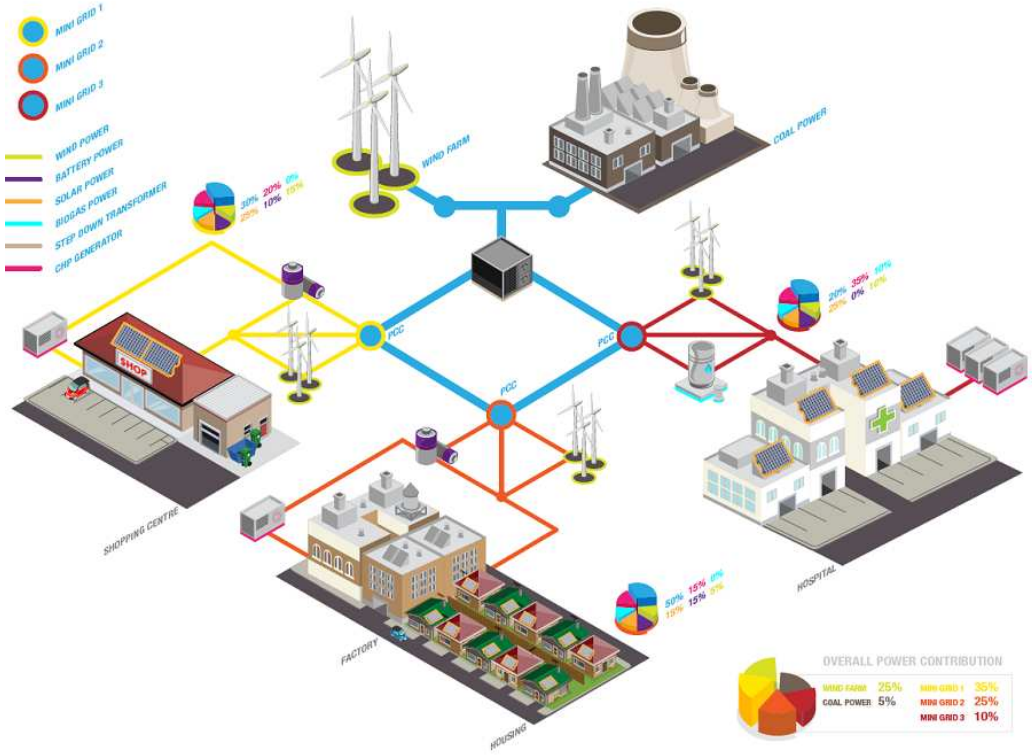

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Distributed Energy: why smart grids?

Anthony (Tosh) Szatow
Project Leader, Intelligent Grid
November, 2009

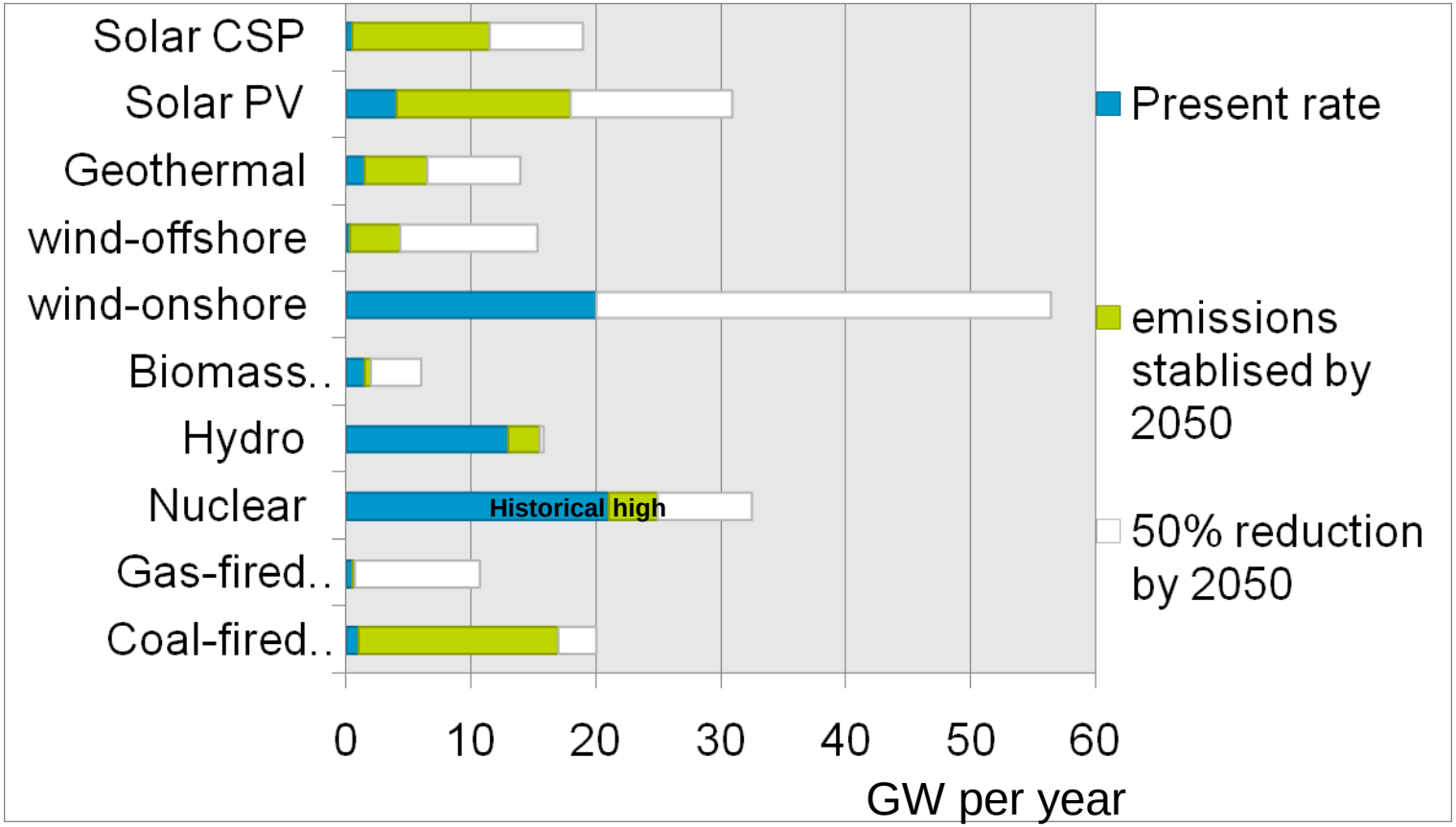
CSIRO

Fundamentals

- *"leaving aside the political feasibility of the 450ppm policy scenario, it is uncertain whether the scale of the transformation envisaged is even technically achievable as the scenario assumes broad deployment of technologies that have not yet been proven. The technology shift, if achievable, would certainly be unprecedented in scale and speed of deployment." (IEA, 2008)*

Fundamentals

Average Annual Power Generation Capacity Additions 2010-2050

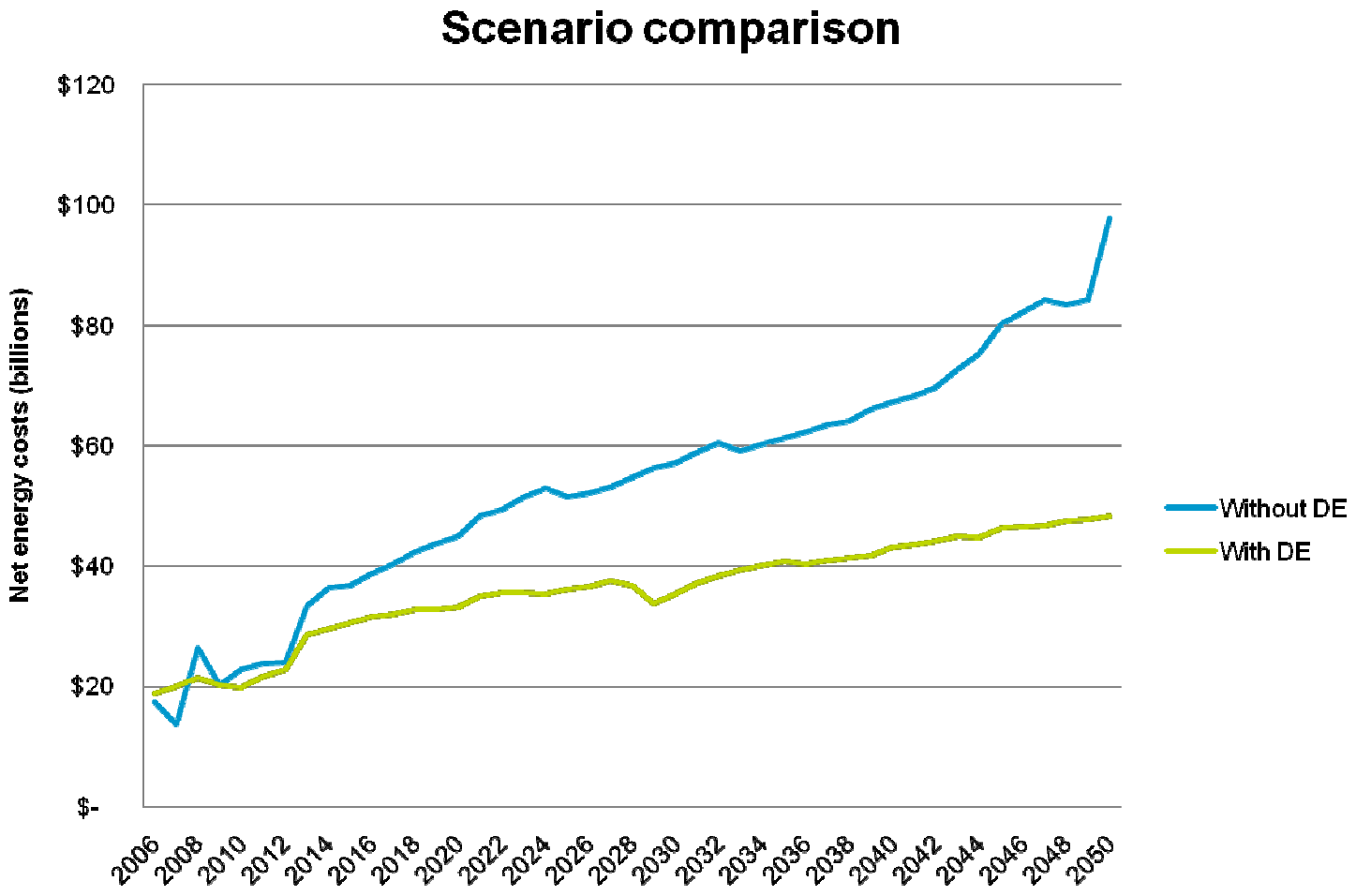


The demand side, not represented here, accounts for 80% of investment to meet the 50% reduction by 2050.

Key findings – the value

- DE is a critical early action response to climate change providing immediate, low cost, low emission energy and avoiding more expensive low/zero emission energy in the future.
- We project electricity prices to be significantly lower with deployment of DE representing a net social gain that may not necessarily be captured proportionally by those implementing DE - $800b in simple terms, highlighting the importance of aligning socially efficient outcomes with private incentives
- Collectively, distributed energy and renewables significantly reduce the water intensity of energy supply (66% by 2030, 83% by 2050), providing risk insurance against the impact of drought on centralised power supply

DE value: Early action response to climate change

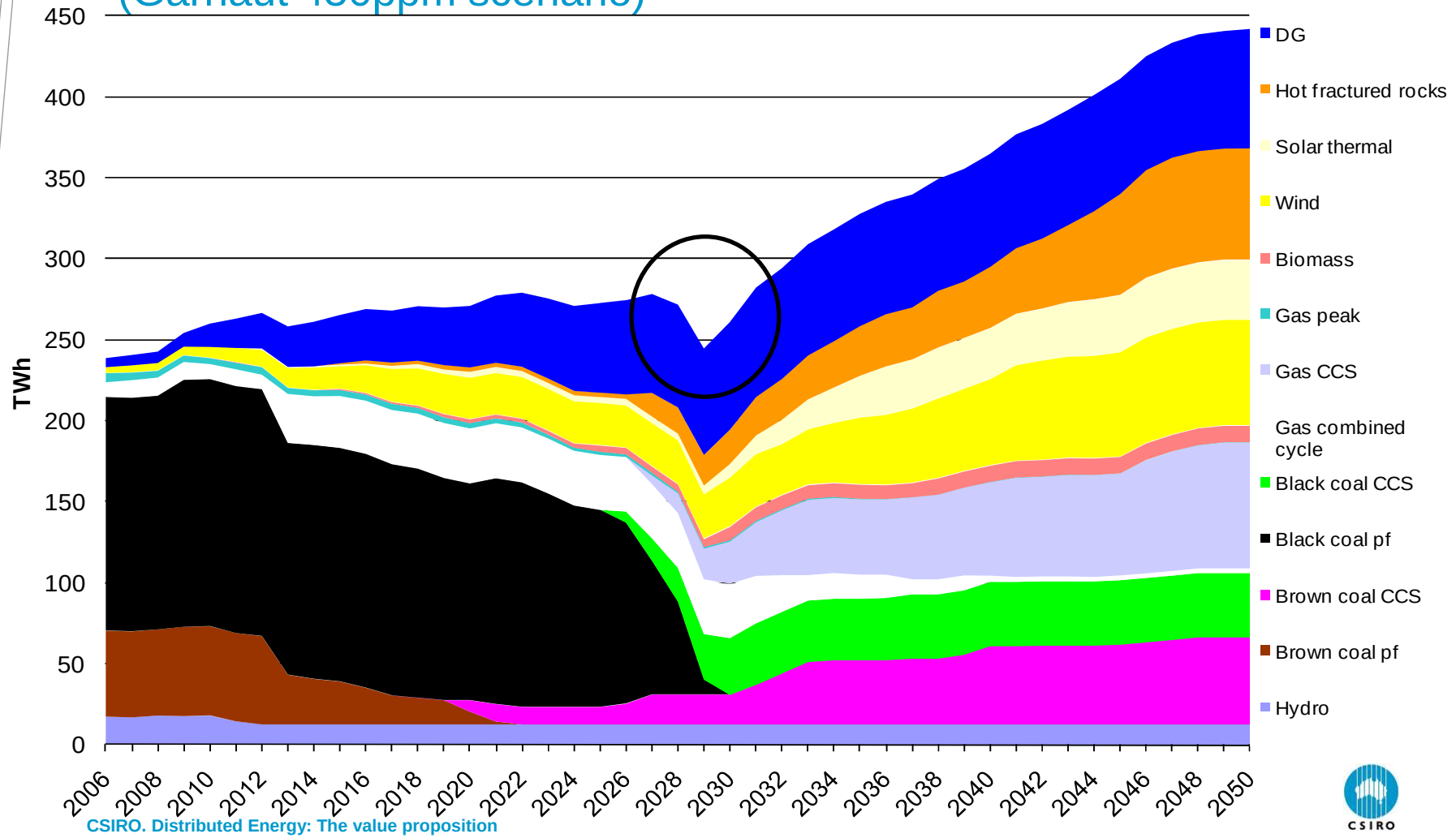


Key findings – the value

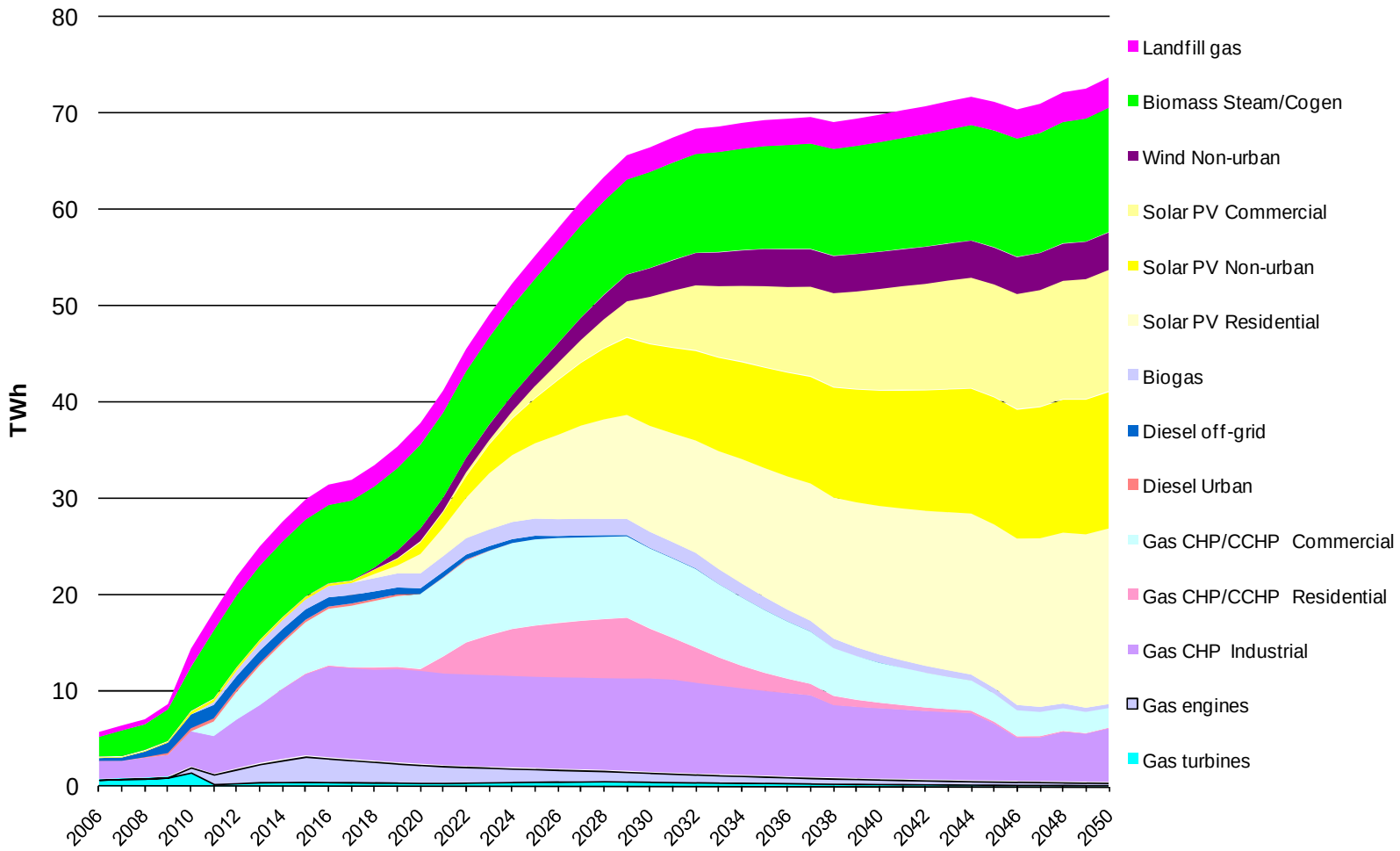
- At projected rate of uptake, we predict DE has largely positive network benefits, few negative impacts
  - Further work planned will qualify the impact of higher levels of DE on a greater variety of feeders
- The role of DE in reducing emissions cost effectively is made more important if technologies such as CCS and hot dry rock do not emerge at commercial scale

DE value: Early action response to climate change

- DE is a critical early action response to climate change (Garnaut 450ppm scenario)



DE value: breakdown of DG technologies



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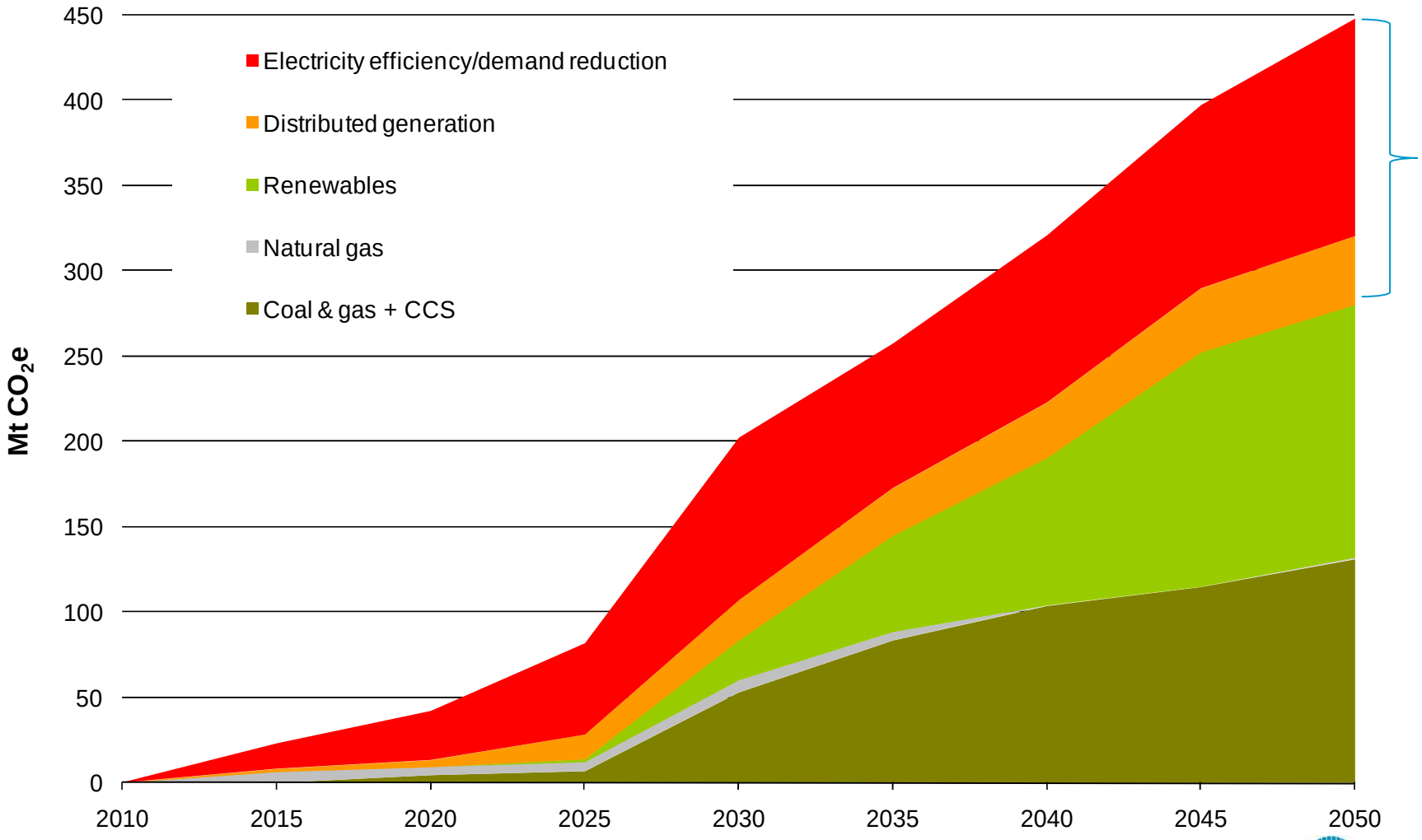
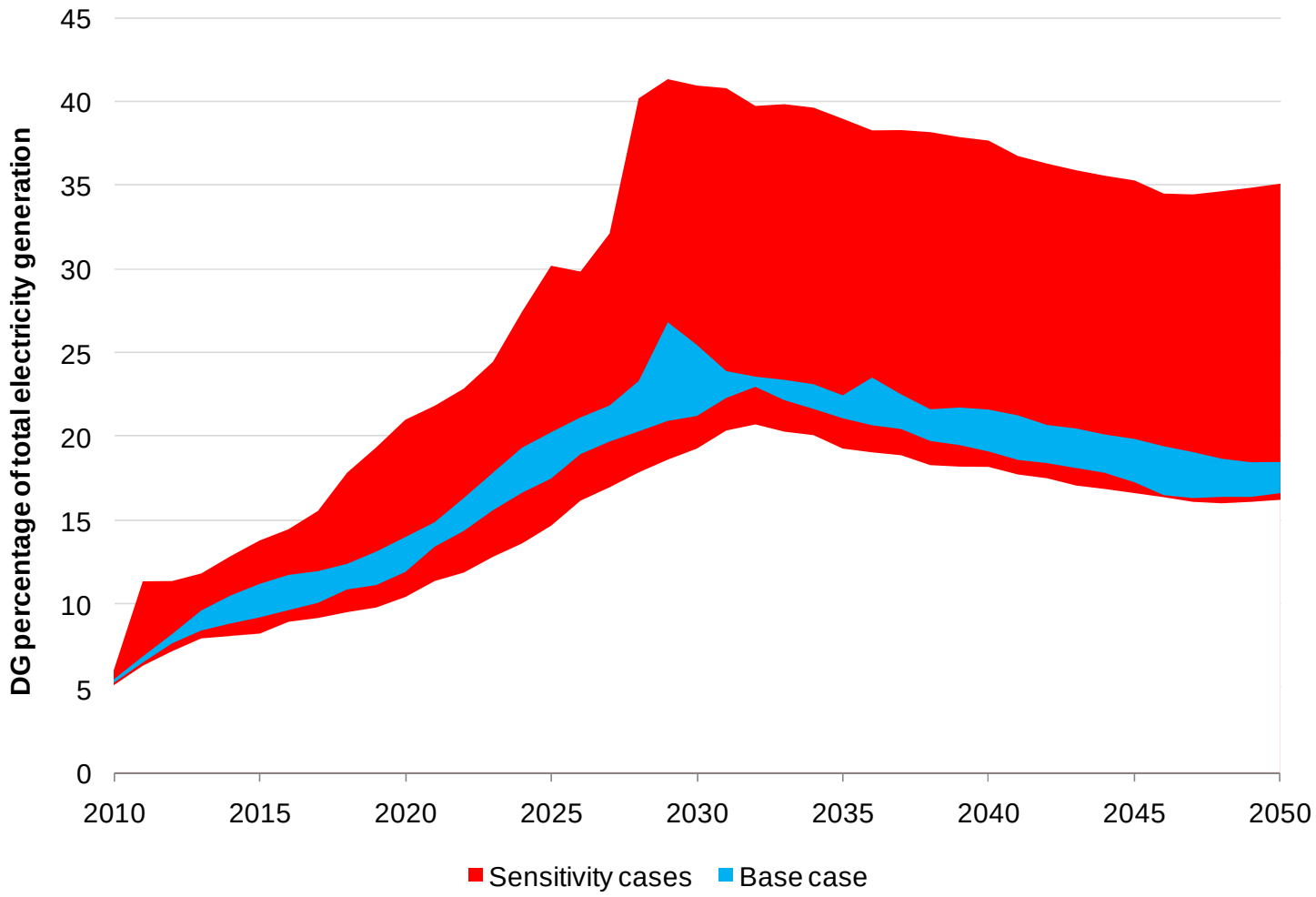
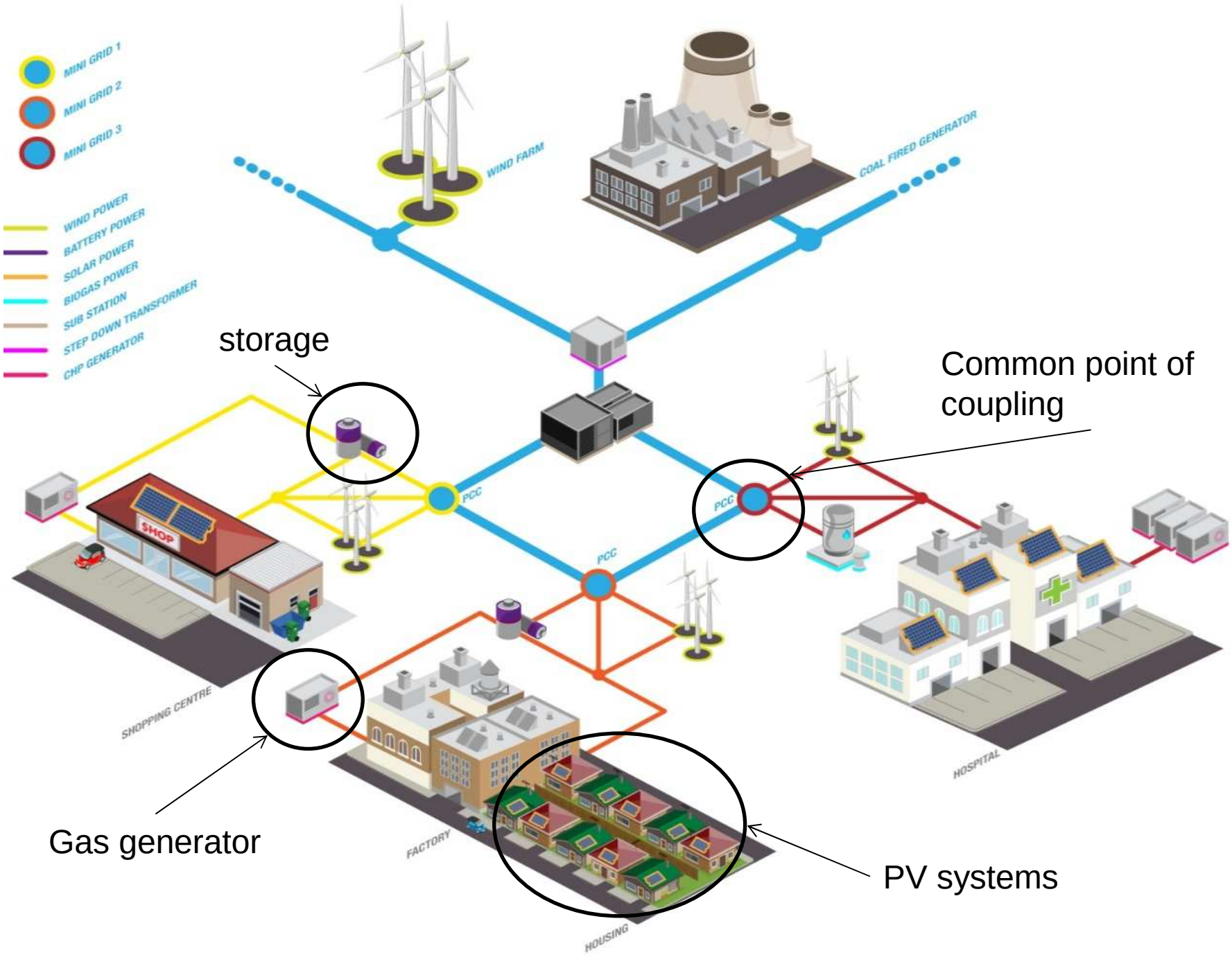
DE value: Early action response to climate change



DE value: Sensitivity analysis




MINI GRID 1
MINI GRID 2
MINI GRID 3
WIND POWER
BATTERY POWER
SOLAR POWER
BIOGAS POWER
SUB STATION
STEP DOWN TRANSFORMER
CHP GENERATOR
WIND FARM
COAL FIRED GENERATOR
storage
Common point of coupling
PCC
PCC
PCC
$HOP
SHOPPING CENTRE
HOSPITAL
FACTORY
HOUSING
Gas generator
PV systems

Intelligent Grid

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Thank you

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