



**A POCKET
GUIDE TO THE**

ETI

ENERGY TECHNOLOGIES INSTITUTE

We are a £400m industry and government funded research institute into low carbon energy system planning and technology development to address UK energy and climate change targets.

OUR MEMBERS



CATERPILLAR



 **Rolls-Royce**



EPSRC
Pioneering research
and skills



Innovate UK

ETI Programme Associate

HITACHI
Inspire the Next

CHAPTER ONE

WHAT WE DO

KNOWLEDGE BUILDING TO:

- » Inform industry decision making through robust, shared evidence and commercially available projects
- » Build a better understanding of decarbonisation potential in developing industries
- » Inform policy debate

DEVELOPING TECHNOLOGY TO:

- » Build supply chain capability
- » Create economic opportunities
- » Exploit UK technology knowledge and skills

DEMONSTRATING TECHNOLOGY TO:

- » De-risk new systems
- » Focus and accelerate low carbon innovation
- » Build investor confidence

STRATEGIC ANALYSIS AND PLANNING TO:

- » Develop an internationally peer-reviewed national energy system design and planning capability
- » Identify the lowest-cost decarbonisation pathways for the UK energy system
- » Produce technology and industry sector insights and develop whole system modelling capability

CHAPTER TWO

THE AREAS WE WORK IN



TECHNOLOGY INNOVATION TO IMPROVE RELIABILITY AND REDUCE THROUGH-LIFE COSTS

What we are doing

- » Undertaking targeted investments to accelerate levelised cost of electricity reduction
- » Supporting the demonstration of technologies and systems to inform decision making and increase industry confidence
- » Investing in onshore testing capability to de-risk new offshore technology



ACCELERATING INNOVATION TO HARNESS THE UK'S VAST NATURAL WAVE AND TIDAL RESOURCES

What we are doing

- » Researching and developing detailed knowledge of UK wave and tidal economic potential
- » Supporting the demonstration of technologies and systems to inform decision making and increase industry confidence
- » Working with industry and stakeholders to help establish a viable UK market



RESEARCHING TECHNICAL SOLUTIONS FOR THE CONTROL OF HEAT AND HOT WATER IN THE HOME

What have we done

- » Looked at large scale and individual solutions
- » Researched the long term potential of integrated solutions provision in the UK
- » Understood how consumers want to consume energy in their homes



BUILDING KNOWLEDGE TO MAKE DOMESTIC BUILDINGS ENERGY EFFICIENT

What have we done

- » Understood consumer needs for energy efficiency in the home
- » Understood how to keep heat inside buildings
- » Developed solutions for retrofitting UK homes at mass scale



MOVING ENERGY ECONOMICALLY AND EFFICIENTLY TO WHERE AND WHEN IT IS NEEDED

What we are doing

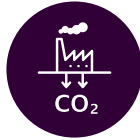
- » Adapting and developing network designs to enable delivery of a cost effective and secure future low carbon energy system in the UK
- » Developing new infrastructure approaches
- » Demonstrating new infrastructure technologies



CREATING FUTURE- PROOF AND ECONOMIC LOCAL HEATING SOLUTIONS FOR THE UK

What we are doing

- » Connecting together the understanding of consumer needs and behaviour with the development and integration of technologies and new business models... into
- » Delivering enhanced knowledge amongst industry and public sector
- » Resulting... in industry and investor confidence to implement from 2020 which enables a UK heat transition



HELPING TO ACCELERATE THE IMPLEMENTATION OF CCS IN THE UK

What we are doing

- » Investing in innovation to reduce the cost of capture and reduce the risks of storage
- » Building knowledge to understand the infrastructure requirements for CCS application in the UK
- » Building knowledge to create confidence amongst investors, policy makers and industry towards CCS opportunities



DELIVERING INCREASED REAL WORLD FUEL EFFICIENCY

What we are doing

- » Undertaking a systems integration approach to the future of vehicle design and vessel concepts
- » Developing and then demonstrating component technologies
- » Applying technologies to demonstration vehicles and vessels that are up to 30% more efficient



DELIVERING INCREASED REAL WORLD FUEL EFFICIENCY

What we are doing

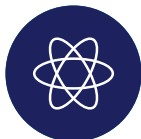
- » Analysing the light vehicle market and its energy supply infrastructure to define a potential low carbon transition path
- » Our methodology for the analysis is included in a report entitled 'An affordable transition to Sustainable and Secure Energy for Light Vehicles in the UK'



APPLICATION OF SUSTAINABLE BIOMASS AND WASTE RESOURCES FOR FLEXIBLE AND AFFORDABLE LOW CARBON ENERGY

What we are doing

- » Building an evidence base to assess the sustainability of land use change to biomass production in the UK
- » Developing modelling tools to identify optimal bioenergy value chains
- » Developing low carbon energy technologies that deliver carbon savings and which could be maximised if combined with CCS



EXPLORING THE ROLE FOR NEW NUCLEAR IN A UK LOW CARBON ENERGY SYSTEM

What we are doing

- » Reviewing siting options for new nuclear power stations alongside new fossil fuelled power stations with CCS technologies
- » Identifying the characteristics for small modular reactors to be a competitive technology in a UK low carbon energy system
- » Developing a credible integrated schedule leading to a UK small modular reactor operating by 2030, with a focus on the enabling activities in the first 5 years



STRATEGIC INSIGHTS AND SYSTEMS MODELLING – BUILDING A BETTER UNDERSTANDING OF UK ENERGY CHALLENGES

What we are doing

- » Creating a national energy system design and planning capability
- » Delivering a whole systems analysis through a suite of software models
- » Providing evidence and data that informs the UK Committee on Climate Change and the Department for Business, Energy and Industrial Strategy to support policy recommendations

CHAPTER THREE

OUTCOMES

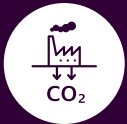


FIRST FULLY COST OPTIMISED UK ENERGY SYSTEM MODEL TO 2050

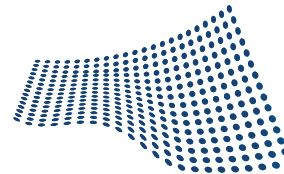


ENABLING THE WORLD'S LARGEST WIND TURBINE BLADES 30% LIGHTER WITH 5% MORE ENERGY YIELD



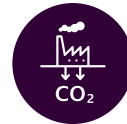


FIRST UK COMMERCIAL CO₂ STORAGE SITE APPRAISAL DRILLING WITH NATIONAL GRID



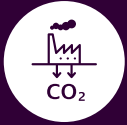
CO₂ Stored

FIRST NATIONAL
DATABASE CREATED FOR
OFFSHORE CO₂ STORAGE

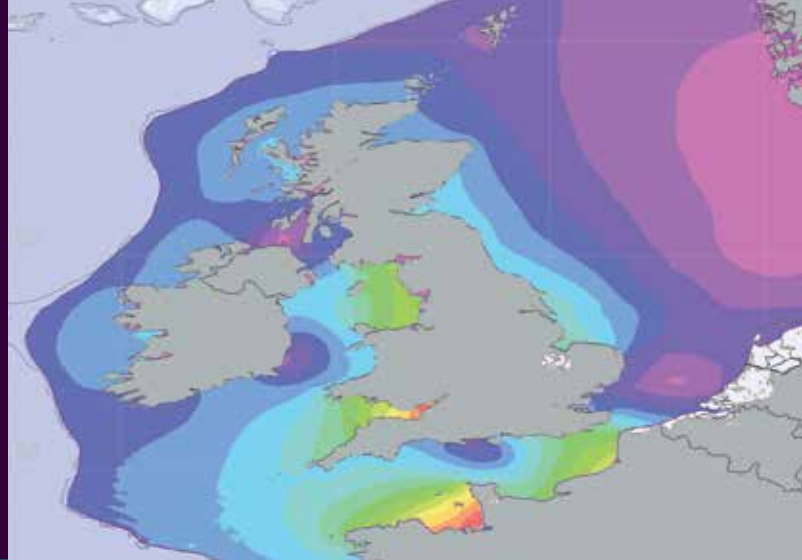


FIRST DISTRIBUTION SCALE ACTIVE FAULT CURRENT MANAGEMENT





FIRST WHOLE CHAIN CCS SYSTEM MODELLING SOFTWARE PACKAGE



PRODUCED 100% MORE ACCURATE UK CONTINENTAL SHELF SOFTWARE MODEL



COST REDUCTION IN OFFSHORE WIND GENERATION THROUGH FLOATING PLATFORM DESIGN



VEHICLE DESIGNS CREATED FOR FUEL EFFICIENCY IMPROVEMENT ACROSS THE UK HDV FLEET



CHAPTER FOUR

COMMERCIALY
AVAILABLE
PRODUCTS



SMARTtide



WET-MATE CONNECTOR

A low cost high voltage generic Wet-mate connector to link offshore energy sources to the cables transmitting electricity to shore



For further information visit:
www.macartney.com



SMARTtide

A software model of the UK continental shelf and North European Waters, 100 times more accurate than existing data

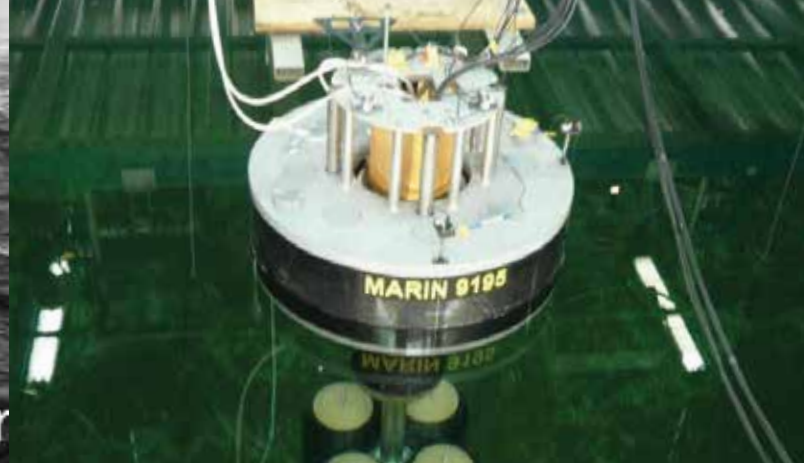


For further information visit:
www.hrwallingford.com/projects/smarttide



New

Wave ener



WAVEDYN

A marine energy array performance modeling tool kit



For further information visit:
www.dnvgl.com

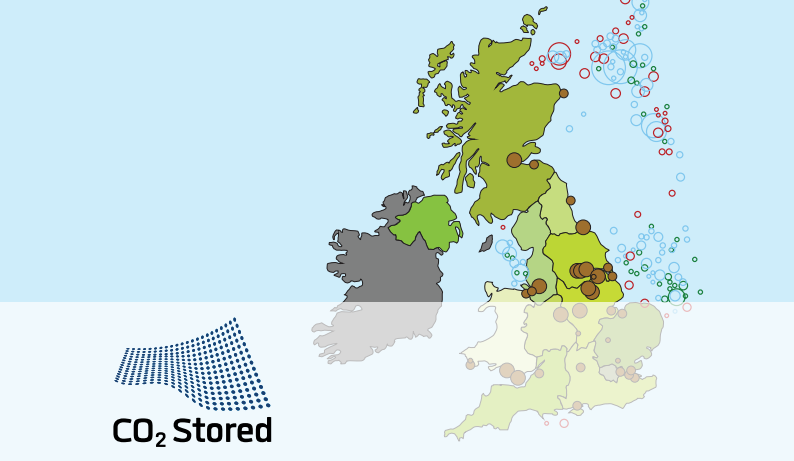


TIDALFARMER

A software tool for the performance of a tidal stream farm



For further information visit:
www.dnvgl.com

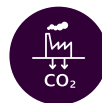


WAVEFARMER

A software tool that determines hydrodynamic interaction effects for wave farms



For further information visit:
www.dnvgl.com



CO₂ STORED

The UK's first CO₂ storage appraisal database



For further information visit:
www.co2stored.co.uk



ReDAPT

A 1MW buoyant tidal generator



For further information visit:
www.alstom.com



FAULT CURRENT LIMITER

A fault current limiter suppresses the damaging currents which result from electricity network faults



For further information visit:
www.gridon.com



ESME

An internationally peer reviewed national energy system design and planning capability – to identify the lowest cost decarbonisation pathways for the UK energy system



For further information visit:
www.eti.co.uk/project/esme

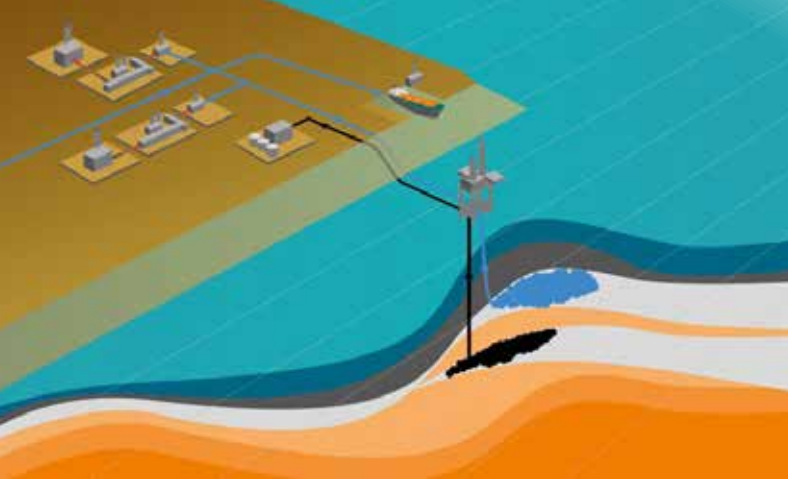


IDCORE

An industrial doctorate centre in renewable energy technologies co-funded with the Engineering and Physical Science Research Council



For further information visit:
www.idcore.ac.uk



gCCS

A modeling tool-kit capable of simulating the operation of all aspects of the carbon capture and storage chain



For further information visit:
www.psenterprise.com

COMMERCIALLY AVAILABLE PRODUCTS AN OVERVIEW

- » Wet-mate Connector
www.macartney.com

- » SMARTtide
www.hrwallingford.com/projects/smarttide

- » Wavedyn
www.dnvgl.com

- » TidalFarmer
www.dnvgl.com

- » WaveFarmer
www.dnvgl.com

- » CO₂ Stored
www.co2stored.co.uk

- » Redapt
www.alstom.com

- » Fault Current Limiter
www.gridon.com

- » ESME
www.eti.co.uk/project/esme

- » Idcore
www.idcore.ac.uk

CHAPTER FIVE

WHO WE HAVE
WORKED WITH



OFFSHORE WIND

Alstom

Harland and Wolf

Glosten Associates

WaveHub

Blade Dynamics

Narec

GE

MTS

Romax Technology

University of Strathclyde

EDF

E.ON

Moog

Insensys

Seebyte

BP

Rolls-Royce

Cefas

Blue H

Sea & Land and
Power Energy Ltd

PAFA Consulting

OTM Consulting

University of Sheffield

James Ingram & Associates

QinetiQ

Cranfield University



MARINE

Lockheed Martin

Black & Veatch

Atlantis Resources

Pelamis Wave Power

University of Edinburgh

HR Wallingford

MacArtney

E.ON

Alstom

EDF

DNV GL

Plymouth Marine Laboratory

European Marine Energy Centre

Queens University Belfast

University of Oxford

University of Manchester



DISTRIBUTED ENERGY

Caterpillar

EDF

Manchester University

Passiv Systems

BRE

University College London



BUILDINGS

BRE

EDF

Peabody

PRP Architects

Total Flow

University College London

Wates



ENERGY STORAGE AND DISTRIBUTION

DNV GL

Western Power Distribution

Isentropic

Buro Happold

GridON

E.ON

UK Power Networks

Applied Superconductor Ltd

Rolls-Royce

Mott MacDonald

Sinclair Knight Merz

North Energy

NNFCC

Forest Research

Element Energy

Baringa Partners

CNG Services

Liwacom

Aecom



SMART SYSTEMS AND HEAT

EDF

Hitachi

DNV GL

Baringa Partners

Europe Economics

PRP Architects

Peabody

Vinci

Frontier Economics

DNV Kema

Element Energy

David Vincent & Associates

Imperial Consultants

The Technology Partnership

University College London

National Centre for Social Research

Aecom

Cambridge Consultants

Energy Systems Catapult



CARBON CAPTURE AND STORAGE

Durham University

Geospatial Research

RPS Energy

Element Energy

The Crown Estate

Fugro

Sonardyne

National Oceanography Centre

British Geological Survey

Plymouth Marine Laboratory

University of Southampton

Amec Foster Wheeler

National Grid

Health and Safety Laboratory

Imperial College

RPS Energy

Caterpillar

University of Nottingham

Herriot Watt University

SNC Lavalin

CONTINUED »



CARBON CAPTURE AND STORAGE

- PSE
- CO₂ DeepStore
- Rolls-Royce
- E.ON
- EDF
- E4tech
- Howden
- Invenys
- Doosan
- Costain
- Edinburgh University
- LR Senergy Limited
- Scottish Centre for CCS
- Pale Blue Dot Energy
- University of Southampton
- Durham University
- Ikon Science
- Element Energy
- T2 Petroleum Technology
- Atkins
- OGCI - Climate Investments



HEAVY DUTY VEHICLES

- Romax
- Ansys
- Castrol
- Ricardo
- Horiba Mira
- Element Energy
- UCL
- Stratoco
- CNG Services
- Caterpillar
- Rolls-Royce
- Loughborough University
- Johnson Matthey
- Maersk Tankers
- Norsepower
- Teignbridge Propellers Ltd
- Shell
- Avid Technology
- RED Marine Ltd
- Royston Power
- Enogia S.A.S



LIGHT VEHICLES

- E.ON
- ARUP
- University of Leeds
- IBM
- EDF Energy
- Imperial College
- Transport Research Laboratory
- Element Energy
- Baringa
- Cenex
- Route Monkey
- EV Connect
- Shell
- The Behavioural Insights Team
- Ricardo
- University of Aberdeen
- University of Sussex
- FleetCarma



BIOENERGY

- E.ON
- Forest Research
- Advanced Plasma Power
- Broadcrown Ltd
- Royal Dahlam
- E4tech
- EDF
- Agra Ceas Consulting
- Eifer
- Shanks Waste Solutions
- Cranfield University
- CPI
- RDI Associates
- ADAS
- Crops for Energy
- Imperial College Consultants
- Imperial College
- Rothamstead Research

CONTINUED »



BIOENERGY

University of Southampton

CMCL Innovations

University of Cambridge

Doosan

Drax

University of Leeds

Centre for Ecology & Hydrology

Aberystwyth University

University of Aberdeen

University of Edinburgh

University of York

Forest Fuels

Uniper

University of Sheffield

Baringa

North Energy Associates

SynTech



NUCLEAR

Mott MacDonald

Atkins

EDF

Decision Analysis Services

Met Office



STRATEGY

Loughborough University

University of Aberdeen

University of Sussex

Imperial College London

University of Leeds

University College London

Mott MacDonald

EDF

Atkins

Energy Technologies Institute
Holywell Building
Holywell Way
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