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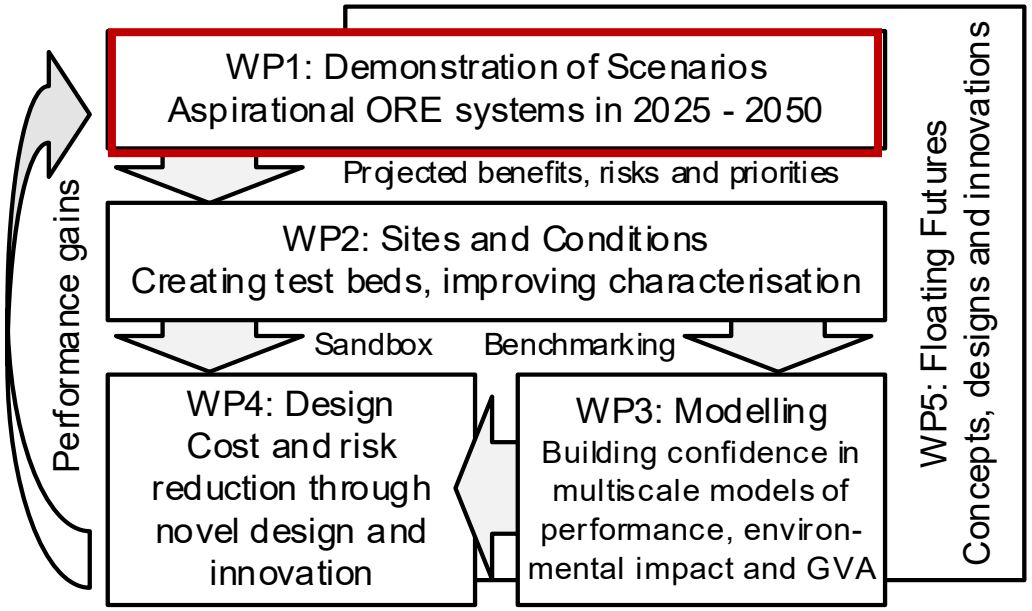
What are the socioeconomic and system benefits of ocean energy?

A GB 2050 net zero case study

Shona Pennock and Henry Jeffrey
Policy and Innovation Group,
University of Edinburgh



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How much wave and tidal could be installed by 2050?

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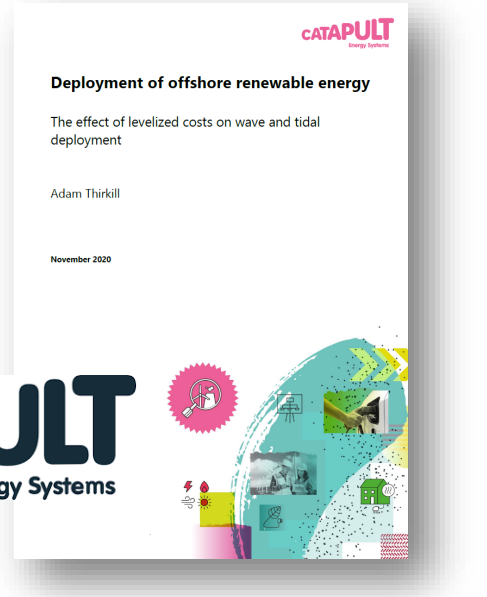
- GB deployment modelling to 2050
- ESME model run by ESC
- Future Ambition (96%) Scenario



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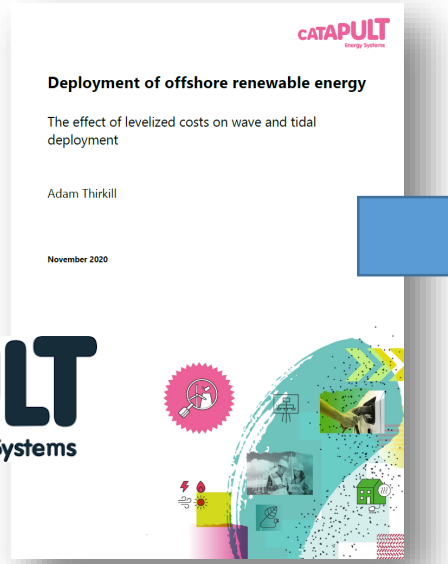
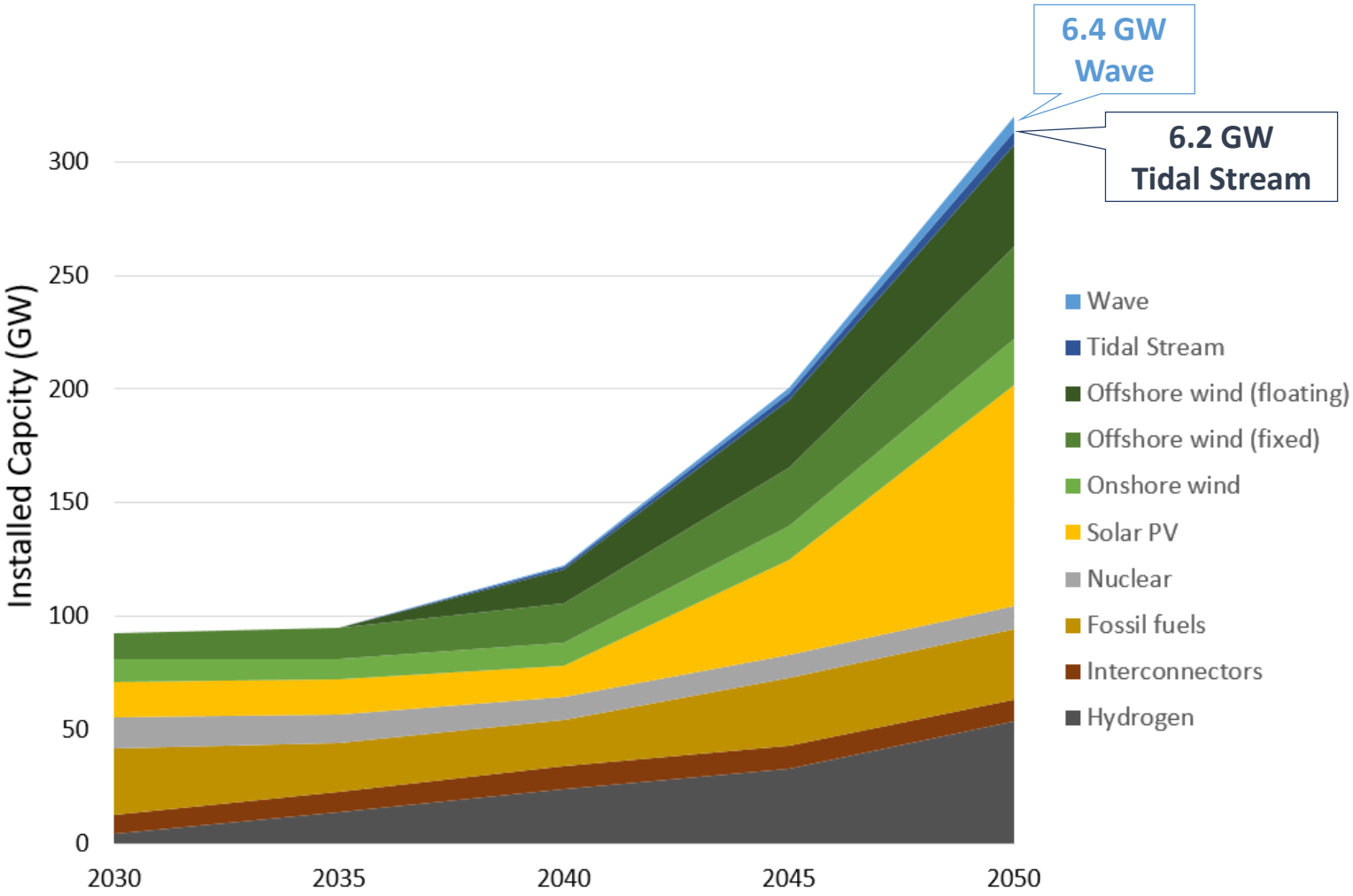


CATAPULT Energy Systems



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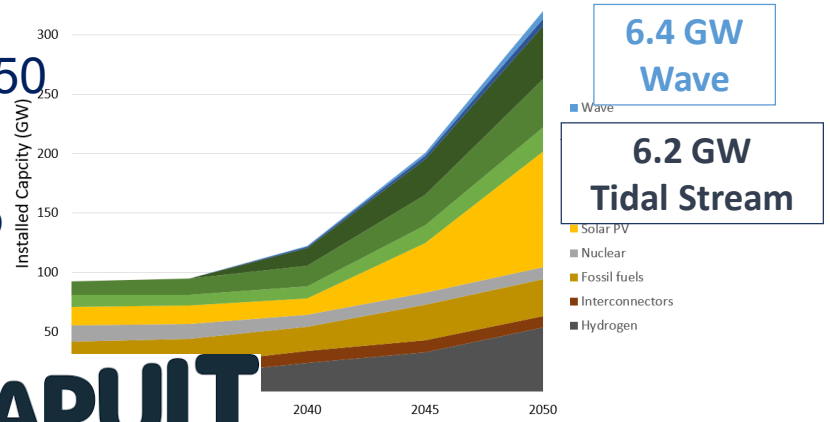

CATAPULT
Energy Systems

Socioeconomic benefits

- Gross Value Added

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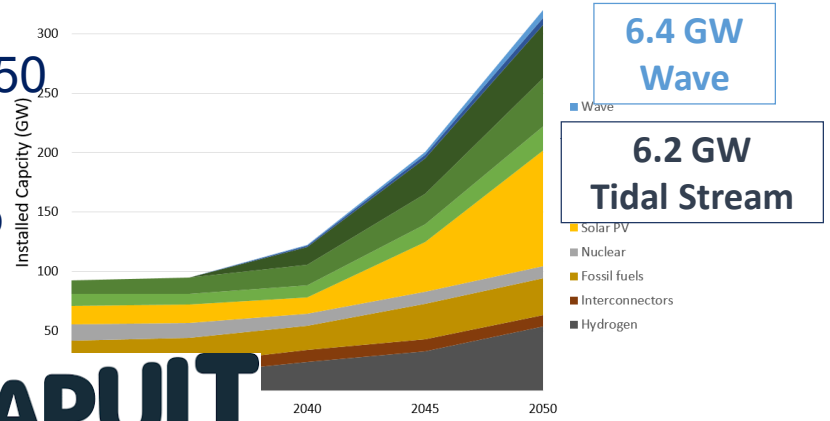

6.4 GW Wave

6.2 GW Tidal Stream

CATAPULT Energy Systems

Socioeconomic benefits

- Gross Value Added

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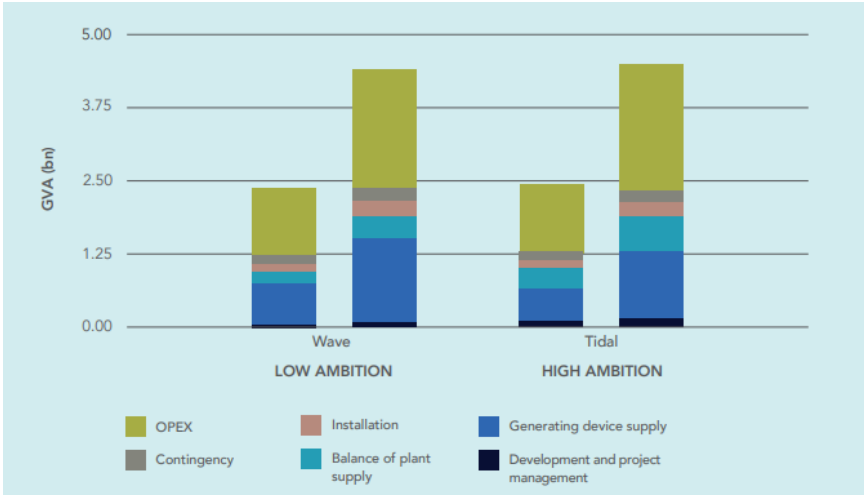
£4.9bn - £8.9bn GVA from UK deployments



What are the system benefits of ocean energy?

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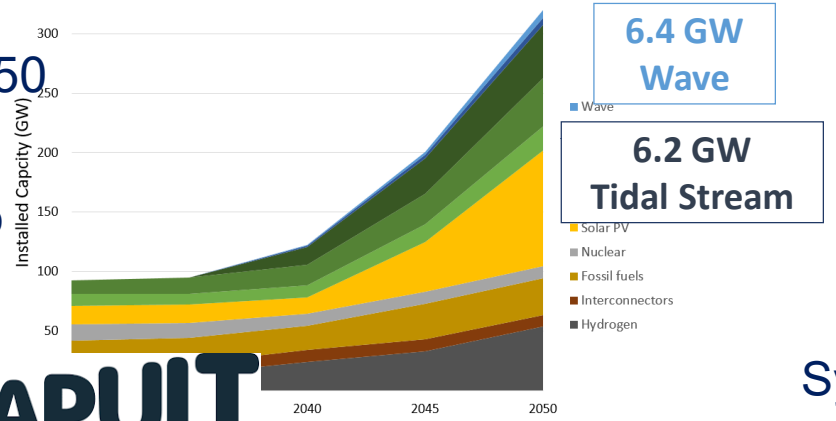

6.4 GW Wave

6.2 GW Tidal Stream

CATAPULT Energy Systems

Socioeconomic benefits

- Gross Value Added

£4.9bn - £8.9bn GVA from UK deployments

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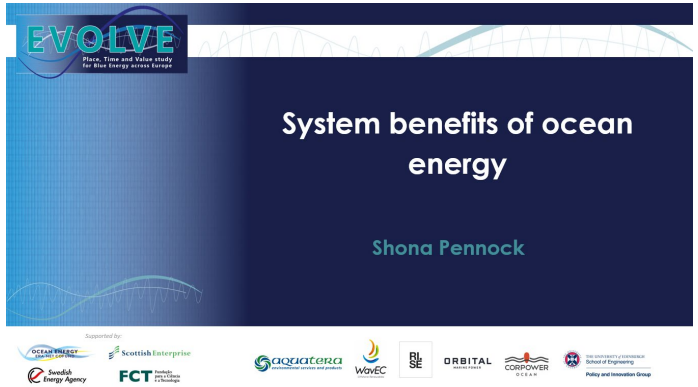
System benefits

- Economic dispatch modelling
- Reduction in dispatch costs
- Reduction in fossil fuel dispatch



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EVOLVE

How do demand and renewable resources compare?

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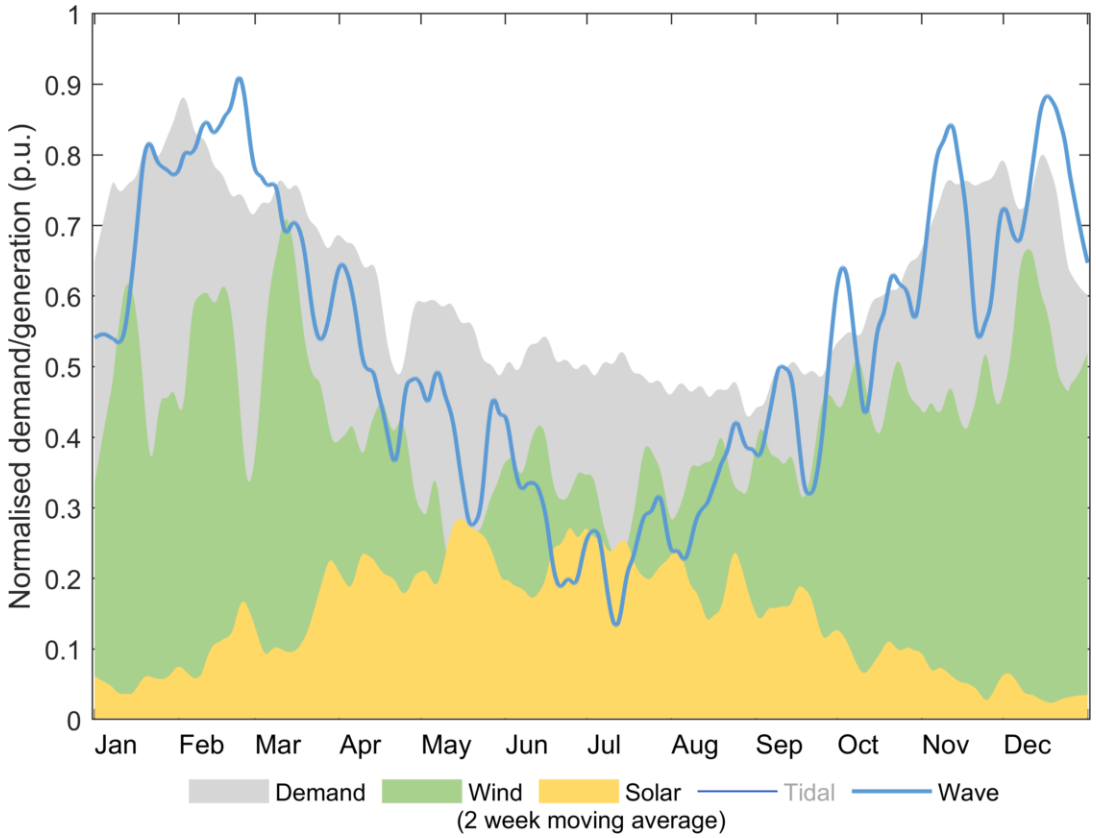

- Electricity demand is highly seasonal in GB
- Wind generation higher in winter
- Solar generation higher in summer
- Tidal consistently available - in cycles
- Wave generation higher in winter – coinciding with peak demand

Hourly dispatch – first week in January

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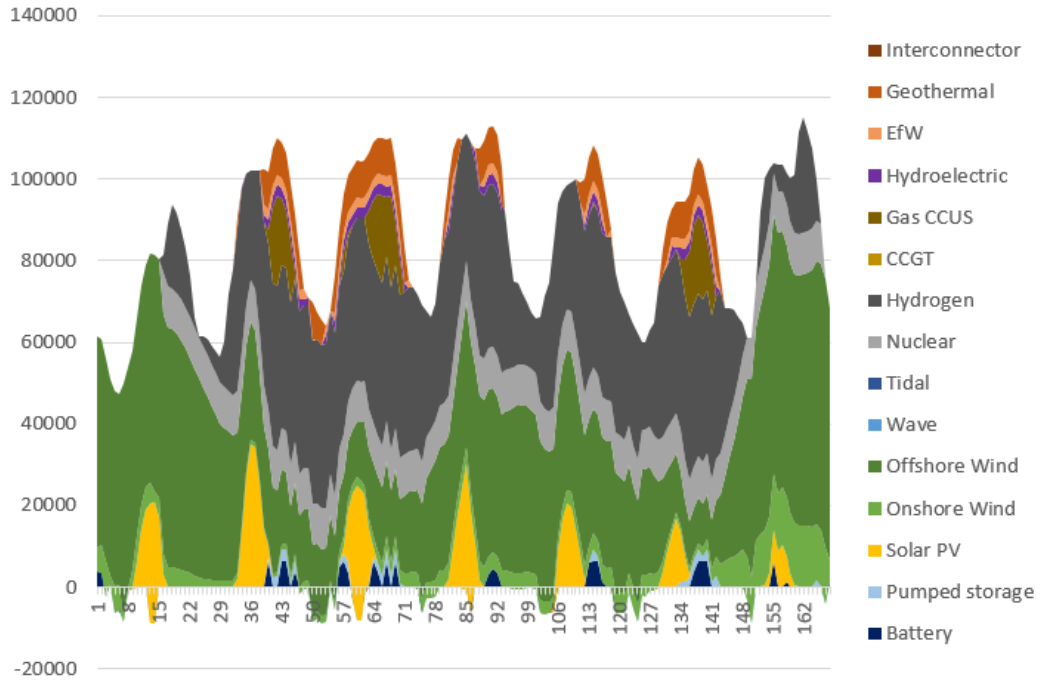
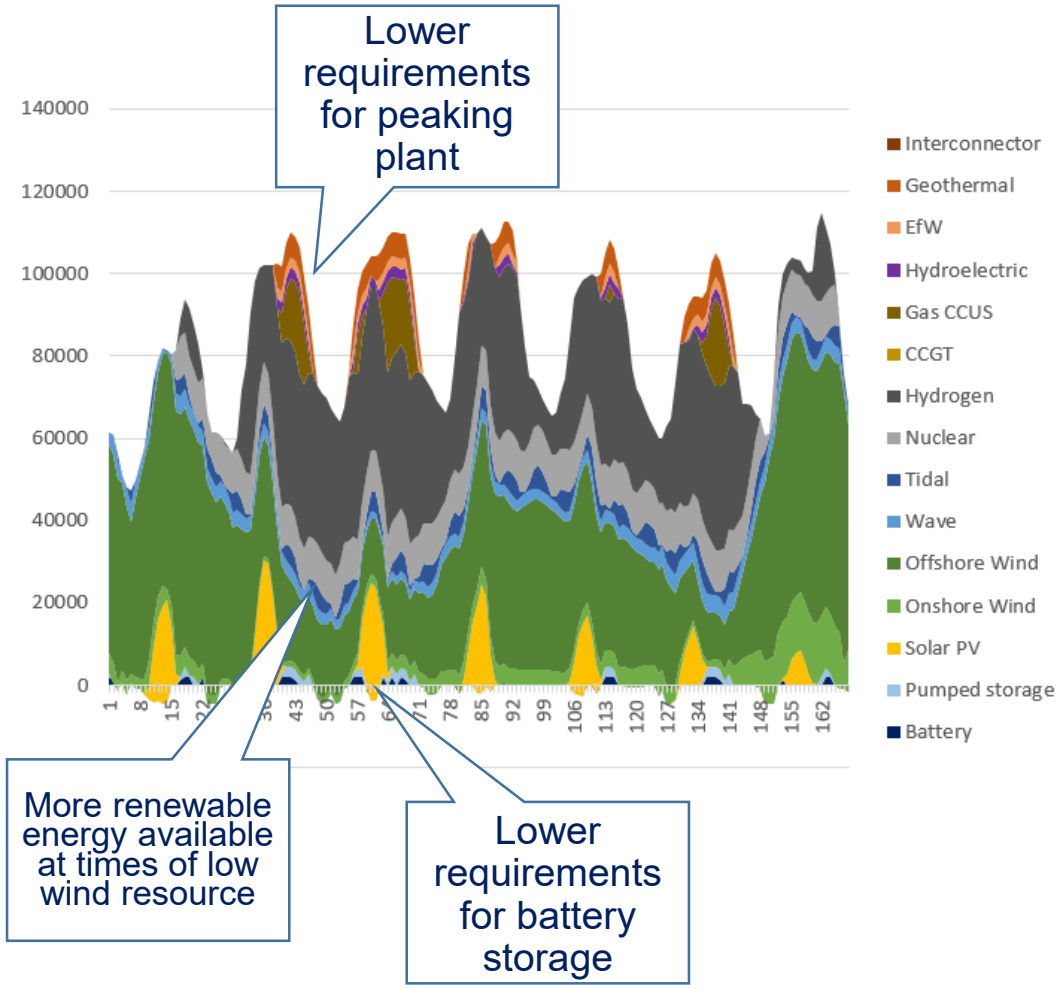
Without marine



With marine



System benefits results - 2050

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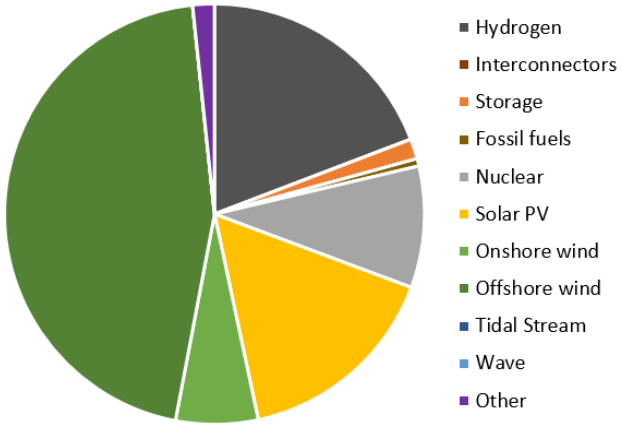
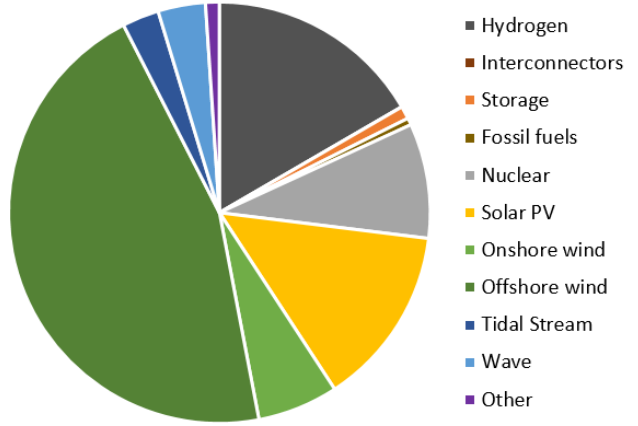
Without marine

68% renewable dispatch



With marine

72% renewable dispatch



Annual dispatch cost: £13.54bn

Annual dispatch cost: £12.51bn **(-8%)**

Reduction of £1.03bn

Fossil fuel dispatch: 4.06 TWh

Fossil fuel dispatch: 3.76 TWh **(-7%)**

Reduction of 300 GWh

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Conclusions

- Energy system modelling projects **6.4GW Wave** and **6.2GW Tidal Stream** by 2050
  - *if SET Plan targets are reached by 2030*
- Resultant GVA to UK economy (2020-2050):
  - **£4.9bn - £8.9bn** from UK deployments
  - **£11bn - £41bn** from global deployments
- Resultant system benefits in 2050:
  - **£1.03bn** annual reduction in cost of dispatch
  - **300 GWh** reduction in fossil fuel dispatch

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