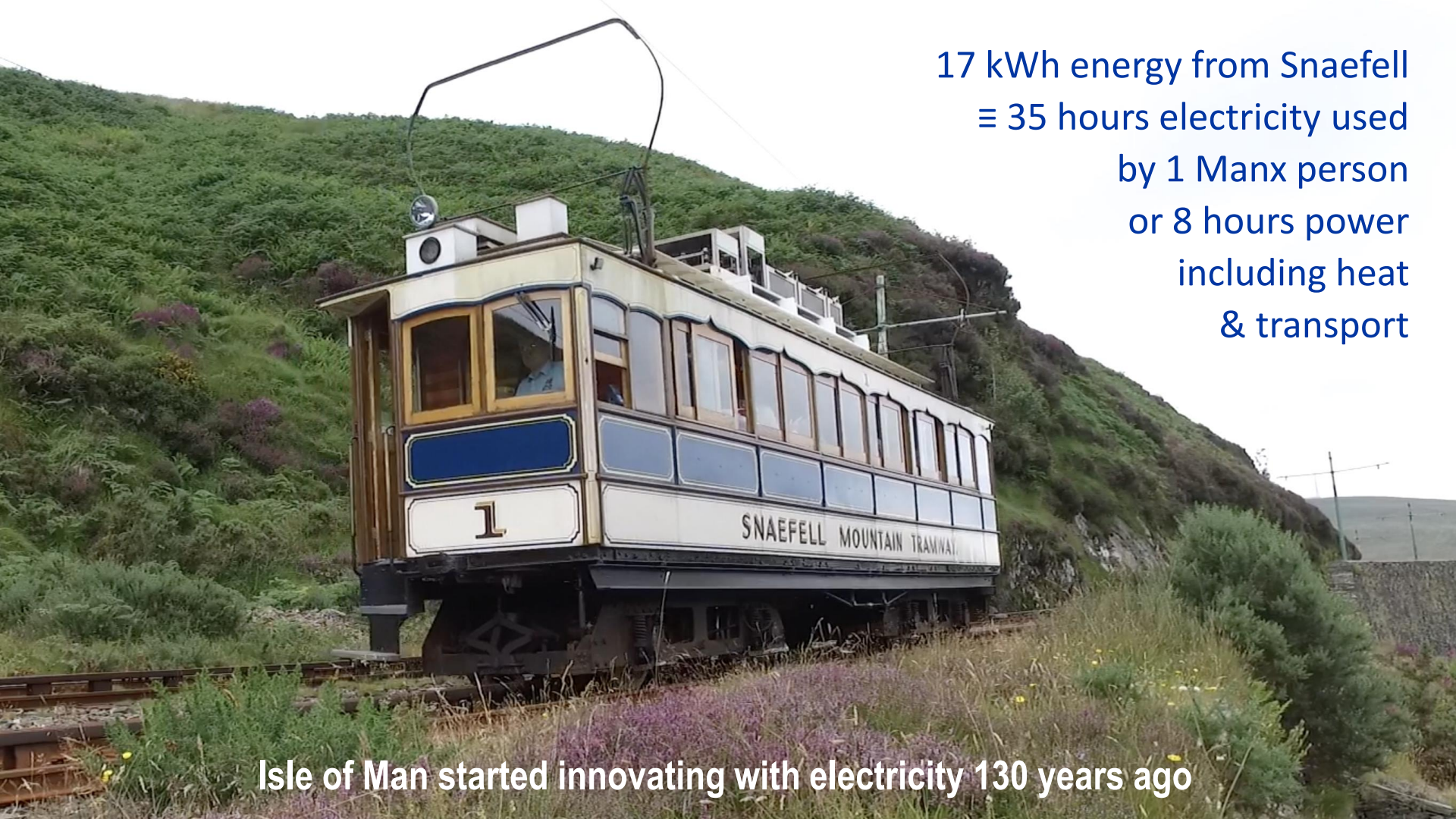

Welcome to the
Low-Carbon Island conference


17 kWh energy from Snaefell
≡ 35 hours electricity used
by 1 Manx person
or 8 hours power
including heat
& transport
1
SNAEFELL MOUNTAIN TRAMWAY
Isle of Man started innovating with electricity 130 years ago

Options for Sustainable Power on the Isle of Man

Dave Quirk, Ralph Peake, John Boucher

Government prioritises & enables

Industry embraces Island's needs

Mutual benefit through collaboration

≥1500 Laxey Wheels needed to power the Island

Energy and Sustainability Centre, IoM

AALBORG UNIVERSITY
DENMARK

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Grateful thanks to

- Manannan Energy
- Zurich, KPMG, Peel Group, MMC
- Phil King, Simon Clague, Adrian Dobbins & Mike Newby
- IoM Government Chief Minister & Deputy Chief Minister
- Poul Østergaard, Henrik Lund, Filipe da Silva, Felipe Camara & DTU Offshore
- Dave Armstrong, Gary Myers, Mike Quirk, Charles Guard
- Rebecca Keeley, Maya Sengupta Gledhill
- Mark Shimmin

MANANNAN ENERGY

Energy and Sustainability Centre, IoM

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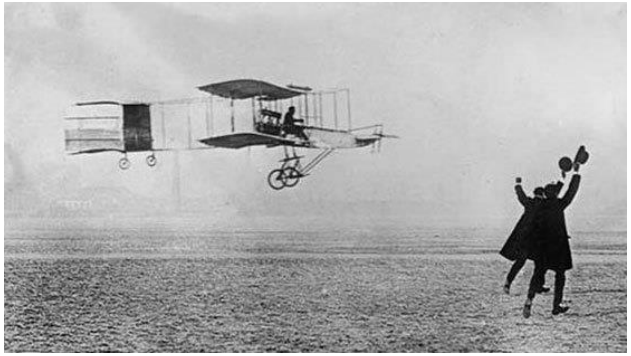
Introduction

- Commitment to NZE in <28 years
  - We can benefit from renewable energy now
  - Time is of the essence
  - Which path is best?



Introduction

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  - Which path offers most benefit?

Lots of valid reasons why low-carbon power looks difficult
But changing perceptions of what is affordable & resilient

- Can Island's gas & oil power plants be replaced by renewables?
  - If so, how to transition? If not, what to do instead?

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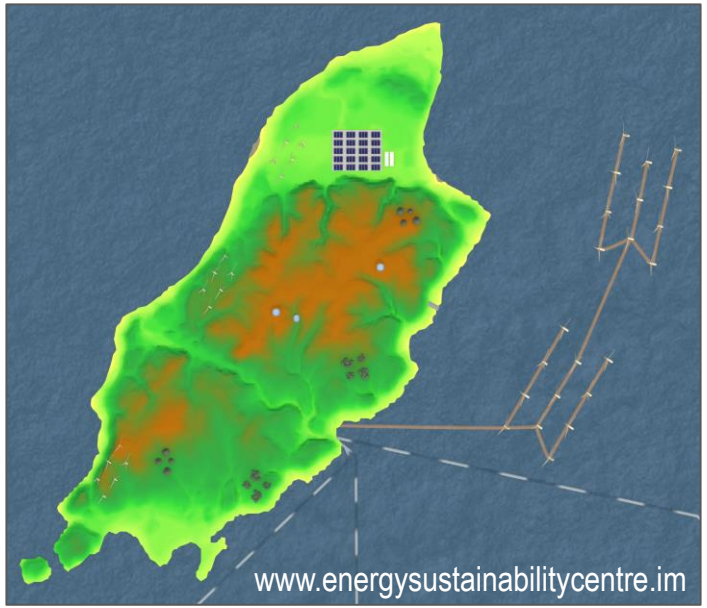
Lots of valid reasons why low-carbon power looks difficult
But changing perceptions of what is affordable & resilient

- Can Island's gas & oil power plants be replaced by renewables?

- No regret decision
  - Wind & solar power
  - Energy storage
  - Export facility



Isle of Man's situation

- Annual ½ million tonnes of CO_2 from use of fossil fuels
  - Same as CO_2 captured by 1250 km^2 forest

2500 Meary Vegs

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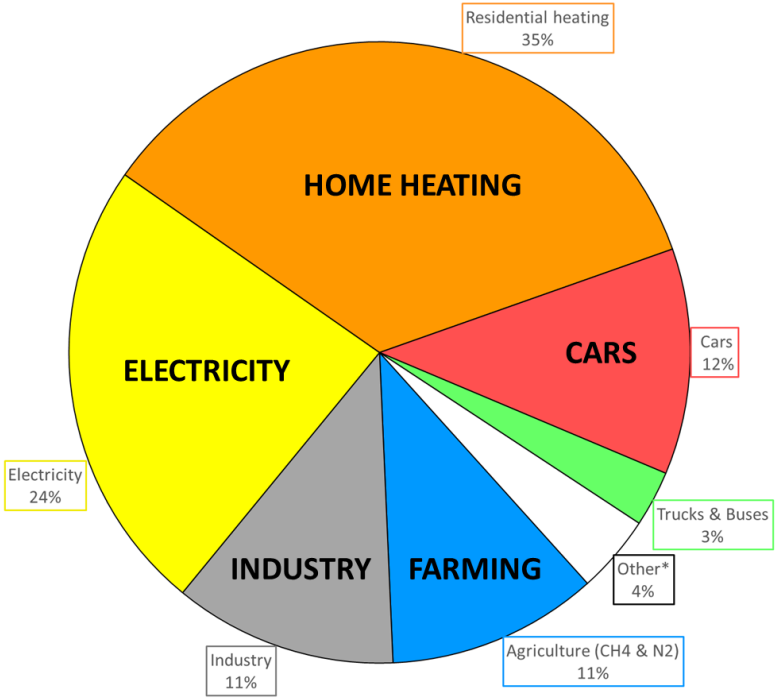

Isle of Man's situation

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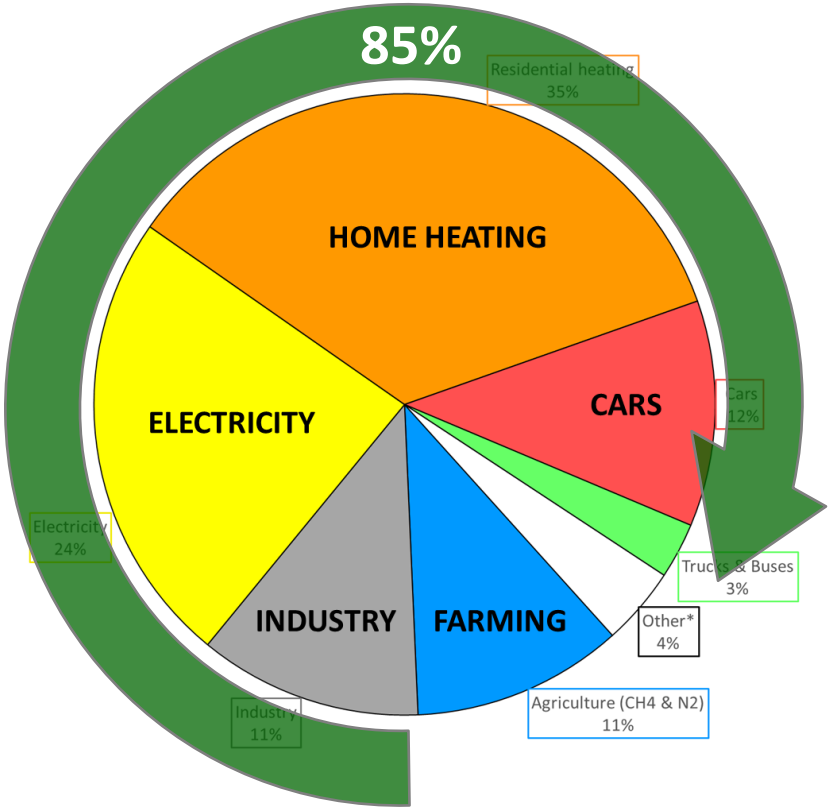
- Enviable renewable energy resources*
  - Predictable costs & value

Wholesale electrification



* Wind & solar is the cheapest generated power

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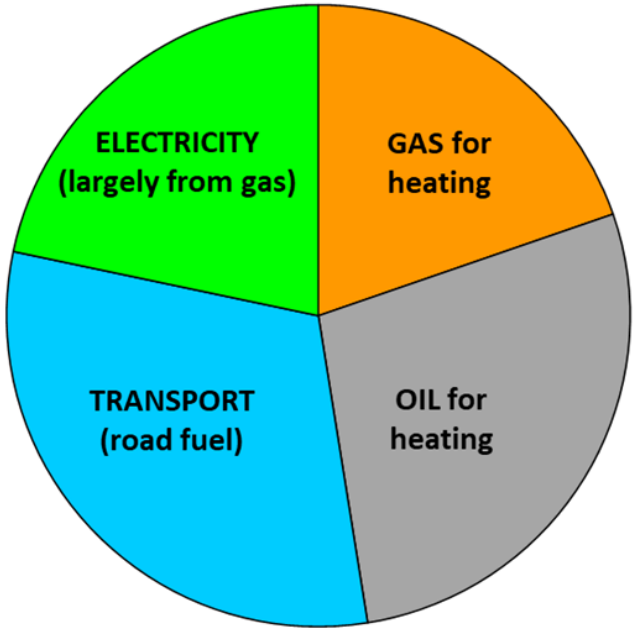
- High & volatile gas & oil prices
  - Winter supply worries

Manx renewable energy resource ≈70,000 GWh/yr



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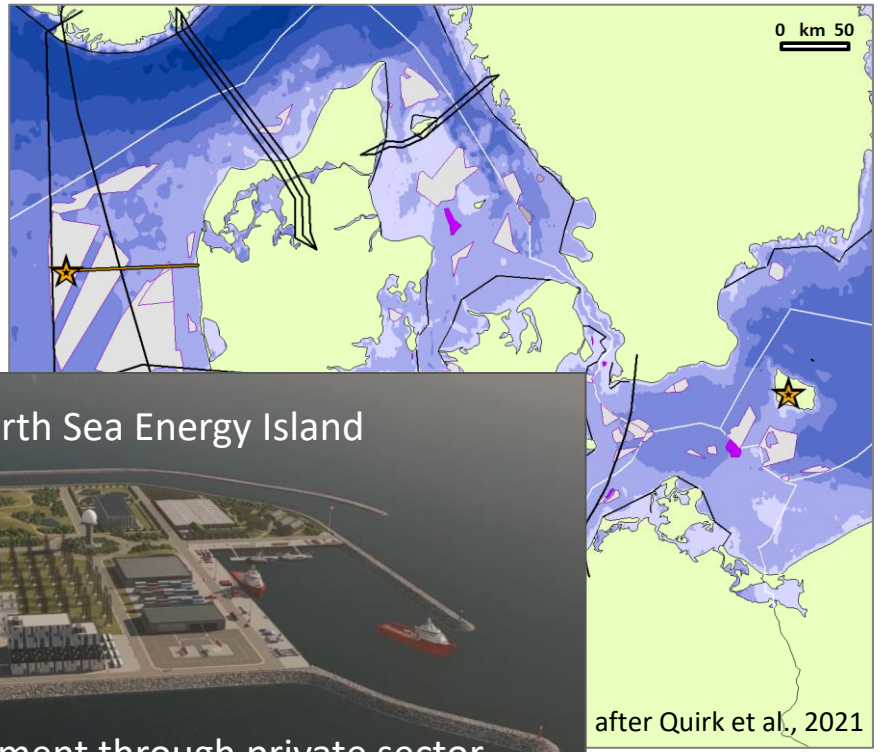

after Quirk et al., 2021

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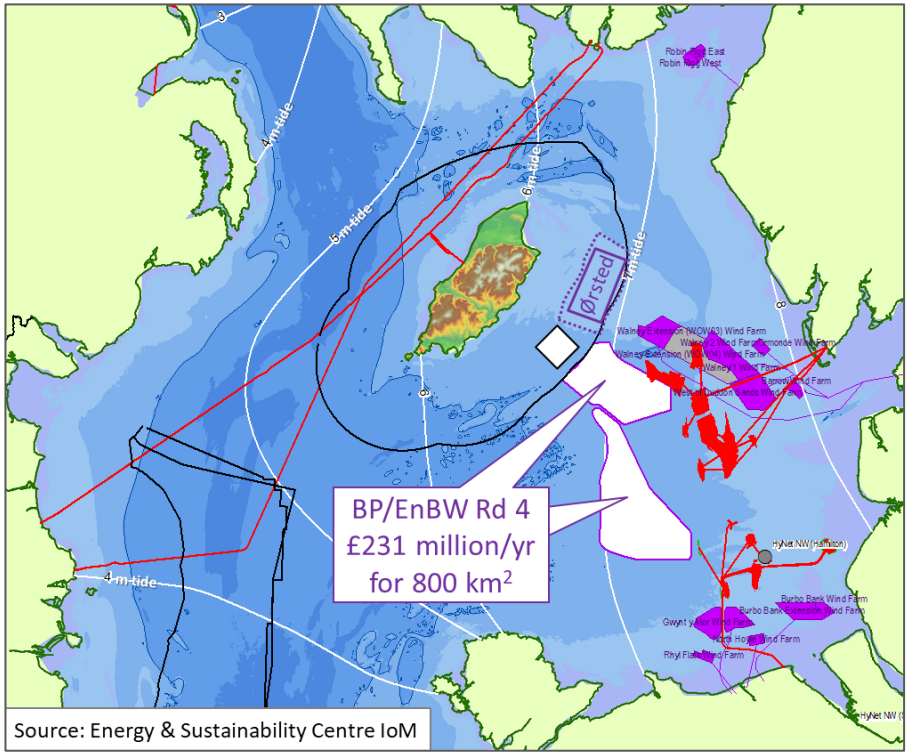
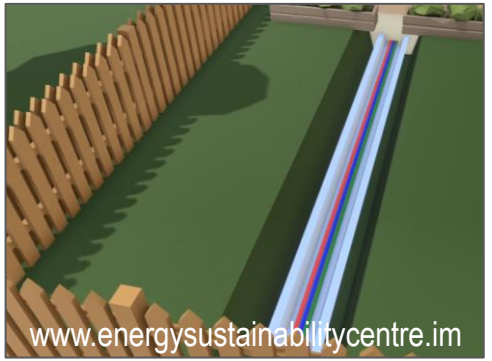
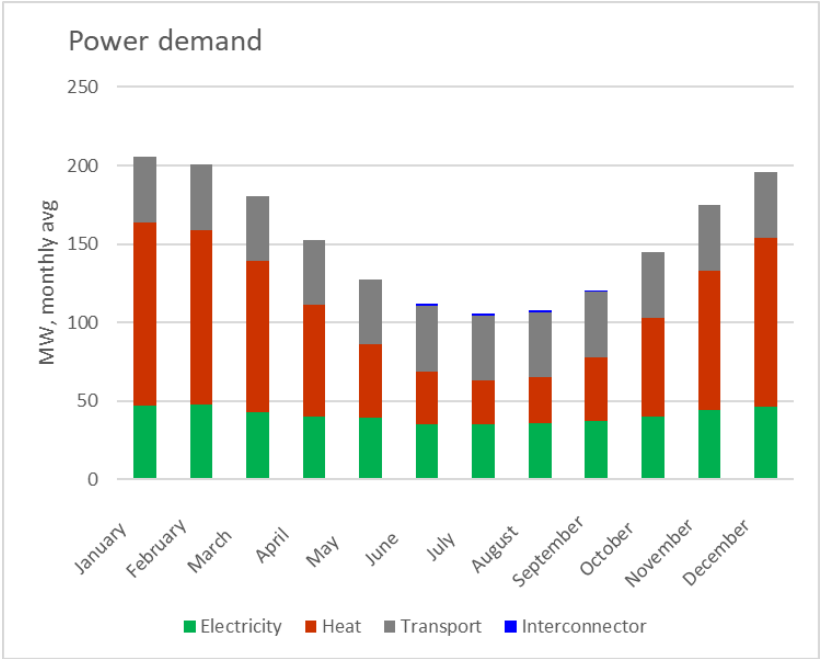


Questions

- **Is the energy transition doable?**
  - Can the IoM be self-sufficient in renewable energy?
  - How to pay for new infrastructure?
- **What are the benefits to IoM?**
  - Is affordable energy realistic?
- **What is motivating us?**
  - Can Manx houses be as warm & dry as Denmark?
  - Can we replace Pulrose & Peel power stations?
  - How to help the economy… & avoid carbon penalties?
  - What do businesses & new industry need?
  - How to be responsible global citizens?
- **Would you accept a fixed price for green power?**



What is the energy transition?



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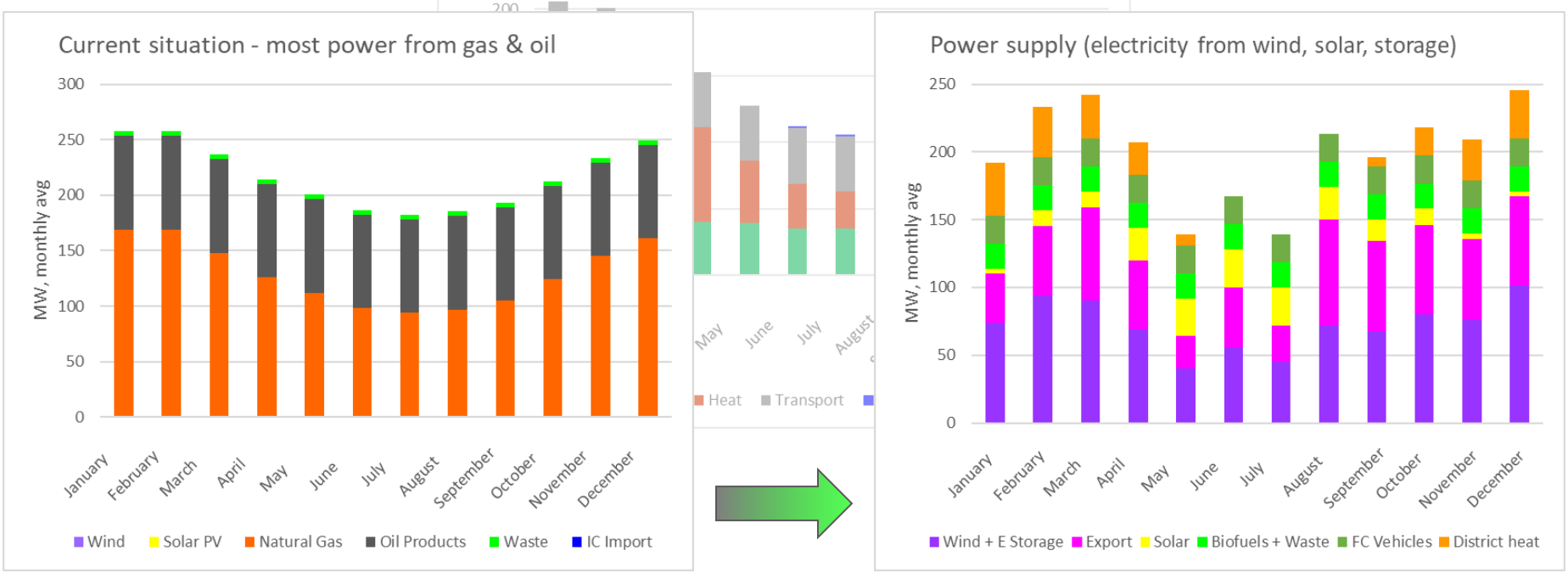
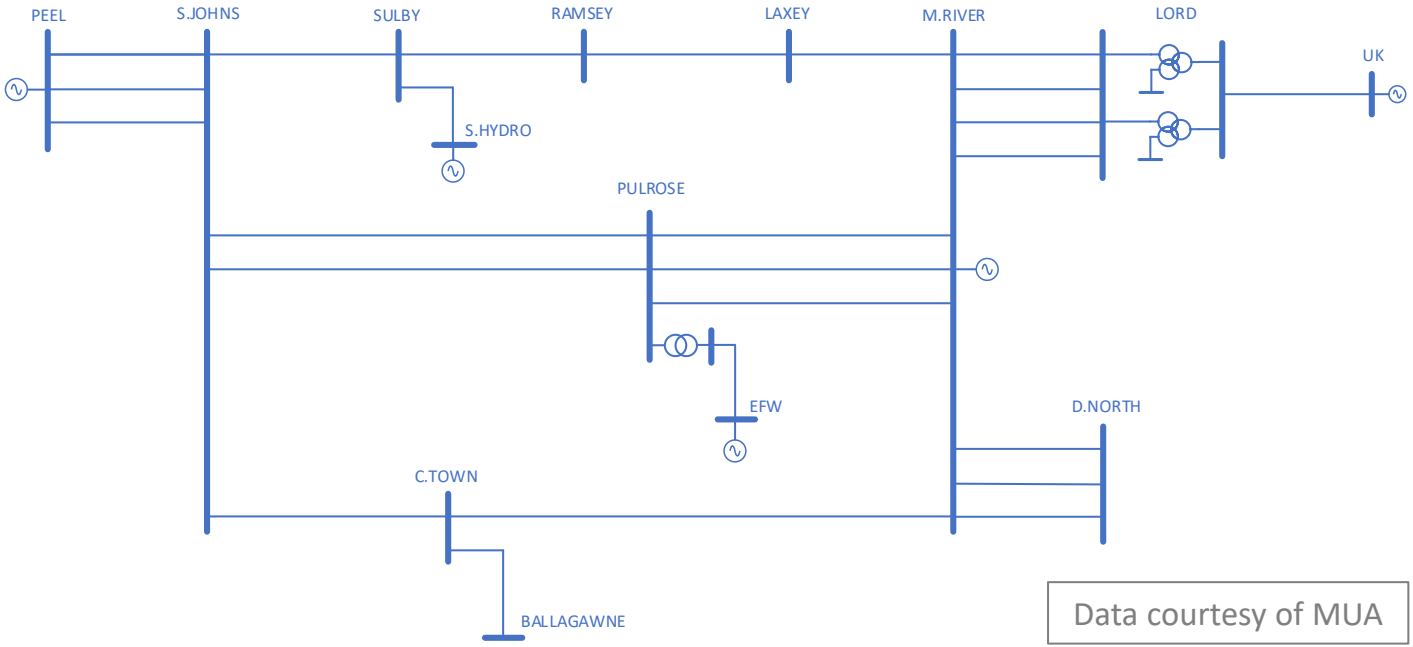


But not that simple

- The electricity grid is truly a wonder
  - Power at a flick of a switch
  - The largest, most complicated human construction



Data courtesy of MUA

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- The electricity grid is truly a wonder
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- Fossil fuel power plants are flexible & provide heat

  … ignoring emissions & costs
- Wind & solar energies are intermittent

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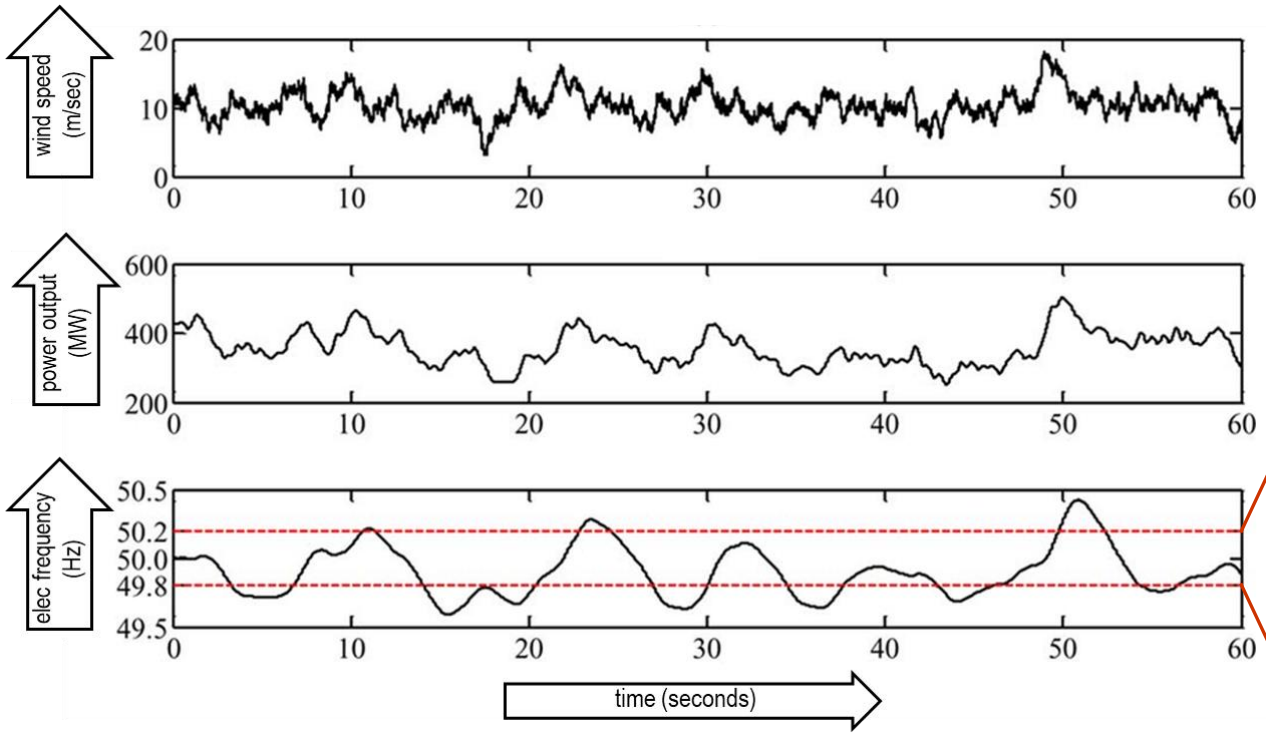
Any variation in supply or demand can affect the stability of the grid



From [www.energy sustainabilitycentre.im](www.energysustainabilitycentre.im) after Jiang et al., 2014

Ancillary services are used to avoid blackouts (batteries, synchronous condensers, power electronics, etc.)

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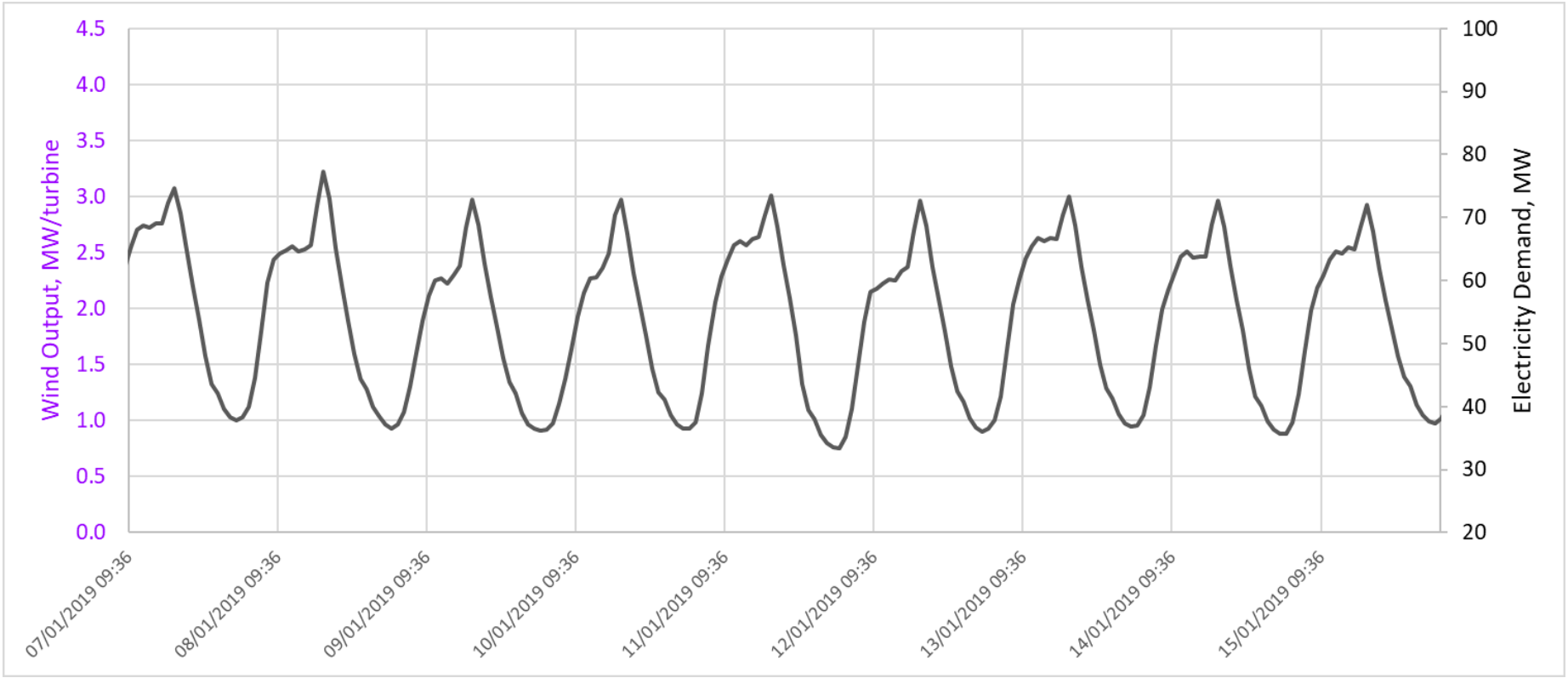
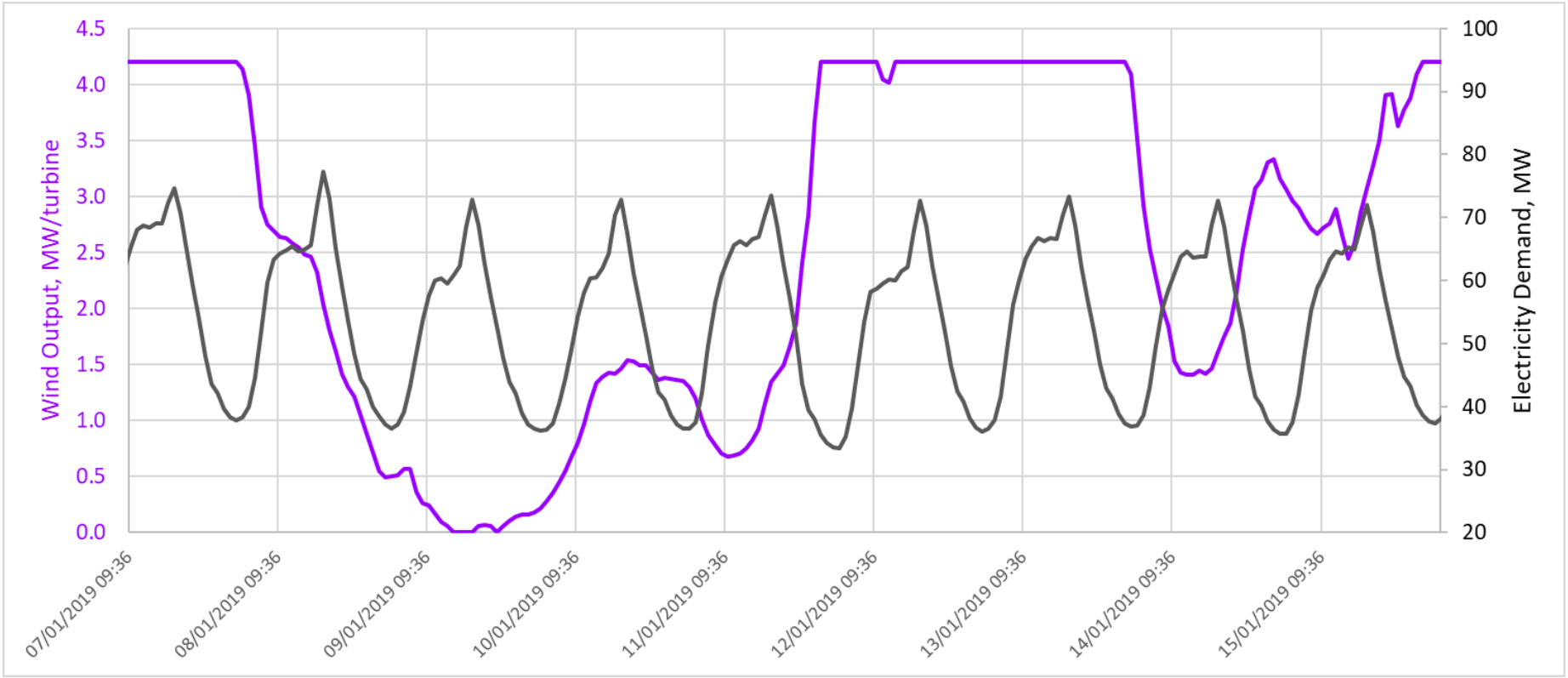
- Electricity demand is variable

Variation electricity demand over 8 days in January

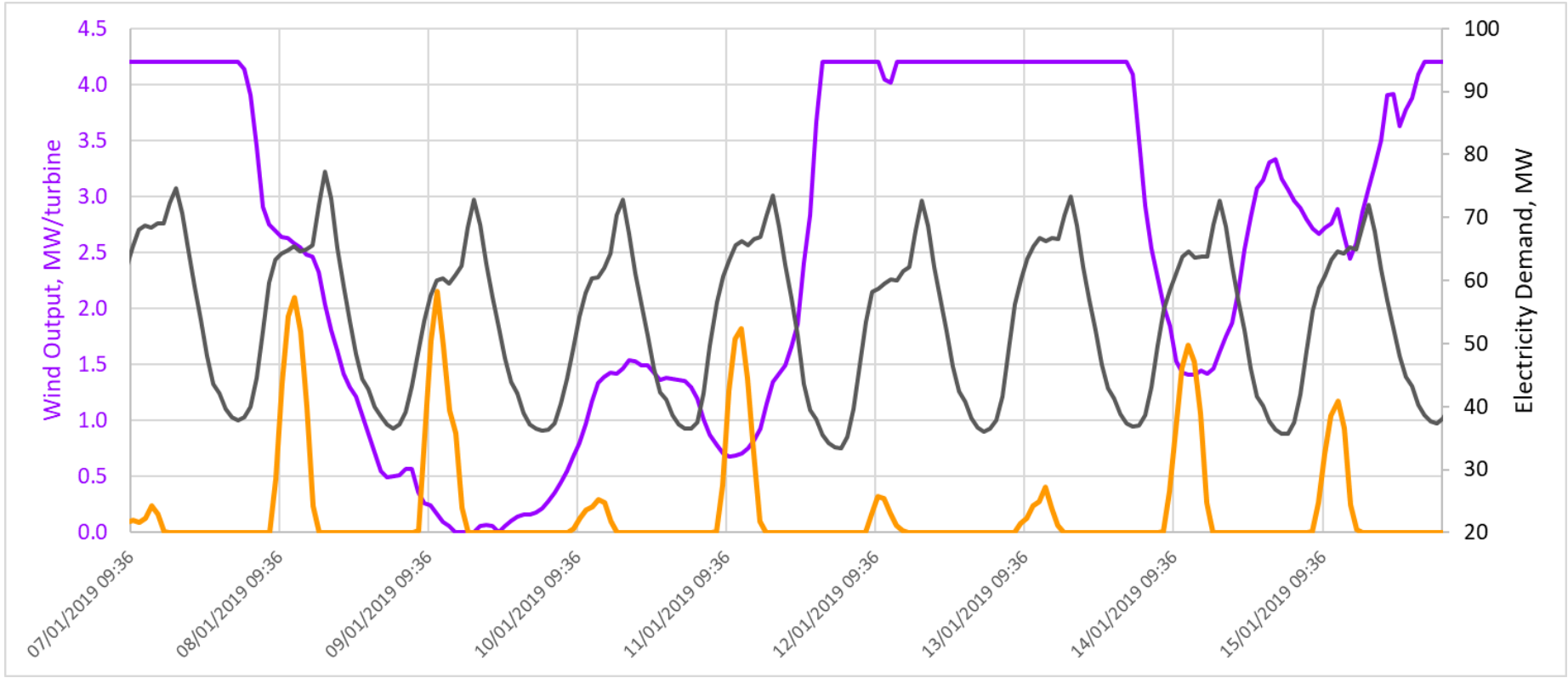


Data courtesy of MUA

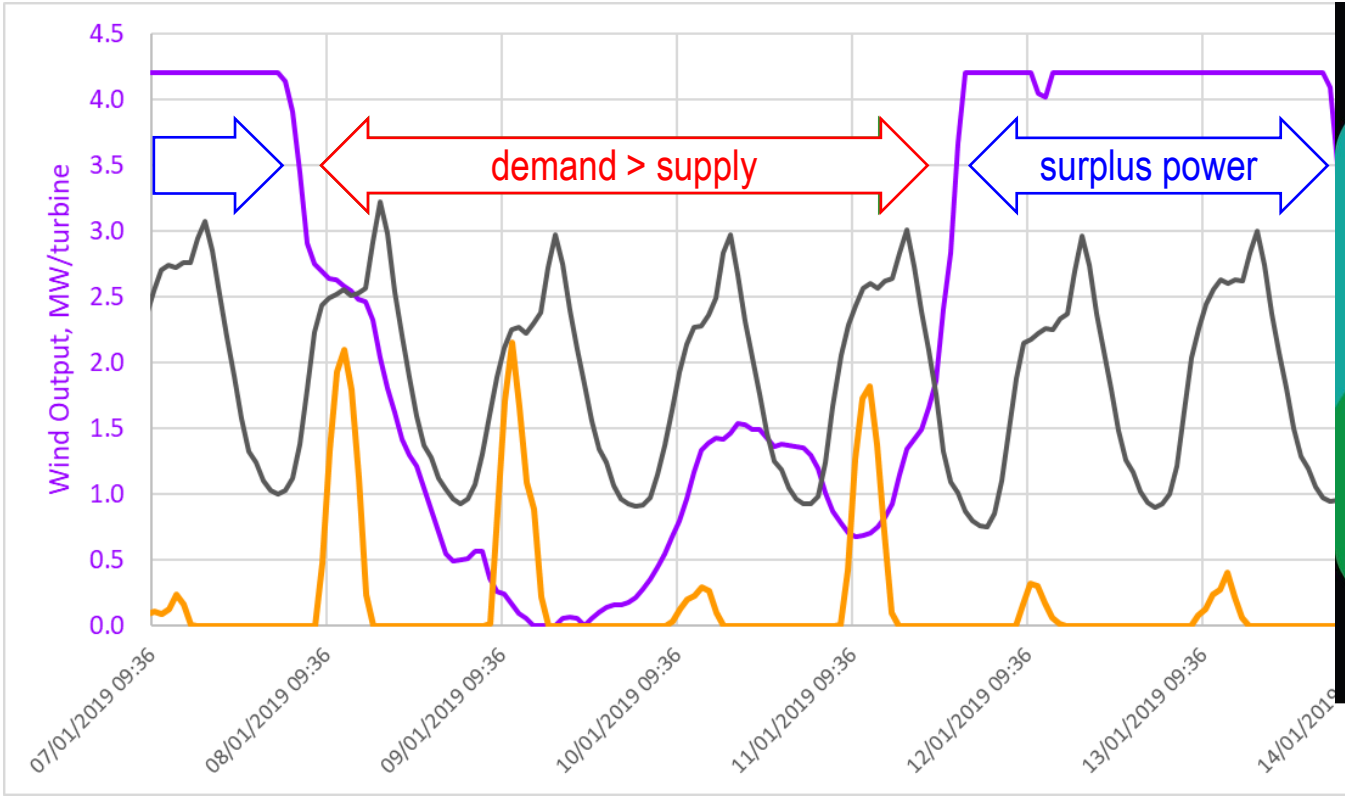
Variation in wind power over 8 days in January



Variation in solar power over 9 days in January



Turn on power plant, import electricity or build energy storage



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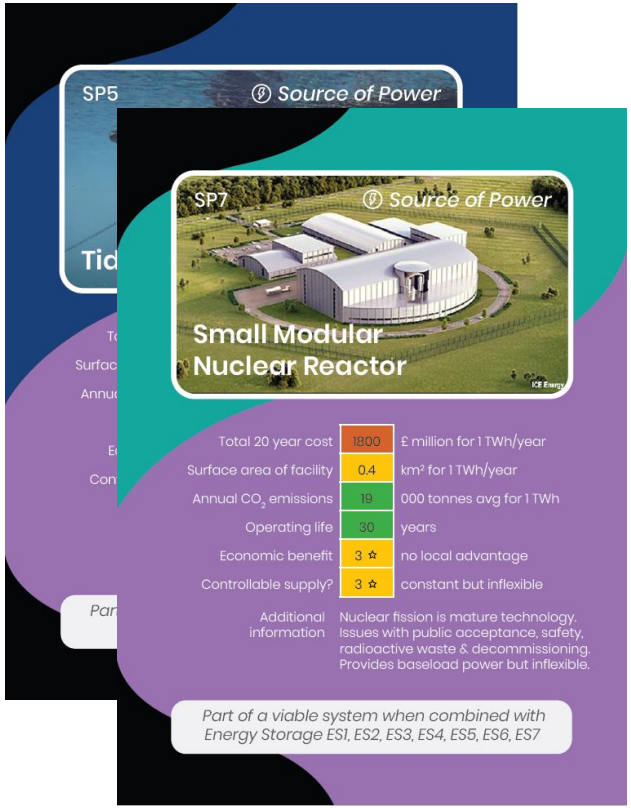
- Electricity demand is variable
- Tidal, wave power & nuclear are not commercial
  - Immature & expensive (+ radioactive legacy)



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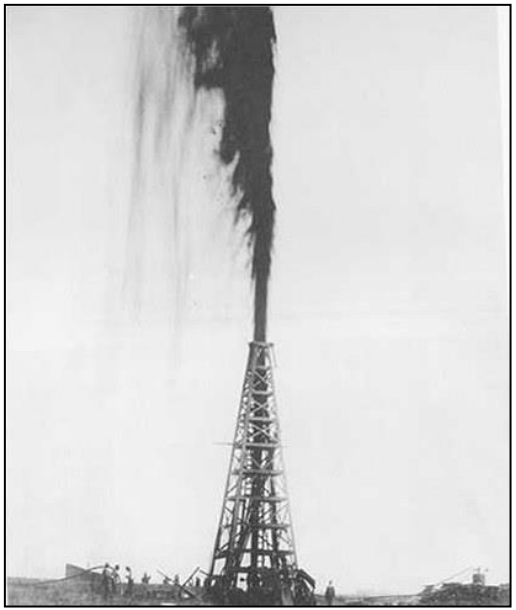
- What is the best way to transition?

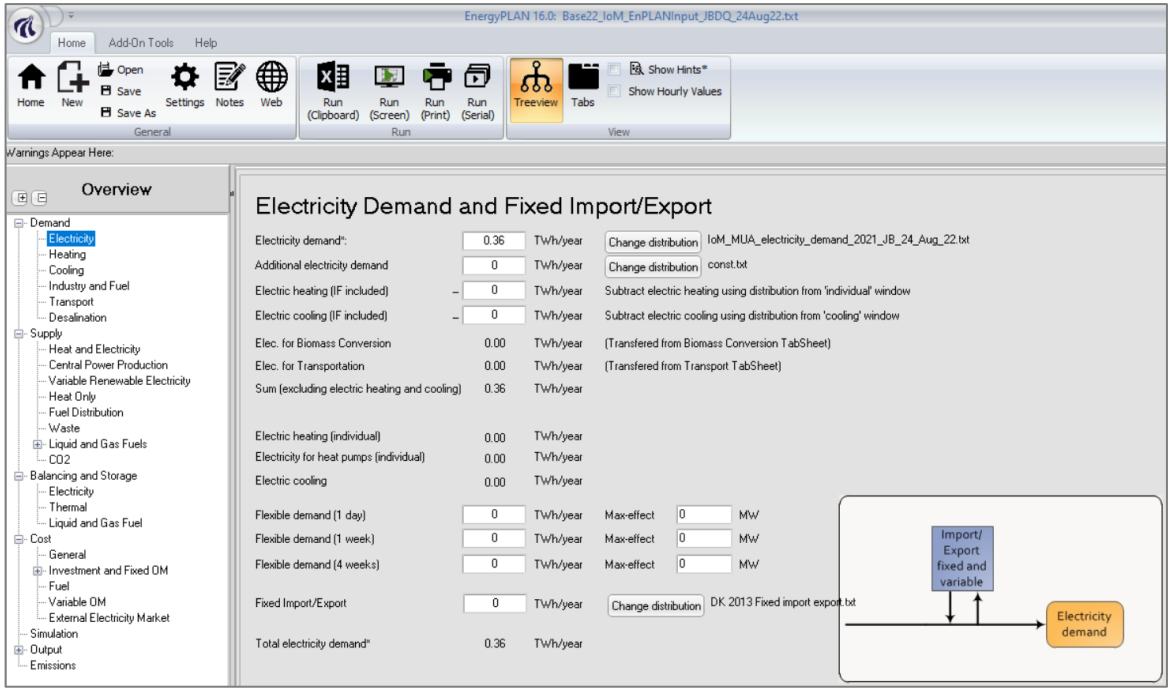


If only we weren't fossil fuel-dependent

- Can we blame geology, Texas or Henry Ford?
- A simple path is not always the right one

What we did

- Compiled data* on all energy transition options
  - generation, storage, costs
- Built digital models using state of the art software
  - EnergyPlan & PowerFactory
- Simulated & optimised paths to future energy systems
  - roadmap to low-carbon IoM



* Including generation, transmission, demand & cost data from MUA

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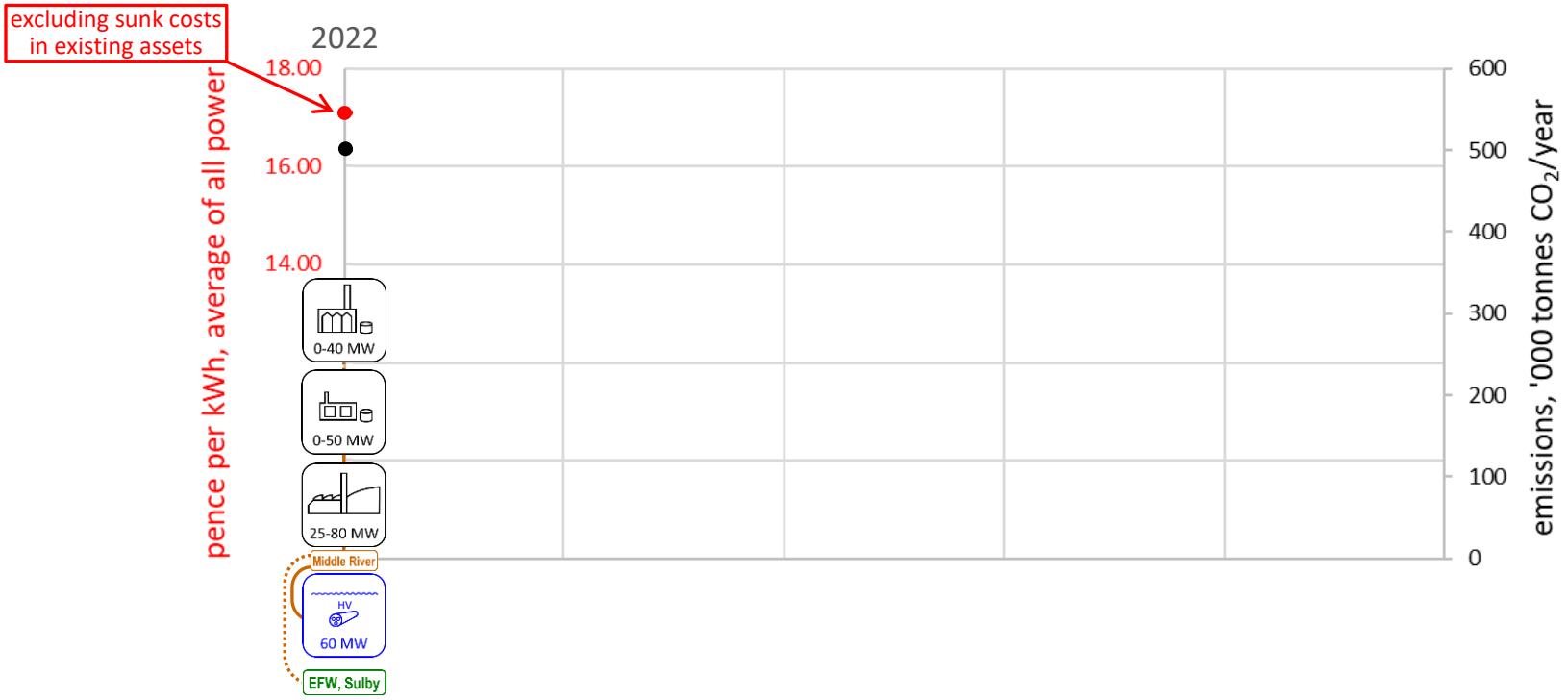
Stepwise pathway to Manx self-sufficiency in renewable energy



Data courtesy of MUA

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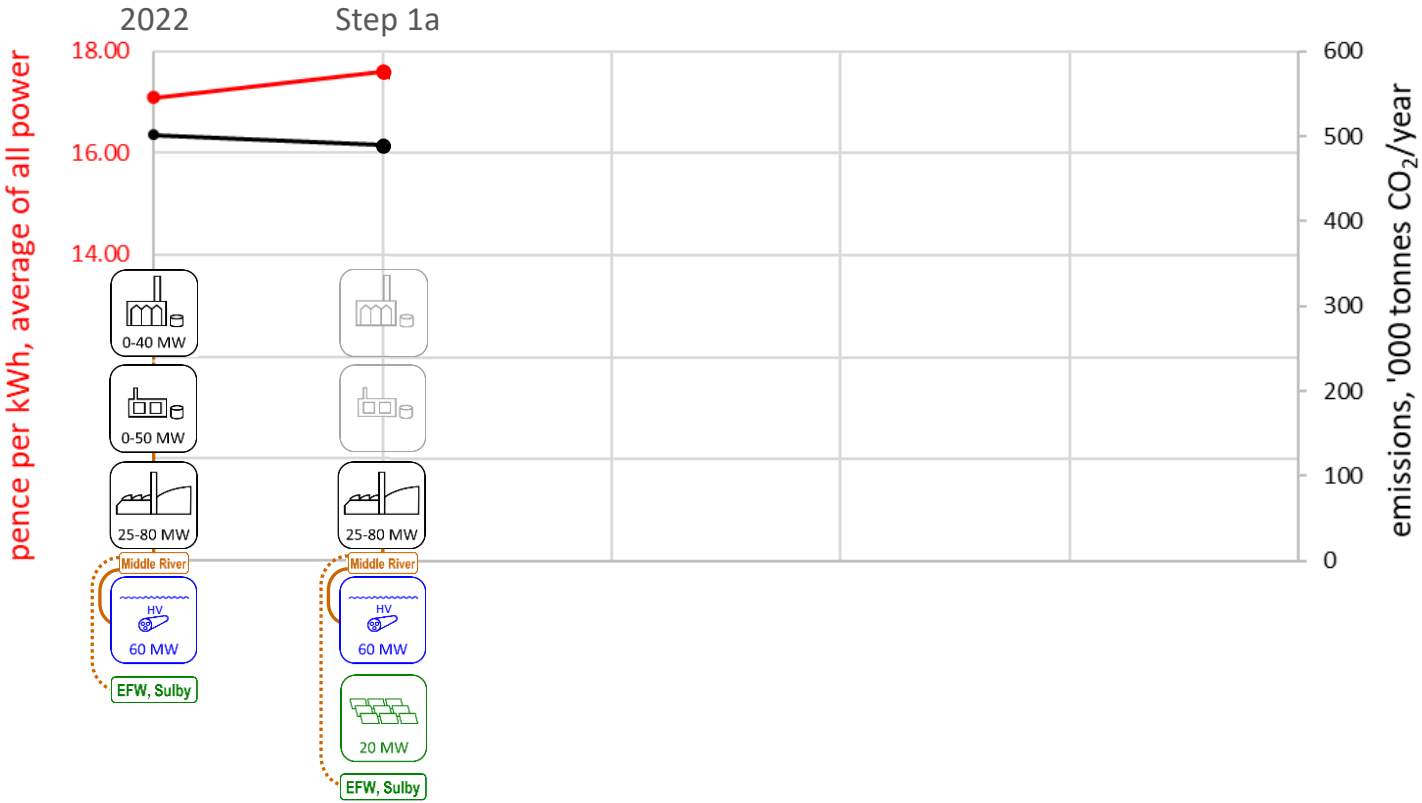
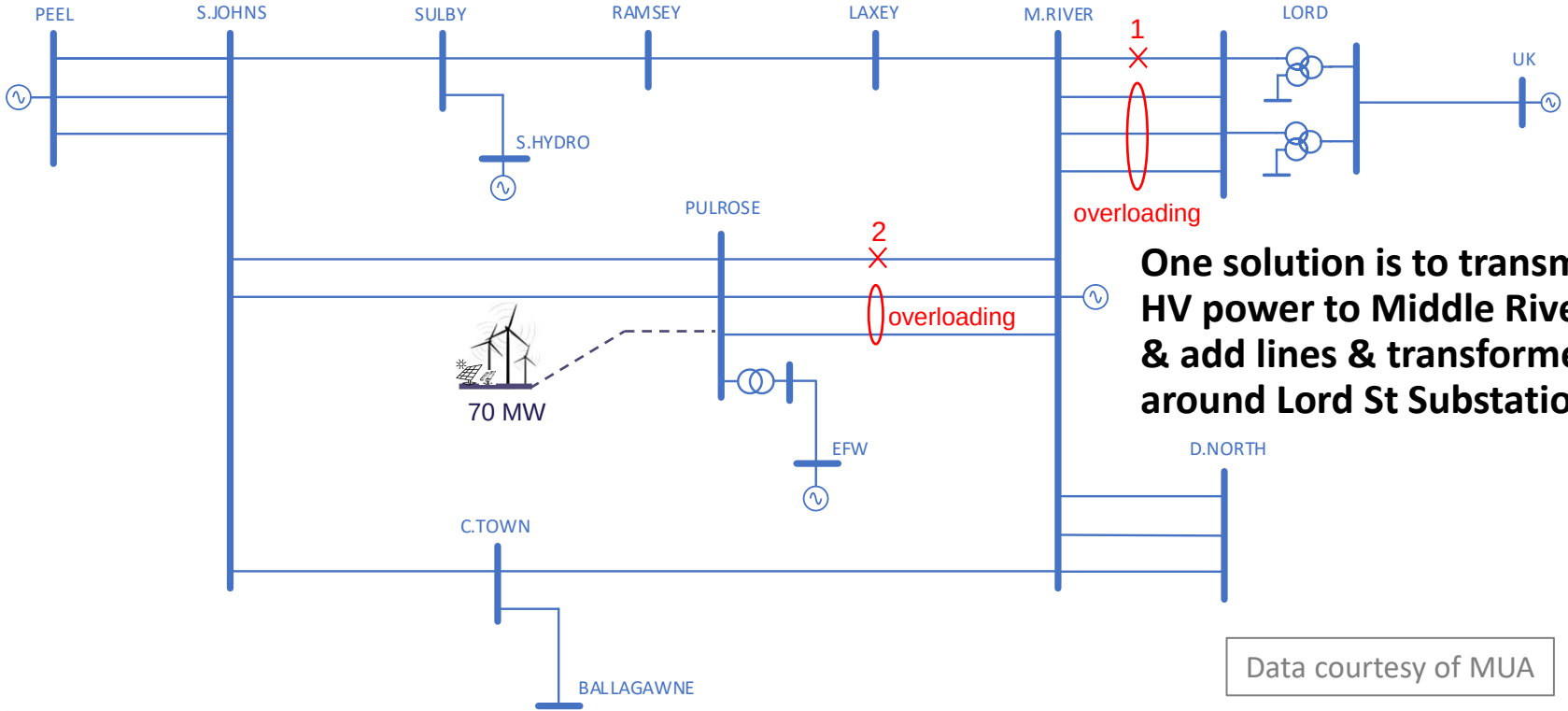


33 kV grid is rapidly overloaded by new supply… or rising demand



One solution is to transmit HV power to Middle River & add lines & transformer around Lord St Substation

Data courtesy of MUA

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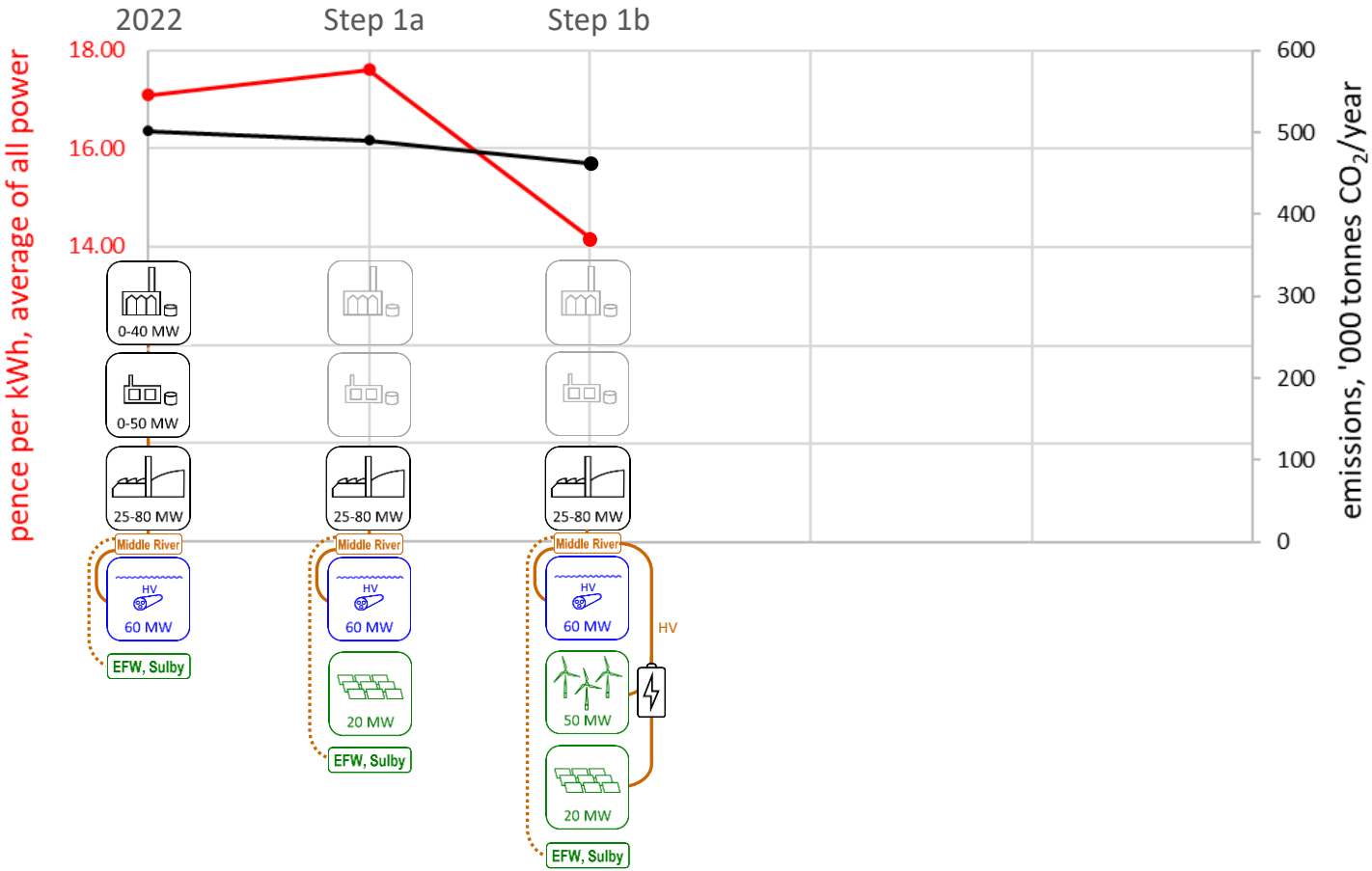

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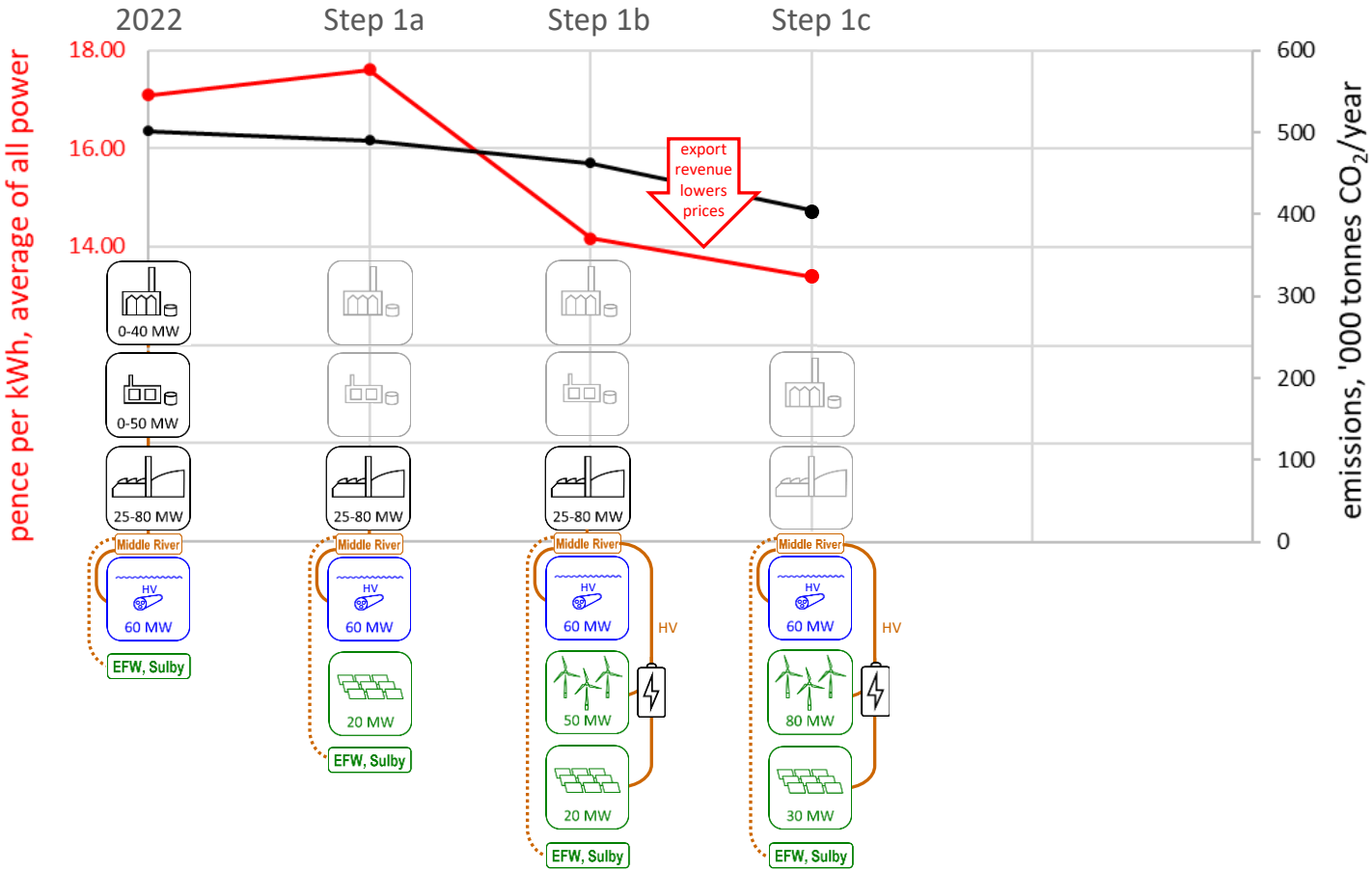

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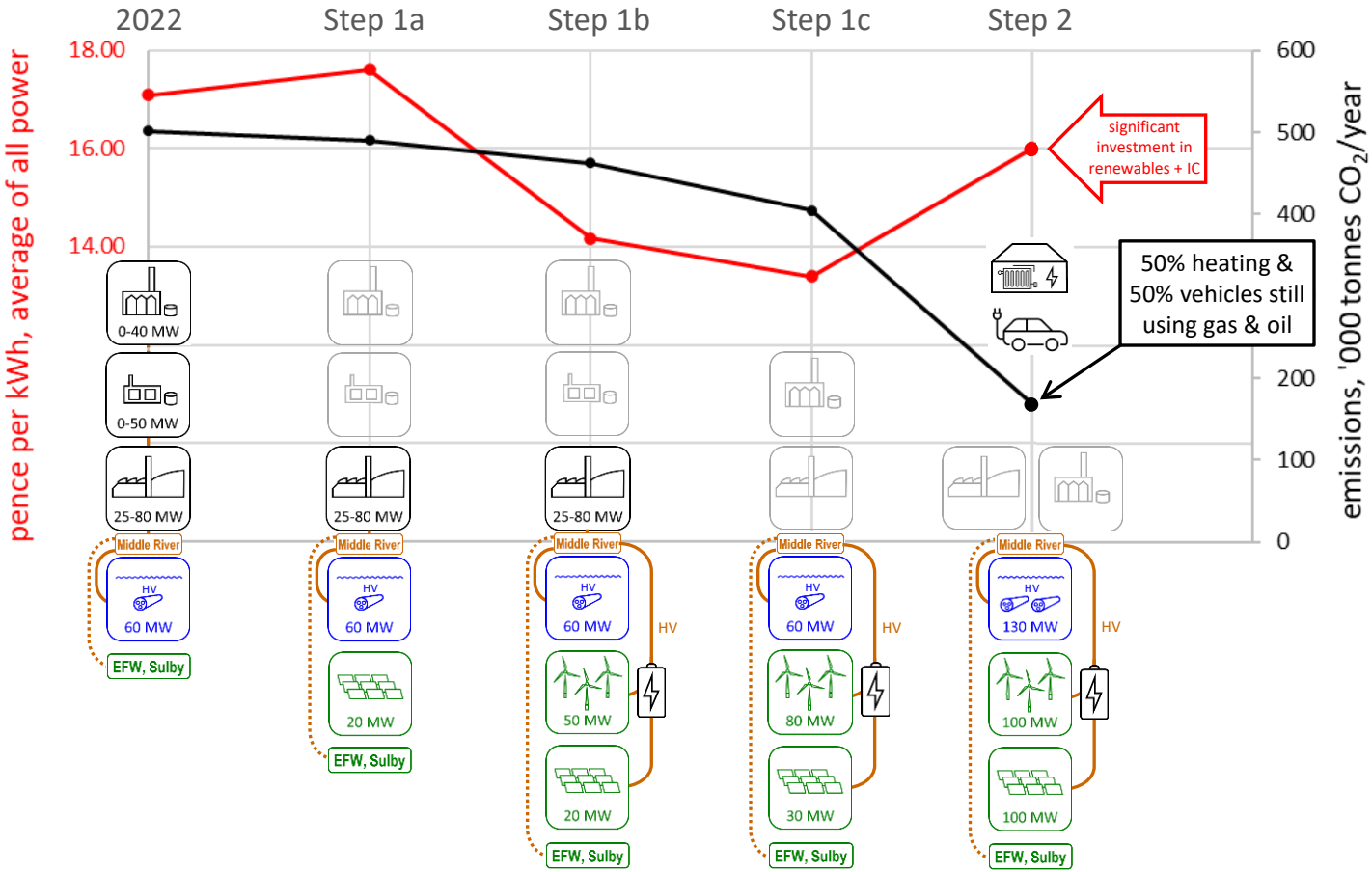

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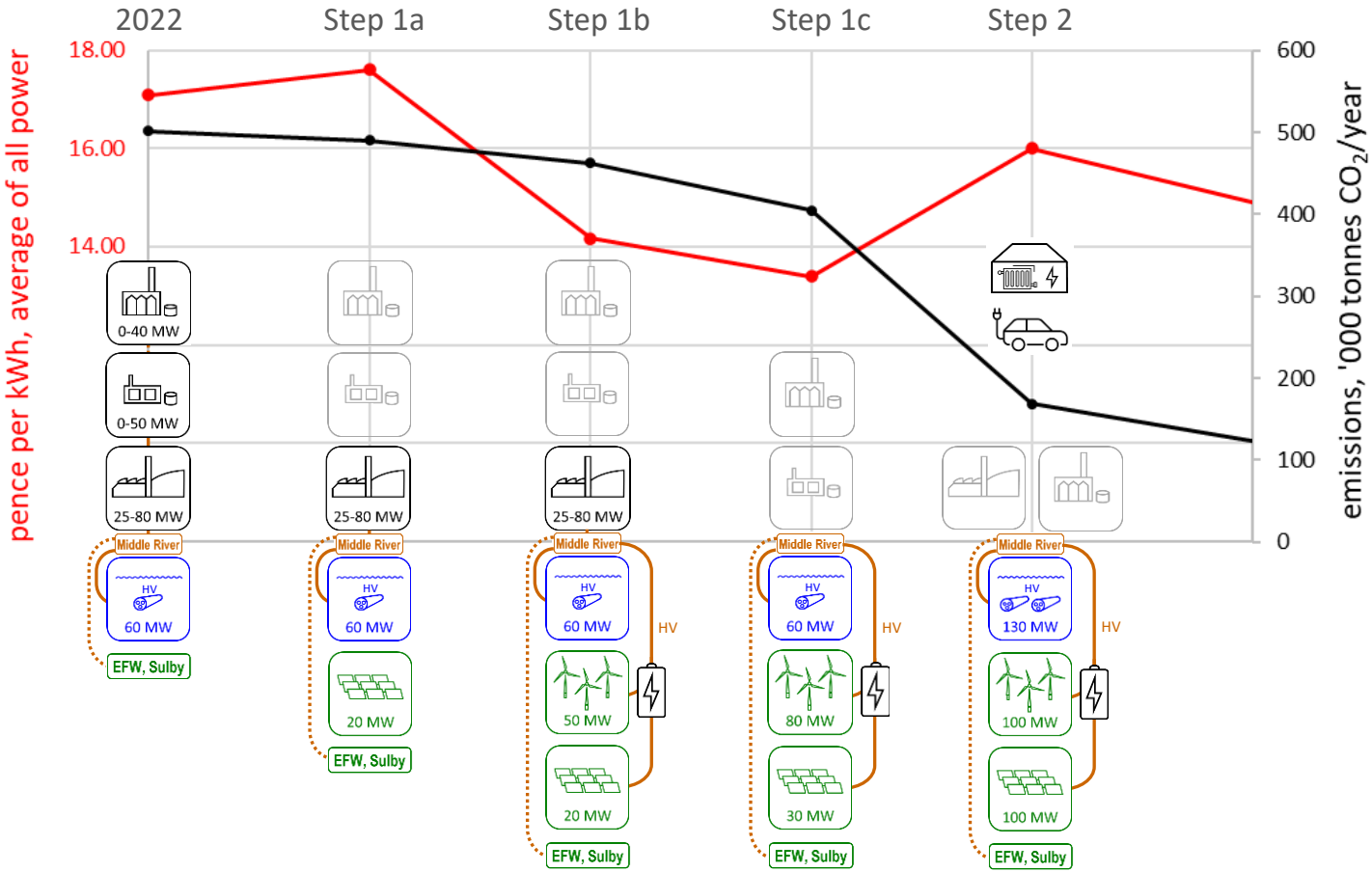
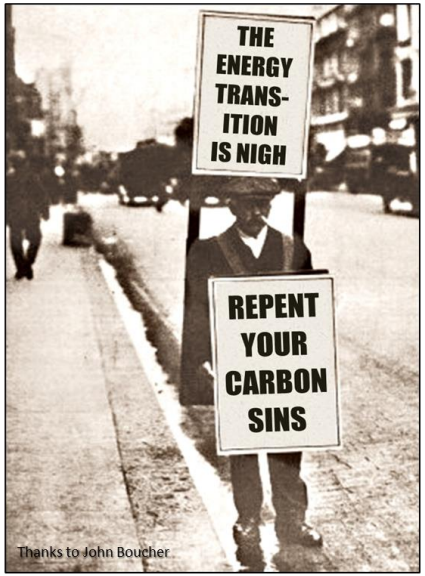


Conclusions

Conclusions I

- We are committed to net zero emissions – most benefit in doing it now
- What fantastic assets we have
  - Just a question of choosing, facilitating & accommodating an optimum path
  - Need to move quickly to secure 1) affordable energy and 2) private funding
- Yes it is doable… even with a 33 kV grid at current demand
- Gas prices are unpredictable, unlike renewables
- At grid scale, renewable energy is affordable
- A larger interconnector adds more value
- Energy storage improves value & export sales



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Conclusions II

- Risk of avoiding losing revenue & business
- All the technology is available & companies are ready to invest

- Permitting needs to be streamlined
- The grid will need to be reinforced, flexible & smart
- District heating, biofuels & H_2 should be added to our options

- Alignment is critical – time to collaborate
- Let's work this out on 16 November

- IoM will get colder if climate change continues unabated
  - visit www.energysustainabilitycentre.im

15 years since first iPhone

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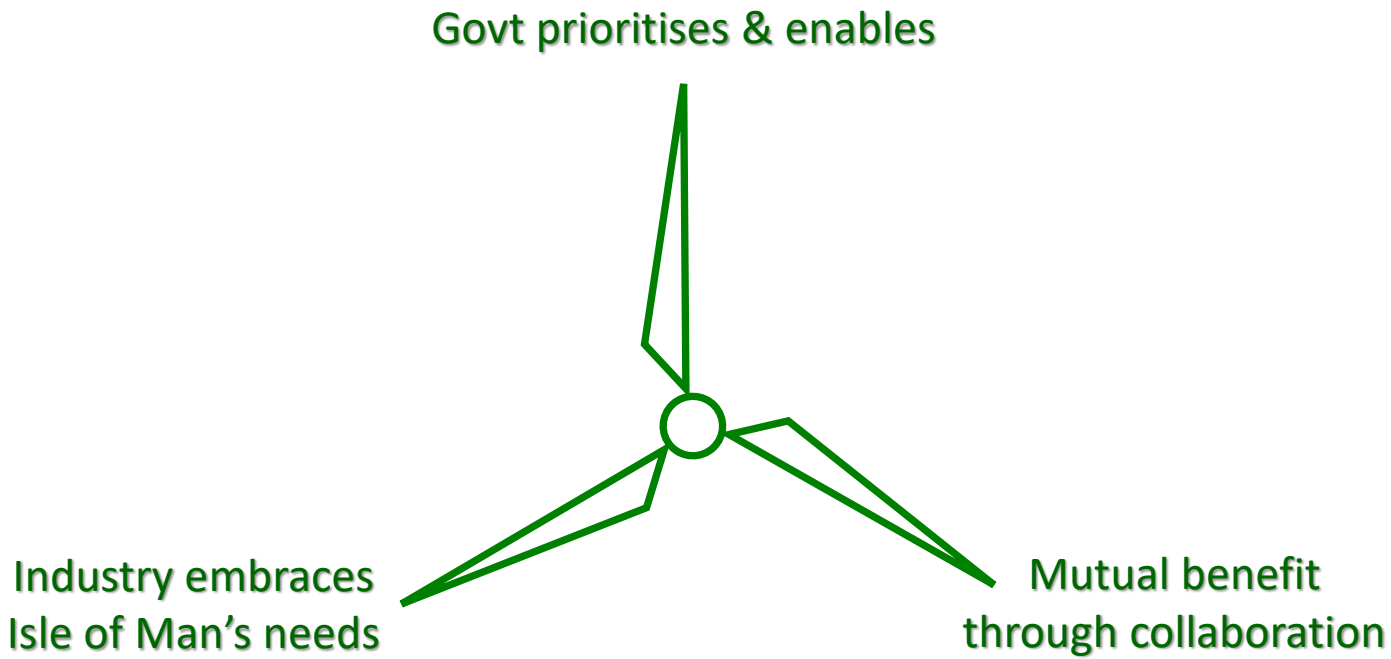
Conclusions - IoM can have global impact by example



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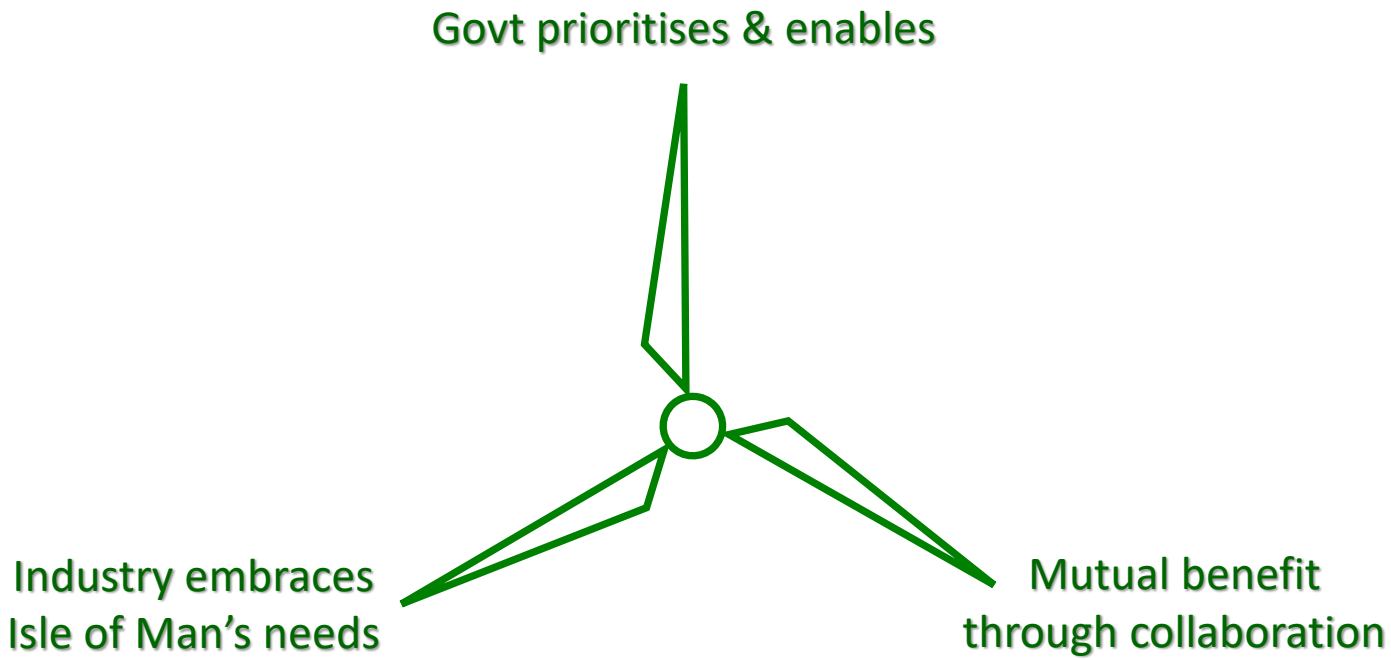
www.energysustainabilitycentre.im - Empowering a green future

ESC's Role:

To act as a pathfinder & intermediary between Government and Industry, sharing ideas and knowledge to promote the development of a secure, reliable & economic transition to low-carbon energy on the Isle of Man

Thank you
Gura mie ayd

Discussion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Changing climate