

Economic Innovation as part of the Energy Transformation

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BIEE LONDON 2019 POLICY CONFERENCE

The BEIS Energy Innovation Programme

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IMPACT: The Energy Entrepreneurs Fund







Certification and Commercialisation of Fuel Produced by Recycling Mixed Plastic Waste. Recycling Technologies provides a machine and a service to recycle End-of-Life Plastic





The Challenge:

 Global production of plastic surpasses 300 million metric tons per year and is forecast to double over the next 20 years. Only 10% of the waste generated is recycled with the remainder being incinerated, sent to landfill or left to pollute land and sea.

Key Achievements to Date:

- BEIS is funding Recycling Technologies to turn the plastic disposed of in landfill or incinerators into a valuable low sulphur hydrocarbon which can replace fossil-based oils. This cuts plastic waste and reduces CO2 emissions.
- Recycling Technologies have received funding in two separate waves from EEF.

Department for Business, Energy & Industrial Strategy

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Developer of advanced vanadium-based flow batteries for use in industrial, commercial and residential applications.

Products: include 30kWh to 180kWh energy storage systems for distributed energy generation, renewable energies integration, peak shaving and electric vehicle applications.



- Company headcount now over 70.
- •60% cost reduction through BEIS sponsored innovation.
- Prequalified to provide flexibility services to UK National Grid.







£4.2m for Tata Chemical to construct a CCU Demonstration plant in Cheshire

Tata is UK's only manufacturer of soda ash and sodium biocarbonate



- Equivalent to 47,000 acres of forest being planted (40,000 tonnes of carbon dioxide) – to be captured each year at Tata Chemicals in Cheshire
- UK's largest carbon capture project to date 100 times more than the UK's current largest facility





Validation of the world's largest offshore wind turbine blade

CATAPULT Offshore Renewable Energy	SIEMENS Gamesa RENEWABLE ENERGY	a GE Renewable Energy business	
	UK Project Value £1,786,800	9:	
	BEIS Contribution £1,072,080	n:	

Specific project objectives

- Static and fatigue testing of the world's longest (88.4m) wind turbine blades, produced by Adwen and LM Windpower
- Upgrade of facilities to perform tests at this scale
- Demonstration of an award winning bi-axial blade test methodology at scale, which is much closer to the in-service loads experienced by wind turbine blades
- Deployment of instrumentation on an offshore met mast to create a unique dataset of offshore environmental conditions.
- Use of the above to support blade coating design.



Haliade-X blade arrives for OREC tests

UK R&D facility to put giant LM component through its paces

💾 15 August 2019 🛛 🗁 OFFSHORE WIND

[Image: LM]

August 2019: A (record-breaking) 107-metre long blade for GE Renewables' 12MW Haliade-X platform has arrived at ORE Catapult facilities in Northumberland, north-east England.





CASE STUDY: Innovation and hydrogen









- We can produce low carbon hydrogen from methane and zero carbon hydrogen via electrolysis using todays technology
- We can build the boilers to heat our home
- We could also use an electrical heat pump which is the more energy efficient route.







£25m demonstrating the safety and practical feasibility of using hydrogen rather than natural gas (methane) in UK buildings.

Partners: ARUP + Kiwa, Embers, Yoenergy & Progressive Energy





So technology has the answer for Net-Zero?





Post war Economic approach (Samuelson, 1948)







Post war Economic approach based on income flow (Samuelson, 1948)







Post war Economic approach (Samuelson, 1948)



Economic modelling the engineers way (whole system)





Beyond the engineering mindset -Exploring doughnut economics

- Highlights the importance of addressing environmental sustainability and social justice together
- A new way to think about economic growth away from contemporary capitalism
- The doughnut can help to generate a set of Sustainable Development Goals







The transformation we need for net-zero is technological, economical & *cultural*





CULTURE: How we spend our leisure time







CULTURE: How our kids get to school







CULTURE: How we fix our mistakes







Cultural revolution impacts the environment







& it's not just the climate

Phosphate fertiliser 'crisis' threatens world food supply

Use of essential rock phosphate has soared, but scientists fear it could run out within a few decades



"The river is dead': is a mine polluting the water of Brazil's Xikrin tribe? MATTER

Birds Are Vanishing From North America

The number of birds in the United States and Canada has declined by 3 billion, or 29 percent, over the past

e Wildlife Energy Pollution

• This article is more than 7 months old

Plummeting insect numbers 'threaten collapse of nature'



90% of fish stocks are used up – fisheries subsidies must stop emptying the ocean





Technological change is just part of the solution and is doable





Beyond the usual "who pays" topic based on the current paradigm



Create an economic model that drives healthy human behaviour, sustainable use of resources, recycling of everything, less consuming and efficient replication of effective technology globally. A new human culture.



