

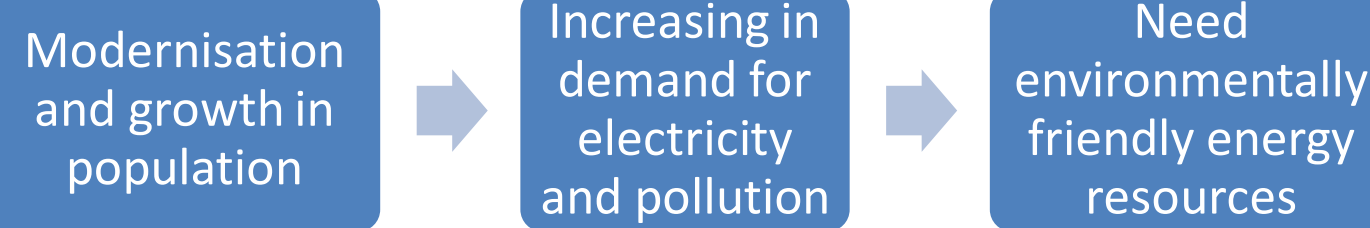
What is the True Price of Gas for Electricity Generation?

-Study Case of Trafford Power Plant in Greater Manchester, United Kingdom-

by Hartono Kurniawan



Background and Motivation



Gas Based Energy Resources

- CCGT: one of electricity generation technology with feature of low environmental pollution (using natural gas as its fuel), high thermal efficiency, high flexibility, low capital cost to power ratio, high reliability, compactness, early commissioning and commercial operation.
- More than 21% of the world's electricity generation is based on natural gas (Seebregts, 2010).

Renewable Energy Resources

- Onshore wind has the lowest costs in Renewable Energy Technology and currently competing with new gas.
- renewableUK is committed to ensuring onshore wind is the lowest-cost technology in the UK by 2020 (Morgan, 2015).

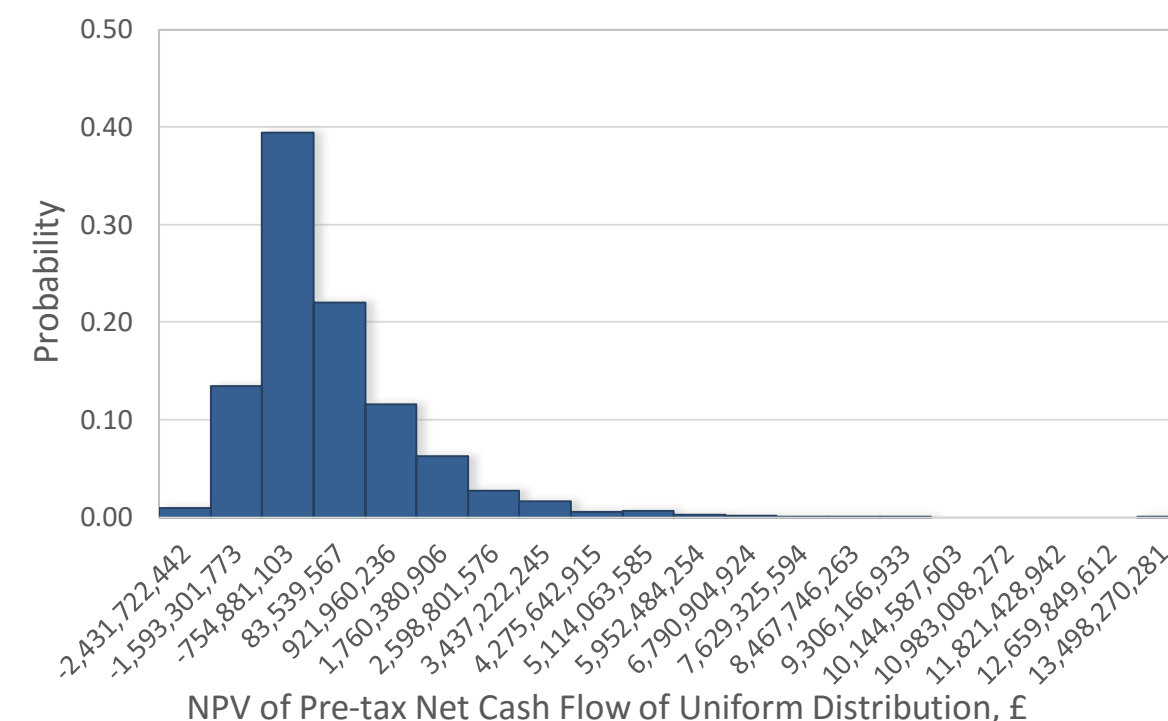
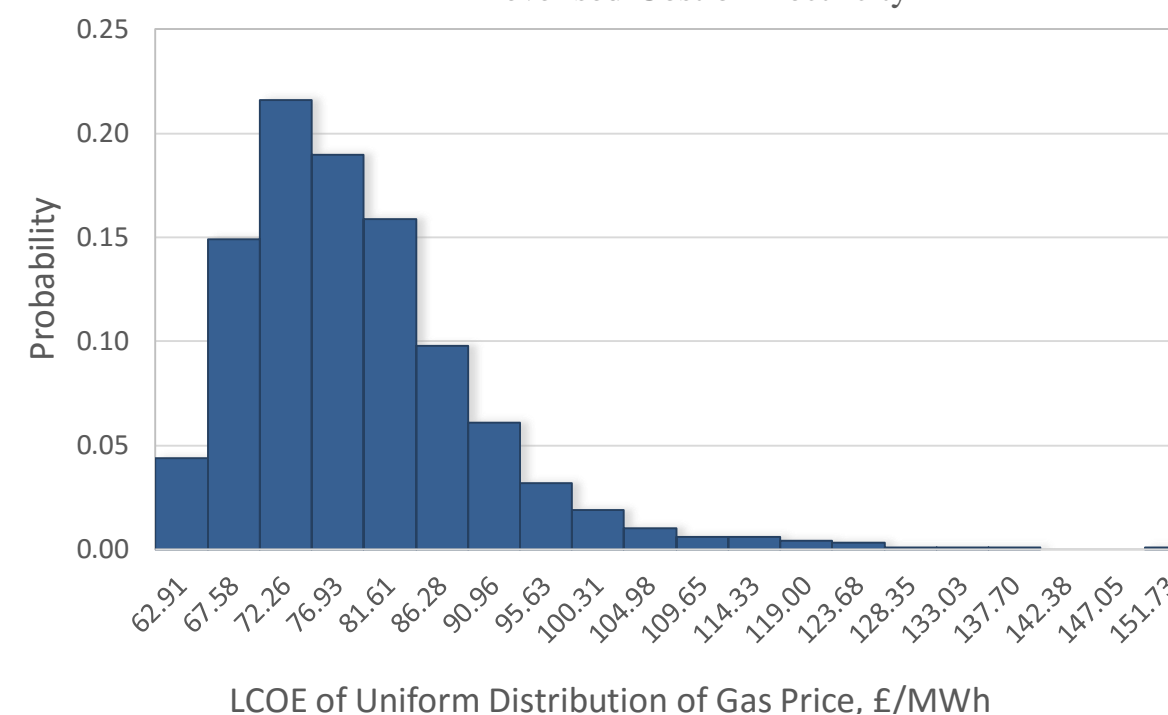
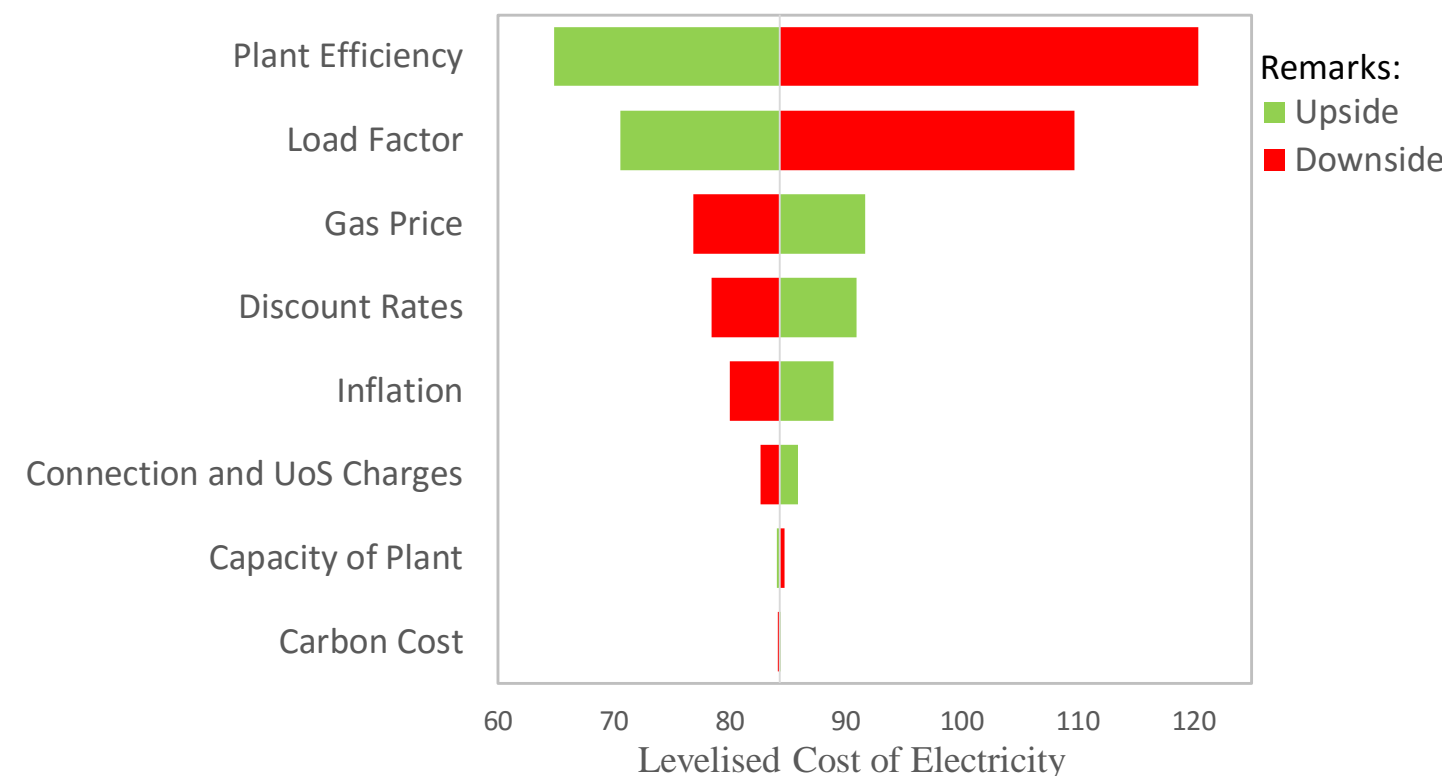
Research Questions

- What is the true price of gas? For renewable energies to compete with CCGT, they need to beat gas on price and have the knowledge of what cost levels they need to compete.
- How significant the gas price in affecting the Levelised Cost of Electricity (LCOE) of CCGT Plant compared to other parameters?
- How much is the profitability of CCGT plant?

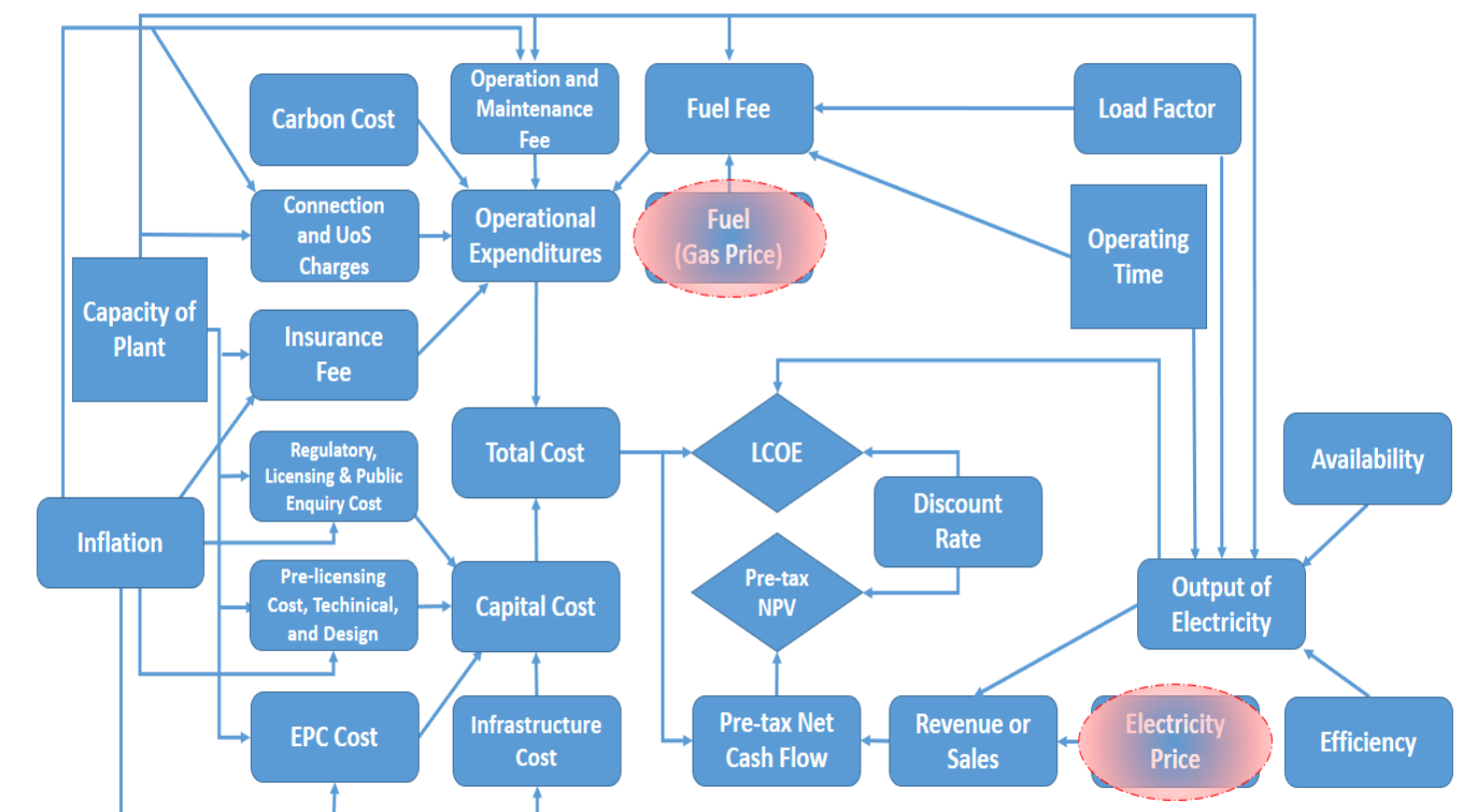
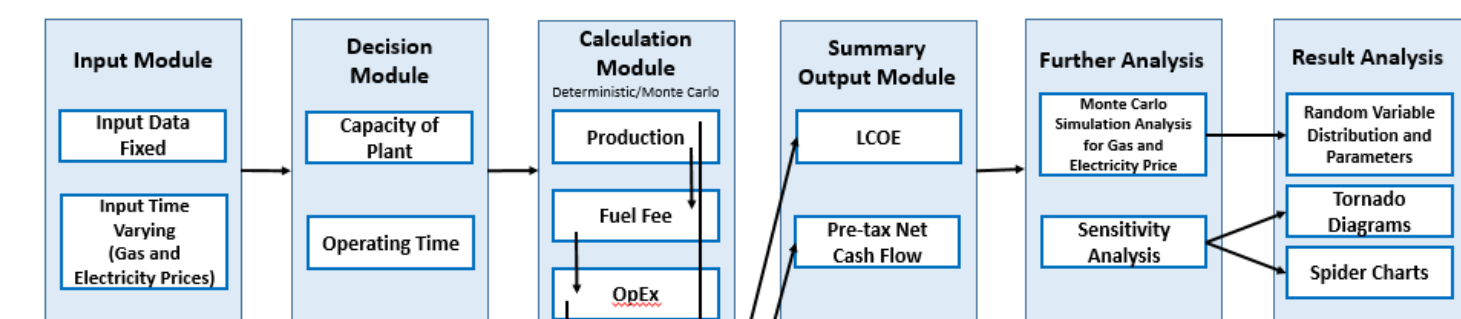


Trafford Power, the one & only new build CCGT Plant in the UK.

Main Results



Methodology



Conclusions

- To keep attractive, LCOE of new build CCGT Technology must be less than £100/MWh (DECC, 2016).
- Using 2% rate of inflation and deterministic scenario, the true price of the gas cannot exceed £18/MWh to prevent technology-shifting.
- Using Monte Carlo/Probabilistic Analysis for Trafford Power Plant; with average gas price of £13/MWh, the LCOE will be £76.32/MWh.
- The plant efficiency and the load factor of CCGT Technology have more significant influence towards LCOE than the Gas Price.
- Current wholesale electricity prices in the UK are significantly low; hence, investors still need subsidies from Government (Capacity Market Scheme) for not obtaining loss (negative NPV of cash-flows).