



Department  
of Energy &  
Climate Change

# CIR Smart Grids and Cleanpower Role of innovators in changing the industry

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# Agenda

- Introduction
- What is innovation?
- Why is innovation important?
- Some examples...

# DECC Innovation and Engineering Teams Major programmes

## Innovation Policy

Co-ordinating innovation spend in energy across government, not just DECC (DECC is about 20% of total)

Monitoring, designing and evaluating innovation schemes

Owning and developing TINAs

Europe engagement

## Innovation Delivery

Project management/delivery unit

Approx 160 contracts and grants, inc. around 60 SMEs,

Very wide range from nuclear reactors to innovative biomass recycling to lightbulbs

# Science and Engineering Teams (2)

## Energy Engineers

Central engineering experts

Support CSA and policy teams on very wide range of subjects –  
core focus on energy infrastructure

Support to innovation programme

## Technical Energy Analysis

Central engineering and science experts

Core focus on issues around the built environment

Own R&D programme supporting a range of DECC policies



## strawman

Misrepresenting someone's argument to make it easier to attack.

After Will said that we should put more money into health and education, Warren responded by saying that he was surprised that Will hates our country so much that he wants to leave it defenseless by cutting military spending.



## slippery slope

Asserting that if we allow A to happen, then Z will consequently happen too, therefore A should not happen.

Coin Closet asserts that if we allow same-sex couples to marry, then the next thing we know will be allowing people to marry their parents, their cars and even monkeys.



## special pleading

Moving the goalposts to create exceptions when a claim is shown to be false.

Edward Johns claimed to be psychic, but when his 'abilities' were tested under proper scientific conditions, they magically disappeared. Edward explained this saying that one had to have faith in his abilities for them to work.



## the gambler's fallacy

Believing that 'runs' occur to statistically independent phenomena such as roulette wheel spins.

Red had come up six times in a row on the roulette wheel, so Greg knew that it was close to certain that black would be next up. Suffering an economic form of natural selection with this thinking, he soon lost all of his savings.



## black-or-white

Where two alternative states are presented as the only possibilities, when in fact more possibilities exist.

Whilst rallying support for his plan to fundamentally undermine citizens' rights, the Supreme Leader told the people they were either on his side, or on the side of the enemy.



## false cause

Presuming that a real or perceived relationship between things means that one is the cause of the other.

Pointing to a fancy chart, Roger shows how temperatures have been rising over the past few centuries, whilst at the same time the numbers of pirates have been decreasing; thus pirates cool the world and global warming is a hoax.



## ad hominem

Attacking your opponent's character or personal traits in an attempt to undermine their argument.

After Sally presents an eloquent and compelling case for a more equitable taxation system, Sam asks the audience whether we should believe anything from a woman who isn't married, was once arrested, and smelts a bit weird.



## loaded question

Asking a question that has an assumption built into it so that it can't be answered without appearing guilty.

Grace and Helen were both romantically interested in Brad. One day, with Brad sitting within earshot, Grace asked in an inquisitive tone whether Helen was having any problems with a fungal infection.



## bandwagon

Appealing to popularity or the fact that many people do something as an attempted form of validation.

Shamus pointed a drunken finger at Sean and asked him to explain how so many people could believe in leprechauns if they're only a silly old superstition. Sean, however, had had a few too many Guinness himself and fell off his chair.



## begging the question

A circular argument in which the conclusion is included in the premise.

The word of Zorbo the Great is flawless and perfect. We know this because it says so in The Great and Infalible Book of Zorbo's Best and Most Trustworthy Things that are Definitely True and Should Not Ever Be Questioned.



## appeal to emotion

Manipulating an emotional response in place of a valid or compelling argument.

Luke didn't want to eat his sheep's brains with chopped liver and Brussels sprouts, but his father told him to think about the poor, starving children in a third world country who weren't fortunate enough to have any food at all.



## tu quoque

Avoiding having to engage with criticism by turning it back on the accuser - answering criticism with criticism.

The blue candidate accused the red candidate of committing the tu quoque fallacy. The red candidate responded by accusing the blue candidate of the same, after which ensued an hour of back and forth criticism with not much progress.



## burden of proof

Saying that the burden of proof lies not with the person making the claim, but with someone else to disprove.

Bertrand declares that a teaspoon is, at this very moment, in orbit around the Sun between the Earth and Mars, and that because no one can prove him wrong his claim is therefore a valid one.



## no true Scotsman

Making what could be called an appeal to purity as a way to dismiss relevant criticisms or flaws of an argument.

Angus declares that Scotsmen do not put sugar on their porridge, to which Lachlan points out that he is a Scotsman and puts sugar on his porridge. Furious, like a true Scot, Angus yells that no true Scotsman sugars his porridge.



## the Texas sharpshooter

Cherry-picking data clusters to suit an argument, or finding a pattern to fit a presumption.

The makers of Sugarette Candy Drinks point to research showing that of the five countries where Sugarette drinks sell the most units, three of them are in the top ten healthiest countries on Earth, therefore Sugarette drinks are healthy.



## the fallacy fallacy

Presuming that because a claim has been poorly argued, or a fallacy has been made, that it is necessarily wrong.

Recognising that Amanda had committed a fallacy in arguing that we should eat healthy food because a nutritionist said it was popular, Alyse said we should therefore eat bacon double cheeseburgers every day.



## personal incredulity

Saying that because one finds something difficult to understand that it's therefore not true.

Nik drew a picture of a fish and a human and with offensive disdain asked Richard if he really thought we were stupid enough to believe that a fish somehow turned into a human through just, like, random things happening over time.



## ambiguity

Using double meanings or ambiguities of language to mislead or misrepresent the truth.

When the judge asked the defendant why he hadn't paid his parking fines, he said that he shouldn't have to pay them because the sign said 'Fine for parking here' and so he naturally presumed that it would be fine to park there.



## appeal to authority

Using the opinion or position of an authority figure, or institution of authority, in place of an actual argument.

Not able to defend his position that evolution isn't true? Bob says that he knows a scientist who also questions evolution (and presumably isn't a primate).



## appeal to nature

Making the argument that because something is 'natural' it is therefore valid, justified, inevitable, good, or ideal.

The medicine man rolled into town on his bandwagon offering various natural remedies, such as very special plain water. He said that it was only natural that people should be wary of 'artificial' medicines such as antibiotics.



## composition/division

Assuming that what's true about one part of something has to be applied to all, or other, parts of it.

Daniel was a precocious child and had a liking for logic. He reasoned that atoms are invisible, and that he was made of atoms and therefore invisible too. Unfortunately, despite his thinny skills, he lost the game of hide and go seek.



## anecdotal

Using personal experience or an isolated example instead of a valid argument, especially to dismiss statistics.

Jason said that that was all cool and everything, but his grandfather smoked, like, 30 cigarettes a day and lived until 97 - so don't believe everything you read about meta analyses of sound studies showing proven causal relationships.



## genetic

Justifying something good or bad on the basis of where it comes from, or from whom it comes.

Accused on the 6 o'clock news of corruption and taking bribes, the senator said that we should all be very wary of the things we hear in the media, because we all know how very unreliable the media can be.



## middle ground

Saying that a compromise, or middle point, between two extremes is the truth.

Holly said that vaccinations caused autism in children, but her scientifically well-read friend Caleb said that this claim had been debunked and proven false. Their friend Alice offered a compromise that vaccinations cause some autism.

# thou shalt not commit logical fallacies

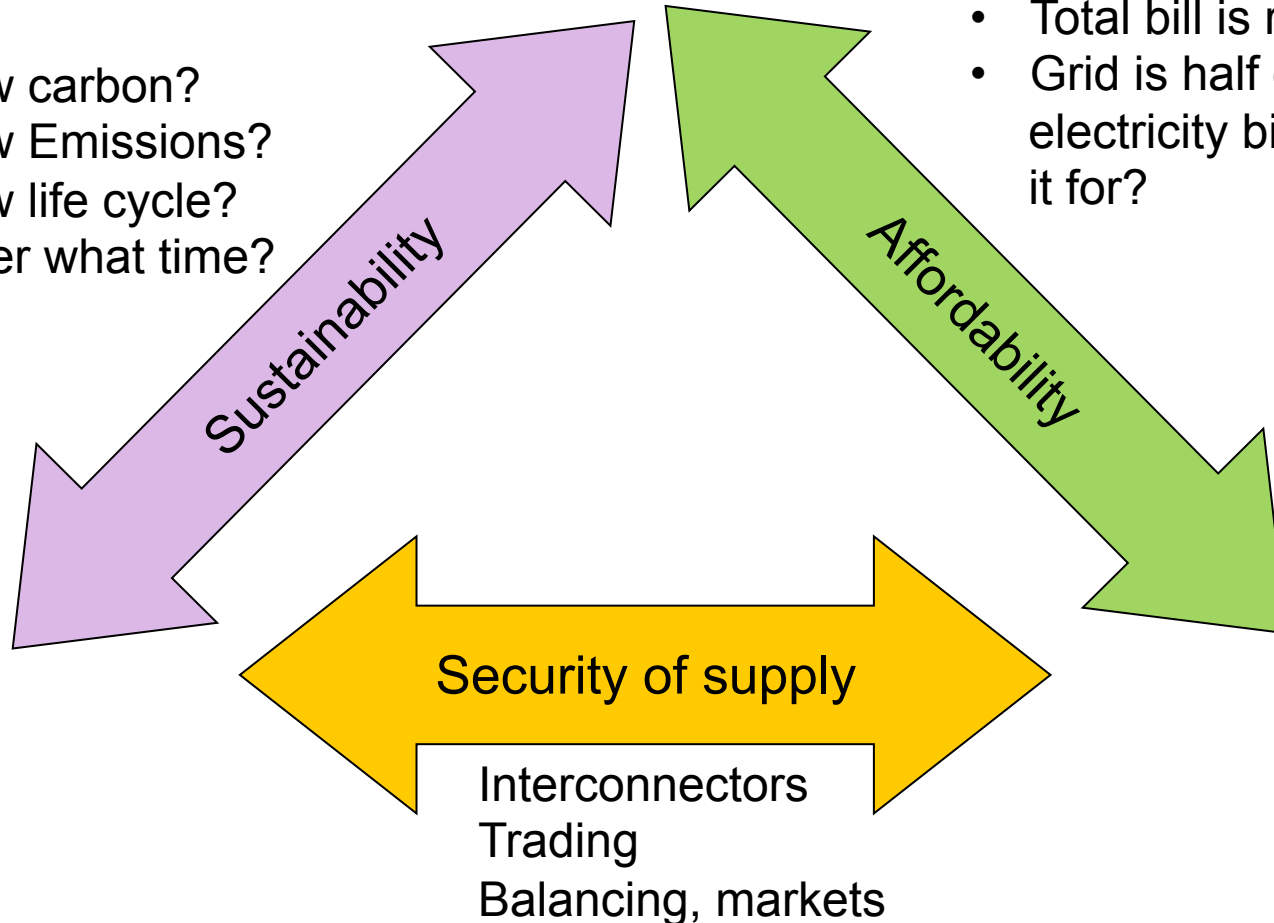
A logical fallacy is a flaw in reasoning. Strong arguments are void of logical fallacies, whilst arguments that are weak tend to use logical fallacies to appear stronger than they are. They're like tricks or illusions of thought, and they're often very sneakily used by politicians, the media, and others to fool people. Don't be fooled! This poster has been designed to help you identify some of the more common fallacies. If you see someone committing a logical fallacy online, link them to the relevant fallacy to school them in thinkiness e.g. [yourlogicalfallacyis.com/strawman](http://yourlogicalfallacyis.com/strawman)

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[yourlogicalfallacyis.com](http://yourlogicalfallacyis.com)

# The Energy Trilemma - We face a “trilemma” of objectives

Low carbon?  
Low Emissions?  
Low life cycle?  
Over what time?



- Total bill is rate + use
- Grid is half of electricity bill – what is it for?

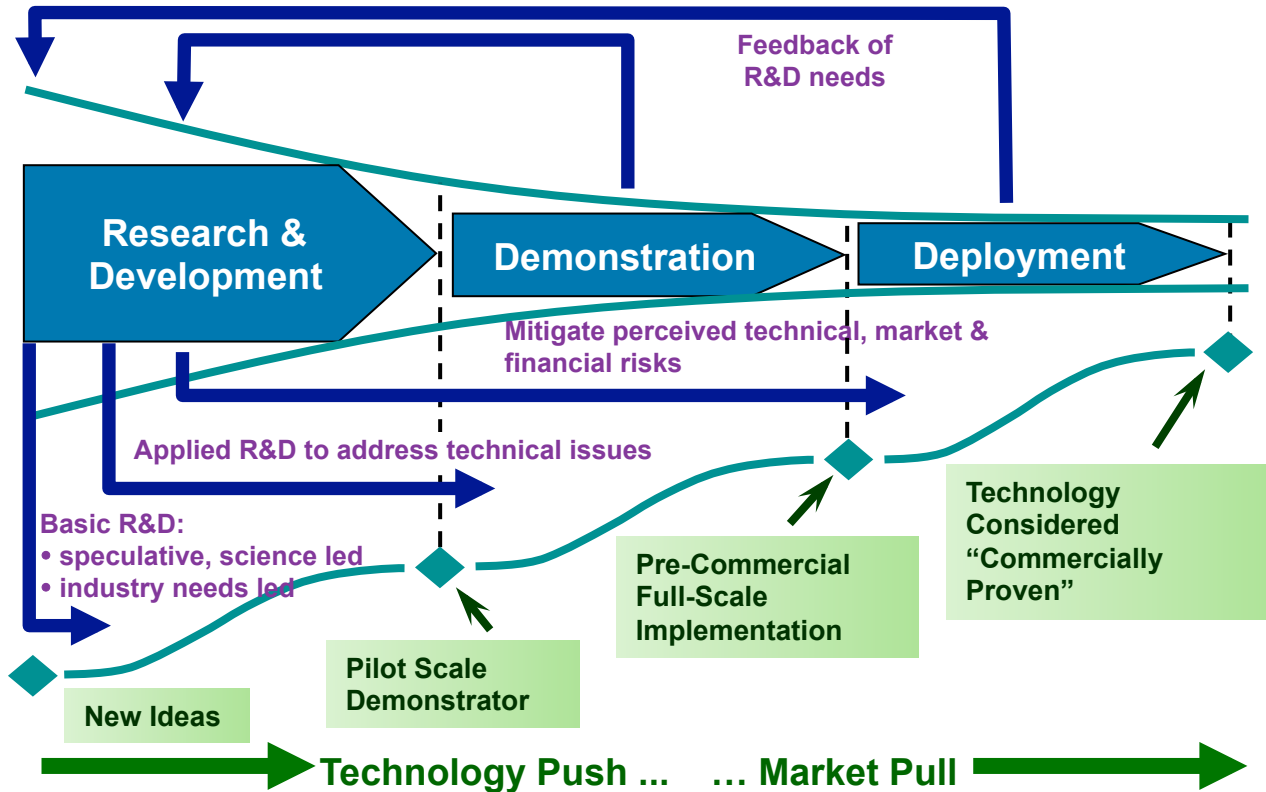


# What is innovation?

Government spend is around £1billion on Energy Research, Development and Demonstration...

In addition, subsidies support pre-commercial deployment...

# Technology development cycle

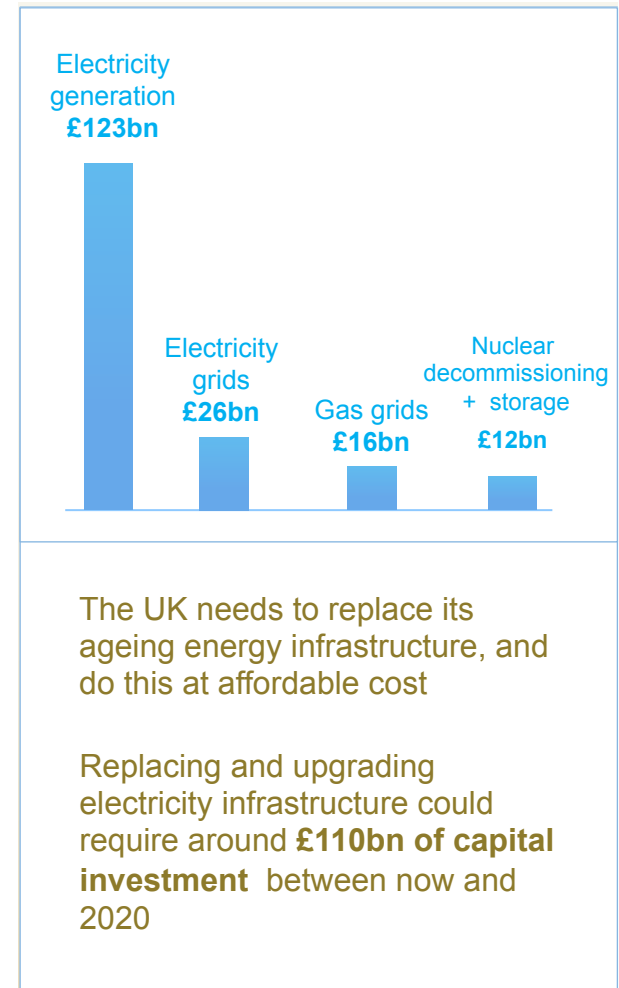


Innovation is often presented as a chain and feeding back learning to support future technology development is essential.



# The Importance of Innovation

- Three objectives for low carbon innovation:
  - Contribute directly and indirectly to economic growth
  - Secure, Affordable, Sustainable Energy
  - Reducing risks and costs
- UK's Climate Change Act - reduce GHG emissions by at least 80% below 1990 levels by 2050.
- Massive investment predicted in new energy infrastructure – c.£120bn by 2020.
- DECC Carbon Plan 2011 – between 60-80GW of new capacity required by 2030.



# How we support energy innovation

## Technology 'push': direct funding such as grants

1

- For research & development
- For demonstration

2

### Market 'pull': indirect funding

- Market adjustments to support particular technologies (e.g. feed-in tariffs, the renewables obligation)
- Ensure electricity prices reflect carbon savings (e.g. emissions trading)

3

### Remove barriers to technology development

(e.g. resolve planning and grid issues in advance; or support for innovative companies)

# UK Public-sector Support for Low Carbon Innovation

UK public backed bodies investing in excess of £1bn in low carbon innovation (2011-2015)



Logos of Core LCICG Members:

- Department of Energy & Climate Change
- Department for Business Innovation & Skills
- The Scottish Government
- EPSRC (Engineering and Physical Sciences Research Council)
- Technology Strategy Board (Driving Innovation)
- CARBON TRUST
- Scottish Enterprise
- energy technologies institute

Core LCICG Members



Logos of Associate LCICG Members:

- Department for Communities and Local Government
- Llywodraeth Cymru Welsh Government
- Department for Transport
- Department for Environment Food & Rural Affairs
- UK TRADE & INVESTMENT
- Northern Ireland Assembly
- ofgem
- THE CROWN ESTATE
- Defence Infrastructure Organisation

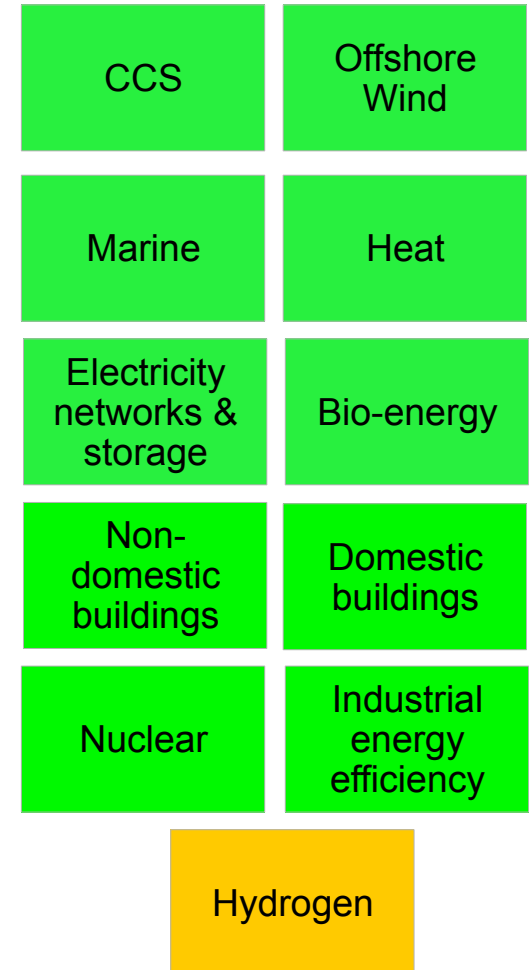
Associate LCICG Members

# Prioritising our support

11 TINAs - 10 published and further 1 to be completed by summer 2014.

## LCICG's Technology Innovation Needs Assessments

- The TINA project highlights the innovation needs of those technologies likely to be most important in delivering our energy and climate change targets.
- TINAs create a common understanding of innovation needs and the case for support, to facilitate coordinated planning between LCICG members and with developers.



# LCICG's Low Carbon Innovation Strategy

- *“Coordinating Low Carbon Technology Innovation Support” , published in February 2014.*
- A shared cross government view on innovation priorities out to 2020.
- A guide to what we will be focusing our support on in the next 6 years.
- The Strategic Framework sets out the LCICG's planned approach to collaboration and the prioritisation of future innovation support programmes.
- It builds on the [TINA](#) evidence base, it also presents a shared assessment of the key innovation needs that will likely require government support between now and 2020.

[www.lowcarboninnovation.co.uk/](http://www.lowcarboninnovation.co.uk/)

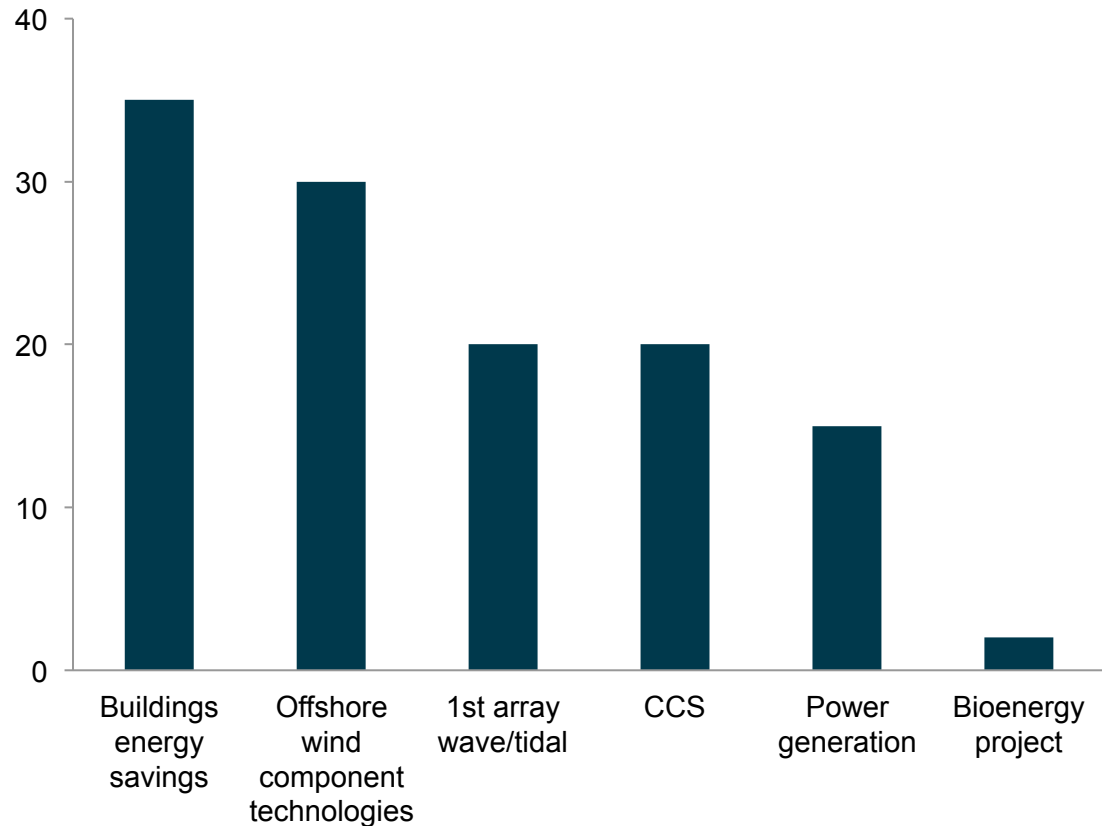
# DECC's £180m innovation programme

**'late-stage' support**  
bridges the Valley of Death  
between development and  
deployment

**Many beneficiaries**  
Supports 150+ companies  
including 60+ SMEs

**Attracts private funds**  
Expected to leverage  
several hundred million of  
private sector investment

DECC innovation allocated budgets (2011/12-2014/15)  
(£m)



Also, collaborative contributions for bioenergy & nuclear supply chain

# Innovation spending 2011-15

Offshore Wind, (cost reduction mainly), – up to £30m

Marine Energy – up to £20m

Carbon Capture and Storage – up to £20m

Fuel Cells - up to £5m

Waste and Biomass Conversion – up to £10m

Buildings Innovation – up to £35m

Electricity Storage – up to £20m

(Renewable Hydrogen Production included above)

Entrepreneurs Fund: Power Technologies – up to £15m

Future Nuclear – up to £5m

# International collaborations

- UK investment alone won't deliver. Collaboration with other countries is key.
- The **EU's Strategic Energy Technology (SET) Plan** is doing just that.
- The SET Plan is the technology pillar of the EU's energy and climate policy. It is the principal decision-making support tool for European energy policy, with a goal of:
- Accelerating knowledge development, technology transfer and up-take; Maintaining EU industrial leadership on low-carbon energy technologies; [...] and contributing to the worldwide transition to a low carbon economy by 2050.
- In each technology a Roadmap and Implementation Plan has been developed and is informing national and EU investment decisions.
- An integrated Roadmap and Action Plan are under development.

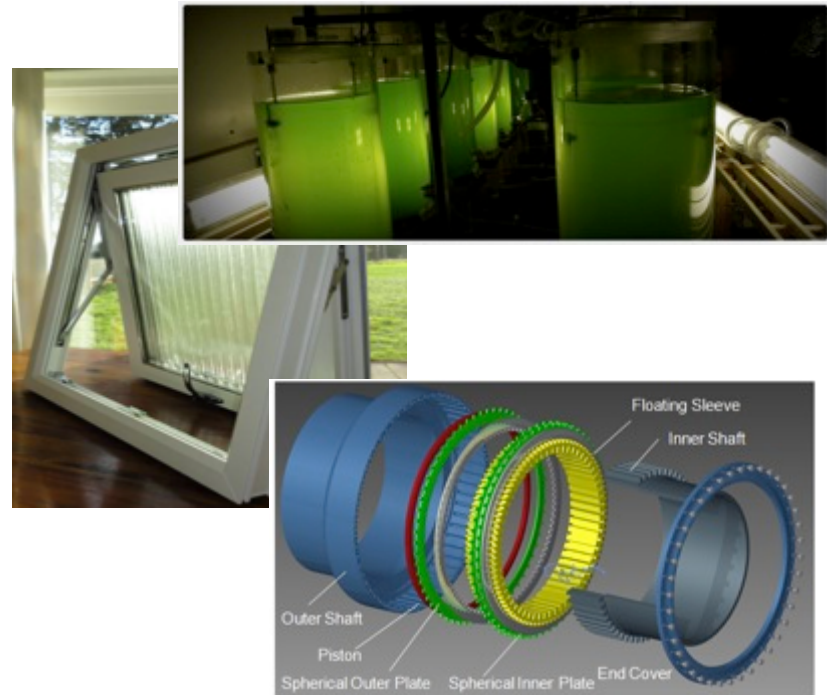






# Example – Energy Entrepreneurs’ Fund and the Energy Catalyst

- Broadest innovation programme
  - CO<sub>2</sub> reduction
  - Commercial potential
  - Value for money
  - UK enterprise and growth
  - Targeted to reach small innovative enterprises (although not exclusive)
- We assess technical and commercial potential
- Real commercial partners involved in evaluation to encourage investment
- Need to identify business needs as well as technical potential



See: [www.lowcarbonfunding.org](http://www.lowcarbonfunding.org)



Department  
of Energy &  
Climate Change

# Our Stable of Entrepreneurs...

From novel double glazing...



To carbon sequestering algae



# Halcyon™

is an advanced wireless lighting system that is simple to use, by everyone, to improve your personal environment.



# Summary

[www.lowcarboninnovation.co.uk](http://www.lowcarboninnovation.co.uk)

UK Government see's low carbon innovation as key to achieving energy and growth objectives.

There are multiple public-sector backed bodies providing broad programme of support.

We've been working to strengthen coordination through the LCICG.

Collaboration between countries, companies, universities is key to delivering the innovation we need.

The key challenge as we prepare for the next Spending review will be the need for prioritisation.

We have a framework to make those choices and want to work closely with stakeholders to do so.



Source: Keystone 'twisted jacket',  
SeaEnergy 2011



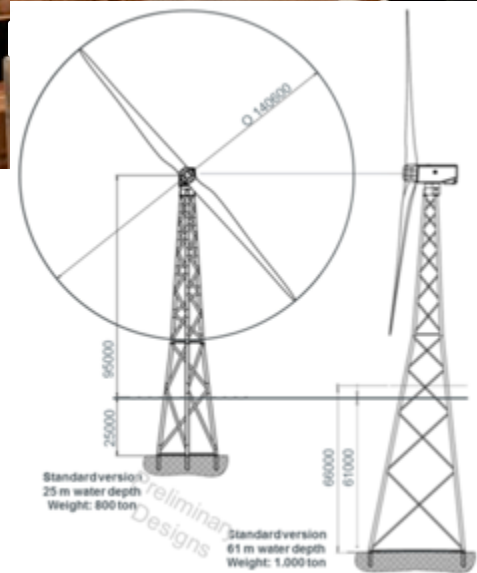
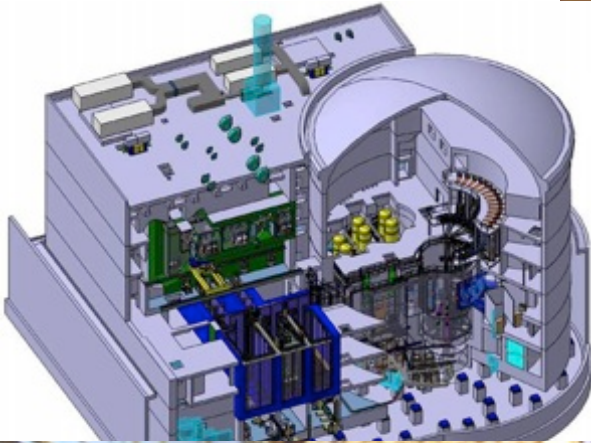
# Thank you

[ian.ellerington@decc.gsi.gov.uk](mailto:ian.ellerington@decc.gsi.gov.uk)

<https://www.gov.uk/innovation-funding-for-low-carbon-technologies-opportunities-for-bidders>



# Thank - you

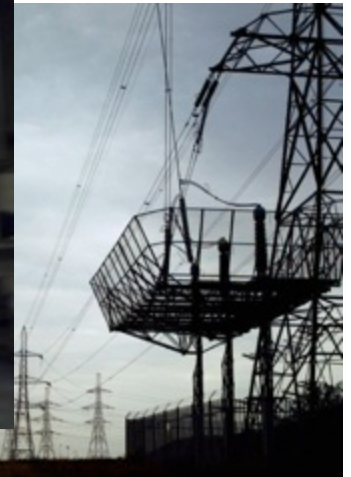
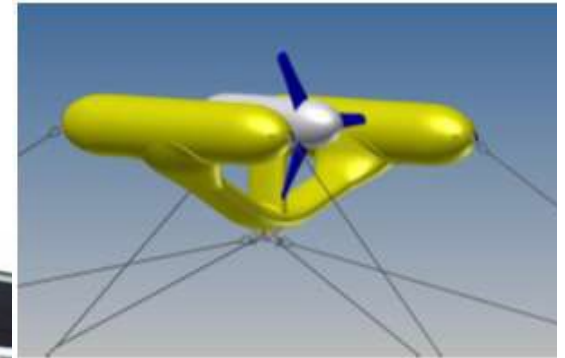




# Learning from DECC Innovation Programme

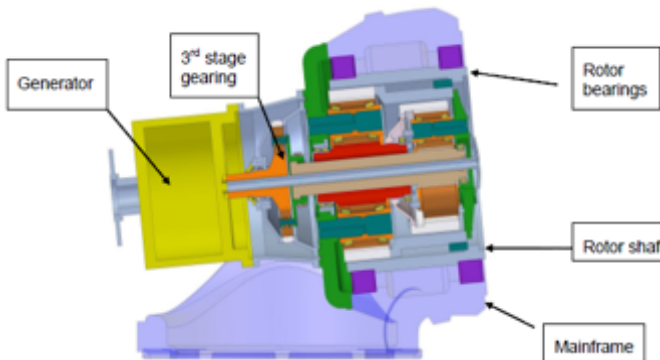
## SMEs and big corporates – an unequal alliance

- sector culture and behaviours (e.g. procurement behaviour) – e.g. LCNF
- creating the skills base in managing & delivering innovative projects



# Powertrain Gearbox Solution for Large Scale Offshore Wind Energy Production

DBGS 3 stage gearbox, with 2 stage torque splitting planetary & output epicyclic modules



## Aims

To build and test an innovative gearbox prototype for use in 7MW offshore wind turbines.

To prove the powertrain concept for use in large scale offshore wind turbine electrical generation, deployable for application in Round 3 (2020).

DBGS  
Test Rig  
Concept

## Benefits

The high reliability of the design will allow for operational uptime being increased, improving the turbine generation capability and thus reducing the levelised cost of energy.

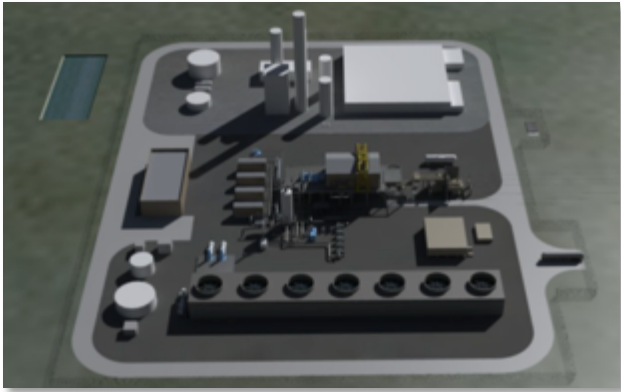
The compact design minimises space requirements and dramatically reduces up-tower mass, which will enable lighter nacelle design, leading to an overall reduction in turbine weight and therefore material costs, as well as reducing lifting and handling difficulties.

The gearbox is configured to enable up-tower maintenance at component level and to permit complete removal without disturbance of the rotor, rotor shaft or main bearings.

DBGS has been able to secure an OEM partner (Samsung Heavy Industries) whereby the technology improvements, if proven through this project, will secure initial pre-series production unit orders of 8 further prototypes. If the trials with those units are successful, projections are that further orders will be placed for 150 units over the next 3-5 years with a potential for 650 units in total.



# Carbon Capture and Storage



## Aim:

The overarching aim of the NET Power programme is to develop and demonstrate a technology that will reduce the cost of CCS so that it can be deployed earlier and for lower cost than currently projected.

## Benefits

**Development of a technology that will enable widespread deployment of low cost, highly efficient power plants with carbon capture from fossil fuels**

**Development of manufacturing expertise in the UK to supply advanced materials to the power generation industry and future commercial NET Power plants**

**Dramatic reduction of the costs currently expected for the deployment of CCS technologies**