



Statoil

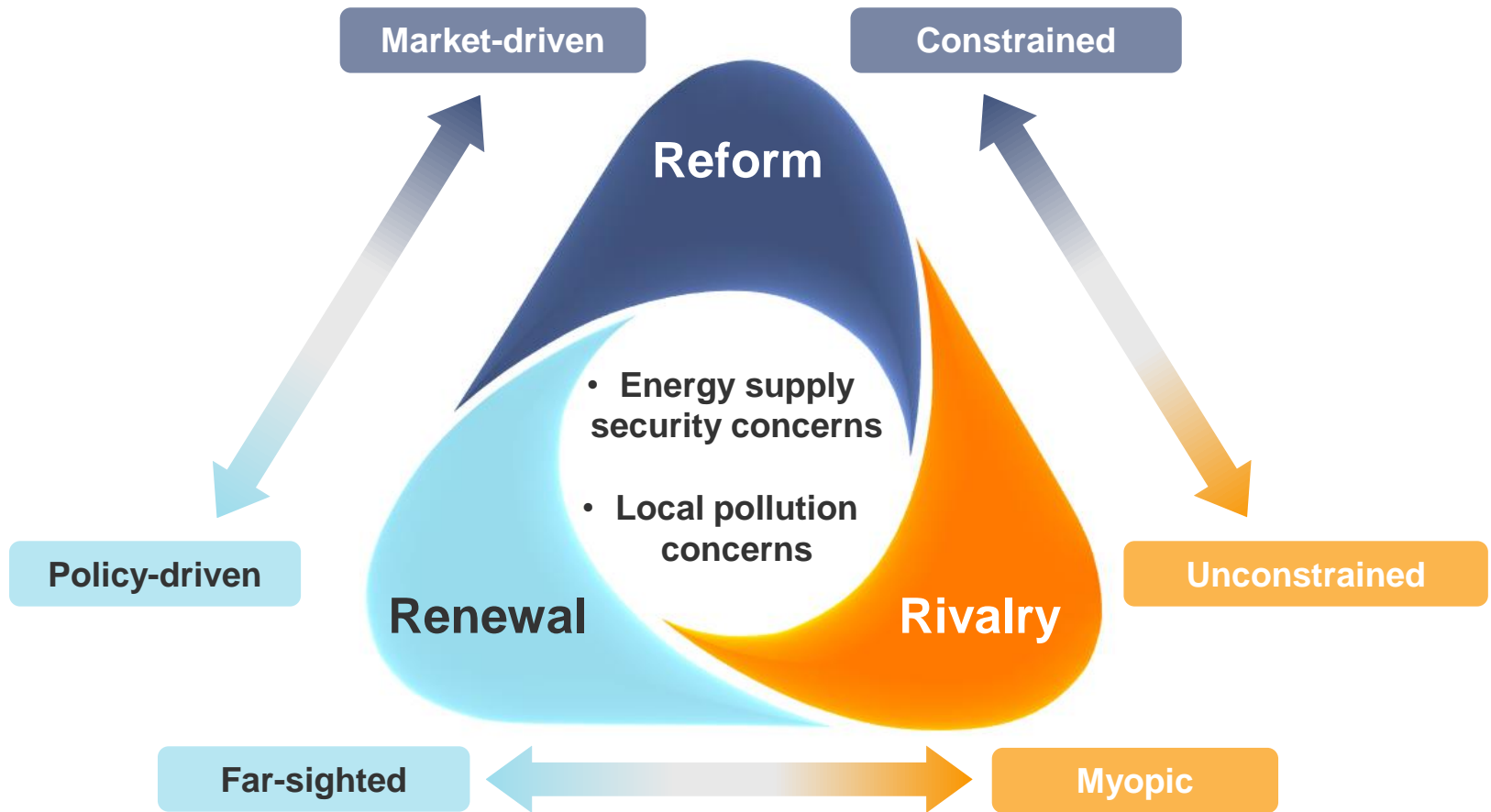
Energy Perspectives 2017

Long-term macro and market outlook

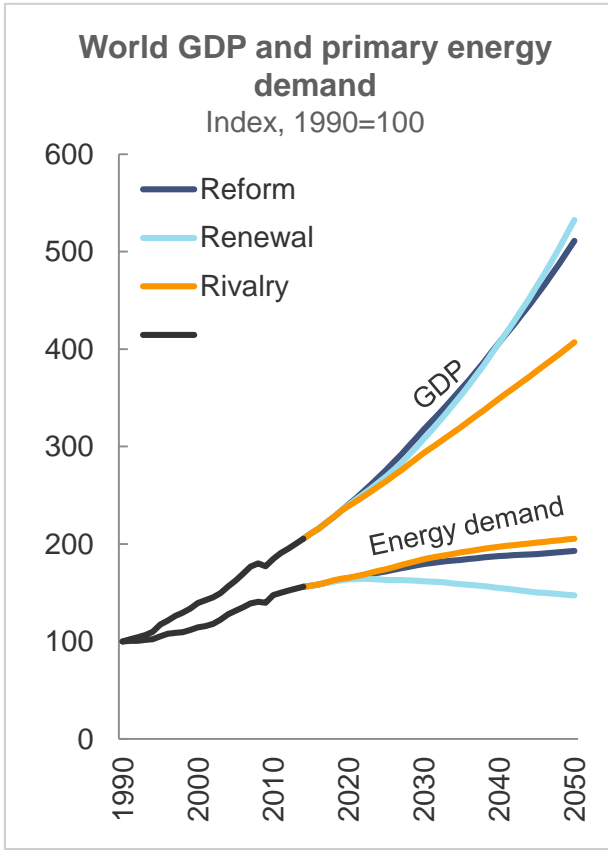
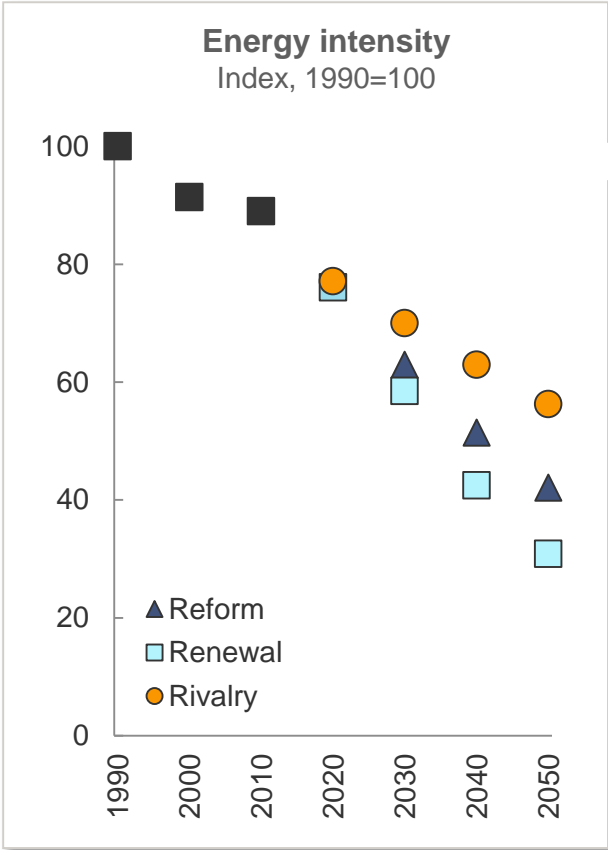
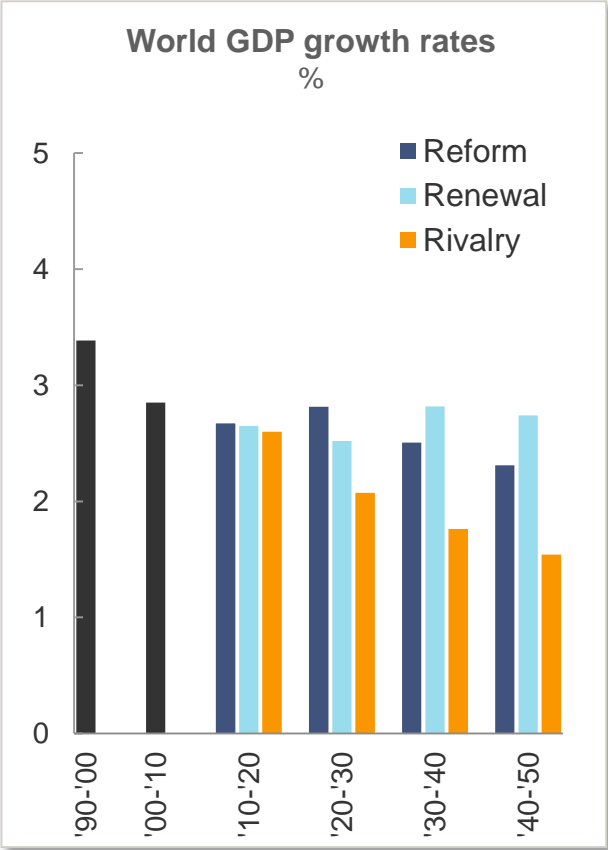
NTNU Energy Transition workshop
7 November 2017

Three images of the future towards 2050...

None are BAU



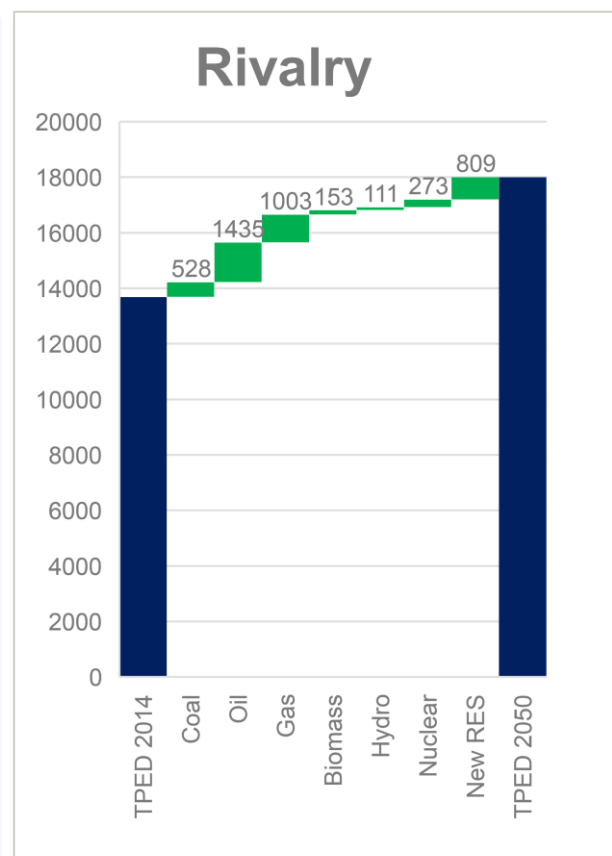
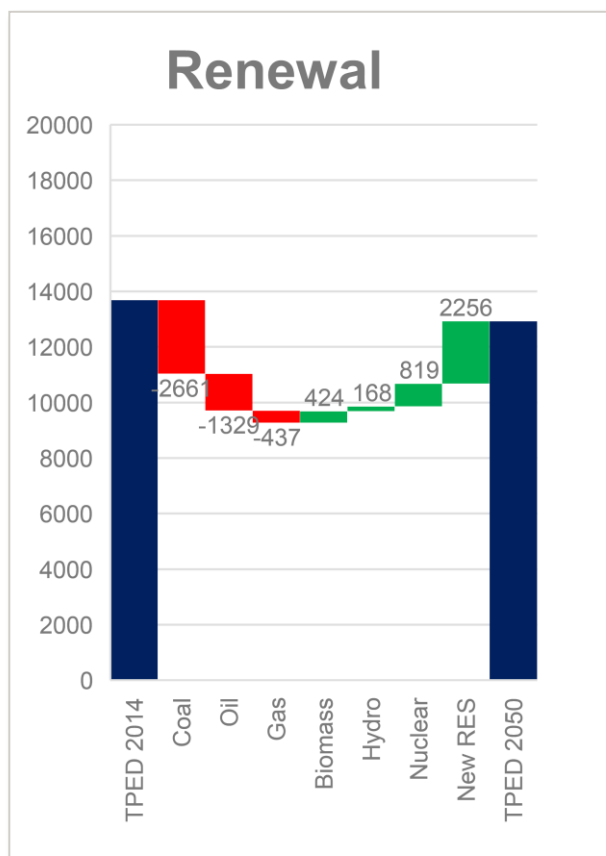
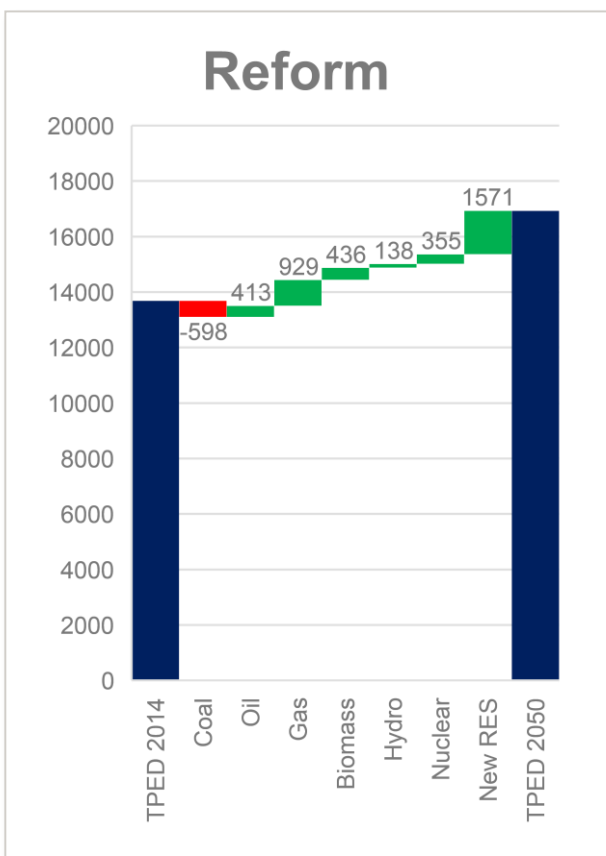
Population and economic growth sustain energy demand growth in two of three scenarios



Source: IEA (history), Statoil



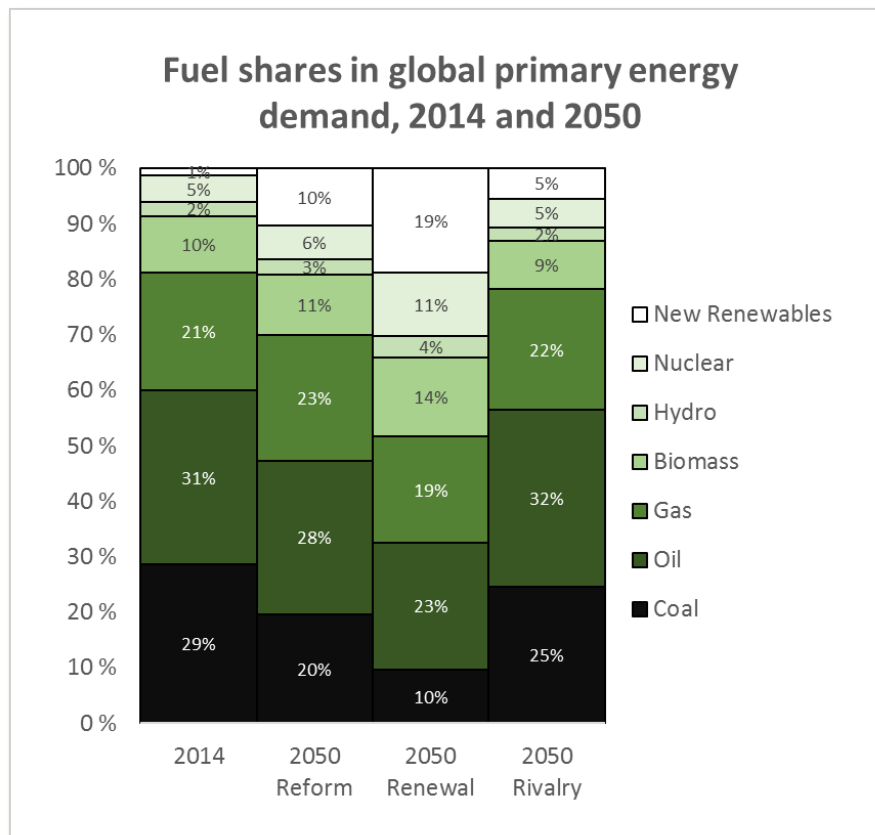
Changes in the components of world primary energy use, 2014-50 (mtoe)



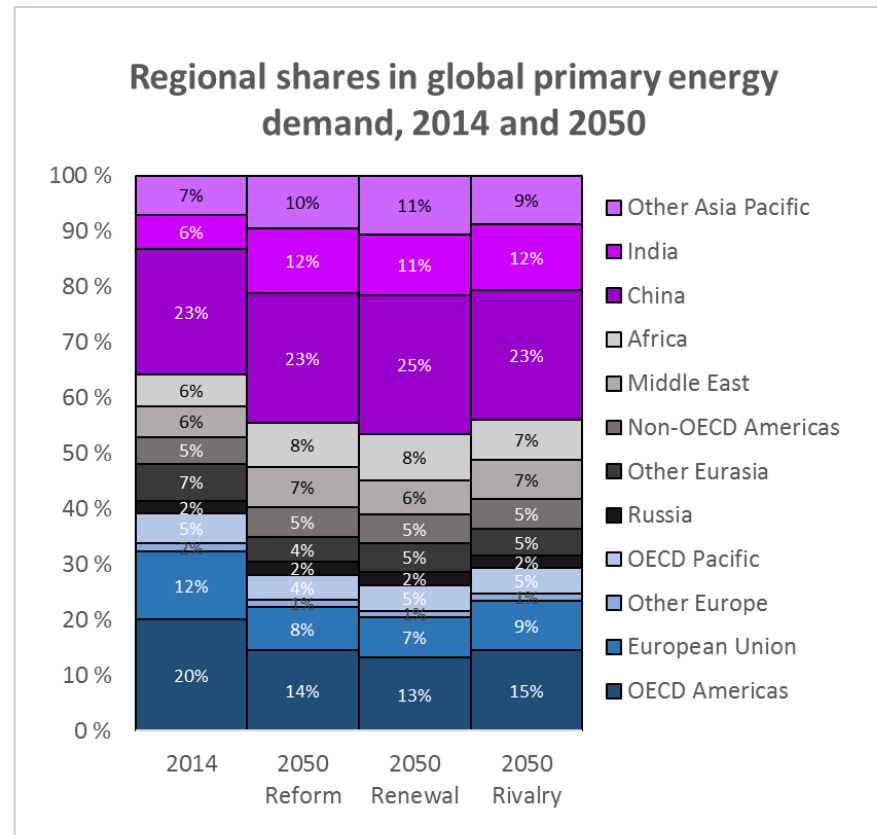
Sources: IEA (2014), Statoil

Fuel mix and regional mix of global primary energy demand, 2014 and 2050

Deep cuts in coal in 2 of 3 scenarios:



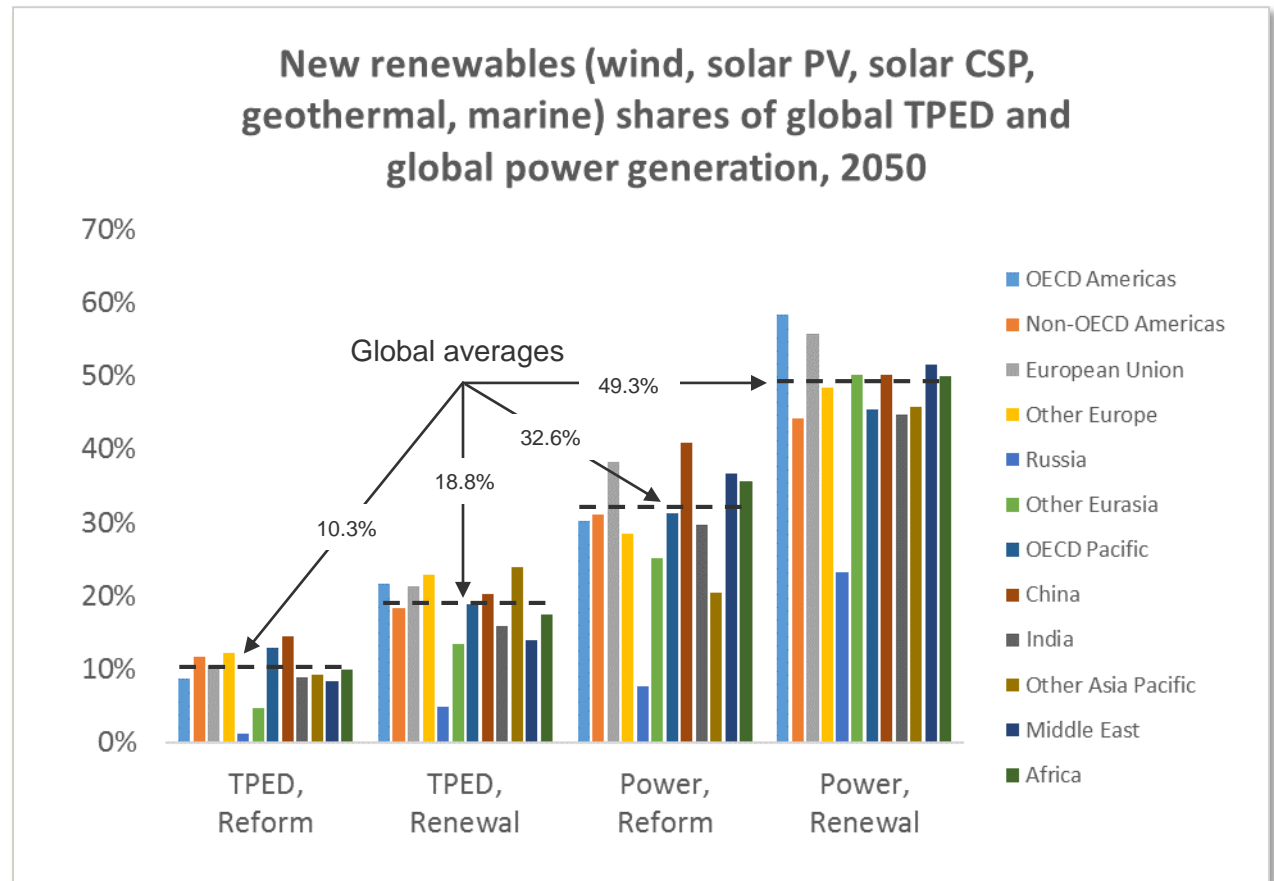
OECD share down in all scenarios:



Source: IEA (2014), Statoil

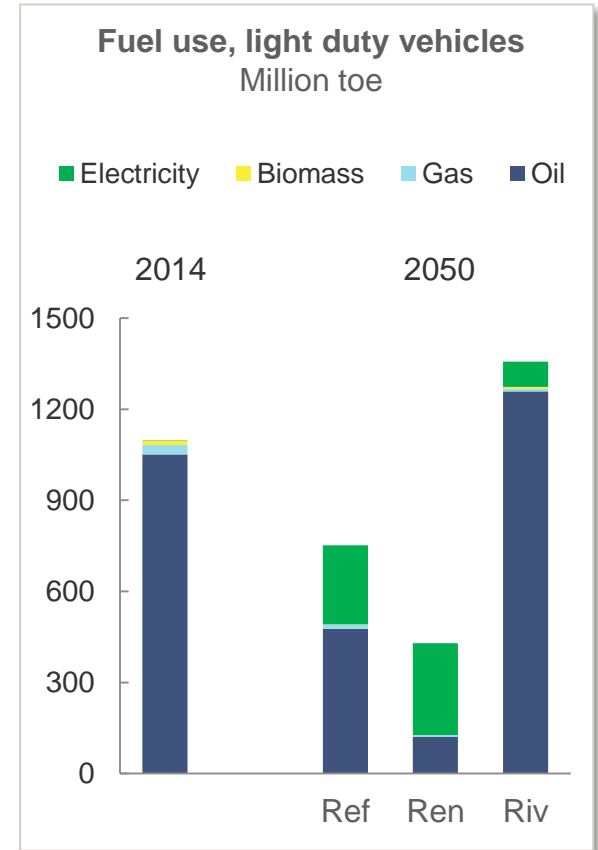
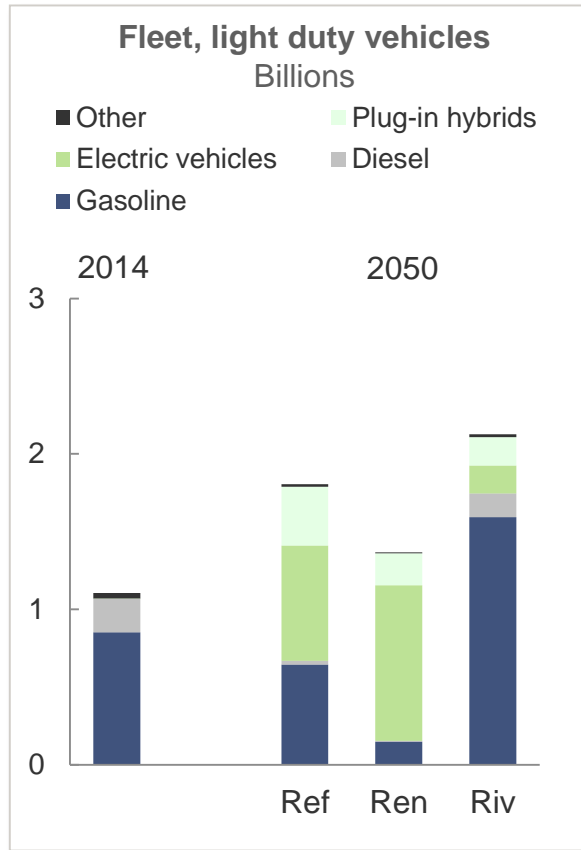
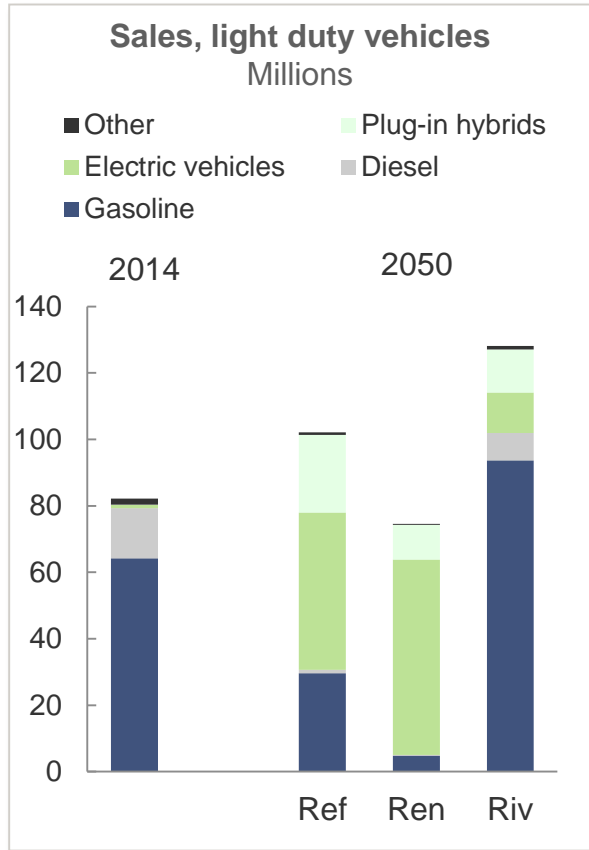
New renewable energy set for rapid growth in absolute and relative terms

- Renewable energy net of hydro and biomass energy assumed to capture growing shares of the overall primary energy and power sector fuel markets
- Limits to growth in the variable power share of total power generation:
 - Real
 - But location specific
 - And shifting out



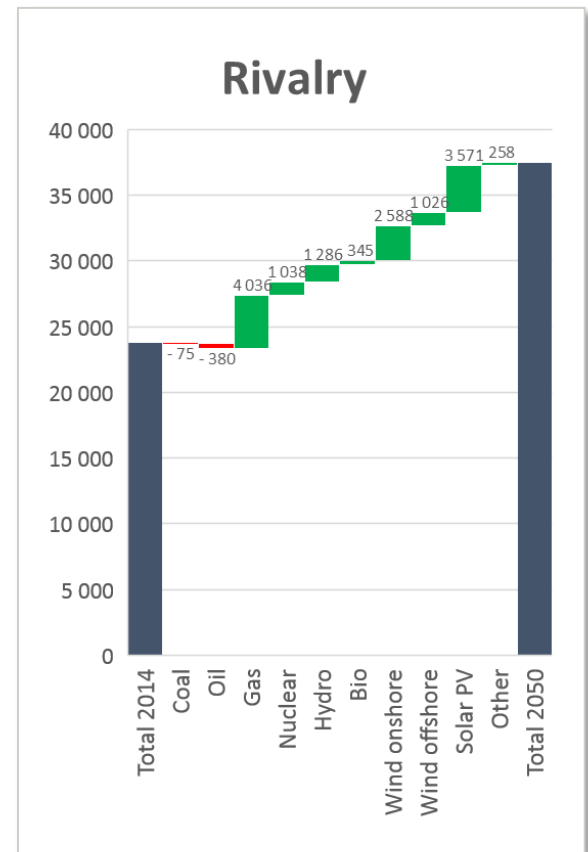
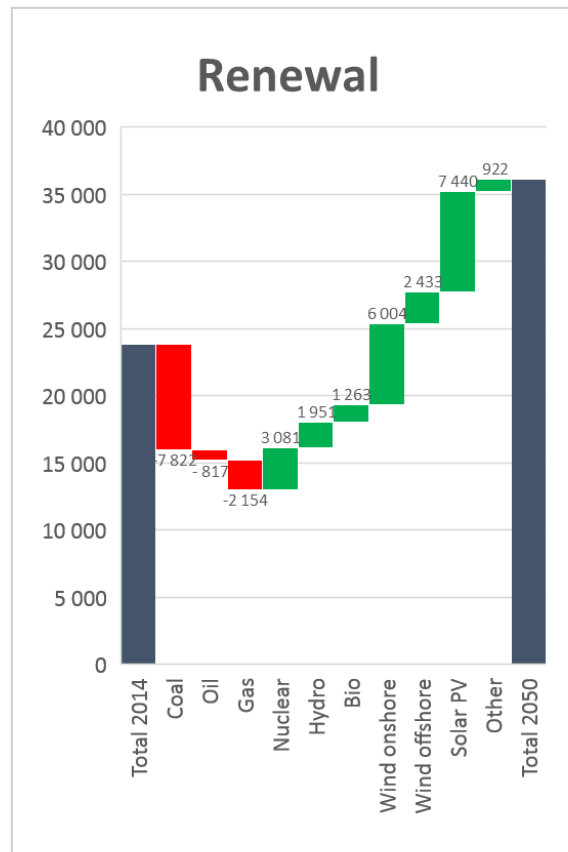
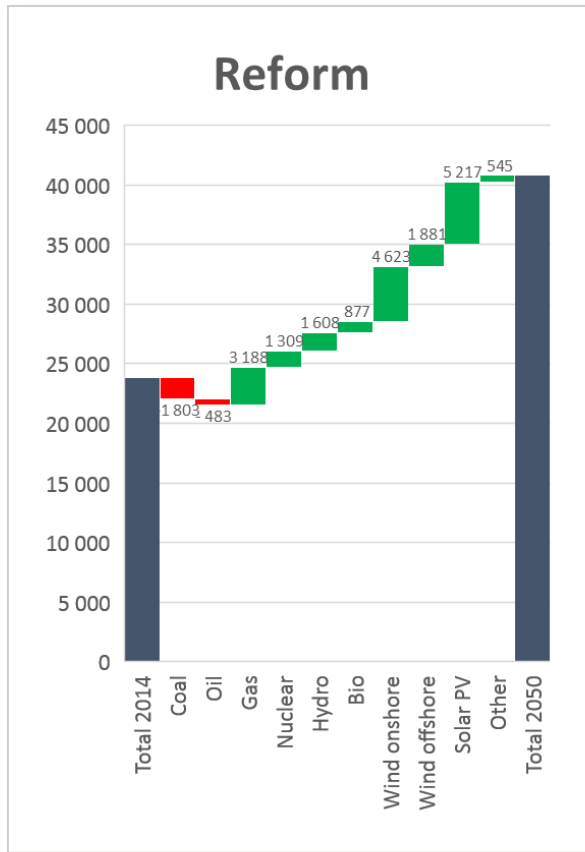
Source: Statoil

Road passenger transport: Undergoing rapid electrification in two of three scenarios



Sources: IEA (2014), Statoil

Power generation: Changes in global power generation volume and mix, 2014-50 (TWh)

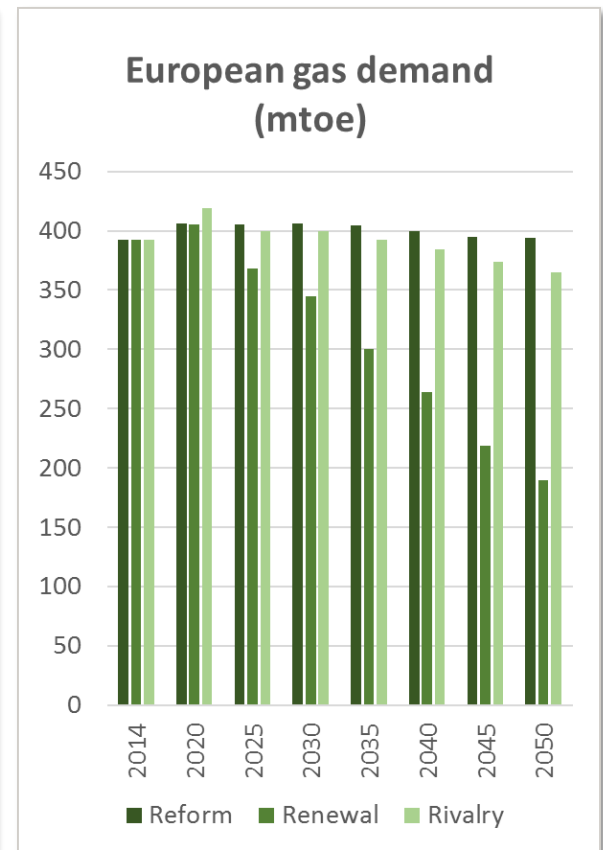
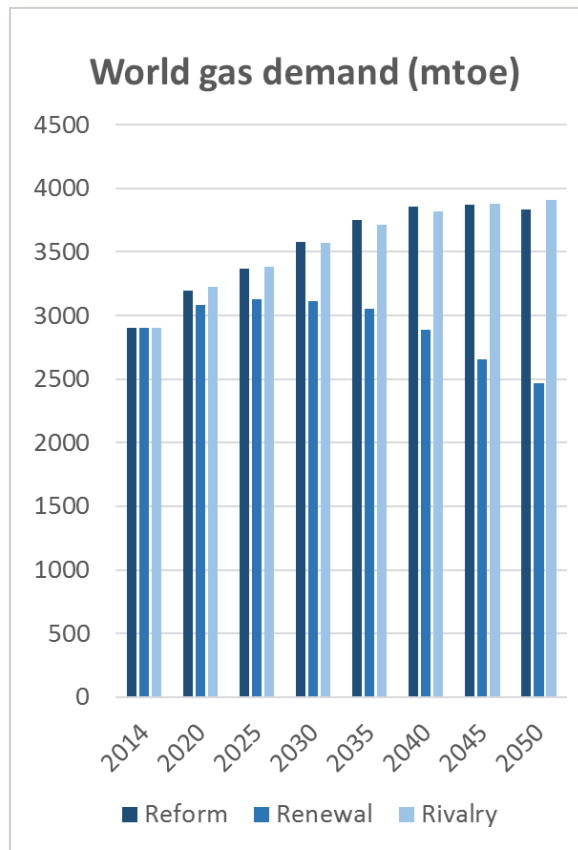
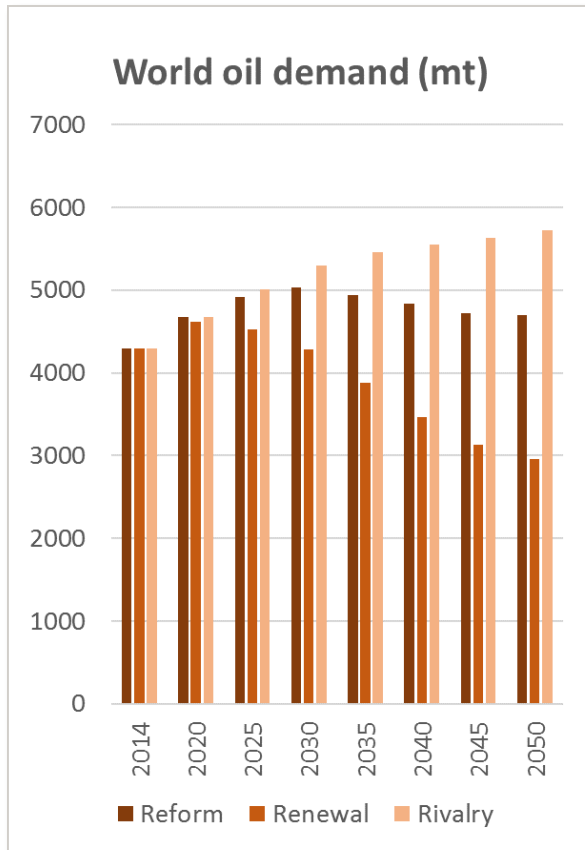


Sources: IEA (2014), Statoil



World oil demand: Peaks ~2020 in Renewal, ~2030 in Reform, not before 2050 in Rivalry

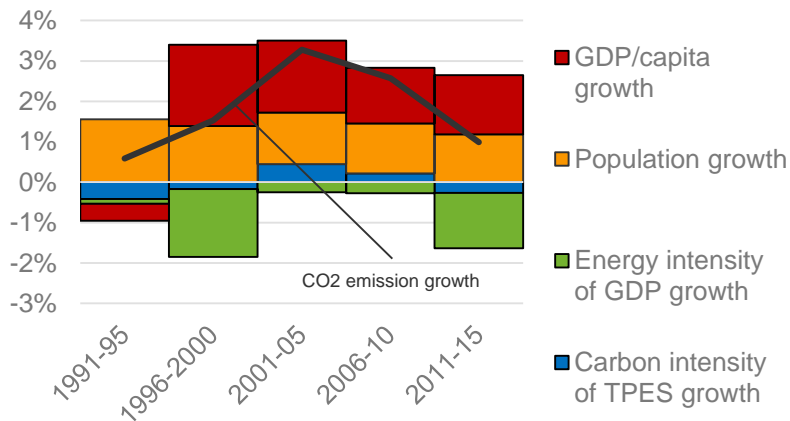
World gas demand levels out in Reform and Rivalry, peaks mid 2020s in Renewal



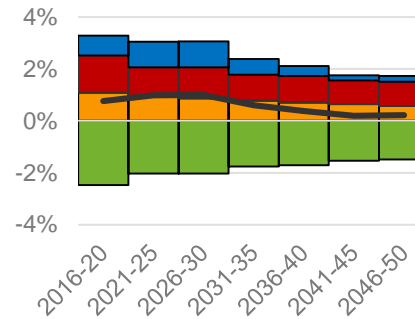
Sources: IEA (2014), Statoil

Energy CO₂ emissions: Decomposing the growth

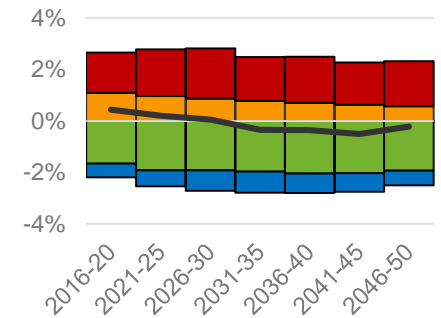
Annual growth in global energy related CO₂ emissions and in the four emission drivers, 1990-2015 (5 y averages)



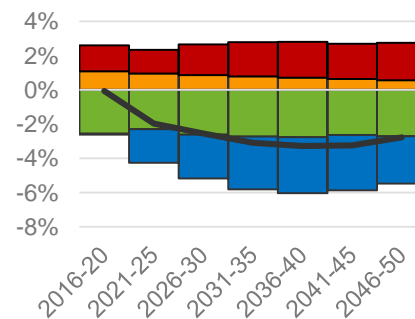
2015-50, Rivalry



2015-50, Reform

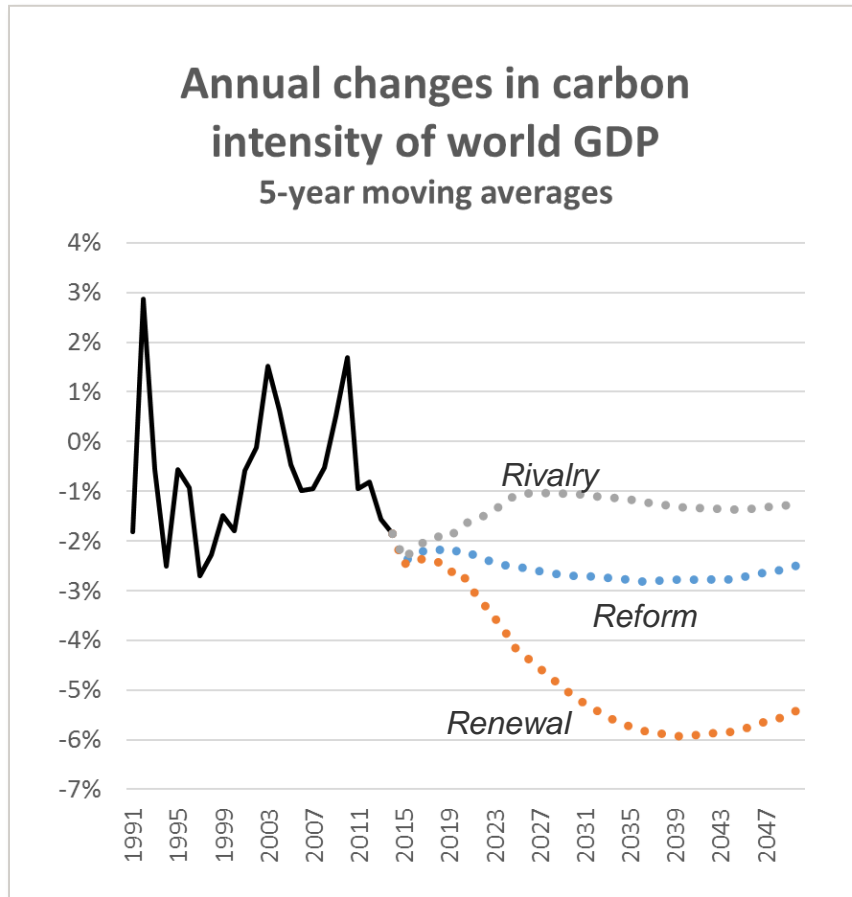


2015-50, Renewal



Sources: IEA (history), Statoil

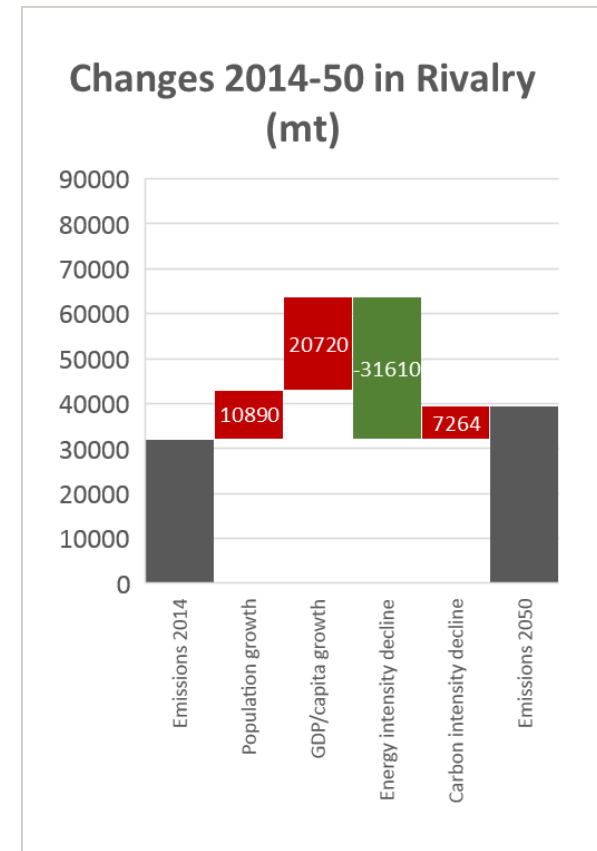
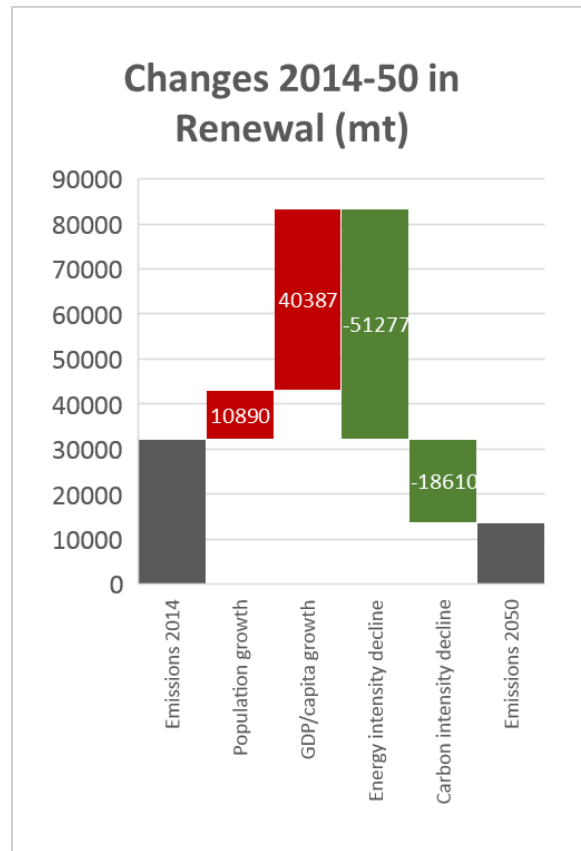
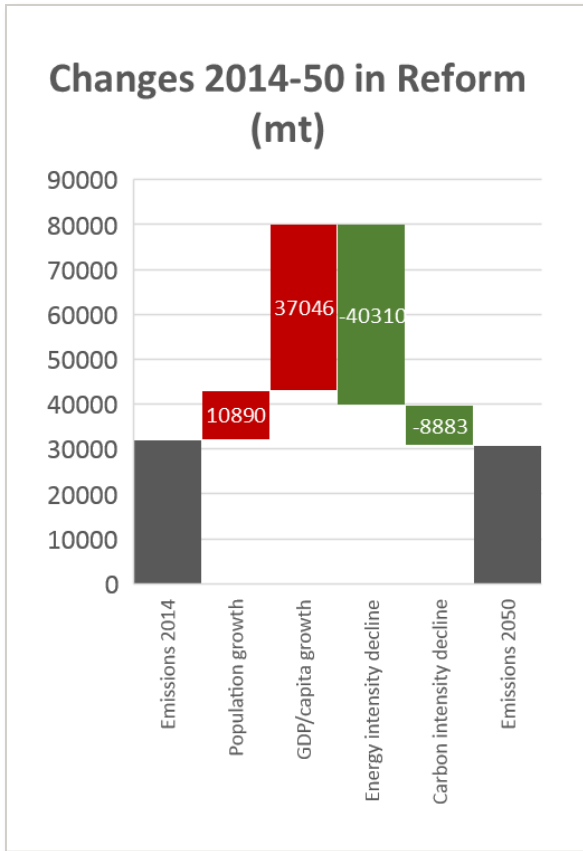
Carbon intensity down by 61%, 84% and 38% in Reform, Renewal and Rivalry respectively



- Global CO₂ emissions per unit of global GDP down by an average of 0.7% per year between 1990 and 2014
- Scenario assumptions (averages for 2014-50):
 - 2.6% per year in Reform
 - 4.9% per year in Renewal
 - 1.3% per year in Rivalry

Sources: IEA (history), Statoil

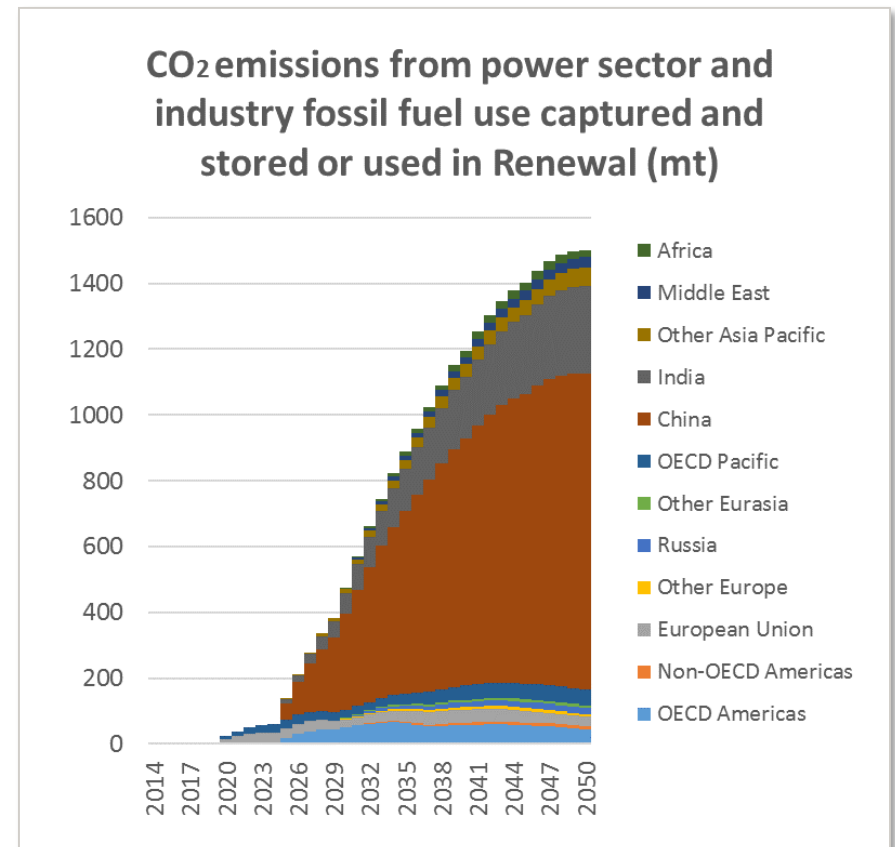
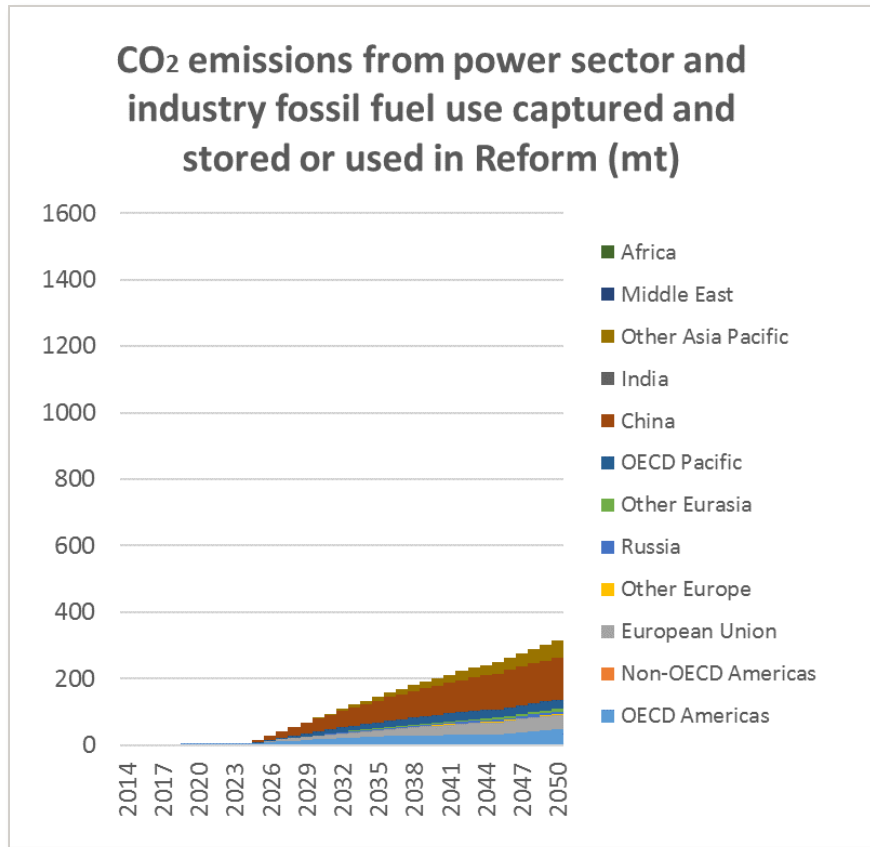
Resulting changes in world CO₂ emissions



Sources: IEA (2014), Statoil

CCS: Takes off in Renewal in the late 2020s, capture 1.5 Gt/y by 2050

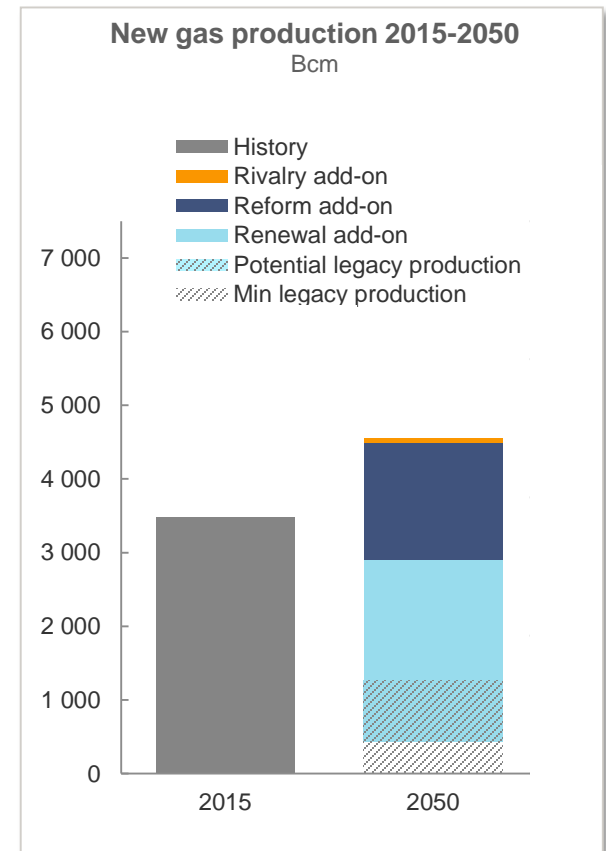
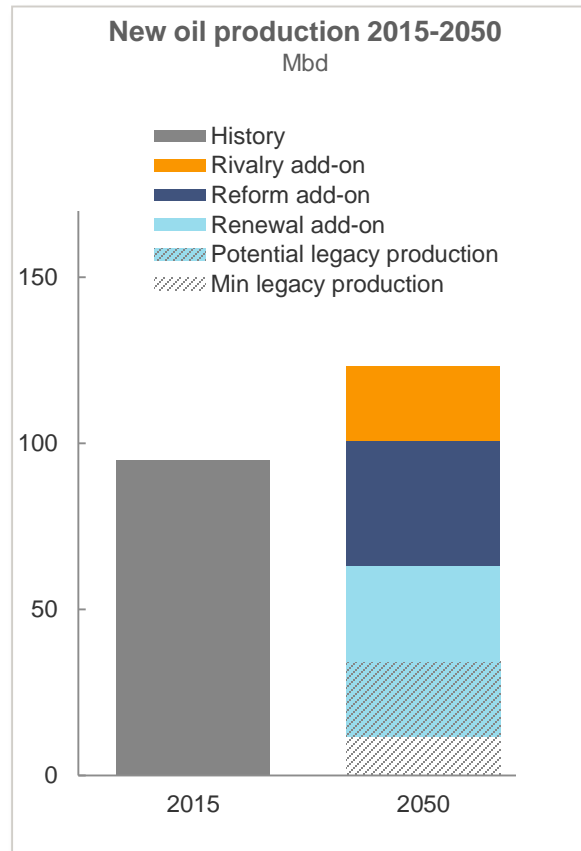
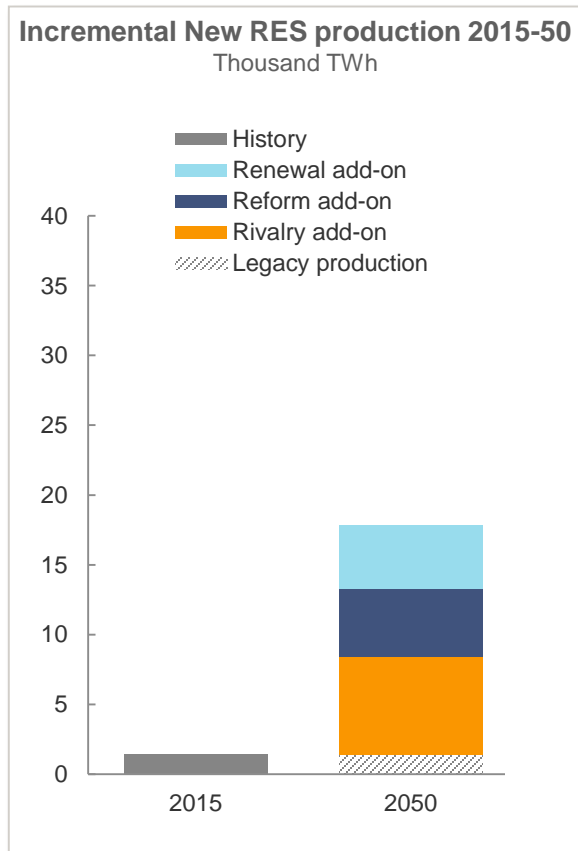
A conservative assumption by IPCC scenario standards



Sources: Global CCS Institute, Statoil

Huge investments needed not only in renewable energy, also in oil and gas

...to ensure sustainability and avoid harmful market upheavals



Source: Statoil

Statoil. The Power of Possible

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