

Technology Innovation Needs Assessment (TINA)

UK best practice on low carbon innovation

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A decorative graphic at the bottom of the slide consisting of three overlapping, wavy bands in shades of blue, ranging from a light sky blue to a dark navy blue.

Agenda

- › The Carbon Trust
- › The UK innovation ecosystem
- › TINA methodology
- › Impacts of the TINAs in the UK

The Carbon Trust



- › We are an independent, not-for-profit organization created by the UK government in 2001 to accelerate the **move to a sustainable, low carbon economy**
- › Key part of the UK's **low carbon innovation** and **energy efficiency** strategy
- › Impartial partner of leading organisations around the world, helping them contribute to and **benefit** from a more sustainable world
- › Working internationally since 2010 – operating worldwide with 170 employees from offices in London, Washington, Beijing, Mexico City and Johannesburg.

Our mission is to accelerate the move to a sustainable, low carbon economy

We help our clients benefit from the opportunities of sustainable, green growth



ADVICE

Business Advice

Helping businesses capture the opportunities in a sustainable low carbon world

Government Advice

Providing cutting-edge policy advice and insights on the transformation of markets

Public Sector Advice

Enabling the public sector to cut costs and emissions

FOOTPRINTING

Measuring

Understanding the environmental impact of an organisation, product or service

Certifying

Providing independent verification of organisational or product footprints to endorse sustainable leadership



TECHNOLOGY

Implementation and Finance

Providing expertise and support to businesses to put energy efficiency plans into action



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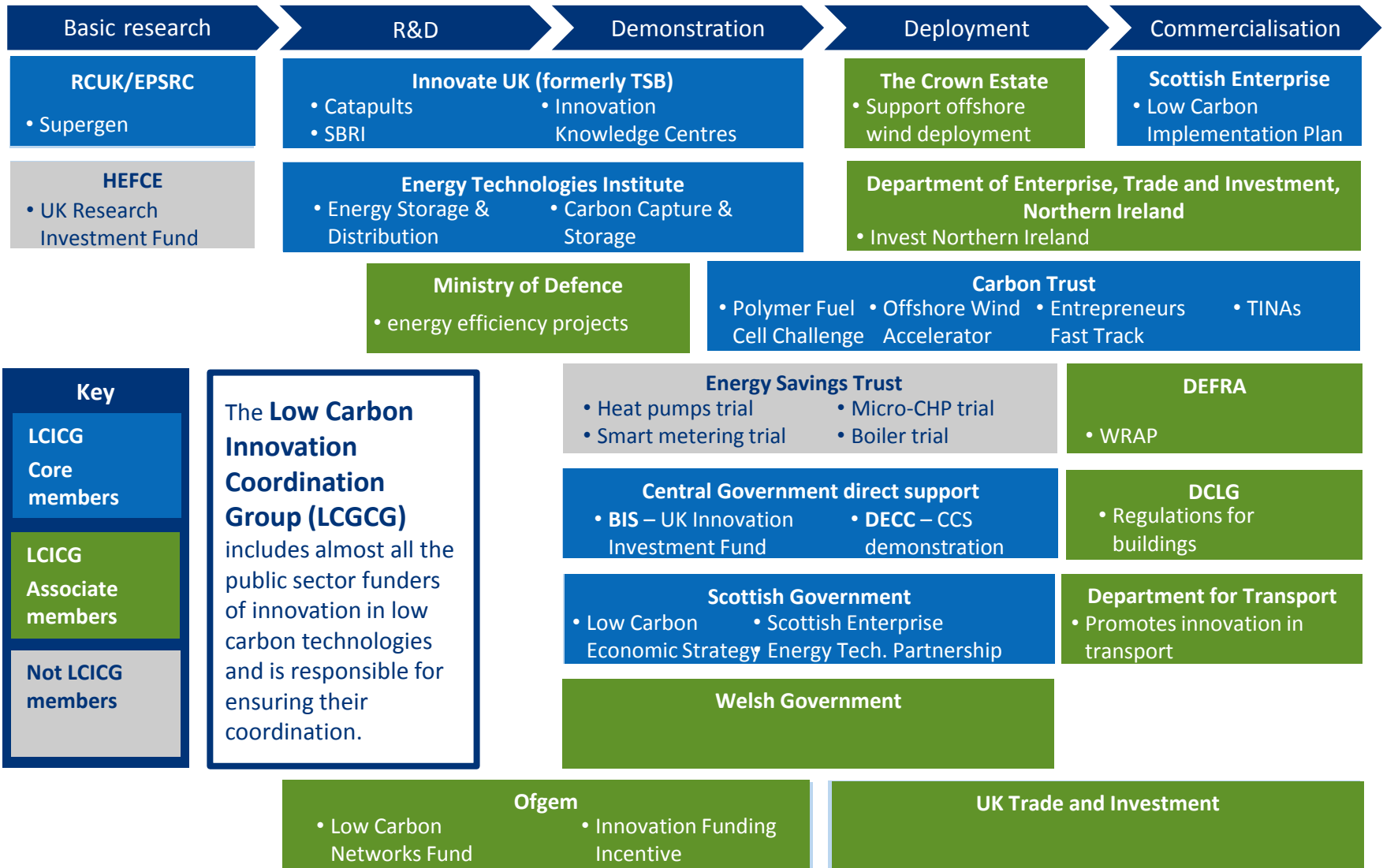
Innovation

Partnering with companies and governments to overcome barriers to innovation and create value from clean technology

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The UK has many public innovation support bodies, mostly coordinated by the LCICG



Note: Programs listed here are just some examples and activity may spread further across the maturity range than as depicted here

Significant effort is spent coordinating UK innovation activity on a national basis

- › The UK had a large coordination challenge, so it created the Low Carbon Innovation Coordination Group (LCICG)
- › Having created a coordination body it is very important to give it the right tasks and responsibilities
- › The LCICG initially focused on analysing and building consensus on priorities **internally** through the TINAs
- › More recently the LCICG has focussed on communicating its consensus views **externally**

LCICG
Low Carbon Innovation
Co-ordination Group



Technology Innovation Needs Assessments (TINAs)

- The Carbon Trust developed and delivered the TINAs with the UK's major public sector backed funding and delivery bodies in the area of 'low carbon innovation'



- The TINAs aim to identify and value the key innovation needs of specific low carbon technology families to inform the **prioritisation** of public sector investment in low carbon innovation
- The TINAs apply a **consistent methodology** across a diverse range of technologies, and a comparison of relative values across the different TINAs is as important as the examination of absolute values within each TINA

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TINA purpose and framework

TINA: Technology Innovation Needs Assessment

Purpose: To inform government decisions by providing a robust and consistent evidence base on the innovation needs of technologies likely to be important in delivering the UK's energy and climate change targets and/or economic benefits across low carbon technologies

Application: Can be applied to any technology area, though most successful and impactful applications have been for those at very early stages of development

Framework:

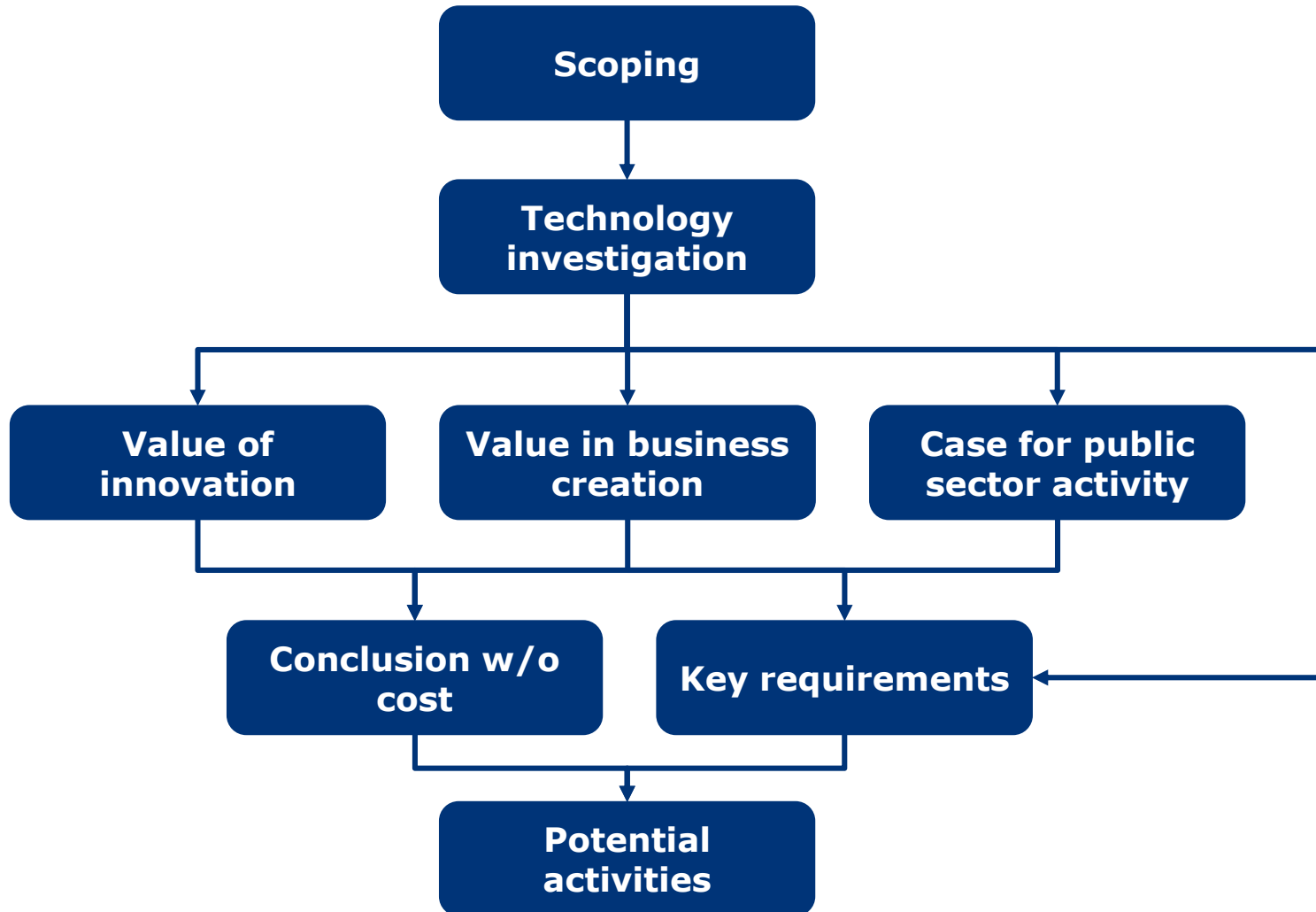


Prioritising low carbon technologies for innovation support – how the UK did it

UK carbon abatement vs. economic value creation potential

UK Carbon abatement potential	H	<ul style="list-style-type: none"> • Biomass CCS 	<ul style="list-style-type: none"> • Nuclear fission • Appliances • Lighting • Biomass to power • <i>CO₂ transport/storage</i> 	<ul style="list-style-type: none"> • Building materials/design • Gas CCS • Electric vehicles • Heat pumps • Improved ICE vehicles • LCL biofuels • Offshore wind • Onshore wind • <i>Electric grid technologies</i>
		<ul style="list-style-type: none"> • Biogas (BioSNG and AD) • Biomass to heat • High efficiency CCGT • Rail (Diesel/Electric) • Marine transport • <i>Thermal storage</i> 	<ul style="list-style-type: none"> • Hydroelectric (small/large) • Conventional heat/cooling • Solar hot water • Small power fuel cells • <i>Hydrogen prod./storage</i> 	<ul style="list-style-type: none"> • Coal CCS • Hydrogen FCV • Solar PV
	L	<ul style="list-style-type: none"> • Geothermal • Solar thermal electric • Community CHP • Small wind • Nuclear fusion • MicroCHP 	<ul style="list-style-type: none"> • Large power fuel cells • Tidal (stream/range) 	<ul style="list-style-type: none"> • Wave • Aviation
		<p>NOTE: This analysis is now out of date, presented for illustration only</p>		
		L	Economic value creation potential for UK business	H

TINA process in practice

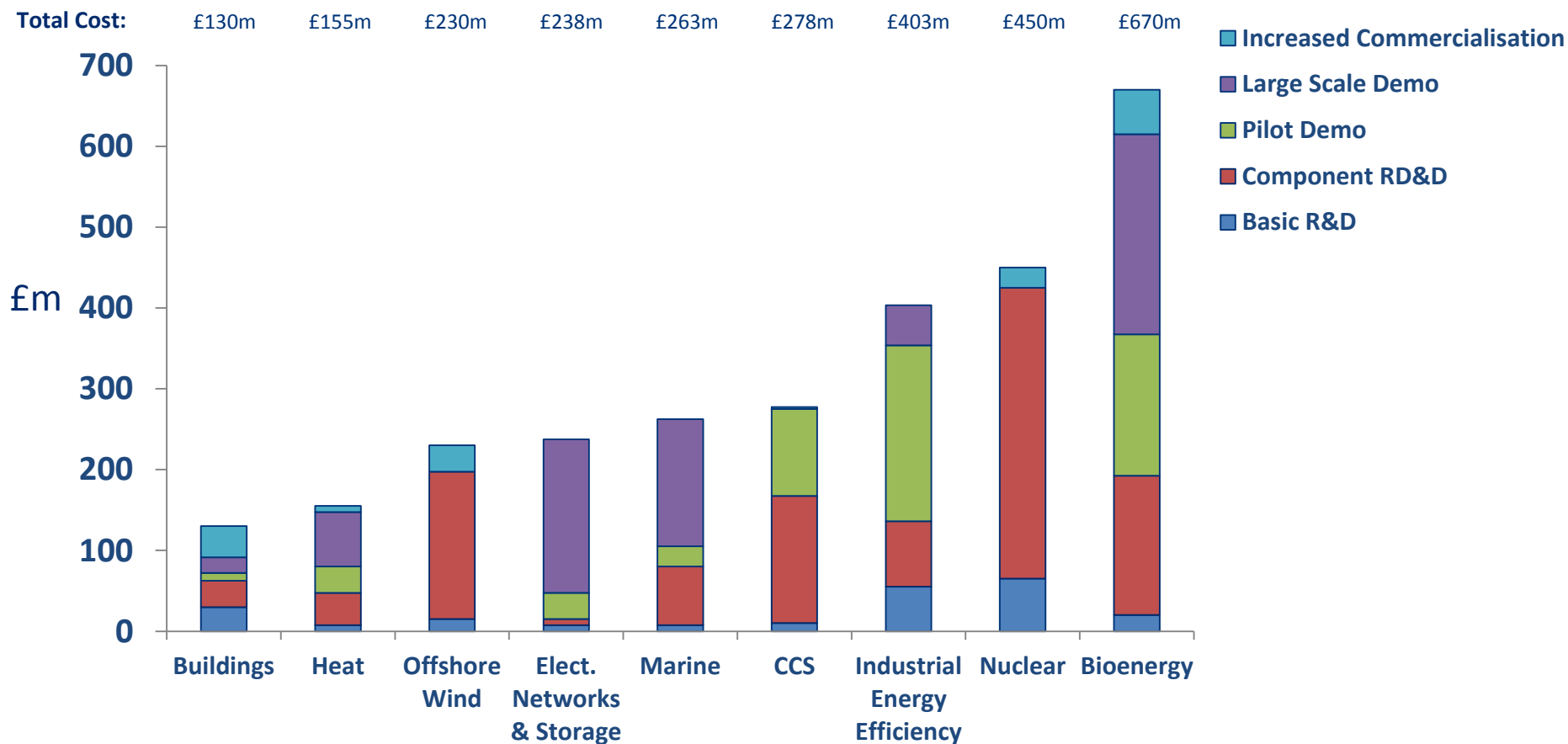


Identified innovation programmes in offshore wind

Sub-area	Key areas for public sector innovation activity/investment	Desired outcomes	Estimated total costs, 2010-15	Est. public sector contrib. ¹	Rough benefit / cost ²	Other benefits ³
Turbine	<ul style="list-style-type: none"> Scale up funding for test facilities, new concepts, data pooling 	<ul style="list-style-type: none"> "Disruptive" technology enters market 	c. £430mn	Up to £100mn	Medium	<ul style="list-style-type: none"> All areas will support the deployment of lower cost offshore wind, thereby generating fuel poverty and energy security benefits Foundations, installation and O&M may lead to more specific community benefits
	<ul style="list-style-type: none"> Provide funding for monitoring 	<ul style="list-style-type: none"> Validated models for designing optimised arrays 	£20mn	£5mn	High	
	<ul style="list-style-type: none"> Develop supply chain capability 	<ul style="list-style-type: none"> Encourage investment in UK turbine supply chain capability 	£100mn	£20-30m	tbd	
Foundation	<ul style="list-style-type: none"> Funding for manufacturing development of deep water foundations 	<ul style="list-style-type: none"> Scale manufactured foundations 	£100mn	£35mn	High	
Collection & transmission	<ul style="list-style-type: none"> Scale up funding to incentivize supply chain to respond 	<ul style="list-style-type: none"> Effective solution identified and exploited 	£15mn	£3mn	High	
Installation	<ul style="list-style-type: none"> Funding to build and test new vessels / barge 	<ul style="list-style-type: none"> Optimised process from foundation manufacture to sea bed installation 	£170mn	£45mn	High	
O&M	<ul style="list-style-type: none"> Funding to build and trial novel vessels and access systems 	<ul style="list-style-type: none"> Validated low cost O&M approached 	£25mn	£6mn	High	

The UK TINAs recommended 135 programmes costing ~£2.8bn. Limited budgets necessitate further programme prioritisation

TINA programmes by technology area and focus



Using the TINA criteria programmes can be prioritised to match the available funding

Top 10 prioritised UK innovation programmes

TINA	Subarea (each subarea has specific innovation programmes attached to it)	Value of Innovation Savings to the UK (Ranked)	Value of UK Business Creation (Ranked)	UK Competitive Advantage	Extent of Market Failures	Rely on others	Benefit of UK Investment
Offshore Wind	Turbines (yield/reliability)	Green	Green	Green	Green	Green	Green
Ind. EE	Low Carbon Cement	Yellow	Red	Green	Green	Green	Green
Ind. EE	Low Carbon Cement	Yellow	Red	Green	Green	Green	Green
Nuclear	Waste Management, Reprocessing, Storage	Red	Red	Yellow	Green	Green	Green
Nuclear	Waste Management, Reprocessing, Storage	Red	Red	Yellow	Green	Green	Green
Offshore Wind	Turbines (yield/reliability)	Green	Green	Green	Green	Green	Green
Heat	Heat Pumps (design ...)	Green	Red	Red	Green	Green	Green
Offshore Wind	Installation	Green	Yellow	Green	Green	Green	Green
Offshore Wind	Foundation (30-60m)	Green	Green	Green	Green	Green	Yellow
Bio	Woody/grassy crops	Yellow	Yellow	Yellow	Green	Green	Green

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The TINAs have had both direct and indirect impacts on UK policy making and have the potential for increased impact



Intended use

- › Create a robust, shared knowledge base to guide government R&D investment decisions
- › Create a common understanding of innovation needs and the case for support to facilitate coordinated planning between LCICG members
- › Allow cross-comparison and prioritisation of R&D needs between and within technology areas
- › Provide government with the evidence needed to send clear messages to developers about UK priorities and approach

Broader use

- › Informing academic and university research
- › Feeding into the UK policy debate
- › Providing a key part of the evidence base to guide government's decarbonisation and technology strategy, linked to medium term carbon budgets

Increased impact

- › The Carbon Trust is now working with the British government to explore additional ways in which the TINAs could have impact
- › This could include the tailoring and application of the methodology to other countries

The TINAs have been very successful in achieving all their objectives under the **Intended Use** category

Guiding UK investment decisions and allowing between- and within-technology prioritisation

- 85% of programmes supporting low carbon technologies from 2012 onwards target technology needs identified in the TINAs.
- Prioritisation of government funding between technologies corresponds with the recommended prioritisation found in the TINAs.

Creating a common understanding among UK stakeholders

- Each TINA undergoes a long and complex consultation process involving stakeholders; this has been an effective way of building consensus and resolving conflicts among technology experts, creating a common view

Providing private sector stakeholders with an understanding of government thinking on low carbon innovation

- Industry are involved throughout the TINA process, during interviews and workshops for both data gathering and consensus building
- TINA workshops will often gather all of the major actors in an industry into one room for consensus building exercises: the TINAs act as a conduit that channels government's approach to policy making.

The TINAs have also achieved impact beyond their stated objectives – **Broader Use**

Informing academic and university research

- › The TINAs have multiple academic citations: the Carbon Trust has identified at least 49 instances where the TINAs have been cited in academic publications, of which over 50% pertain to UK-focussed research

Feeding into the UK policy debate

- › The Committee on Climate Change's recent reports on cost reduction in offshore wind and potential cost reduction mechanisms for CCS cite the TINAs as key literature feeding into their research.

Additional analysis on top of the TINAs has informed the following Government projects

- › LCICG Strategic Framework
- › Objective Driven Integrated Programmes (ODIPs)
- › Support for DECC Strategy in the 2015 Comprehensive Spending Review
- › Additional ad hoc policy support

The TINAs could be extended and scaled up to have **increased impact**


- › Extending the TINA scope to consider innovation needs and cost reduction outside of R&D;
- › Including an analysis of the relationship between deployment, innovation and cost reduction;
- › Creating a central set of deployment scenarios to be used for each technology;
- › Shifting to a systems perspective when considering technologies;
- › Including greater detail on potential innovation programmes;
- › Including support for decarbonisation and technology strategy into the TINA scope.

These improvements could be adopted in the tailoring of the TINA methodology to Mexican needs

Thank you

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