large body of literature on applying BI generally, and annual conferences (BX for general applications of BI, and BECC and BEHAVE for energy and climate related applications) provide global forums for knowledge sharing periodically.

However, there is currently no global platform for collating policy makers' practical experiences applying BI *specifically for energy policy*. Both the OECD (OECD, 2017) and World Bank (Afif, Islan, Calvo-Gonzalez, & Goodnow, 2019) have conducted global surveys of BI for government but, while energy sector case studies were included, the analyses were general in nature, without going into depth on any particular sector.

Further, while several countries now have valuable experience from the application of BI to the energy sector, most of these counties are centred in advanced economies. A global platform would provide a central knowledge base to benefit both advanced and emerging economies.

In addition, the IEA's Energy Efficiency Division would find it valuable to include BI in its policy advice, however currently a global evidence base for providing these insights is lacking. The challenges found in the energy sector are shared by governments across the world and a wide range of tools are required to address issues. Behaviour Insights offers a framework and evidence base to develop and evaluate effective interventions that can be used in isolation, or more commonly, in conjunction with more traditional regulatory tools.

In September 2018, participants at the joint IEA/IPEEC/G20 workshop on behaviour change for energy efficiency expressed interest in taking forward work on BI through the IEA Demand Side Management Technology Collaboration Programme (now Users TCP). These countries felt that there could be much to gain from sharing experiences, collecting case studies and developing guidance for each other's benefit and to help countries that were considering using BI for the first time.

A global platform for energy sector behavioural insights

A global platform for sharing knowledge and experiences in applying BI to energy policy could benefit energy policy makers by potentially providing:

- A global network of energy policy makers using BI, who could share insights into their experiences applying BI.
- A regularly updated database of case studies with detailed information about what worked (and what didn't work) to design and deliver energy policy and programmes using BI.
- Guidance for policy makers considering using BI for energy policy.

Objectives

1. **Overall objective: Improve the efficacy of demand-side energy policies by ensuring that human behaviour is accounted for at all stages of the policy cycle.**
2. Build an international network of energy policy makers that use or are interested in using BI for energy policy.
3. Identify benefits and drawbacks of different institutional governance models for incorporating BI into policy: From in-house models (including both centralised models placing BI teams within a central agency and decentralised models which embed BI teams in line agencies), to outsourced models.
4. Share lessons learned and identify best practices, from inside and outside the energy sector, in applying BI throughout the policy cycle and in both advanced and emerging economies.

Why Users TCP?

The IEA's Technology Collaboration Programme is a network of 38 research collaborations involving over 6 000 experts worldwide who represent nearly 300 public and private organisations

located in 55 countries, including many from IEA Association countries such as China, India and Brazil.
Most of the collaborations are focussed on the development of energy technologies. Users TCP is unique, as the only collaboration focussed primarily on energy technology *users*. Its mission is to provide evidence from socio-technical research on "behind the meter" energy use and production, to inform policy making for clean, efficient and secure energy transitions.
With its focus on energy users, and previous work on behaviour change (IEA DSM TCP, 2019), the TCP a natural home for the Platform. In addition, many of the TCP's members are leaders in the field of applying BI to energy policy (See *Who are the Global Leaders?*).

Deliverables and timeline

Work streams are described using the TCP terminology as "sub-tasks". Deliverables refer to the individual products that together, comprise a sub-task.

Sub-task 1: Environment scanning

Duration: ~9 months
The purpose of the sub-task is to assess **where** and **how** BI is being used to inform energy policy around the world.
The core countries of focus will be TCP member countries with BI teams that have already expressed an interest in this task, including: Australia, Ireland, and the United Kingdom and Switzerland. Japan, although not currently a member of Users TCP, has also expressed an interest in being involved.
Other countries that may be included in the study, based on their application of BI in the energy sector, are listed in Table 1.

Table 1 Examples of countries where BI has been applied in the energy sector

Country	Institution	Project
Australia	Department of Environment and Energy / BETA	Testing the efficacy of different energy efficiency appliance rating labels
Canada	Ontario Ministry of Energy	Social factors contributing to the success of cycling uptake interventions
European Union	European Commission Consumers, Health and Food Executive Agency (CHAFEA)	Framing energy efficiency information to encourage uptake of energy efficient electric appliances: How the provision of online information on energy performance of household appliances can be improved to promote energy efficient product choices
	European Commission Director-General for climate action (DG Clima)	Framing fuel efficiency, emissions and running cost information: Testing the effectiveness of variants of car eco-labels and of mandatory information on fuel efficiency in promotional material
	Executive Agency for Small and Medium Enterprises (EASME), Unit B1 Energy	Can new ICT tools trigger more Energy Efficient behaviours? - Challenges and good practice to improve pilot design and implementation
France	DITP (French public transformation unit)	Project with the City of Paris to encourage more energy efficient practices to reduce energy bills
Italy	Regulatory Authority for Electricity, Gas and Water	Better consumption data for more efficient energy use: How individuals react to different types of feedback they receive when they use energy
Japan	Ministry of Environment (Administrative office of BEST) and Oracle	Trial testing BI for improving the efficacy of home energy reports. Improving transport fuel consumption through eco-driving.
Portugal	Municipality of Lisbon	Development of a digital social market to promote sustainable and energy efficient behaviour: Lisbon pilot

Singapore	Ministry of the Environment and Water Resources (MEWR) and Land Transport Authority (LTA)	Encouraging employees to go car-lite: Study on the effectiveness of usage-based parking schemes in encouraging employees to take public transport to work
South Africa	Western Cape Government	Energy efficiency project: Testing behavioural responses to four different styles of email prompts aimed at encouraging energy efficient practices
Switzerland	Swiss Federal Office of Energy (SFOE)	Testing the efficacy of different energy efficiency appliance rating labels Using BI to design a program to increase awareness and willingness for energy efficient behaviour
	Schweizerische Bundesbahnen (SBB)	Analysing behavioural drivers of Swiss citizens by conducting online surveys in the field of renovation (boiler exchange), space heating and mobility (shifting rush hours to non-busy periods)
	Canton St.Gallen	Energy concept 2021-2030: Development of BI-founded interventions to reach a reduction of CO2, increase the share of renewable energy and to increase efficiency of energy usage in the Canton of St.Gallen
Sweden	Energy Markets Inspectorate (EMI)	An electricity market in transition: Changing energy consumption patterns amongst the Swedish population
The Netherlands	The Netherlands Authority for Consumer and Markets (ACM)	Transparency in energy contracts: Increasing compliance amongst energy suppliers in terms of transparency in energy contracts
	Ministry of Economic Affairs and Climate Policy	Project with the Netherlands Enterprise Agency (RVO): Using BI to increase readership of an e-mail containing the feedback on commercial users' energy consumption
Turkey	Directorate General of Renewable Energy, Ministry of Energy and Natural Resources	End-use electricity consumption profiles of Turkish homes
United Kingdom	Ofgem / UK Behavioural Insights Team	Testing different communications methods to incentivise consumers to switch energy suppliers.
United States of America	Department of Energy (DOE)	Consumer adoption of renewable energy: Testing various behavioural tools to encourage homeowners to select renewable energy sources
	Philadelphia Behavioral Science Initiative and GovLabPHL	Testing interventions to increase bike-share use

Sources: OECD "Behavioural Insights and Public Policy: Lessons from Around the World" (2017); BEHAVE "Book of Abstracts" (2018); Afif, Islan, Calvo-Gonzalez, & Goodnow "Behavioral Science Around the World: Profiles of 10 Countries" (2019); Personal communication.

Methodology

Through desktop research, a survey, and interviews, evidence will be compiled on which countries have established BI teams for the purpose of informing the design and delivery of *energy* policy and regulations.

The following organisations will be within scope:

- Central policy agencies (for example, Cabinet offices)
- Line agencies responsible for energy and related policy areas (e.g. transport)

- Energy regulators responsible for regulating energy markets

In addition, increasingly governments and utilities—particularly those obligated to achieve energy savings under national or state energy efficiency obligations—are partnering with product manufacturers and behavioural specialists to influence energy users' purchasing decisions and behaviour. These collaborations often involve the application of BI (for example, Pacific Gas and Electric's *Marketplace* for energy efficient products. Therefore, case studies from beyond government will also be examined where relevant.

To assess how BI are being used, a **BI policy typology** will be developed to categorise the use of BI in energy policy making. Dimensions assessed could include: policy type, policy stage, scale, behaviour targeted, intervention type, impacts, evaluation methods and institutional/cultural settings amongst others (Table 2). While similar to the typologies used by SEAI (2018) and DECC (2012) to assess international studies of 'what works' in changing behaviour, the focus of this work will be on government applications of BI, rather than academic studies. Therefore, only certain academic case studies will be in scope, and there will be much more reliance on evidence provided through surveys and interviews with policy makers.

Table 2 Examples of dimensions included in a typology of BI applications in energy policy

Dimension	Categories

Policy type	• Information provision policies, including:
	  ○ Billing information and customer comparisons
	  ○ Appliance, vehicle and building labels
	  ○ Product information and comparisons
	• Financial incentives, such as grants and loans
	• Regulatory compliance, including compliance with:
	  ○ Mandatory reporting requirements
	  ○ Building code compliance
	  ○ Appliance minimum energy performance standards, etc

Policy stage	• Problem identification • Policy design • Implementation • Monitoring • Evaluation
Sector and end use targeted	• Buildings (Heating and cooling, lighting, etc) • Transport (Road transport, Modal shift, etc) • Industry (Energy reporting, Energy management systems, etc)
Scale of intervention	• Trial • Full-scale policy, etc
Behaviour targeted	• Loss aversion • Bounded rationality • Optimism bias • Social norming, etc
Evaluation methods	• Ex-ante • Ex-post • Quantitative • Qualitative
Impacts	• Energy / emissions savings • Increased regulatory compliance • Increased take-up of product or service, etc
Institutional settings	• In-house/central • In-house line agency • Outsourced, etc

Deliverable 1.1: Summary briefing note

The *Global Commission on Urgent Action for Energy Efficiency* (the Commission) is a group of influential people from the energy sector, who are examining how progress on energy efficiency can be rapidly accelerated through new and stronger policy action. The Commission will conduct its investigation between July 2019 and June 2020, supported by the IEA's Energy Efficiency Division.

It is proposed that preliminary findings of the environment scanning report are presented for consideration by the Commission in the form of a short briefing note, as part of their search for novel ways of scaling up energy efficiency action.

Audience: The members of the IEA Global Commission on Urgent Action for Energy Efficiency

Format: A short, briefing note of 1-5 pages.

Timing: February 2020

Deliverable 1.2: Environment scanning full report

The full report will summarise research conducted over a 6-month period. It will include case studies from all the countries involved and summaries of activities undertaken by governments using the BI policy typology.

The report will contain suggested areas for further research, which will be used to inform Sub-task 2.

The report will be published on ieadsm.org. Depending on if the IEA itself is a co-author of the report, it may be published on the IEA website, potentially as part of the website itself.

Audience: Global

Format: Electronic document and/or website [tbc]

Deliverable 1.3: Workshop: Environment scanning report results

A workshop will be held to discuss the results of the environment scanning report. Potentially, this could be held as a side event in Paris, alongside the IEA's Global Conference on Energy Efficiency or another major international energy or behaviour change conference (such as BECC, BEHAVE or BX). In 2020, Japan will host BECC Japan and its *Innovation for Cool Earth Forum*, which is likely to have a behavioural focus, both of which could be an appropriate forum at which to launch the work.
The purpose of the workshop will be to:

- Present the findings of Sub-task 1.
- Identify areas for in-depth analysis to be undertaken during sub-task 2.
- Attract new members to the research collaboration (if desired).
- Discuss options for the ongoing governance and management of potential sub-task 2 activities – for example, the ongoing management of an online platform to ensure its currency and promotion.

Audience: Users TCP members and other national behaviour/energy sector experts

Format: In person workshop. Location tbc.

Deliverable 1.4: Workshop report and recommendations

This report will summarise the outcomes of the discussions during the workshop and provide detailed written recommendations for the next phase of work (Sub-task 2).

Audience: Task participating countries

Format: 5-10 page electronic document

Sub-task 2: [TBC]

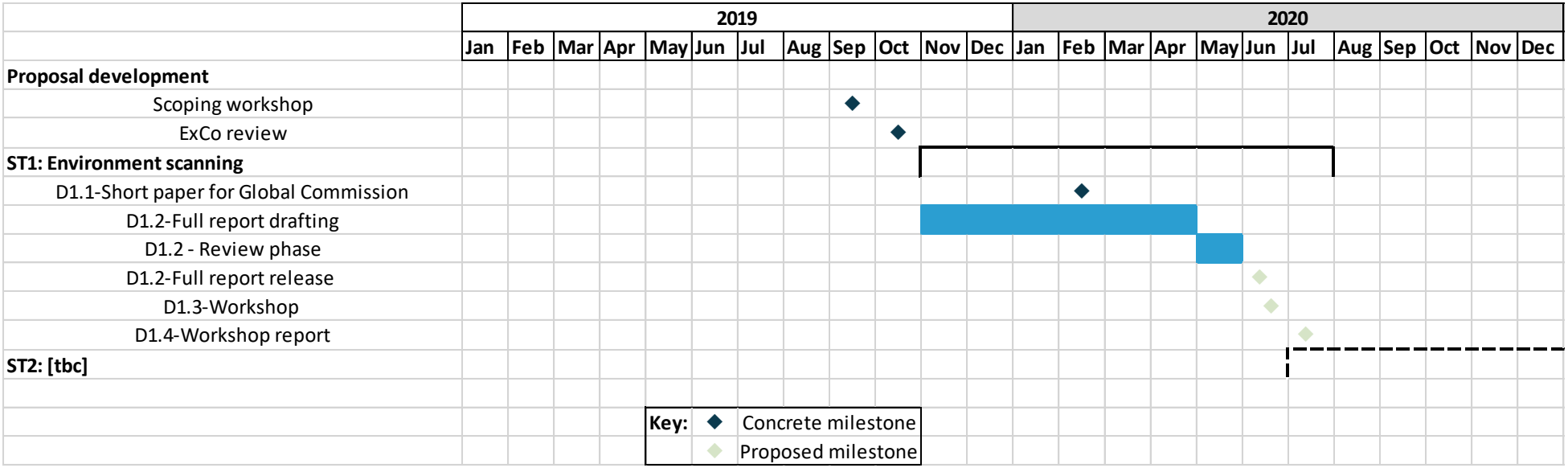
Based on the analysis from Sub-task 1, and the results of Deliverables 1.3 and 1.4, the topic for the next phase of work will be identified. A range of ideas are presented below:

- **Workshops and training** sessions with policy makers (in both advanced and emerging economies). For example, the IEA's *Energy Efficiency in Emerging Economies* (E4) programme provides regular week-long training sessions with energy efficiency policy makers from emerging economies. A session on using BI could be developed and incorporated into a future training week.
- **Webinar series:** A series of webinars from policy makers could be delivered via DSM University. Each webinar could be focussed on a different aspect of applying BI for energy policy.
- **Guidance reports** for energy policy makers on various topics. For example:
    - *How-to establish a BI team for energy policy*: What expertise is needed, where to look for qualified personnel, what institutional conditions make a BI team more or less successful, etc.
    - *How to conduct field trials in the energy sector*: What resources are needed, how to measure and verify the impacts of behavioural interventions, what mistakes to avoid, etc.
    - *From field trials to actual policy:* How to move from trialling interventions on a limited scale, to implementing policies at full scale?
    - *Using BI to optimise [X]*: A series of papers on how BI can be used to optimise the various policy used by energy policy makers.
- **Online case study database:** A searchable online database of case studies, cataloguing the types of interventions tested, impacts, etc.

Alignment with objectives

Sub-task / deliverable	Objectives to which product is aligned
Sub-task 1: Environment scanning	*Refer to specific deliverables below*
Deliverable 1.1: Summary briefing note	• Obj 2: Build an international network
Deliverable 1.2: Environment scanning full report	• Obj 3: Identify good governance models • Obj 4: Share policy best practices
Deliverable 1.3: Workshop: Environment scanning report results	• Obj 3: Identify good governance models • Obj 4: Share policy best practices
Deliverable 1.4: Workshop report and recommendations	• Obj 4 Share policy best practices
Sub-task 2: In-depth analysis of selected topic	[tbc]

Proposed timeline for delivery



Risk assessment

Description	Likelihood	Impact	Risk pre-mitigation	Mitigation	Risk post-mitigation
Unable to identify a project coordinator to continue work after ST1	Medium	High	High	During ST1, planning to begin for next phase of work	Medium
Inability to identify suitable interviewees to survey	Low	High	Low	IEA Secretariat to fully utilise networks with member countries and OECD	Low
D1.2 time over-runs affect delivery of D1.3 and D.14	Medium	Medium	Medium	Alternative times and places for workshops to be identified (later in year)	Low
Additional requirements from countries joining late.	High	Low	Low	Clear stipulation of national contributions required, and clear cut-off dates for later entry.	Low

Governance

This proposal has been developed primarily by Users TCP members Australia, the UK and Ireland, coordinated by the IEA Secretariat.

If approved, it is proposed that in lieu of an 'operating agent,' the IEA Secretariat will take the role of 'Coordinator' for this task[4].

Initially, it is proposed that the IEA would act as Coordinator for the duration of Sub-task 1: *Environment scanning*. With respect to Sub-task 1, the Coordinator would develop the work plan, take the lead on organising and delivering activities and outputs, and coordinate and track inputs from Task participants, where relevant. As currently proposed, the countries and IEA do not anticipate that an operating agent will be necessary for the duration of Sub-task 1.

Depending on the content of Sub-task 2, the IEA could continue in this role or an operating agent could be selected for the next phase of work.

The IEA would be particularly appropriate to lead Phase I of the work for the following reasons:

- Global convening power: With its 30 member countries and 8 Association member countries, the IEA can access a large network of policy makers to conduct research on the use of BI in for energy policy. The IEA also has access to high-level decision makers (Prime Minister and President level) via its role as the Secretariat for the Global Commission on Urgent Action on Energy Efficiency, with which D1.1 will be shared.

- Established connections to the OECD's Directorate for Public Governance. This will allow the IEA to build on existing global surveys of governments' use of BI for policy and tap into OECD networks where necessary.

4 As Coordinator, the IEA Secretariat would take on many of the functions normally undertaken by an operating agent, subject to terms and conditions necessary to conform to the IEA's governance structures, rules, regulations, policies, and procedures. However, unlike an operating agent, the IEA is unable to carry out "legal acts" on behalf of the Task participants, such as holding intellectual property rights on behalf of the participants. That said, the IEA is willing to grant broad intellectual property licenses, such as Creative Commons (CC) licenses, to use any Deliverables.

Budget

The proposed budget for sub-task 1 is €100 000[5] over 9 months (suggested as a contribution of €20 000 from 5 countries).
In addition to the cost of conducting the analysis for D1.1, D1.2 and D1.4, this would also cover the cost of running the findings workshop (D1.3), and producing materials for publication online.
Note that any funding that is provided to the IEA to carry out the Coordinator function would be subject to IEA's standard rules and procedures with respect to voluntary contributions—whether provided from TCP common funds or if provide directly from individual governments.

Alignment with the TCP's strategy

This project aligns closely with the TCP's new focus on 'user centred energy systems' and mission 'to inform policy making for clean, efficiency and secure energy transitions.'

Direct involvement of policy makers using BI

The task will involve direct collaboration between policy makers using BI for energy policy. As such the research outcomes are expected to feed directly into policy, aligning well with the TCP's aim to inform policy.

Alignment with the IEA Secretariat's work

The IEA Secretariat is prepared to take on the role of 'Task Coordinator' during the development of this proposal and throughout Sub-task 1. While the Secretariat's role may change, following the completion of Sub-task 1, the IEA has a strong interest in this topic and will seek to leverage its network to expand the reach of the work beyond the membership of the TCP. This aligns strongly with the TCP's goal of having its work feed into the work of the IEA Secretariat.

Cross-TCP linkages

Several TCPs are producing policy-relevant research to help promote the uptake of clean energy technologies. Amongst these, some are investigating the impact of consumer behaviour. For example, the Hybrid and Electric Vehicle TCP (HEV TCP) has a task that includes examining behavioural drivers behind the consumer adoption and use of electric vehicles.
Annex 66 of the Efficient Buildings and Communities TCP (EBC TCP) focused on ways to better incorporate building occupant behaviour into building simulation models. Annex 79 (2018-2023) will build on this work and includes a deliverable to provide "recommendations on occupant modelling in building energy codes" (Energy in Buildings and Communities Programme, 2018).
These tasks align well with the aims of this proposed task and research findings on the use of BI for policies relevant to these technologies will be shared with the relevant TCP task leaders.

5 The United Kingdom has already committed €10 000 during the project proposal phase, meaning the remaining budget required is €90 000.

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Document Q

BEST PRACTICES IN DESIGNING & IMPLEMENTING ENERGY EFFICIENCY OBLIGATIONS 2.0

Jan Rosenow, Regulatory Assistance Project (RAP)

Background and motivation

Energy efficiency obligations can play a key role in delivering energy policy goals, whether they be to save energy, access cost-effective energy resources, reduce carbon emissions, develop energy service markets or tackle fuel poverty. As their popularity increases and energy policy objectives evolve, new design and implementation questions are arising.

DSM Strategy alignment: The project is highly policy driven; there is a link to behaviour (how to include behavioural measures in Energy Efficiency Obligations (EEOs), a link to digitalisation (understanding the scope for integrating "pay for performance" principles and the adaptability of EEOs to changing energy systems in which the value of efficiency will vary by time and place).

Cross-TCP linkages: Potentially all end-use TCPs; specifically – 4E, EBC and IETS given the potential for the use of standards and labelling programmes to inform savings estimates and the traditional focus of EEOs on the buildings, industry and products sectors.

Who are the global leaders?: Several U.S. States (e.g. Rhode Island, Massachusetts, California), France, Italy, United Kingdom, and India (PAT Programme).

Why RAP? Already recognised for previous work in this area, we have leading expertise at RAP. A number of member countries have obligations (Australia (4 States/Territories); India; Ireland; Italy, Korea; United Kingdom; United States (many states)) and other member countries have actively considered implementing obligations (Netherlands, Sweden). Non-member countries may be interested to join as a result (e.g. Canada has an obligation in one state). The 2012 report has been used by policymakers and their advisors in many jurisdictions around the world which we know from conversations with DG ENER, EBRD, GIZ and USAID. We believe that a follow-up report would be equally well-received.

Why now?: In Europe, Members States are preparing their policy frameworks for the 2021-2030 period; in India, the results of the Perform Achieve Trade (PAT) Programme are worth analyzing; in the United States and Australia policymakers are looking to evolve policy to variations in the value of efficiency by time and place.

Which of us? RAP would take on the Operating Agent role for the Task in lieu of paying membership fees, as was the case with Task 22. Participating countries would be expected to attend biannual workshops on specific issues and prepare material to present at these events.

Objectives

Energy Efficiency Obligations (EEOs) are becoming more and more popular as a policy instrument to deliver energy efficiency gains. The growing and relative importance of EEOs is demonstrated by recent research. The IEA's research carried out by RAP in 2016/2017 found that the number of EEOs has quadrupled over the last ten years, while investment stimulated by them has risen six-fold, to USD 26 billion in 2015, which is around 10-15% of global energy efficiency investment.[6] This makes EEOs probably the most important policy instrument after standards in terms of driving uptake of energy efficiency.

Clear policy guidance such as provided in the DSM TCP report "Best practices in designing and implementing

[6] IEA (2017), Market-based Instruments for Energy Efficiency, https://webstore.iea.org/insights-series-2017-market-based-instruments-for-energy-efficiency

EEOs", published in 2012, is critical for the sound design and implementation of EEOs. What distinguishes EEOs from other policy instruments is that, by giving market actors the freedom to choose the measures and delivery routes that work best for them, the market as a whole is able to discover the most cost-effective way to achieve the outcomes set out by policymakers. That freedom puts a premium on good policy design and implementation, including strong monitoring, verification and evaluation. Sharing knowledge across jurisdictions will be central to the success of the next wave of policy making in this area.

The 2012 best practice paper for EEO design and implementation, produced by RAP as part of Task 22, was very well received and placed the TCP at the forefront of work in this area. Now, with the energy sector in transformation, and new implementation issues emerging, the time is right to dig deeper on the issues facing countries with EEOs and those considering their design.

Following the above, the objectives of this project are:

- Provide clear and globally applicable guidance for policymakers on the design and implementation of EEOs;
- Test the existing DSM TCP/RAP guidance to identify areas where it is no longer relevant or where further details are needed; and
- Dig deeper on a set of issues deemed by participants to deserve further attention (see next section for further details).

Issues for the new work (scope)

Since the publication of the DSM TCP/RAP guidance in 2012, EEOs have grown in both number and ambition. The experiences gained by policymakers and programme implementers will be valuable to share and draw out conclusions for the guidance document. At the same time, the changing nature of energy systems means that EEO programme design must adapt. The scope of the issues that will be covered in the guidance will be agreed following the first expert meeting and might be expected to include:

- Pay-for-performance and "EM&V 2.0"

  Led by U.S. states such as California, EEOs are experimenting with Pay-for-Performance (P4P) as a way of rewarding obligated parties for energy savings on an ongoing basis, using data from smart meters, rather than paying for the installation of measures in Year 1. This holds out the prospect of aligning the incentives of policymakers and obligated parties, increasing savings and their persistence and stimulating innovation in the energy efficiency industry.

- How to adapt EEOs to changes in the value of efficiency by time and place

  The growth of intermittent distributed renewable generation at the grid edge, coupled with increasing electrification of transport and heating, and growing demand for air conditioning is changing the value that energy efficiency measures can bring to both energy systems and climate protection. Designing programmes to reward energy efficiency where and when it is needed most could provide policymakers with better value for money, while providing a potential income stream for end-users.

- How to adapt EEOs to electrification

  The electrification of end-uses such as transportation and heating is enabling reductions in emissions, long-term savings to end-users and new opportunities for the provision of flexibility services by end-users. This desirable development is not always supported by EEO programme design, which is often focussed solely on electricity consumption reduction. Ensuring that EEOs do not discourage, or indeed could be designed to encourage, the take-up of efficient and flexible end-use equipment would align them with broader policy goals.

- How to design and operate trading mechanisms

  Since the publication of the 2012 guidance, which did not address this issue to any great extent, trading has become more common, with the Italian and French White Certificate programmes having expanded and other programmes having introduced mechanisms to enable obligated parties to trade.

- Best practices related to using EEOs in the wider policy mix

  EEOs can interact with other policies to deliver wider policy objectives. This work will consider the role of EEOs in the delivery of deep building renovation as well as the synergies that EEOs can have with other policies that can reward energy efficiency, such as tax incentives, as well as standards and labels.

Structure (sub-tasks)

Sub-tasks are formed to investigate each of the issues deemed worthy of in-depth study. The following subtasks are foreseen:

Task 1: Project Management

Task 2: Update of the existing report on EEOs and best practices
Task 2.1: Review of existing reports and selection of content to be updated
Task 2.2: Update of selected content

Task 3: Drafting of new chapters on key issues
Task 3.1: Draft chapter on pay-for-performance and EM&V 2.0
Task 3.2: Draft chapter on trading of energy efficiency certificates
Task 3.3: Draft chapter on EEOs in the policy mix
Task 3.4: Time and location energy efficiency

Task 4: Review of draft report and finalisation
Task 4.1: Extensive external review
Task 4.2: Finalisation based on comments

Management

The Operating Agent will produce a report on “Best practices in designing & implementing Energy Efficiency Obligations 2.0”. This will be based on previous work and a review of emerging issues. Subtasks are not led by other organisations given the size of this project. Expert input will be required at various stages of the project. Once a final list of issues to assess in the report has been compiled it will be tested with experts from TCP member countries before being finalised. The draft report will also be sent for review by experts from TCP member countries.

Deliverables

The following deliverables will be provided by the project team:

1) Updated paper on the design and implementation of EEOs
2) Individual chapters on each of the sub-task issues
3) Knowledge sharing with policymakers and other experts through a webinar and presentations at events

Time Schedule and milestones

The following timetable is proposed for this project:

Q4 2019: Project kick-off with workshop co-hosted with IEA in Paris

End Q4 2019: focus issues agreed

Q2 2020: workshop exploring key focus issues, informed by initial findings

Q4 2020: second workshop exploring key focus issues, informed by initial findings

Q2 2021: event at ECEEE to present draft of final guidance document

Q4 2021: publication of report following sign-off by ExCo

Funding and Commitments (Resources needed)

No funding is required from the TCP. Costs for producing the report will be covered by RAP as an in-kind

contribution as part of RAP's TCP membership. However, the TCP members would be expected to support the project through providing expert inputs and reviewing project outputs.

Meetings plan

The following meetings are planned:

Workshop December 10th co-organised with IEA in Paris.

Three further workshops during the course of the project, to be organised alongside other relevant events.

Information activities

RAP has a strong capability for outreach to stakeholders and will carry out the following information activities:

- Webinar on User-Centred Energy Systems Academy
- Blog post distributed through channels with wide reach
- Presentations at relevant events (e.g. ECEEE, Concerted Action Energy Efficiency Directive in Europe)

Co-operation with other TCPs, the Secretariat and other interested parties

The IEA Secretariat is interested in collaborating with RAP on the project. The exact nature of the collaboration is being discussed, but would be expected to include, at a minimum, co-hosting a workshop (to which the IEA Secretariat has already committed), and at a maximum co-authorship of the report. By the time of the ExCo meeting, more information will likely be available.

The 4E TCP will be consulted over the links between EEOs and standards and labels. The IETS and EBC TCPs will be consulted on issues related to interventions in the industry and buildings sectors, should these become a focus of the project.

Other organisations with an interest in EEOSs will be partners in the organisation of events and potentially in the production of material for the report. These organisations include American Council for an Energy Efficient Economy (ACEEE) and Consortium for Energy Efficiency (CEE) in North America and the White Certificate Club in Europe. The project will also collaborate with the ENSMOV Horizon 2020 project, which is examining measurement and verification and policy implementation issues in the context of the EU Energy Efficiency Directive, with which RAP is a consortium partner.

The Hard-to-Reach Task (and potentially the Behavioural Insights Platform) will be consulted on how to incorporate behavioural interventions successfully in EEOs. The issue of how to design EEOs so that hard-to-reach end-users benefit may also be an issue of interest to stakeholders.

Country contributions to funding and Tasks

No funding of the tasks is required. Instead, it is expected that member countries of the TCP with EEOs in place would be able to provide expert inputs in form of information and review of task outputs.

Document I

REPORT FROM THE IEA SECRETARIAT H2 2019

The IEA Secretariat report provides an overview of recent developments within the network and the IEA Secretariat that are of interest to all Technology Collaboration Programmes (TCPs). This report is designed to complement the information provided by your Desk Officer related to IEA analysis and projects (current and planned) of relevance to individual TCPs. If you have comments or questions, please forward to TCP@iea.org.

IEA SECRETARIAT

Collaborating on energy technology innovation

The recently published paper on Energy Technology Innovation Partnerships provides an overview of the global landscape of multilateral efforts relevant to energy technology innovation. The report examines four collaborative partnerships including the IEA Technology Collaboration Programmes.

Three reasons why the IEA report on hydrogen is a game-changer

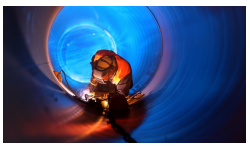
In this IEA commentary, former IEA Governing Board Chair and Hydrogen Envoy at the Ministry of Economic Affairs & Climate Policy of the Netherlands, Mr. Noé van Hulst explains why the IEA's recent report The Future of Hydrogen is a game-changer.

Nuclear power in a clean energy system

With its mission to cover all fuels and technologies, the IEA's first report addressing nuclear power in nearly two decades, Nuclear Power in a Clean Energy System, brings this important topic back into the global energy debate.

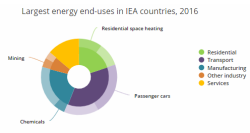
IEA unveils global high-level commission for urgent action on energy efficiency

The IEA has established an independent global commission to examine how progress on energy efficiency can be accelerated through new and stronger policy action. The focus of the new panel will be on key policy actions and will produce a concise list of clear, actionable recommendations next year.



Tracking methane emissions

The IEA has launched a new "methane tracker", offering the most comprehensive global picture of methane emissions, covering eight industry areas across more than seventy countries. This new and unique tool provides up-to-date estimates of current oil and gas methane emissions drawing on the best available data.



Energy efficiency indicators database

The recently released 2019 edition of the IEA energy efficiency indicators database, features detailed energy end use and activity data from 2018 for the residential, services, industry and transport sectors.

Recent IEA commentaries

- Three priorities for energy technology innovation partnerships
- Helping a warming world to keep cool
- Global patent applications for climate change mitigation technology – a key measure of innovation – are trending down

- The who and how of power system flexibility
- Carbon market negotiations under the Paris Agreement
- Bitcoin energy use –mined the gap
- Addressing the diversity challenge in energy sector recruitment
- Fossil fuel consumption subsidies bounced back strongly in 2018
- District heating needs flexibility to navigate the energy transition
- Frontier electric technologies in industry
- Can CO_2-EOR really provide carbon-negative oil?
- Shared, automated… and electric?

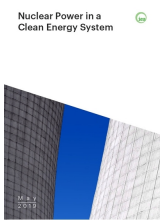
IEA PUBLICATIONS

The Future of Hydrogen: seizing today's opportunities. This free report finds that clean hydrogen is currently enjoying unprecedented political and business momentum, with the number of policies and projects around the world expanding rapidly. It concludes that now is the time to scale up technologies and bring down costs to allow hydrogen to become widely used. The pragmatic and actionable recommendations to governments and industry that are provided will make it possible to take full advantage of this increasing momentum.

Exploring Clean Energy Pathways: the role of CO_2 storage
This report analyses the implications for the global energy system of CO_2 storage facilities not being developed at the scale and pace needed to follow the optimised pathway of the IEA Clean Technology Scenario (CTS).

Clean Energy Investment Trends 2019: evolving risk perceptions for India's grid-connected renewable power projects. This report maps out the evolution in the renewable power industry and investment landscape through tracking the risk perceptions of debt financiers towards solar photovoltaic and wind projects over the period from 2014-2018 and recent developments impacting the pace of capacity addition.

Global EV Outlook 2019: scaling up the transition to electric mobility. This year's edition of this annual publication features a specific analysis of the performance of electric cars and competing powertrain options in terms of greenhouse gas emissions over their life cycle. It includes policy recommendations that incorporate learning from frontrunner markets to inform policy makers and stakeholders that consider policy frameworks and market systems for electric vehicle adoption.



Nuclear Power in a Clean Energy System. This report focuses on the role of nuclear power in advanced economies and the factors that put nuclear power at risk of future decline. It is shown that without action, nuclear power in advanced economies could fall by two-thirds by 2040. The implications of such a "Nuclear Fade Case" for costs, emissions and electricity security using two WEO scenarios are examined.

Other recent publications

- The Future of Cooling in China
- Technology Innovation to Accelerate Energy Transitions

- LNG Market Trends and Their Implications
- Securing Investments in Low-Carbon Power Generation Sources
- Perspectives for the Clean Energy Transition
- Transforming Industry through CCUS
- Tracking SDG7: the Energy Progress Report
- Status of Power System Transformation 2019: power system flexibility

COMMITTEE ON ENERGY RESEARCH AND TECHNOLOGY (CERT)

CERT Chair

The second and final term of the CERT Chair, Alicia Mignone, will draw to a close after the next CERT meeting in November. Part of the CERT landscape for more than twenty years, Ms. Mignone first served as Italian delegate from 1997-2002, as Vice-Chair from 2002-2013 and as Chair from 2014-2019. At the CERT June 2019 meeting delegates approved the nomination of Amanda Wilson of Canada as her successor.

Update on CERT Task Forces

Task Force #1 on Partnerships, created to consider the landscape of multilateral technology initiatives has completed the first phase of a comparative analysis of four collaborative energy technology mechanisms: Technology Collaboration Programmes, Mission Innovation, the Clean Energy Ministerial, and European Technology and Innovation Platforms.
https://www.iea.org/publications/reports/EnergyTechnologyInnovationPartnerships/

Future efforts could seek to further support policy makers in identifying strategic synergies between existing multilateral initiatives, and effective co-ordination processes to initiate or strengthen the interactions between ongoing activities. As a starting point, the Secretariat may conduct further research on a select number of technology areas followed by interviews with relevant actors, including TCPs. Please direct any questions or suggestions on the next phases of this work to TCP@iea.org.

Task Force #2 on CERT operations*,* created to reflect on ways to make CERT meetings more dynamic in terms of processes and operations has completed its activities.

Task Force #3 on TCP Enhancement*,* created to oversee implementation of the Action Plan for TCP Enhancement will continue its work for the time being. In addition to working with the Secretariat on the implementation of the Action Plan, Task Force 3 will be working with the IEA Legal Office on the proposed modernisation of the legal mechanisms (see below) and on exploring improvements to TCP communications.

Today in the Lab – Tomorrow in Energy?

This new *ETP 2020* initiative aims to highlight to decision makers and the broader public the importance of RD&D for the global energy future and, specifically, the ground-breaking research being carried out by the wider TCP network.

TCPs are invited to submit before 7 October, information on current research projects via a simple template. With input from CERT delegates a number of these projects will be showcased by the IEA through social media. TCPs are invited to take part in a conference call at 14h30 (Paris time) on 19 September for further information. In the meantime any questions may be sent to etp@iea.org.

Next meeting

The next meeting of the CERT will take place at the IEA in Paris on 19 and 20 November 2019. Items on the agenda will include thematic discussions on hydrogen and ***ETP 2020***.

WORKING PARTIES AND EXPERTS' GROUPS

Working Party on Energy End-Use Technologies (EUWP)

The **76th meeting of the EUWP** will take place at the IEA on 16-18 September 2019. It will include a discussion with the EEWP on the role of technology and policy in promoting innovation in the building sector. The aim of this joint discussion is to promote increased collaboration and knowledge sharing between the two working parties. Three TCPs will present their request for extension at the EUWP meeting: Advanced Motor Fuels (AMF TCP); Demand-Side Management (DSM TCP) and Hybrid and Electric Vehicles (HEV TCP).

Fusion Power Co-ordinating Committee (FPCC)

The **48th meeting of the FPCC** took place in Paris on 14-15 February 2019. It was preceded by a strategic session on Developments in Materials Research for Fusion which provided an opportunity to review the strategies, recent developments and remaining challenges of research on fusion materials among key research programmes worldwide. The next meeting of the FPCC will take place on 12-13 February 2020.

Working Party on Renewable Energy Technologies (REWP)

The **76th meeting of the REWP** will take place in Helsinki, Finland on 10-11 September 2019, and will include a strategic discussion on sustainable bioenergy.

Working Party on Fossil Fuels (WPFF)

The **76th meeting of the WPFF** was hosted by the Chinese Ministry of Science and Technology (MOST) in Beijing, China on 26-27 June 2019. The meeting provided an opportunity for detailed presentations and discussions on the role of fossil energy in China, including advances in highly efficient coal-fired power generation. A dedicated session on carbon capture, utilisation and storage (CCUS) highlighted the significant progress and activity underway in China on this key technology, including the publication of a new CCUS technology roadmap in May 2019. The meeting also discussed the new WPFF mandate and strategy (for 2020-2023) and recommended a further 5-year extension for the Fluidised Bed Conversion TCP. While in Beijing, the WPFF delegates visited the Guohau Beijing gas-fired cogeneration plant, a highly efficient facility that can operate with fewer than 30 employees due to significant digitalisation. The next meeting of the WPFF will be in Paris on 10-11 December 2019.

Experts' Group on R&D Priority-Setting and Evaluation (EGRD)

The EGRD held a workshop on system resiliency and flexibility, hosted by the Austrian Ministry for Transport, Innovation and Technology in Vienna on 13-14 May. Presentations are available on the workshop page. The next EGRD workshop, on the topic of alternative fuels, will take place at the IEA on 21-22 October 2019. The EGRD is currently also preparing its request for extension for the CERT November meeting.

TECHNOLOGY COLLABORATION PROGRAMME (TCP)

3rd TCP Universal Meeting

Leading energy experts from the public and private sector gathered in Paris on 18 and 19 June 2019 for the third TCP Universal Meeting. “2019 is a key year for innovation at the IEA,” said Dr Fatih Birol, the IEA’s Executive Director. “A more integrated and holistic approach to energy technology innovation is required to reach a sustainable energy future, which means even more partnerships among those in this room.”

The first day of this event was jointly hosted by the CERT and the IEA Standing Group on Long-Term Co-operation (SLT). It brought together policy and decision makers to share experiences on disruptive innovation, technology trends, and partnerships between governments, the private sector and other energy stakeholders. The meeting provided an opportunity for innovators and strategic thinkers to discuss key trends, which will help to inform future IEA activities related to energy technology, research and innovation. That includes the preparations for the 2019 IEA Ministerial and the 2020 edition of *Energy Technology Perspectives*, one of the IEA’s major publications.

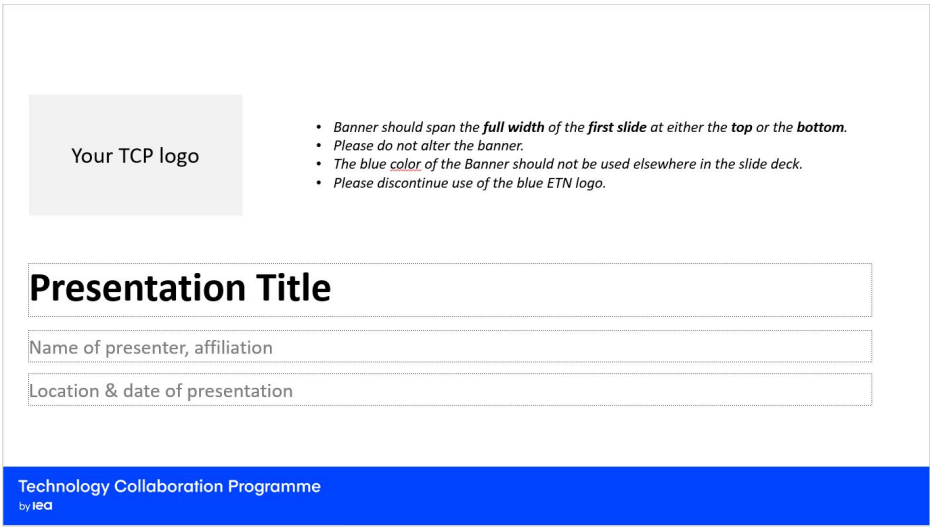
At the meeting, the IEA unveiled a new TCP logo as well as new tools and online resources available under its energy innovation web portal, including a study mapping international partnerships relevant to energy technology innovation in order to identify synergies and foster strategic engagement across initiatives. The IEA Secretariat also outlined plans for a major effort to modernise the TCP legal mechanism, further explore how the IEA can make better use of TCP work and improve communication across the TCP network.

Speaker presentations, a summary of break-out group discussions, and the new TCP video are available for download from the IEA event website.

New TCP logo and webpage

Following the unveiling of the new IEA brand and logo, the Agency released a new Technology Collaboration Programme (TCP) logo at the Universal Meeting in June 2019. TCPs are one of IEA’s longest-standing programmes, and their new logo seeks to clarify the relation between the agency and TCPs, and provide a link with our new digital identity.

The logo comes in two formats. One is for use by TCPs themselves, and comes as a banner to be applied on their public content.



i. Example slide presentation template using TCP Banner

The second is a badge which the IEA will use when communicating about TCPs, as used in the header to this document. Note that the TCP Badge is intended for the use of the IEA Secretariat *only*.

The new TCP logos are expected to be rolled out over the next six months. A new online guide will be made available in mid-September to advise on how TCPs should use this banner in a variety of formats including publications, power point presentations. Templates for common TCP documents will also be available on this webpage. An IEA webinar on **communication matters relating to the TCP logo and online resources** is scheduled for **13 September** at 16h00 CET.

In line with the IEA digital strategy, the IEA TCP webpage has also been updated and a new webpage created for each individual TCP. The 2-page TCP brochures are also available for download on the individual TCP pages. Please contact the IEA Secretariat at TCP@iea.org if you have any feedback regarding the brochure or individual webpage for your TCP.

TCP Survey

34 out of 38 TCPs responded to the IEA Secretariat's April 2019 TCP Survey. A summary presentation of the results is available on the Forum (https://www.iea.org/tcp/forum/ *login*: forum *password*: network).

Modernisation of the TCP legal mechanisms

The Legal Office is currently working with delegates to propose an update to the TCP legal framework. As discussed at the TCP Universal Meeting, these updates will focus on the following overarching priorities, identified with input from TCP representatives, CERT and WP delegates, and other stakeholders.

- Increase **collaboration** with external partners
- Deepen **integration** of TCP inputs into IEA work
- Stronger engagement with **emerging economies**
- **Streamline** administrative processes and procedures

Over the past several months, the Legal Office has held a number of discussions with TCP representatives to gather input on specific proposals that will be included as part of the modernisation proposal. We will host a webinar for all TCPs at 16h00 on October 16 to present the proposal and what it means for TCPs. Please contact K.C. Michaels if you would like additional information.

Recent new TCP participations

Contracting Parties

The **Netherlands Enterprise Agency (RVO)** joined the GHG TCP as a Contracting Party on 29 August 2019.

The **Swiss Federal Office of Energy (SFOE)** joined the Hydropower TCP as a Contacting Party on 26 August 2019.

ENEA of Italy joined the **IETS TCP** as a Contracting Party on 11 July 2019.

The **European Commission** joined the **4E TCP** as a Contracting Party on 26 June 2019 and the C3E TCP on 4 July 2019.

The **China Academy of Building Research (CABR)** joined the **HPT TCP** as a Contracting Party on 10 May 2019.

The **Energy Efficiency and Conservation Authority (EECA)** of New Zealand joined the 4E TCP as a Contracting Party on 10 April 2019.

Sponsors

- The **Institute Teknologi Bandung (Indonesia)** joined the **GHG TCP** as a Sponsor on 30 July 2019.
- **Sotacarbo (Italy)** joined the **GHG TCP** as a Sponsor on 3 July 2019.

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Kevin Lane	4E TCP	End-use: Electricity
Jeremy Sung	DSM TCP	End-use: Electricity
Peter Levi	IETS TCP	End-use: Industry
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Paolo Frankl	Working Party on Renewable Energy Technologies	REWP
Samantha McCulloch	Working Party on Fossil Fuels	WPFF
Per-Anders Widell	Experts' Group on R&D Priority Setting and Evaluation	EGRD
Simone Landolina Claire Hilton	Cross-agency efforts on energy innovation, including TCPs and other partnerships	TCPs
Diana Louis	Co-ordinating information on TCPs	TCPs
KC Michaels Claire Hilton	Legal advice (incl. modernisation of the TCPs' legal mechanisms)	TCPs

MISCELLANEOUS

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Executive Committee meetings of the DSM TCP initiative

Meeting #	Date	Country	Participants	Countries on ExCo
interim	1 –2 April, 1993	Stockholm, Sweden	14	14
1	28 – 29 October, 1993	Kerkrade, Netherlands	13	14
2	24 – 25 March, 1994	Madrid, Spain	12	14
3	13 – 14 October, 1994	Washington D.C., USA	14	15
4	23 – 24 March, 1995	Schaffhausen, Switzerland	15	15
5	19 – 20 October, 1995	Fukuoka, Japan	14	15
6	21 – 22 March, 1996	Paris, France	14	15
7	31 Oct – 1 Nov, 1996	Sydney, Australia	12	15
8	10 – 11 April, 1997	Helsinki, Finland	14	15
9	10 – 13 September, 1997	Oslo, Norway	9	15
10	25 – 27 March, 1998	Seoul, Korea	10	15
11	7 – 9 October, 1998	Chester, United Kingdom	12	15
12	14 – 16 April, 1999	Copenhagen, Denmark	12	17
13	28 – 29 October, 1999	Amsterdam, Netherlands	14	17
15	3 – 6 April, 2000	Ankara, Turkey	12	17
16	12 – 13 October, 2000	Athens, Greece	13	17
17	3 – 4 May, 2001	Eskilstuna, Sweden	12	17
18	3 – 5 October, 2001	Barcelona, Spain	13	17
19	18 – 19 April, 2002	Milan, Italy	15	17
20	3 – 4 October, 2002	Graz, Austria	15	17
21	8 – 10 April, 2003	Canberra, Australia	9	17
22	14 – 15 October, 2003	Paris, France	15	17
23	15-16 April 2004	Trondheim, Norway	16	17
24	13-15 October 2004	Atlanta, United States	13	17
25	20-21 April 2005	Saariselkä, Finland	15	17
26	October 2005	Madrid Spain	14	17
27	April 2006	Copenhagen Denmark	14	17
28	October 2006	Maastricht Netherlands	9	17
29	April 2007	Seoul Korea	10	18
30	11-12 October2007	Brugge Belgium	15	18
31	2-4 April 2008	New Delhi, India	11	19
32	October 2008	Milan Italy	13	19
33	April 2009	Vienna, Austria	11	20
34	September 2009	Chester, UK	11	20
35	April 2010	Paris, France	11	19
36	October 2010	Stockholm, Sweden	9	19
37	April 2011	Washington, USA	8	18
38	2 – 4 November 2011	Jeju Island, Korea	14	18
39	18 - 20 April, 2012	Trondheim-Tromsø, Norway	10	15
40	September 14-16 2012	Espoo, Finland	10	16
41	24 - 26 April, 2013	Utrecht, The Netherlands	11	17
42	16 – 18 October 2013	Lucerne- Rigi, Switzerland	11	17
43	17 – 21 March 2014	Wellington, New Zealand	9	16
44	15-17 October 2014	Graz, Austria	9	16
45	25 – 27 March 2015	Cape Town, South Africa	9	16
46	22 – 23 October, 2015	Halifax, Nova Scotia	9	17
47	17 – 18 March, 2016	Stockholm, Sweden	11	18
48	11 – 12 October, 2016	Brussels, Belgium	11	18
49	11 – 12 May 2017	Dublin, Ireland	13	18
50	5-6 October 2017	The Hague, Netherlands	8	18
51	17-18 April 2018	Bergen, Norway	15	18
52	1-3 October 2018	London, United Kingdom	14	19
53	3-5 April 2019	Bern, Switzerland	13	19
54	21-22 October 2019	Melbourne, Australia		19

No's of Executive Committee meetings held in each country

Netherlands	5	Australia	3	Japan	1
Sweden	4	Denmark	2	Turkey	1
Norway	4	Italy	2	South Africa	1
France	3	Switzerland	3	Nova Scotia	1
Finland	3	UK	2	Ireland	1
Korea	3	Belgium	2		
Austria	3	Greece	1		
Spain	3	India	1		
USA	3	New Zealand	1		