



BEIS Industrial Energy Efficiency Accelerator (IEEA)

Industry Workshop - Manchester



JACOBS



Innovate UK
Knowledge Transfer Network

16th August 2017

Workshop Facilitators

FUNDED BY:



Department for
Business, Energy
& Industrial Strategy

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Innovate UK
Knowledge Transfer Network

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Aim of the Day

- Clarify what the **programme** is and how you can benefit from it
- Point to **technology examples**
- Transform technologies into **project ideas**
- Help you better **understand each party's expectations**
- Help you **find your partner**
- Take you through the **application process**
- Explain **how to take part**



Session 1

Al-Karim Govindji, The Carbon Trust

IEEA Objectives and Key Information

Funder: Department for Business, Energy & Industrial Strategy



Department for
Business, Energy
& Industrial Strategy

Key Objectives:

- **Increase the global competitiveness of UK industry**, while achieving decarbonisation
- **Facilitate deployment of industrial EE projects** by mitigating adoption risk and supporting novel applications
- Help **commercialize innovative technologies**
- **Leverage private sector investment**

Key Information:

- **Programme value:** £9.2 million
- **Timeline:** 4 Years (2017-21)
- **Technology / sector neutral**
- **Key metric:** Total UK impact (energy and carbon savings)

IEEA – Key Questions

- What is it?
- What is it not?
- Why is it needed?
- Who is it for?
- Why take part?

IEEA – What is it?

- **Overview:** A four-year, 2-phase programme seeking to accelerate deployment of new energy efficient technologies (and processes) to UK industry
- **Target markets:** All manufacturing sectors
- **Key focus:** Innovations with the largest cross-sectoral impact, either from novel technologies or known technologies in new sectors
- **Funding:** Funding will be awarded on a competitive basis with awards typically between £150k - £750k for up to 20 projects (40-60% capital support of eligible costs)
- **Partnerships:** Joint industrial and technology developer applications are encouraged
- **Support services:** Including pre-deployment support for demonstrations and incubation services for technology developers

IEEA – What is it not?

- Not for buildings related technologies
- Not for electricity generation or other utilities
- Not CCS
- Not for big data / analytics (except for process optimisation)
- Not for supporting public sector projects

IEEA - Why is it needed?

Innovation is valued for UK industry competitiveness but barriers exist:

Market Risk

- › First mover risk & advantage

Operational Risk

- › Management focus is often on best practices instead of on innovations
- › Innovations often deployed only in new build plants due to concerns around product risk

Capital Constraints

- › Prioritisation of growth/operational projects over energy savings opportunities
- › Funding gap between R&D stage and full commercialisation
- › Funding is challenge for innovation deployment that can cost £100ks or more, especially for sectors with tight profit margins¹

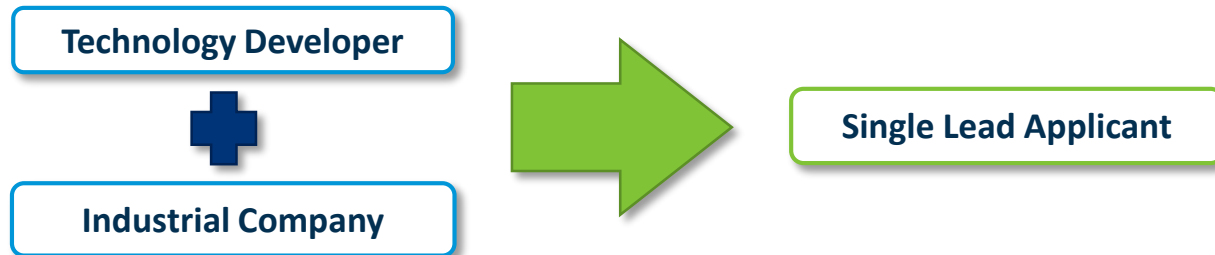
Knowledge & Deployment

- › In some sectors, lack of awareness has meant many viable technologies have not been deployed that would increase industry competitiveness
- › Innovations in other sectors or internationally deployed are not always known

IEEA – Who is it for?

The IEEA is targeted at UK technology developers and industrial partners who are looking to deliver:

- **A UK demonstration:** The demonstration must take place at a UK industrial site
- **High impact:** Project must have significant energy saving potential following replication
- **A novel technology or application:** The project must demonstrate a novel technology or a known technology in a novel application
- **A private sector partnership:** The programme is open to private sector participants and academia. Public sector bodies are not eligible
- **An industrial application:** Project must benefit industrial and manufacturing sectors



Why take part?

Industrial Company

- Improve knowledge of promising technologies
- Understand technology developer needs
- Receive a capital contribution
- Receive project support for a demonstration
- Reduce energy consumption, costs & emissions
- Enhance competitiveness
- Gain first mover advantage
- Reputational benefits

Technology Developer

- Understand industry needs
- Receive a capital contribution
- Receive incubation support for commercialisation
- Access investor networks
- Benefit from positive press
- Increase market confidence in your solution
- Potentially secure new IP

Project and Incubation Support

	Project Support	Incubation Support
Industrial Company	✓	✗
Technology Developer	✓	✓

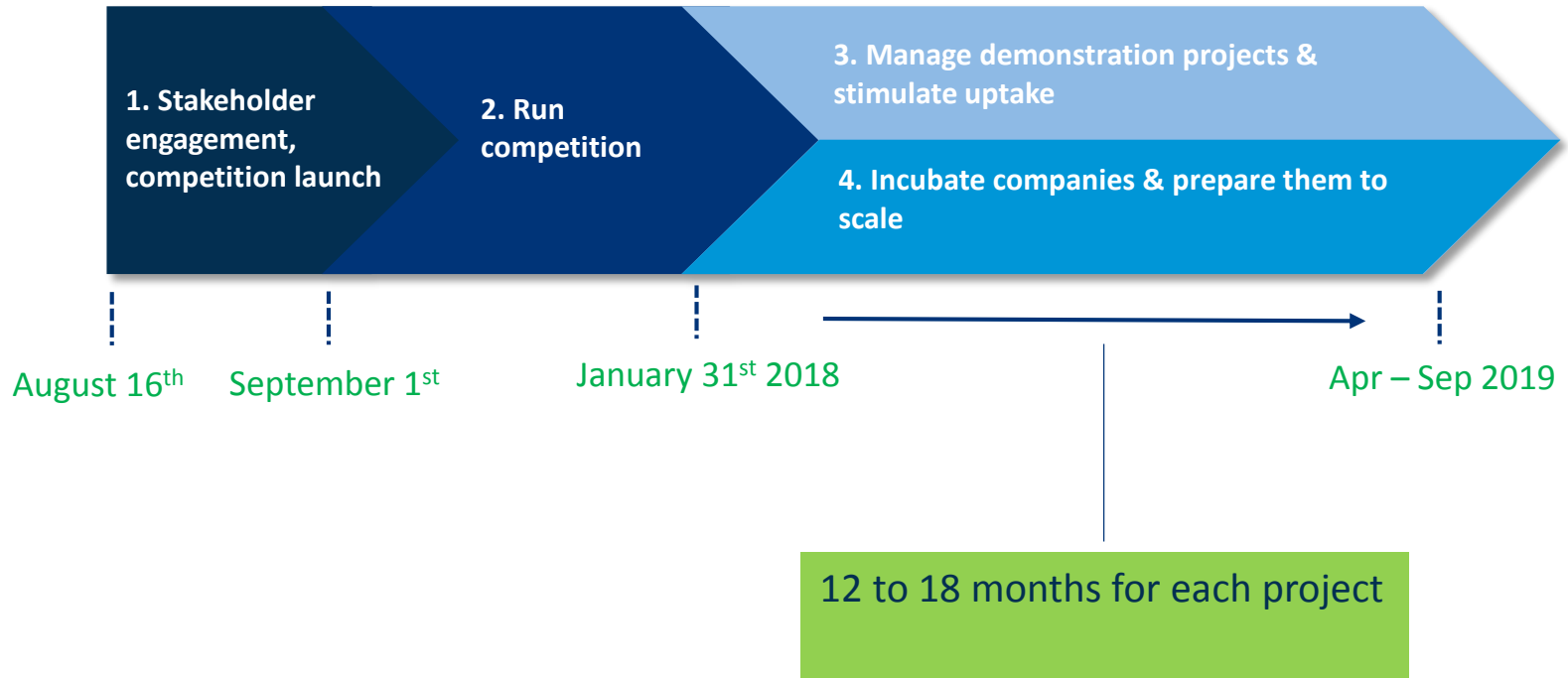
Project support

- Develop a detailed project plan
- Manage and monitor projects

Incubation Support

- Develop a **bespoke incubation** plan
- **Prioritised support** across areas such as sales & business development, strategy & business planning, funding, technology & intellectual property, etc.
- Support **after the project** e.g. business model refining, building sales pipeline, access to financing

Funding is over two rounds, spanning four years





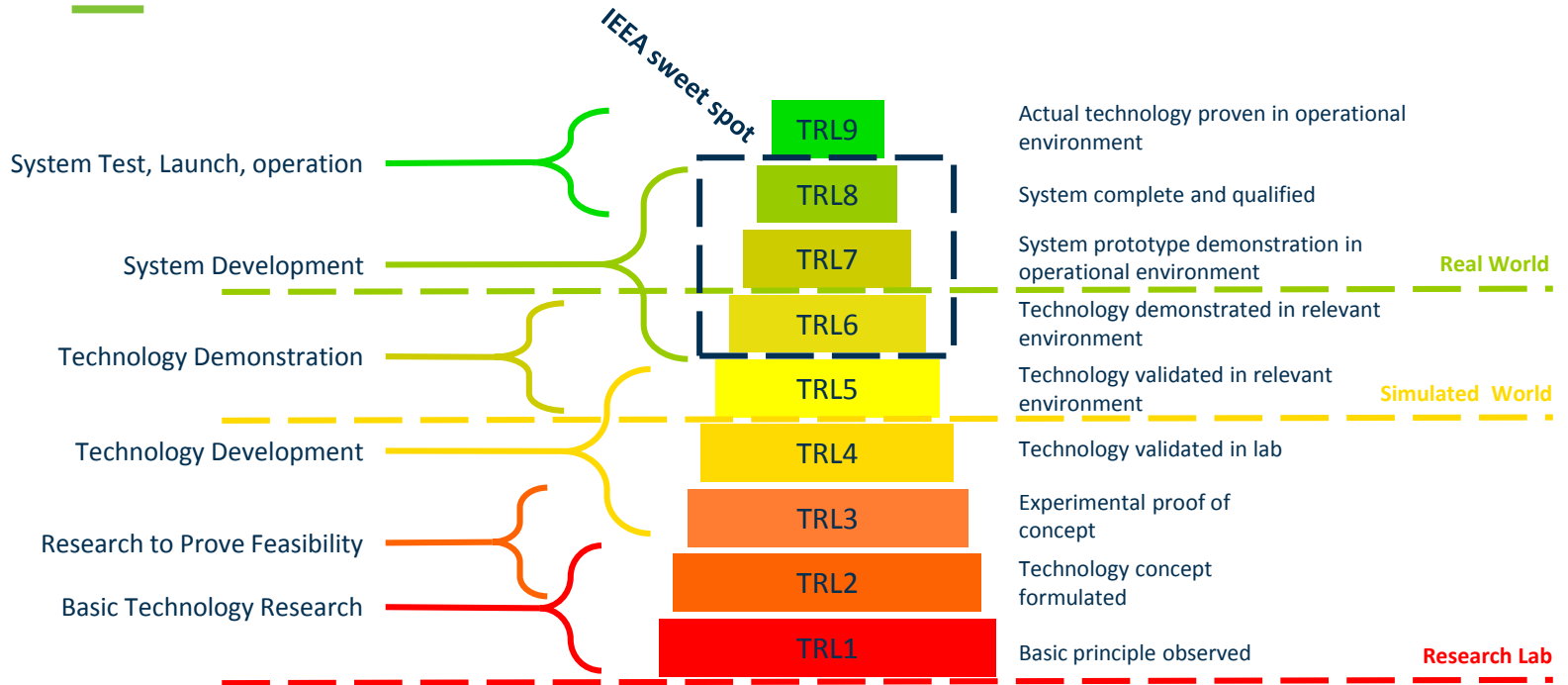
Session 2

Paul McKinney, The Carbon Trust

Session content

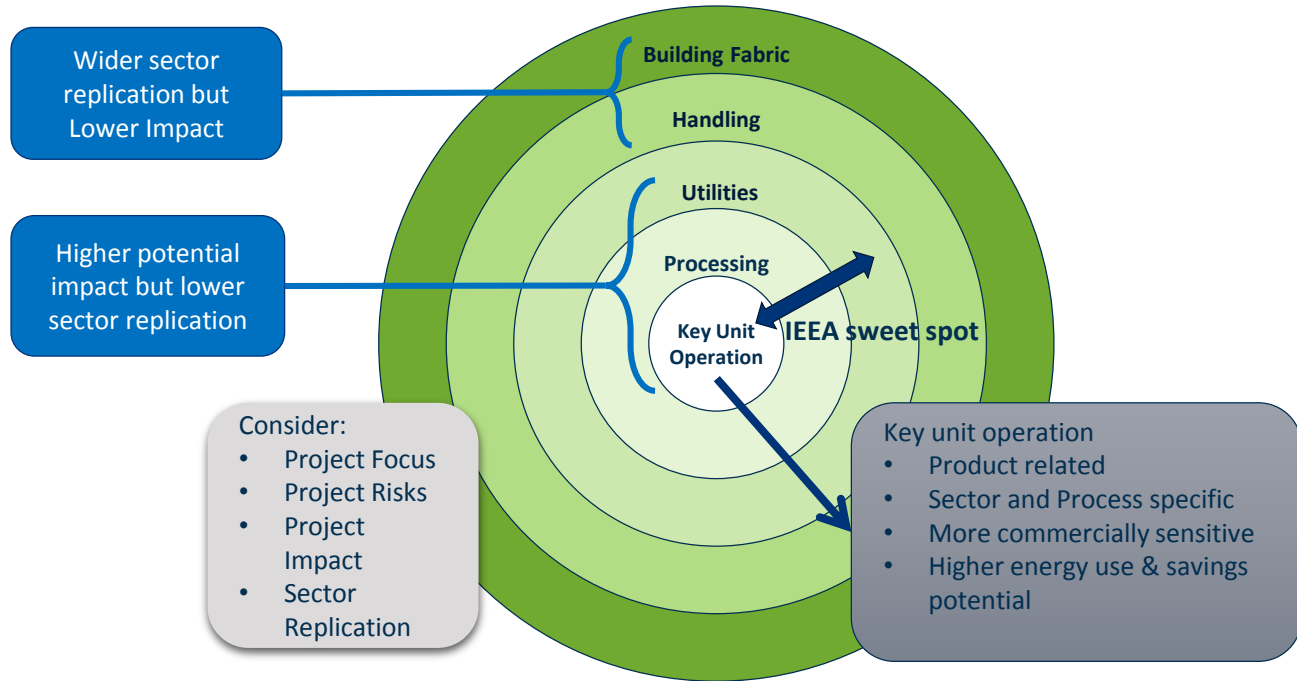
- Plenary session
 - Technology Readiness Level (TRL) focus
 - Technology Buckets & Definitions
 - Technology Categorisation
 - Case Study: What makes for a good technology?
- Session Split:
 - Session 2A for Industry Partners
 - Session 2B for Technology Developers

TRL focus – Between 6 and 8



However, technologies which are TRL 9 in other geographies, or other sectors, may be considered for support.

Focusing on technologies with wide cross-sectoral impact



Technology Categorisation

Technologies can be cross-sectoral or not

Level 1 – Technology themes

1. Process Heating
2. Process Control, Automation and Optimisation
3. Process Equipment
4. Alternative Materials, Sources and Utilities

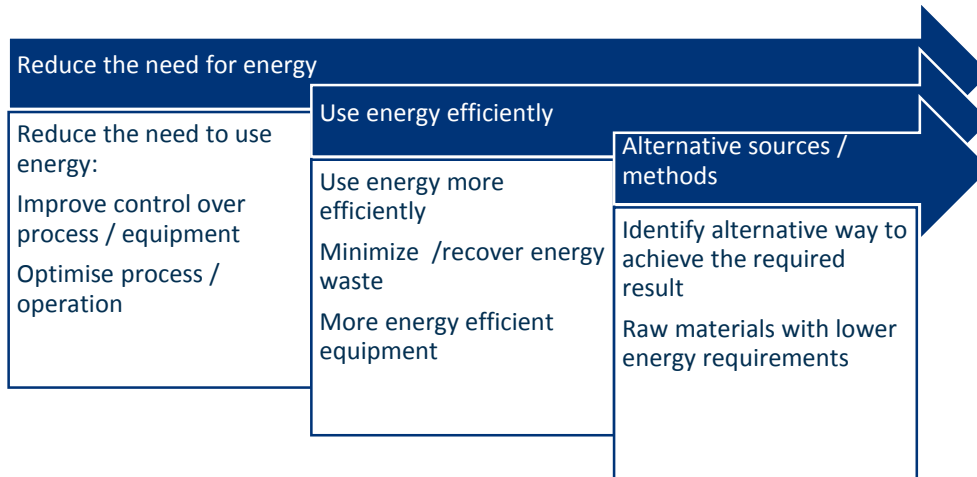
Level 2 – Outcome

1. Reduce energy demand
2. Increase energy efficiency
3. Alternative energy sources / Alternative methods

Level 3 - Technologies

Level 2 - Definitions

- We have grouped together technologies within the four technology buckets (identified to date and played back to Industry)



Technology Buckets Visualisation

Level 1

Process Heating

Process Control,
Automation and
Optimisation

Process
Equipment

Alternative
Materials,
Sources and
Utilities

Level 2

Reduce the need
for energy

Use energy
efficiently

Alternative
sources / methods

Level 3

- Technology
- Technology

- Technology
- Technology

- Technology
- Technology

Technology Buckets Visualisation

Level 1

Process Heating

Process Control,
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Technology Buckets Visualisation

Level 1

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Automation and
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for energy

Use energy
efficiently

Alternative
sources / methods

Level 3

- Technology
- Technology

- Technology
- Technology

- Technology
- Technology

1. Process Heating

Reduce the need for energy

- Segmented Heater
- Materials with reduced energy requirements
- Paired Straight Hearth Furnace

Use energy efficiently

- Waste heat recovery
- Insulation
- Flash Condensing with Steam
- Burners

Alternative sources / methods

- Microwave
- Superheat steam
- Heat pumps
- CHP
- Infrared heating
- Induction heating

2. Process Control, Automation and Optimisation

Reduce the need for energy

- Humidity / temperature control
- Integrated electrical controls
- Cleaning verification
- Infrastructure Loss Reduction
- Modelling and simulation

Use energy efficiently

- Moisture profile control
- Tunnel Pasteurizer Optimisation
- Handling processes

Alternative sources / methods

- Low-Temperature Pasteurization
- Ultrasonic Cleaning
- Advanced Electrolysis Techniques

3. Process Equipment

Reduce the need for energy

- Pre-treatment
- Pre-Conditioning
- Good equipment design

Use energy efficiently

- More efficient dewatering
- Emerging Grinding Technologies
- Efficient screening
- Servo drives

Alternative sources / methods

- Microwave Drying
- Energy saving separation
- Microfiltration and Ultrafiltration
- Optimized drying processes

4. Alternative Material, Sources and Utilities

Reduce the need for energy

- Additives to Raw Materials
- Low-energy products
- Redesign of process equipment
- Scheduling, planning, batching
- Pre-treatment

Use energy efficiently

- Heat Pumps
- CIP – Novel technologies
- Utilities generation efficiency

Alternative sources / methods

- Electrification of processes
- Induction heating
- Superheated Steam
- Biomass gasification

Summary of technology buckets and examples

Process Heating

- Induction heating
- Pasteurisation
- Microwave
- Waste heat recovery
- Superheated steam
- Drying technologies

Alternative Material, Sources and Utilities

- Heat Pumps
- Low energy products
- Electrification of processes
- Biomass gasification
- New / optimised refrigeration technologies
- CIP - Low-Temperature Detergents
- Materials with reduced energy requirements
- Additives to Raw Materials

Process Equipment

- Membrane Technology / RO
- Emerging Grinding Technologies
- New CIP technologies
- Energy saving separation
- Servo drives
- UV Sterilisation
- Efficient screening
- Good equipment design
- Microfiltration and Ultrafiltration

Process Control, Automation and Optimisation

- Avoiding pre-cooking
- Low-Temperature Pasteurisation
- Integrated electrical controls
- CIP – real time cleaning verification
- Heat management with CHP
- Selective Batching
- Modelling and simulation
- Hydraulic Mapping
- Humidity Control

Case Study: Ice pigging for dairy applications

Method of cleaning pipework using an ice slurry

Ice Pigging for Dairy Applications



- **Main Applicant:** University of Bristol
- **Partners:** Yeo Valley, BV Dairy
- **TRL:** 5-6
- **Demonstration Capital Cost:** £497,000
- **Funding received:** £198,800 (£40%)
- **Intellectual Property:** Sold to Suez

Value from	Standalone	Integrated
Product Recovery	£190,000	£190,000
Reduced downtime	N/A	£306,000
Total cost (annualised)	£58,000	£133,000
<i>Net benefit</i>	<i>£132,000</i>	<i>£364,000</i>
<i>Payback</i>	<i>1.6 years</i>	<i>2.2 years</i>
<i>Potential sector CO2 reductions</i>	<i>N/A</i>	<i>23,000 tonnes/year</i>
<i>Replicability</i>	<i>Has become vastly commercial</i>	

Rest of Session 2 – Session 2a & 2b

Session 2a - Industry Partners

Objective: Help us identify and review relevant technologies

- Split in 2 groups to review 2 tech buckets each
- Free to decide which group to go to
- Make sure the groups are balanced

Session 2b - Technology Developers

Objective: Capture the risks of deploying innovative technology and discuss how the IEEA can help overcome these.



Session 2a

Paul McKinney, The Carbon Trust

Andrew Moore, Amec Foster Wheeler

Session 2a – IPs – Workshop questions

Briefly review the prioritised technology lists. Answer these questions:

1. Looking at the high level technology descriptions, which ones present the biggest opportunity for your site? Or are there others we are missing?
2. For which of these are demonstrations projects feasible, and likely to have an impact?
3. What would be the impact at your site(s), across your sector, and cross sectorally?

Technology Bucket– For IPs

Reduce the Need For Energy

[Consider Technologies / Methods that reduce Energy needs]

Use energy Efficiently

[Consider Technologies that use energy more efficiently]

Alternative Sources / Methods

[Identify Alternative ways to achieve required result]



Session 2b

Al-Karim Govindji, The Carbon Trust

Keir McAndrew, Amec Foster Wheeler

Key discussion points to address for Technology Developers (TDs)

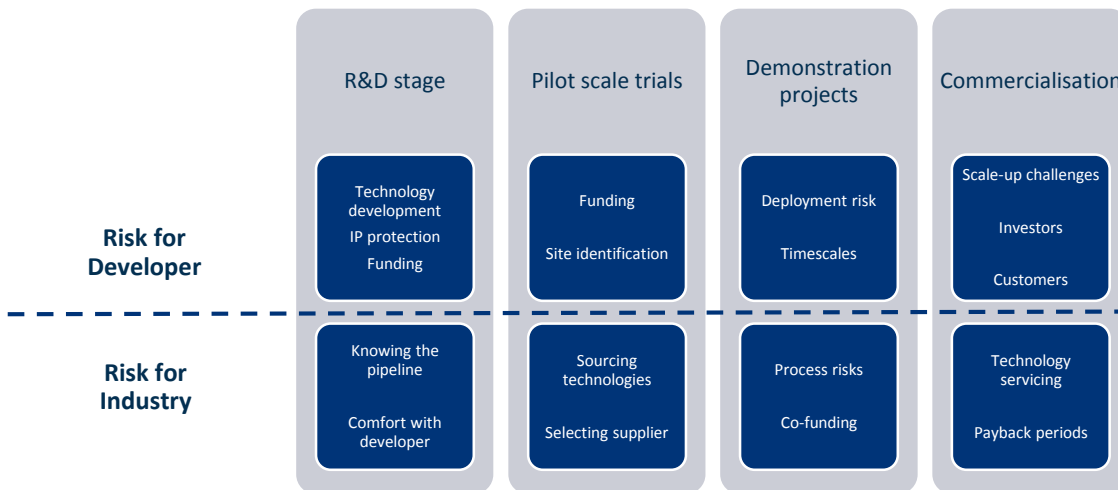
Session Discussions Aims

- Capture the risks of deploying innovative technology and
 - Discuss how the IEEA can help overcome these.
1. 1 minute each – Technology, TRL and Sector (you will have an opportunity later to present your technology solution to the IPs)
 2. How can risks be minimised
 3. Finding partners
 4. Incubation services – the services we plan to make available
 5. Summary of discussion on technologies, gaps, other challenges

1. One minute overview of the technology

1. What is the problem the technology addresses
2. What is its unique feature(s)
3. Which sector(s) are you targeting

2. How do you overcome risks



1. Which are the most significant risks and barriers to getting industry to take up your technology?
2. How do you go about overcoming or mitigating these risks as developers? How do you industry get comfortable?
3. How can you and IEEA help Industrial Partners overcome or minimise the risks?

3. Identifying partners

- Do you develop your technology for specific customers, or in response to industry need hoping to find customers in future?
- Have you already developed partnerships and/or do you have prospective customers now for your innovative technologies?
- The IEAA will support companies on brokerage activity

1
Network
Events

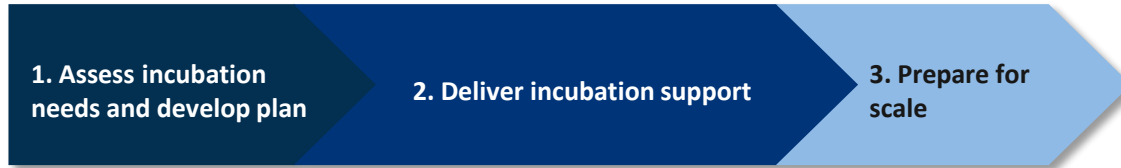
2
Online
Matchmaking

3
1-2-1 Advice

- What activities should we undertake to maximise the effect of this?

4. Incubation support is also available

The technology developers in successful project applicants will have access to the Carbon Trust's bespoke incubation offering:



- **Assess project incubation needs**
- Prioritise and develop a **bespoke incubation** plan to address key adoption, commercialisation and deployment gaps

- Prioritised support** across 8 core areas:
- Market
 - Sales & business development
 - Strategy & business planning
 - Technology & intellectual property
 - Product
 - Supply chain and operations
 - Team
 - Funding

- Support for up to **6 months after the project**:
- Skills strengthening
 - Business model refining
 - Marketing literature
 - Awareness raising
 - Building sales pipeline
 - Assess to financing

- What types of support are likely to be most relevant?
- What help exactly would you be looking for?

5. Does your technology(ies) fit the IEEA?

1. Given the broad buckets we have seen, which area does your technology fit?
2. How feasible do you feel your technology is to deploy?
3. How will your technology impact across the sector(s)?
4. Could funding help fund a demonstration?
5. Are there any technologies which haven't been adopted which could re-invigorated with a demonstration project?
6. What would help you kick-off an application?



Session 3

Al-Karim Govindji, The Carbon Trust

The IEAA – Overview of the competition [Recap]

Competition – support for novel and high impact technology demonstration projects

Services on Offer:

- i. **Funding:** ~£150k - £750k of capital support, although higher funding is available for high impact projects (implying typical total projects costing between £300k and £1.5m)
- ii. **Incubation:** Incubation support for Technology Developers
- iii. **Programme Support:** For example, pre-deployment assessment

Funding Intensity: Typically up to 40-60% capital support of eligible costs

Joint Partnership: Joint industrial and technology developer applications are encouraged

Eligibility (in more detail)

Tier 1 Requisites

- ✓ **Target Institutions:** The IEEA phase 1 competition is open to the private sector and universities
- ✓ **Secured match funding:** All companies and partners must have match funding, this can be in the form of capital and/or in-kind contributions
- ✓ **Secured UK demonstration site:** The project consortium must have a demonstration site secured; technology companies who do not have a demonstration site may advertise for a partner through the IEEA website
- ✓ **Novel Technology or Application:** Application of a novel technology or a commercial technology in a novel and high impact application (ideally TRL 6-8)
- ✓ **Industrial Focus:** The project must demonstrate benefit to the manufacturing sector
- ✓ **Sign up to BEIS T&C's:** Projects will be required to sign up to BEIS terms and conditions (the contracting party)
- ✓ **Comply with state aid rules**

Tier 2 Project Impact

Successful projects must clearly demonstrate:

- ✓ Strong energy and CO2 savings potential
- ✓ A scalable industrial application
- ✓ Commercial potential
- ✓ Value for money
- ✓ Ability to deliver against project plan
- ✓ Ability to leverage a high proportion of non-IEEA funds

Available Funding: How much co-funding can you get for your project?

Funding	~£9m
Number of projects	Up to 20 projects are anticipated
Project £Co-funding Available	Typical BEIS co-funding ~ £150k to £750k contribution to eligible costs (potentially more for exceptional high impact projects)
Funding Intensity	Target funding intensities will typically be 40%-60% to maximise value for money
Funding Intensity Cap	Intensity capped by state aid limits i.e. combined public support cannot exceed these.

EU State Aid Limits

EU State Aid Guidance	Small Enterprise	Medium Enterprise	Large Enterprise
Industrial Research	70%	60%	50%
Industrial Research with collaboration uplift	80%	75%	65%
Experimental Development	45%	35%	25%
Experimental Development with collaboration uplift	60%	50%	40%

1. Funding intensity cap may be applied at the discretion of BEIS
2. Actual funding intensity will be subject to perceived value of the project
3. See Section 4: Aid for research and development and innovation- Article 25: Aid for research and development project (CR EU) No 651/2014

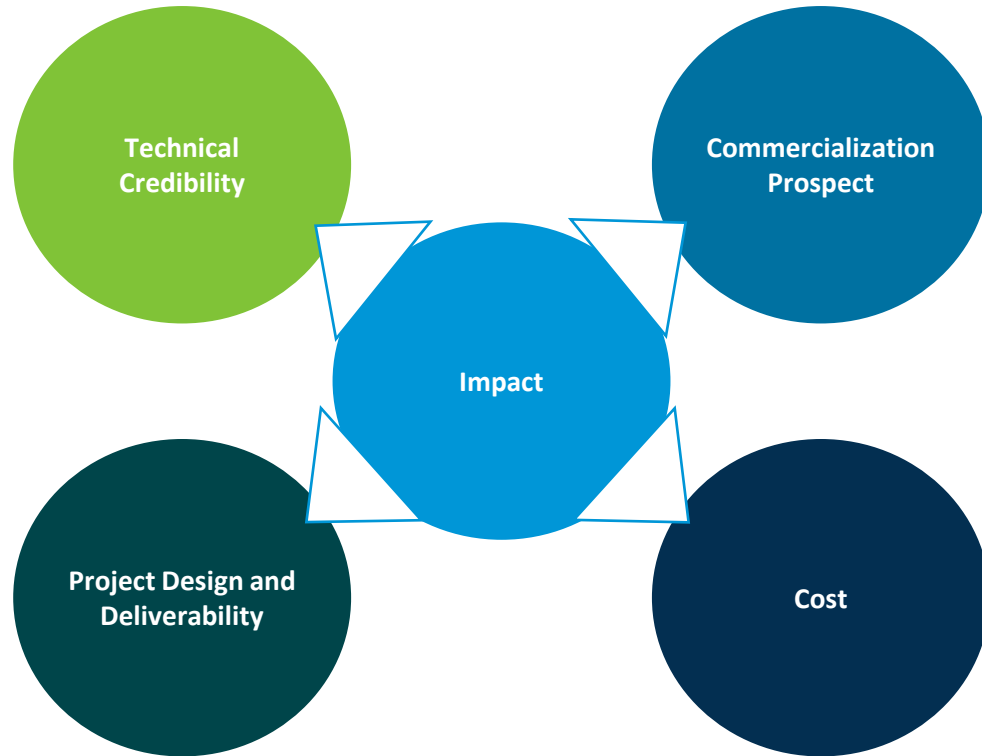
How to establish SME Status

To be recognized as an SME, a business must comply with the staff thresholds and the thresholds for either the balance-sheet total or the turnover.

Micro Enterprise*	<ul style="list-style-type: none"> • Employees < 10 persons • Annual turnover / balance sheet < €2m (approx. £1.4m)
Small Enterprise*	<ul style="list-style-type: none"> • Employees < 50 persons • Annual turnover / balance sheet < €10m (approx. £7m)
Medium Enterprise*	<ul style="list-style-type: none"> • Employees < 250 persons • Annual turnover < €50m OR balance sheet < €43m
Large Enterprise	<ul style="list-style-type: none"> • Employees > 250 persons • Annual turnover > €50m OR balance sheet > €43m

*The definition of an SME distinguishes three types of enterprise, according to their relationship with other enterprises in terms of holdings of capital or voting rights or the right to exercise a dominant influence. For details of the types of enterprise and the corresponding restrictions, please visit http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.187.01.0001.01.ENG (Annex 1 of GBER)

Evaluation Criteria of Applications



Documentation & guidance

Available at www.carbontrust.com from early September

Application
Form

Guidance
Document

BEIS Terms &
Conditions

Get in touch
with us with
questions!

The proposals will need to cover:

- Description of Technology / Process
- Project Team and Technical credibility
- Impact
- Commercialisation Potential
- Proposed Method
- Project Plan & Risk Register
- Work Packages and Milestones
- Project Team
- Outputs
- Financial proposal

What are Eligible Costs?

Funding will only cover eligible costs at given intensity

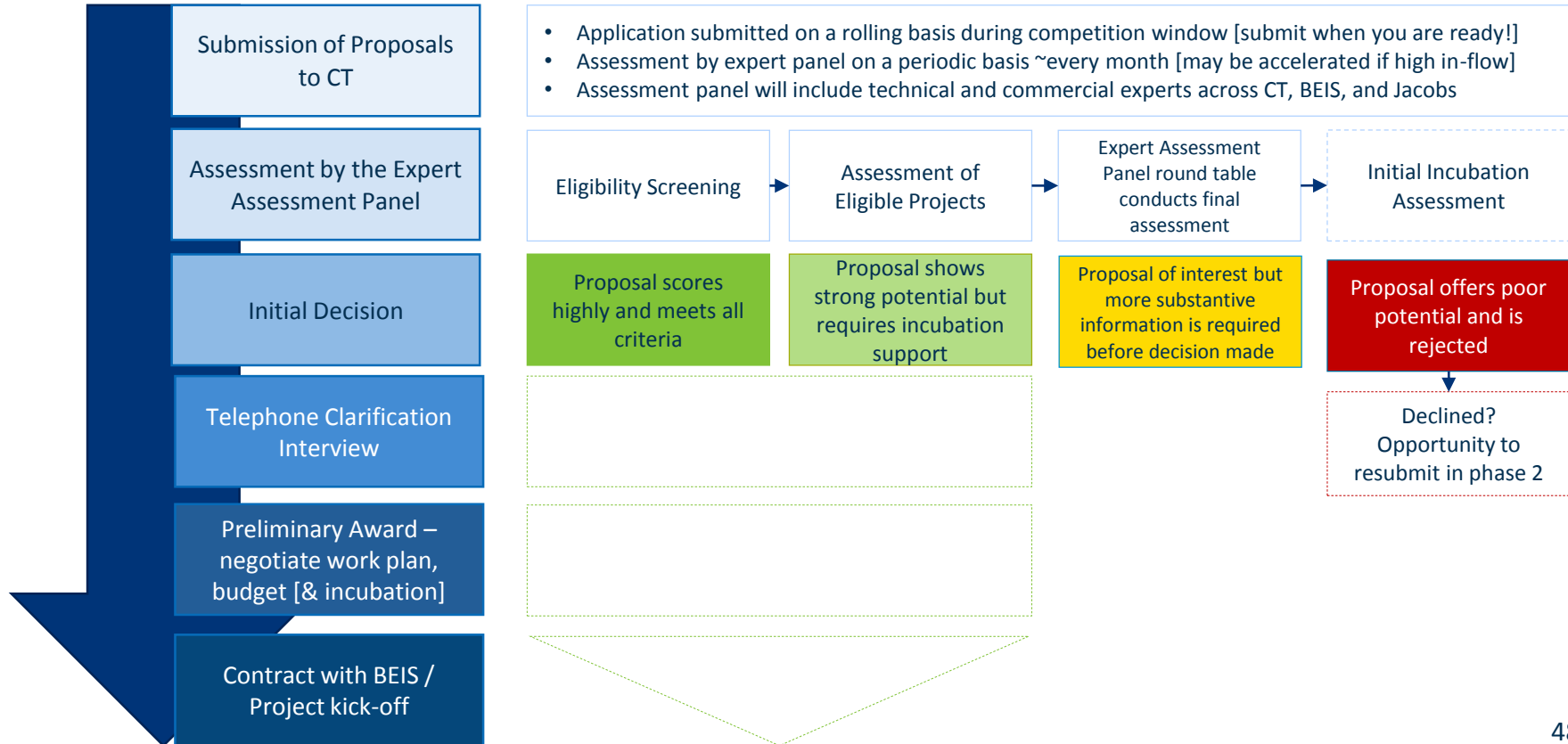
Eligible Costs Definition

- Personnel Costs
- Instrument, equipment, land and premises
- Services
- Additional overheads
- Other operating expenses

Not Covered

- Profit
- Bonuses
- Interest payments of any kind
- Dividend payments
- Loss of salaries or consultancy income
- Production and sales costs
- Recoverable VAT
- Direct Sales and Marketing Costs

Application Process [Phase 1 Early September to 31st of January 2017]



Competition Opens Early September 2017

Ready to Apply?

- Pre-existing partnerships between an industrial company and technology developer
- Co-funding is still required to make the business case

Have an industrial partner? Get in touch with us!

- **Phase 1 Timeframe:** The competition will open in early September 2017 and closes on 31st of January 2017.
- **Publication of Application material:** Application form and competition guidance documents will available on the Carbon Trust website in September.
- **Guidance documentation:** includes (i) Full eligibility criteria (ii) evaluation criteria
- **Key success metric :** Total UK impact (cross sectorial energy and carbon savings)
- **Others metrics:** Co-funding leveraged, speed of commercialisation prospect, quality of team



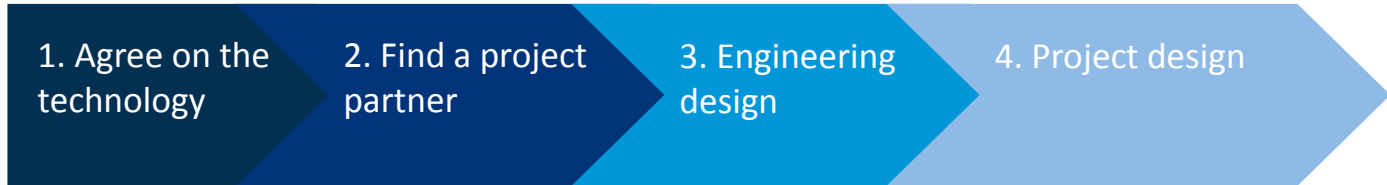
Session 5: Developing Projects

Paul McKinney , Carbon Trust

Andrew Moore, Jacobs

Moving from Technology to Project: What is required?

There are a number of key steps to establishing a successful project:



1. Agree on the technology

1. Agree on
the
technology

What needs to be done

- Identify a technology i.e. assess site requirements, engage with innovators
- Assess the potential impact of the technology for your site(s)
- Assess the likely viability of implementing the technology

Common challenges

- Achieving sufficient visibility over near-commercial sector innovations
- Overcoming unwillingness to consider innovative technologies
- Assessing the potential for scale-up to other sites/applications may be tricky

How the IEEA can help

- IEEA support materials such as an indicative list of potentially impactful energy efficiency projects
- Networking and brokerage sessions will provide exposure to available technologies

2. Find a Project Partner



2. Find a
project
partner

What needs to be done

- Map the different suppliers of the technology
- Determine key criteria for partners i.e. size, existing partner
- Engagement with suppliers


Common challenges

- If the technology was identified through site needs, a suitable technology supplier may not be known
- May only be one supplier, or only suppliers to other sectors
- Supplying sufficient evidence of viability may be tricky for some innovative technologies

How the IEEA can help

- Networking and brokerage sessions will be held throughout the competition window
- A remote brokerage platform will be available through the IEEA website
- IEEA projects partners may be able to provide bespoke advise/brokerage

3. Engineering Design



3. Agree on
the site

What needs to be done

- Determine the desired size/scale for the demonstration i.e. whole plant or portion
- Find a suitable site
- Engineering specifics i.e. throughput, operating temperature, performance specifications
- Identify risks and de-risking mechanisms

Common challenges

- Often a trade-off between potential energy savings and operational risk
- It is often hard to run a technology demonstration across only part of a site
- Benchmarking performance can be tricky unless suitable monitoring is already in place
- Installation may require a plant shutdown

How the IEEA can help

- Pre-installation support available i.e. identifying risks, baselining and monitoring

4. Project Design

What needs to be done

- Cost the project and develop the business case
- Identify and locate roles and responsibilities, including ownership
- Develop project management (inc. timing and resourcing), MRV and O&M strategies

Common challenges

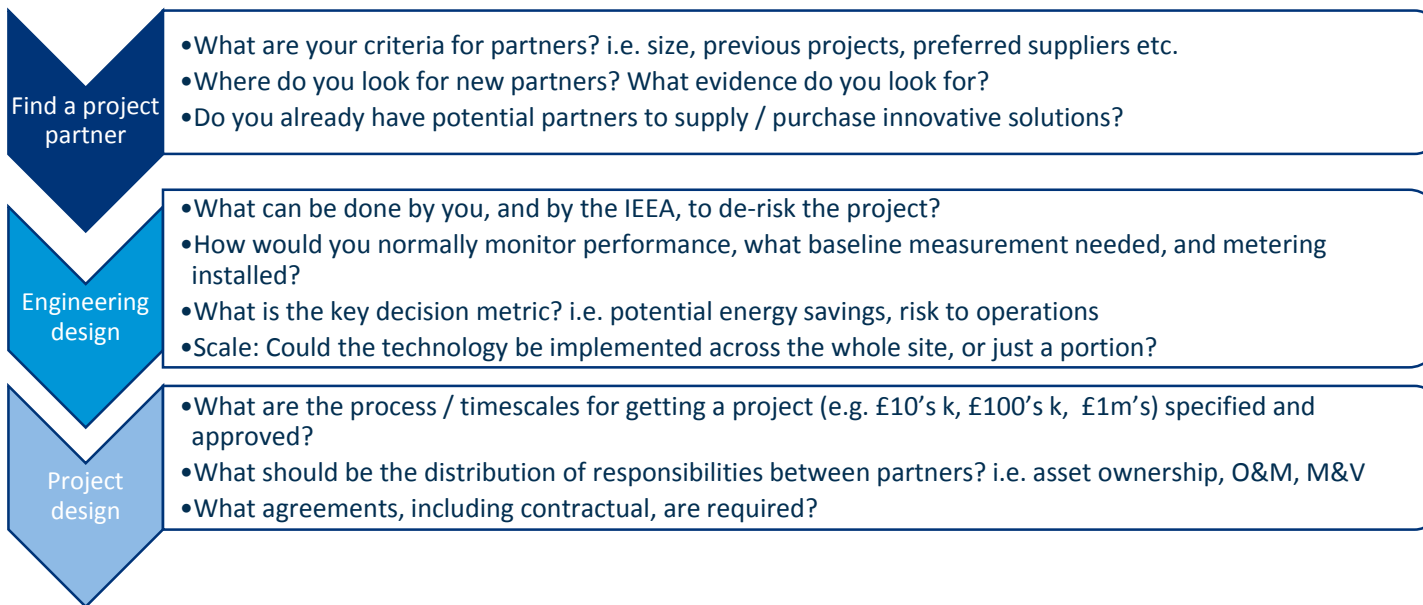
- Only high-level cost estimates may be available for near-commercial technologies
- Strong communication is required between project partners
- Planning and decision processes and timescales can be obstructive

How the IEEA can help

- Financial and in-kind support can be provided to both partners
- Support in developing the project plan will be provided to competition winners
- Ongoing incubation support may include business planning and project management capacity building

Group discussions (1/2) – Moving to projects

Please discuss and answer the following questions:



In general, what could the IEEA do to further support you in this process?

Group discussions (2/2) - Shared understanding of needs

Above all a successful project an understanding of each partner's needs

Please discuss in your group:

What are IP's looking for from TD's?

- Project plan
- Support
- Trial
- TD's Process understanding
- Risks assessment

What are TD's looking for from IP's?

- Availability and access
- Support
- Commitment

What are IP's looking for from IEEA?

- Independent verification
- ...

What are TD's looking for from IEEA?

- Funding

Review of priority technologies from Session 2a

If time, consider the following questions:

- Now you are in sector groups, which are the priority areas? Which have most potential for taking forward as demonstration projects?
- What else is needed to progress projects in the key areas?
- How can IEEA and the partners further de-risk the projects?
- What projects could you take forward? How will you find the right partner?
- What can we do to help you find the right partner?

Next Steps: Get in touch with ideas!

Start to think about:

- Projects
- Partnerships
- The application process
- Funding

Have you already got a technology to demonstrate and a site?

- We are keen to fund some demonstrations to commence as soon as possible
- Get in touch with the IEEA team to discuss your application
- TDs and IPs to let us know their offer/needs for brokerage
- Verify you are eligible
- Submit proposal as soon as possible

- The competition will open in September. Application forms and supplementary materials will be provided on the IEEA [website](#)
- Technology developers can submit potential ideas via this [form](#)
- Enquiries should be sent to ieea@carbontrust.com



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