On the role of natural gas in generating low carbon power

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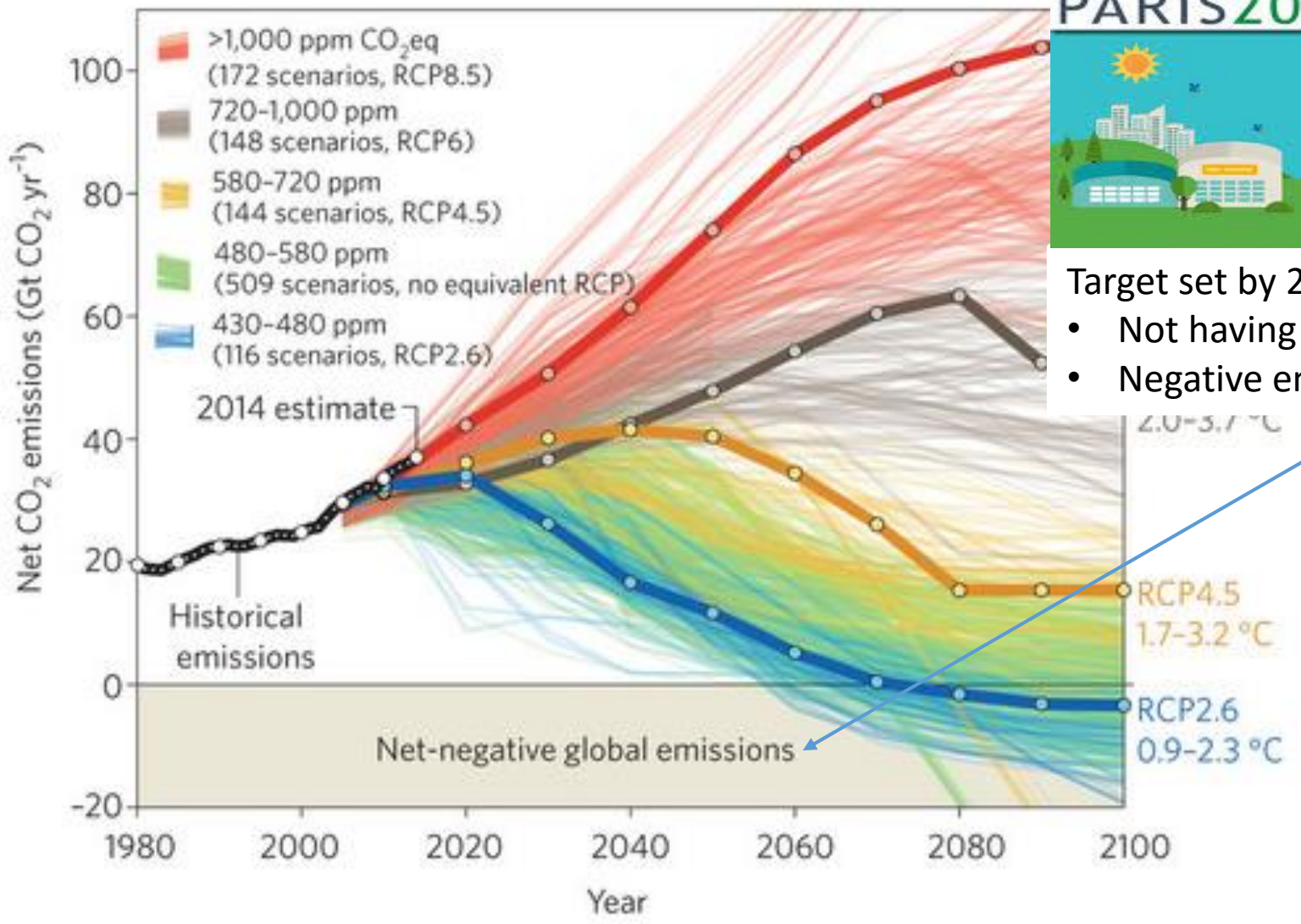
Climate change mitigation is a global challenge

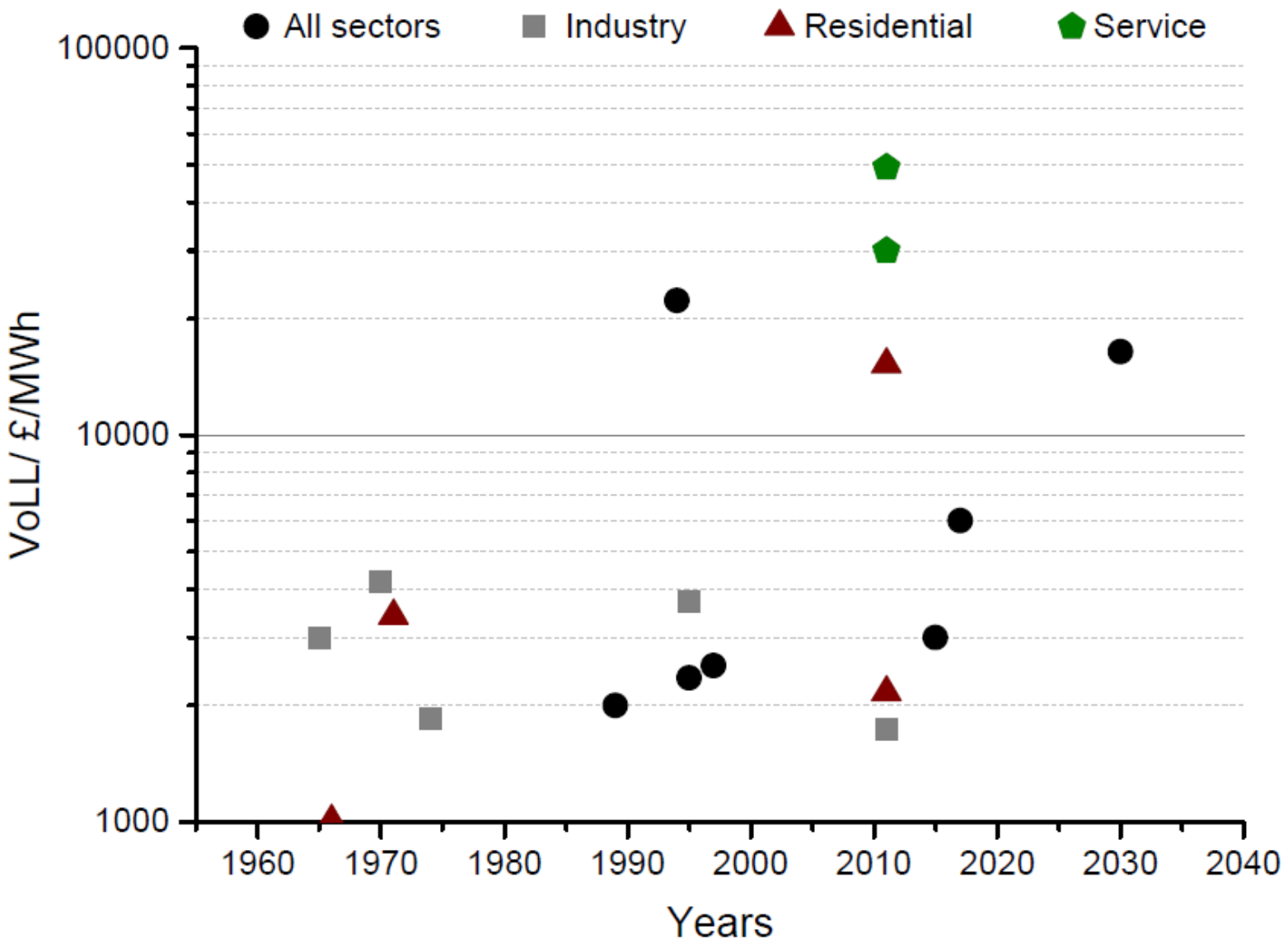


Target set by 2015 Paris COP (1.5C)

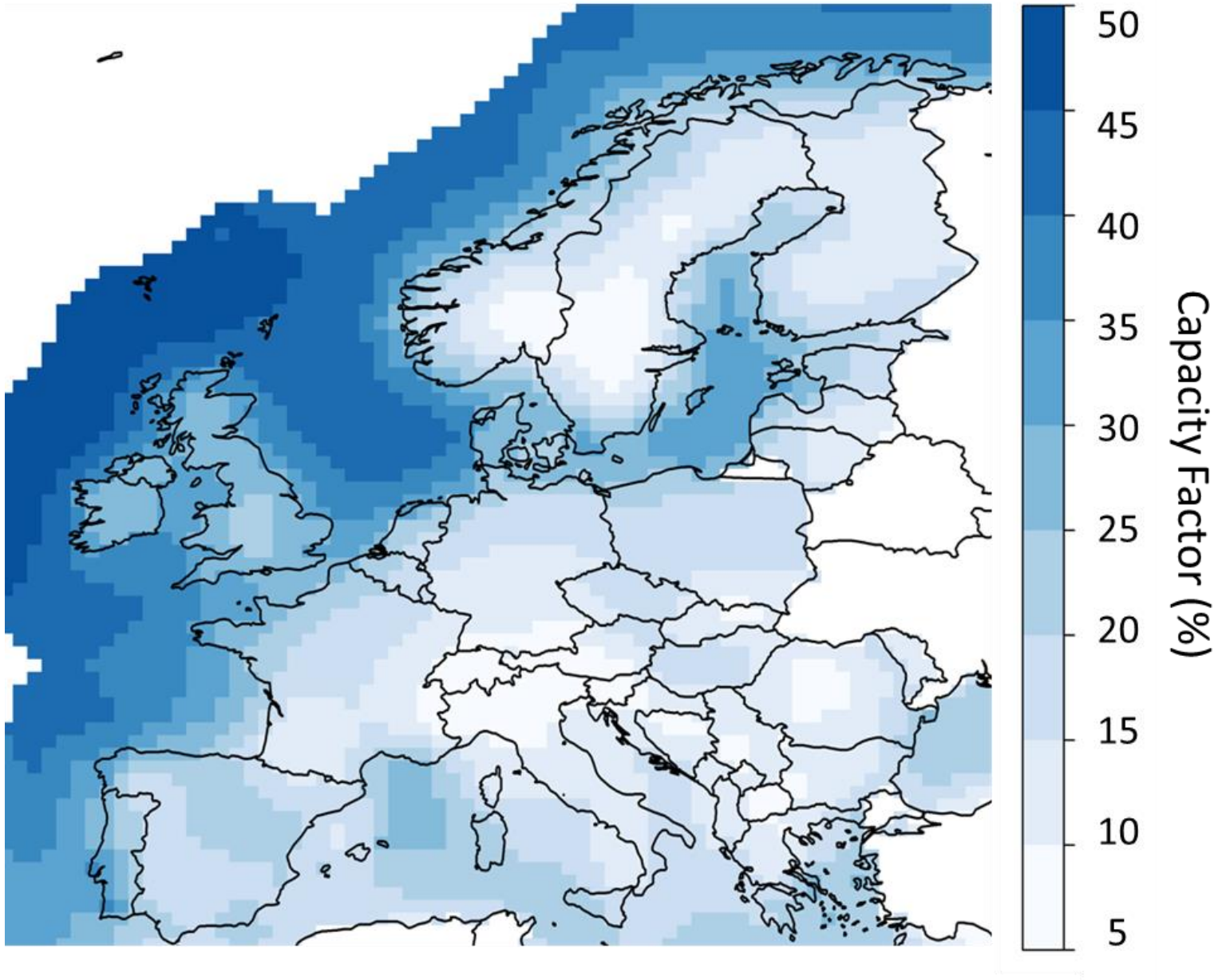
- Not having CCS is uniquely costly
- Negative emissions via BECCS key

BECCS: BioEnergy with CCS

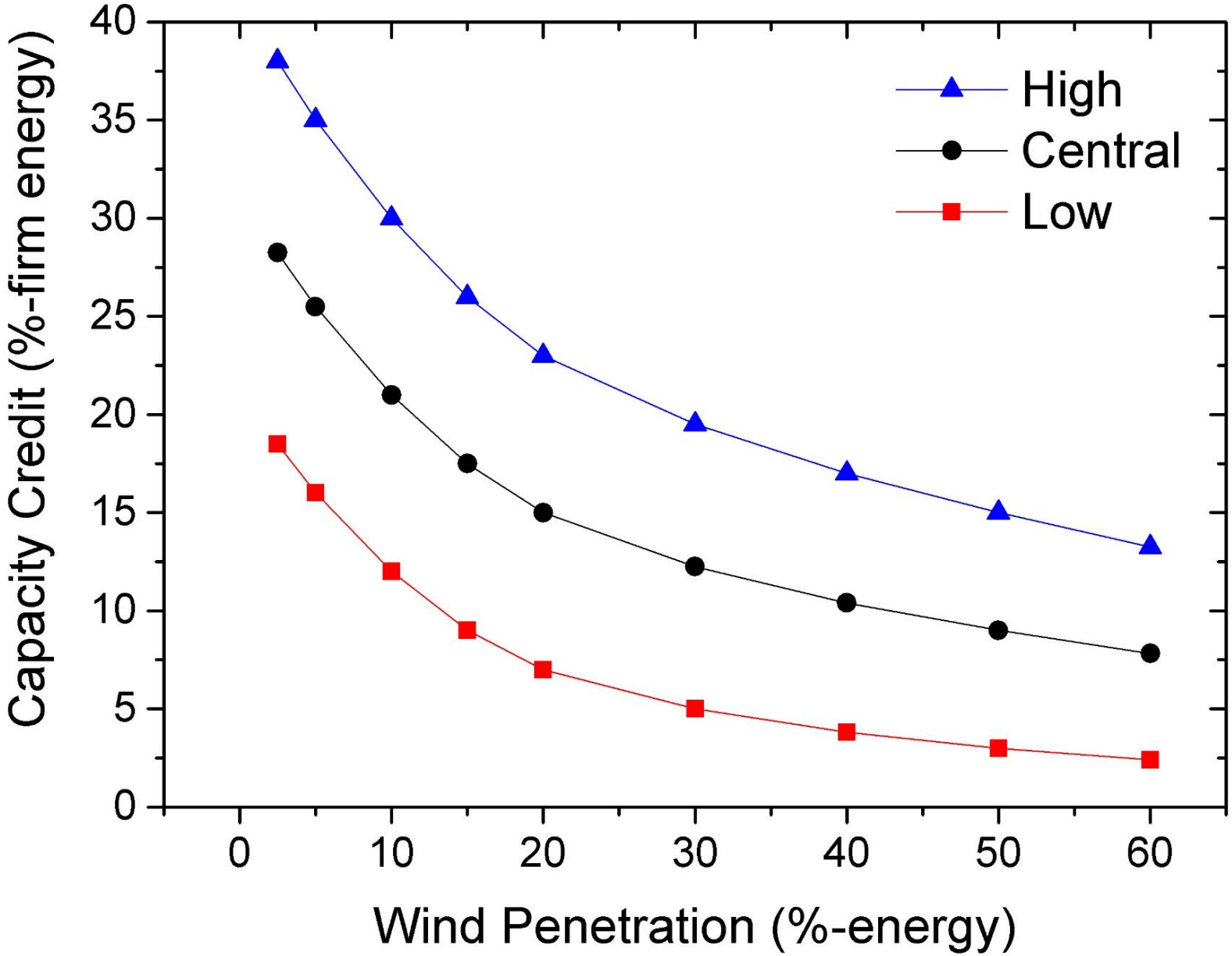
The increasing value of electricity



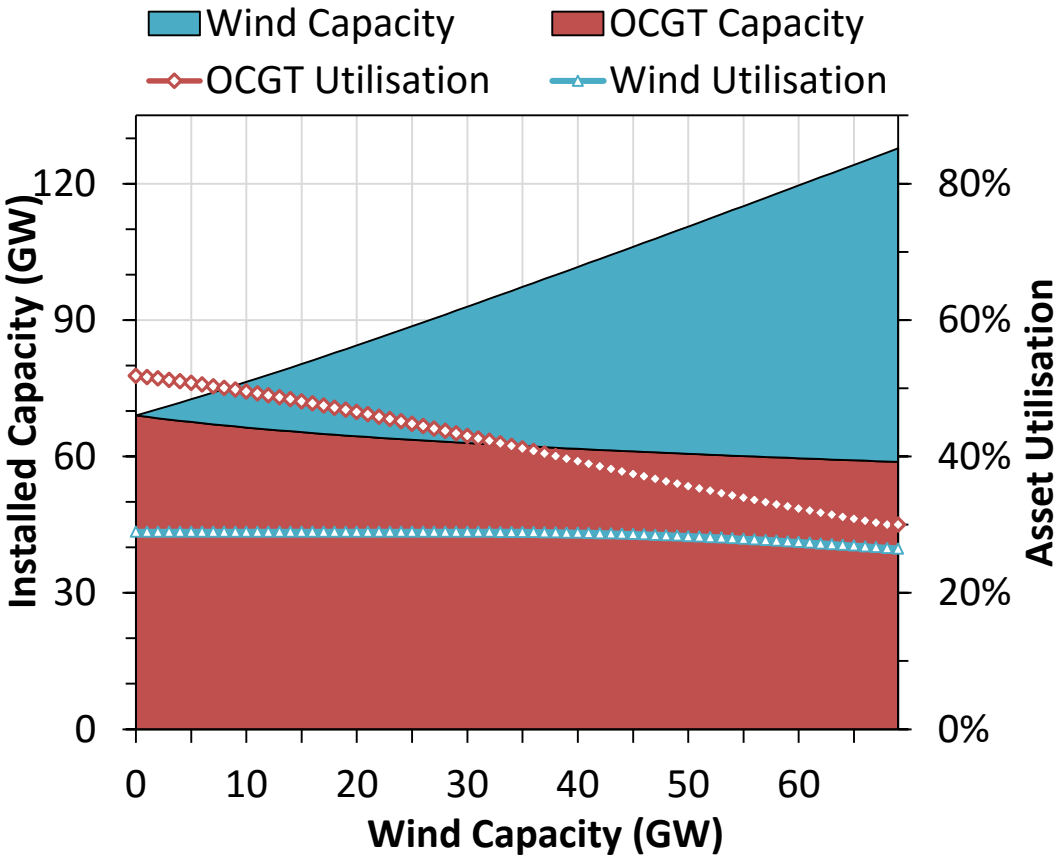
Regional wind power availability varies significantly

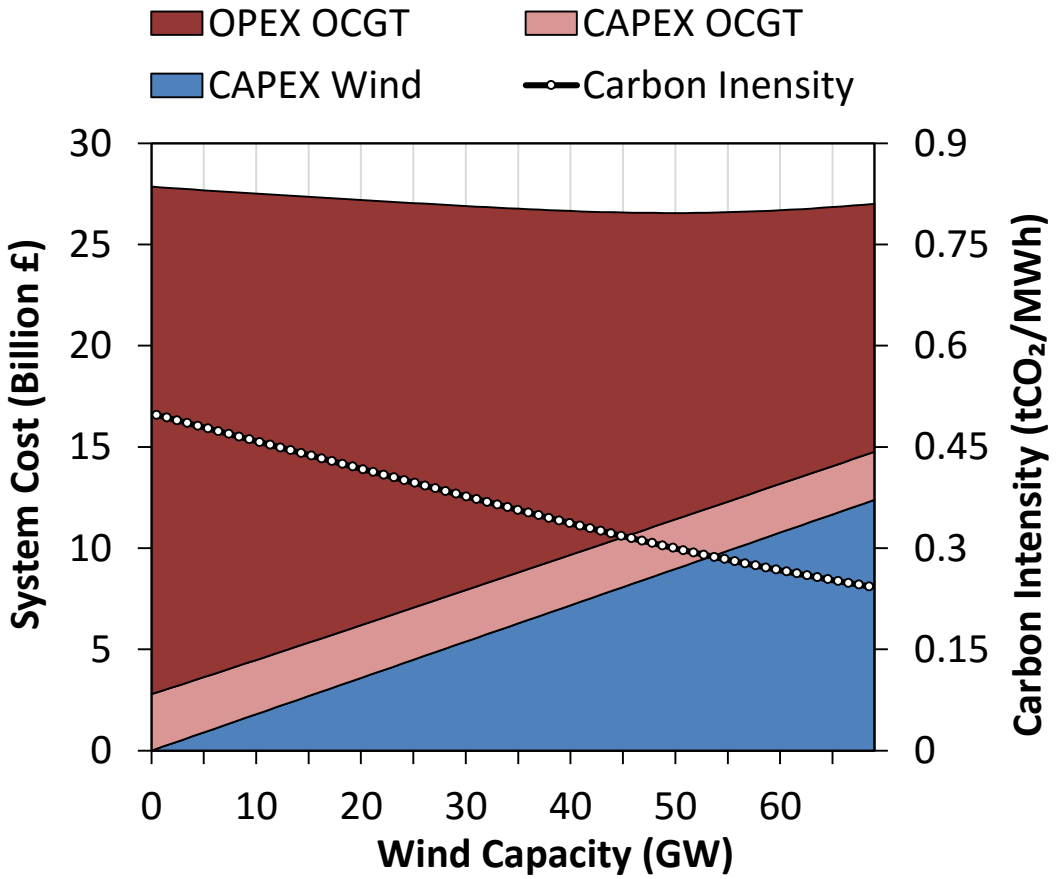


The value of wind power declines with deployment

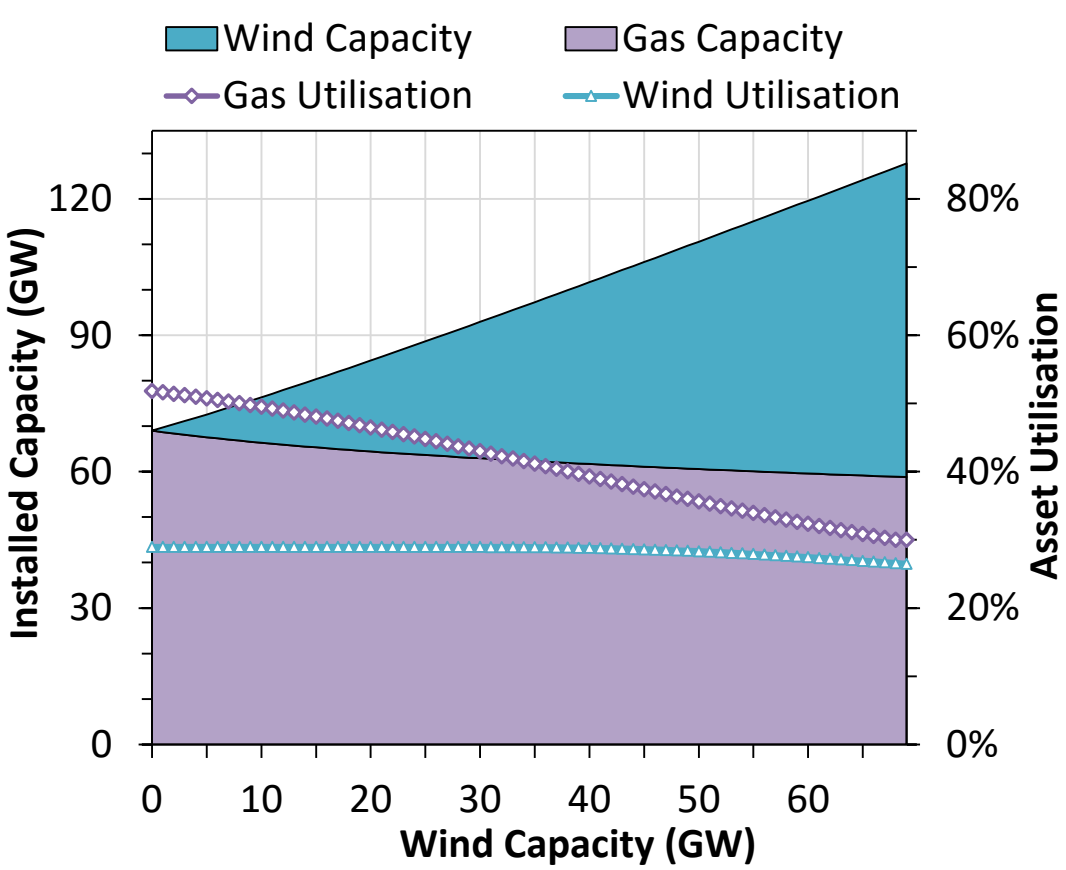


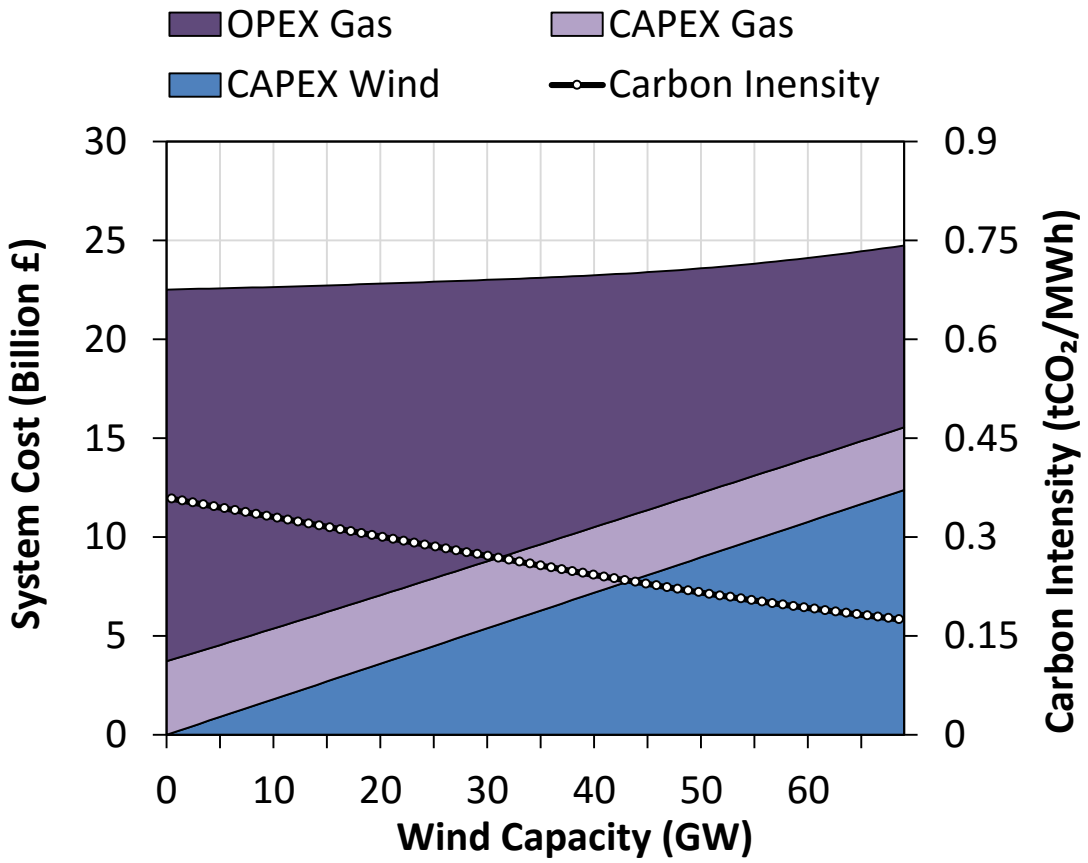
Using OCGTs to “back-up” wind is counter-productive



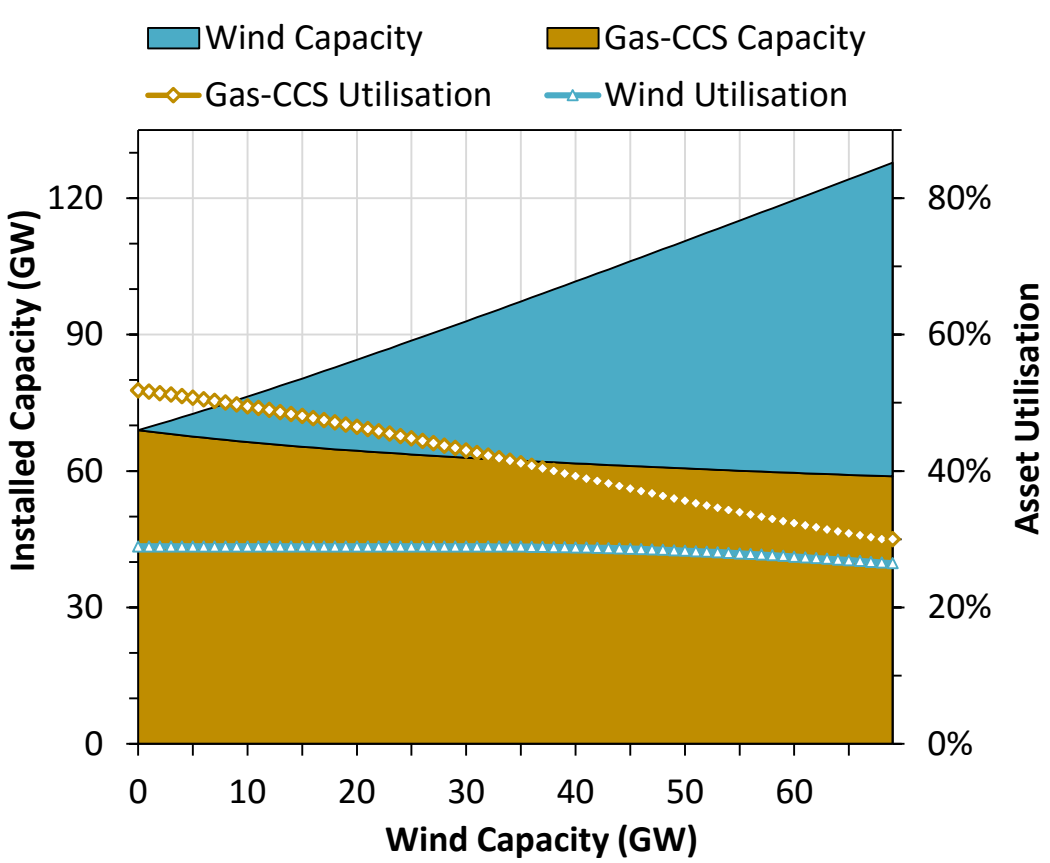


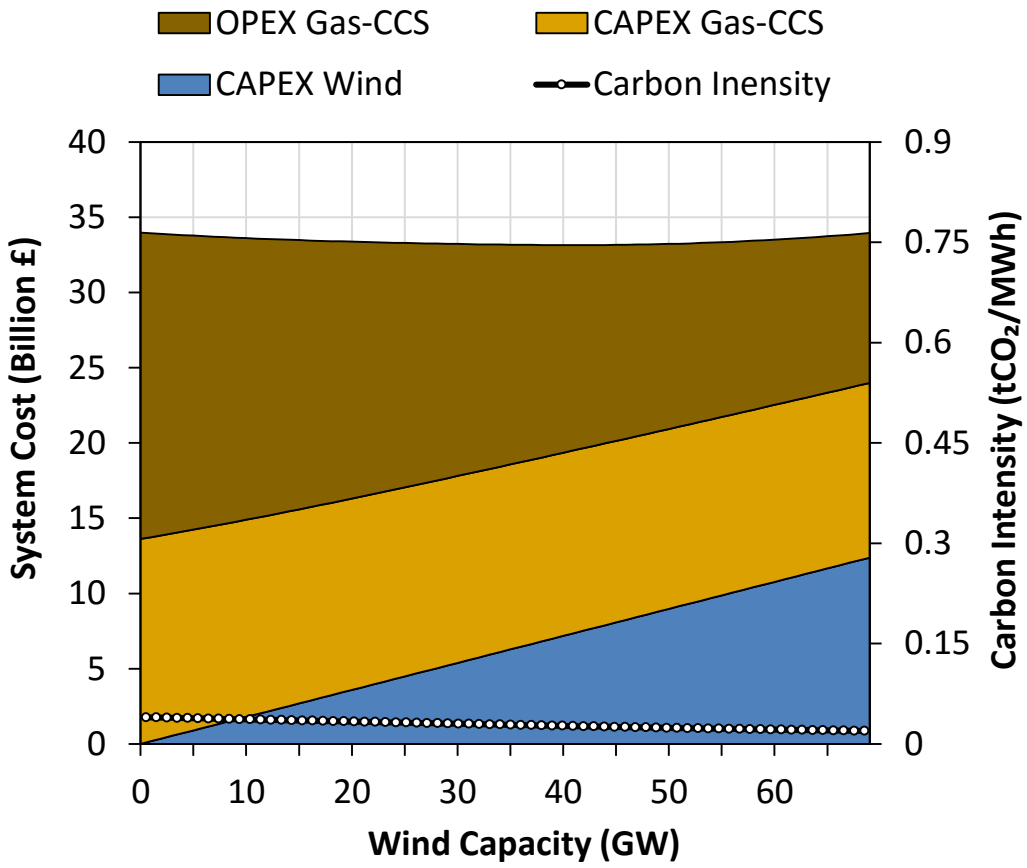
The combination of CCGT and wind is lower carbon



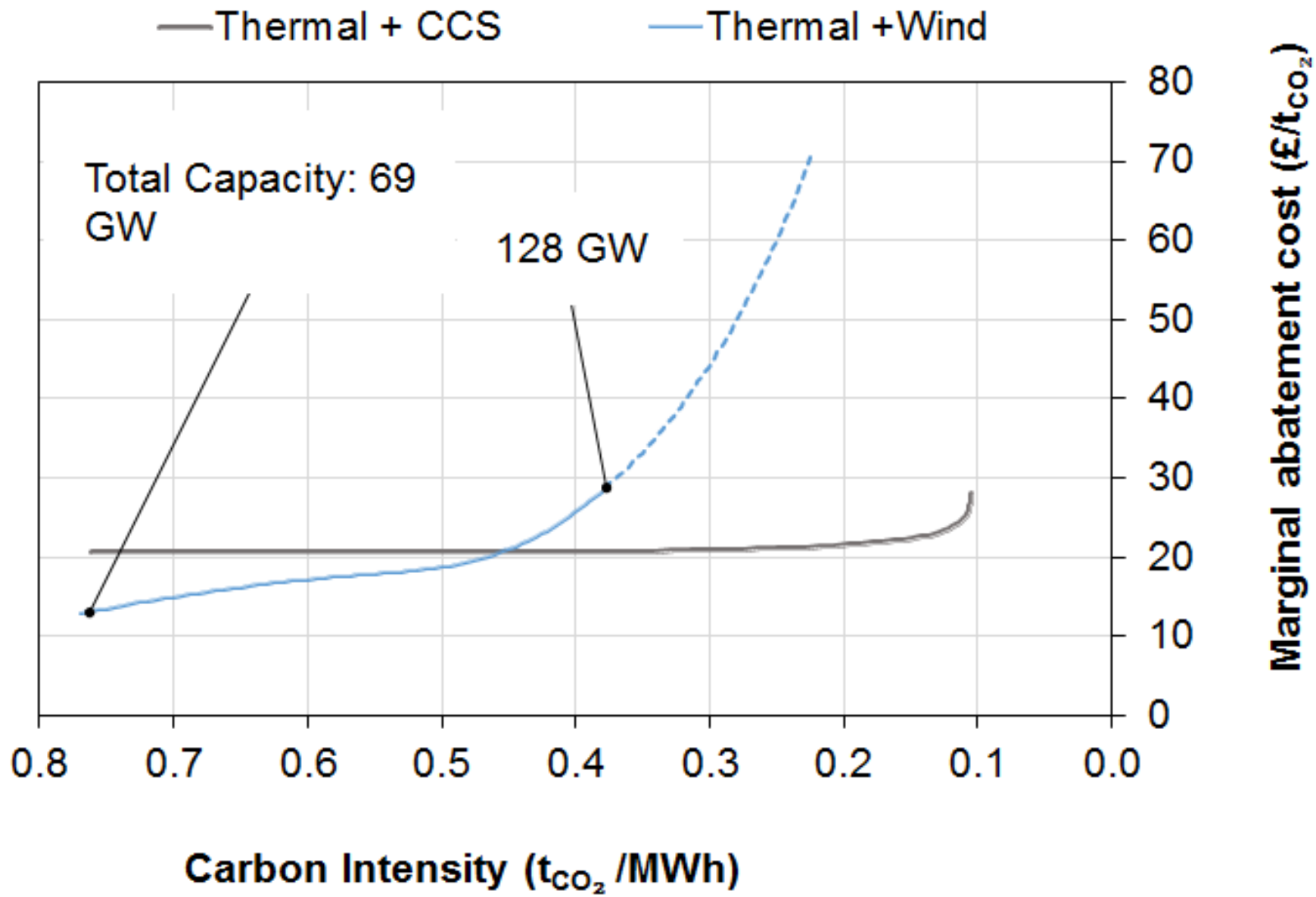


Wind plus CCGT-CCS provides low carbon power





Deep decarbonisation requires a technology portfolio



Conclusions

- Relying on intermittent renewables (iRE) alone to provide reliable, decarbonised power is unrealistic
  - Need to understand how a system comprised of multiple technologies will operate
  - The value provided by iRE decreases with increasing penetration
- Thermal power plants remain vital to the stable operation of the electricity grid, providing immense societal value
  - Need to understand how this value can accrue to the technology providers
- Low carbon power is generally defined as being below 50 kg_{CO2}/MWh
  - At ~ 243 kg_{CO2}/MWh, wind + OCGT do not provide low carbon power
  - At ~ 175 kg_{CO2}/MWh, wind + CCGT is low**er** carbon, but not yet good enough
  - At ~ 19 kg_{CO2}/MWh, wind + CCGT-CCS is **low** carbon, consistent with UN SDGs
- Attempting deep decarbonisation via iRE very significantly increases the marginal abatement cost