IEA DSM Task 23

Task Status Report / Final Report

Project Overview

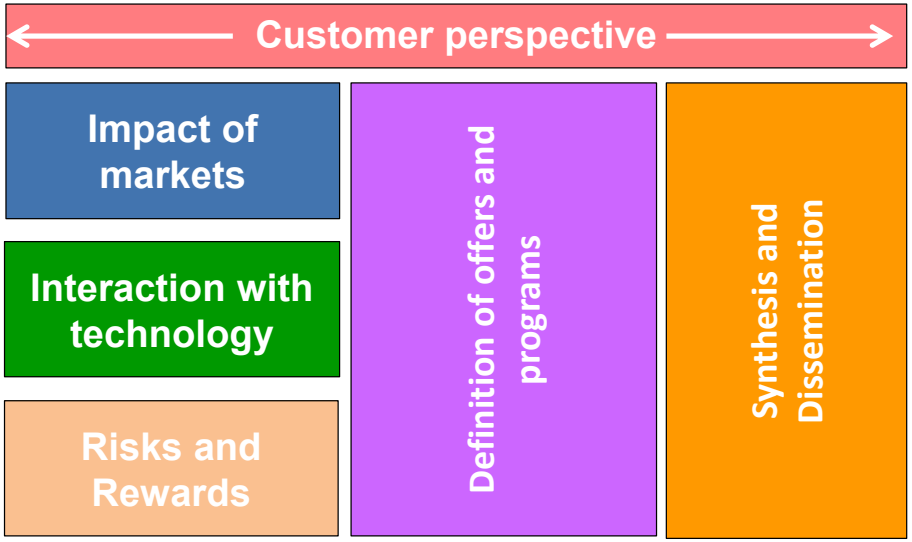
Aim

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

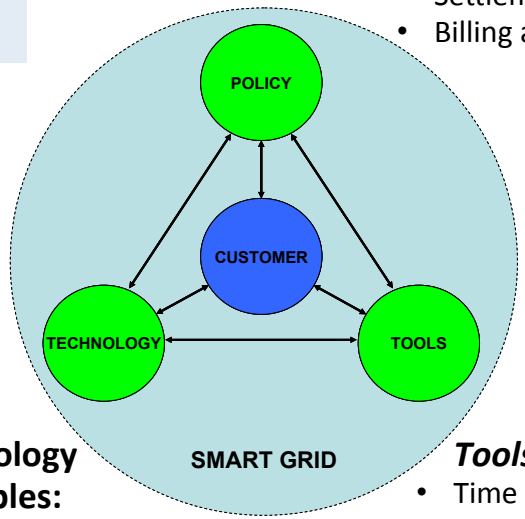
To explore Smart Grid related policies, technologies and tools from the perspective of the consumer (specifically households and small businesses) in order to gain a better understanding of the impact on consumer willingness and ability to engage in Smart Grids.

Work Programme



Policy Examples:

- Smart meter roll out
- Appliance standards
- Market structure
- Settlement arrangements
- Billing arrangements



Technology Examples:

- Smart meter
- In-home display
- Smart appliances
- Remote / auto control

Tools Examples:

- Time of Use Tariff
- Energy services
- Demand aggregation
- Energy advice

Participants

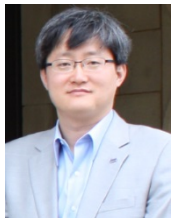
A multi-national project with partners from five countries

Operating Agent

Linda Hull
(EA Technology)

Yvonne Boerakker
DNV GL

Even Bjørnstad
Enova



Chae, Yeoungjin
Korea Power Exchange

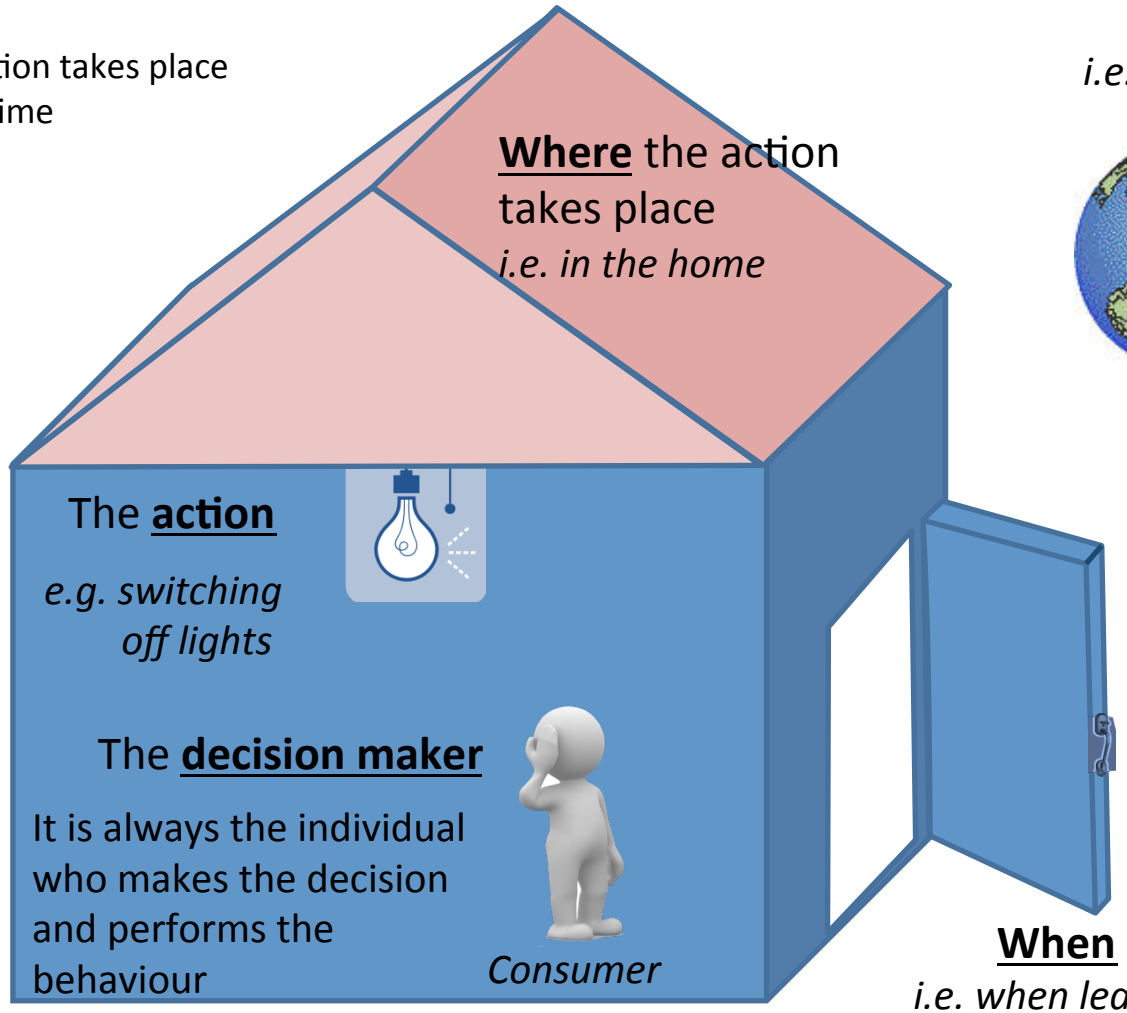
Magnus Brolin
SP Technical Research Institute

Duncan Yellen
EA Technology

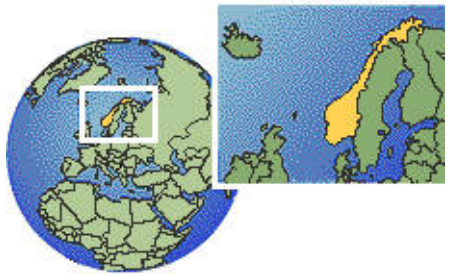
Understanding Energy Behaviour (1)

In order to understand what is meant by energy behaviour, it is necessary to consider the following elements:

- The decision maker
- The action
- Where the action takes place
- The point in time
- The context

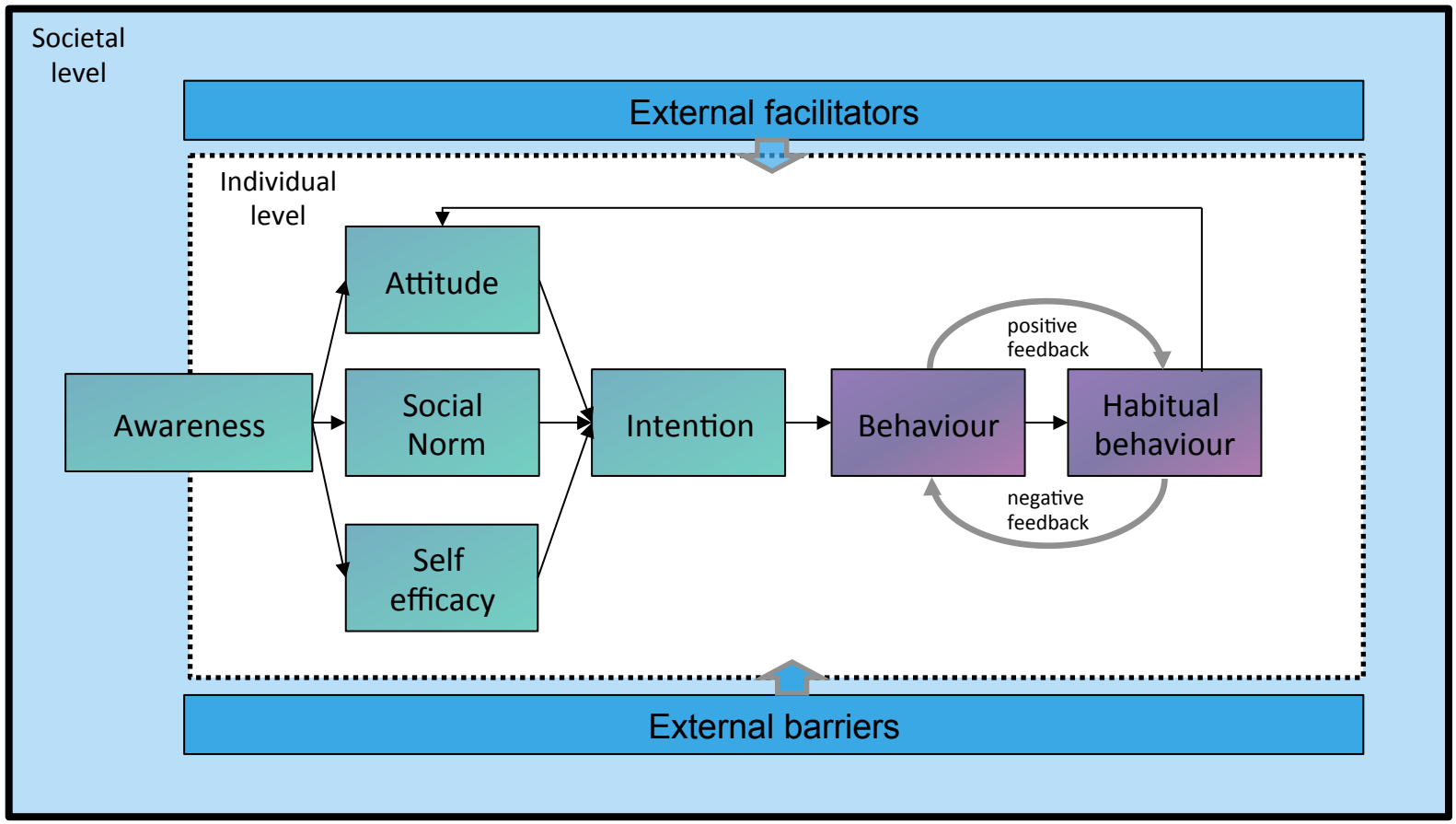


The **Context**
i.e. the 'external' factors



When the action occurs
i.e. when leaving a room unoccupied

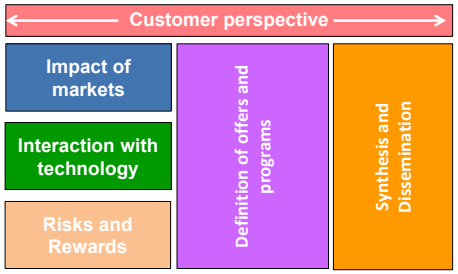
Understanding Energy Behaviour (2)
- energy behaviour model



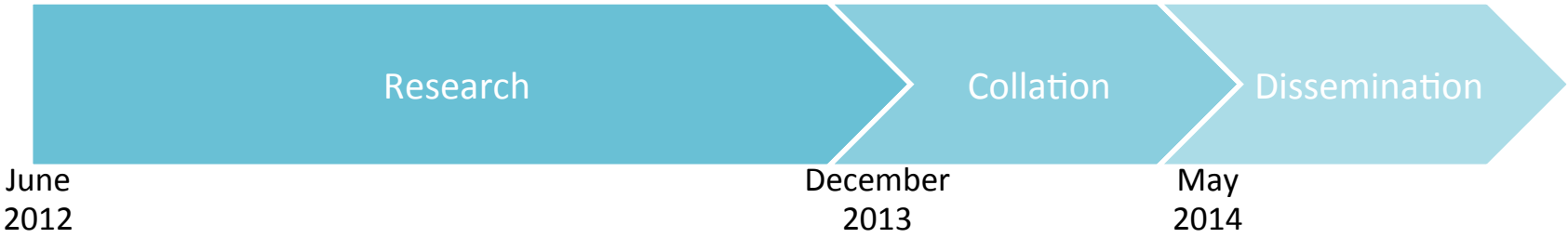
Whether or not an individual performs a behaviour is influenced by:

- Their individual views and beliefs (green boxes)
- The external facilitators / barriers (blue boxes)

Work Programme

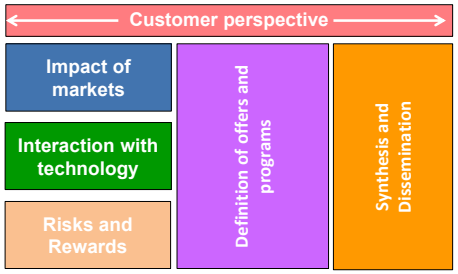


The project was conducted over three distinct phases



Background research & information gathering	Collation of results to produce a 'Smart Grid Guidance' document	Key learning points applicable in participating countries

Work Programme



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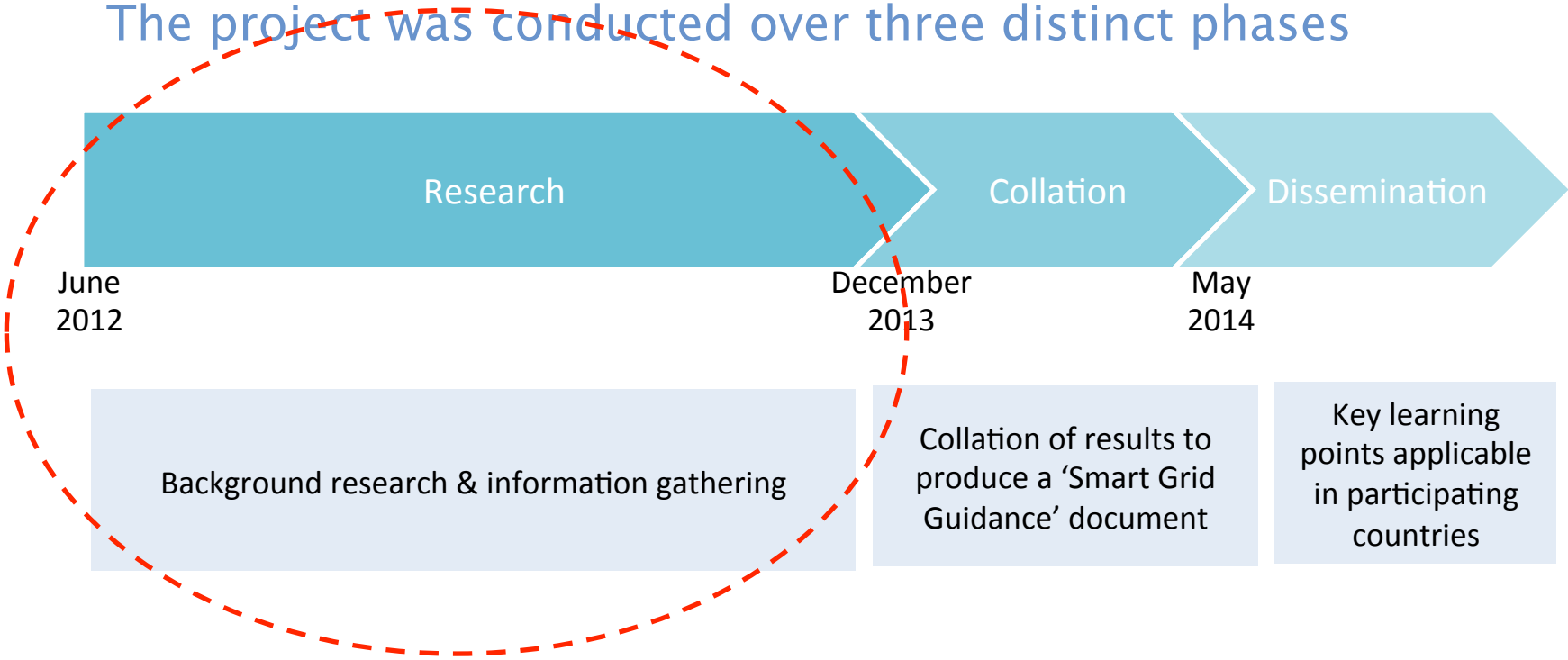

Background research

Three ‘areas’ of research

Impact of markets	Identifying the drivers for Smart Grids Assessing the impact of the electricity market on consumers Recognising the extent to which the electricity market facilitates consumer engagement or represent a barrier
Interaction with Smart Grid initiatives	Gathering information on consumers views towards and experiences with Smart Grid initiatives
Risks and Rewards	Exploring risks and rewards viewed from the consumer perspective Understanding how this impacts the decision making process

Background research

Three 'areas' of research

Impact of markets

Identifying the drivers for Smart Grids
Assessing the impact of the electricity market on consumers
Recognising the extent to which the electricity market facilitates consumer engagement or represent a barrier

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Risks and Rewards

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Understanding how this impacts the decision making process

Drivers for Smart Grids

The drivers for Smart Grids differ from one context to another

UK Drivers

- Support transition to low carbon economy
- Ensure security of supply
- Minimise costs to customers
- Empowering customers

Electricity market impact on consumers

The impact of electricity markets on consumer engagement in Smart Grid activities is wide ranging and often poorly understood.

There is no one size fits all solution, with many elements of electricity markets representing both facilitators and barriers to participation.

Key facilitators in UK

- Equalising incentives scheme
  - DNOs no longer dis-incentivised to seek 'capital solutions'
- RIIO approach to network regulation
  - Strong incentive to deliver efficiency savings and use innovative approaches

Key barriers in UK

- Metering is the responsibility of Suppliers
  - Not network companies
- Consumers lack trust in energy companies
- Time of use tariffs not widespread

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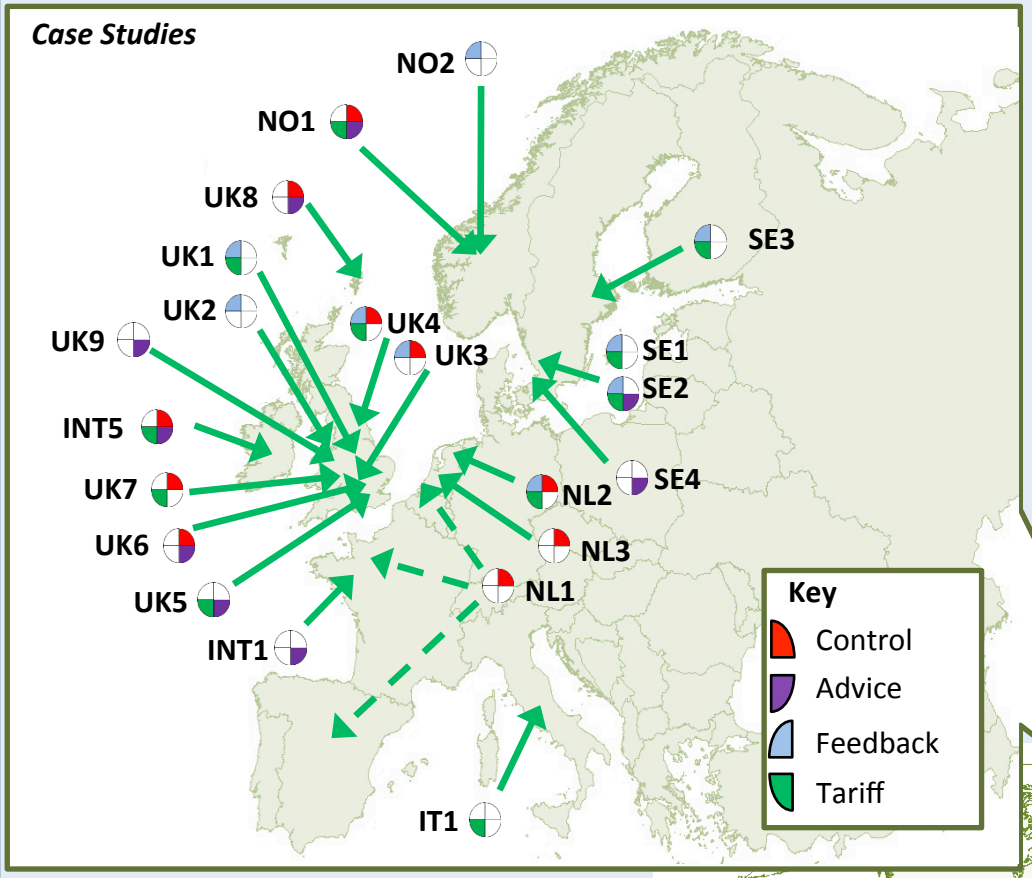
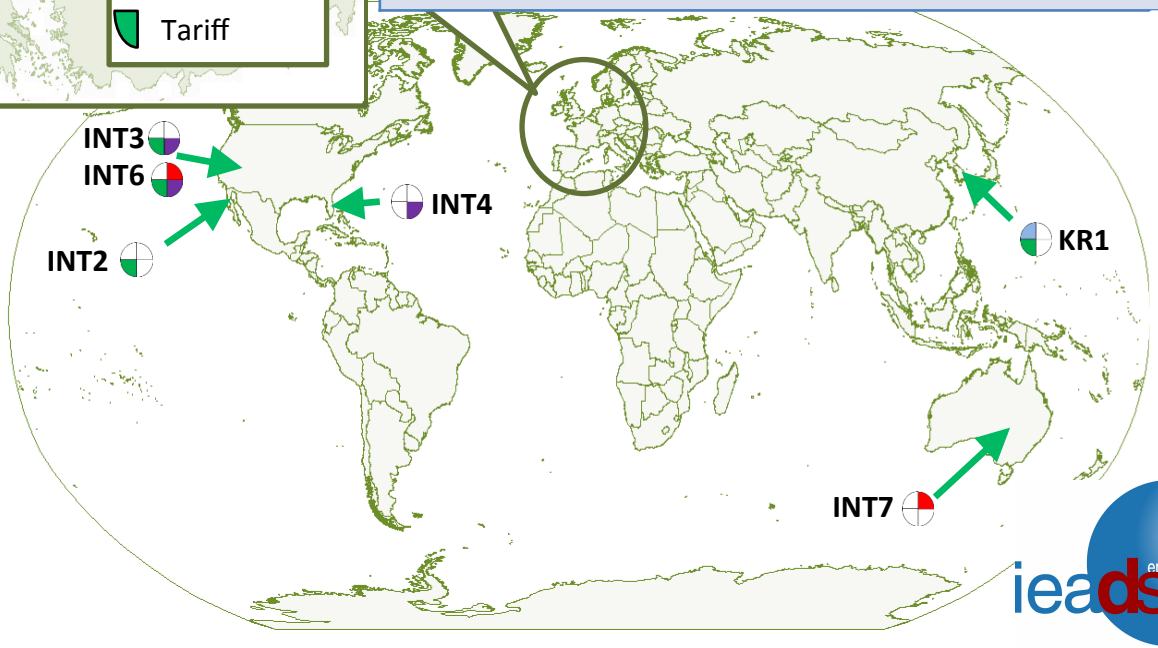


Any **Tariff** or pricing incentive to reward consumers that change their pattern of demand. This includes static Time of Use tariffs, Critical Peak Pricing, Peak Time Rebates and Real Time Pricing.

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.



During the project, 23 case studies from around the world were used to explore consumer experiences with one or more Smart Grid related interventions.

ieadsm energy efficiency

Review of consumer attitudes

During the project, 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

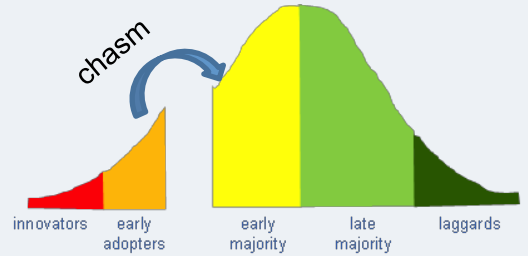
Some consumers say they would not participate under any circumstances

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

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

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

Key findings – top five

1	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.	
2	Information collated from consumer surveys shows that consumers ***say*** 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 ***not*** engaging in Smart Grids.	
3	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 illustration) see new technology as a way to "beat the herd" and reap the advantages of the new technology/practice before it becomes common practice.	 The early majority, however, are hesitant to new technology, and choose to sit on the fence until it is proven.
4	Do not underestimate consumer concerns	Learn from the non-participants to understand why individuals don't sign up.	
5	What works for one group of consumers doesn't necessarily work for another group.	Context may be different. Attitudes, beliefs social norms relevant to the individuals may be different.	

Background research

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Predicting behaviour

The traditional 'engineers' 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 (£)

Loft insulation example

There are many examples to show that neo-classical economic modelling does not predict behaviour

Benefits to the consumer

~ £180/year reduced heating bill
~ 730kg/year reduced CO_2 emissions

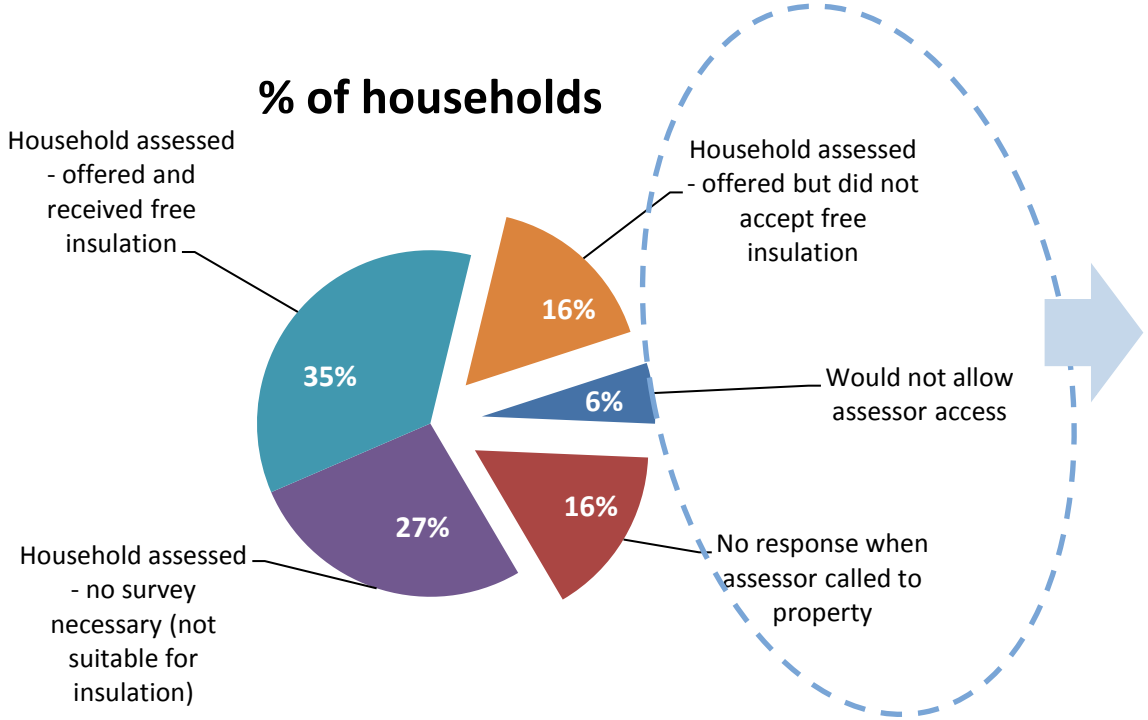
Costs to the consumer

~ £0 – installed free of charge

But, they need to:
- allow installers into their home
- empty the loft of all its contents

Example (continued)

Kirklees Scheme
An extremely successful scheme, achieving very high participation levels

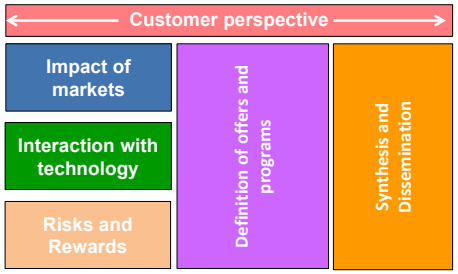


A significant number of households did not take up the offer of free insulation

Key findings – top five

1	What works for one group of consumers doesn't necessarily work for another group.	Context may be different. Attitudes, beliefs social norms relevant to the individuals may be different.
2	Always provide an element of choice	Avoid providing too many choices, which can cause 'purchasing paralysis'
3	Take care when framing the initiative (1)	There may be advantages in framing the initiative in terms of 'avoiding waste' or 'avoiding loss' rather than in terms of the potential benefits that could be achieved.
4	Take care when framing the initiative (2)	Benefits tend to be considered in relative terms, not absolute terms. Therefore, selecting the most appropriate reference point for expressing benefits
5	Take care over the timing of rewards	Consumers generally prefer to get 'rewards' sooner rather than later, but delay payment for as long as possible even if it costs them more in the long-run

Work Programme



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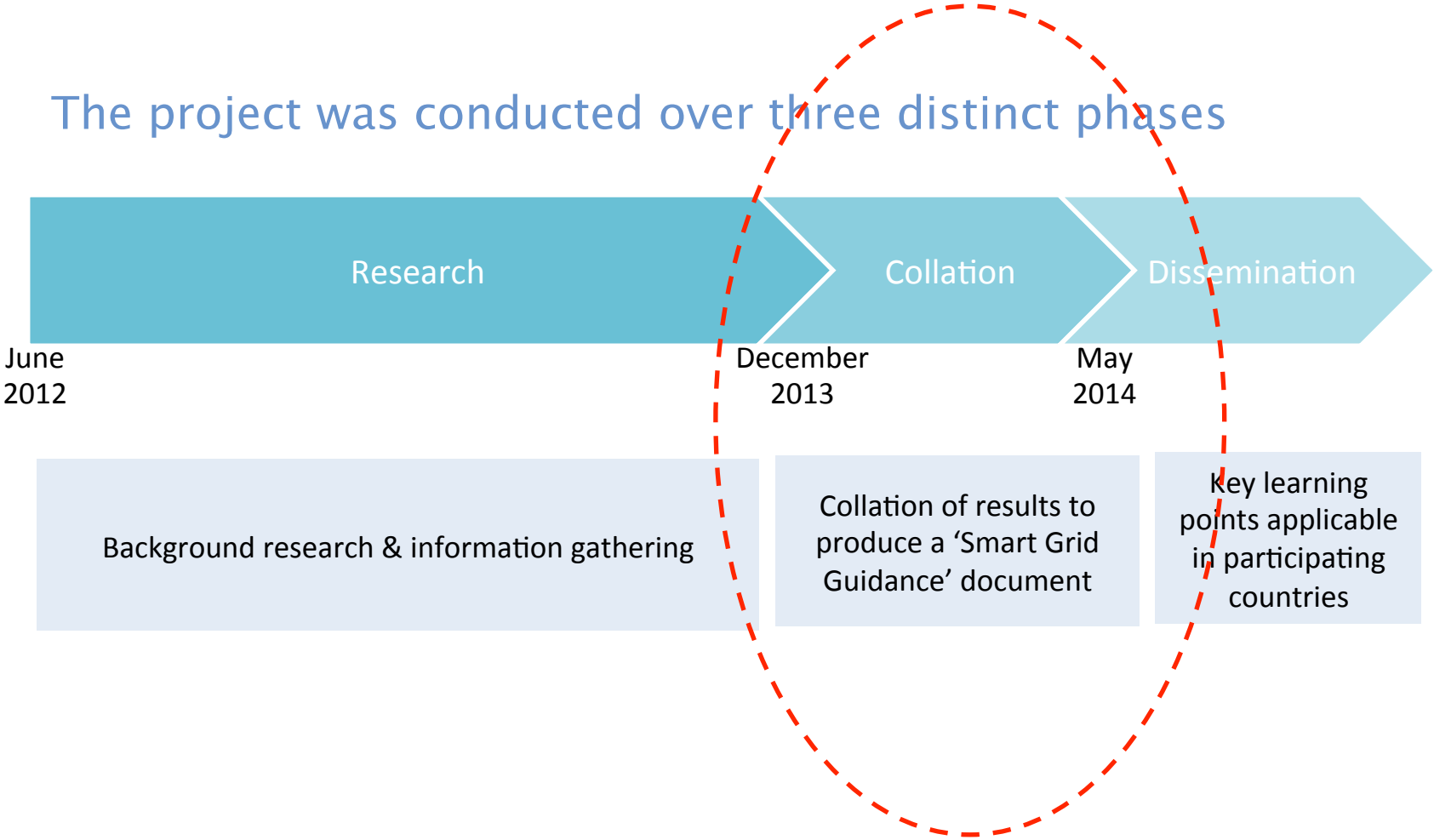


Smart Grid Implementation Guidance document

What is it?

The guidance document describes a step-by-step approach to implementing Smart Grid initiatives.

Who is it for?

The document is intended to provide guidance to implementers of Smart Grid initiatives , specifically those initiatives that require action from households and small commercial / industrial businesses.

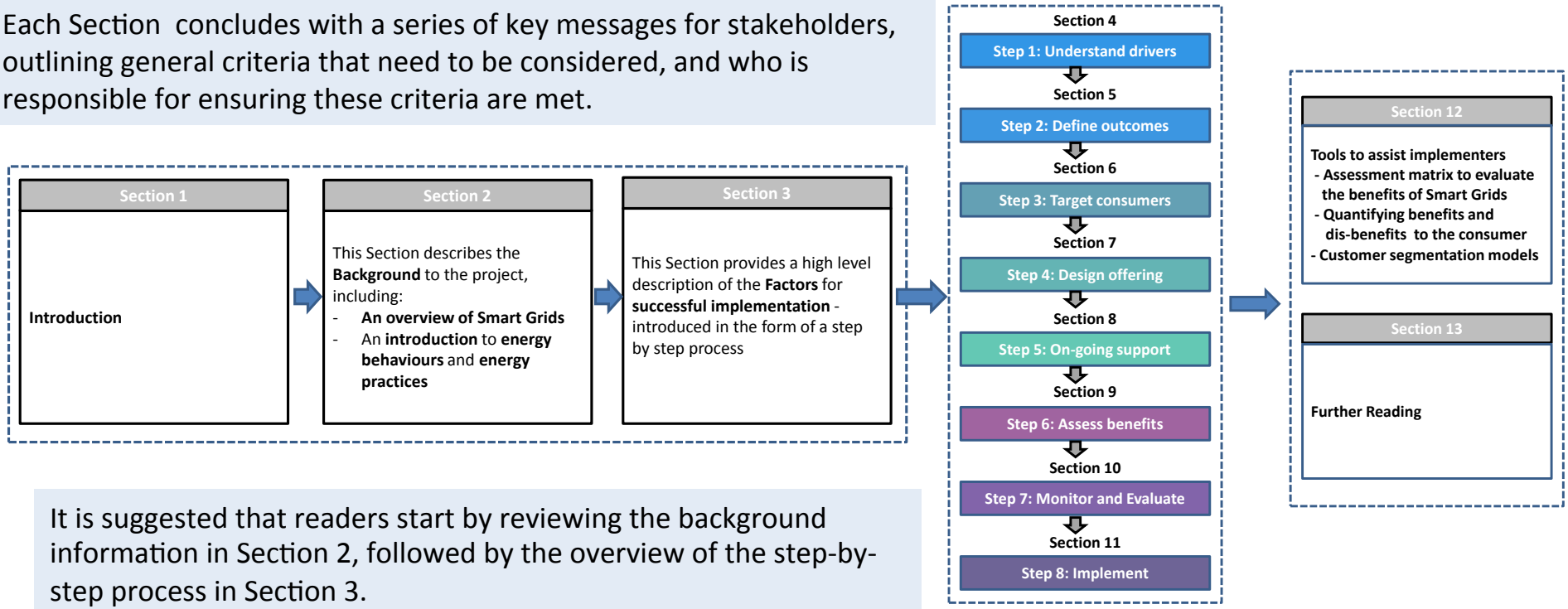
How should it be used?

The guidance document provides general guidance, applicable in a range of contexts, on how Smart Grid initiatives should be designed in order to make them more attractive to consumers.

Overview of guidance document

The document contains a number of interesting and relevant examples to highlight the key criteria from a consumer perspective.

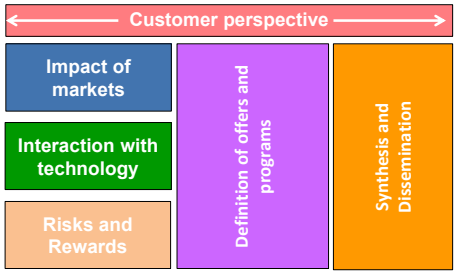
Each Section concludes with a series of key messages for stakeholders, outlining general criteria that need to be considered, and who is responsible for ensuring these criteria are met.



It is suggested that readers start by reviewing the background information in Section 2, followed by the overview of the step-by-step process in Section 3.

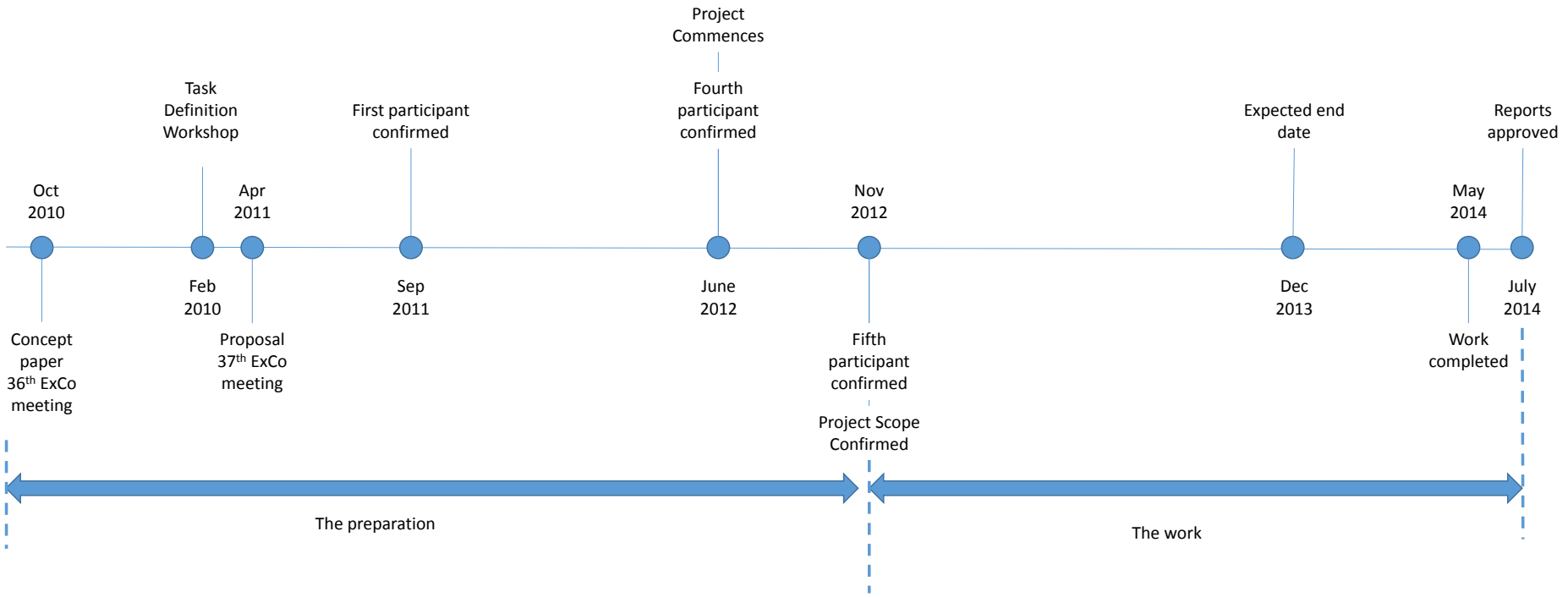
Thereafter, readers have the option to focus only on those areas where they require further information and guidance.

Project Outputs



Document Type	Document Title	Date
Research Report	The Impact of Electricity Markets on Consumers	January 2013
	Interaction between Customers and Smart Grid Related Initiatives	November 2013
	How risks and rewards from the perspective of customers affects the decision to engage in Smart Grids	December 2013
Guidance Document	Smart Grid Implementation: How to engage consumers	July 2014
Executive Summary	Smart Grid Implementation: How to engage consumers	July 2014

Overall Project Timeline



Finance

- Budget
  - £279,220
  - Based on five countries each paying £55,844
- All invoices paid
- Expenditure in line with work programme

- Questions / Comments?
- Approval of Task Status Report
- Approval of Final Management Report