



# Task XIX: Micro Demand Response and Energy Savings

Final Management Report  
Presented by Linda Hull





## Outline of Presentation

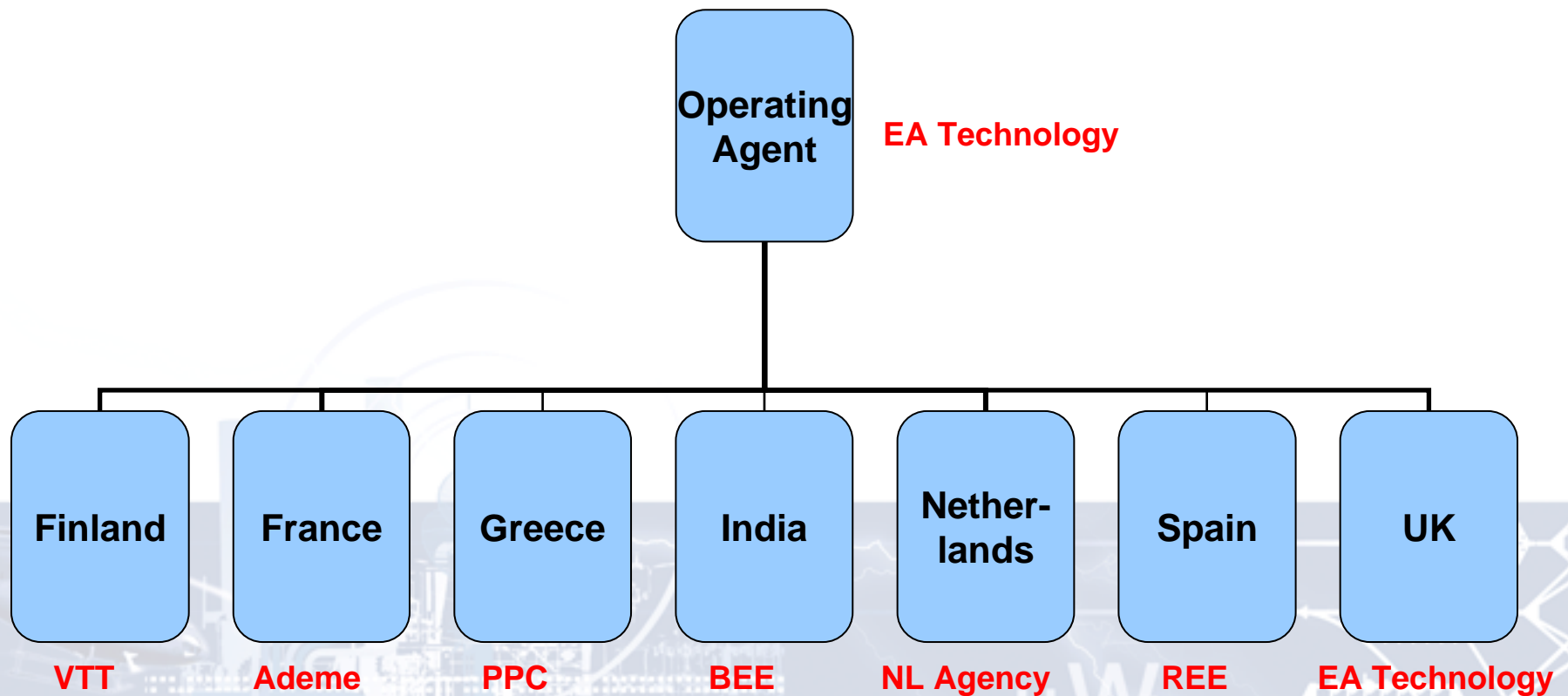
- Overview of project
  - Objectives and work programme
- Task Status Report
  - Objectives / Progress for last 6 months
  - Finance
- Final Management Report
  - Work Performed
  - Outputs
  - Achievements
- Matters for the ExCo
  - Approval of Final Management Report



# Overview of Task XIX



# Task XIX Project Participants





## Task XIX – Summary of objectives

- Demand response and energy saving services in the residential and small and medium enterprise sectors
  - End-use monitoring and feedback
  - Time of use pricing
  - Remote / automatic demand control
- Identifying the business case for demand aggregators / energy saving service providers





## Work Plan

- Subtask 1: Demand response and energy saving products
- Subtask 2: End use demand changes
- Subtask 3: Demand response & energy saving delivery mechanisms
- Subtask 4: SME customer costs and benefits
- Subtask 5: Residential customer costs and benefits
- Subtask 6: Business case estimation





# Task Status Report





## Objectives / Progress over last 6 months

- Finalise the scenarios to be used.
- Obtain the necessary data and information from the Task Experts on the country specific case studies.
- Refine Excel models and produce worked examples.
- Write the second report - The Business Case for Micro Demand Response and Energy Saving.

**ALL COMPLETED END MAY 2010**





# Finance

Subtask Description	Original Budget (Euros)	Revised Budget (Euros)
1 Demand response and energy saving products	45,875	40,141
2 End user demand changes	54,895	48,033
3 Delivery mechanisms	39,025	34,147
4 SME costs/benefits	41,640	36,435
5 Residential costs/benefits	41,640	36,435
6 Business case estimation	42,825	37,472
Project management, ExCo liaison & reporting	48,795	42,696
Travel and subsistence	23,150	20,256
	<b>337,845</b>	<b>295,614</b>
Expenditure to end August 2010	£197,753	

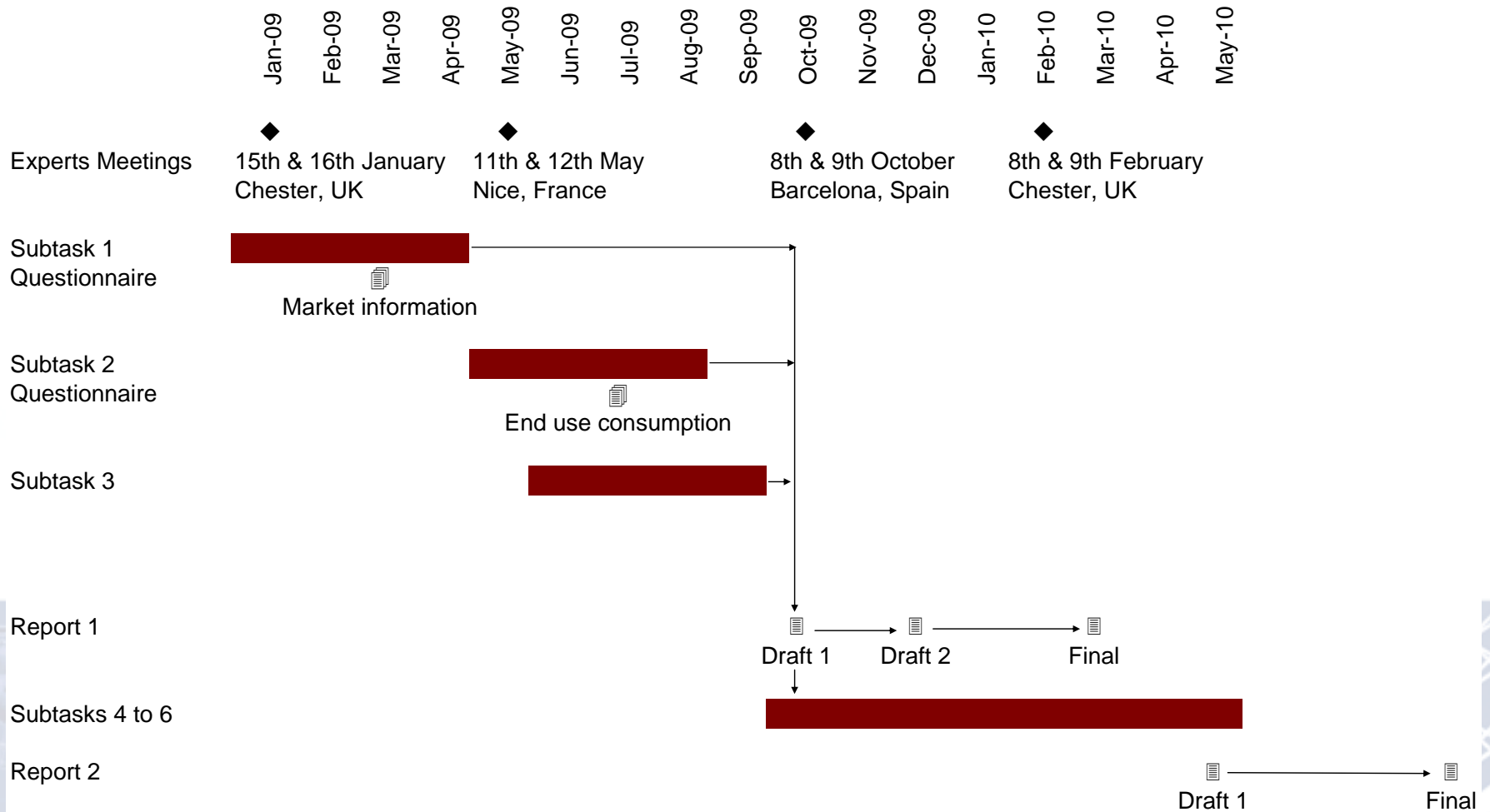
# Final Management Report

- Work performed
- Reports
  - Report 1 } Overview
  - Report 2 } Lessons learnt and conclusions
  - Dissemination of results
- Recommendations





# Work Performed – overview





**Report 1:  
Micro Demand Response and Energy Saving Products:  
Definition of Requirements & Options for Effective Delivery**

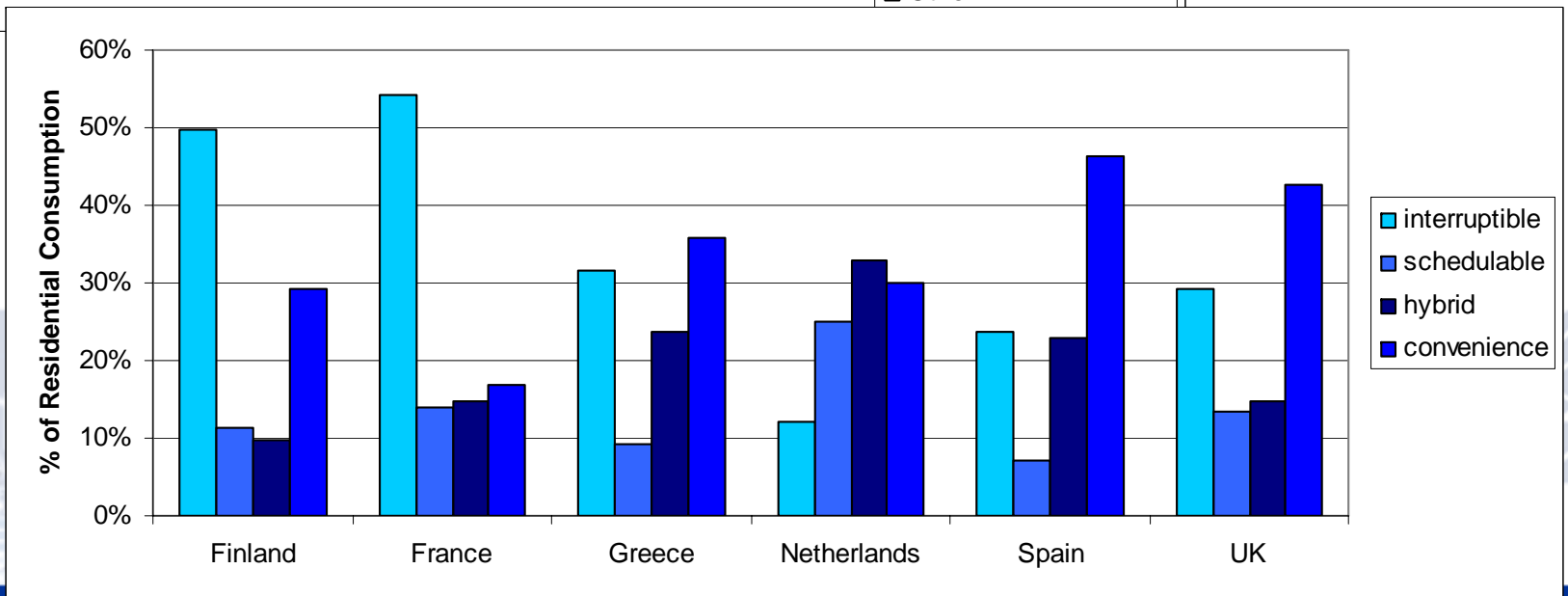
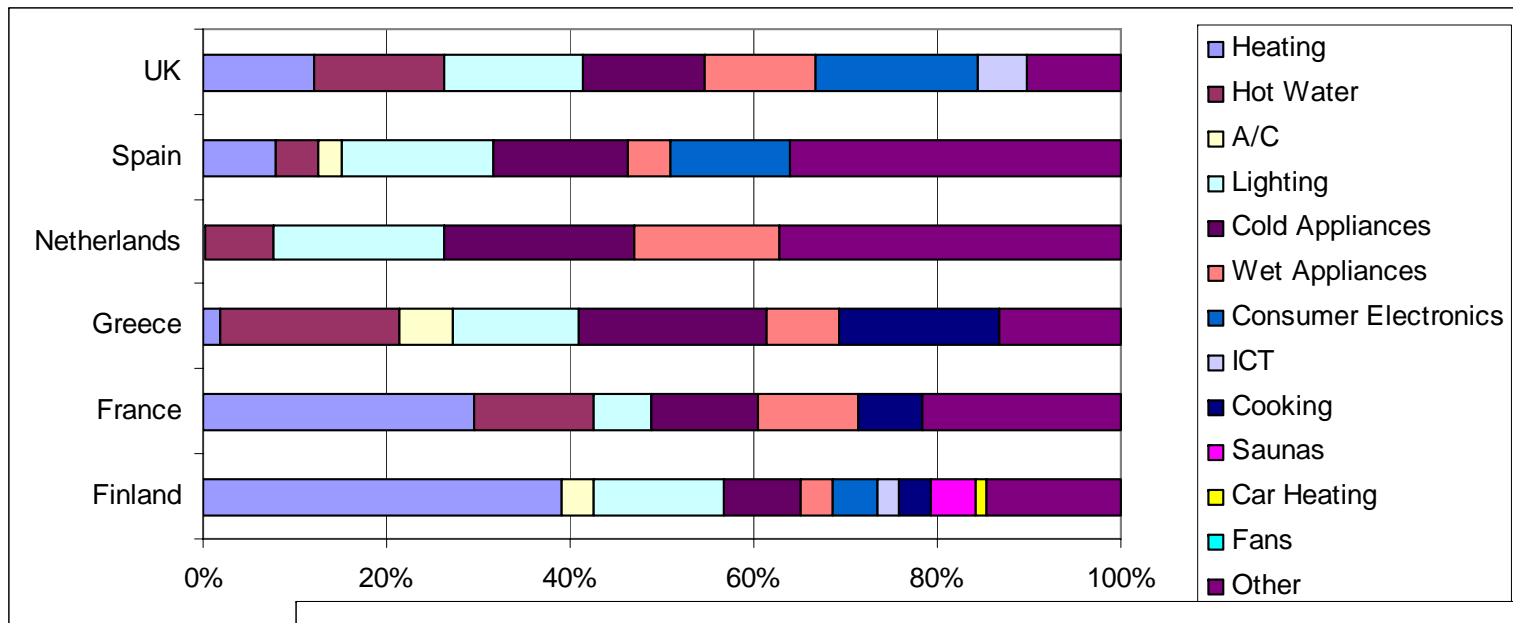




## Micro Demand Response and Energy Saving Products: Definition of Requirements & Options for Effective Delivery

- Impact of market structure
  - Opportunities (drivers) for demand response and energy savings
  - The way participants interact with one another (barriers)
- Opportunities for demand response and energy savings
  - Types of loads – suitability for different products/services
  - Difficult to assess due to lack of data – particularly for SMEs
- Products and services
  - Advantages / disadvantages considered
- Review of pilots and case studies
  - Results wide ranging
- Technical architecture requirements
  - The minimum requirements

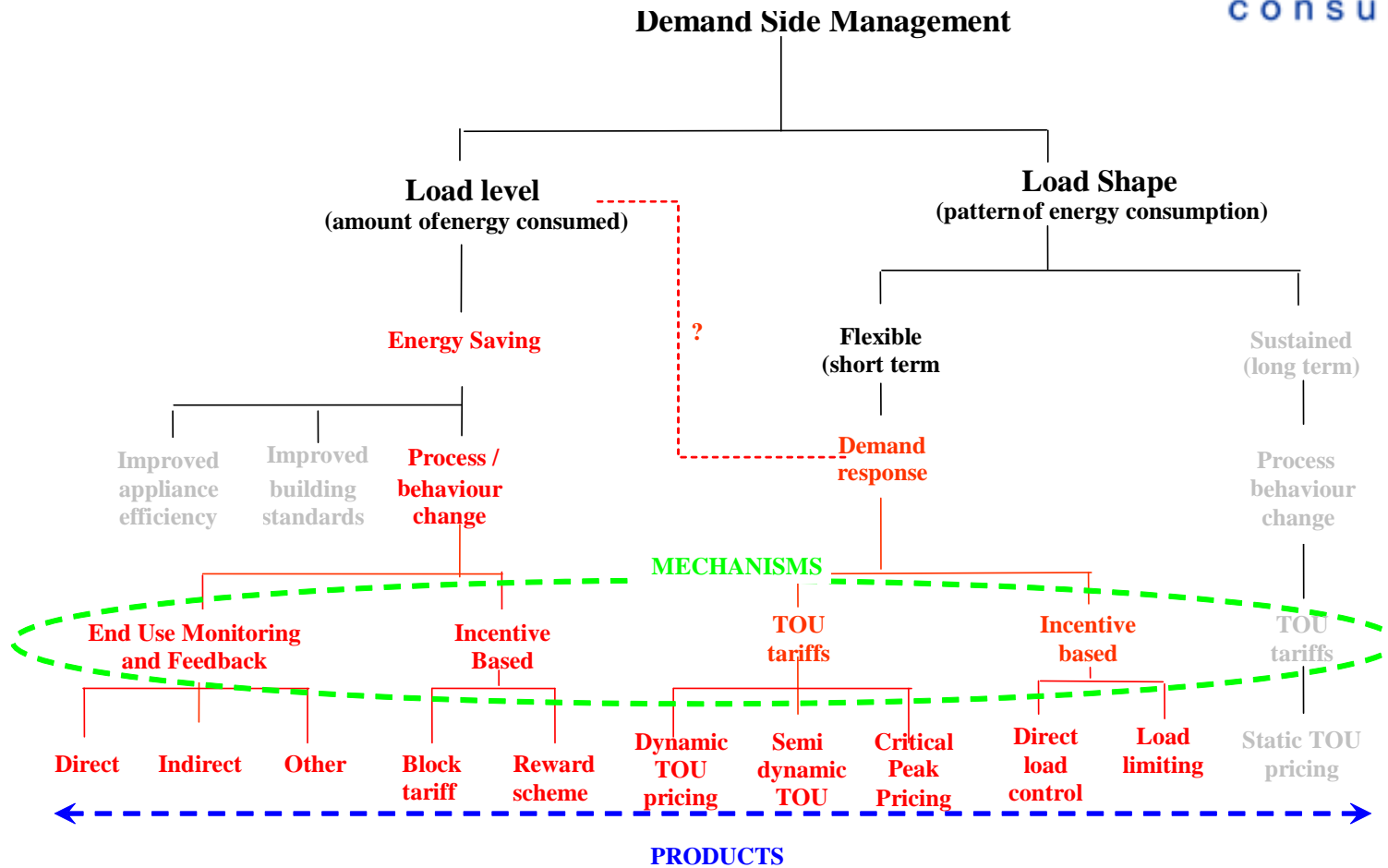
# Residential energy end uses



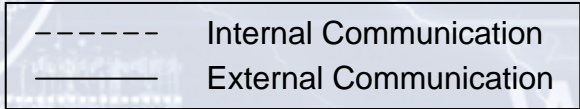
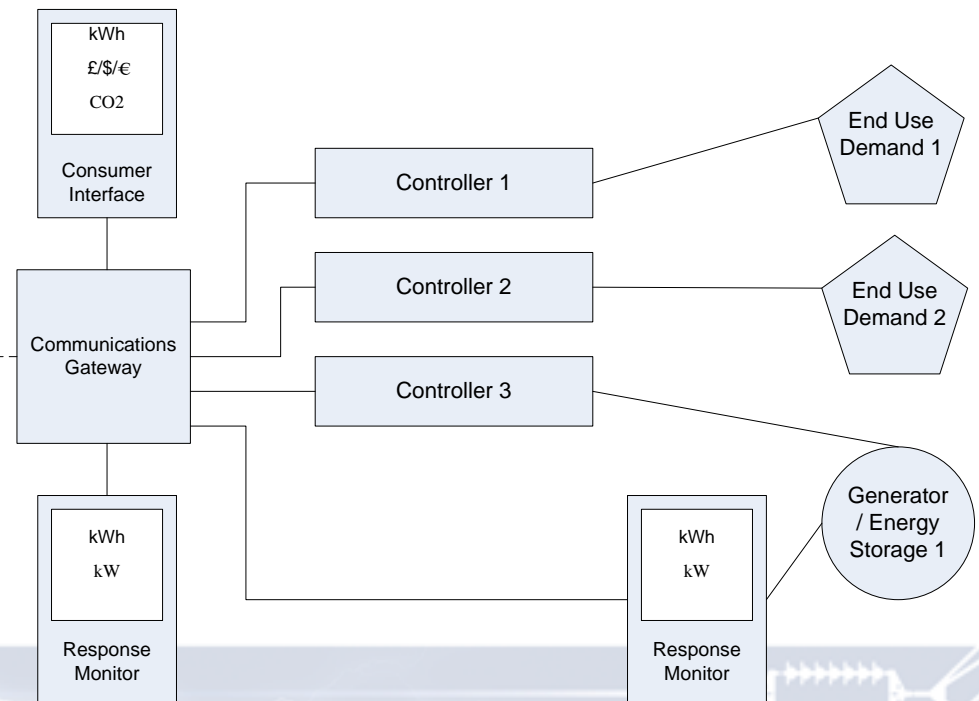




# Products



- Controller
- Consumer Interface
- Response Monitor (Meter)
- Internal Communication
- Communications Gateway
- External Communication



# Minimum Functionality Example

## DR – Dynamic Time-of-Use Tariffs

Controller	Consumer Interface	Internal Communications
<p><b>*Trigger Mode:</b> Manual [Automatic]</p> <p><b>*Demand Modification:</b> On/Off [&amp; Modulated]</p> <p><b>*Location:</b> General Purpose Outlet (GPO) [Central Home Energy Management System]</p>	<p><b>*Information:</b> Tariff Price &amp; Historical consumption</p> <p><b>*Notification:</b> Meter Display [VDU+Mobile/Pager] &amp; Bills</p> <p><b>*Notification Frequency:</b> Half-hourly/Hourly &amp; Billing Cycle (monthly, quarterly, annually)</p> <p><b>*Input:</b> None [Consumer Preference Input]</p>	<p>None</p> <p><b>[*Signal Flow:</b> Duplex (Two-way)]</p> <p><b>[*Medium:</b> Wireless]</p>
Response Monitor (Meter)	Communications Gateway	External Communications
<p><b>*Type:</b> Interval Meter</p> <p><b>*Data Transfer:</b> Manual Read Locally [Read Remotely]</p> <p><b>*Tariff:</b> Tariffs can be applied retrospectively with time stamping</p>	<p><b>*Signal Flow:</b> Simplex (One-way) [Duplex (Two-way)]</p> <p><b>*Situation:</b> Customer Interface (Meter Display/VDU) [Controller (Central Home Energy Management System)]</p>	<p><b>*Signal Flow:</b> Simplex (One-way) to Consumer [Duplex (Two-way)]</p> <p><b>*Connection:</b> [To/]From Aggregator, ESCO or Supplier</p>

## Report 1: Conclusions

- Impact of market structure is significant
  - Different drivers / opportunities for new products
  - Different barriers
- Lack of data on energy end use consumption
  - Time of day data
  - Small and medium enterprises
- No 'one size fits all solutions'
  - Products
  - Energy end uses



## Report 2: Evaluating The Business Case for Micro Demand Response and Energy Saving





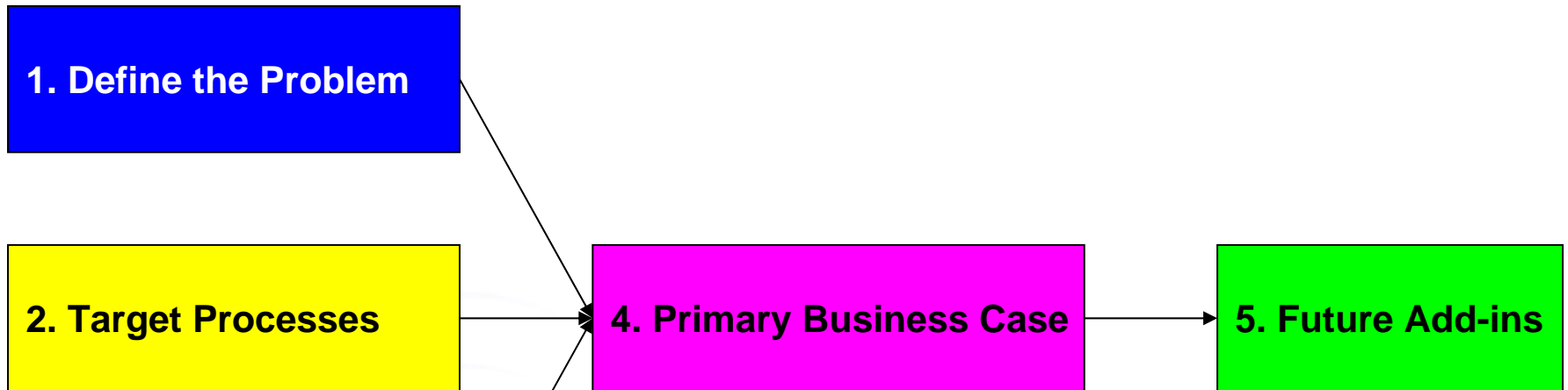
## Evaluating The Business Case for Micro Demand Response and Energy Saving

- Step-by-step methodology
- Five country specific case studies
  - Finland: Dynamic control of residential storage heater loads
  - France: Dynamic control of residential storage heater loads
  - Greece: Subsidy for 'green a/c' equipment
  - India: Replacement of incandescent lamps with CFLs
  - UK: Direct load control of commercial air-conditioning loads



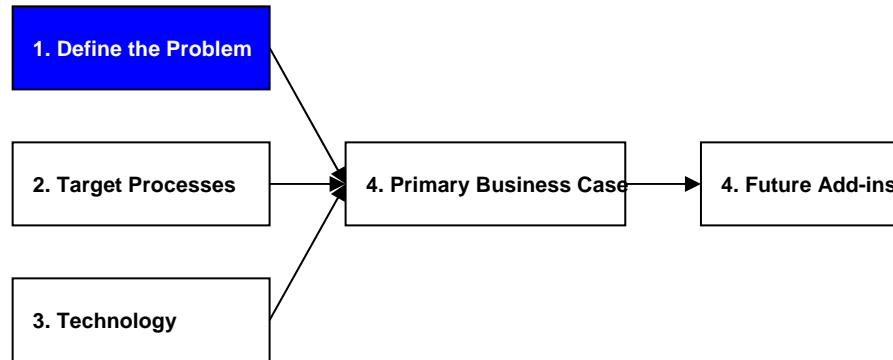


# Step-by-step approach



“win-win-win”



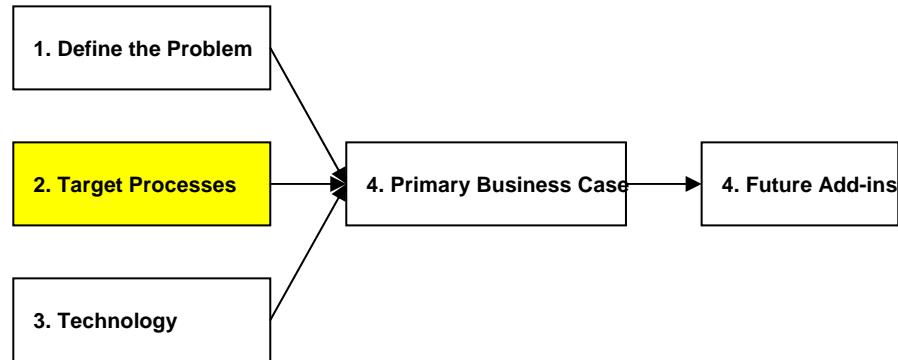


## The problem?

- National Grid (TSO) increasing need for Balancing Services

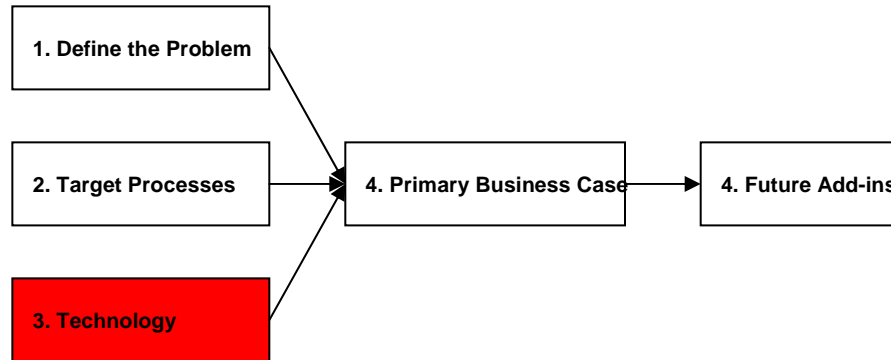
<b>Reserve</b>	<b>2010/2011</b>	<b>Forecast 2025/26</b>
Volume	3 TWh per annum	8 TWh per annum
Cost	£311m per annum	£690m per annum





## Target Processes?

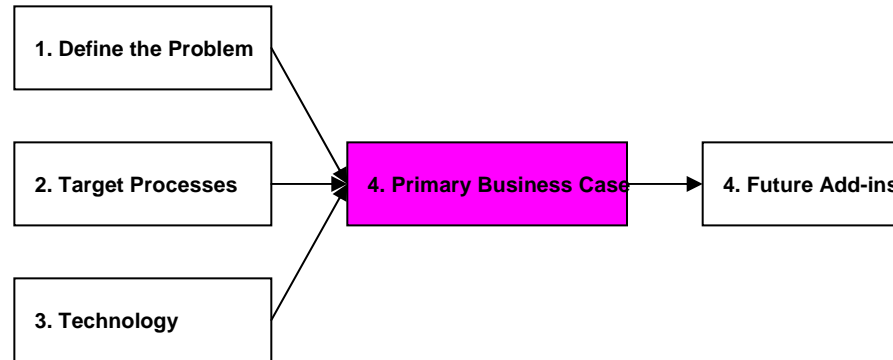
- Cooling and ventilation loads significant
  - ~10% to 20% of electricity used in services/commercial sector
- Three scenario's considered
  - Single split a/c unit (power consumption 2kW / cooling o/p 6kW)
  - Scenario 1: daytime / summer operation
  - Scenario 2: daytime / year round operation
  - Scenario 3: 24 hours per day / year round operation



## Control, Monitoring, Communication Technology

- Control: automatic on/off control of compressor
- Meter: existing advanced metering (AMR)
- Comms Gateway: dedicated gateway needed
- Internal Comms: one way wireless (or wired)
- External Comms: one way PSTN, GSM or internet



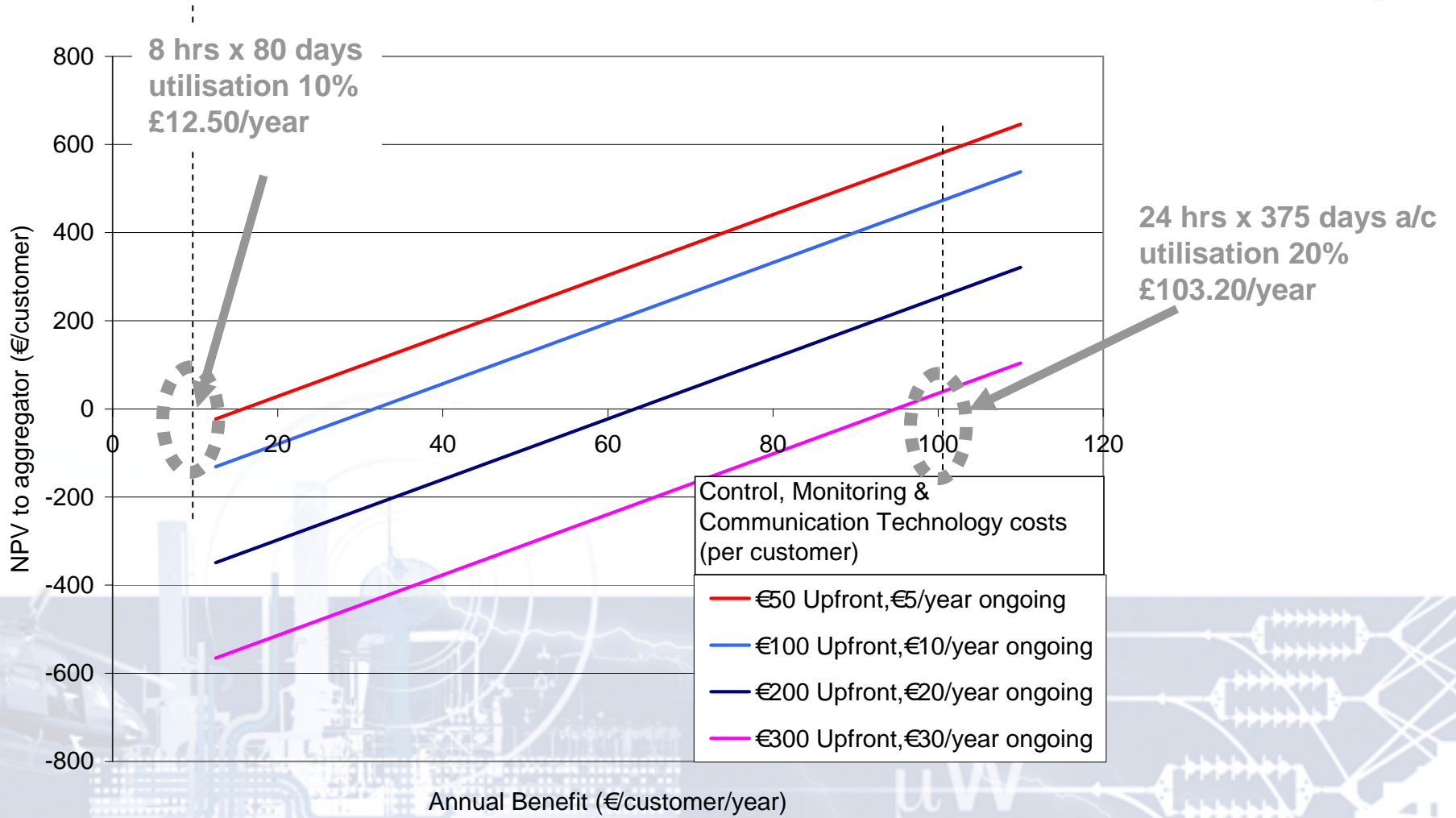


## Primary Business Case

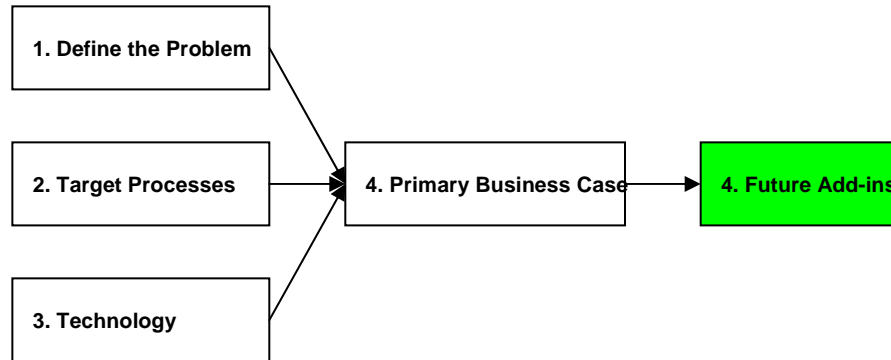
- **Aggregator:**
  - Expenditure: Purchase of controllers
  - Income: Provision of balances services to TSO
- **Consumer:**
  - Energy savings advice (sufficient?)
- **TSO:**
  - Avoided shortfall of reserve and equivalent price to conventional sources



# UK: Direct Load Control of Commercial A/C (1 x 2kW)







## Future Add-Ins (Secondary Business Case)

- Provision of frequency response
- Additional technology costs
  - Real-time control



## Report 2: Conclusions

- Step-by-step approach provides a useful way of assessing business case
- Difficult to obtain robust data
  - Technology costs
  - Amount of demand available for specific products/services
  - Value of demand response
- Roll of smart metering needs to be considered
  - None of the case studies utilised smart meter functionality (when available)



## Dissemination of Results

- Reports 1 & 2 confidential to participants until March 2011
  - After March 2011: Available from public area of IEA DSM web-site
- In country dissemination led by Experts
  - National focus meetings
  - Summary reports
  - National reports



## Overall Recommendations

- Impact of market structure important
  - Market mapping could help interaction between participants
  - Role of regulation needs to be understood
- Difficult to assess level of demand response / energy savings
  - Need for improved energy end use information
- Technology costs
  - Need for on-going support of innovation in control and monitoring technology
- Smart meter
  - Third-party access



# Matters for Executive Committee

Questions / comments

Approval of Final Management

