Assessing air quality impacts of UK energy scenarios: The RAPID tool

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Introduction to RAPID (Rapid Air Pollution Impact Diagnostics) tool

Illustration for power sector

Uncertainties and further development

RAPID

Rapid Air Pollution Impact Diagnostics Tool

Simple spread-sheet model: off-shoot of UKIAM

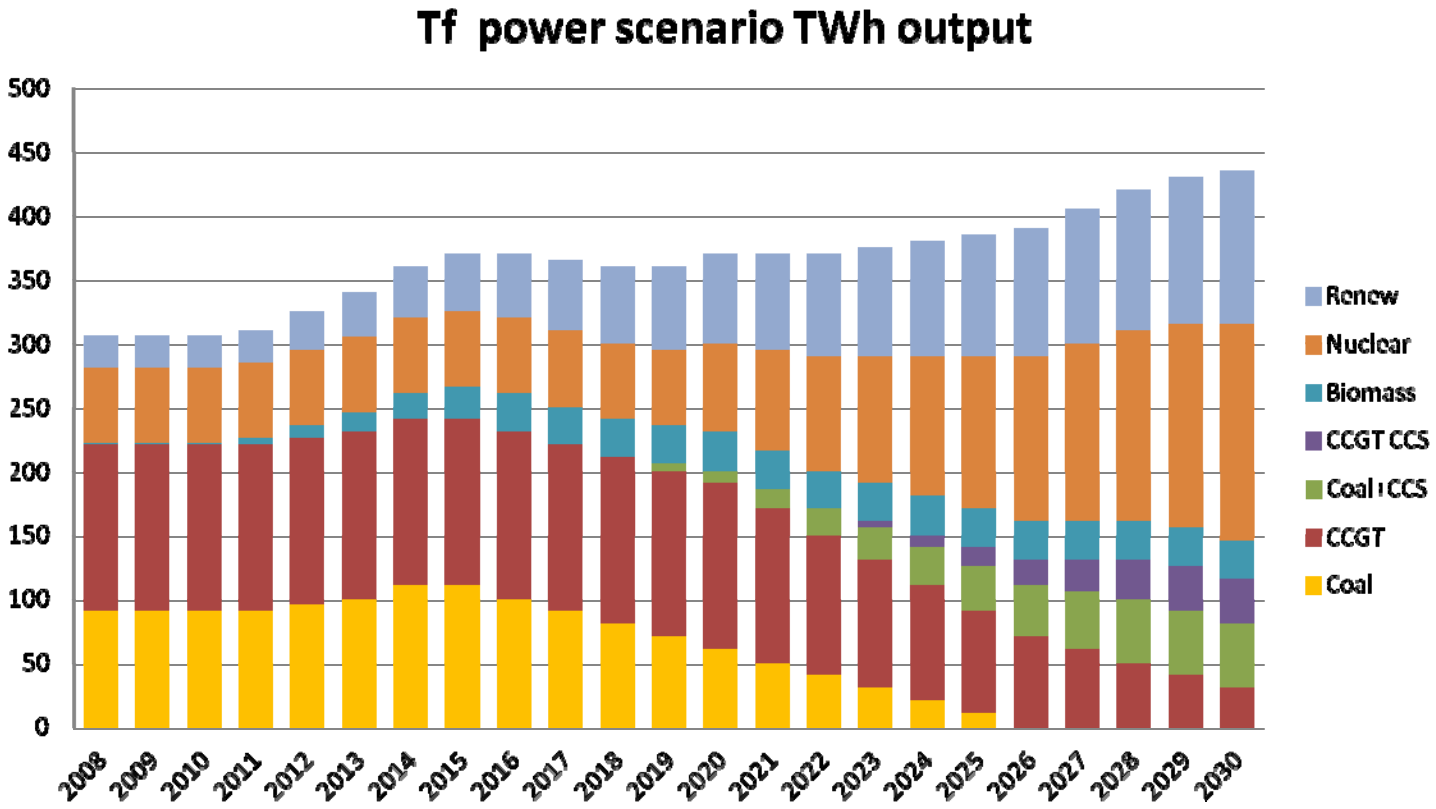
Emissions: Uses database of emission factors as used in UKIAM based on NAEI etc.

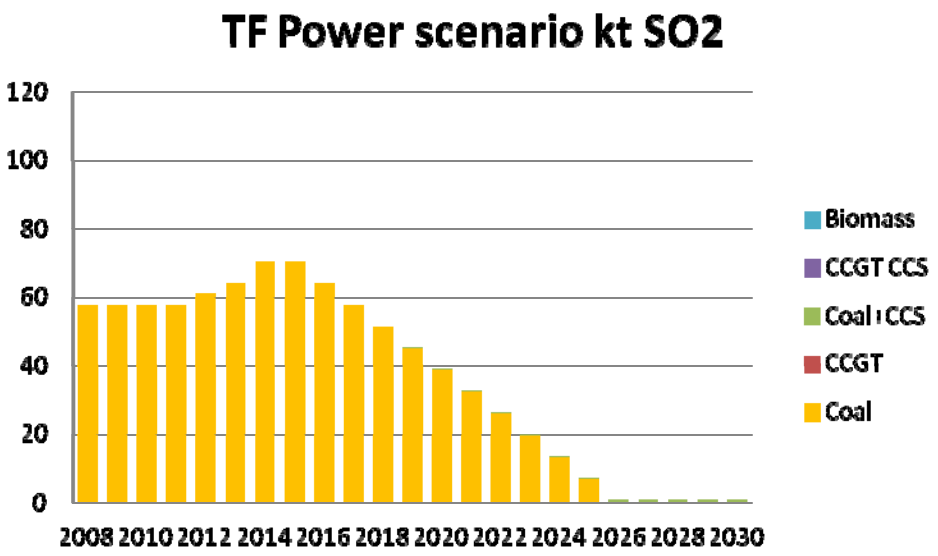
Environmental impacts: uses "impact factors" derived by UKIAM for each type of source-> footprint per kt emitted from each source wrt acid deposition and eutrophication; and population exposure to NOx and PM

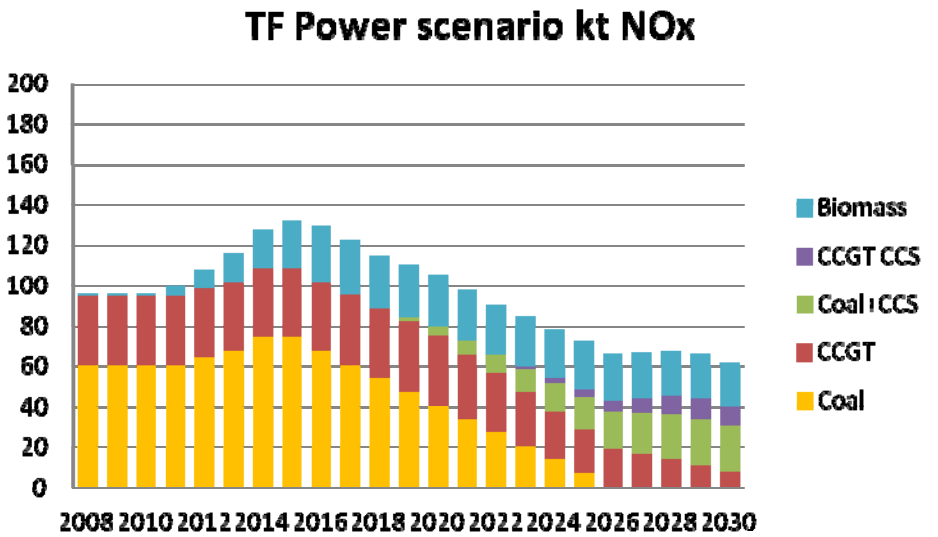
Damage costs (alternative approaches)

Power sector scenario for illustration

RAPID also covers domestic, industry, public, transport, agriculture etc







Emissions of SO_2, NOx, NH_3, PM_{10}, $PM_{2.5}$

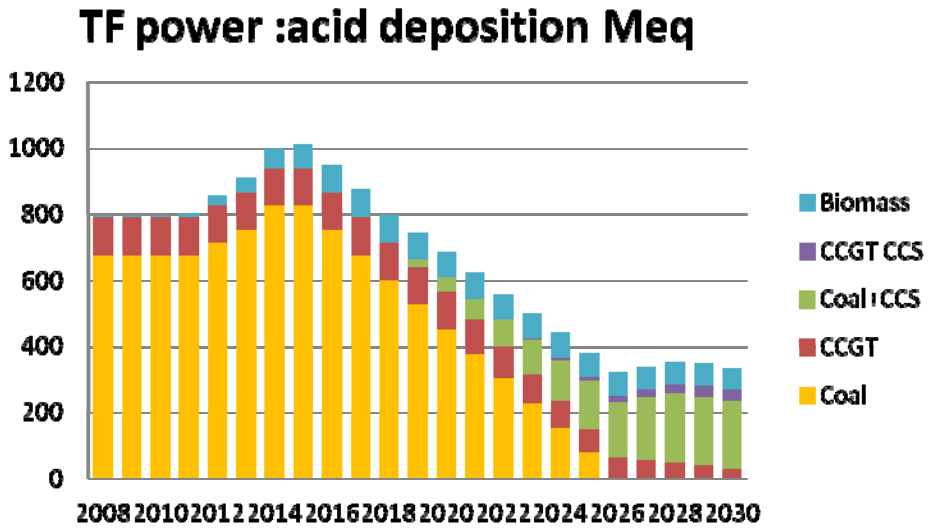
Emission factors as in

UK NAEI supplemented

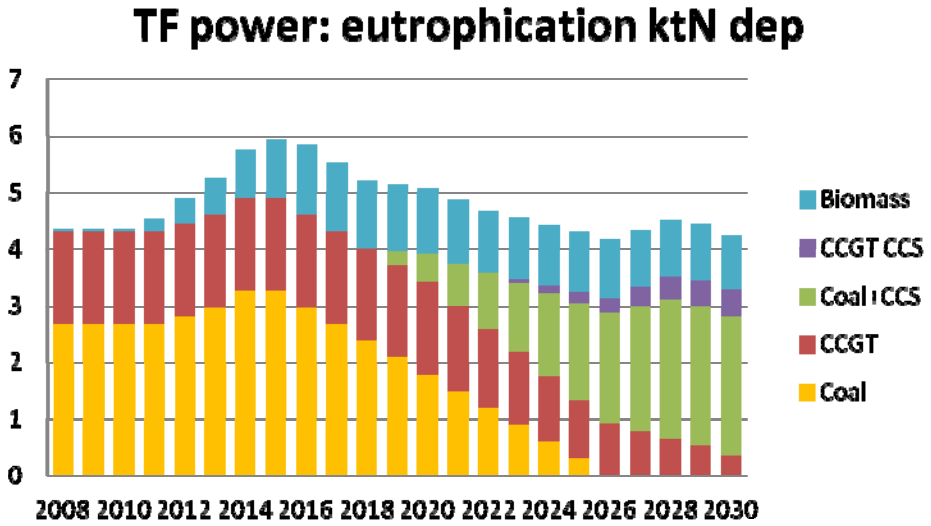
for new technologies

and sources

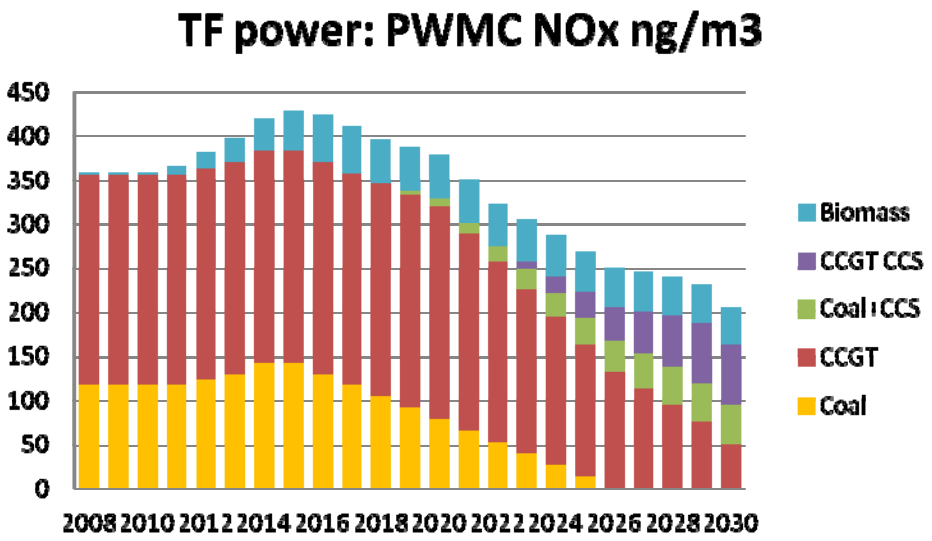
Impacts on ecosystems:

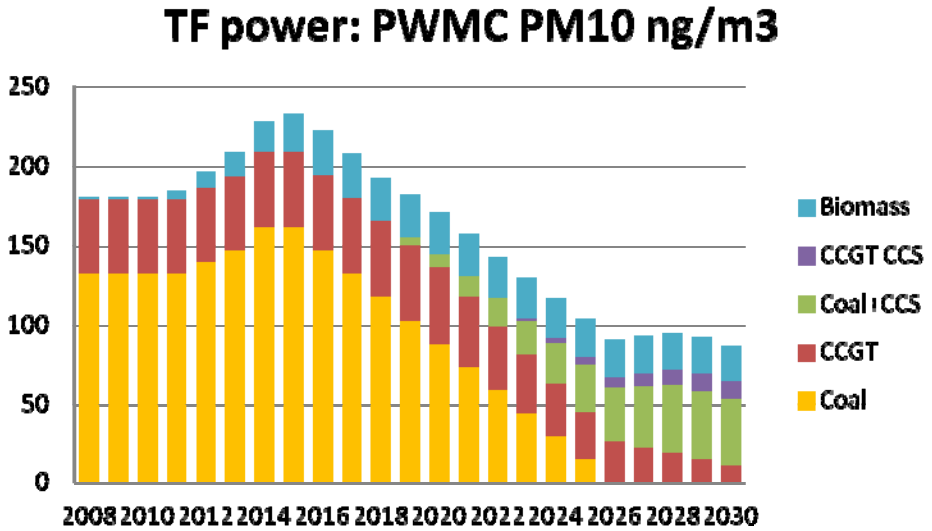


Estimate contributions to acid deposition in Meq (set in context that projected dep in 2020 over UK ~23,000 Meq



Estimate contributions to N deposition in kt across UK (set in context of projected N dep in 2020 of ~260 kt of which ~40 kt due to UK NOx sources)

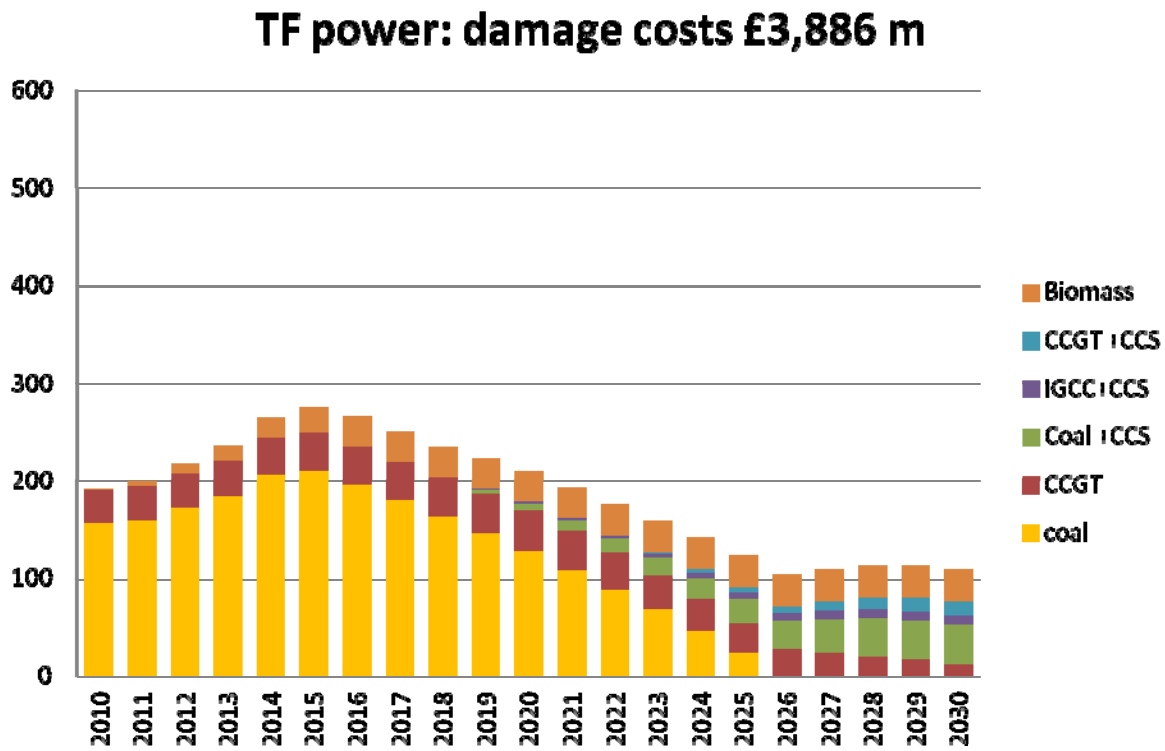




Impacts on urban air quality and human health

Estimate contributions to population weighted mean concentrations of NOx. Compare with NOx conc. equivalent to NO2 limit values.

Contributions to population weighted mean concentrations of PM_{10} or $PM_{2.5}$. Can then use in estimation of damage costs.



Damage costs calculated using emissions and Defra cost data.

Compared with alternative approach using PM exposure and life tables.

Uncertainties and further development

Large uncertainties in some sectors- e.g. biomass use and heat

Overall economic benefit can be high but involves differences between large damage costs and damage benefits, both uncertain and critically dependent on scenarios and measures.

Future: explore different ways of estimating damage costs.
Extend to other species eg GHGs, VOCs.
More investigation of new/uncertain sources.