
ETIPOCEAN
European Technology & Innovation Platform for Ocean Energy
Special Edition Webinar
International Women in Engineering Day
11th July 2018

Agenda

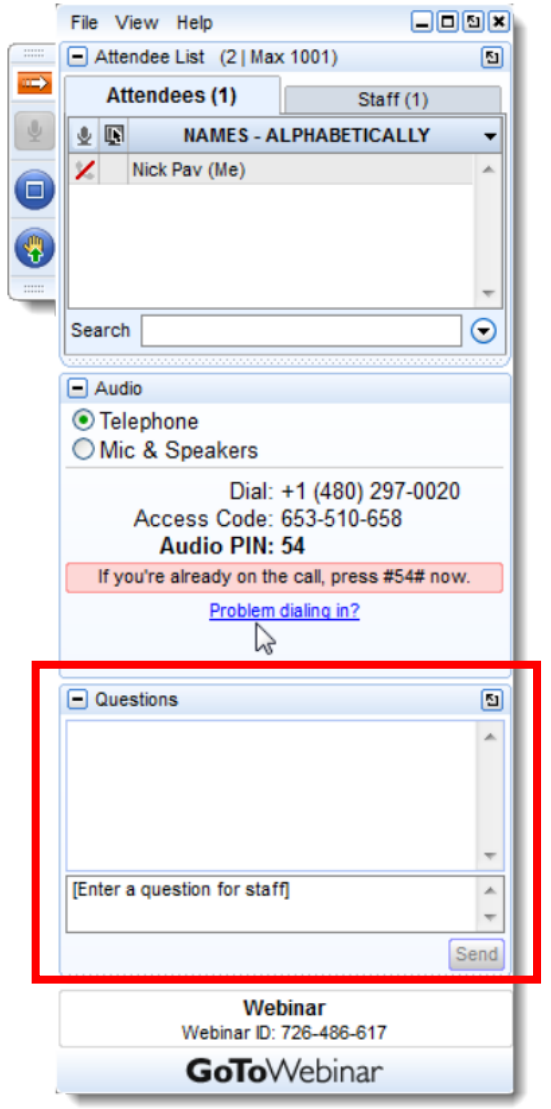
INTERNATIONAL WOMEN In ENGINEERING DAY

Moderator	Speakers			
Shona Pennock	**Becky Corley**	**Jillian Henderson**	**Elva Bannon**	**Hannah Buckland**
The University of Edinburgh	The University of Strathclyde	Wave Energy Scotland	Wave Energy Scotland	CorPower Ocean

Panel discussion and questions from the audience

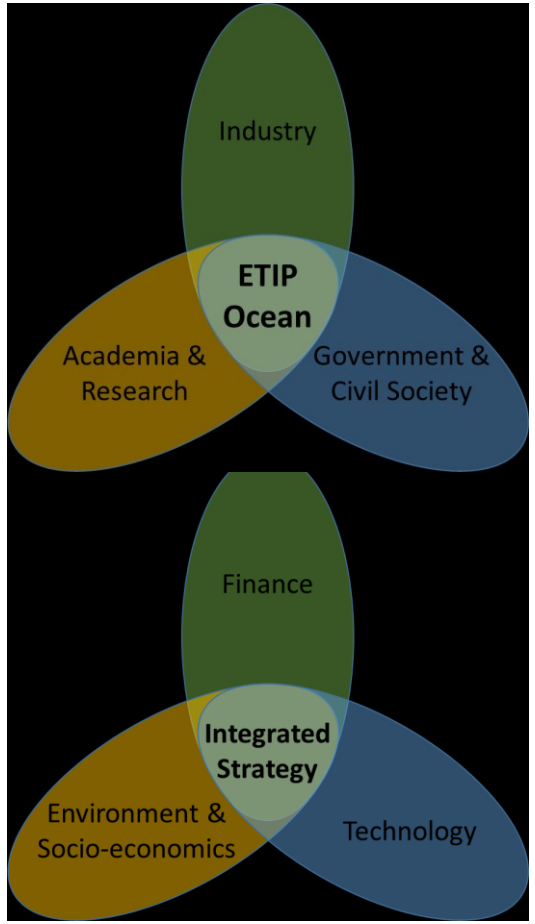
Technical details

- All attendees have microphones muted
- Feel free to send questions or commments by text at any time
- The webinar will be recorded and available online



The European Technology and Innovation Platform for Ocean Energy

- Identify methods of overcoming barriers to sector commercialisation
- A hub for knowledge sharing and collaboration in the ocean energy sector
- Define a common vision for the accelerated development of the sector
- Public engagement and education



Consortium

- **ETIP Ocean Coordinator**
- Europe's ocean energy trade association
- 115 member organisations
- Represents the interests of the European ocean energy sector

- **ETIP Ocean Partner**
- Policy and Innovation Group at the Institute for Energy Systems
- Leading research institution in the ocean energy sector

- **ETIP Ocean Partner**
- EERA Ocean Energy Joint Programme
- A network of the 12 foremost research institutions in the European ocean energy sector
- Coordinated by the University of Edinburgh

Steering Committee

- Composed of the leading companies, research organisations and other key stakeholders in the sector
- Provides guidance on ETIP Ocean strategy and prioritisation

International Women in Engineering Day

- Organised by Women's Engineering Society (WES)
- 11% of the engineering workforce worldwide is female
- UK <10%
- Latvia, Bulgaria and Cyprus ~30%
- UK skills gap – shortfall of engineering skills between 25500 – 60000 jobs

https://www.wes.org.uk/content/wesstatistics

International Women in Engineering Day

- Now very little gender difference in uptake and achievement of core STEM GCSE subjects
- In a survey of 300 female engineers, 84% were happy or extremely happy with their career choice
- Enabling women to meet their full potential in work could add as much as $12trillion to annual global GDP in 2025

INTERNATIONAL WOMEN In ENGINEERING DAY

https://www.wes.org.uk/content/wesstatistics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Wind & Marine Energy Systems CDT

University of Strathclyde Engineering

Creating a Diverse & Inclusive Energy Sector

EPSRC Engineering and Physical Sciences Research Council

INTERNATIONAL WOMEN In ENGINEERING DAY

23 June 2018

Introduction

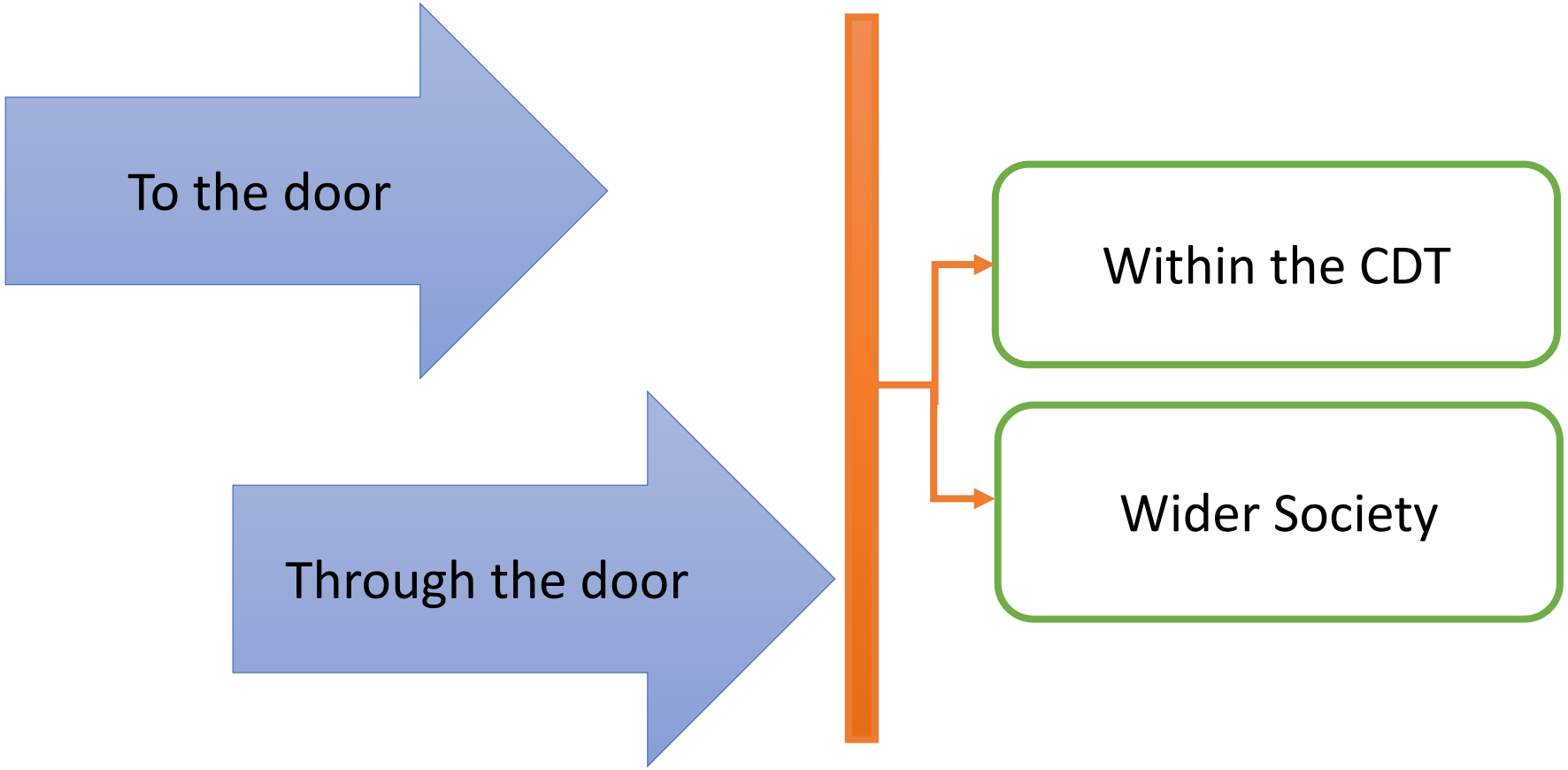
- Becky Corley
  - PhD student
  - Mechanical Engineer
- Why diversity and inclusion
- What we've done so far
- Aspirations for the future

Motivation

- EPSRC rated the CDT 4/5 for diversity
- What is D&I?
  - Diversity: having many difference voices around the table to improve discussion
  - Inclusion: Creating an environment in which these different voices are **encouraged**, **heard** and **valued**
  - Gender, race, cultural background, skills, income level, social background, personality type…
  - Focusing on STEM – gender imbalance
- Business case

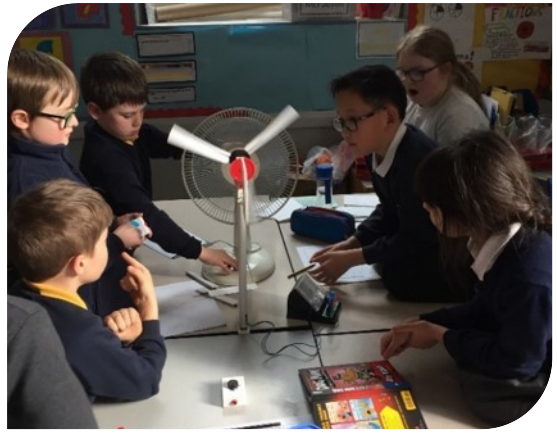
£1 → D&I → £5

How?



What we've done

1. School Outreach



What we've done

2. Gender Neutrality

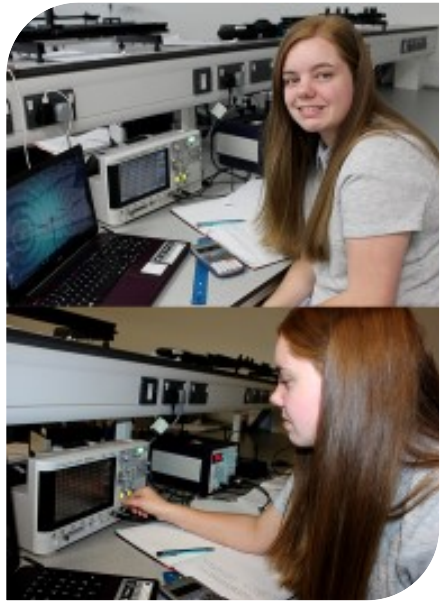
"Evidence that gendered working in job advertisements exists and sustains gender inequality" Gaucher, Friesen, Kay

- Gender biased language
  - Challenge
  - Enthusiasm
  - Determination
  - Collaboration
  - Independent

- All outward facing material gender neutral
  - Website
  - Studentship advertisement

What we've done

3. Internship



- Pilot scheme paid internship
- Funding for more internships
  - UK-China project ~£36,000
- Show PhD research as an option
- Provide paid opportunities
- Widening access for students from under represented backgrounds

What we've done

4. Overhaul Recruitment

- Worked with SSE D&I team
  - Shared their knowledge & lessons learnt
  - Unintended negative consequences – blind CV
- Eliminate unconscious bias in recruitment
- Balanced assessors

University of Strathclyde Engineering

What

5. Knov

- Wider e
  - Equali
- Organis

University of Strathclyde Glasgow

Engage with Strathclyde

Creating a Diverse and Inclusive Workforce in the Energy Sector

Lessons Learned, Best Practice and Building Momentum

1st May 2018,

10:00 am—12:00 pm

Technology & Innovation Centre
University of Strathclyde
Glasgow

Increasing diversity and inclusion in the Wind and Marine Energy Systems Centre for Doctoral Training has been a key target. The Centre has found relatively small changes can have a huge impact.

This event will discuss and demonstrate best practice that can easily be translated into industry and academia.

- Talks from practitioners who have had significant successes, looking to share their knowledge and experiences.
- Network, collaborate and a panel discussion with the opportunity to ask key questions.

Register Here

Or visit www.engage.strath.ac.uk/event/439 for more information

Wind & Marine

sse

What now?

- Continue to implement recruitment practices
  - Review and track progress
- Internship scheme
- Continue school outreach
- Diversity and Inclusion belief training
- Embed D&I in all aspects

Take home message

- **A few people doing a small number of things have managed to achieve big success**
- **We want to share experiences and collaborate**
- **Get in touch**

becky.corley@strath.ac.uk

University of Strathclyde Glasgow

Webinar for International Women in Engineering Day

Jillian Henderson, Wave Energy Scotland

11th July 2018

wave energy SCOTLAND

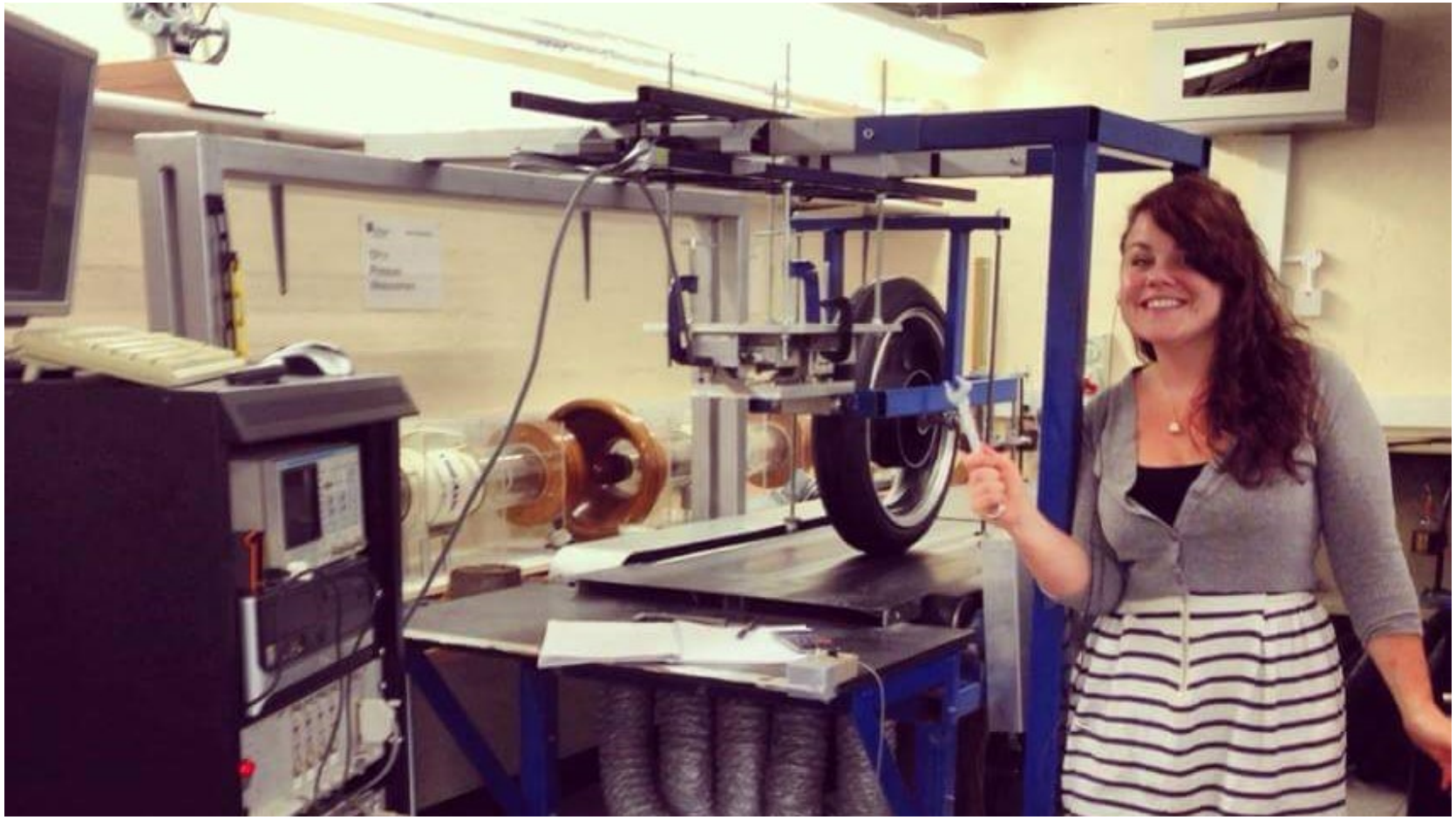
HIE
Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean

International Women in Engineering Day

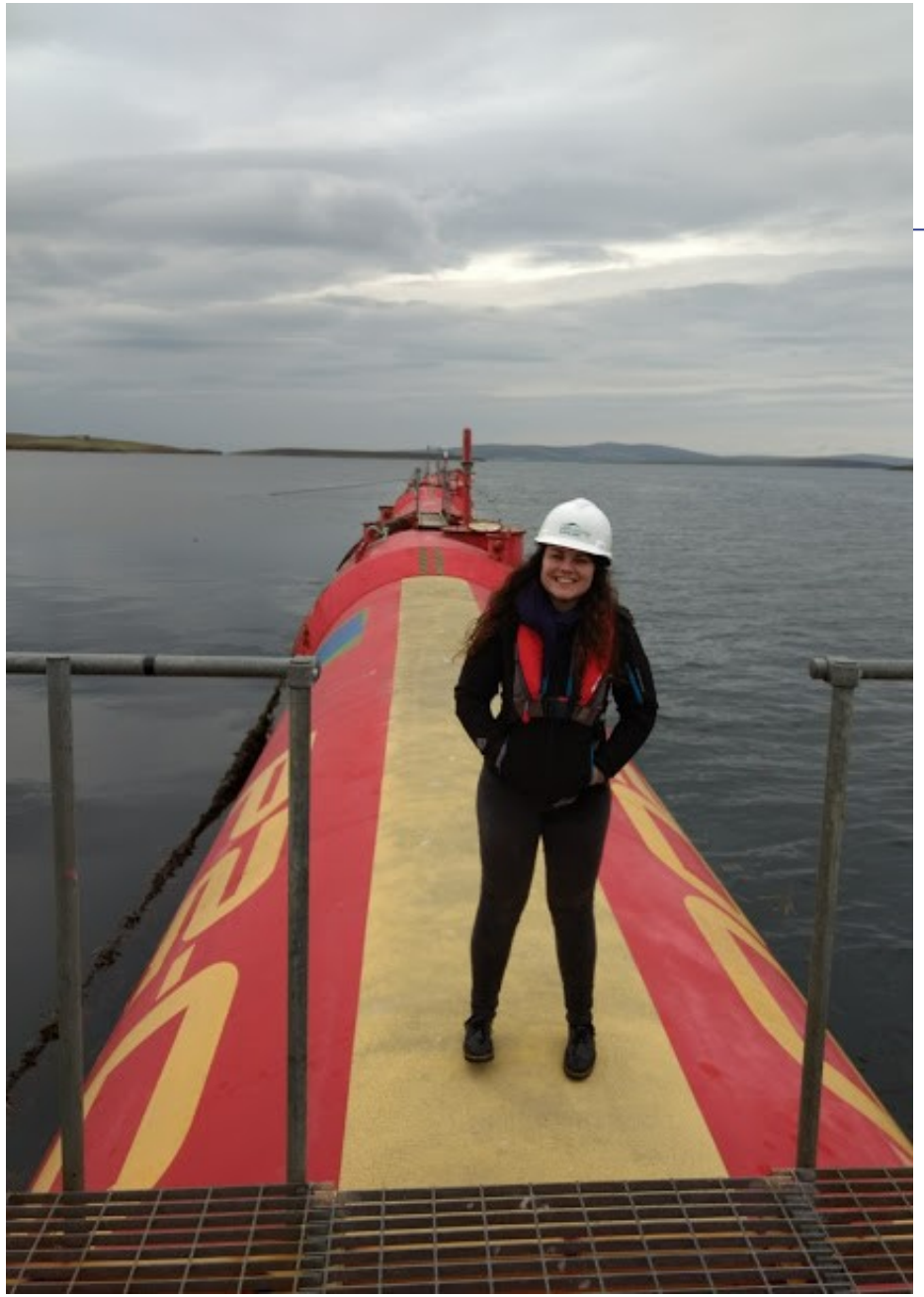
HIE
Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean

wave energy
SCOTLAND

- Why engineering? – Career so far




STOP!



Thank you

Jillian.Henderson@waveenergyscotland.co.uk

11th July 2018

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Webinar for International Women in Engineering Day

Elva Bannon, Senior Research Engineer

11th July 2018

wave energy SCOTLAND

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Iomairt na Gàidhealtachd 's nan Eilean

Why Engineering?

- Problem Solving
- Design
- Build
- Innovate
- Invent

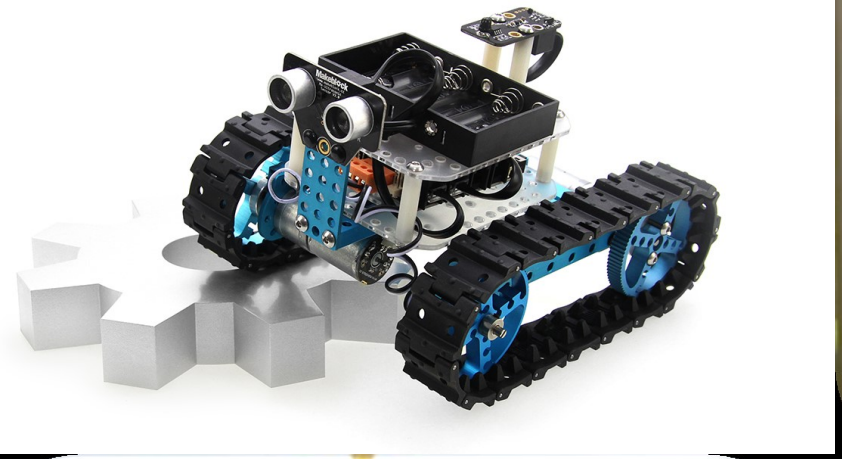
Why Engineering?

Albert Einstein

“Scientists investigate that which already is; Engineers create that which has never been ”

…to where I am today

- Degree – Mechatronic Engineering **Robots**
- Masters – Advanced Engineering (wave energy thesis)
- Wave Energy Technology developer (Ireland)
- Wave Energy Technology developer (Scotland)
- Engineering Consultant **Robots**
- Senior Research Engineer (Wave Energy Scotland)



rise
ilean

wave energy
SCOTLAND

(some of) who we work with

HIE
Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean

wave energy SCOTLAND

European Commission
Joint Research Centre

WORLD ECONOMIC FORUM
COMMITTED TO IMPROVING THE STATE OF THE WORLD

U.S. DEPARTMENT OF ENERGY

The Scottish Government
Riaghaltas na h-Alba

SALTIRE PRIZE JUNIOR

Get Energised!

National Museums Scotland

What can we do?

- Women's Engineering Society
- IET Women's Network
- POWERful Women
- Women on Boards
- RenewableUK Switch List

LITTLE MISS INVENTOR
Roger Hargreaves

What can we do? – BE SEEN, BE HEARD

- Sign up to speak at conferences
- Ask questions at presentations
- Renewable UK Switch List

Thank you

Elva.Bannon@waveenergyscotland.co.uk

11th July 2018

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Iomairt na Gàidhealtachd 's nan Eilean

A career in Renewables…

2010-2014 Swansea University - PhD in Engineering

Combined Current, Wave and Turbulent Flows and their effects on Tidal Energy Devices

2013-2014 National Oceanography Centre

Marine renewable energy modeller

2014- 2016 Black & Veatch

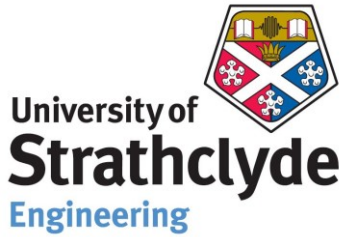
Senior marine renewable energy specialist

2016-2018 The University of Strathclyde

Researcher in Energy for Development

2018 CorPower Ocean

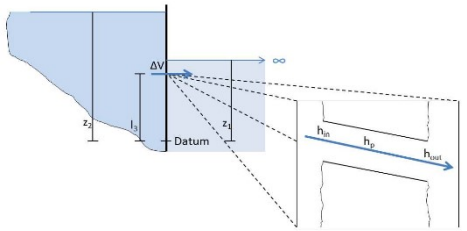
Wave energy Modelling engineer

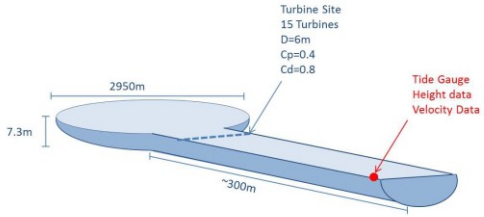


Combined Current, Wave and Turbulent Flows and their effects on Tidal Energy Devices

Swanturbines:

https://www.youtube.com/watch?v=jrr7VJTZ4Lg





Tidal stream turbine modelling:

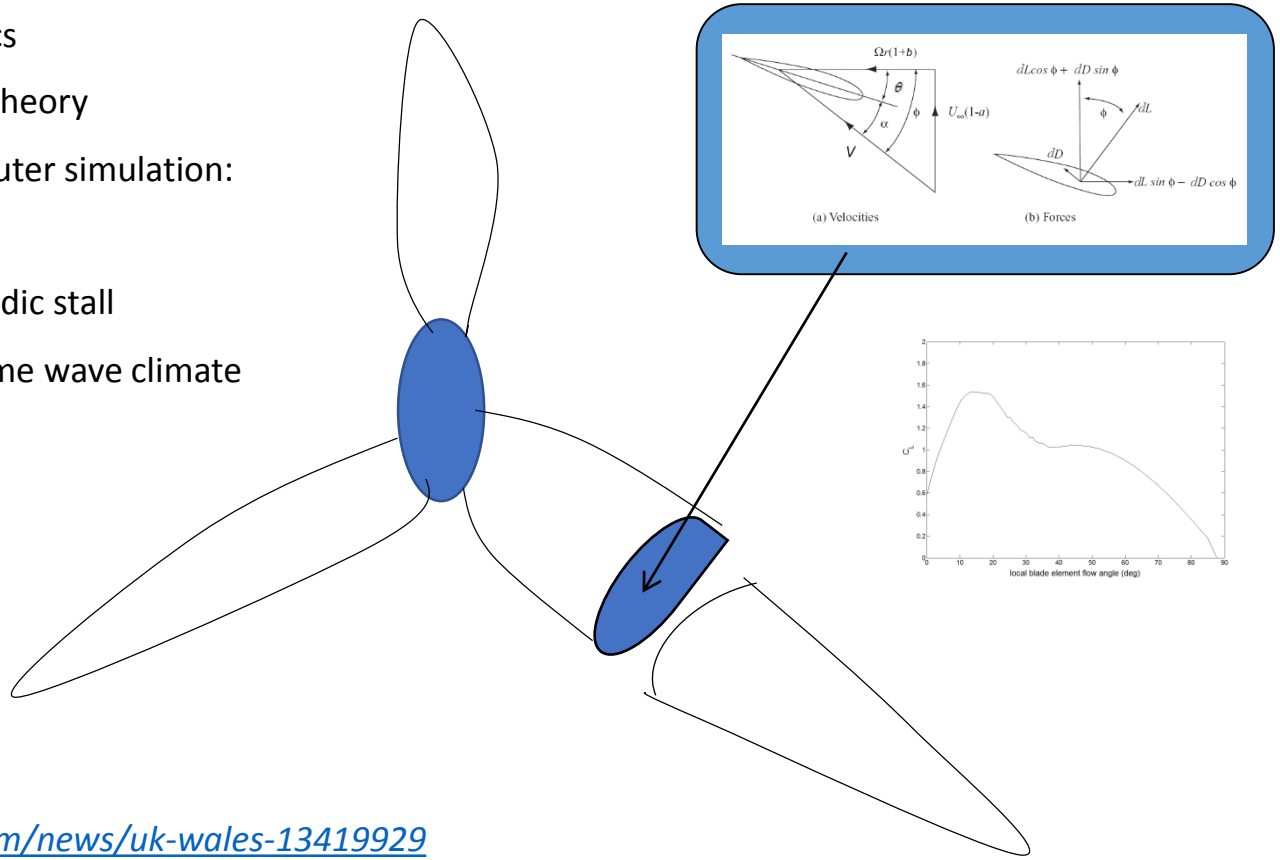
- Computational fluid dynamics
- Blade Element Momentum Theory

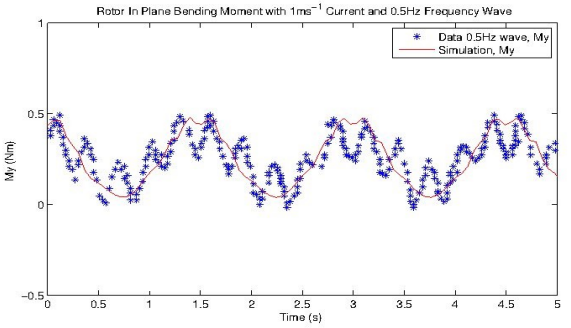
->Fast and robust turbine computer simulation:

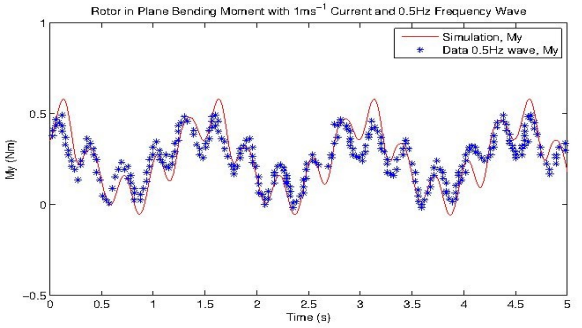
Performance, periodic stall

Survivability, extreme wave climate

Fatigue







Field work: https://www.bbc.com/news/uk-wales-13419929

Marine renewable energy modeller

Large scale 3-D (20-2km element length scales) modelling of ocean dynamics

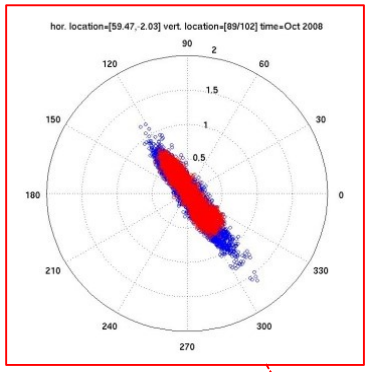
Structured grids:
- POLCOMS-WAM
- NEMO-WWIII

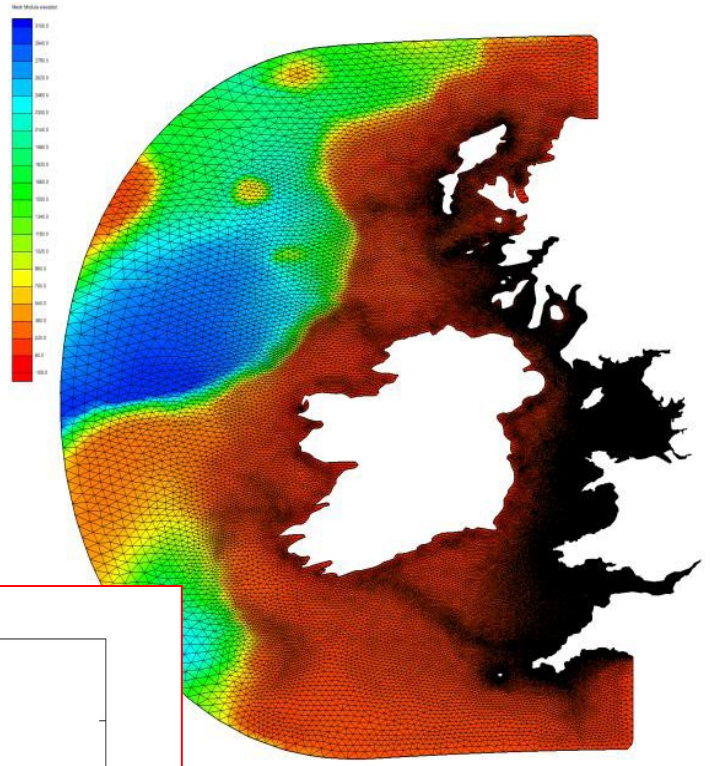
Unstructured grids:
- ADCIRC
- FVCOM-SWAVE

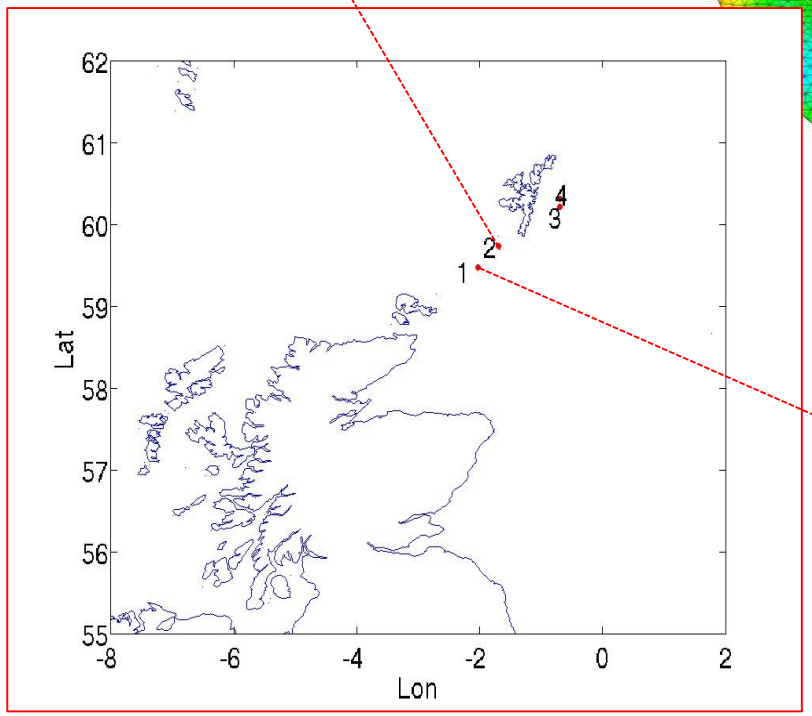
3D mean currents determined and used for resource and environmental impact estimation

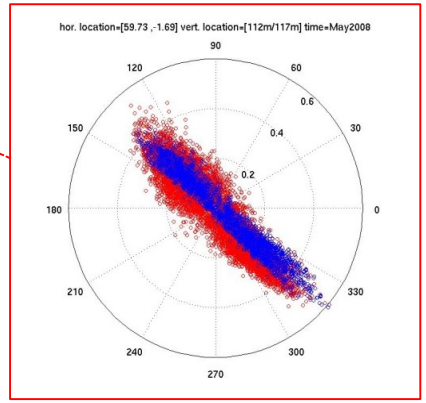
Temperature and salinity gradients

Large data management – statistical analysis of errors!



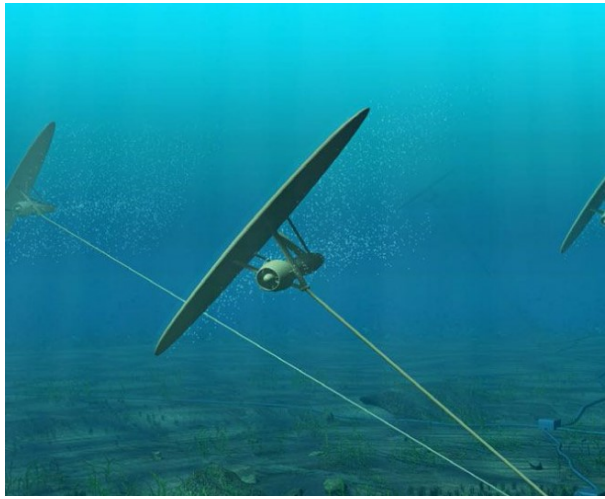






Senior marine renewable energy specialist

Third party verification of wave and tidal devices
- Minesto flying kite tidal turbine
- Anaconda device
- Waveswing point absorber



Funders technical advisor to the MeyGen Project
- https://www.atlantisresourcesltd.com/projects/meygen/
- Information exchange between the project engineers and the funders
- Project investment tracking during installation

Tank testing in France - IRFREMER

Researcher in Energy for Development

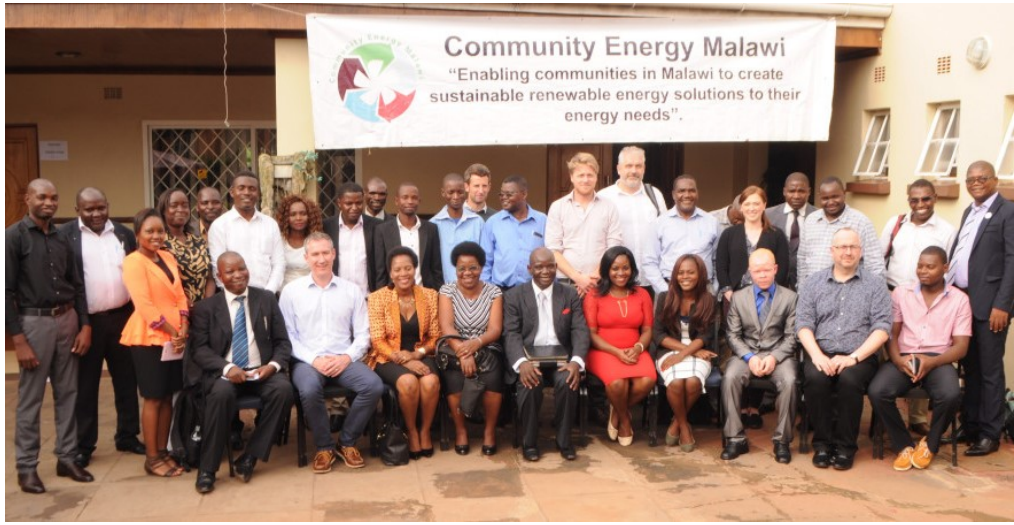
Community Energy Development Programme Malawi

University of Strathclyde Engineering

Managing the Scottish Government investment into renewable energy in Malawi

Working with partner organisations to manage solar panel installations

http://united-purpose.org/malawi
http://communityenergymalawi.org/
(https://www.facebook.com/communityenergymalawi/)



Collaborative research – Decentralising energy
https://strath-e4d.com/2017/07/04/district-energy-officers-in-malawi-blueprinting-recommendations-paper/

Solar energy project risk modelling

Montecarlo modelling with Bayesian analysis

Teaching

Third year maths

China teaching programme

https://strath-e4d.com/

Wave energy Modelling engineer

Wave energy device

Compact high-efficiency Wave Energy Converter
Using a novel phase control method power capture is amplified
Phase controlled oscillation allows for 5 X times higher power

Challenges…

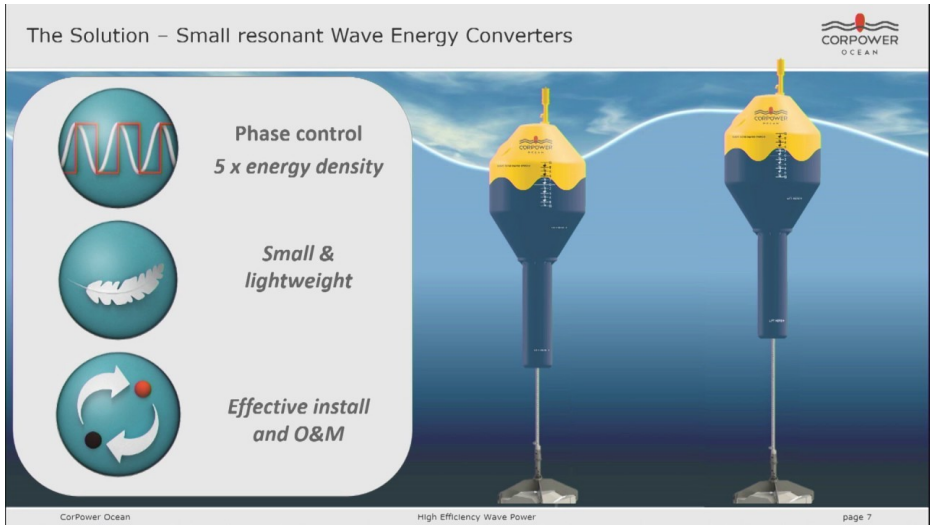
Robustness, survivability in stormy seas
Economic LCOE

Potential…

2000-4000TWh of electricity per year – 10-20% of worldwide electricity consumption
Create a world where producing our energy needs is efficient, clean and economical

½ scale sea testing complete

www.renews.biz/111591/corpower-passes-emec-test/
http://www.corpowerocean.com/
http://www.emec.org.uk/about-us/wave-clients/corpower-ocean/



https://gender-pay-gap.service.gov.uk/

https://ig.ft.com/gender-pay-gap-UK/

BLACK & VEATCH

Who received bonus pay

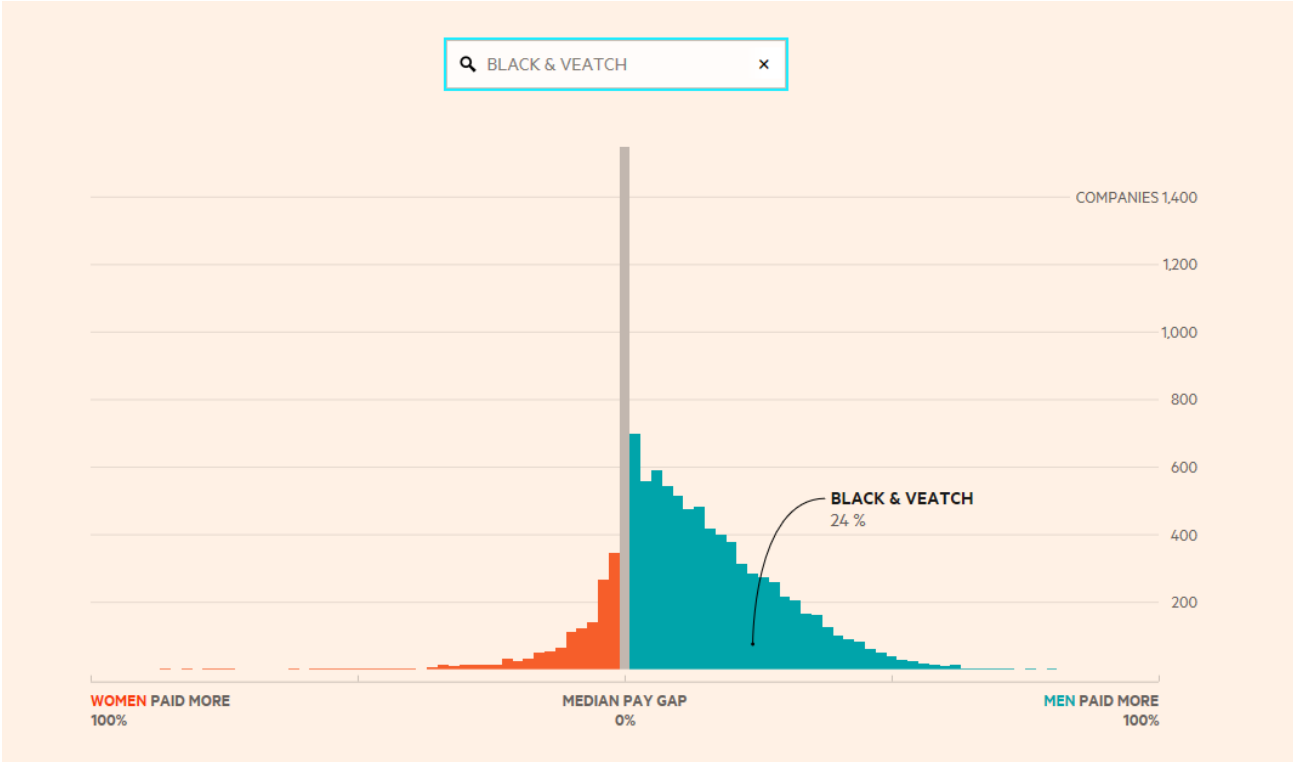
1.5% of women

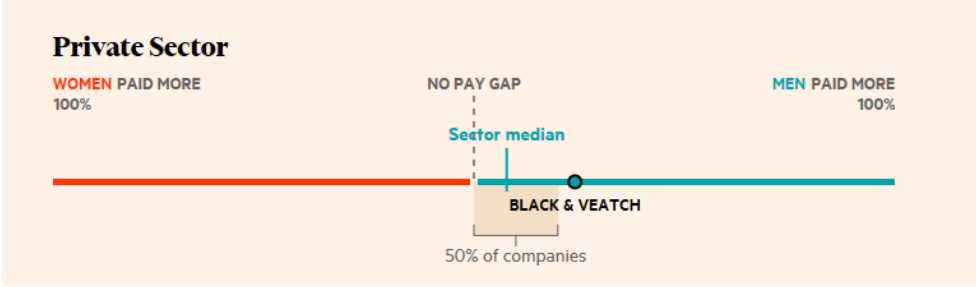
4.8% of men

Difference in bonus pay

Women's mean bonus pay is **62% lower** than men's

Women's median bonus pay is **25% lower** than men's



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Staying in Touch

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https://vimeo.com/channels/1210250

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Coordinated by
Ocean Energy Europe

Partners
THE UNIVERSITY of EDINBURGH
EERA

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European Commission

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