Industrial Energy Efficiency Accelerator:
Refreshing the business case for DECC

Microelectronics Sector

June 2016

Agenda

- Introduction
- Programme Structure
- Innovations
- Cost savings and appetite to get involved

Introduction

- The Industrial Energy Efficiency Accelerator was originally a £15m programme to identify and test near market innovations for CO2 reduction in 14 sectors.
- Due to insufficient funds from DECC only 4 sectors were covered. The aim of this programme is to complete the other 10 sectors.
- There are opportunities to complement current efforts of the microelectronics industry to mitigate carbon.
- There are three main stages to the previous project:

X 10 Sectors

1 Investigation and Solution Identification

Examination of specific processes in depth to understand energy use and interfaces with other systems.

Identification of solutions that improve energy efficiency based on this investigation.

2 Demonstration

Demonstration of the cost-effectiveness and carbon saving potential of innovations, such as equipment upgrades and process optimisation.

3 Replication

Dissemination of **best practices** throughout the industry sector.

Engage with key influencers in industry to overcome barriers to adoption of **innovations.**

The previous IEEA demonstrated successful examples in four sectors

CARBON TRUST

Demonstrations

Asphalt/Aggregates

- Development of low temperature asphalts
- Increased use of Reclaimed Asphalt Plannings
- Hybrid turbocharger for quarry vehicles

Animal feed

- Optimising formulations for energy efficiency

Dairies

- Use of ice pigging for cleaning pipes

Bakeries

- Improved combustion efficiency and heat recovery

Replication/Dissemination

Dissemination and replication

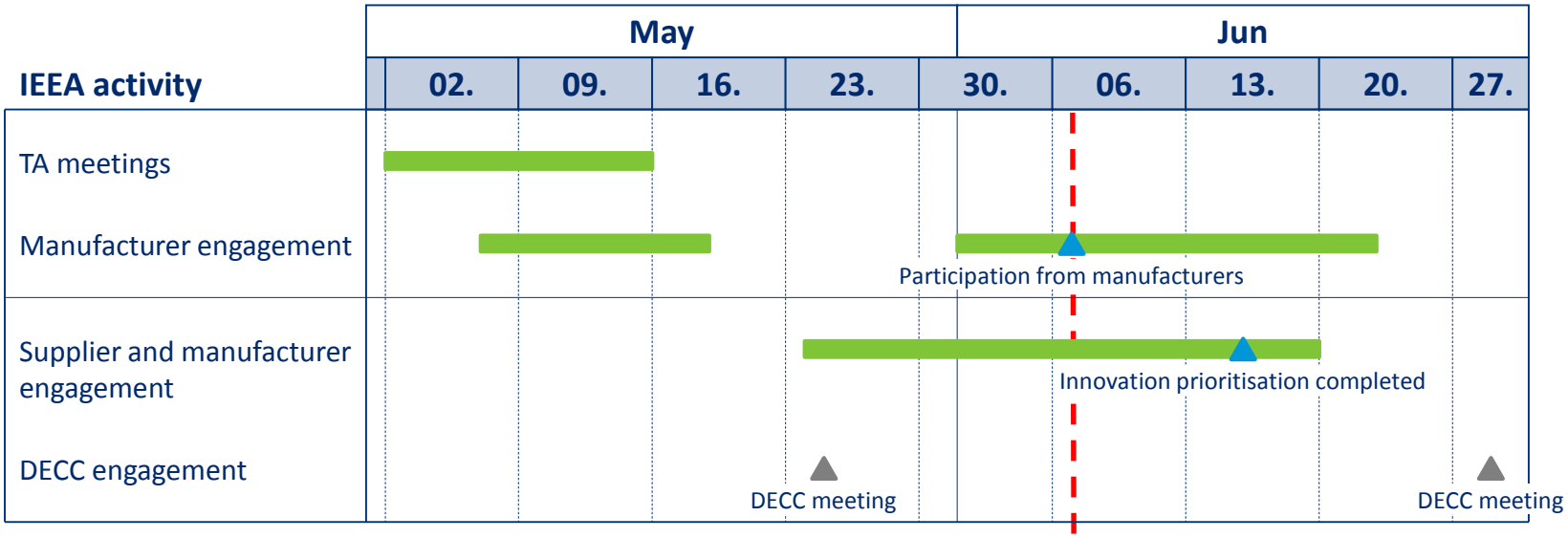
- Technical case studies
- Standards & specifications
- Site visits
- Best practice guides
- Articles in trade press

Agenda

- Introduction
- Programme Structure
- Innovations
- Cost savings and appetite to get involved

Programme structure and project plan

- At this stage the focus is on previously identified innovations, to identify their relevance today. This will inform prioritisation of innovations considered for potential demonstration funding.
- It is likely, but not certain, that DECC will provide funding for around two innovations per sector to go through the second (demonstration) phase.
- The funding is likely to be around £1m per sector from DECC, therefore a cost element will be factored in when choosing innovations, to make them viable for manufacturers.



Deploying innovations across the remaining 10 sectors requires an additional £10m to £12.5m over 2½ years, but could save £100m annually

CARBON TRUST

Phase 1 Industry Re-engagement (2½ Months)	Phase 2 Collaborative Demonstrations (17 to 25 Months)	Phase 3 Replication (8 to 12 Months)
Activities		
• Connect with sector **trade associations** to resume prior discussions • Engage with **manufacturers** in each sector • High level review of the **innovations** and best practices previously identified to determine relevance • Connect with **equipment suppliers** regards current technology	• Deep dive into each sector to test the long list of innovations and **prioritise** ones likely to be most practical and impactful • Define 2 to 3 **collaborative demonstration projects** per sector • **Project manage** each demonstration, including site visits, to ensure effective delivery • **Assess impact** of each (CO2, cost)	• Work with project partners to develop **technical case studies** • Undertake **press releases** to get traction with broader set of manufacturers • Develop **best practice guides** for each sector • **Survey sector** to understand likelihood of deployment of the innovations

Demonstration case study - Bakeries

Project: improving combustion efficiency in ovens

- Innovation: Improving combustion efficiency by optimising gas flow rates
- Collaboration: Collaborative demonstration between Campden BRI and Spooner Industries
- Funding: Co-funding from Regional Growth Fund

Project overview

- Innovative technology deployed in Campden BRI ovens by Spooner Industries
- Testing / monitoring process to evaluate technology impact on energy use and cost savings
- Data analysis of findings
- Case study produced and published
- Results disseminated across industry

18 months

Project outputs

- Potential efficiency savings of 4.7% from linking variable speed drives with combustion control
- Potential savings of £14,000 per year*
- Payback period from 1 to 5 years (depending on condition of existing oven)

Objective: demonstration project creates awareness of benefits, driving wider deployment across industry

Source: Campden BRI, Measuring oven exhaust gases during bread baking, 2015

* Assumes typical oven energy costs of £300,000 per year

Agenda

- Introduction
- Programme Structure
- Innovations
- Cost savings and appetite to get involved

Potential co-funding limits for the innovations, in line with EU state aid guidelines

Innovations	Small enterprise	Medium enterprise	Large enterprise	
Industrial research projects	70%	60%	50%	
Industrial research projects involving collaboration or with dissemination	80%	75%	65%	**Max intensity**
	This category refers to projects with new technology development!			
Experimental development	45%	35%	25%	
Experimental development involving collaborations	60%	50%	40%	**Max intensity**
	This category refers to projects that tweak existing products and processes!			

Industrial research defined as "planned research or critical investigation aimed at the acquisition of new knowledge and skills for **developing new products, processes or services** or for bringing about a significant improvement in existing products, processes or services"

Experimental development: pre-competitive development category defined as "the acquiring, combining, shaping and using of **existing scientific technological business** and other relevant knowledge and skills for the purposes of producing plans and arrangements or designs for new, altered or improved products, processes or services". This category does not cover routine or periodic changes to produces and services

Overview of innovations identified for the sector

CARBON TRUST

Identified 2011

- Reverse Osmosis Membrane Placement
- Reverse Recovery Osmosis (RRO), Electronic De-Ionisation (EDI)

Identified 2016

- Utilise adiabatic cooling in return air path
- Modulate Process Exhaust Systems to match tool demand
- Modulate Process Cooling Water to match tool demand
- Hydraulic Mapping
- Central Plant Controls Optimisation

We use high-level criteria set by DECC to shortlist innovation opportunities in the sector

CARBON TRUST

Illustrative

Innovations	CO_2 saving	Payback	Capital required	Replicability
Reverse Osmosis Membrane Placement	Low	Short-term	Low	Data to be verified
Reverse Recovery Osmosis (RRO), Electronic De-Ionisation (EDI)	High	Medium- long-term	High	Data to be verified
Modulate Process Exhaust Systems to match tool demand	Data to be verified	Data to be verified	Data to be verified	Data to be verified
Modulate Process Cooling Water to match tool demand	Medium	Medium- long-term	Medium	Data to be verified
Utilise adiabatic cooling in return air path	High	Immediate	Data to be verified	Data to be verified
Hydraulic Mapping	High	Medium- long-term	High	Data to be verified
Central Plant Controls Optimisation	Medium	Medium- long-term	Medium	Data to be verified

Identified 2016

We have received some feedback on these innovations so far– further thoughts welcome

CARBON TRUST

Innovations	Feedback	Interest
Reverse Osmosis Membrane Placement	University and laboratory facilities are using this type of technology, so it is questionable as to whether this is still considered innovative.	
Reverse Recovery Osmosis (RRO), Electronic De-Ionisation (EDI)	University and laboratory facilities are using this type of technology, so it is questionable as to whether this is still considered innovative.	
Modulate Process Exhaust Systems to match tool demand	Good energy saving opportunity, however there is concern that the tool won't switch on in time if automated. Fairly high cost.	
Modulate Process Cooling Water to match tool demand	Good energy saving opportunity, however there is concern that the tool won't switch on in time if automated.	
Utilise adiabatic cooling in return air path	Questionable whether this is an innovation or best practice. This was installed in a facility in 2008/9 which has since closed down. It has significant cost saving potential, but hasn't been readily taken up.	
Hydraulic Mapping		
Central Plant Controls Optimisation	This is common practice in other industries, but feedback so far suggests it is not deployed yet within the microelectronics sector.	

Identified 2016

Agenda

- Introduction
- Programme Structure
- Innovations
- Interest from industry

IEEA offers an opportunity for industry to leverage innovations to drive efficiency and competitiveness

- Since the recession, manufacturing industries such as microelectronics were impacted and now have a greater need to remain competitive
- Microelectronics could have significant annual cost saving from deploying innovative technologies through energy savings
- These innovation technologies can aid industry to be more competitive with the global market as well as meet the UK's climate change targets.

Your feedback is important...

- What is your interest in and appetite for an industrial energy efficiency program for the Microelectronics sector?
- Would you be interested in talking to us to help identify innovations?
- We will reengage with industry to seek feedback on a prioritised list of innovations soon.
- Contact details:
  - Robyn Haggis: robyn.haggis@carbontrust.com
  - Manu Ravishankar: manu.Ravishankar@carbontrust.com

The Carbon Trust is a company limited by guarantee and registered in England and Wales under company number 4190230 with its registered office at 4th Floor Dorset House, Stamford Street, London SE1 9NT.
Published in the UK: 2016.