



BLUE ENERGY FOR A BRIGHT FUTURE

The first leading international event on Ocean Energy

12 / 14 JUNE 2018

CHERBOURG
NORMANDY FRANCE



WWW.ICOE2018NORMANDY.EU

FOLLOW US
 @BlueSignEvents
#icoe2018

Organized by



With the support of



THE UNIVERSITY of EDINBURGH
School of Engineering



Policy and Innovation Group

UNDERWATER

Technologies getting wet, corroded and colonized Economic Opportunity Assessment of Anti-Corrosion Solutions for the Offshore Renewables Sector

Content

- Policy and Innovation Group
- NeSSIE
- Aim
- Method
- Main assumptions
- Results
- ACS challenges and solutions
- Conclusion



NeSSIE
North Sea Solutions for Innovation in Corrosion for Energy

Economic Opportunity of Anti-Corrosion Solutions

Policy and Innovation Group (University of Edinburgh)



THE UNIVERSITY of EDINBURGH
School of Engineering

Policy and Innovation Group

Services:

- Techno and Socio-Economic Assessment
- Life Cycle Evaluation
- Array Optimization Analysis
- Technology Roadmaps
- Consultancy

"The group analyses the dynamics of innovation in energy systems, especially the relationships between policy, investment and innovation."

Main partners:



www.policyandinnovationedinburgh.org



Team Leader:
Henry.Jeffrey@ed.ac.uk



Economic Opportunity of Anti-Corrosion Solutions

Policy and Innovation Group (University of Edinburgh)



THE UNIVERSITY of EDINBURGH
School of Engineering

Policy and Innovation Group

UK Ocean Energy Review 2017

- Available at
<http://www.policyandinnovationedinburgh.org/>
- Overview of developments in UK wave and tidal sector in 2017...
- ...in terms of:
 - Key sector achievements
 - Supporting policies
 - Research and development
 - Technology demonstration



Economic Opportunity of Anti-Corrosion Solutions

NeSSIE

North Sea Solutions for Innovation in Corrosion for Energy

- Vanguard Initiative: 'Advanced manufacturing for energy related applications in harsh environment'
- Aim: Develop 3 offshore renewable energy demonstration projects related to corrosion issues
- Co-funded by the European Maritime and Fisheries Fund



THE UNIVERSITY of EDINBURGH
School of Engineering

Policy and Innovation Group



Economic Opportunity of Anti-Corrosion Solutions

Aim



THE UNIVERSITY of EDINBURGH
School of Engineering

Policy and Innovation Group

→ Anti-corrosion solutions (ACSs)

- Cathodic protection
- Coating systems



→ Economic value of anti-corrosion solutions (ACSs) in the development of offshore renewables in EU



Economic Opportunity of Anti-Corrosion Solutions

Method



→ Three scenarios

- Developer cost savings
- ACS Supplier value

Business as usual – Reference case

Scenario 1

Scenario 2

Scenario 3

OPEX reduction 18%²

CAPEX
reduction
30%¹³

CAPEX
equal

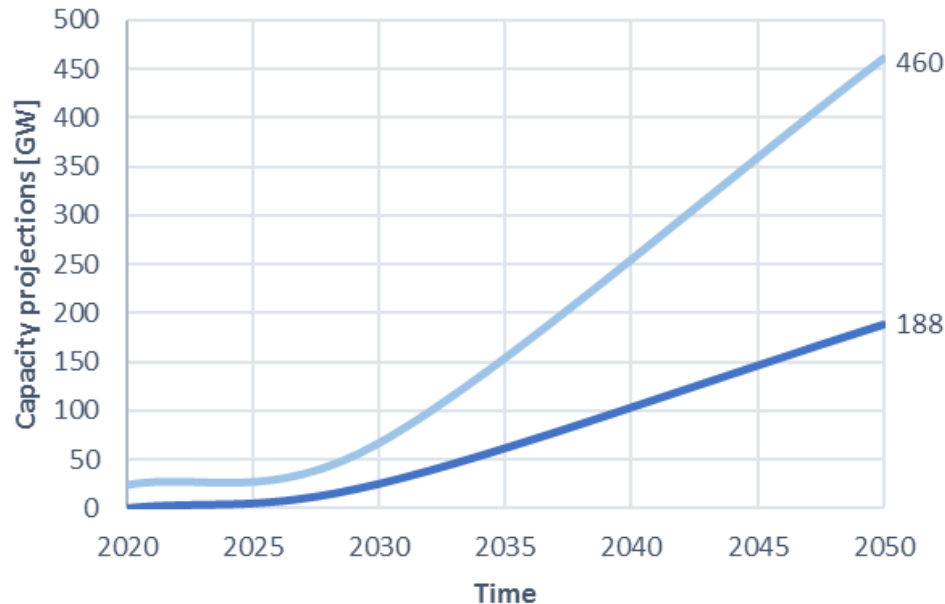
CAPEX
increase
10%⁴

Economic Opportunity of Anti-Corrosion Solutions

Main assumptions



Capacity projections EU



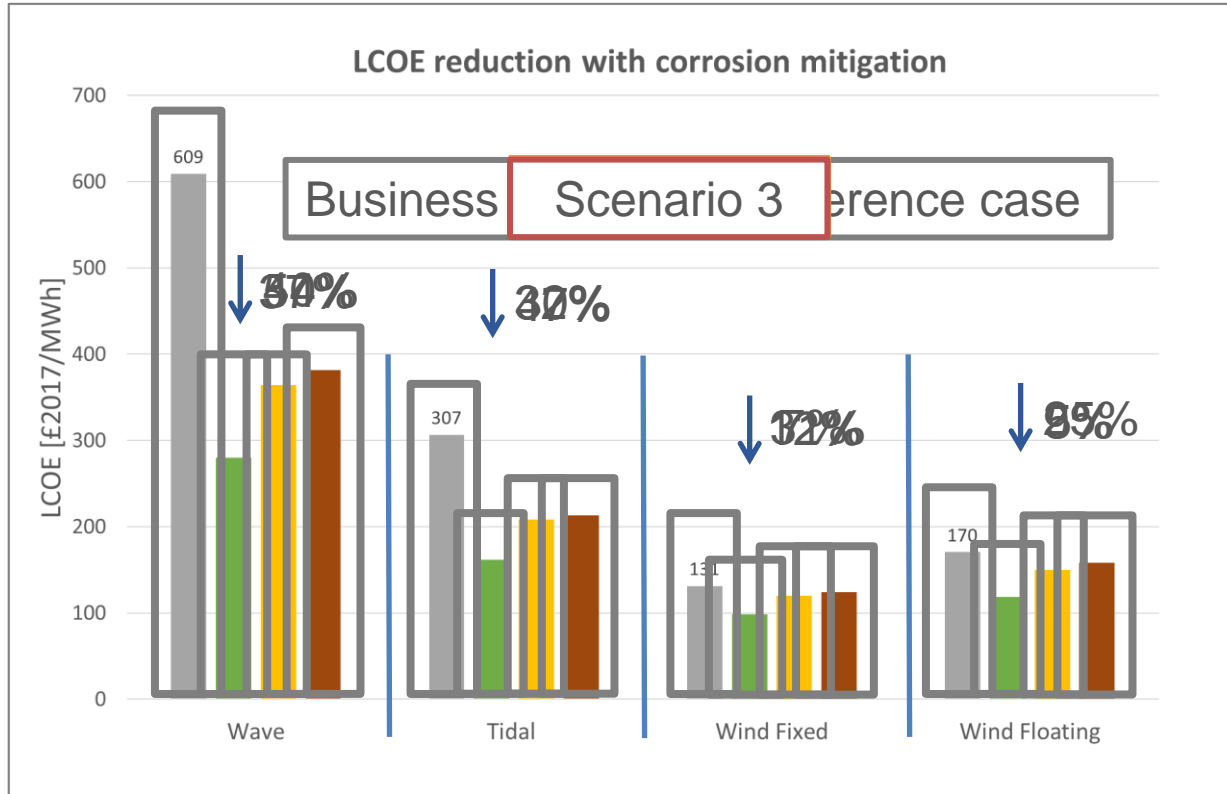
	Construction cost	O&M cost	Load Factor	Annual degradation
Wave	90% of CAPEX ¹	60% of OPEX ¹	33% ¹²	4.5% ⁸
Tidal	80% of CAPEX ¹	50% of OPEX ¹	37% ¹²	
Floating Wind	90% of CAPEX ¹	60% of OPEX ¹	50% ⁶	-
Fixed Wind	88% of CAPEX ¹⁰	60% of OPEX ¹⁰	45% ⁵	-

— Offshore Wind⁷

— Wave and Tidal¹¹

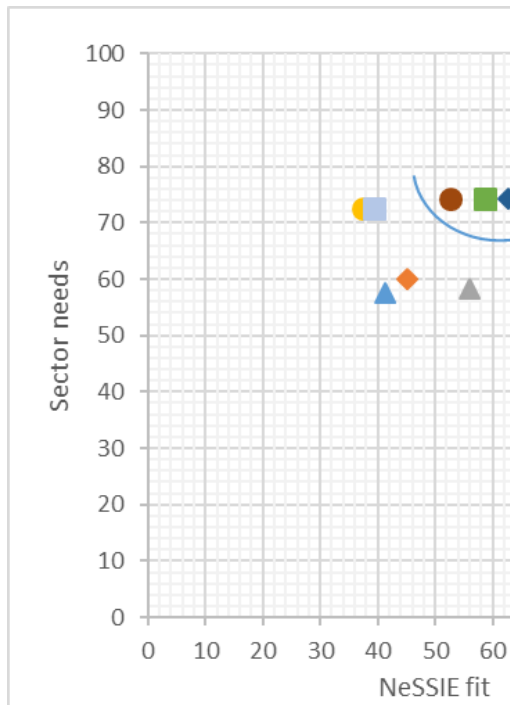
Economic Opportunity of Anti-Corrosion Solutions

Results - LCOE



Economic Opportunity of Anti-Corrosion Solutions

ACS challenge prioritisation



NeSSIE Priority	ACS Challenge
A	Preparation and application of coatings
	Maintenance difficulties and coating repairs
	Inspection
B	Quality Control
	Novel Product Risk
	Cathodic Protection (CP)
	Design
	Experience and unknowns

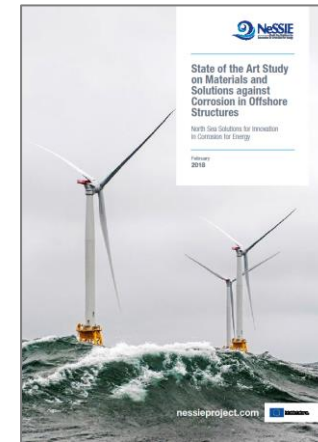
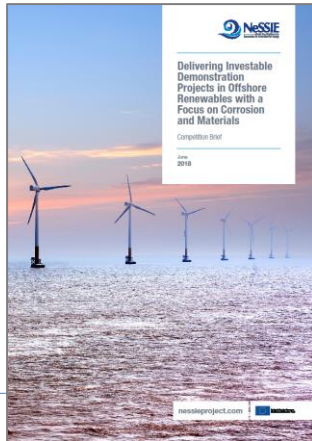
Economic Opportunity of Anti-Corrosion Solutions

Conclusion



- Significant economic opportunity in the EU with improved ACSs
- NeSSIE demonstration projects: First stage competition launched 6th of June, will close on 7th of August

- nessieproject.com



Economic Opportunity of Anti-Corrosion Solutions

References



1. **Black&Veatch, 2010.** Cost of and financial support for wave, tidal stream and tidal range generation in the UK
2. **BP, 1998.** Kermani et al., The impact of corrosion in the oil and gas industry (SPE-29784-PA)
3. **Carbon Trust, 2010.** Technology Innovation Needs Assessment - Wind Energy Summary report
4. **Composites Trade Association, 2016.** Life Cycle Cost of Fiber Reinforced Polymer Structures
5. **Energy numbers, 2018.** Capacity factors at Danish Offshore wind farms
6. **E&Y, 2010.** Cost and Financial support for offshore wind - a report for DECC
7. **EWEA, 2013.** Deep water The next step for offshore wind energy
8. **ICOE, 2010.** D. Meseguer Yebra et al., Marine Fouling and Corrosion Protection for Off-Shore Ocean energy set ups
9. **NREL, 2015.** 2014-2015 Offshore Wind Technologies Market Report
10. **ORE Catapult, 2010.** Cost Reduction Monitoring Framework
11. **ORECCA, 2011.** European Offshore renewable energy roadmap
12. **SI Ocean, 2013.** Ocean Energy: cost of energy and cost reduction opportunities
13. **WES, 2016.** Wave Energy Scotland, Materials Landscaping Study - final report



Leonore van Velzen
l.vanvelzen@ed.ac.uk



THE UNIVERSITY of EDINBURGH
School of Engineering

Policy and Innovation Group

12 / 14 JUNE
CHERBOURG FRANCE



 #icoe2018

Organized by



With the support of



www.icoe2018normandy.eu