INTERNATIONAL ENERGY AGENCY

WORKSHOP REPORT 2015

Energy Efficiency, Buildings and Behaviour Workshop

11-12 March 2015

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INTERNATIONAL ENERGY AGENCY

The International Energy Agency (IEA), an autonomous agency, was established in November 1974. Its primary mandate was – and is – two-fold: to promote energy security amongst its member countries through collective response to physical disruptions in oil supply, and provide authoritative research and analysis on ways to ensure reliable, affordable and clean energy for its 29 member countries and beyond. The IEA carries out a comprehensive programme of energy co-operation among its member countries, each of which is obliged to hold oil stocks equivalent to 90 days of its net imports. The Agency's aims include the following objectives:

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

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This paper identifies themes that emerged from the workshop on Energy Efficiency, Buildings and Behaviour held at the International Energy Agency (IEA), 11-12 March 2015. It was prepared by Samuel Thomas and Sara Bryan Pasquier of the IEA Energy Efficiency Unit, with inputs from Jeremy Vincent, UK Department of Energy & Climate Change (DECC). Special thanks to the United Kingdom government for funding this work and for the many experts who shared their valuable expertise at the workshop.

Energy Efficiency, Behaviour and Buildings

Overview

The International Energy Agency (IEA) convened a workshop on Energy Efficiency, Buildings and Behaviour 11-12 March in Paris, France. Speakers from over 30 countries presented on energy efficiency policies and interventions to change behaviour, or to better account for behaviour in technology and policy design and implementation.

The first session of the workshop was held jointly with the International Partnership on Energy Efficiency Cooperation (IPEEC) and featured presentations from a number of non-IEA Member Countries (China, India, Mexico, Russia and South Africa). Later sessions focussed on energy efficiency in the buildings sector, and explored technology design and usability, information campaigns, public-sector initiatives and modelling behaviour. Elizabeth Shove (Lancaster University) provided a challenging introductory presentation, and Ruth Mourik (IEA Demand Side Management Implementing Agreement) provided the final presentation on monitoring and evaluation.

The workshop agenda can be found in Annex 1. A Summary Record of the presentations is provided in Annex 2, the Participant List is in Annex 3 and workshop presentations can be found here: http://www.iea.org/workshop/energy-efficiency-behaviour-workshop.html.

Objectives

The workshop is part of a broader work stream that seeks to:

1. Identify the range of cost-effective measures available to policymakers to deliver better energy efficiency outcomes, by taking into account behavioural factors.

2. Exchange lessons learned in terms of programme design, implementation and evaluation.

3. Explore replicability and scalability across different implementing organisations, geographical and sector boundaries, and social contexts.

The work steam is investigating the extent to which the take-up of energy efficiency measures (both technological and practice-based), their energy-saving performance and the persistence of those energy savings can be improved by designing and implementing policies and technologies informed by behavioural sciences. It will also explore the impact of changing consumer preferences (and changes in systems and practice) on the design and implementation of energy efficiency policies and technologies.

Key themes emerging from the workshop

1. Defaults and norms are important

Norms around what constitutes a comfortable indoor temperature have changed over time, influenced by technologies, fashion, policies, etc. Policymakers can and do influence norms and preferences by setting temperature requirements in building codes and defaults for equipment. For example, a default thermostat temperature of 22°c sets a certain expectation and creates a norm of what is comfortable (presentation by Elizabeth Shove, Lancaster University, UK). These norms can be changed, Japan, for example, has recommended higher temperature settings for air conditioners to shave peak electricity demand in summer months. In parallel it has put in place the

Super Cool Biz campaign to encourage seasonally appropriate business clothes, e.g. short sleeves with no jacket or tie.

2. Some "energy efficiency technologies" do not facilitate energy efficiency

Evidence from the US (presentation by Alan Meier, LNBL, US) showed the difficulties that many people face when interacting with programmable thermostats. Technologies that have the potential to facilitate energy efficiency are often having the opposite effect due to poor design. Discussion at the workshop led to the conclusion that a principal agent problem may well lie at the heart of the product design issue –thermostats tend to be sold to boiler manufacturers who then sell them on to new-build developers and property landlords, many of whom value lower costs over better design and usability. The development of internet-based energy service provision with learning algorithms may enable more efficient energy use by making programming more intuitive.

Evidence from the UK (presentation by Jeremy Vincent, DECC, UK) did not provide conclusive evidence that employing boiler engineers to provide advice to tenants on how to use their thermostats reduced energy consumption (although advice may have led to great energy efficiency – e.g. using the same amount of energy and achieving a warmer indoor temperature).

3. Information comparing people and businesses to their peers can drive some behaviour change

Evidence from the US Army Lend Lease billing scheme (presentation by Brian Dean, IEA), residential billing programmes in various jurisdictions (presentation by Guilia Gioffreda, OPower) and the non-residential NABERS scheme in Australia (presentation by Carlos Flores, NABERS Australia) pointed to some impact from information provision that compares a target audience with its peers.

Both the US Army and NABERS schemes used peer comparison at the same time as other measures (rewards and public disclosure respectively) and thus it is more difficult to attribute savings to one measure or another. OPower however, used pure peer comparisons, and showed small sustained savings of 1.5% to 2.5% in the US (suspected to be lower in other jurisdictions, owing to the lower consumption levels already achieved).

The savings generated by peer comparison are likely cost effective given the relatively low cost of this kind of intervention (at least in the OPower case). It would be interesting to see whether a more tailored peer comparison (OPower did not tailor comparisons to individual household or building characteristics) could generate higher savings at reasonable additional cost. The pilot work in Europe on energy classes for households (presentation by Corinna Fischer, Öko Institut) may provide some insight here.

4. Rewards can incentivise behaviour change but response will vary with context

Presentations focussing on North America (Laura Oleson, Canada; Maria Vargas, US; and Brian Dean, IEA) all showed positive effects from offering rewards (vouchers for stores; loyalty programme points) in return for energy savings.

While more standard subsidy programmes were not a core part of the behaviour workshop, it is worth noting that, in China, the USD2bn subsidy fund resulted in USD41bn of investment in energy efficient household appliances (presentation by Yang Liu, Harbin Institute of Technology, China / Ecole Polytechnique, France).

5. At programme level, a number of different tools are likely to be needed to achieve the best results

Many of the presentations at the workshop dealt with specific projects. The presentation on the Energy Star programme (Maria Vargas, US DoE) highlighted the need to combine measures to change behaviour; examples of measures include public commitments, individual and group incentives, testimonials, communication campaigns, online pledges, and specials offers from partners. Information alone is unlikely to change behaviour and a lot depends on the kind of information provided (message) and the delivery mechanism for the information (messenger).

The Energy Star presentation also highlighted the value of branding energy efficiency to achieve loyalty, quality control and trust, just as you might expect from other kinds of brands (clothing, food, services, etc.).

6. Energy consumption trends are embedded in both changing technology and changing practice

Elizabeth Shove highlighted how infrastructure influences society and energy consumption, for example sewage systems, water systems and transport systems. A number of participants also highlighted the importance of the product supply chain in influencing the technology choices available to consumers.

A number of participants emphasised how practices, e.g. what people do and when they do it influence energy consumption. In some societies, practices are highly synchronised. For example, in France, most people eat lunch sometime between 12:30 and 2 pm, in Sweden people cook dinner and watch TV around the same time, and in Japan, everyone turns off the lights and their computers when going to lunch. All of these synchronised social practices have an impact on energy consumption, and in particular on peak power demand.

New technologies change practices and social expectations around comfort (presentations from Albane Gaspard, Adème, France; and Kirsten Gram-Hansen, Aalborg University, Denmark). For example, a Danish study found that in old homes, where energy losses and bills were high, an indoor temperature of 19°c was often acceptable and the norm. It was then expected that 19°c would be the norm in new, efficient homes. However, given the opportunity to increase indoor temperature or to maintain 19°c and lower their energy bill, households living in new homes preferred a higher temperature. Fewer energy savings were thus achieved in new homes than expected.

While many changes in practice occur gradually, sudden changes can occur (e.g. around smoking and seat belts) and Alan Meier (Lawrence Berkley National Laboratory, US) raised evidence from Japan which showed that energy could be conserved through quite dramatic behaviour change if required, given the emergency situation following the Fukushima tsunami event. Evidence from Italy (presentation from Linda Cifolelli and Alessandro Federici, ENEA, Italy) suggested that habits could be changed (around the choice between taking the elevator or climbing stairs), at least for a period – further evaluation evidence on persistence is required before conclusions can be drawn.

7. The preferred communication medium: message and messenger aimed at improving energy efficiency varies with context and target audience

The workshop featured a session on information campaigns, and many of the other presenters also pointed to such interventions as part of their policy portfolios.

Media:

A number of different media were highlighted: television advertising (Poland); radio jingles (India); soap operas (Mexico); QR codes (Canada); face-to-face / community-based (US; UK; Finland); internet (RSA; US; Finland); and print media (Hungary; US; RSA; UK; France; Finland). The choice of medium reflected in many cases the characteristics of the target audience. In India, rural areas were most likely to be reached via radio, while in South Africa road shows and demonstration projects spread messages in areas without televisions. Mexico used soap opera stars to pass energy efficiency messages to viewers – many of whom are women and wield great influence over domestic energy use.

Message:

The message also varied with context. In South Africa, which suffers from energy shortages at peak times, messages appeared on the tv, asking for people to reduce energy consumption when a blackout was imminent. Similar schemes were in operation in Japan after the Fukushima tsunami and are being put in place in Brazil following the recent droughts (which have impacted on hydroelectric potential). In non-crisis situations, messages are often designed to show the wider, multiple benefits of energy efficiency, for example focussing on increases in disposable income (e.g. enabling Poles to take foreign holidays). There was general agreement that messages would be most successful if they appealed to the sorts of multiple benefits that motivated their target audiences (these could be economic, comfort, health, status, the environment).

The style of message also varied, but there was general consensus of the effectiveness of using humour allied with clear examples of practical things that people can do. Evaluations[1] show that campaigns are more effective if they convey saving energy as "cool, fun and feasible" rather than as "onerous tasks of self-deprivation".

A common theme (UK, France) was that the quality of messaging varied with face-to-face communication – not every energy adviser or boiler technician will have good people skills; this makes evaluation of outcomes more difficult to analyse.

Repetition of messaging was also highlighted by a number of participants (e.g. Finland, US, OPower) in order to ensure that some energy efficient behaviours persist, and that old norms are not fallen back into. Finding new ways to communicate messages to keep them fresh is a policy challenge in this context.

Target Audience

The Polish presentation (Aneta Ciszewska, Ministry of Economy, Poland) showed a television advertisement that used metaphors about waste in everyday life to highlight the energy waste that goes unnoticed in the home. Again, the target audience is important, and at times this might be people in the supply chain, as opposed to the end consumer. In Finland (see presentation by Irmeli Mikkonen, Motiva, Finland) energy labels were designed to highlight the technical aspects in order to appeal to the messengers – the young men selling the products.

Messenger

The messenger also varied, and was seen to be key. Well-known people were used in some cases, helping to draw attention to the message (the Prime Minister promoting Super Cool Biz in Japanese crisis situation; famous actors in Poland and Mexico). Where communication was done face-to-face, trusted messengers were chosen (boiler engineers in the UK).

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[1] Hummer J., J. Harris, R. Firestone and P. Thompson (2010), "The Time for (Behaviour) Change is Now, Applying Social Marketing Principles to Residential Energy Efficiency Programs,', International Energy Program Evaluation Conference, 10 June 2010, Paris.

In the non-domestic sector, the importance of the right energy champion was raised (presentation by Conor Clarke, Office of Public Works, Ireland), with his conclusion being that a champion should be not too senior (owing to time constraints) and not too junior (as need to bring senior colleagues along with the project). Other key communication channels needed to be made between finance and facilities / energy departments within businesses (presentations by Maria Vargas, US DoE; and Carlos Flores, NABERS, Australia).

Another theme that emerged from the messaging discussion related to the importance of key individuals in driving through change; this is a potentially limiting factor on the replicability and scalability of some projects.

8. Government, as a key purchaser of buildings services, can change market behaviour

Evidence from the NABERS scheme (presentation by Carlos Flores, NABERS, Australia) showed that the Government, as the largest single purchaser in the rental market, can drive up the standards prevalent in the market more widely. In India, the value of bulk buying LED light bulbs was highlighted, with technology costs to end-users being reduced by over 50%.

9. Small changes in systems / practice can have big impacts

The presentation on optimising power at work (Conor Clarke, Office of Public Works, Ireland) highlighted the impact of making a small change to office practice; in this case the organisation changed the "clocking on" system, whereby staff members did not need to log on to their computers to clock on. This put an end to the practice of leaving computers on all night in order to clock on as quickly as possible, saving a lot of energy.

10. Monitoring and evaluation is key to understanding the impacts of interventions and to improving outcomes

Many of the interventions presented had not been monitored or evaluated, making it difficult to draw conclusions about their success. Where monitoring and evaluation had taken place, much richer policy conclusions could be drawn (for example, see the presentations on Energy Star / Better Buildings by Maria Vargas, US DoE; on Optimising Power @ Work by Conor Clarke, Office of Public Works, Ireland; and on thermostat advice by Jeremy Vincent, DECC, UK). In the Irish case, monitoring and evaluation had enabled the "clocking on cause of wasted energy to be identified, and a policy change enacted.

Next Steps

The Energy Efficiency and Behaviour work stream is scheduled to continue through 2015 and 2016. The first workshop on buildings generated some interesting cross-cutting themes that warrant further attention. Potential work may emerge in the following areas:

- Evaluation – possibly working with a partner organisation such as IEPPEC to organise a workshop on evaluation and monitoring of the impacts of behavioural interventions.
- Modelling – possibly working with the IEA Implementing Agreements to find ways to better represent behaviour change and behavioural interventions in energy models.
- Webinars on emerging themes, for example on messaging, defaults or the interaction between technology and behaviour.

Annex 1: Workshop Agenda

Day 1: Wednesday 11 March 2015[2]		
TIME	**TOPIC**	**PRESENTERS**
Session 1. Opening session *This session will set the scene for the workshop and feature a presentation by a key emerging economy.* Moderator: Sara Bryan Pasquier, IEA		
9.00	Welcome	Didier Houssin, Director of Sustainable Energy Policy and Technology, IEA
	Opening presentation: Understanding consumption, efficiency and demand	Elizabeth Shove, DEMAND Centre, Lancaster University, UK
	Workshop goals	Sam Thomas, IEA
	Piloting energy efficiency and behaviour policies in Mexico	Santiago Creuheras Diaz, Director General of Energy Efficiency, Mexico
10.15-10.45 Coffee break		
Session 2. Experience across IEA and IPEEC[3] countries *In this session, a sample of IEA and IPEEC member countries will share experiences with a variety of innovative energy efficiency and behaviour initiatives.* Moderator: Melanie Slade, IEA		
10.45	Energy efficiency and behaviour in India	Shri Bhaskar J. Sarma, Secretary, Bureau of Energy Efficiency, India (TBC)
	Changing behavior to drive greater energy efficiency--Lessons from two US programs (ENERGY STAR and Better Buildings)	Maria Vargas, Department of Energy, USA
	Understanding consumer behaviour: Lessons from the subsidy policy for energy-efficient home appliances in China	Yang Liu, Harbin Institute of Technology, China, Ecole Polytechnique, France
	Maximizing Canada's energy advantage through social innovation	Laura Oleson, NRCAN, Canada
	Energy efficiency and behaviour in South Africa	Xolile Mabusela, Department of Energy, South Africa
	Promoting energy efficiency behaviour in Russia: monitoring, measures, outcomes	Olga Yudina, Ministry of Energy, Russia
13.00-14.00 Lunch		

[2] Sessions 1 and 2 are joint IEA / IPEEC sessions.
[3] IPEEC is the International Partnership for Energy Efficiency Cooperation

Session 3. Building-sector initiatives *Presenters in this session will share experiences with implementing energy efficiency and behaviour measures in the residential and commercial sectors.* Moderator: Brian Dean, IEA		
14.00	How NABERS ratings helped Australia achieve unprecedented energy savings in existing buildings	Carlos Flores, National Australian Built Environment Rating System, Australia
	Do energy efficient buildings make energy efficient everyday life? Reflections on striving to increase energy efficiency in Swedish buildings	Kajsa Ellegard, Linkoping University, Sweden
	Swiss Energy and Climate Policy regarding the Building sector: A cost-benefit analysis	Lukas Gutzwiller, BFE, Switzerland
15.30-16.00 Coffee break		
16.00	Case studies of achieving energy savings by applying lessons from behavioural sciences	Giulia Gioffreda, Head of Regulatory Affairs, OPower
	Energy classes for households? First results of a field trial.	Corinna Fischer, Senior Researcher, Oko-Institut, Germany
	What is the relevant support package for users in order to achieve energy savings (is information sufficient)? Illustration from smart meters and NZEB projects.	Albane Gaspard, ADEME, France
	Thailand energy efficiency	Chetapong Chiralerspong, Ministry of Energy, Thailand
17.30 Close		
19.30 Self-paying dinner at Le Suffren, 84 Avenue de Suffren, 75015 Paris		

Day 2: Thursday 12 March 2015		
9.00	Setting the stage for Day 2	Philippe Benoit, Head, Energy Efficiency and Environment, IEA
Session 4. Interacting with technologies *This session will examine the interaction between technologies and users.* Moderator: Sam Thomas, IEA		
9.05	When a lousy interface interferes with energy-saving behaviours	Alan Meier, Lawrence Berkeley Labs, USA
	User interaction with heating controls to improve energy efficiency in the UK	Jeremy Vincent, Customer Insight, Department of Energy Efficiency Deployment Office, UK
	How users and energy efficient buildings/technologies interact and what we can learn from this in a Danish context	Kirsten Gram-Hansen, Danish Building Research Institute, Denmark
10.30-11.00 Coffee break		
Session 5. Information campaigns *Presenters will share experience with designing, implementing and evaluating behaviour campaigns.* Moderator: Sara Bryan Pasquier, IEA		
11.00	The Finnish Recipe to Energy Efficiency	Irmeli Mikkonen, Motiva, Finland
	Information campaign in Hungary for cost effective renovation and less energy consumption	Ilona Soltész, Ministry for National Development, Hungary; Zoltan Kapros, Energy and Public Utility Regulatory Authority, Hungary
	Energy efficiency campaign in Poland – experience and lessons learned	Aneta Ciszewska, Ministry of Economy, Poland
	Energy efficiency survey: Understanding consumer behaviour	Bilal Düzgün, Turkey (TBC)
Session 6. Modelling behaviour *This session will examine how to better integrate occupant behaviour into building models.* Moderator: Brian Dean		
12.00	Occupant behavior simulation and definition in buildings	Yan Da, Tsinghua University, IEA DSM Annex 66
	Data driven modelling of behaviour for energy scenario analysis	Luis Munuera, IEA
13.00-14.00 Lunch		

Session 7. Public-sector initiatives *This session will examine replicability of public-sector energy efficiency and behaviour initiatives.* Moderator: Sam Thomas, IEA		
14.00	Residential utility billing program: U.S. Army & Lend Lease experiences in saving energy through behaviour	Brian Dean, IEA
	No Lift Days – Italian public sector initiative	Linda Cifolelli and Alessandro Federici, ENEA, Italy
	Optimising Power @ Work - A staff energy awareness campaign	Conor Clarke, Office of Public Works, Ireland
15.30-16.00 Coffee break		
Session 8. Lessons learned across countries *Presenters will provide lessons learned from international cooperation on energy efficiency and behaviour.* Moderator: Sara Bryan Pasquier		
16.00	European Union: Experiences of policies for behaviour change from the Concerted Action Energy Efficiency Directive	Anette Persson, CA EED Core Theme Leader, CT6 Consumer information programmes, certification and training of professionals
	Did you behave the way we intended you to? Monitoring and evaluating behaviour change	Ruth Mourik, IEA DSM Task 24, Closing the Loop
Conclusions and next steps Moderator: Sam Thomas, IEA		
17.30 Workshop Close		

Annex 2: Summary Record

DAY 1

Session 1 - Opening session

This session set the scene for the workshop and featured a presentation by a key emerging economy.

Speaker 1 - Didier Houssin introduced Day One's sessions which would first set out the task ahead then move on to residential, commercial and information campaigns aimed at promoting and enabling energy efficiency. He explained that the goal of the workshop was to facilitate methods that help make policy makers aware of the range of measures available to them and help them better identify opportunities for interventions. The workshop kicks off a two year programme of work that will culminate in 2016 with a report detailing policy recommendations for interested parties.

Speaker 2 - session 1 - Elizabeth Shove, DEMAND Centre, Lancaster University, UK
Understanding consumption, efficiency and demand

Elizabeth's simple proposition "What is energy for?" reminded us that people use energy as an outcome of other things. They do not just to use energy for the sake of it but to enable them to live their lives. This means that in order to recognise real opportunities for change there is a need to engage with the fundamental dynamics of daily life to find opportunities for efficiency. In modern life devices are a key part of this. When nationwide power was introduced through the national grid and there was surplus energy going untapped, demand was created through the invention of numerous powered devices that replaced more manual processes. Energy is always mediated through devices, devices that markets have been built on. This is an important point as any move to a more efficient future will inevitably lead to a loss for someone and this will create opposition.

Lighting uses fuel and the complexity of that fuel has increased over time. Candle light has given way to oil burning lamps which in turn gave way to increasingly sophisticated means of electric lighting. In some ways lighting has become more energy efficient but the means of device production have become increasingly complex. The development of technologies is constant and these can use energy (e.g. air-conditioning) or not (e.g. clothing). Energy efficiency should not only focus on the former but also better utilising the latter.

Energy helps accomplish many social practices. It helps us work better, rest longer and enjoy our leisure time to greater extent by enriching our environment. Each of these social practices has a meaning and history of their own and cannot be changed or discarded easily.

More efficient use of energy will require challenging established norms. Fanger's equation posits 22°C as a norm yet there is nothing natural about 22°C. In the 1970's, average room temperature was 13°C. Similarly food preservation behaviour has become more energy dependent over time. Houses used to have larders which have been replaced by fridge freezers. This has impacted building design as there is no longer a need for these cooler kitchen spaces.

Office work has become reliant on multi-screen, server based computing in offices that require (as standard) air-con, boilers, lifts, sprinklers, standby generators, water pumps etc. These are all

essential parts of a competitive office space that has its own market. Market standards are norms in themselves and are equally tricky to change.

Attitudes, Behaviours and Choices alone are not a good model for changing systems of practice. This is far too simple and Elizabeth suggests we need to look at:

The **Dynamics** of modern life
The **Infrastructure** we have become dependent on
The **Practises** that we have adopted
The **Regimes** we have created around these practices
The **Systems** that have evolved, and,
The **Transitions** required establishing these systems.

Currently the efficiency debate assumes the existence of freezers, offices, devices etc., but why? This might not allow enough scope for the necessary reductions in energy consumption. Currently the debate is too narrow. We need to engage with modern life in a radical way, we need to change the system of demand.

The "Cool Biz" campaign, where office staff were encouraged to dress less formerly (e.g. no necktie, wearing shorts) to allow air-conditioning to be turned down, questions at the right level. Addressing the social expectation can have a meaningful impact.

Barriers to policy are the excuse for the policies lack of impact - the policy never did work!!!
We need to ask:
Which demand practices are changing and how? - Who/what is driving up demand?
How is this playing out across different countries?
How does energy use relate to infrastructure and technologies? - how intrinsically are these linked and how dependent.
How do norms and needs evolve and how should they? Can they be steered?

Speaker 3 - Sam Thomas (IEA)

Sam spoke about using behaviour as a catch all term. We have a policy focus but we need to think about the whole system when we are looking for solutions. We need to show an interest in the long term trends in behaviour, the development of technology and devices and how to cater the policy landscape accordingly.

The motivation for our work should be more than just energy objectives. We should consider security, sustainability, climate change and macro-economic impacts.

He encouraged us to consider energy efficiency as the first fuel which moderates all others. Without energy efficiency developments consumption would be 40% higher than in the 70s. This shows that efficiency considerations present huge opportunities to tap economic potential in industry, power generation, transport and building design/use.

With that in mind the remaining presentations focus on the more immediate and showcase to policy makers the range of cost effective measures out there in order to exchange lessons learned and explore replicability/scalability.

Speaker 4 - session 1 - Santiago Creuheras Diaz, Director General of Energy Efficiency, Mexico
Piloting energy efficiency and behaviour policies in Mexico

Santiago introduced steps taken in Mexico to reduce energy consumption. Here energy use is split 26% residential - 47% industry, 17% SMEs with the remainder used on agriculture and public services.

The focus to date has been on lighting and appliances in the residential sector (to be rolled out into other sectors in time). The initiative is based on an energy efficiency exchange programme where old technologies are swapped for new more efficient alternatives. So far they have concentrated on lighting bulbs, air-conditioners and fridge-freezers. They have found the major barriers to change being lack of knowledge, little interest in such matters and a deficiency of technical/financial support.

Mexico has used various partners to help deliver the national programmes. One result worth noting was that following many of the exchange programmes, energy consumption is not reduced due to greater comfort/convenience. New fridges tend to be bigger so even though they are more efficient they use the same energy. Similarly efficient bulbs tend to be used in greater number so use the same net energy.

Incandescent bulbs were used as replacements for the national programme, not LED because of the quality of the electricity supply. It was also suggested that LEDs would be resold at profit.

Mexico is now looking at SME and public sector energy use for similar opportunities for programmes. They are currently working up a service for financing efficient devices and technologies such as air-con, lighting, fridges, efficient motors and substations where loans will be provided with subsidised interest rates. They are also using trace tools to measure the efficiency of municipalities transport, buildings, lighting, water/waste, power/heating & solid waste disposal.

Mexico have also used popular soap operas to push energy efficiency messages through the "Think, Act, Save" campaigns. Because of the cultural significance of soap operas in Mexico, actors from these shows have fronted a series of ads promoting efficient behaviours and practices.

The Mexican government are now working to produce various apps and brochures to complement these interventions and further inform the general public. Research work they are undertaking is looking at the roles men/women/children play in energy efficiency consideration and promotion. Different consumption habits present different opportunities and they intend to cater approaches accordingly.

Session 2 - Experience across IEA and IPEEC countries

In this session, a sample of IEA and IPEEC member countries shared experiences with a variety of innovative energy efficiency and behaviour initiatives.

Speaker 5 - session 2 -Shri Bhasker J. Sharma & Arijit Sengupta, Bureau of Energy Efficiency
Energy efficiency and behaviour in India

In India the Energy Conservation Act 2001 provides a framework of legislation and standards for energy efficiency promotion. Appliances require star labels detailing efficiency, they have an energy conservation building code, norms for industry consumption, programmes for demand side management and nation-wide certification for energy auditors.

Appliances must be labelled (4 types are currently mandated) such as fluorescent lamps, air-con units (leading to 20% increase in average Energy Efficiency rating between 2007 & 2013), frost free fridges (leading to 50% reduction in average kWh/l/yr. between 2007 & 2013) and distribution transformers. A further 12 common appliances are being brought into the scheme with others (in development stage) to follow. India has found mandating to be a hard yet effective lever resulting in a significant increase of energy efficient equipment.

The Energy Conservation Building Code governs the construction of new buildings through state by-laws and sets standards for materials used and architectural ability. The government provide training for architects and run demonstration projects of best practices.

An example of demand side management is a programme to facilitate market transformation for Lighting. 20% of India's energy consumption is accounted for by the lighting sector. A business based model providing initial investment for street and domestic lighting has been rolled out in 9 states. Old inefficient bulbs are replaced with LED bulbs and owing to the magnitude of the scheme and state buying power, LED bulbs can be bulk procured bringing the $7 price down to $3. If the estimated 30m street lights in the country are replaced (target 2020) this will yield savings of 2000 MW and $500m (to Municipalities) annually. If the estimated 770 million incandescent bulbs for household were replaced by LEDs, this would yield annual savings of 25 billion KWh (20,000 MW). The Domestic Efficient Lighting Programme (DELP) facilitates replacement by providing 2 LED bulbs to each household at the cost of incandescent bulb with additional costs recovered through energy savings from utility bills. Further initiatives include the provision of solar cooking units distributed through a large scale state programme and radio programmes promoting energy efficient tips using jingles. They have also created energy savers portal for schools and are driving star levelled appliances as a norm.

Industry norms are being created through mandated reductions in specific energy consumption (SEC) of Designated Consumers. 478 units in 8 sectors; have been assigned a target specific energy consumption to be achieved in 2014-15. Their efforts have been recognised through a National Energy Conservation Awards that has been running since 1999.

Speaker 6 - session 2 - Maria Vargas, US Department of Energy
Changing behavior to drive greater energy efficiency--Lessons from two US programs (ENERGY STAR and Better Buildings)

Maria spoke about two US initiatives - Energy Star and Better Buildings.

Energy Star sprang from a 1992 goal to reduce greenhouse gas emissions through win-win-win opportunities (state, business & consumer) to achieved 30% saving in buildings, homes & facilities. They first spent a long time understanding the market to determine what would get all parties on board - people, businesses and energy providers. They formulated a brand promise of cost effective energy efficiency with no trade off (and if more the bill reduction will pay for itself over a reasonable timeframe).

The Energy star specification changes with technological evolution meaning it is always top 20% efficient appliances. Applied to buildings they must be 20% more efficient than code standard.

They determined that the brand must deliver both functional benefits and an emotional connection. This made Energy Star an effective market player by appealing to both head and heart. Brand loyalty is the goal. This is achieved through raising **Awareness** making the brand **Relevant** leading to the brand gaining **Value** through recognised **Satisfaction** which creates **Loyalty**. The brand then influences purchasing behaviour which drives the market to value efficiency. The brand essentially makes it an easy decision for consumers to choose efficiency through facilitating fast thinking.

The initiative used three strategic elements; Branding; Product Marketing; and, Social Marketing. The latter stemmed from recognition that all politics are won at the local level through devolve campaigns, not just top down information dissemination. Examples are:

- a public commitment was made through an online pledge,
- incentives were created with special offers,
- norms were promoted through testimonials,
- effective communications were achieved through knowing and leveraging messengers that the audience deemed credible, and
- implementation was kick-started by making the brand easy to act on.

Lesson learned in delivering this initiative were:

1. Start with behaviour and work backwards to identify tactics
2. Combine tools to address complex behaviours
3. Make it easy for consumers to act
4. Involve people through targeting norms and eliciting commitment
5. Place messages close in time/space to action
6. Constantly evaluate

Energy efficiency must be easy. It’s not a salient issue with most people so don't assume they will put any effort in.

Better Buildings was launch in 2011 and aimed to make buildings 20% more efficient in 10 years. Providers worked with government and fed back solutions to common problems. They found it important to know your specific goal and in achieving this data matters as this is how you determine progress.

Look beyond technical solutions as they found half their achieved saving came from organisational and behavioural change. Employ champions and teams to drive success through people power and innovation. They will then constantly learn and teach driving evolution.

An example of how this worked in practice was when "Kohl's" encountered barriers to funding of energy efficiency projects. They created a partnership between the finance and energy teams leading them to become a market leader in building efficiency performance. Another example was when "Alcoa" gave employees better pay if they've contributed to energy efficiency which led to a massive upshot in innovative ideas for efficiency drives yielding significant impacts.

Speaker 7 - session 2 - Yang Liu, Harbin Institute of Technology, China, Ecole Polytechnique, France

Understanding consumer behaviour: Lessons from the subsidy policy for energy-efficient home appliances in China

Yang's focus was on lessons learned from a nationwide subsidy program for energy efficient home appliances and the quantifiable impacts of the policy.

The nationwide subsidy programme ran for one year between June 2012 and June 2013 and provided cash rebates (worth $2bn) promoting efficient TVs, refrigerators, air conditioners, washing machines and water heaters. Their research enabled them to determine what internal and external influencers drove target behaviours.
They decided on middle size cities as test beds and ran two data sites - one urban and one rural. There were 400 households in each sample both test and control (800 total). They divided their samples into homogenous subgroups based on per capita electricity consumption.

The policy objectives of China's government were partly achieved because of increased sales and market share of energy-efficient home appliances. However, results showed that if not well designed, the subsidy program can lead to an undesired increase in energy consumption. This is explained by homes increasing use of appliances for better comfort such as equipping themselves with two TVs rather than replacing.

In terms of efficient appliance buying behaviour, they found that income has an impact on how effective the subsidy is where the rich were less swayed by the small subsidy (Cash rebates ranging from US$16 to 64). Higher education contributes to higher income and leads to more electricity consumption; however the education level does not play a prominent role in the purchase decision of energy-efficient appliances.

The older generation use less energy due to consumer habits. The older rural population have a lower base consumption but change due to the subsidy accounts for a higher proportion of base consumption change. Prior energy-saving awareness leads to a more significant impact of the subsidy in the rural area than in the urban area. The middle class are more likely to be impacted by the subsidy policy, except for those in the distribution tails due to wealth or lack of scope for change (consumption).

In order to have an impact on buying behaviour without causing rebound through greater energy consumption, such programs need to be complemented with other measures such as disincentives on energy use as well as incentives for efficient appliances. These might take the form of increased energy prices or a carbon tax.

Speaker 8 - session 2 - Laura Oleson, NRCAN, Canada

Maximizing Canada's energy advantage through social innovation

Canada is realizing significant savings from energy efficiency policies. This in necessary as Canada is one of the highest per capita energy consumers in the world due to the cold climate and dispersed population. A five year mandate with programmes across all sectors is under way covering businesses, consumers and environment.

The focus is on social innovation where consumers and businesses are encouraged to make energy saving decisions and leverage partnerships for better efficiency. They are having the best results where interventions are stacked and have a multiplying effect. They suggest engaging everyone for solutions. An example of this comes from Ontario where their "Green Button" initiative is helping people find out their energy use making it more salient. Partnerships increase scope and willingness for others to get involved through mutual public commitment.

An example of a rewards based initiative is where Ontario piloted offering air miles to take energy efficient action which was very successful, although the promoted behaviour may have offset some of the effectiveness. It is hoped that this can be replaced with gym memberships and they are testing the persistence of this as participants are weaned off of air miles.

An efficiency label project "Energuide" has had success redesigning labels to make them easier to digest for consumers. They have also introduced policy benchmarking buildings energy efficiency and created an "Architectural and Design challenge" to encourage innovation in this space.

Speaker 9 - session 2 - Xolile Mabusela, Department of Energy, South Africa
Energy efficiency and behaviour in South Africa

Xolile outlined South Africa's strategic approach to energy efficiency at the policy level and showed how this feeds into various programmes of tax incentives, funds and subsidies leading to project or real action on the ground. The three tier system is a means to devolve power and action to the most effective level.

There was an overall focus on conservation and efficiency through various campaigns for implementation and quantifying impacts. The South African administration tries to understand energy use first through face-to-face dialogue, surveys and monitoring, before deciding on targets for intervention. They have engaged local government and energy providers as municipalities distribute energy at profit; therefore it is important to engage them first and gain their buy in. They increase energy cost as consumption increases and have also introduce time of use pricing to smooth peaks. They also use multiple media platforms for information campaigns (websites, social media, radio, television and print).

Active interventions being rolled out include the use of energy audits, a rebate scheme for solar water heaters (shown to reduce electricity bill by 30-50%) and residential mass roll out programmes for energy efficient bulbs, shower heads, air-conditioners and geyser blankets. Preference is given to mixed basket offers as opposed to single technology proposals.

Load shedding risks are minimised through information campaigns designed to reduce energy hungry appliance use during peak periods. This draws heavily on easy to understand infographics telling consumers what they can run at different energy levels, colour coded for ease of

understanding. This also facilitates the use of block tariffs allowing consumers to optimise their purchasing to their energy requirements.

Speaker 10 - session 2 - Olga Yudina, Ministry of Energy, Russia

Promoting energy efficiency behaviour in Russia: monitoring, measures, outcomes

In the 1940s strict state control was complemented with poster campaigns designed to save energy through promotion of efficient lighting and water heating behaviours.

More recently a legal framework introduced in 2008 set a goal to reduce energy intensity of the Russian economy by 40% by 2020. Federal laws followed in 2009 leading to state programs in 2010 and 2013 designed to improve efficiency through development. The three main aims of this are:

1. Creation of standards for efficiency and conservation at regional level and the private sector
2. All Russia competitions for efficiency projects/innovations
3. Organisation of International forums for efficiency promotion

Standards in the regions/private sector are geared to promote energy efficiency through promotion of key topics to targeted groups. Certain segments (e.g. businesses, students) are provided pertinent information through a range of channels (federal/regional forums) and events (e.g. ENES 2015 Exhibition).

The latest all Russian energy efficiency competition drew 400 projects from 67 regions and was reported on by 500 publications resulting in over 1m votes which helps to highlight the issues and devolve participatory actions. There are now 70 regions with policies designed to promote efficiency through various means such as demonstrations, media centres (videos, posters, articles etc.), regional forum/expos and competitions.

A recent public survey showed that of the 48% of households that actively monitored/controlled energy consumption, money saving (64%) was a more important driver of conservation than traditions (7%). Common opinions coming out of the survey were that society, not citizens are responsible for energy efficiency, that it is not effective to concentrate on individuals and efficient technology is expensive. Possible motivators of efficiency were: price (31%), benefit to future generations (30%), the establishment of fashionable trends for efficient living (26%) and a better understanding of one's personal contribution (22%). The latter (shaping fashions/way of life) is the long term goal of Russia's efficiency policy.

Session 3 - Building-sector initiatives

Presenters in this session shared experiences with implementing energy efficiency and behaviour measures in the residential and commercial sectors.

Speaker 11 - session 3 - Carlos Flores, National Australian Built Environment Rating System, Australia

How NABERS ratings helped Australia achieve unprecedented energy savings in existing buildings

The National Australian Built Environment Rating System (NABERS) is a commercial buildings programme in Australia focusing on energy efficiency in commercial premises (offices, shopping centres, hotels and data centres). Measurement is based on metered performance (how much energy) across comparable environments (fair comparisons) and there is an aim to be technologically neutral and not being too prescriptive in how efficiency is achieved.

Efficiency is rated in 1-6 stars, where 1 = poor, 3 = 3 average and 6 = market leader. This equates to roughly 1 star for 250 kg CO2/m2 through to 6 stars for 20 kg CO2/m2 and 60-70% of office space have been rated, generating lots of data on what works and what doesn't.

The drivers for this initiative are corporate social responsibility & various support initiatives covering a range of support available for low rated buildings and improvers. One of these initiatives is a Government Procurement Policy where procurement power is leveraged by requiring 4.5 stars minimum for access to contracts. The energy cost saving is not enough of an incentive for real change but occupancy income is hugely important. This helped grow the 4.5+ star share of the market from 8% in 2007 to 19% in 2010. Another initiative mandates disclosure of the NABERS energy rating in leases and sales making it relevant/salient and driving engagement with it. Within 4 years of mandating, 10% of 5+ stars turned to 27% and those below 4 stars dropped from 60% to 32%.

There was a rapid reduction in energy use following these initiatives resulting in a near 3.5% reduction per annum for nearly 8 years. This was achieved through a combination of building feature changes; building features decision making changes and general behavioural shift. An important finding was that the greatest results are achieved when you influence the FACILITY MANAGER as they control a large proportion of the demand.

The rating requires annual building visits and certification costs between AU$2,000 and AU$3,000, completed by independent assessors. The success was achieved by catering for a need of something which informs consumers quickly but when leasing more detail can be covered (as is necessary). A wider impact is achieved by the Naming and Shaming/Faming part of the equation because of the mandated star rating. Contact - Carlos.Flores@environment.nsw.gov.au who is happy to share a wealth of data.

Speaker 12 - session 3 - Lukas Gutzwiller, BFE, Switzerland

Swiss Energy and Climate Policy regarding the Building sector: A cost-benefit analysis

The Swiss Energy Strategy includes a target of 43% reduction of per capita consumption by 2035 (vs. 2000). Older buildings have massive scope for energy efficient modifications which is one of the biggest areas for CO2 emission reduction in Switzerland. Construction companies, architects and planning professionals have a key role in renovation decisions as mediators and trusted advisors. Renovation decisions are considered high risk by owners so it is important that these

intermediaries are well versed in the advantages of efficient technologies and techniques. This warrants targeted training schemes.

Further to this subsidies and tax deductions could help but only if linked to ambitious and specific efficiency criteria to deter use for non-energy saving renovations. Since 2008 a CO2 levy is charged on heating fuels which is redistributed to the population adding roughly 20% to the retail price. Heating bills are paid by the tenant so there is no incentive for landlords to refurbish their properties. To counter this Switzerland tried to better engage landlords through targeted incentives (monetary support for renovation). The idea was to trigger new investment, bring it forward or enhance planned refurbishments in terms of quality of quantity of home improvements. Although building refurbishments can lead to net increases in rent which make them less appealing to renters, they can be cost effective for landlords.

Why did the subsidy work? The targeted offer provides approx. 15% of the cost of roofing improvements and 5% of the costs for windows. These refurbishments can save 25% - 40% of heating costs making it appealing to renters although it can result in a high burden on the tenant through rental costs. To mitigate this some schemes in Australia cap the rise in rents against saving in energy bills.

They concluded that their approach would be replicable in other markets if there are a stable financing conditions and transparent rental law. There is also a need for monitoring and reporting to minimise free riders who misuse the service.

Speaker 13 - session 3 - Kajsa Ellegard, Linkoping University, Sweden
Do energy efficient buildings make energy efficient everyday life? Reflections on striving to increase energy efficiency in Swedish buildings

Kasja introduced innovative research that aimed to inform how housing companies can help meet 2020 energy efficiency targets by better understanding renovations markets and energy consumption habits. The latter will be of particular importance as systems move to less predictable renewable energy provision.

In construction and renovation Sweden is always trying to use the latest energy efficient materials and technologies (perhaps made more salient by the climate). It is also common for designers, manufacturers and associated professionals to get annoyed when technology is not used for maximum gain. However, users of the materials only find out about new technologies once they are released to the market and this can lead to them (initially at least) being used incorrectly. To counter this "knowledge time gap", manufacturers need to explain the technology better when it is released and has the optimum potential for efficiency gain. Efficient use of efficiency technology is important.

These technologies can improve efficiency by 20% or thereabouts, but is this enough? By better understanding peoples practices in the home, these efficiencies can be compounded when coupled with behavioural efficiencies. Kasja's research helps understand the reality of day-to-day activity in the home through detailed time diaries that inform assumptions regarding potential for energy efficiency and conservation.

On one side you have structural opportunity where the buildings are a heated space, populated with energy efficient goods and appliances, steered by laws, regulations and economic incentives. On the other the building is a heated home for people, to experience and enjoy life,

not to make profit, not to be regulated but to bring comfort. The former should not encroach on the latter but facilitate it in the most efficient way possible. People perform energy intensive activities when in the home creating peak demand. This will need to be levelled out if it is to be sustained with renewable generation (wind etc.) that is less predictable. There might also be opportunities to align rather than smooth peak demand where some renewables facilitate a day peak such as solar.

In 2010/11 3250 individuals in Sweden provided a week long detailed time series of energy use which was then broken down by type of activity (such as self-care, others care, household care, travel, prepare food, employed, reflection/recreation). Distributions of energy use by activity and demographic stratification allow insight to be drawn that can inform strategies. Data showing that women use more electricity than men on week days owing to more home presence suggests that opportunities for efficiency could be targeted accordingly. Other actionable data is recognisable such as younger people tend to cook and eat later in the day, men use more energy for computing than women and computer use is more evenly spread than TV use.

If product manufacturers and housing companies learn more about the agents, amount and timing of activities, they can better target opportunities for energy efficiency.

Speaker 14 - session 3 - Giulia Gioffreda, Head of Regulatory Affairs, OPower
Case studies of achieving energy savings by applying lessons from behavioural sciences

OPower work with 95+ utility companies, assisting them help consumers become more energy efficient. The challenge is to control energy affordability, security of supply and carbon emissions - the "tri-lemma". Initial work Schultz & Cialdini (San Markos study) tried to encourage energy conservation by university students by leaving messages to see what worked to get them to use their fans instead of their air-conditioners. Three didn't work (save money, save the planet, be a good citizen), one did - "your neighbour is doing this". This is the power of socialisation.
Further work show that to change consumer behaviour you should send them the right stuff (messages, prompts, services) at the right time. Try to make them personalised and salient to the customers concerns. A recent Accenture study claims that people attend to energy for (on average) 9 minutes per annum. Although it is hard to judge the robustness of this claim, the premise is one we can all relate to; people are less concerned with energy efficiency than we would have them be and their attention is a scarce resource.

A tool OPower helped build to gauge energy use against a self-committed target resulted in a 1.5-2.5% saving in US. Outside the US the impact was more like 1%. Although this is quite marginal change, these behavioural approaches can be rolled out to whole customer bases all at once, unlike some building/heating upgrades.

OPower's research includes 21000 surveys and interviews in 17 countries and shows striking similarities across borders. People are driven by loss aversion, timely prompts, social influence, public commitments, incentives and more intrinsic motivators. What they want from and believe of utilities companies is as follows:

1. Utilities companies are not meeting customer needs/expectations
2. Bills should be lower
3. Utilities companies should be primary source of energy information
4. Customers value personalised energy insight
5. Everyone want to know how they compare to others

People want information from providers first, independent sources second and then government last. Furthermore information alone is not the answer. It must be easily understandable. Digital engagement is growing and preferred, as are smart meters. Personalised tools to manage spend increase engagement and neighbour comparisons are hugely powerful, however, the wrong comparisons can aggravate and work counterproductively.

Speaker 15 - session 3 - Corinna Fischer, Senior Researcher, Oko-Institut, Germany
Energy classes for households? First results of a field trial

25% of energy consumption is by private households making this a prime segment for potential savings. A major barrier to influencing this segment is the low prestige of electricity saving meaning that it very rare for householders to set personal goals to become more energy efficient.

Field research supported by the Ministry of Research and Education, carried out between 2013 and 2016 (cost €577, 000) aims to create a unified energy efficiency class for households to use as a label, allow detailed comparisons and targeted goal setting.

The project moved from conceptualising (classification, branding, and optimisation) through discourse (stakeholder dialogue, trialling & surveys, analysis) and will result in management of targeted projects. Classification has provided a seven class scheme based on building type, occupancy and heating type which allows identification of potential saving/impact. The branding stage showed that all energy consumers (high & low) favoured; tailored advice/feedback; valued independent, competent advice; and, wouldn't appreciate "naming & shaming/faming".

Optimisation tried to tailor packages of measure to particular clusters of consumers but found no such clusters so instead developed a user tool for tailored advice. This was tested through dialogue and a trial with 50 household that were given access to this tailored advice (the excel tool & professional independent advisers), and their class. They were monitored through meter readings, online tools and final interviews due in May 2015. After receiving tailored advice a commitment is made to improve and this is facilitated by highly visual feedback reports showing where savings could be made.

Hard results will not be available until May 2015 but insight can be drawn already. Efficiency classes were well received but do require volunteered information. Excel and monitoring tools were also well received but do pose software compatibility problems. Tailored advice tools can be a good solution when unable to segment and symbolic reward carries little weight with the general public.

Speaker 16 - session 3 - Albane Gaspard, ADEME, France
What is the relevant support package for users in order to achieve energy savings (is information sufficient)? Illustration from smart meters and NZEB projects,

Efficiency policies are segmented into investment vs. lifestyle decisions and major vs. minor changes. What is useful to drive policy depends on the goal.

Minor investments regard product purchasing - LED bulbs.
Minor lifestyle changes regard habit formation - switching off appliances.
Major investments regard refurbishments - wall insulation.
Major lifestyle changes regard lifestyle choices - choosing flats over housing.

Smart meters were committed to in France in 2011 for electricity and 2014 for gas. 35m electricity meters will be rolled out from 2015 and 11m gas meters from 2016. It is hoped that all meters will be smart by 2022.

Various research projects and experiments have been commissioned to evaluate impacts (see slide 6). Examples are:

1. "Watt et moi" was a two year non-voluntary experiment on 235 households which found that most visited and 21% regularly used a web based portals to track energy use. 40% felt they had reduced their energy use but this wasn't apparent in the hard data.

2. "Afficheco" provided tablet based smart meters to 28 households. Over time the tool empowered the recipients but there was no significant saving. It was thought that this would come from supplementation with behaviour change intervention.

It was concluded from these studies that scaled roll out with impact is very hard given the necessary low per capita cost. Purely providing information does not guarantee saving and it is important to cultivate a "culture of energy" to engage the public and supplement with behaviour change initiatives. In the UK the fact that there is a bespoke device in the home may have greater impact through making the necessary behaviour change easier. The bespoke unit does make scaling a little harder though.

ADEME find there is always a scale vs impact trade off.

The NEZB project in France is focussing on a move to low carbon buildings. New builds will be guided by 2012 regulations whilst a main policy for existing stock will concentrate on refurbishment. It is important that low carbon buildings are used as intended. Examples of where they are not are where inhabitants plug vents, use fans or make additions post completion such as swimming pools. This shows that it is important to work with building users, managers and designers to optimise efficiency.

Speaker 17 - session 3 - Chetapong Chiralerspong, Ministry of Energy, Thailand
Thailand energy efficiency,

Chetapong explained the challenges in Thailand (economic growth, population growth, urban expansion & infrastructure) and broke down energy consumption by economic sector. He then introduced three initiatives to promote efficiency - Soft loans, Tax incentives and Direct subsidies.

Soft loans consisted of a revolving fund to stimulate investment in energy efficiency and normalise the provision of loans for these ends. By making energy efficiency profitable it becomes appealing to banks. This helps to leverage their influence and know how.

Tax incentives delivered through the revenue department provide a 25% tax credit for purchasing energy efficient products under certain conditions. The credit is only available to corporations (not consumers), subject to inclusion on an official list (DEDE) and available on submission of a purchasing receipt.

The Direct subsidies for energy efficiency program is a US$15m fund allocated to investment in 11 proven energy saving measures and new technologies on request. It is limited to a 20% subsidy of not more than US$3m.

DAY 2

Speaker 18 - Philippe Benoit introduced day two by reiterating that "behaviour does matter". Agencies like the World Bank used to be good at building infrastructure to solve problems but increasingly they are concentrating on people and institutional dynamics. This is not only a function of reduced budgets (where policies must be effective at low cost) but also due to the recognition of a wealth of possibility in this area.

Session 4 - Interacting with technologies

This session examined the interaction between technologies and users.

Speaker 19 - session 4 - Alan Meier, Lawrence Berkeley Labs, USA
When a lousy interface interferes with energy-saving behaviours

Lousy interfaces interfere with energy saving behaviours. This is particularly important when you consider that in the US the total energy controlled by thermostats is 9%. That is equivalent to all the nuclear power created in US, thusly it demands attention.

In 1995 Energy Star created a specific energy saving interface designed to make energy efficiency simple. In 2008 the specification was terminated as investigation found the programmable interface to be less efficient than a manual equivalent. The problem was poor usability. Of those households that had the interface installed, 50% had the programming features disabled and 20% didn't even have the correct time set. This shows that understanding the interactions between people and technologies is crucial to explaining behaviour. Energy star withdrew their endorsement until new controls had been created with markedly better usability.

In order to test new products entering the market Energy star needed a single measure of usability for all thermostats. Alan and his colleagues set out to develop a procedure to measure user-friendliness based on ease of completion of essential tasks. They used 5 different thermostats and got 31 participants to test two models each. Each user test consisted of 6 essential tasks.

One result was that 30% took over a minute to turn the thermostat from off to heat. This deters people from turning them off. There were however large discrepancies between models. The Ecobee web interface took approx. 10 seconds; Honeywell 25 seconds; Hunter 35 seconds; Ecobee smart unit took 70; and, the Lux model an average of 80 seconds for this basic task. Other tasks included setting the time and temperature and together the results created a usability score & rated market leaders (see slides for further details).

A second study introduced by Alan looked at Japan's 6 Gigawatt Lunch break. Following the creation of a real time electricity supply plot for Japan, a noon dip of 6 GW was identified during weekdays. It was determined that this was where staff were switching off equipment during their lunch break. This is a cultural norm that does not exist in the USA. It would useful to explore how this came about and what it entails.

Finally, Earth hour introduced as a coordinated effort to avoid electricity use for an hour had some measurable impact and could be expanded upon. Such symbolic actions could act as a foot in the door and form the basis for normalisation.

Speaker 20 - session 4 - Jeremy Vincent, Customer Insight, Department of Energy Efficiency Deployment Office, UK
User interaction with heating controls to improve energy efficiency in the UK

The DECC Energy Efficiency Strategy led to a review of heating controls where many in the UK still reside in the manual (dumb) thermostat world. Heating accounts for a substantial part of emissions. A quarter of UK energy use is domestic, of which 66% is space heating.

Following a run through of the major types of heating controls used in the UK (timers, thermostats & thermostatic valves) and their functions Jeremy explained the major issues with usability. Design and the location of controls can compound knowledge and usability barriers. Further more confusion around practices and mismatches between use and occupancy can lead to considerable inefficiency/waste.

A trial to test the impact of a trusted messenger providing heating control guidance was run in Newcastle. The 1398 achieved social housing population was divided into three arms; a control with no intervention, a trial with leaflet information only and a main intervention trialled on 160 homes where leaflet information was supported with face to face guidance from a tradesman (boiler engineer). The gas use was then measured for the following six months.

Qualitative enquiry did uncover an impact. The information only condition generally led the material being quickly discarded or ignored whereas advice provided by a tradesman was warmly received. These people generally talked about more sophisticated use of controls and claimed to have passed on advice to others. They also felt that they were saving money, although this was not backed up by quantifiable measures. It should be noted that the boiler engineers all had different styles and there was wide variation in delivery following their short training. The quantitative (gas use) measure showed no statistically significant difference. This could be explained by more efficient use of the same energy, given the perceived savings mentioned earlier. It is also possible that the sample size didn't allow for sufficient power to detect a change or that the social housing sector may have limited scope for saving (floor effect).

Turning to smarter heating controls, given their rapid uptake, DECC recognise that enquiry and evaluation here is needed. Some are designed to give more control, some are about giving you more convenience and some are about efficiency but the net effect is claimed by manufacturers to bring a 15-30% savings. Some even claim as high as 50% however the evidence is patchy. There is currently a lack of independent evidence due to unreasonable baselines (some used a base of heating always on) and simplistic assumptions regarding behavioural moderation (usability temperance). DECC are interested in both smart meters and smart controls and are currently trying to get the various providers to run RCT in a standardised way that allows cross market comparisons.

Speaker 21 - session 4 - Kirsten Gram-Hansen, Danish Building Research Institute, Denmark
How users and energy efficient buildings/technologies interact and what we can learn from this in a Danish context

There has not been much change in energy consumption in Denmark over the last 20 years. Modern day appliances are using half the energy they did but the total number is going up which is levelling out net energy use. In the heating sector also efficiencies are being made but people are using the same energy to heat more space, so again greater efficiency but similar

consumption levels. Another significant change is in socialisation. At present in Denmark 40% of households only hold 1 person.

A preliminary finding from an observation of 230,200 detached Danish houses found actual consumption to be a lot more homogenous across energy label ratings than theorised. Actual use is/was a lot higher than the lower band estimates and a lot lower at the upper band estimates (see slides for more detail – main report to follow in the summer). Another recent finding is that people adapt to the efficiency of the housing stock. As insulation efficiency goes down, energy use doesn't always follow but instead levels off. It doesn't track the modelled energy use.

The Danish Building Research Institute also looked at whether heat pumps are as efficient as the models will tell us. They found that in a sample of 138 heat pump owners 20% of the expected saving didn't materialise. People adjusted their comfort levels higher so that the assumed impact was reduced. In summer residences (N = 42) there was no saving at all due to much improved comfort taking. This showed that we cannot assume that technology will reduce use. It certainly will increase efficiency, but will not have the assumed conservational impacts. The presenter did suggest that installers of such measures might be useful messengers for setting norms and initiating practices in order to bolster conservational effects.

Practice theory and investigation can help us understand and change practices but there is not an established approach. It can be said however that practices are collective behaviours and they mediate between structures and actors, for example technology and people. They cover things like:
Habits – influenced through behaviour change
Technology and infrastructure – influenced through default settings and innovation
Rules – influenced through instructions and regulation
Engagement – influenced through campaigns and economic policies

It should be stressed here that energy consumption is not a practice! It is a by-product of everyday practices so advice needs to be mediated through the change of practices. These are structured by technologies, routines, engagements, rules and knowledge (see above for possible solutions).

Session 5 - Information campaigns

Presenters shared their experience designing, implementing and evaluating behaviour campaigns.

Speaker 22 - session 5 - Irmeli Mikkonen, Motiva, Finland
The Finnish Recipe to Energy Efficiency

Irmeli from Finland presented a recipe for Energy Efficiency.

Stakeholders
You first start with the stakeholders and the major players in Finland are; Municipalities; Energy companies; practitioners; NGOs; and, Government Ministries. Collaboration has been steadily improving and these stakeholders are increasingly more open and transparent in their dealings with each other and the public. There are many more ministerial working groups and communication channels (e.g. Climate Communication Group) which can facilitate joint projects. There is also much improved networking, campaigning and consultation with internal and external stakeholders in support of strategy development and implementation. This facilitates joint activities that benefit the whole system of production and consumption, supply and demand.

Measures and Tools
There is a real versatility in measures and tools used to deliver against these stakeholder' objectives. These include; technologies research; information campaigns through various communications channels; specific training and advice; regulation; economic incentives and instruments; and voluntary efficiency agreements.

Preparation
Collaboration helps everyone to speak each other's language and know their priorities. Better engagement also helps know consumer preferences (e.g. men are engaged by energy efficient technical features in goods, business workers engaged by tax reliefs) which guides the direction of priority campaigns.

Eco labelling and eco design are becoming more prevalent for consumer goods and demand has driven even greater scrutiny of wider processes and production chains.

Once good work is done it must be repeated again and again to become a practice, habit and culture. Campaigns must be regularly updated, not only to benefit from the latest information and technology, but to also ensure they do not become background noise. Seasonal reminders can also help to keep campaigns fresh whilst driving a message home. In Finland they pay close attention to the seasonal drivers of peak electricity (heating, cooling, and lighting) and campaign accordingly. They also have annual "Energy Awareness Week" that tries to reinforce their belief that energy efficiency should be a civic skill.

In short the influence mix should include the right ingredients (stakeholders) using the right tools in the right quantities (measures), prepared and served in a certain way (good collaboration and best practice).

Speaker 23 - session 5 - Ilona Soltész, Ministry for National Development, Hungary
Information campaign in Hungary for cost effective renovation and less energy consumption

Ilona, a civil servant presented three work streams designed to change consumer behaviour; an information campaign - Flatlabel; one called Eco Project and one targeting economical renovations through communications.

Flatlabel was a three year campaign started in 2008 when building regulations were introduced. The title is a word play on the need for energy efficiency certificates for dwellings (flats). The responsible ministry in Hungary partnered with banks and service companies to finance the initiative and the campaigns were run by NGOs. The goal was to familiarize or normalise the efficiency certification. The communications mix included brochures, local media appearance and conferences. Engagement was sought through participation in local festivals, face to face through advisory offices in five major towns and also through the use of an innovative web tool.

The Eco and Eco Plus Projects was a refurbishment of district heated flats which allowed the tenant control over their own heating and a means to measure consumption. More than 110,000 district heated flats in Hungary (56k in Budapest alone) were involved. The power to control heating level was given to tenants through the installation of radiator splitters with adjustable thermostats. The costs were split in half between the inhabitant and government. Consumption fell 20% in the first season and a further 5% in second season (25%) (unclear if RCT or annual comparison). The payback period for the project is four to six years. The government now has a goal to install heat splitting equipment into all radiators in similar blocks.

The Economical renovations project consisted of a brochure promoting cost optimal solutions for energy efficiency. The detailed technical leaflet promoted best practice for common renovations such as roof insulation, wall insulation and radiator installations. It also provides advice on how to consult experts, arrange works and make contracts. This was distributed through government offices and trade fairs and supported by a more detailed webbook version for those able to access.

Speaker 24 - session 5 - Aneta Ciszewska, Ministry of Economy, Poland
Energy efficiency campaign in Poland – experience and lessons learned

Aneta presented efficiency campaigns in Poland and shared the lessons they had learned through implementation. Poland's energy policy to 2030 is to develop the economy without increasing energy demand, whilst decreasing intensity to 2005 levels and hitting targets set through international agreement.

An agreed path to critical savings breaks down ways that GWh reductions can be accomplished through various hard and soft interventions. These include measures such as information campaigns and white certificate systems.

One of the information campaigns - 'Time to save energy'- consists of three brochures. The first is a guidebook for energy users containing tips on energy usage, conservation and labelling. The second is a guidebook for manufacturers and retailers on regulations and efficient equipment. The third is a colouring book for children and parents for efficiency education. This was supported by guidance for municipalities and multimedia campaign on TV and radio. They found that the TV ads were effective due to the use of salient themes (e.g. "you don't throw away a little cash after using a bank or tip a little petrol down the drain when filling up…why do it when you use energy").

A campaign to improve EU energy Labelling focussed on reducing the amount of text on the label whilst still providing the same information in a bid to make it easy and attractive for the consumer. This was accompanied by an introductory advert comparing white goods and explaining the various metrics on the labels. Energy efficiency campaigns by the Ministry of Environment also used adverts to encourage energy saving in homes. They found the best results were accomplished when they used humour to promote practices and efficiency labels. Another effective strategy was to link efficiency saving with a life experience such as a holiday, rather than focussing on the monetary saving.

The 'Energy Bus', a mobile education coach, was used to engage people with energy efficiency and increase social awareness of climate change. The bus goes around towns raising awareness of ways to save energy through practices and by comparing more/less efficient goods through demonstrations. The experts on board also offer free and independent knowledge on connected climate impacts.

Finally a survey on Poles Environment awareness found that between 2011 and 2014 there was a significant increase of both; energy efficient behaviours relating to campaigns; and, the purchasing of energy efficient appliances. Radiator moderation, a specific feature of one ad campaign, grew as a common behaviour from 0% to 30%. This result may have been buoyed by the famous actor used in the campaign (salient/trusted messenger). There was also a marked difference in those claiming to not save energy in any way – 11% down to 4%. Following this Poland has become very aware that no hard monitoring or evaluation is in place but are very keen to start.

Session 6 - Modelling behaviour

This session examined how to better integrate occupant behaviour into building models.

Speaker 25 - session 6 - Yan Da, Tsinghua University, IEA DSM Annex 66
Occupant behavior simulation and definition in buildings

Regarding occupant behaviour simulation and definition in buildings the literature shows huge diversity. Consumption can vary widely between individuals in the same building due to their behaviours and practices. Older occupants tend to consume much less energy than young people and there is significantly more saving opportunity to be had by focussing on high consumers.

Occupant behaviour is a key component of building energy efficiency through occupant activity and operational management. An example of this is that individual air conditioning uses much less energy than central chillers for buildings. This is due to the devolved control and a reduction in the cooling of uninhabited or infrequently used space.

It is also important to monitor real behaviour to moderate assumptions. In Hong Kong employees were encouraged to wear a tie to retain body heat so that the temperature in office could be decreased. However, internal heat gains led to a need for air-conditioned cooling through the winter which actually led to increased energy consumption.

There is currently a lack of consensus in evaluative techniques to monitor occupant behaviour and in-depth quantitative analysis, good experimental design and modelling simulations are badly needed. Ideally a consensus would allow international cooperation and data sharing.

Annex 66's current research target is to improve and integrate models. They are currently working with 24 countries and 69 institutions to centralise standards, classifications, definitions and measurement tools. Members cut across academia, research professionals and software design companies.

An example of one of the challenges is the better incorporation of psychological information into whole system modelling. It is essential to agree upon our understanding of the typical person and how this is distributed into a wider, richer segmentation to allow academic research to connect with policy making. This would facilitate the need to model occupancy & movement alongside actions & practices, tempered by cultural differences.

There is also a hope to use this data to study buildings interactions, which are the impact of people on buildings and the impact of buildings on people. Attempts so far have mainly focussed on the technological aspects as contributors are largely engineers. In the longer term it is important to determine where the demand is and where building capabilities should be developed for maximum efficiency. Models based on physical reality and mathematical simulation of this reality (action modelling) should increasingly allow for randomised simulation.

Speaker 26 - session 6 - Luis Munuera, IEA
Data driven modelling of behaviour for energy scenario analysis

Luis introduced IEA data driven modelling of behaviour for energy scenario analysis, focussing on where these could inform planning models and wider policy. He showed how the energy mix is

utilised by various sectors and for different uses at varying proportions (e.g. a lot of natural gas flows to space heating). This helps highlight why accurate behavioural modelling matters when considering the impact of differentials such as the rate of retrofits, heat grade and comfort preferences and uptake of untested low carbon solutions. Other reasons why behaviour matters mentioned are the age of building stock, physical constraints and the heterogeneity of stock, markets and technologies.

It is important to constantly improve energy planning tools given their centrality in policy support. Cost modelling is the classic way to model behaviour but it is critical to model non-cost behaviour. Typical modelling approaches tend to focus on the technical such as; building improvement modelling; Energy system modelling; time series consumption simulation; and, agent/activity based models. These can be complemented with key behavioural parameters such as; intangible costs (unknowns); high time preference for money (adoption rates); sensitivity analysis across social groups; purchasing behaviour; and, revealed vs stated preferences (loosely behaviour vs attitudes). New emerging big data sources such as NEED can help to know and not assume, model or ask about consumption behaviour. Further sources of real world data from trials and monitoring can also offer powerful insight.

Luis' work models 3 different approaches to behaviour, traditional (top down assumption), ABC and bottom up empirical (big data). It is possible to gain very different results from each so it is good to run all and draw on each to create the optimum solution. These include spatially explicit modelling (building simulations and the behaviour within), whole system modelling predicting intervention impact on each housing segment and impact on supply, empirical data and revealed preferences.

Session 7 - Public-sector initiatives

This session examined replicability of public-sector energy efficiency and behaviour initiatives.

Speaker 27 - session 7 - Brian Dean, IEA
Residential utility billing program: U.S. Army & Lend Lease experiences in saving energy through behaviour

The Residential Utility Billing Program is an initiative started in 1998 designed to impact the energy use of US army soldiers. The Department of Defence is the single largest energy user in the US but programs such as this are trying to change that.

Following the privatisation of homes for soldiers through lend leasing the DOD was challenged to achieve a 20% reduction in energy consumption through giving residents responsibility for their own monitoring and usage. All homes were metered for gas and electric. Inhabitants were then either sent; mock statements; or, details of usage where credits were provided for below average consumption and charges were applied for above average. Below average consumption led to the issuance of credits than could be used to exchange for goods called Synergy Rewards. Credits were also available for pro-efficiency behaviours such as energy audits and workshop attendance. This was an excellent test bed as army houses are highly homogenous with similar characteristics both in terms of the demographic mix and building characteristics. In the first year following detailed feedback on monthly energy usage live billing outperformed mock billing by 9% (energy saving) to 4%. The saving from live billing nudges grew to a 30%+ saving by year five that flattened out in year six.

BEMS (Building Energy Management System) is rolling out the Synergy initiative with all of their residents (currently 65% enrolled). They are also looking to extend influence further through incorporating real time feedback and providing 100% of thermostats pre-programmed. Using an in home dashboard residents can track usage and obtain an efficiency score compared to a community average. A simple colour system is used to communicate performance. This creates competition and leads to community level conversations. The distribution of credits, no action and additional charges is roughly 32%, 36% and 32% respectively.

There are now over 70,000 homes included in the scheme which have generated $60m in savings to date. See slides for further details and results data.

Speaker 28 - session 7 - Linda Cifolelli and Alessandro Federici, ENEA, Italy
No Lift Days – Italian public sector initiative

ENEA are an agency that provides research for energy policy making. This particular initiative was focussed on how to influence people's use of lifts through low cost awareness. The premise was that getting employees to use stairs more often combines energy saving with secondary health benefits. The trial attempted to evaluate the impacts of a communication approach designed to frame the preferred behaviour as a "pioneering challenge", one that gratified as well as benefitted. The effects were gauged by attempting to measure savings in energy, healthcare and CO2 emissions as well as trying to measure the personal health benefits of participant employees. The trial was carried out in ENEA's head office which did not lend itself to a control trial so energy use was monitored for two months before the trial commenced to compare to the trial period.

The intervention consisted of stickers and leaflets in lift areas and a motivational video shown to a subset of employees (160 out of 256) at the start of the trial period who were labelled as 'pioneers'. The video compared calories burned and kW used between stair walkers and lift takers, showing the stair walker to be the big winner. Every working day short clips were sent to staff showing the benefits of walking up the stairs. These also included the real time results of the trial from the monitoring campaigns. The cost of the initiative was estimated at 25,000 euro covering the video and approximately 10,000 emails being sent. A voluntary online survey was set up to gather information on attitudes and behaviours and energy use was hard monitored for the following two month campaign period. Health benefits were monitored through cardio metabolic and limb strength tests before and after the trial and also compared to a 'stairs only' subset of employees (N=40) undergoing an extended trial period of three months.

An administered questionnaire resulted in 300 responses showing very high satisfaction. People tended to enjoy the community spirit and feedback suggested that the stairs had become an alternative meeting place. The electricity monitoring showed a 27% energy saving (based on the energy used by four lifts) although it was not clear whether this included any seasonal effects. The team intend to follow up with measurement again in one year to see whether the changes are enduring. There were health improvements but these were negligible and non-significant in the main trial, however the 'stairs only' group did display significant improvements.

A lesson learned from the project was that the efficiency saving did not offset the cost of the initiative. To be worthwhile you would need to assume cost savings through scaling and a multiplier effect as norms change and generations educate future generations. The research team were unable (as yet) to quantify the benefits through reduced health spending although they are still trying and hope that this will identify a net cost saving.

Although the sample was biased, interested and highly energy aware (energy efficiency would likely be more salient to ENEA staff) it was felt that watching the video as a community created an instant new norm. In Italy 8% of energy used by lifts is in offices. There are 850,000 elevators, 40,000 of which are office based. This suggests that larger gains could be generated should office based norms translate to wider societal behaviour.

Speaker 29 - session 7 - Conor Clarke, Office of Public Works, Ireland
Optimising Power @ Work - A staff energy awareness campaign Optimising Power @ Work - A staff energy awareness campaign

The Office of Public Works manages government property and provides service and technical expertise on a day to day basis. Ownership is split 50/50 between the OPW and central government and occupying departments pay for maintenance and energy.

Ireland's National Energy Efficiency Action Plan is targeting 33% reduction public sector consumption by 2020 which is ambitious but achievable. Between 2000 and 2006 energy use data collection equipment was installed in all buildings. Following this a 2007 pilot study in 10 buildings consisting of intensive work with staff to squeeze savings led to a 19% saving. A larger campaign was commenced in 2008 through to 2010 and this was expanded further from 2010 onwards. The main focus of these campaigns was to **Switch off, switch off early** and **Identify Energy Wastage**.

Electricity accounts for 59% of energy consumption and 78% CO2 emissions. Performance was initially ranked as poor until it was recognised that 35% of energy use was at night and 20% was at the weekend. Most buildings used more than half their energy whilst unoccupied.

The 2008 - 2010 campaign covered 250 buildings. For this two service providers were appointed targeting a 15% reduction that resulted in an actual saving of 12%. For the post 2010 phase a target of 20% average and 15% minimum was set and those that achieved 20% were set an additional 5% reduction target.

Key elements to delivery of the programme are:

1. Technology - You need to be able to monitor use in real time. The 270 (14%) in test buildings which use 80% of all energy were fitted with specialist monitors.
2. Specialist resources - Worth providing experienced specialist who were found to save up to three times their cost.
3. Staff engagement - Gain senior management buy-in, appoint an energy officer, establish energy teams (interested staff, security, cleaning, IT rep), have a campaign launch, set targets and provide decent feedback to all

Staff engagement included; monthly energy team meeting and report, inter-building competitions, national awards, night audits, Building management System audits, Staff workshops/lectures/quiz and a web based portal for information. Having monitored level of engagement in each building they found that engagement level corresponded with the following level of energy saving:

Excellent engagement = 19% saving
Good engagement = 12% saving
Fair engagement = 2% saving
Those not participating = 11% increase

Against a 2007 benchmark average saving in 2009 was 13% remaining fairly stable around 16% until hitting 20% in 2014. Broken down that 20% is made up of 11% from electricity saving and 9% from heating fuel saving resulting in an annual cost saving of approx. 5m Euro per annum. These savings have been noticed by government and the scheme has been rolled out into the wider public sector including hospitals, prisons, universities, local authorities and technology institutes.

Session 8 - Lessons learned across countries

Presenters provided lessons learned from international cooperation on energy efficiency and behaviour.

Speaker 30 - session 8 - Anette Persson, CA EED Core Theme Leader, CT6 Consumer information programmes

European Union: Experiences of policies for behaviour change from the Concerted Action Energy Efficiency Directive

EU Energy Efficiency Directive (EED) is a concerted action by All EU members to exchange experience and best practice in eight main EED topics. Behaviour change fits into the directive through:

Article 10 - Billing Information - to be based on actual consumption, smart meter roll out and provision of complementary historical consumption information.

Article 17 - Information & Training - Providing information on efficiency mechanisms and transparent dissemination of financial and legal frameworks for all market actors.

Article 12 - Consumer Information & Empowering Programme - energy efficiency promotion with small energy & domestic customers with optional delivery mechanisms as follows:

1. Promotion of behaviour change through
    a. Fiscal incentives (currently 12 country examples)
    b. Access to finance, grants & subsidies (currently 17 country examples)
    c. Information provision (currently 22 country examples)
    d. Exemplary projects (currently 9 country examples)
    e. Workplace activities (currently 6 country examples)

2. Engaging consumers with smart meter roll out by
    a. Communicating easy, cost effective changes in energy use
    b. Providing information on energy efficient measures

The EED have explored the following behaviour change topics and for best practice examples see slide 9.

- Design measures for behaviour change
- Consumer engagement & smart meters
- Soft measures
- Increasing trust in providers
- Policies and strategies to promote behaviour change
- Scaling up energy efficient behaviour change
- Tools for SMEs
- Customising knowledge transfer

Barriers to energy efficiency identified are lack of awareness, lack of interest, funding, lack of targeted measures, imbalance between national and local action, no incentives in price and difficulty evaluating interventions.

There is a real need for; deep insight into consumers; simple actionable communication; better segmentation for targeted action, ways to increase interest; and, engagement that doesn't

leverage guilt. See slide 12 for ways to counteract these, in particular when communicating with SMEs.

Key findings on behaviour change design are; identify multiple benefits (health, wellbeing, convenience etc.); recognise and consider the social context; draw on several schools of thought (economics, psychology, sociology etc.), motivation and sustainability are imperative, good planning is crucial; and, draw on the wealth of design tools available.

Evaluation of soft measures such as information campaigns and advisory services is a major challenge, as opposed to money or power use saving. It is however important that measures other than kWh is included in an evaluation. The evaluation should be an integral part of a measure and treated as a learning opportunity. Considerations for the roll out of smart meters are included in slide 16.

In summary always identify the main drivers of change which are more often related to convenience, safety, health, social status and environmental concern rather than cash or energy saving. Pay more attention to opportunities with SMEs and organisations and draw on behaviour change expertise from other fields such as health and road safety.

Speaker 31 - session 8 - Ruth Mourik, IEA DSM Task 24, Closing the Loop
Did you behave the way we intended you to? Monitoring and evaluating behaviour change

The IEA through Task 24 are working on answering the question "Do people behave in the hypothesised way?" Their focus is on behaviour change initiatives and programmes and they are attempting to bridge the gaps between policy making, academia and behaviour change practitioners. Across these stakeholder groups they currently have 220 experts from 21 countries committed to improving the application of behavioural theory, practice and appraisal.

Their target audience are predominantly all those attempting to design behaviour change interventions and they hope to support this target audience by providing tools, techniques and expertise to this community. Current work streams include:
1 - 60 case studies in various BC interventions looking at techniques and evaluation methods
2 - In depth analysis in specific challenges (e.g. buildings, transport, SMEs, smart metering)
3 - Evaluation tools for stakeholders
4 - Dissemination through country specific recommendations and advice
5 - An expert platform accessible through social media

Planned outputs under work stream 3; Monitoring and Evaluation tool for stakeholders include two reports and a factsheet;
The "What do we know about what we know?" report will review behaviour based energy efficiency data collection;
The "Did you behave as we designed you to?" positioning paper will give an overview of monitoring and evaluating demand side behaviour change; and,
The "I think I know" fact sheets will focus on specific demand side management themes.

There is a clear mandate (House of Lords, 2011) for establishing the effectiveness and value for money of behaviour change policies and also an opportunity to improve their impact at the population level. There is also growing interest in behaviour change endurance and longer term individual/societal benefits.

Task 24 see the big challenge being moving away from short termism and looking at longer term societal benefits. Most evaluations stem from psychology or economics and are appraised on simple forms of primary impact measurement. A more sociological approach should factor in multiple benefits (secondary and tertiary benefits/impacts) and longer term impacts.
Current barriers to this approach are a need for appropriate baseline measures, lack of attention paid to social considerations and a reluctance to consider proper evaluation at the design stage of policies. There is currently too much focus on the implementation stage and not enough end user consideration. Monitoring is too often based on modelling or irrelevant proxies and devoid of feedback loops (single & double) for improvement. Conventional measurement may well be missing wider benefits of interventions (e.g. health, comfort, convenience) and sociological interventions would benefit from wider forms of monitoring and evaluation (e.g. multidisciplinary, qualitative, iterative etc.).

Task 24 are proposing greater use of double loop learning; creating a culture where practitioners and policy makers feedback to the strategy as well as those governing the actions resultant of strategy. See slide 11 for a list of proposed metrics that might facilitate a universal approach to single and double loop learning.

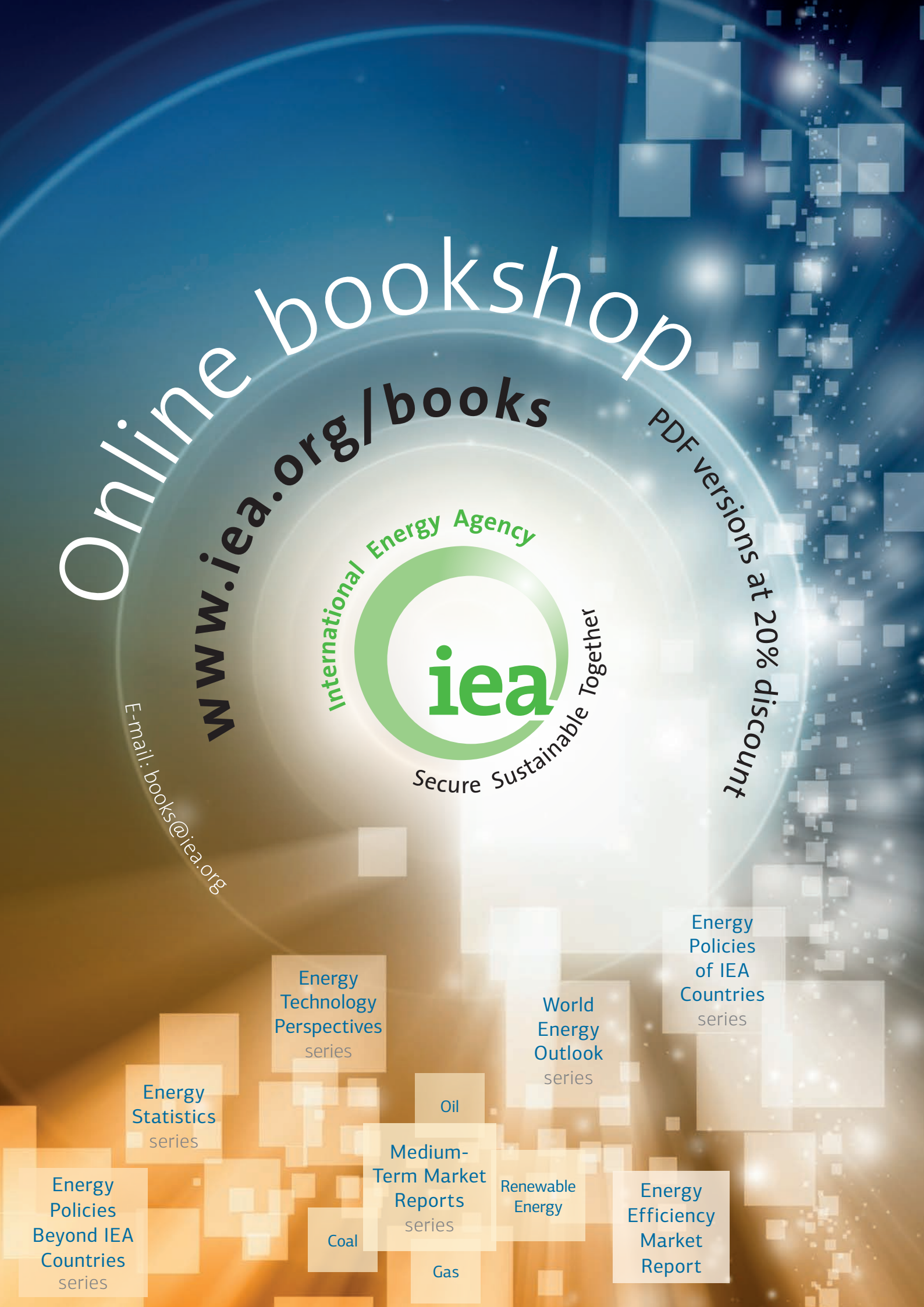
Following this tranche of work an extension of Task 24 work streams will include:
6 - The Issues - Understanding behaviour change practices in demand side management
7 - The People - Identifying behaviour change practitioners in these areas
8 - The Tools - Developing a toolbox for said practitioners
9 - The Measure - Standardising evaluation beyond kWh
10 - The Story - Bringing this together in an overarching narrative

Speaker 32 - Sam Thomas (IEA)
Rounding up Sam Thomas highlighted that the effectiveness of information based approaches are determined by the level of penetration achieved. Personalisation can help to make important messages salient and the use of tools such as smart meters can help translate big data into targeted and relatable metrics for consumers. Peer pressure and public commitment are clearly important in translating campaigns into behaviours and for maximum impact it is essential that messengers be trusted. It also helps if messages can be delivered in a humorous to make them attractive and persistently to create traction.

The test bed used is very important in order to allow robust comparison of interventions and also when considering the ease with which pilots can be replicated and scaled up. Impacts can and should be measured as directly as possible, but the impact of secondary benefits and detriments should always be considered, as should the caveats attached to proxy measures.

The modelling of systems can increasingly benefit from the integration of behavioural observations and computing power is helping us integrate much improved assumptions based on the best evidence. We should also try to consider practices as distinct to behaviours as this allows for a more sophisticated understanding of systemic barriers to policy implementation. Devolution can also work to these ends by providing agency to those best placed to consider the relevant detail.

Finally it has been estimated that on average a person is subject to between 1200 and 1500 messages per day. The vast majority of these (95%) compel the recipient to consume more. This shows just how important it is not to consider interventions in a vacuum.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