UKERC

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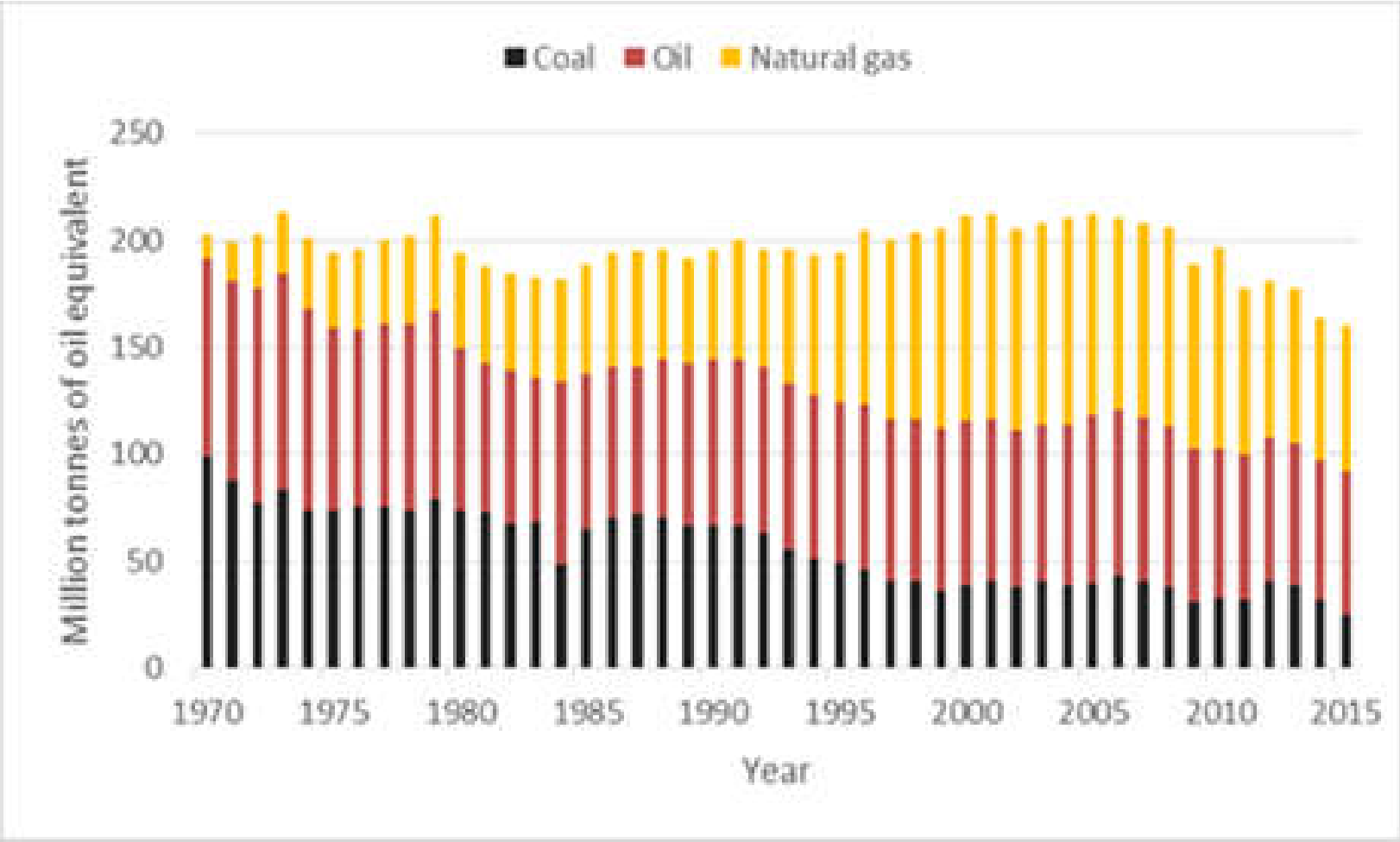
UK fossil fuel futures

Paul Brockway, Sustainability Research Institute, University of Leeds
EROI Workshop, 30/06/2017

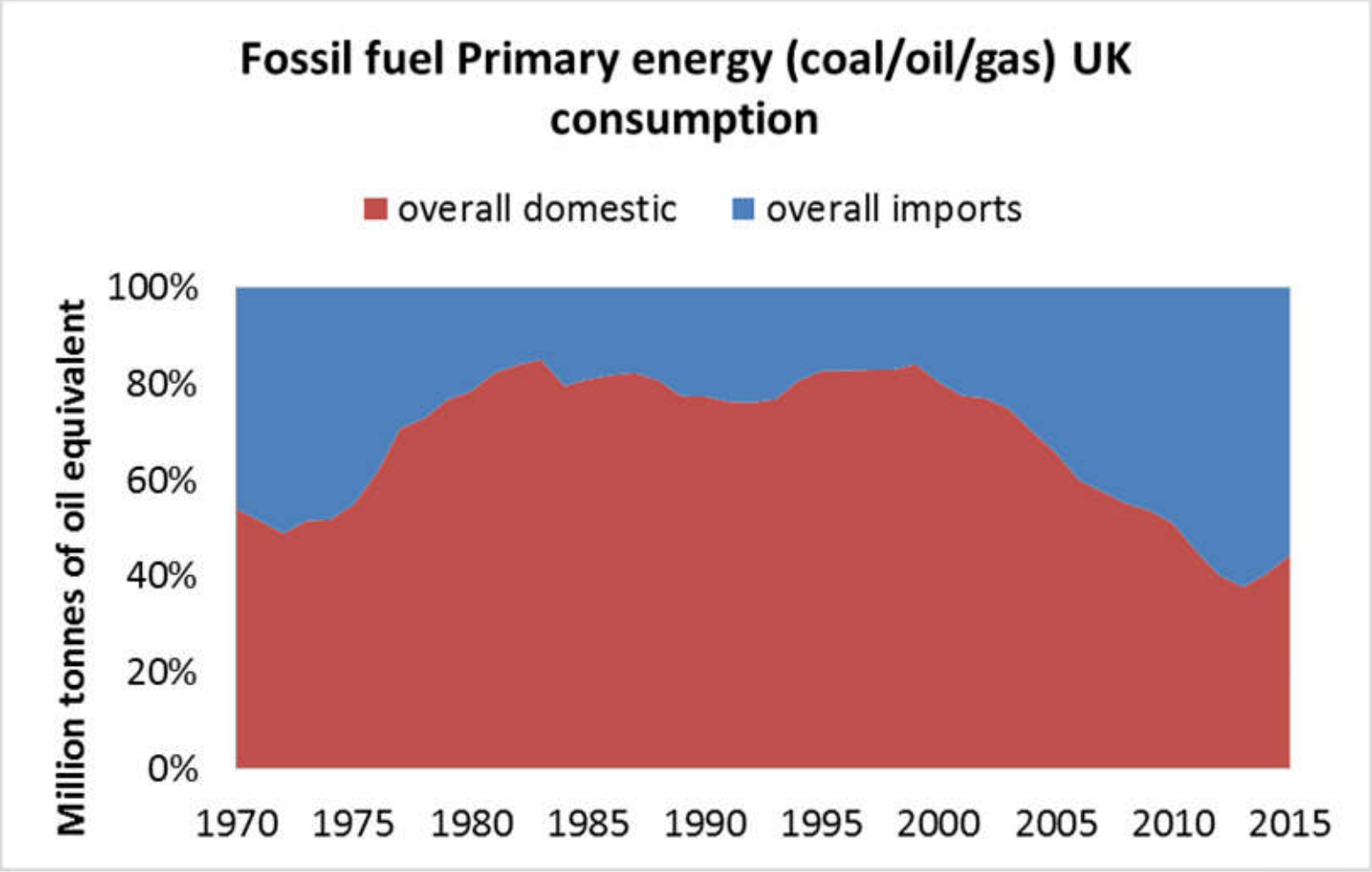
Structure

1. UK fossil fuel sources 1970-2015
2. UK energy futures 2015-2030: BEIS; National Grid; CCC
3. Issues for EROI-UK (fossil fuels) 2030

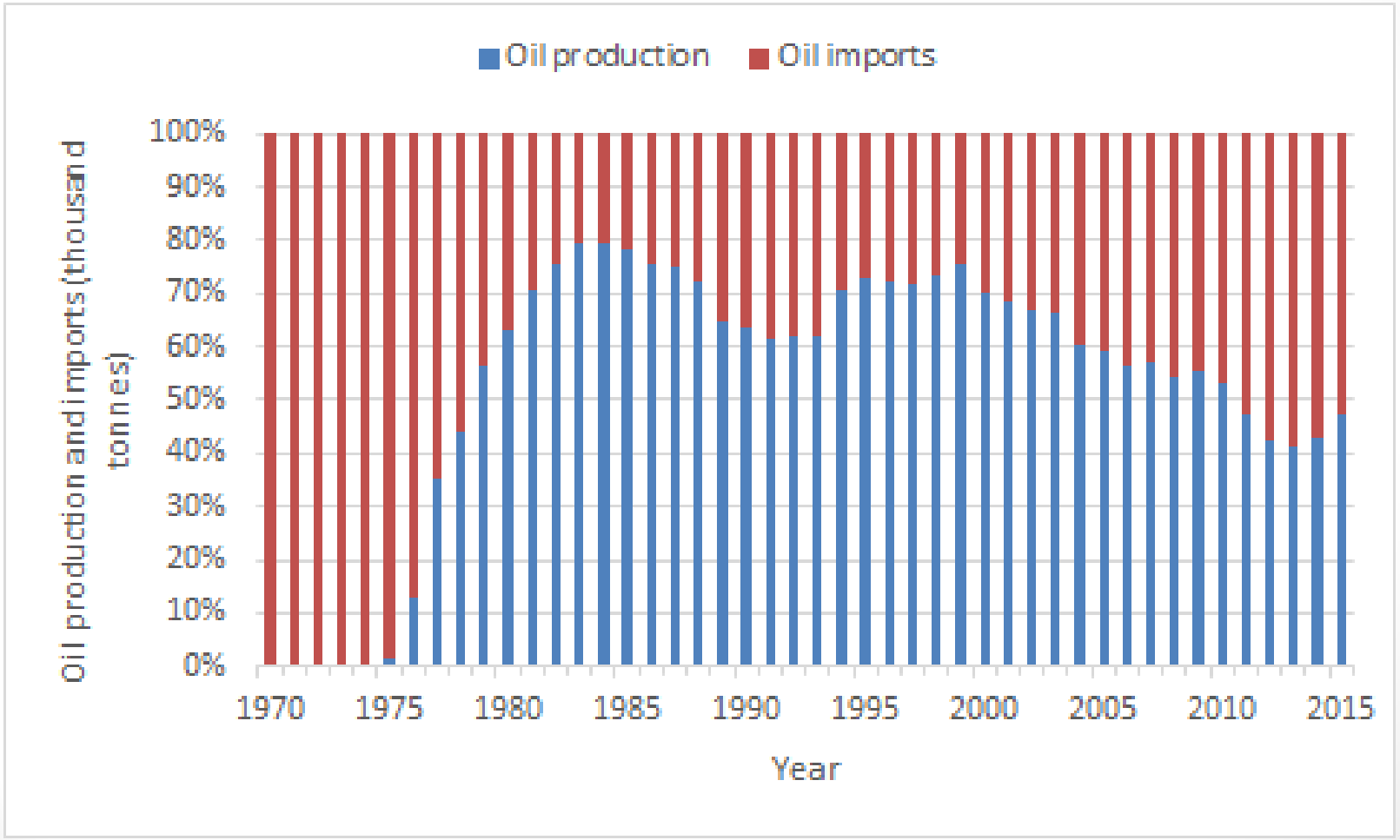
UK Primary energy consumption: coal down, gas up



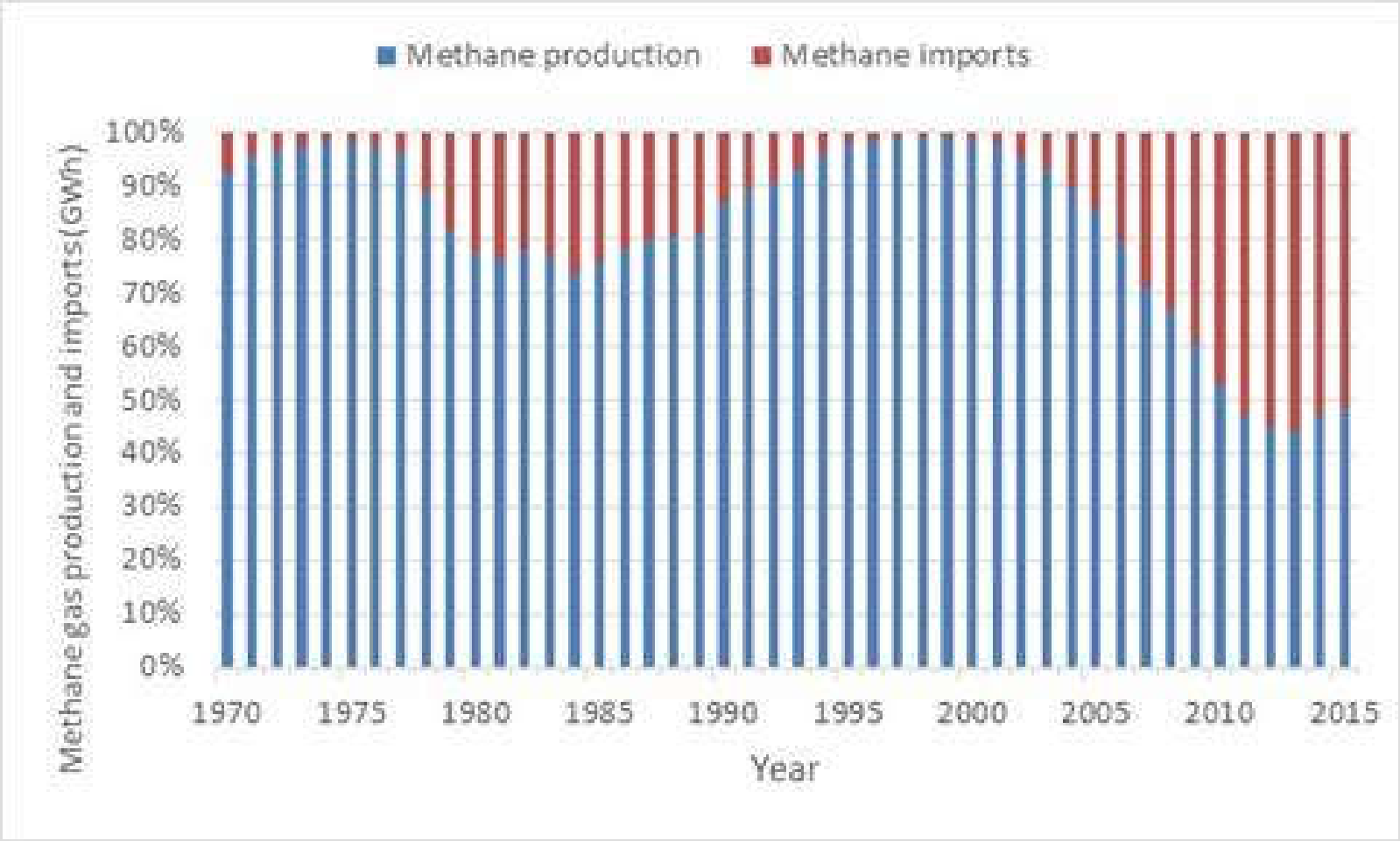
UK Primary energy consumption: fossil fuel imports now >50%



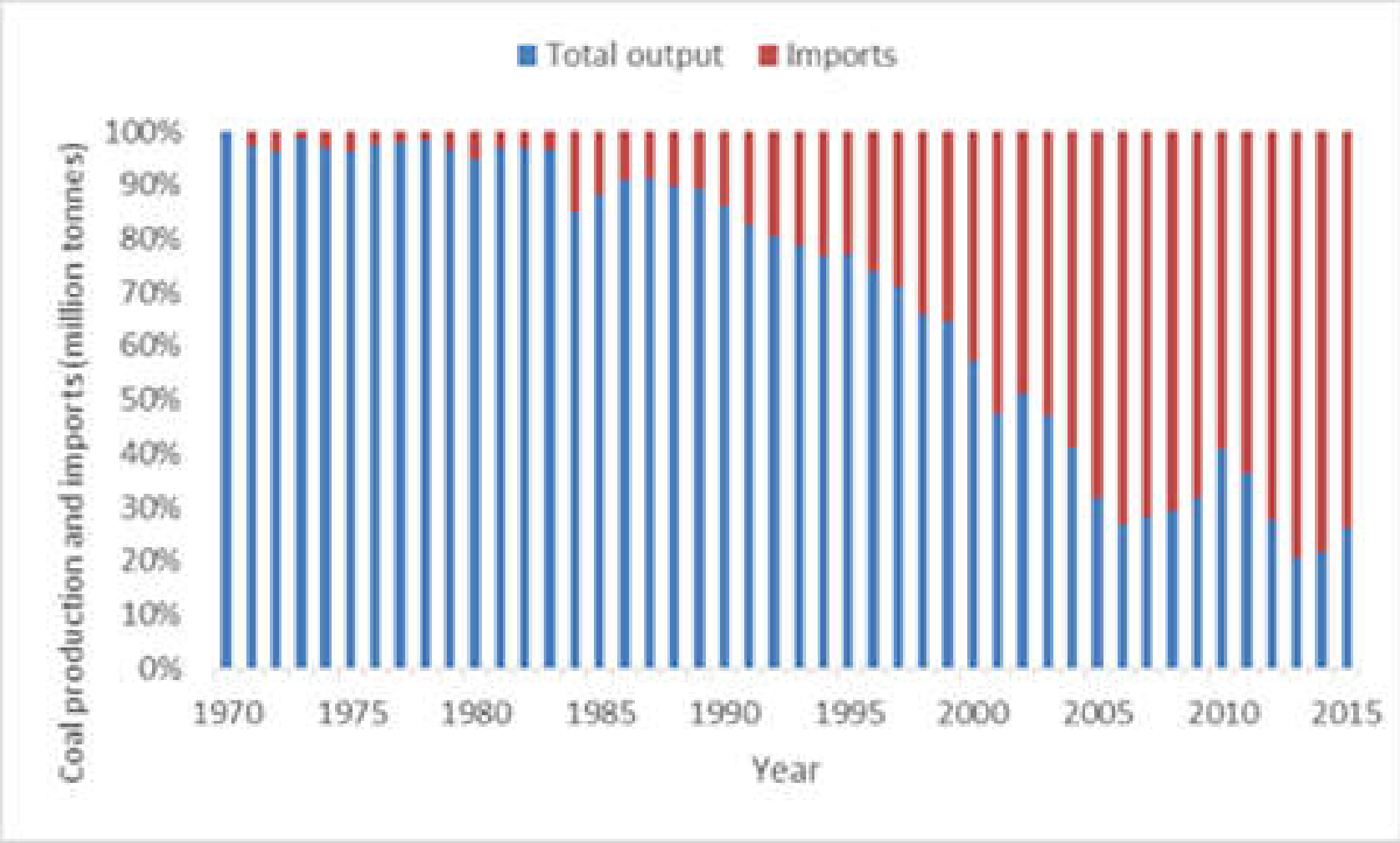
UK Primary energy consumption: OIL: now over 50% imported



UK Primary energy consumption: GAS: now over 50% imported



UK Primary energy consumption: COAL: now over 50% imported



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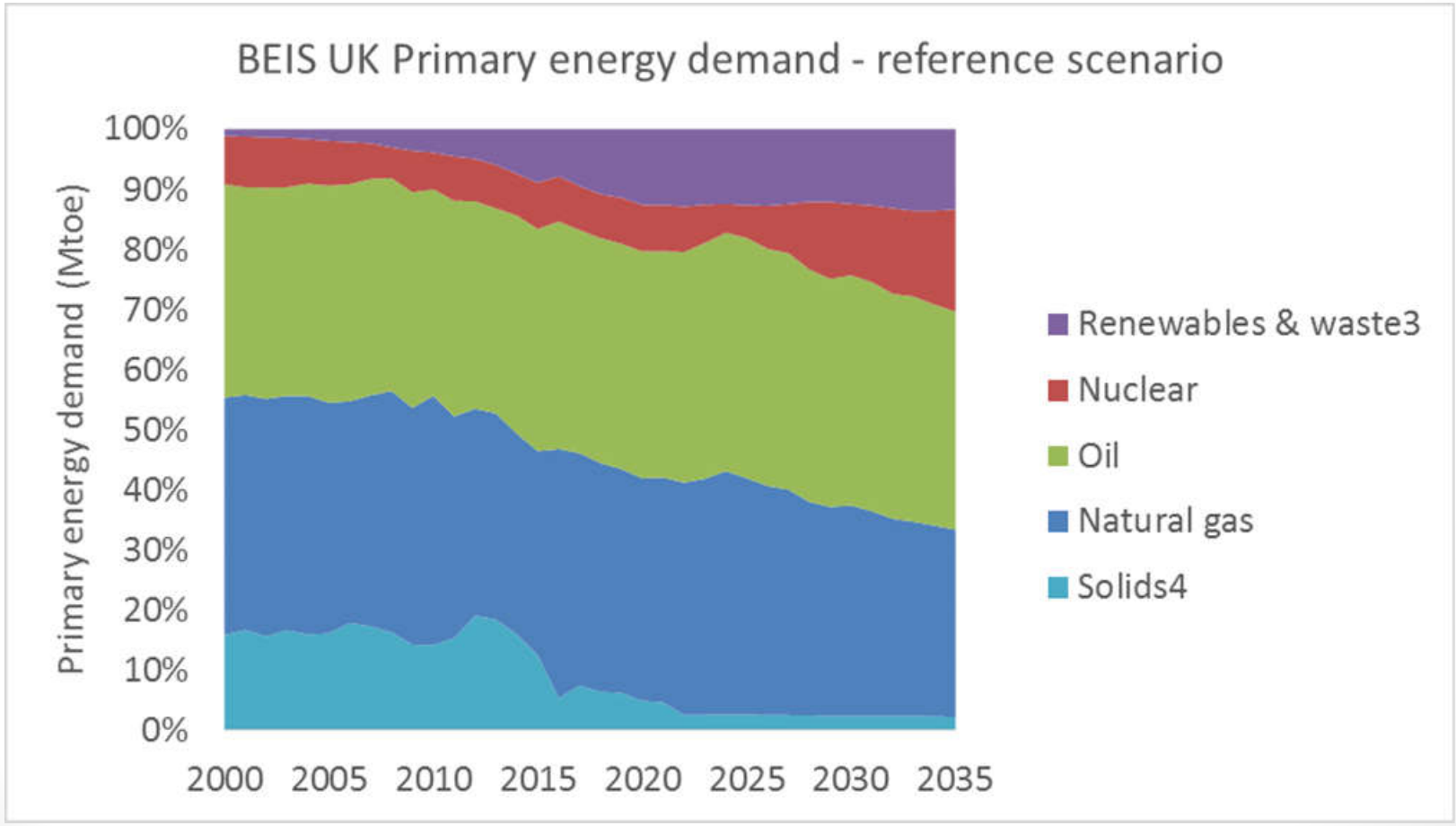
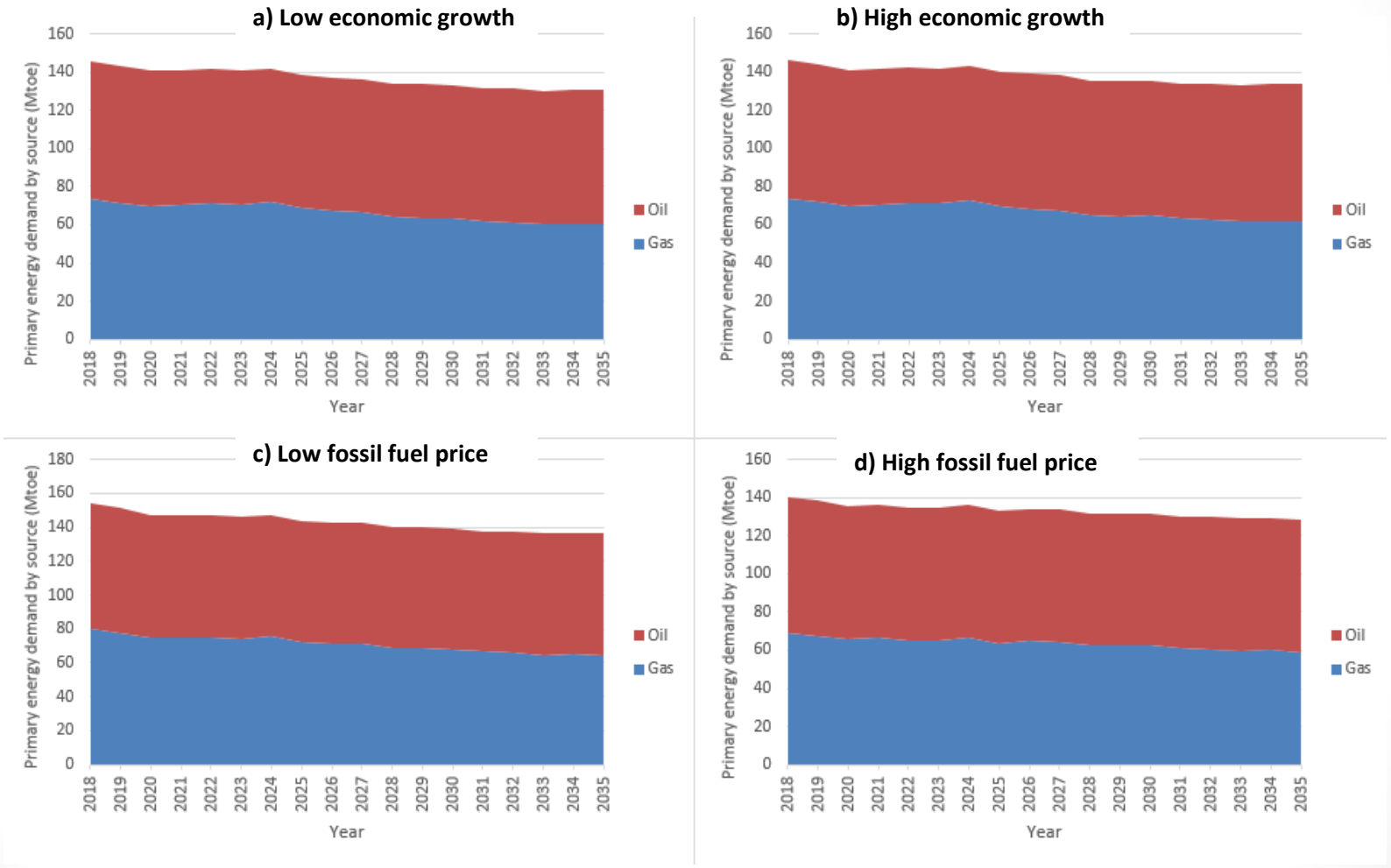
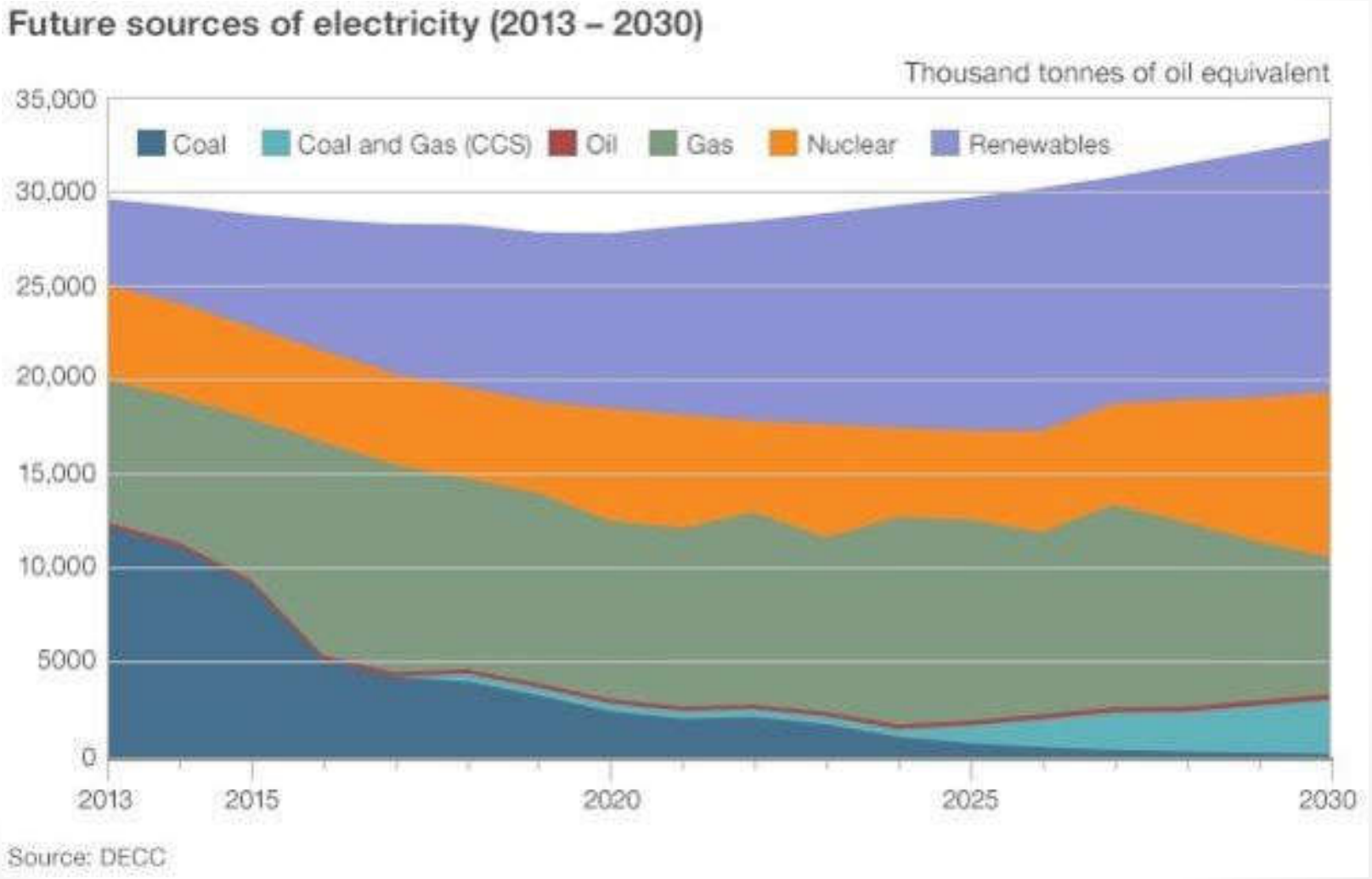
UK Primary energy demand 2000-2030: declining fossil fuels (90% to 70%)



UK Futures: BEIS – oil stable, gas decline

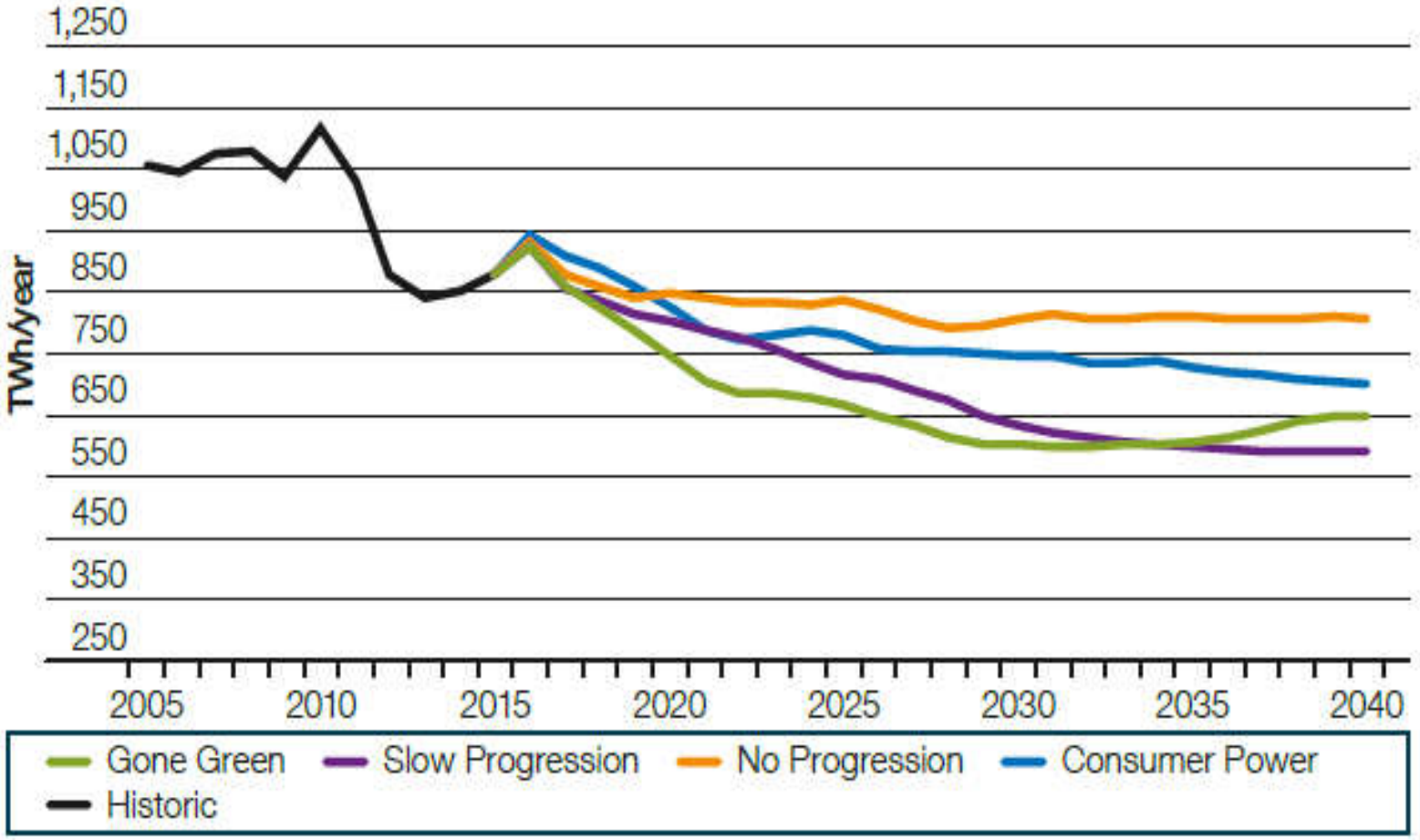


UK Futures (BEIS) –more electricity in 2030 but no coal, less gas (via CCS, more nuclear)



UK Futures: National Grid agrees - gas stable/decline

Figure 3.1.2
Gas – Annual demand



UK Futures: National Grid power scenarios: more electricity in 2030

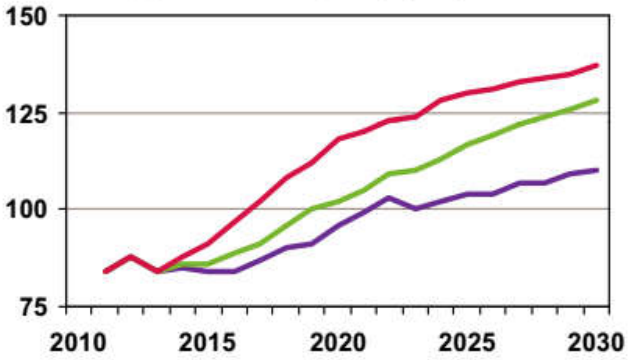
Our scenarios are designed to explore a range of possible outcomes

Gone Green: Renewable and carbon targets are hit

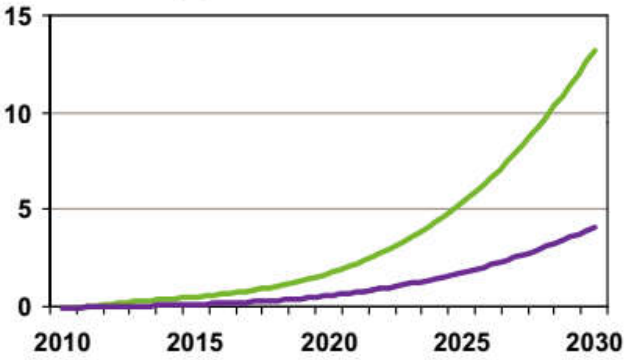
Slow Progression: 2020 targets are not hit until after 2025

Accelerated Growth*: Faster deployment of offshore wind than in Gone Green

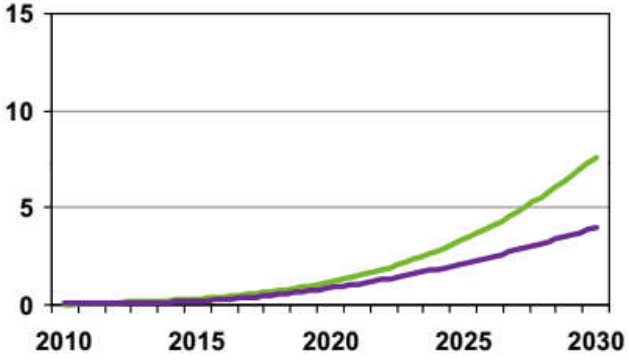
Electricity generation capacity (GW)



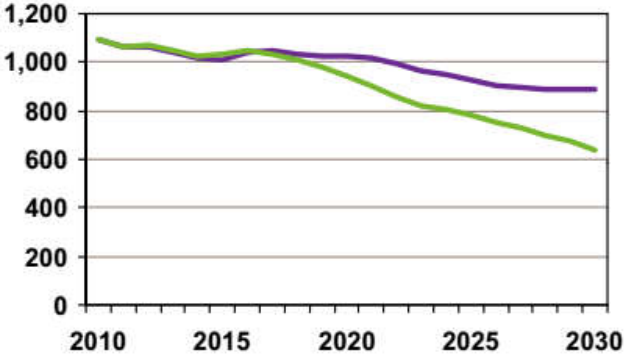
Electric cars (m)



Domestic heat pumps (m)

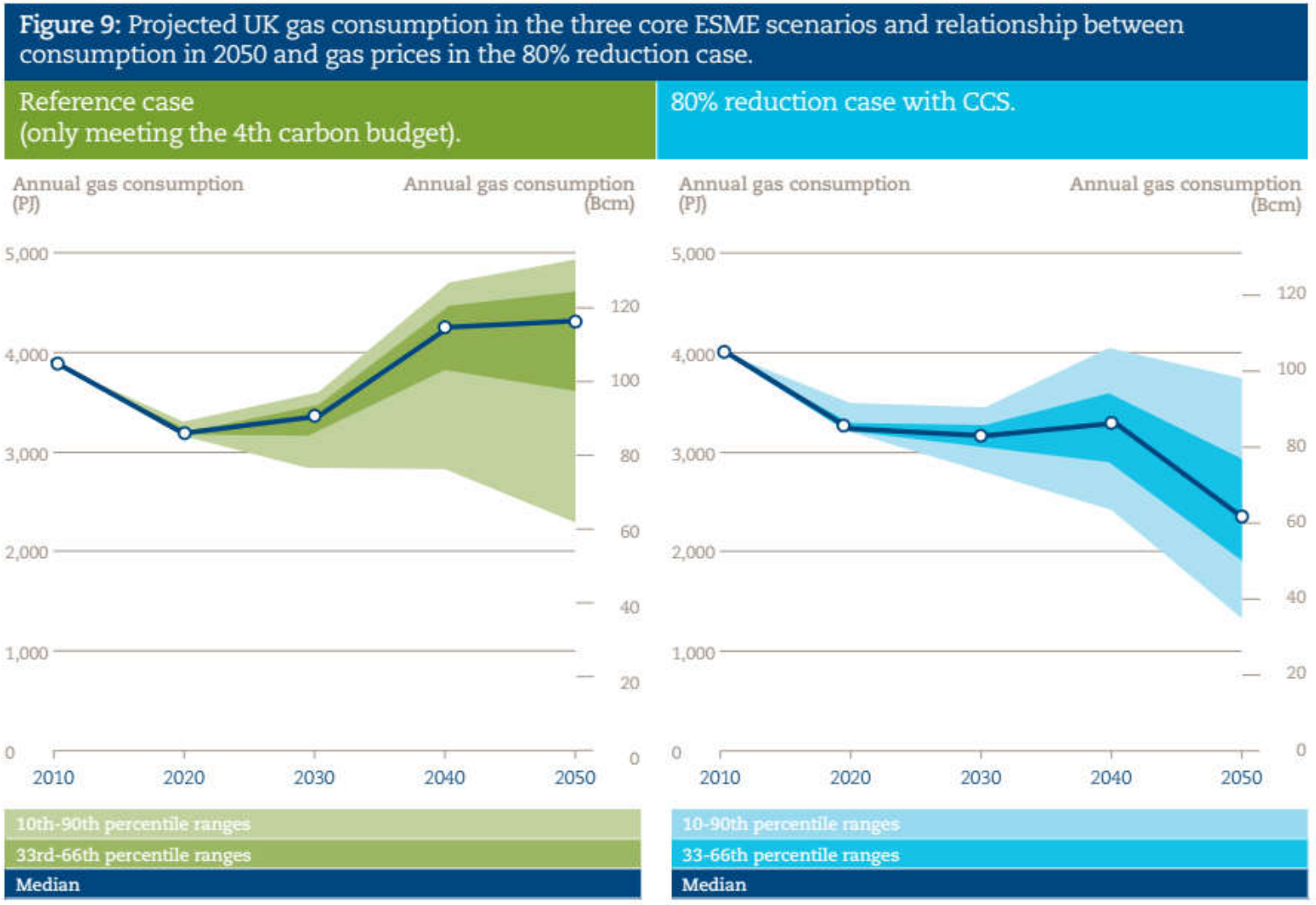


Annual gas demand (TWh)

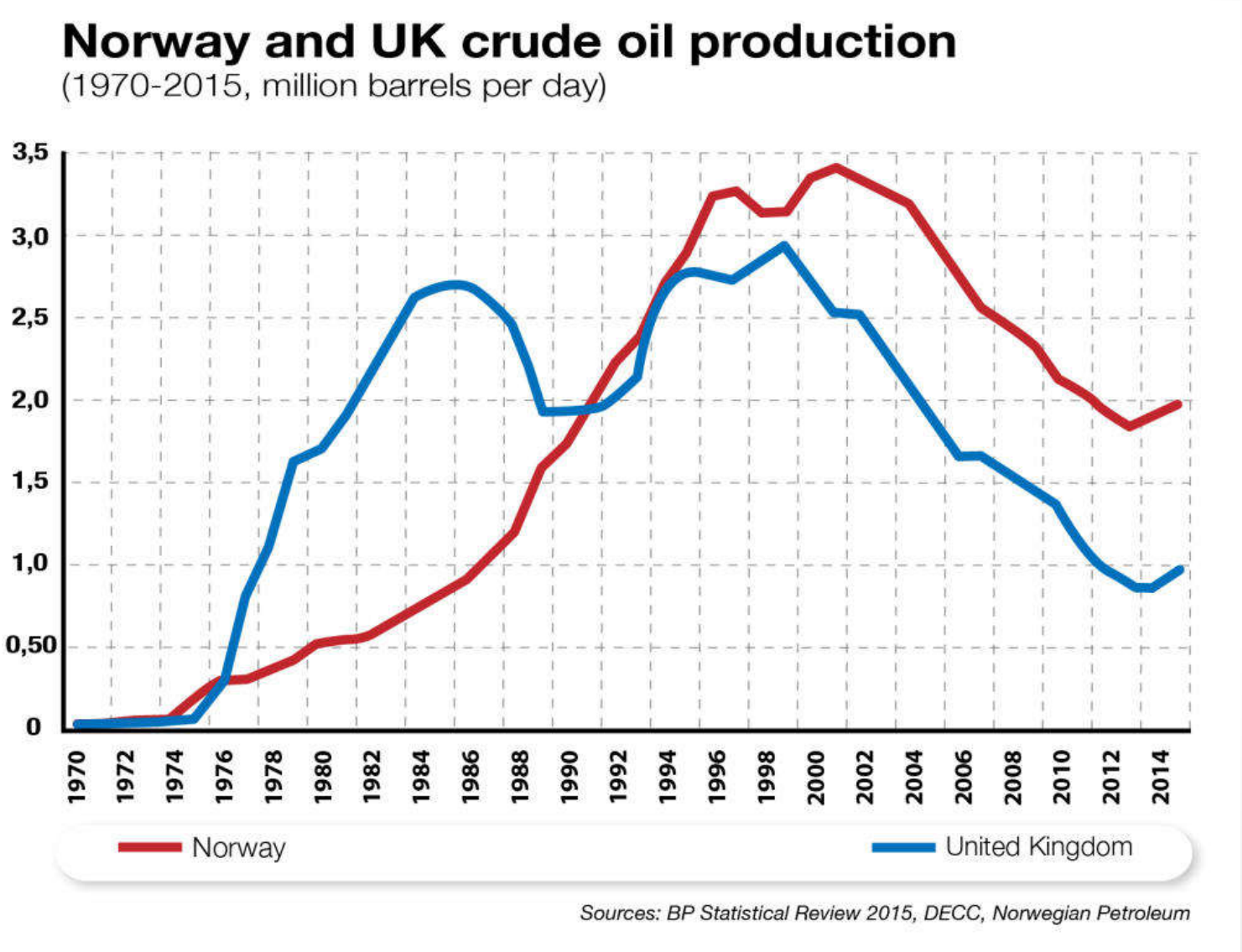


UK Futures: CCC gas demand lower in 2030

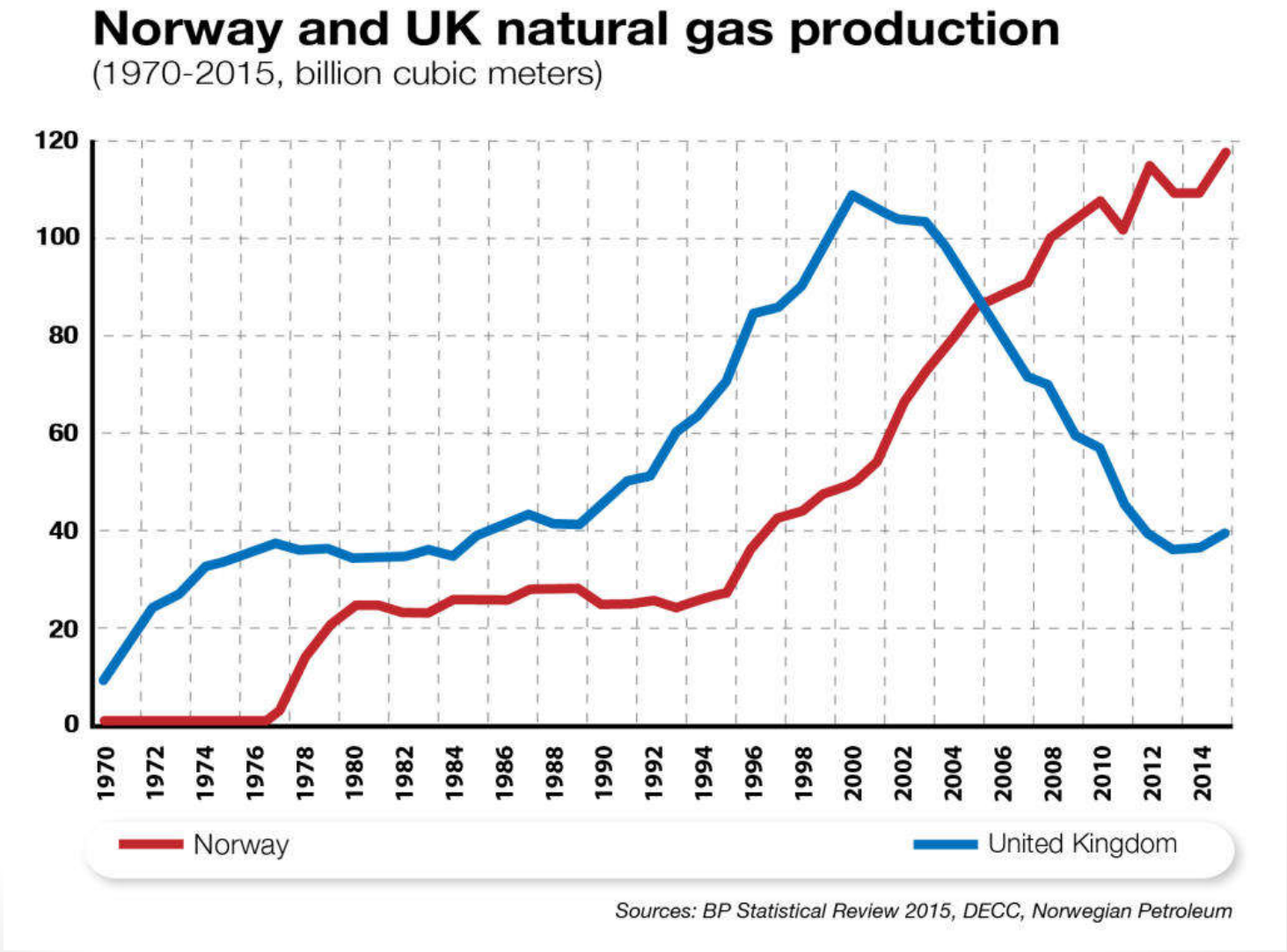
Figure 9: Projected UK gas consumption in the three core ESME scenarios and relationship between consumption in 2050 and gas prices in the 80% reduction case.



UK Futures: rising oil imports beyond Norway

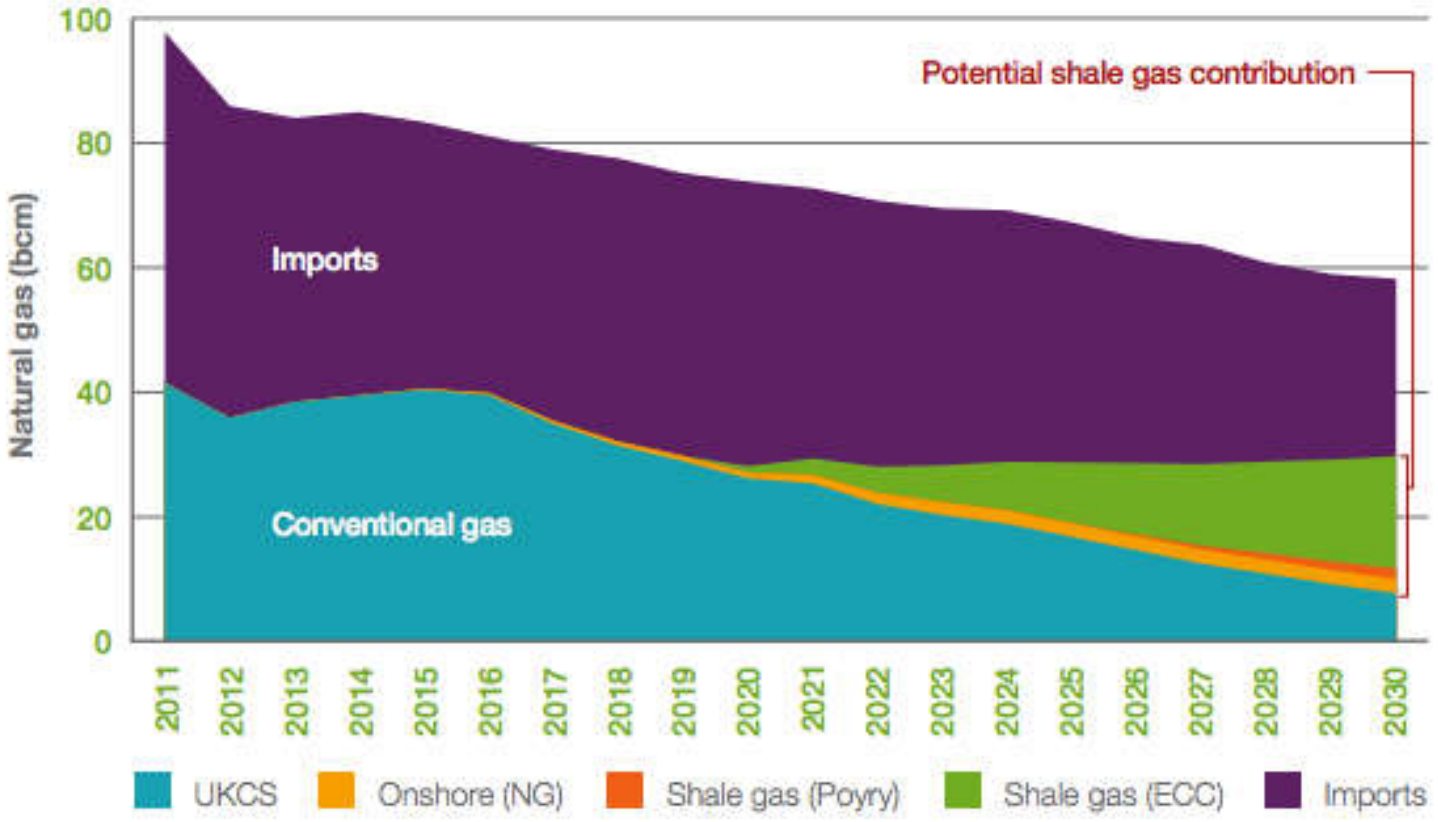


UK Futures: rising Norway gas imports?



UK Futures: role of shale gas?

Figure 8. Future UK gas supply and demand



Source: Calculations based on National Grid (2012), Pöyry (2011) and ECC (2012).

Structure

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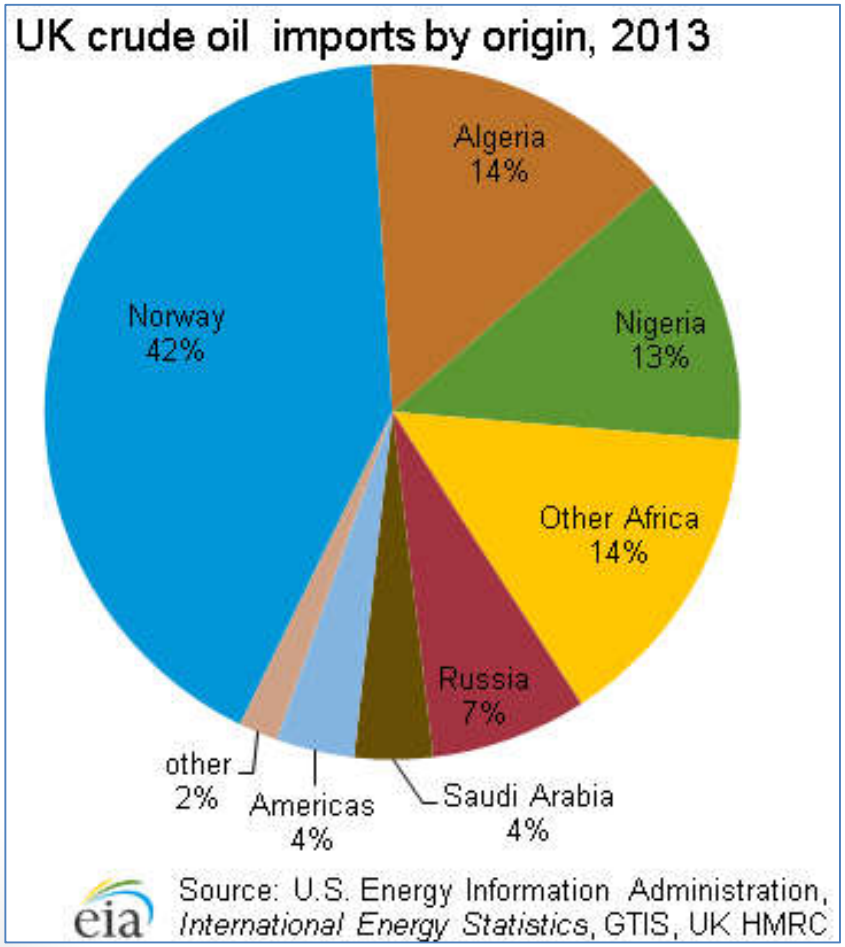
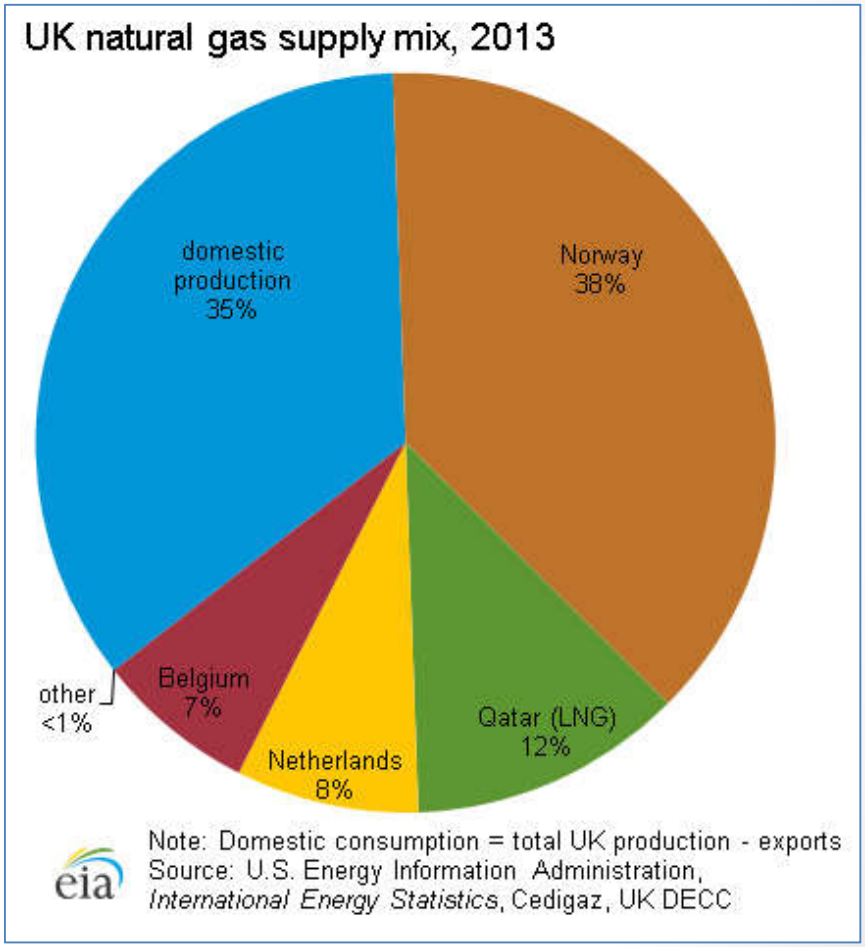
3. Fossil fuel issues for EROI-UK 2030

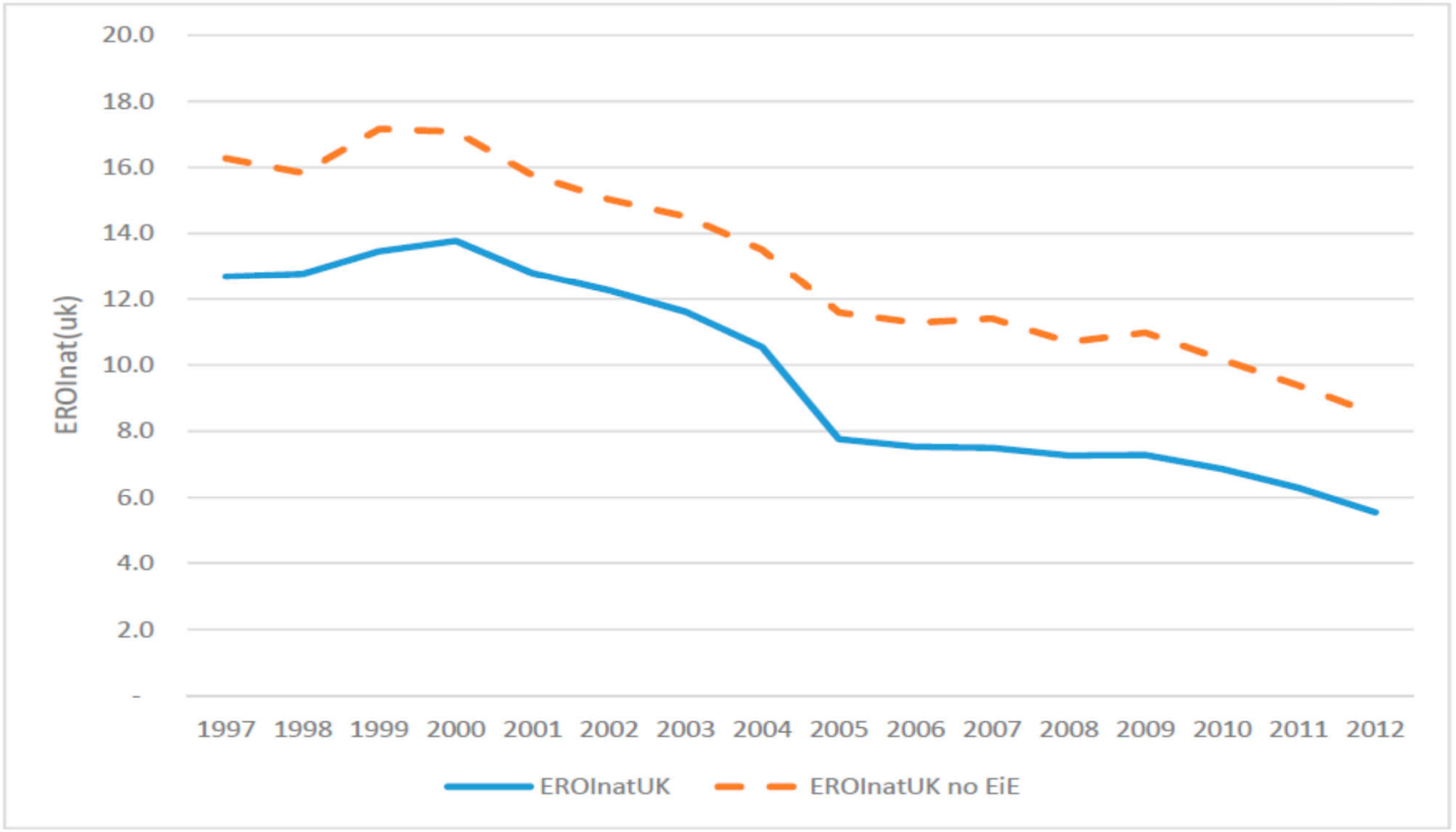
- Coal phase out mid 2020s: EROI-coal irrelevant
- Oil: stable. Likely to reduce to below 50% North Sea production. Thus global EROI for imported oil becomes more important
- Gas: stable (low/no nuclear) to declining. Likely to remain above 50% North Sea production. Thus EROI-global for imported gas is less important (than oil).

UK Primary energy: Gas+Oil imports





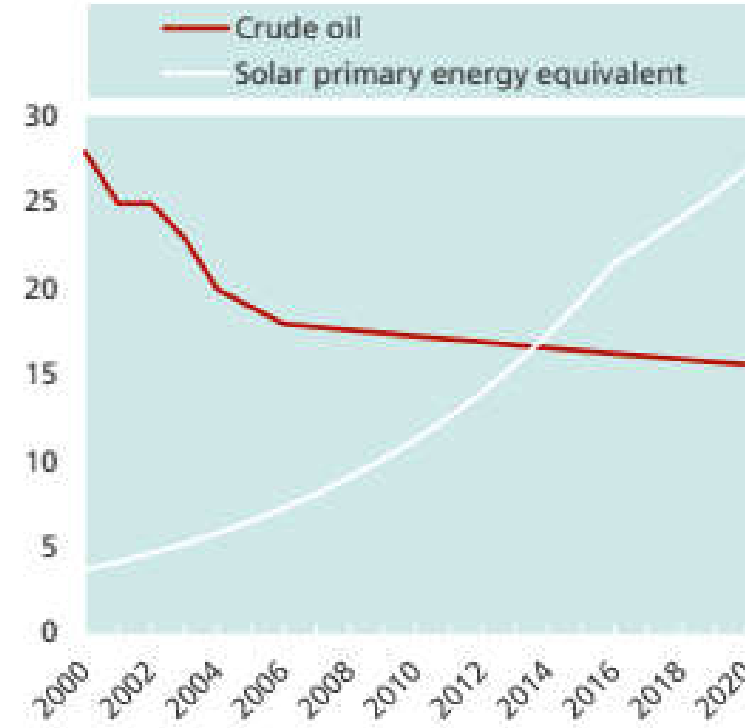
Decline of EROI-UK fossil fuels



Source: Brand-Correa et al. (2017), *Energies* 10, 534

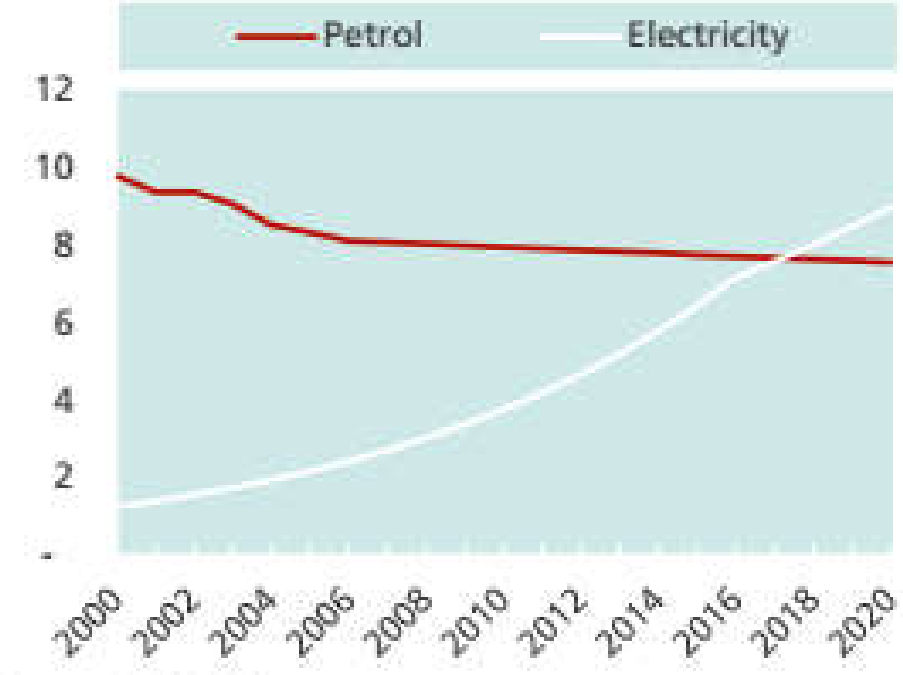
Apples & oranges: Moving beyond primary energy EROI

Chart 2: Standard EROI, 2000-2020



Sources: Gagnon, Louwen and TSRP estimates.

Chart 3: Carrier EROI 2000-2020

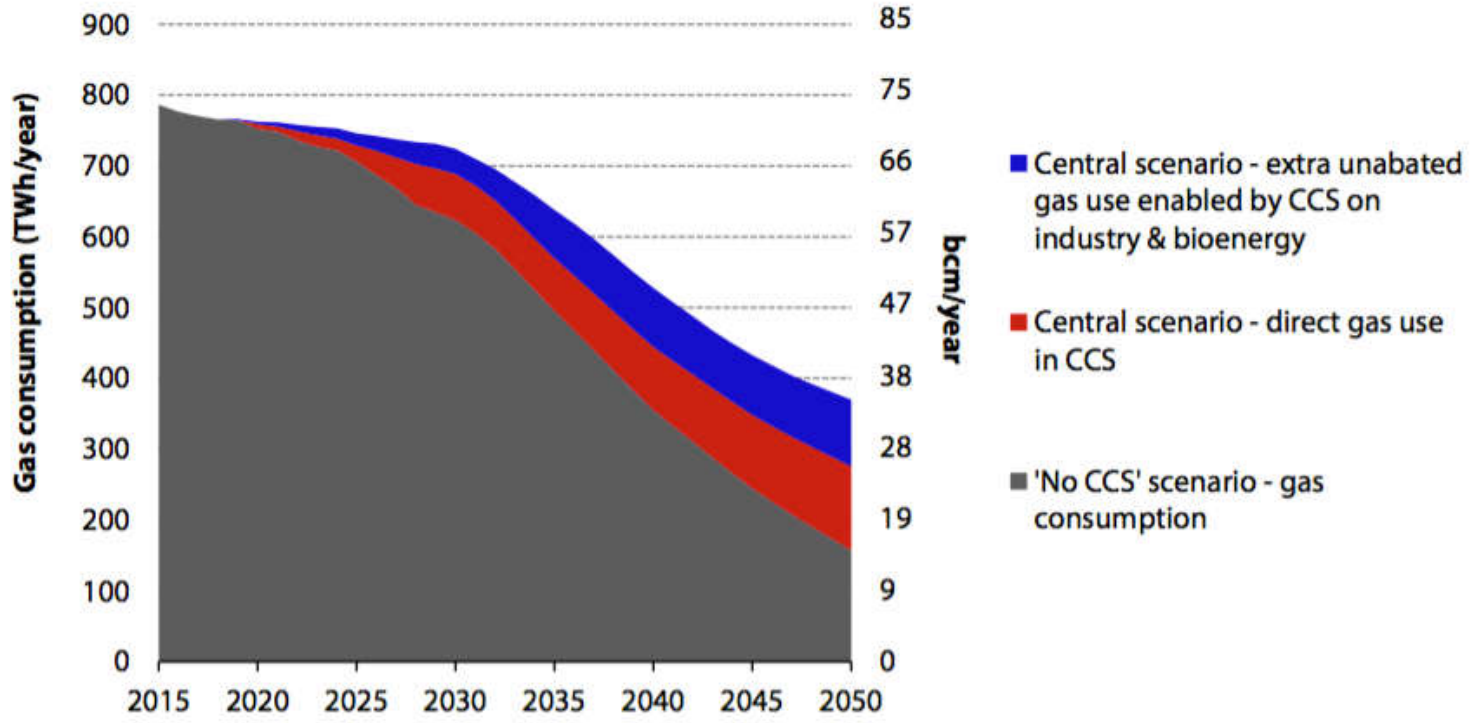


Source: TSRP Estimates

EROI: The dawn of the age of solar. TSL Research

UK Futures: CCS important post 2030

Figure 1: Direct and indirect impacts of CCS availability on gas consumption to 2050



Source: CCC analysis, based on scenarios in the fifth carbon budget advice.
Notes: The 'No CCS' scenario entails each sector following its Max scenario, excluding CCS measures, in order to meet the overall 2050 target.

Why has EROI not become more important in (energy) policymaking?"

- Maybe the time was not right, i.e. low energy prices meant no one needed to listen to EROI people, the economy was working just fine (up until 2008)
- No one was listening- i.e. messaging etc. was fine, its just the communication channel wasn't good from research to the right policy-sided people.
- Maybe the boundaries did not match the policy?
- Maybe the wide ranging estimates put off people?
- Maybe there was no clear message: i.e. lots of EROI values, but not much on what to do with them?
- Other reasons?