

Statoil's Energy Perspectives 2015

Presentation to Manifestasjon 2015, 8 September 2015

Ottar Skagen, Senior Adviser, Statoil

Evolution of Statoil's Energy Perspectives

Documentation

– for strictly internal purposes – of Statoil's economic planning assumptions



Communication tool

for management when explaining Statoil's positions to partners, politicians, regulators, NGOs, the general public

Approach: Single line forecast



Approach: Scenarios



This year's scenarios: Reform, Renewal, Rivalry

Statoil's 2015 scenarios

BAU no longer an option, scenario space ranges from rapid to very rapid change

Reform: Current trends ++

- **Energy efficiency:** Acceleration of current trends
- **New renewable energy:** A more than 6-fold increase in wind, solar, geothermal, biomass based power generation
- **Nuclear:** Growth reflecting mainly ongoing developments.
- **CCS:** Limited roll-out during the 2030s
- **Carbon pricing:** Prioritized in select regions; EU ETS price ~\$50/t by 2040

Renewal: Shaped to be sustainable

- **Energy efficiency:** Further acceleration with rates going beyond stated ambitions
- **New renewable energy:** A more than 14-fold increase and wind, solar power generation
- **Nuclear:** A revival in a wider range of countries
- **Road transportation:** Rapid growth in the non-conventional vehicle share of new car sales
- **CCS:** Handles up to one fourth of emissions from remaining coal power by 2040
- **Carbon pricing:** EU ETS ~\$150/t by 2040

Statoil's 2015 scenarios

BAU no longer an option, scenario space ranges from rapid to very rapid change

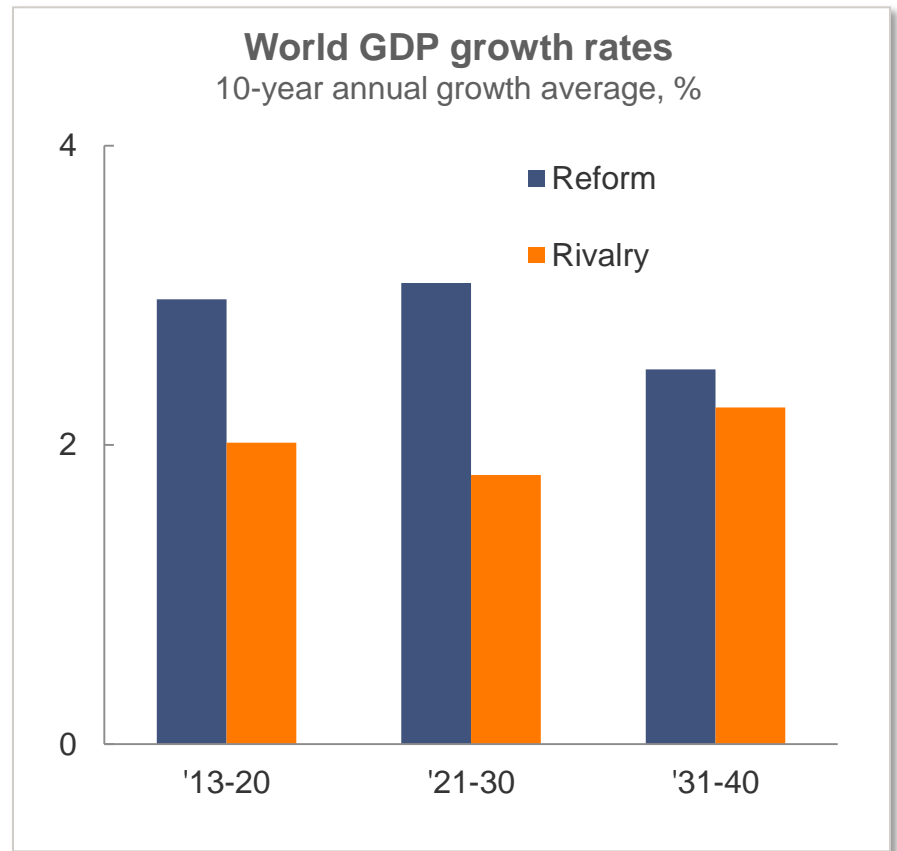
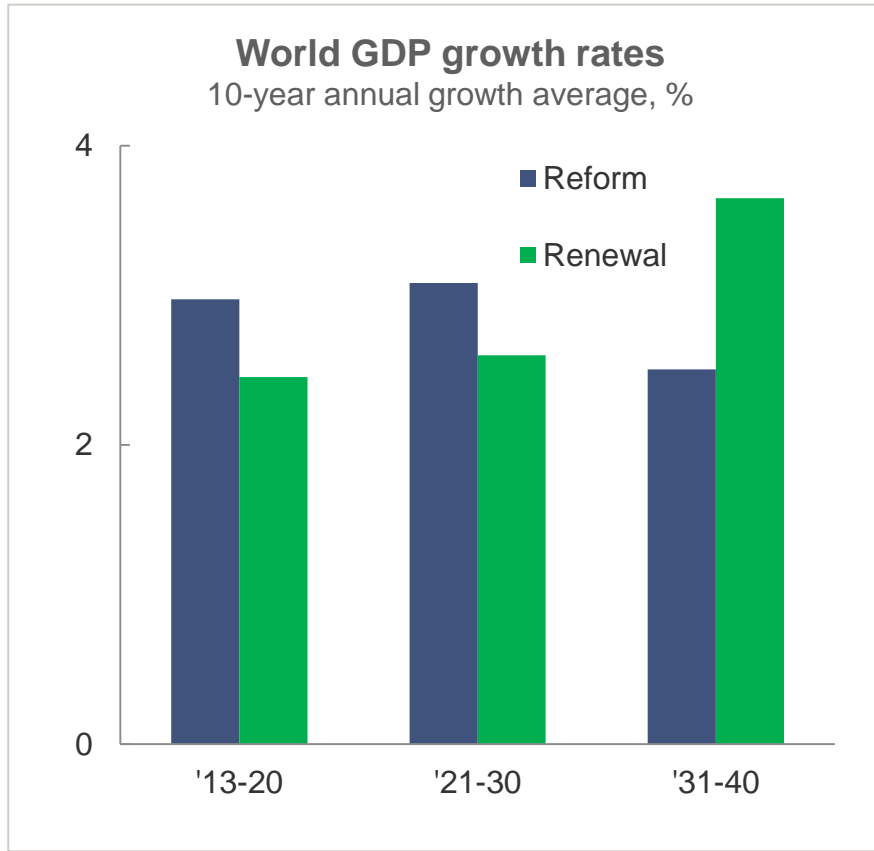
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Rivalry: Troubled geopolitics – depressed growth

- **Energy efficiency:** Supply security concerns sustain interest, but competing calls on leaders' attention and on available resources derail efforts
- **New renewable energy:** Same
- **Nuclear:** Little growth; too costly for an unstable and resource constrained world
- **Road transportation:** Gasoline and diesel prevail
- **CCS:** No take-off
- **Carbon pricing:** Scattered, ineffective schemes; ETS levels out at around \$25/t

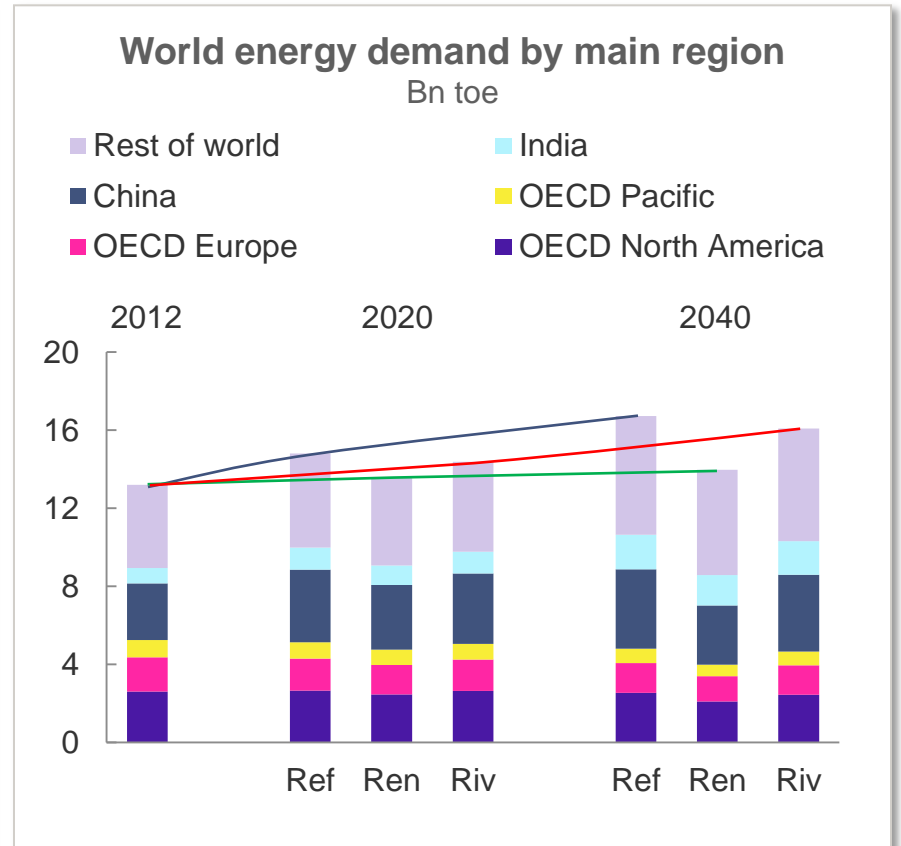
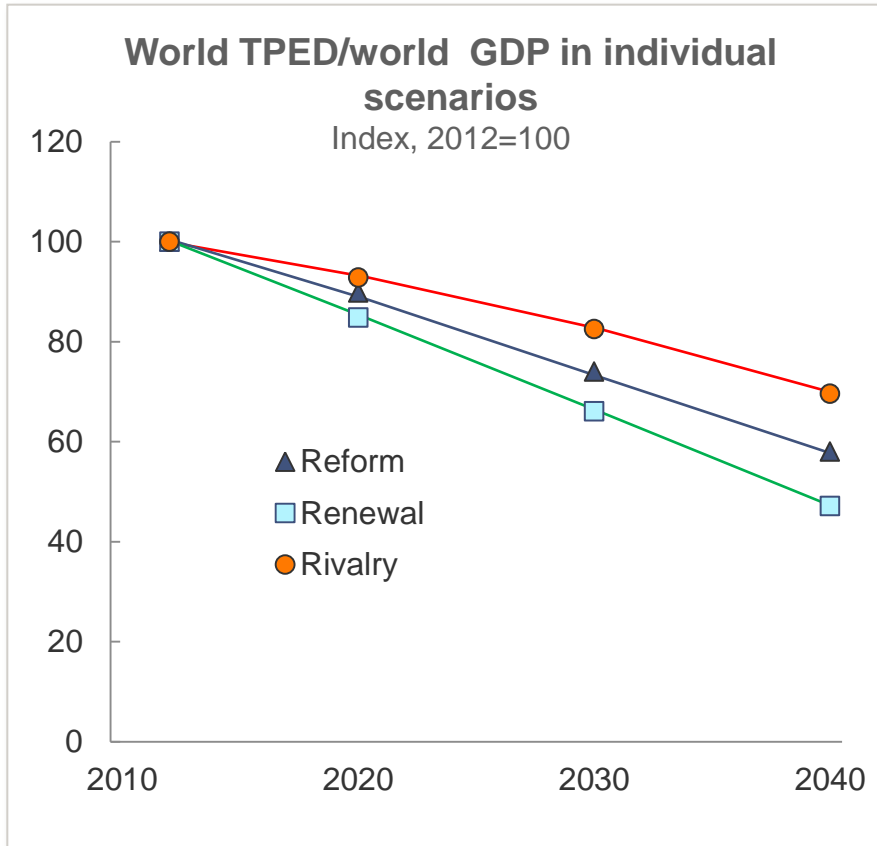
Economic growth: Transiting to sustainability tough in the short term but pays back later



Sources: IEA (history), Statoil (projections)

Energy intensities down in all scenarios

Though faster and more in Renewal

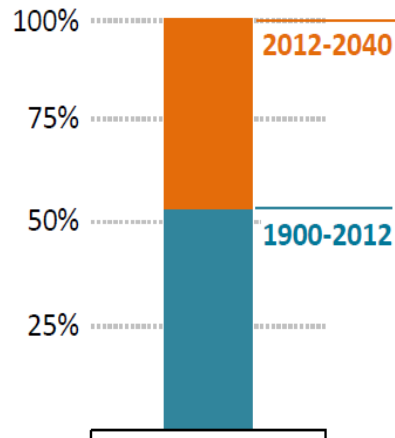


Sources: IEA (history), Statoil (projections)

The “carbon budget” calls for interfuel substitution – but into what fuels?

- IPCC: The 2° limit on global warming calls for an 1000 billion ton limit on anthropogenic carbon emissions into the atmosphere

- Since the industrial revolution started we have exploited more than half this budget



- **The budget concept has triggered discussions over how to divide it up – between fuels as well as between nations**
- **How will the interfuel competition play out?**

Five criteria for evaluating technology and fuel options

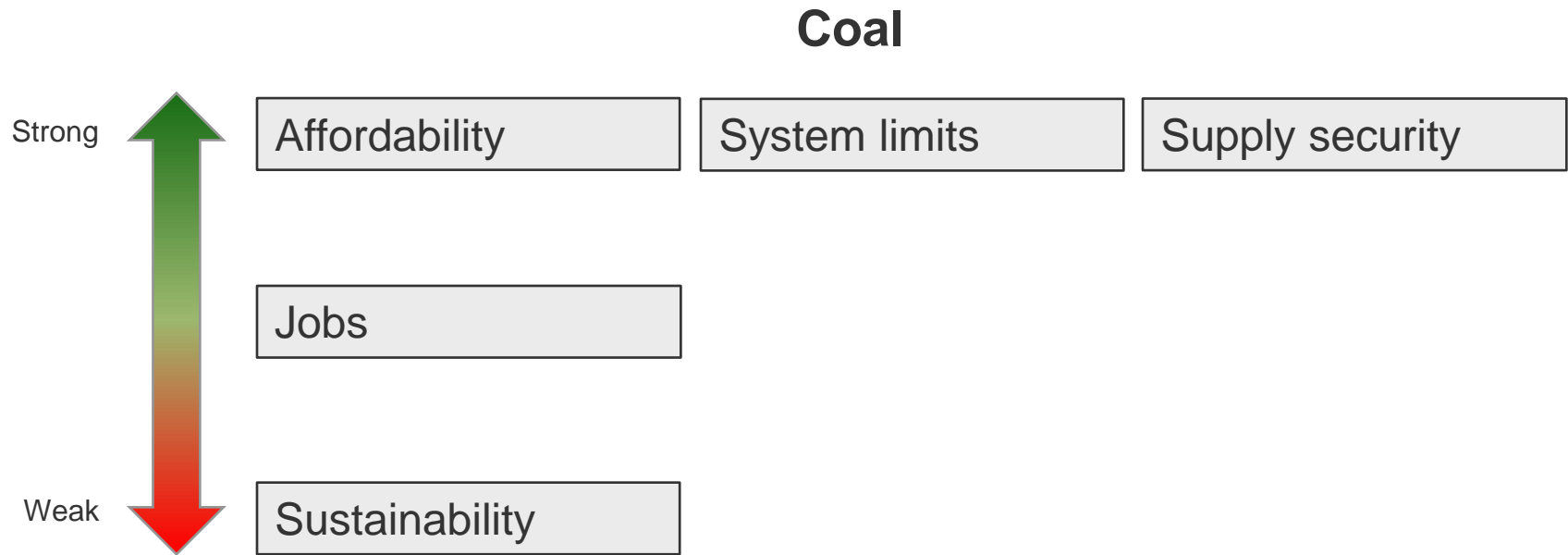
- Sustainability
- Supply security
- Strain on system
- Affordability
- Job preservation / creation

Source: IEA

Power sector focus:

Coal has many strongpoints

But one major weakness...

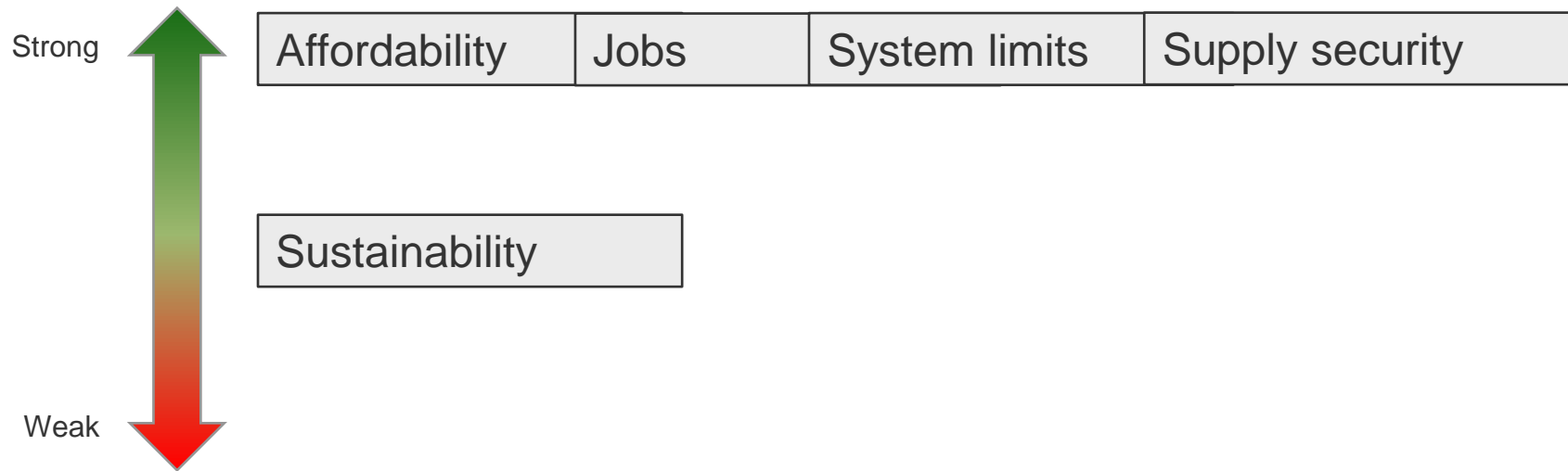


Power sector focus:

Gas' score depends on location

Has a bright future in North America...

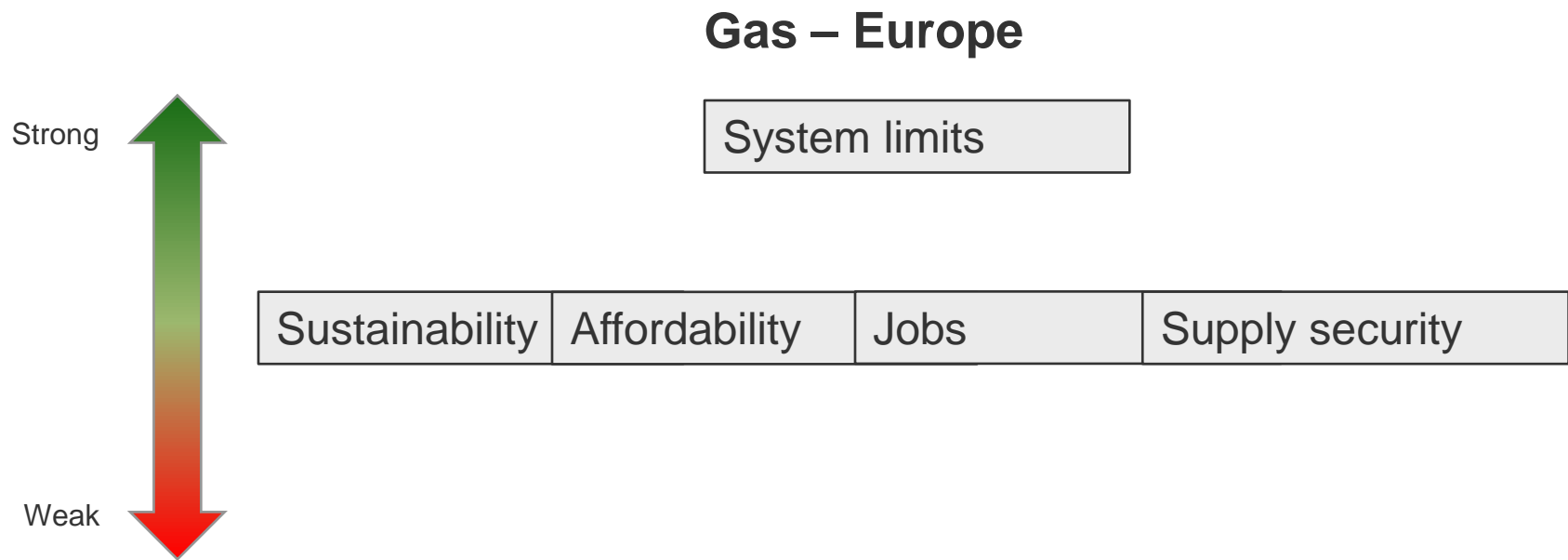
Gas – North America



Power sector focus:

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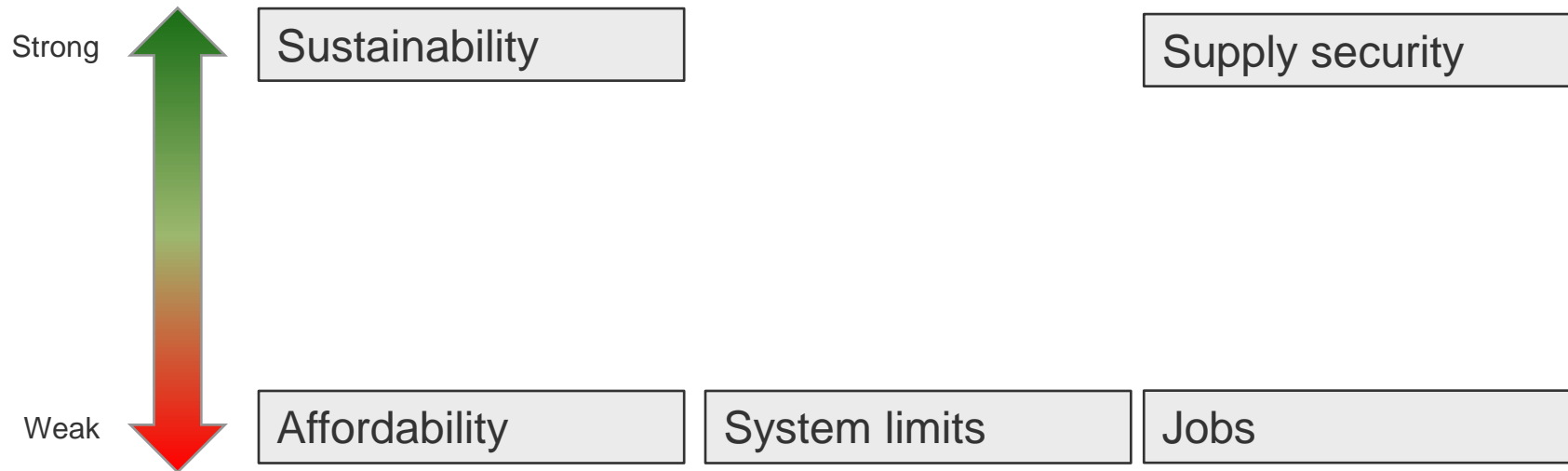
...but a more uncertain outlook in Europe



Power sector focus:

Wind, solar: A niche interest in the past...

The new renewables - past

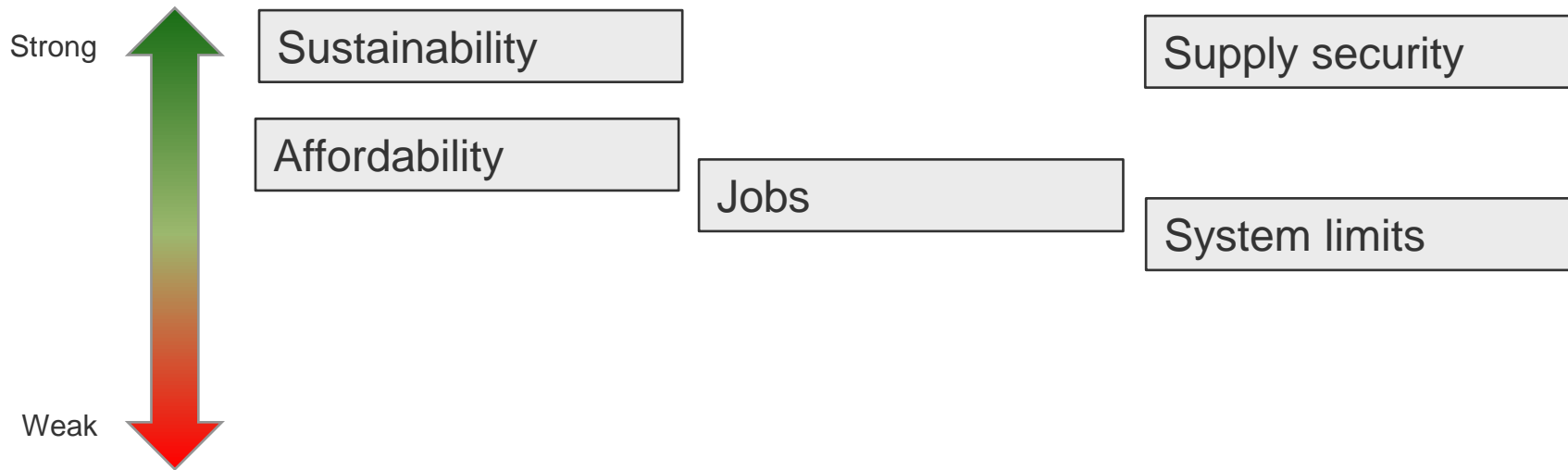


Power sector focus:

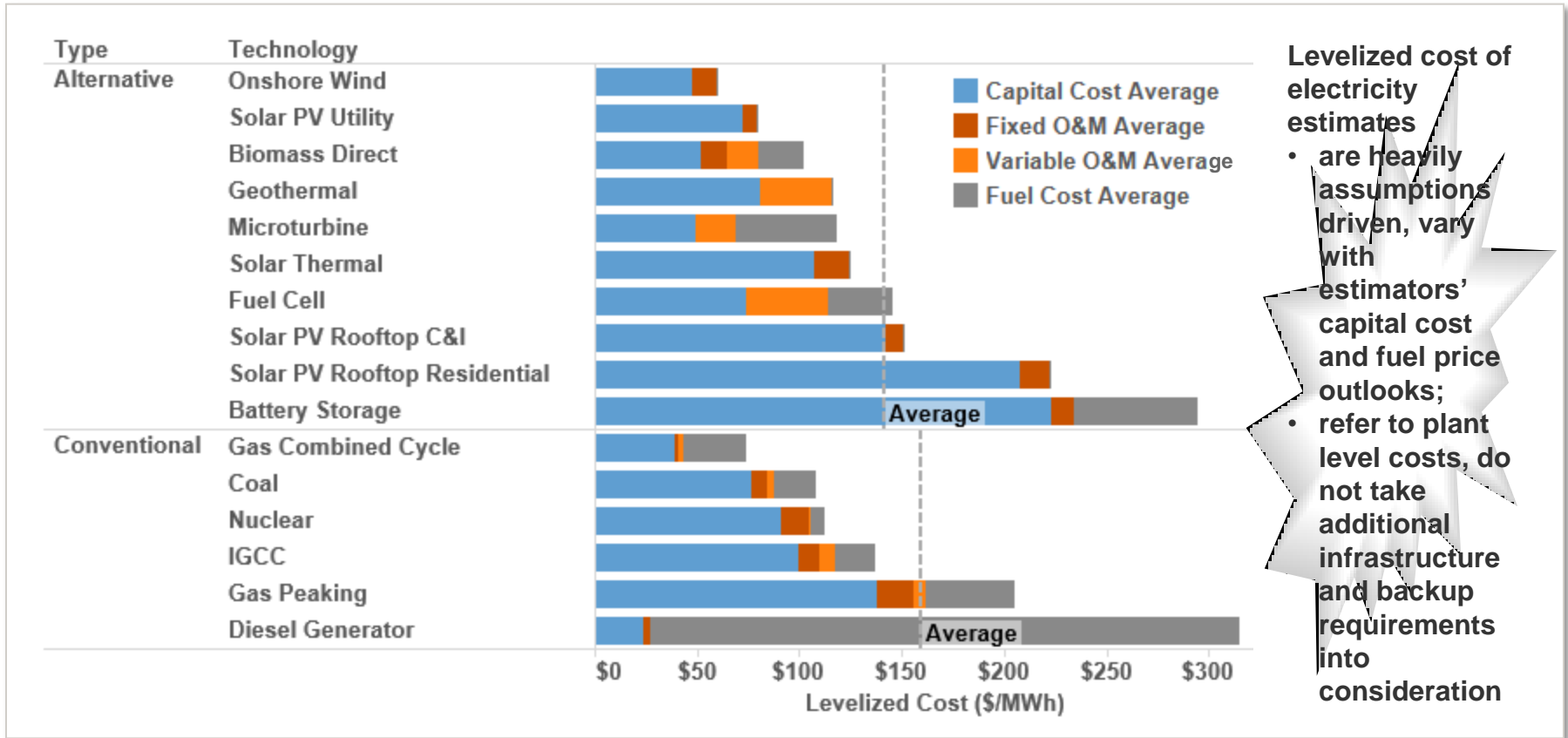
... but no longer

The issue is rather how long can exponential growth be sustained

The new renewables – future?



Onshore wind apparently catching up with gas on levelized costs, solar PV not far behind

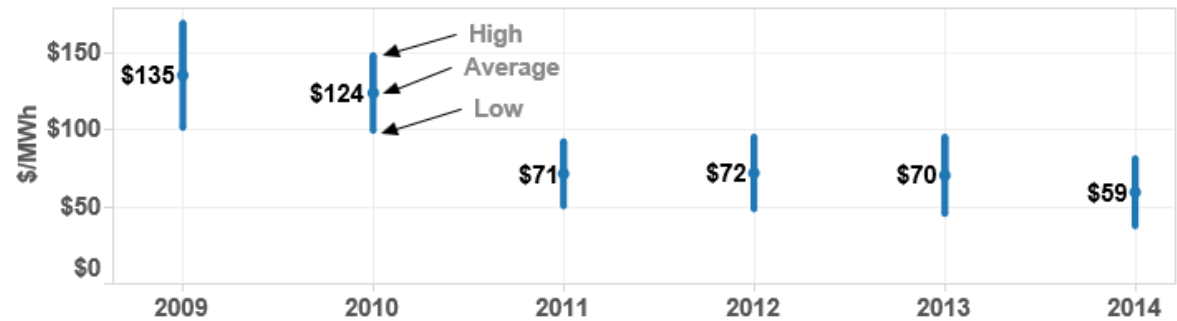


Source: Lazard's Levelized Cost of Energy Analysis – Version 8.0, September 2014

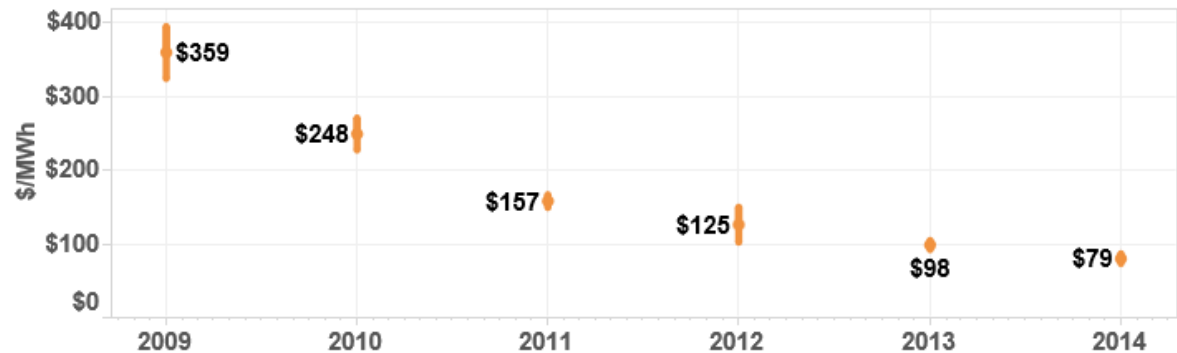
The costs of wind and solar power have plummeted – can the pace be sustained?

- Opposing views:
 - Wind and solar power costs are location specific and as the best locations are taken, cost decline rates will inevitably abate
 - Learning and technology improvement will override this effect and ensure continued decline

Levelized cost of energy: wind power



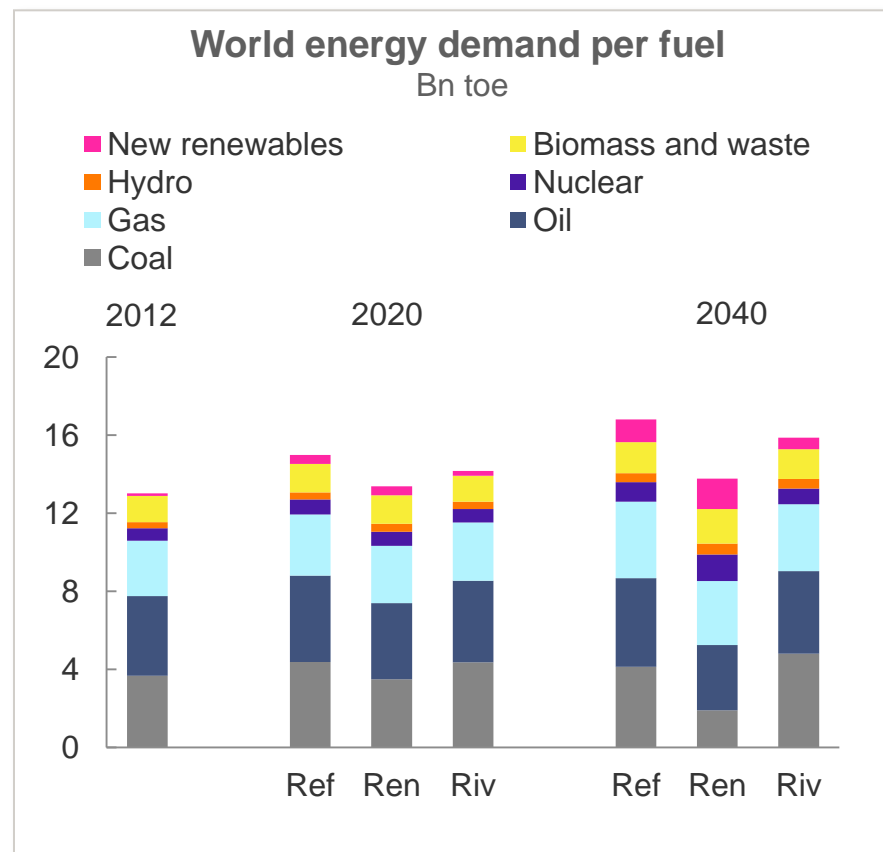
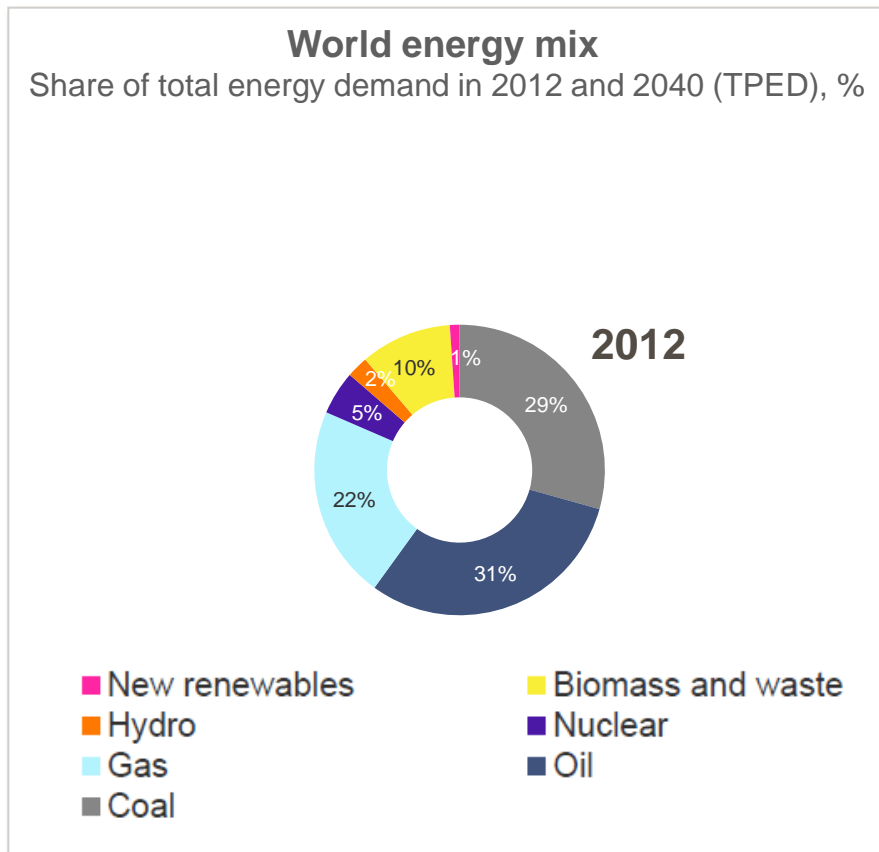
Levelized cost of energy: utility-scale solar photovoltaic



Source: Lazard's Levelized Cost of Energy Analysis – Version 8.0, September 2014

The global fuel mix in Statoil's scenarios

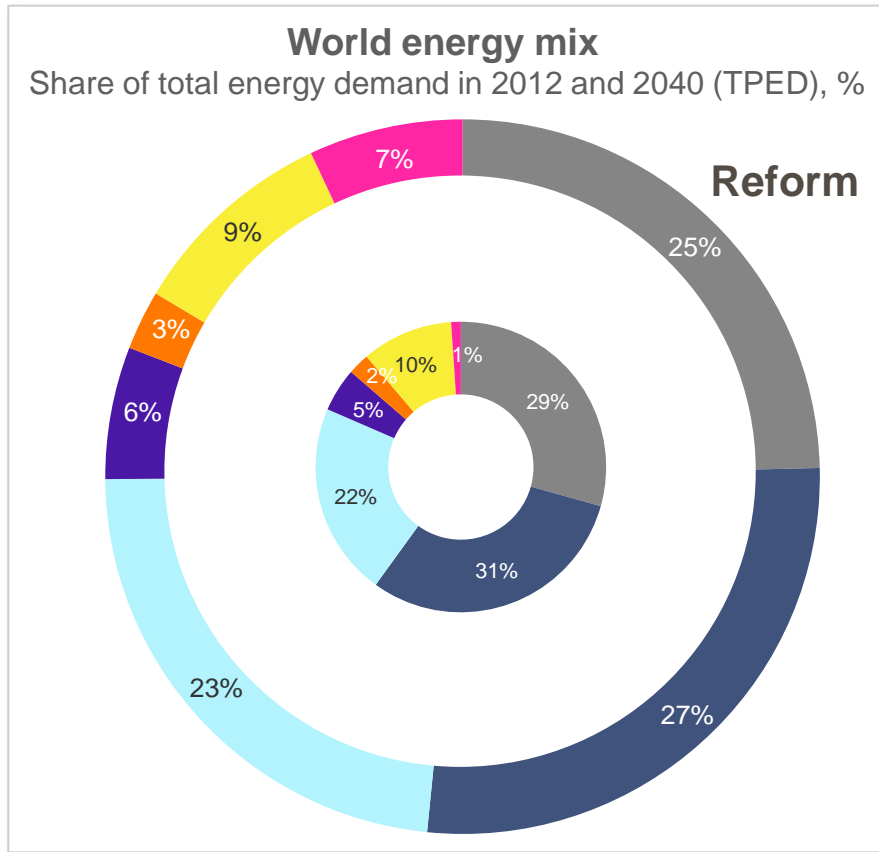
Main drivers: Technology and cost developments, policies



Sources: IEA (history), Statoil (projections)

The global fuel mix in Reform

Main drivers: Technology and cost developments, policies



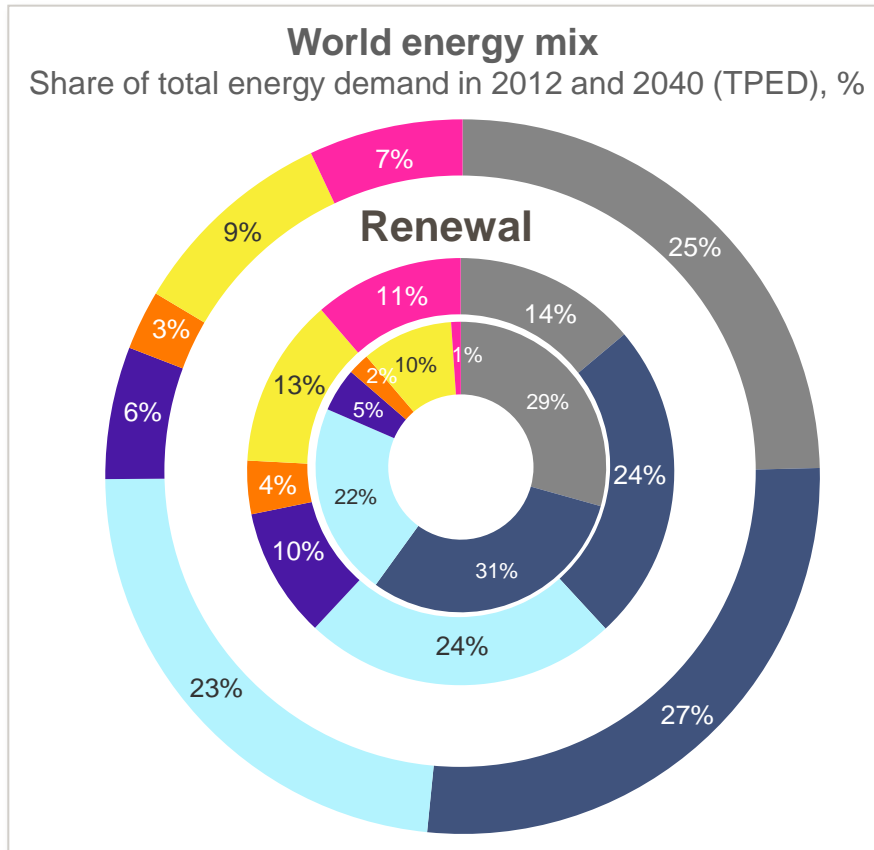
- The **coal** and **oil** shares down, both by 4 percentage points
- The **gas** share marginally up
 - Major differences by region
- The **new renewables** (wind, solar, geothermal) share sharply up
 - World wind power generation: Up 6.4%/y
 - World solar power generation: Up 12.5%/y
- The **nuclear** share: Marginally up



Source: IEA (history), Statoil (projections)

The global fuel mix in Renewal

Main drivers: Technology and cost developments, policies



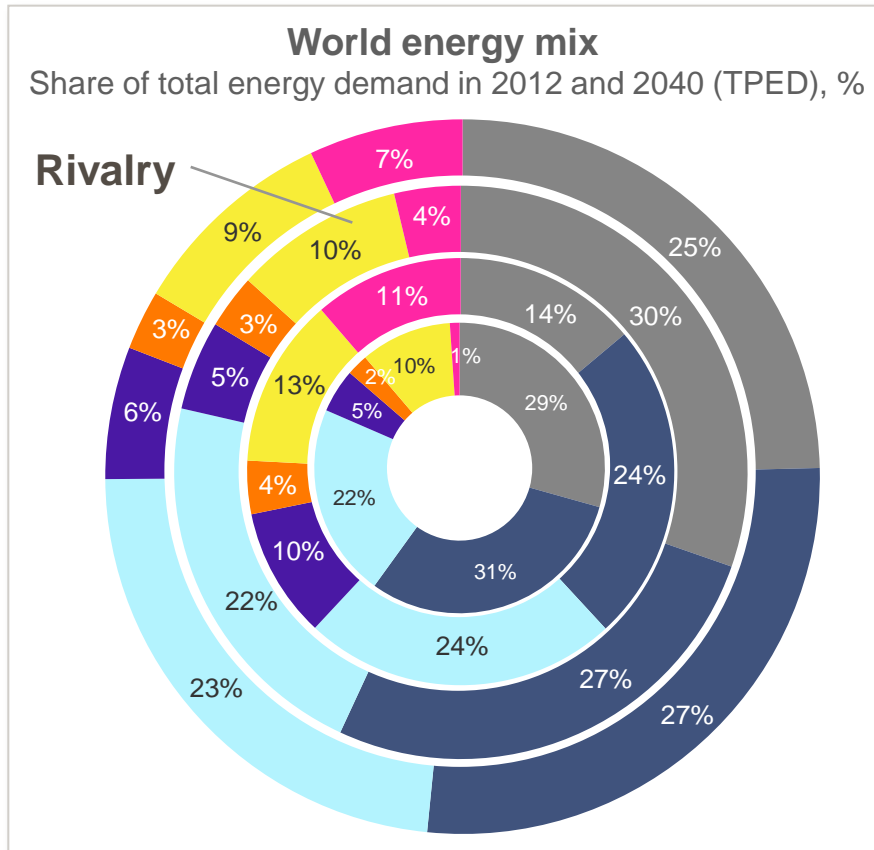
- The **coal** share massively down, by 15 percentage points compared to 2012
- The **oil** share down by 7 percentage points
- The **gas** share marginally up
- The **new renewables** (wind, solar, geothermal) share sharply up
 - World wind power generation: Up 9.2%/y
 - World solar power generation: Up 15.7%/y
- The **nuclear** share: Up 5 percentage points



Source: IEA (history), Statoil (projections)

The global fuel mix in Rivalry

Main drivers: Technology and cost developments, policies

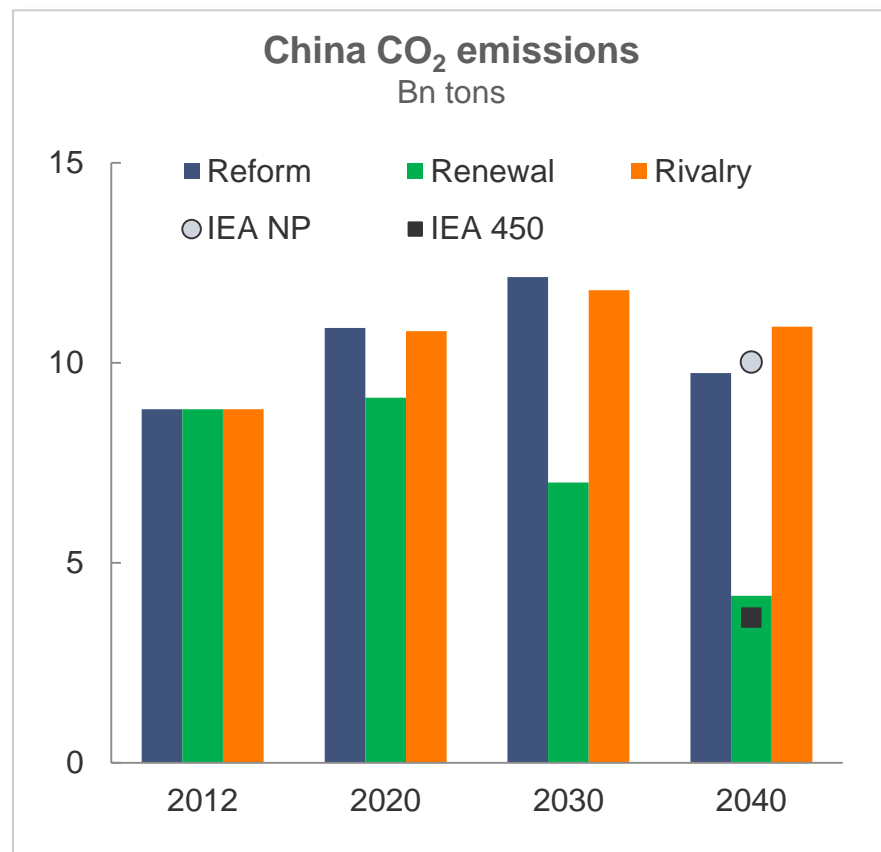
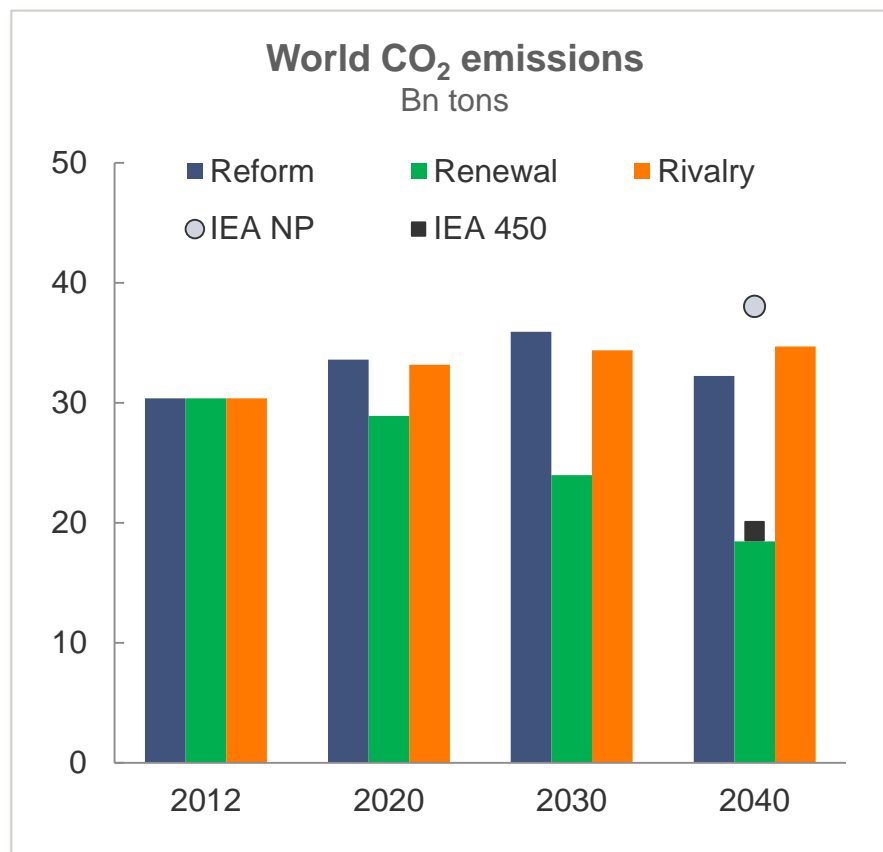


- The **coal** share *up* by 1 per centage point compared to 2012
- The **oil** share down by 4 per centage points
- The **gas** share unchanged
- The **new renewables** (wind, solar, geothermal) up, though less than in the other scenarios
 - World wind power generation: Up 4.5%/y
 - World solar power generation: Up 9.3%/y
- The **nuclear** share unchanged



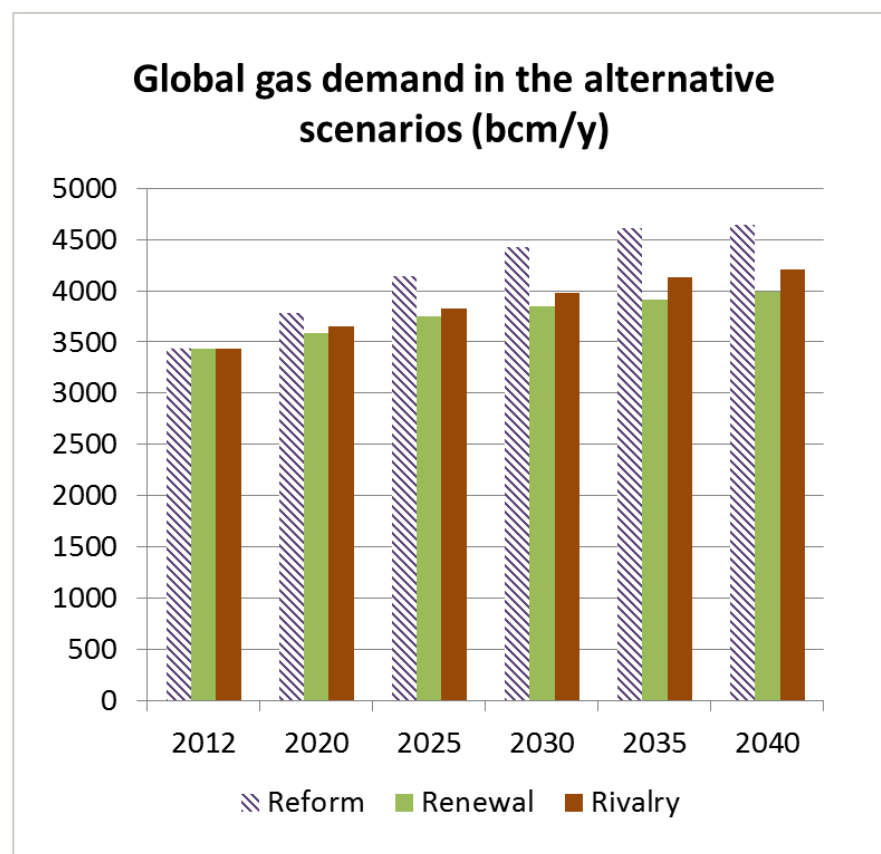
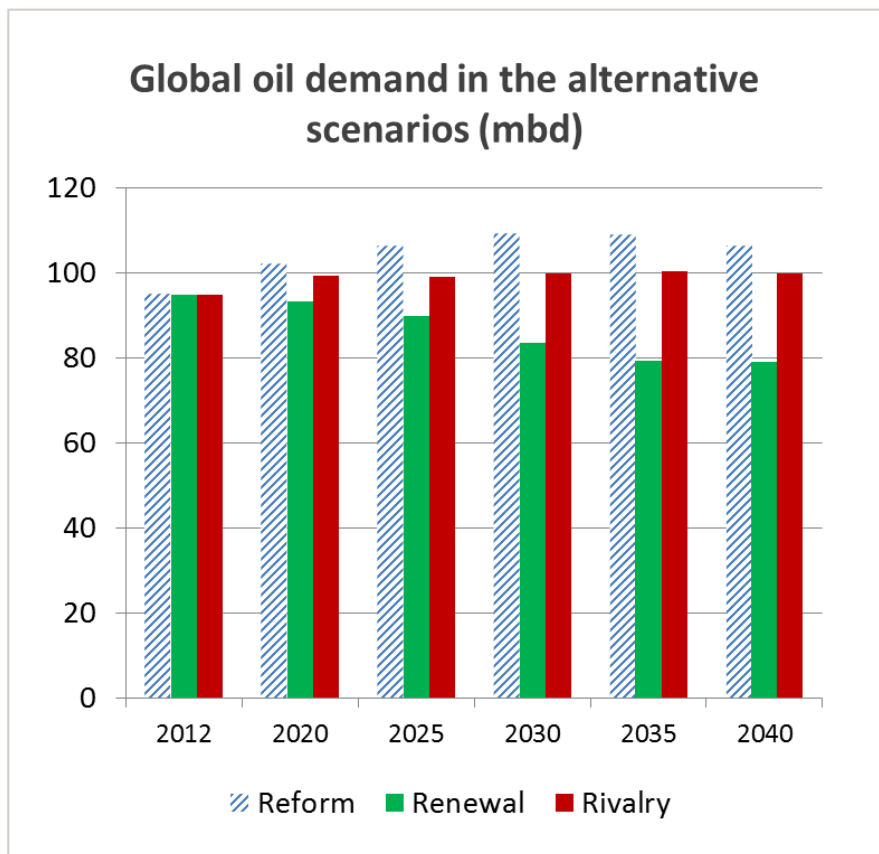
Source: IEA (history), Statoil (projections)

Energy related CO₂ emissions: Down only in Renewal, stagnate in Reform and Rivalry



Source: Statoil, IEA WEO 2014

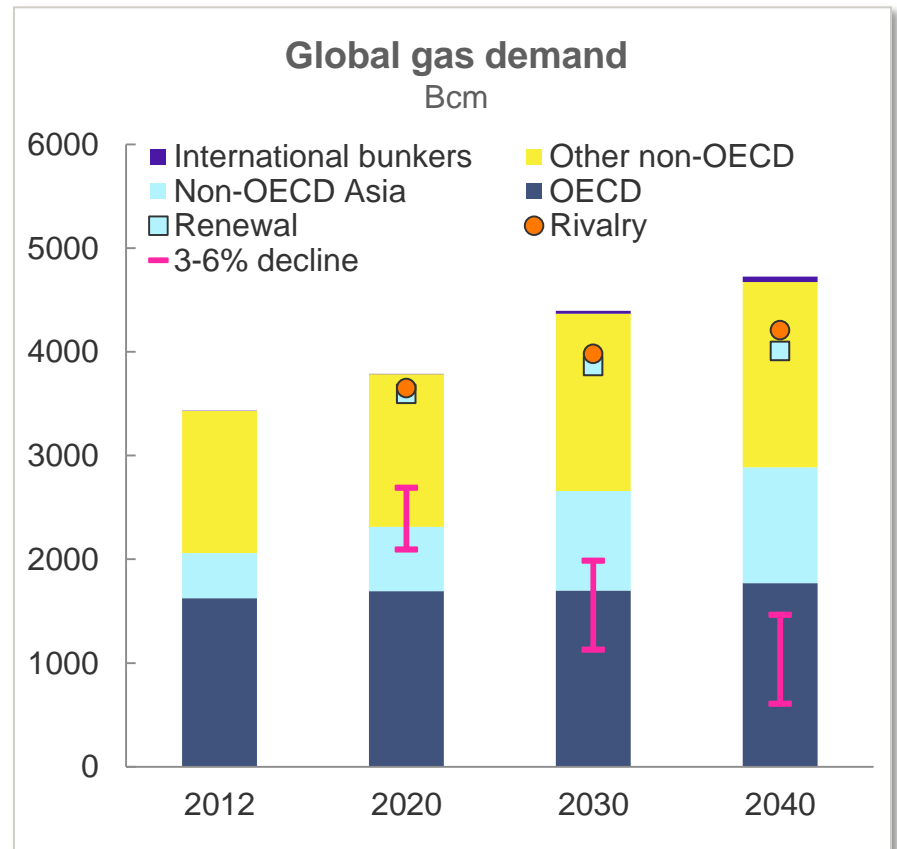
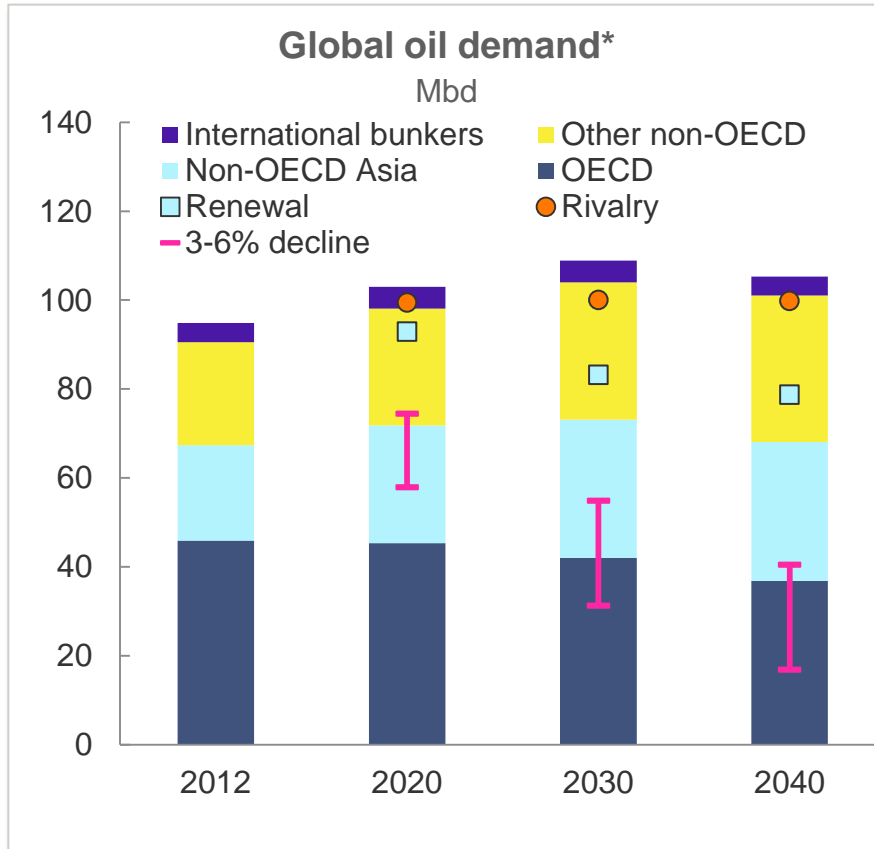
Oil and gas demand in Statoil's scenarios



Source: IEA (history), Statoil (projections)

Oil and gas not to disappear any time soon

Considerable need for new investments, irrespective of scenario



* Excl. Bio-fuels Sources: IEA (history), Statoil (projections)

There's never been a better
time for good ideas

Thank you!