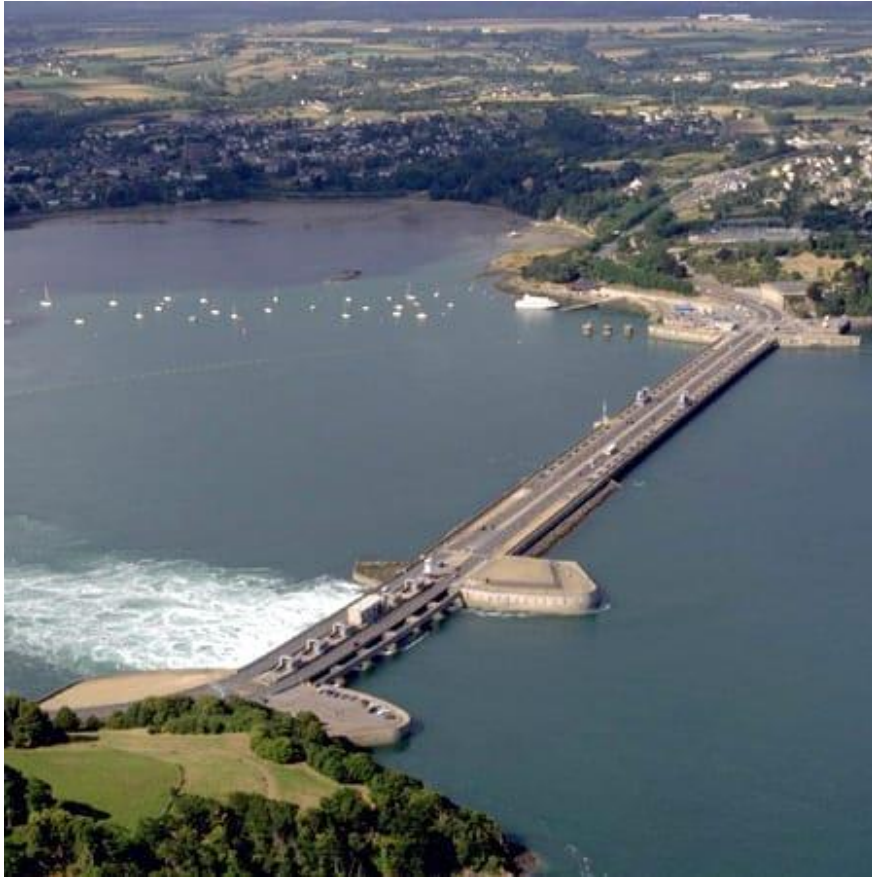


TIDAL POWER

TOM ADCOCK

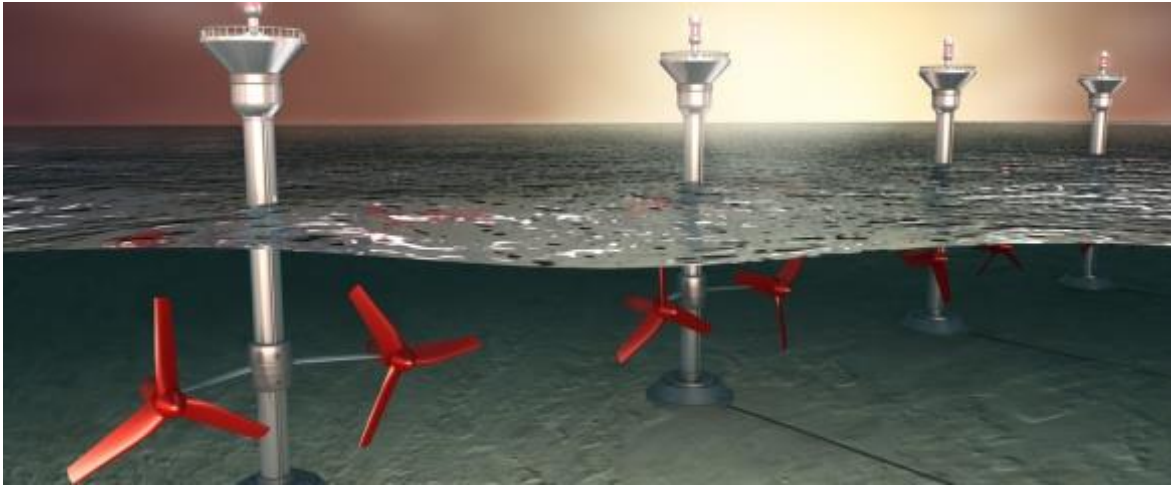
DEPARTMENT OF ENGINEERING SCIENCE

Tidal barrage



- Suitable for areas with large tidal range
- Very standard technology
- Severe environmental impact

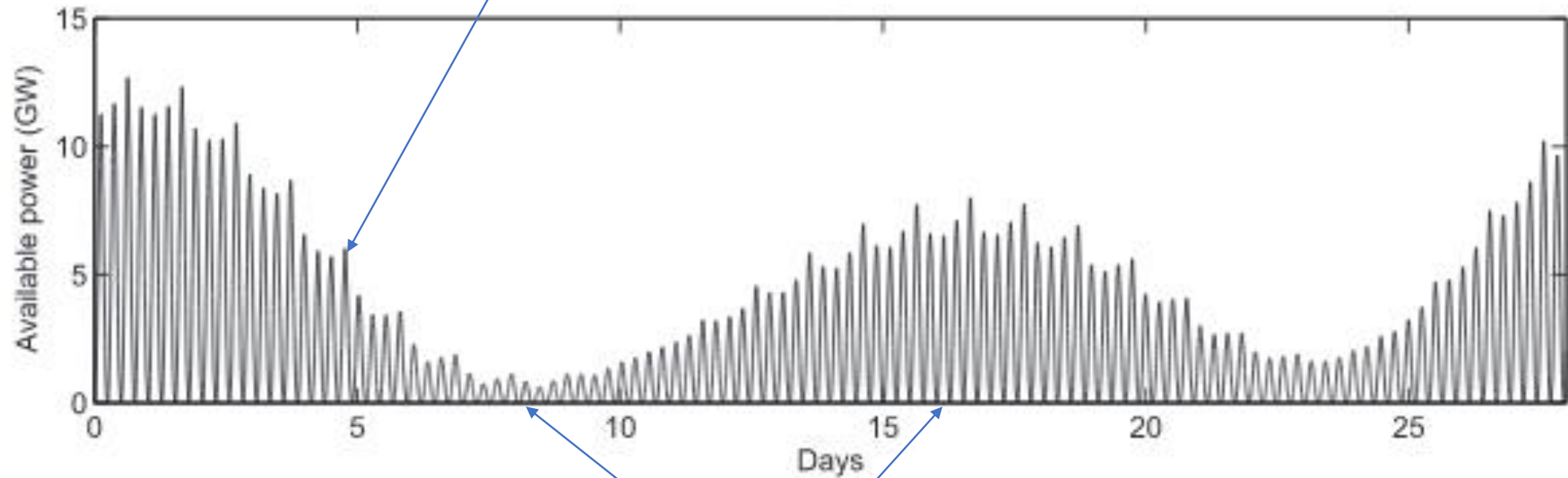
Tidal stream



- Suitable for areas with fast flowing currents
- Similar technology to offshore wind but higher loads and more difficult environment
- Lower environmental impact than a barrage and can be constructed incrementally

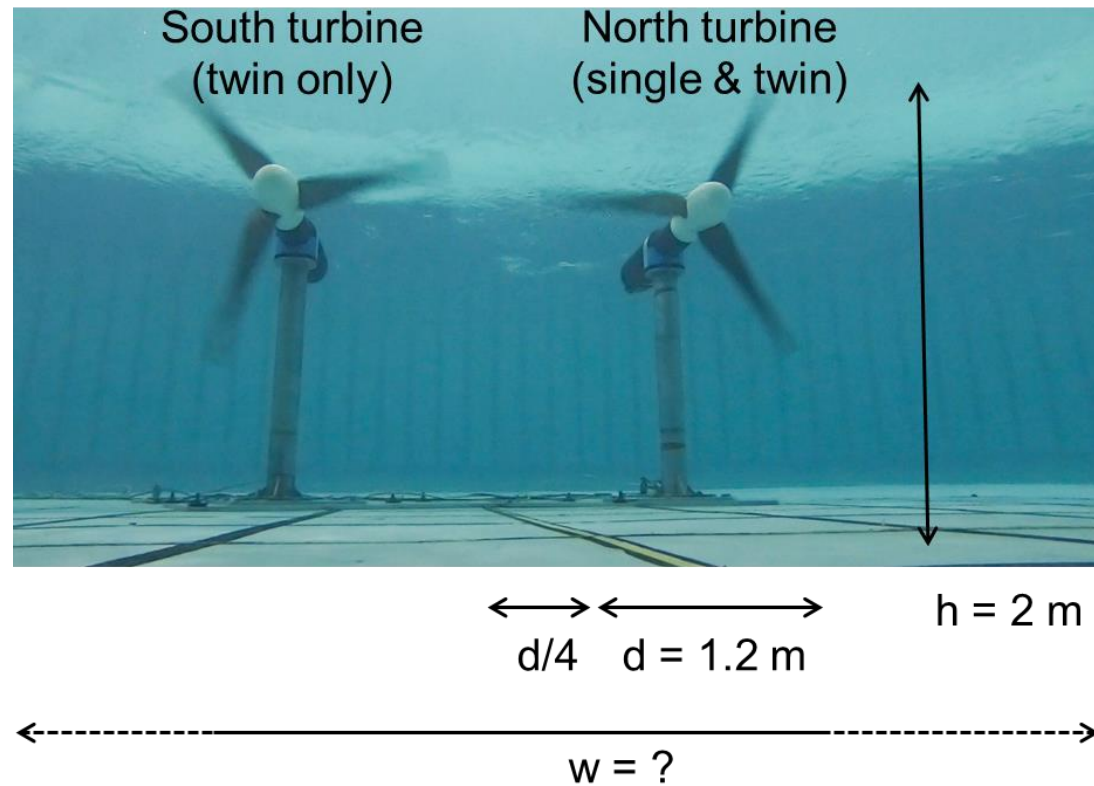
Tidal: predicatable — but intermittent

Individual wiggles will be occur at different times at different sites



But spring/neap tidal cycle the same around the world

Oxford work on improving efficiency



How big is the tidal
resource?

How big is the tidal resource?



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Global tidal power potential is approximately 685 GW, with a staggering 45 GW in the UK alone. Tidal range power is predictable to the minute. Because the timing of tides varies along coastlines, different installations generate at different times to deliver near continuous supply. With its energy storage possibilities, tidal energy will make a significant contribution to Net Zero in a sustainable manner.

How big is the tidal resource?

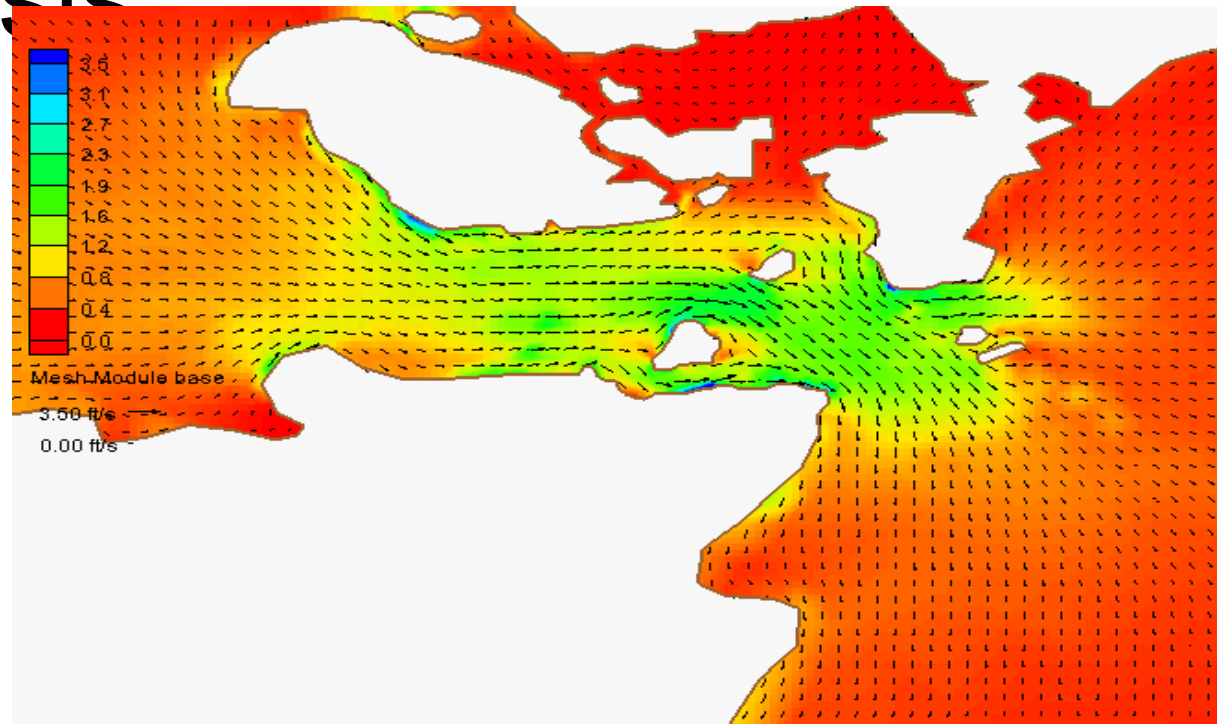
- Estimates vary by orders of magnitude
- Understanding this crucial to knowing whether to develop the technology
- Coupled problem of how the tidal interacts with other renewables

Tidal barrage resource



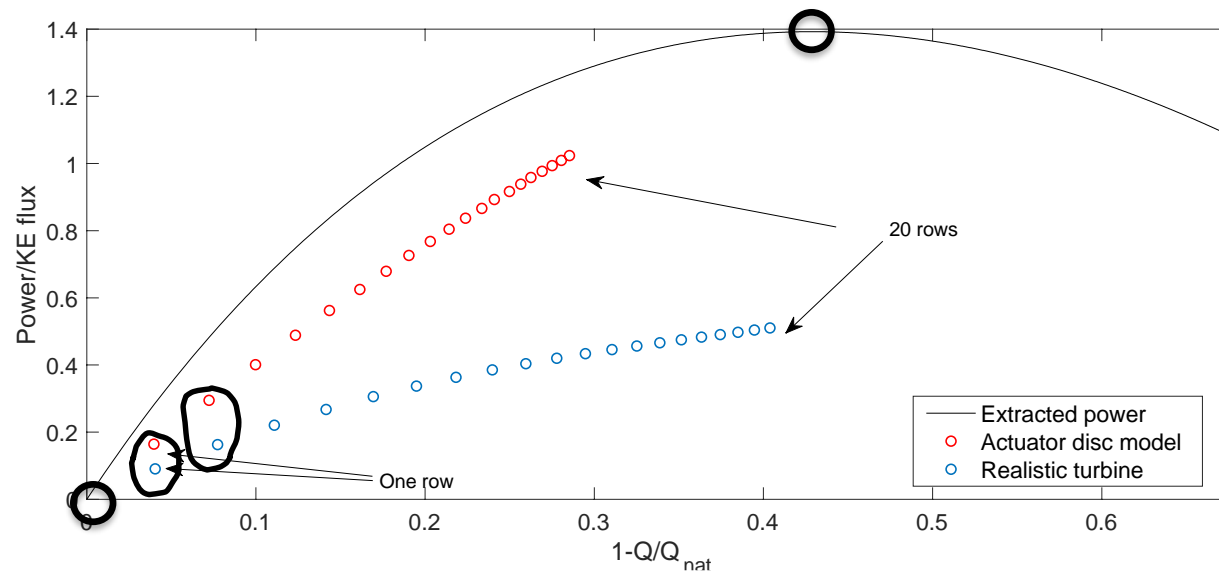
- Modelling of power from tidal barrages well understood
- Severn Barrage would be about 2GW
- Other UK barrages much less

Tidal stream resource analysis



Tidal stream resource analysis

How do you assess the resource of a site?



Adapted from Adcock et al. (2021), Ann. Rev. Fluid Mech.

- How many turbines can you put in before return is not viable?

Tidal stream resource analysis

- How can we improve on this?
- Better models and data help but will not answer the central problem
- Fundamentally a multi-disciplinary problem
 - Environmentalists
 - Economists
 - Ecologists
 - Lawyers
 - Etc.

Summary



- Tidal power is predictable but intermittent
- Tidal barrage uses mature technology and is well understood
- Tidal stream has greater technical challenges but these can be overcome
- The magnitude of the resource remains a significant open question