



Safer, Stronger, Smarter Networks

Role of customers and their potential benefits in Smart Grids

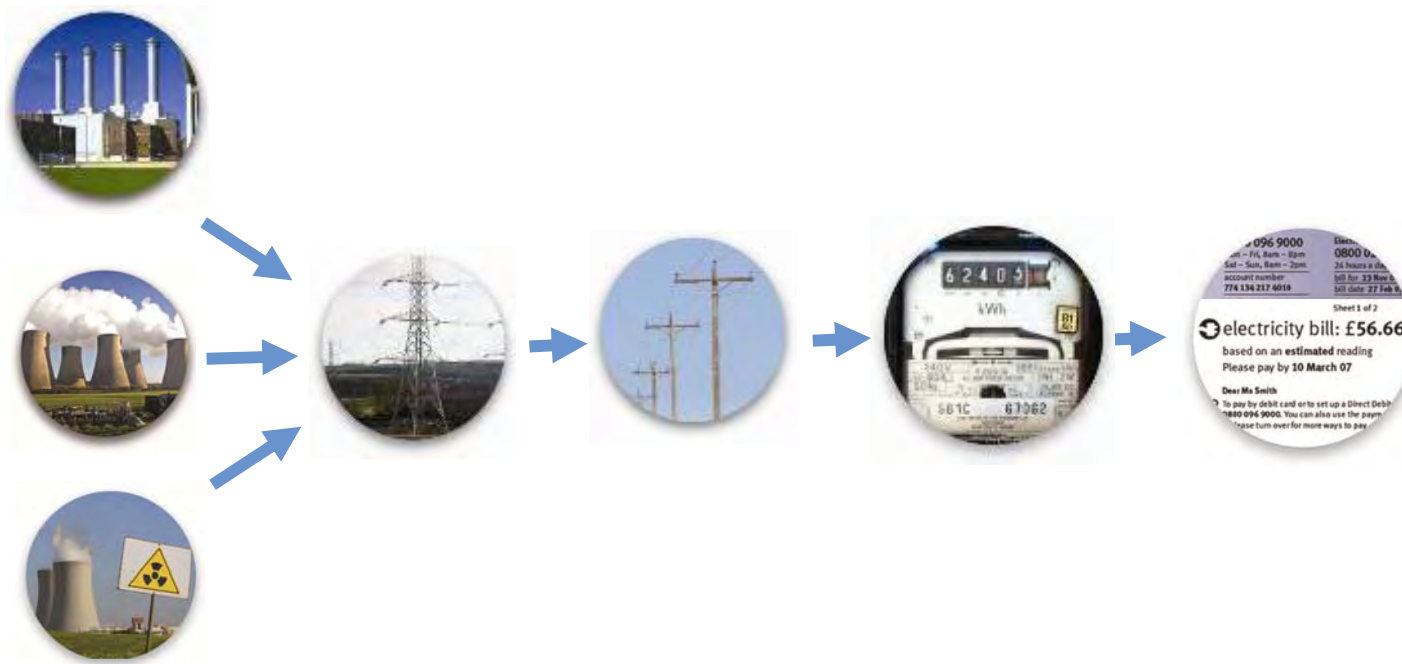
Results from Task 23 of the IEA Demand Side Management Programme

Linda Hull, Senior Consultant, EA Technology

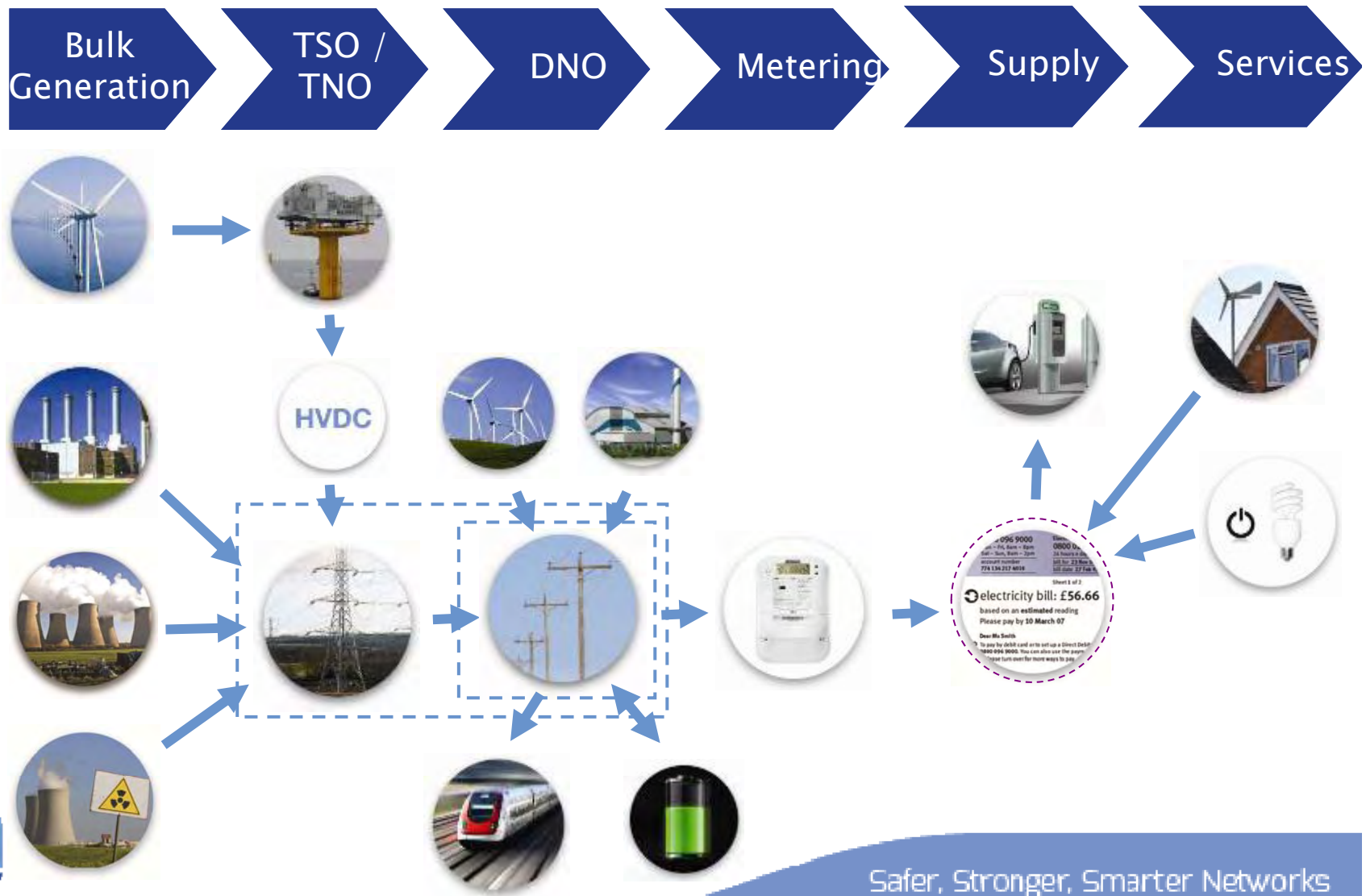


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Electricity networks - for the first 100 years

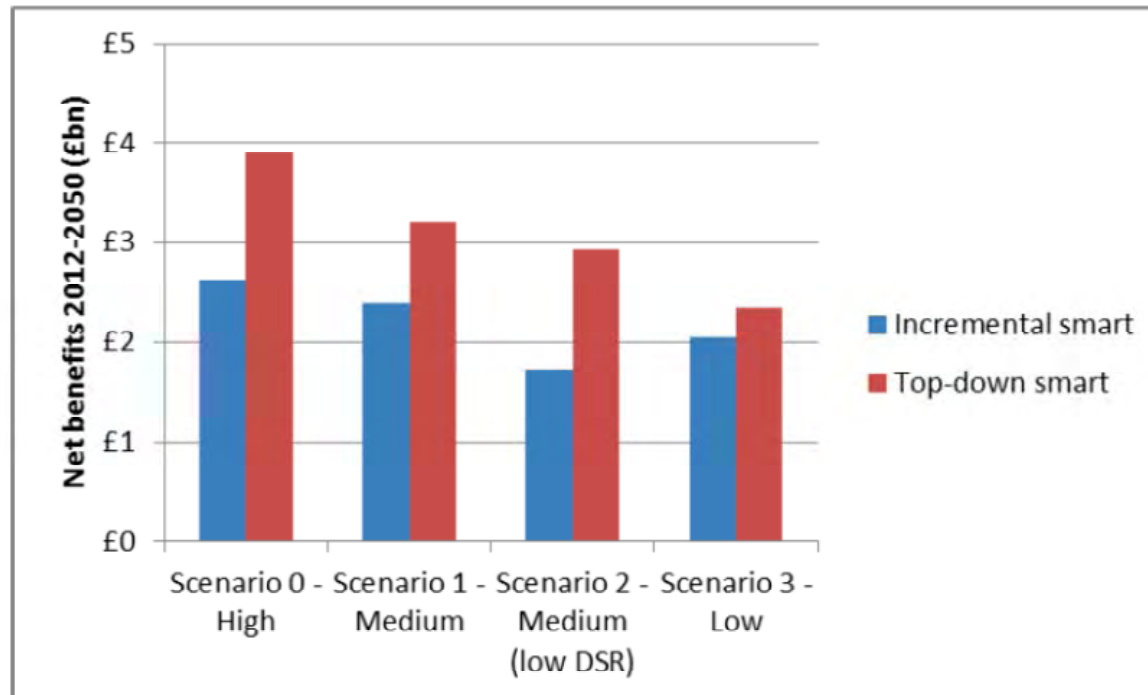


Smart Grids

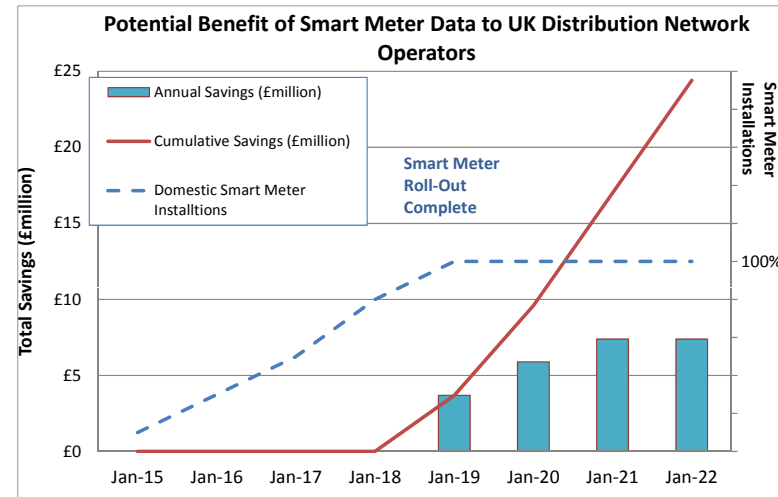
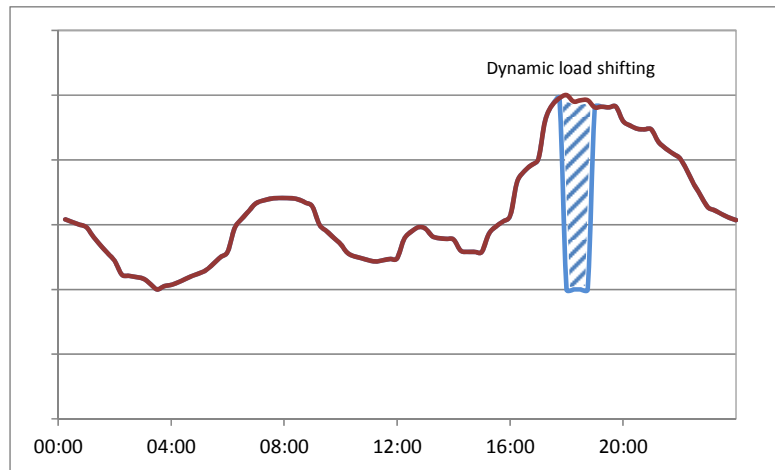
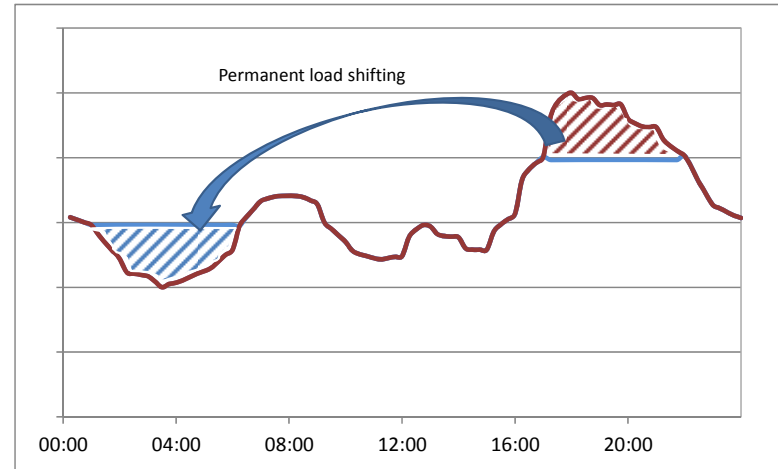
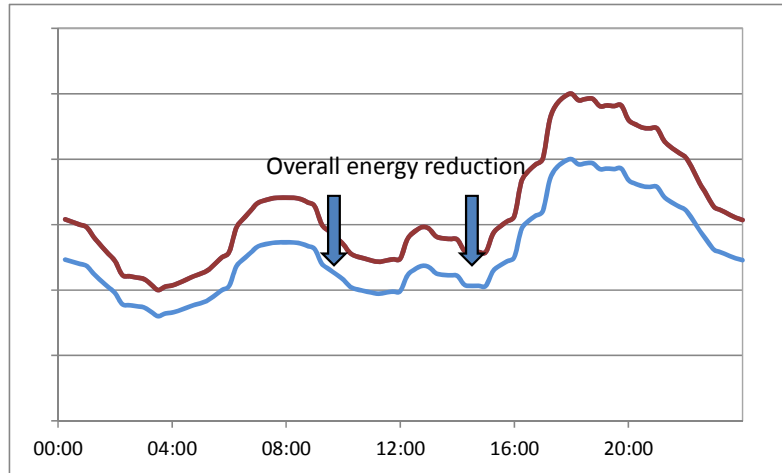


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Are Smart Grids needed?



What is the role of customers?



What are the potential benefits for consumers who 'actively engage' in Smart Grids?

Category	Units
Money	€, \$, £
Other reward/incentive	Loyalty points
Time / convenience	Minutes, hours saved
Comfort	°C of under/over heating avoided
Environmental	Kg CO ₂ /year
Safety	?

Task 23



Aim

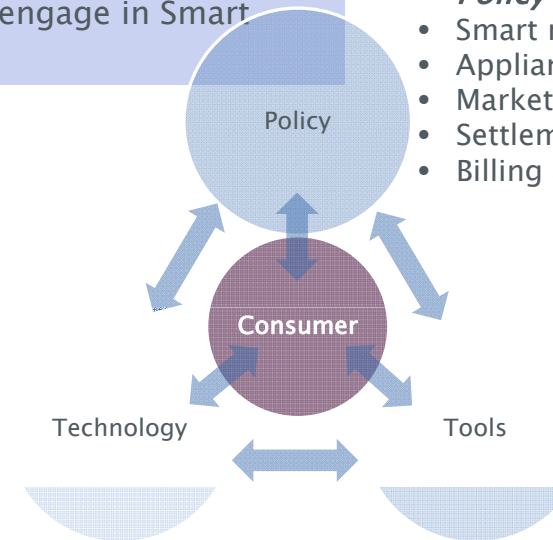
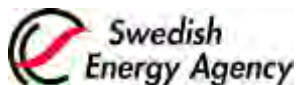
To draw together international experiences in order to provide guidance on how to ensure the demand side become an integral component of a successful Smart Grid.

Scope

To explore Smart Grid related policies, technologies and tools from the perspective of the consumer (specifically households and small businesses) in order to gain a better understanding of the impact on consumer willingness and ability to engage in Smart Grids.

- Policy Examples:**
- Smart meter roll out
 - Appliance standards
 - Market structure
 - Settlement arrangements
 - Billing arrangements

The partners

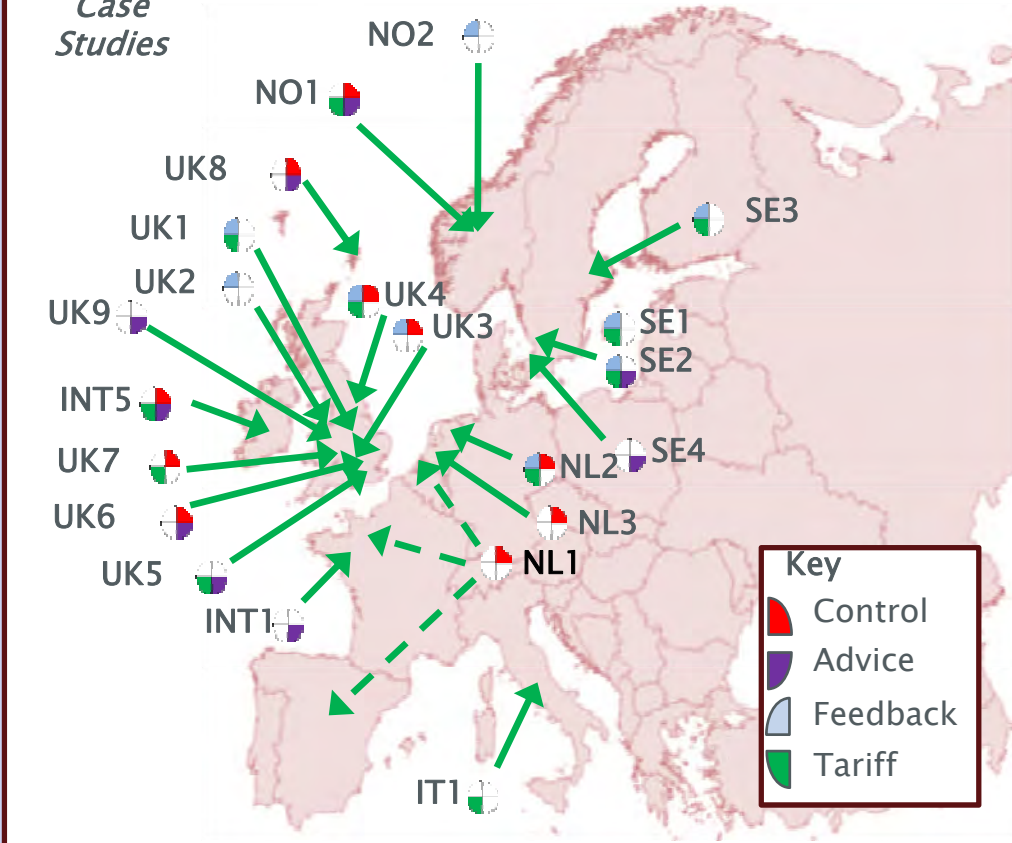


- Technology Examples:**
- Smart meter
 - In-home display
 - Smart appliances
 - Remote / auto control

- Tools Examples:**
- Time of Use Tariff
 - Energy services
 - Demand aggregation
 - Energy advice

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Case Studies



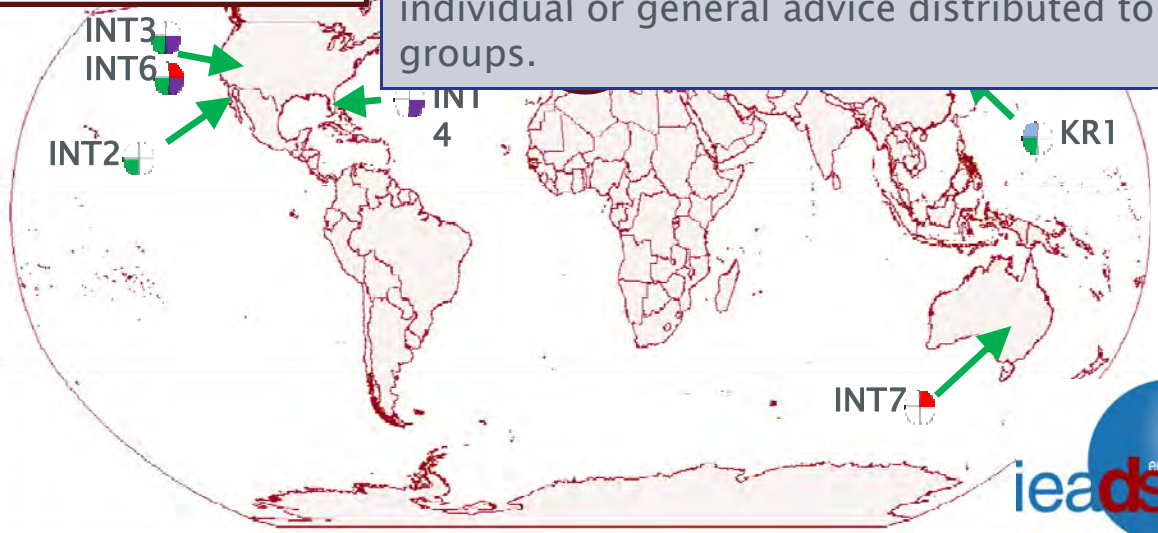
Any Tariff or pricing incentive to reward consumers that change their pattern of demand. This includes static Time of Use tariffs, Critical Peak Pricing, Peak Time Rebates and Real Time Pricing.

Controls to actively manage demand, including direct/automatic load control, home/building energy management systems, smart thermostats.

Feedback of energy end use information relying on data collected from the smart meter. Includes in-home displays, web based feedback, billing information and feedback via mobile devices such as phones and tablets.

Advice to help consumers deliver outcomes that support the effective delivery of Smart Grids, including advice targeted to an individual or general advice distributed to groups.

23 Case Studies from around the world were used to explore consumer experiences with one or more Smart Grid related interventions.



Review of consumer attitudes



22 Consumer Surveys were reviewed to explore consumer attitudes to Smart Grids related initiatives

The views and opinions were wide-ranging

Some consumers are sceptical and lack trust

There is a lot of misunderstanding about why industry stakeholders are developing smart grids and why consumers should engage

Some consumers say they would not participate under any circumstances

The level of payment required varies, but in many cases it is not unreasonable

Once the drivers for Smart Grid are understood, some consumers say they would be willing to participate

Many consumers say they would participate in return for a financial payment

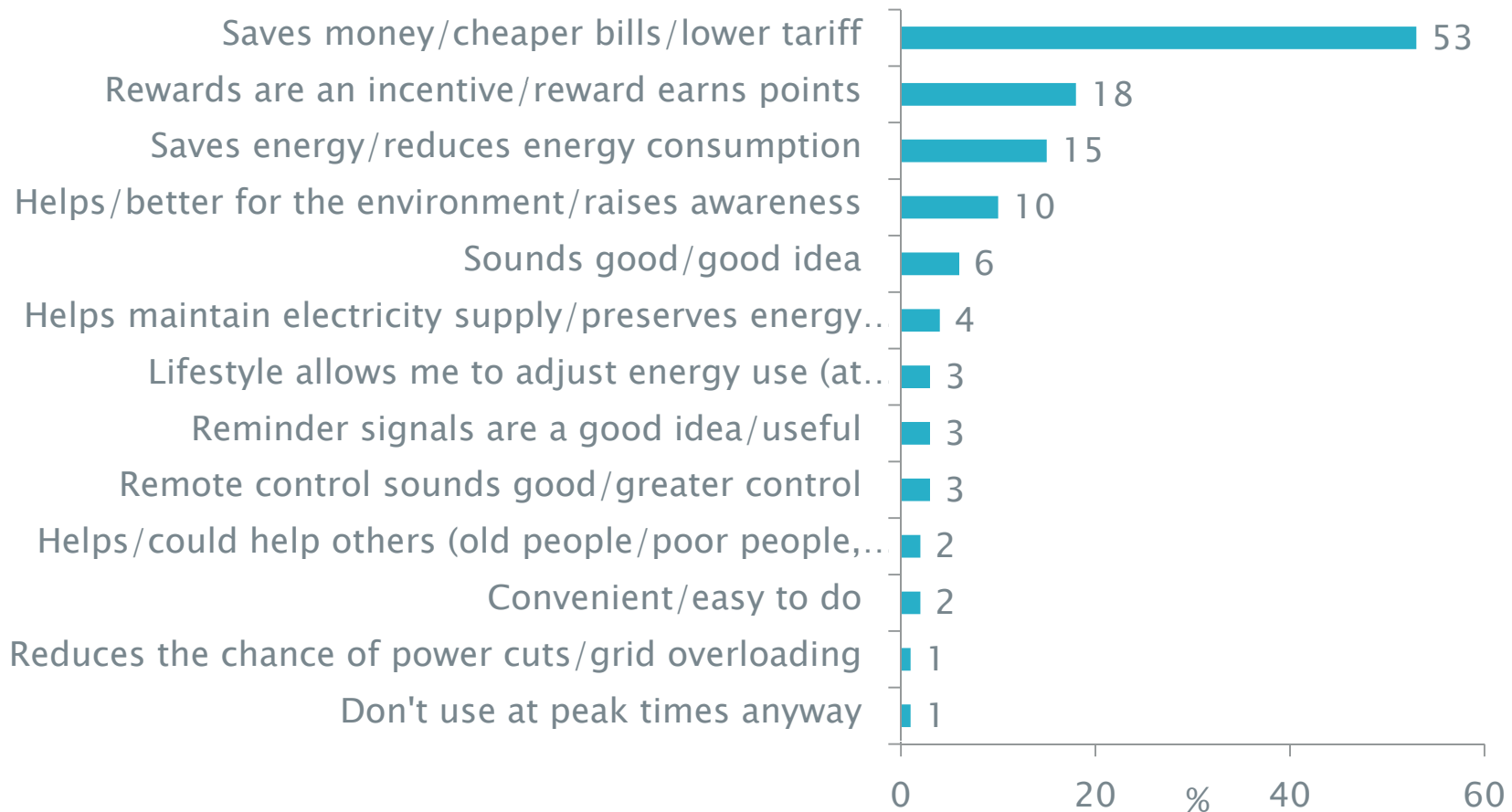


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Market Research on DSR Attitudes

- Main Attractions (Unprompted)

- Saving money (through cheaper rates and/or overall reduced consumption) is a key aspect... alongside any specific incentive/reward scheme



Base: Respondents who are very/fairly interested in the DSR concept (877)

Malvik, Norway

Demand Response Trial

- 1 year Demand response trial (2007)
 - Smart metering
 - Remote control
 - Time variable grid tariff
 - Hourly spot energy price
- Results
 - Significant load shifting
 - Customers mainly motivated by economic savings
 - but electricity savings were also important



Source: Sæle and Grande (2011)



Fig. 8. Load profile for a household customer with hot water space heating system and RLC [13].

Mandatory roll-out of time of use tariffs Italy

- Introduced in July 2010
 - Peak rates: 8am to 7pm
 - Price differential between peak/off peak increased January 2012
 - Study to look at impact of tariff on consumption
 - 28,000 consumers
 - Results
 - Over half the population (~60%) shifted consumption from the peak to the off-peak
- But
- The remaining consumers, shifted consumption in the opposite direction

Overall result



Customers generally say they want a financial benefit from Smart Grids .. but

The traditional approach to predicting whether a consumer will do something is to use a neo-classical economic model

- If $Y > X$ then option will be selected
- If $Y < X$ then option won't be selected

Where:

- Y = benefits to the customer (£)
- X = cost to the customer (£)

BUT: ensuring that consumers receive a financial incentive is not sufficient to secure 'take-up'

MY ELECTRIC AVENUE



EA Technology / Scottish and Southern Energy Power Distribution

- Development of a low cost Electric Vehicle charging system
 - avoiding network 'stress'
- Trial requirement for 100 participants
 - in 10 clusters




Thinking Energy Trial

EON /Milton Keynes Council

- Launched in 2011
- Initially 3 year research demonstration
 - Extended by 1 year
- 75 households
- Development and evaluate of innovative ways of managing energy use in the home
- Initial results:
 - Consumers value ability to remotely control appliances and comfort levels within their homes



The key findings (top five)

1	The impact of electricity markets on consumer engagement in Smart Grid activities is wide ranging and often poorly understood.	There is rarely a one size fits all solution, with many elements of electricity markets representing both facilitators and barriers to participation.	
2	Very little information is currently available on customer attitudes and experiences towards Smart Grids.	Most of the published data focusses on measuring outcomes, with little data available to help with understanding what works and for whom it works.	
3	Information collated from consumer surveys shows that consumers <i>say</i> they want a financial reward in return for actively engaging in Smart Grids.	Evidence from trials shows that there are many reasons that lead to consumers <i>not</i> engaging in Smart Grids.	
4	An assessment of readiness levels shows that whilst significant progress has been made on the development of technologies, the market is not yet 'ready' to accept them. This is referred to as 'crossing the chasm' that exists between early adopters and the early majority.	Early adopters see new technology as a way to "beat the herd" and reap the advantages of the new technology/ practice before it becomes common practice.	 <p>The early majority, however, are hesitant to new technology, and choose to sit on the fence until it is proven.</p>
5	Neo-classical economic analysis is not sufficient to predict whether or not a consumer will undertake a specific action.	Ensuring that the benefits outweigh any costs does not guarantee energy behaviour change takes place. Non-financial influences are as important, if not more so.	



Thankyou

For further information

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