Tipping the energy world off its axis

Four large-scale upheavals in global energy set the scene for the new Outlook:

- The United States is turning into the undisputed global leader for oil & gas
- Solar PV is on track to be the cheapest source of new electricity in many countries
- China’s new drive to “make the skies blue again” is recasting its role in energy
- The future is electrifying, spurred by cooling, electric vehicles & digitalisation

There are many possible pathways ahead & many potential pitfalls if governments or industry misread the signs of change
As China moves global energy markets, again

Low-carbon sources & natural gas meet 85% of the increase in global demand: China’s switch to a new economic model & a cleaner energy mix drives global trends

### Change in world energy demand by fuel

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<th>Fuel</th>
<th>1990-2016</th>
<th>2016-40</th>
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<td>Coal (Mtce)</td>
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**Coal (Mtce)**
- 1990-2016: 2,500 Mtce
- 2016-40: 200 Mtce

**Oil (mb/d)**
- 1990-2016: 30 mb/d
- 2016-40: 2 mb/d

**Gas (bcm)**
- 1990-2016: 1,600 bcm
- 2016-40: 400 bcm

**Low-carbon (Mtoe)**
- 1990-2016: 1,600 Mtoe
- 2016-40: 400 Mtoe

**Other countries**

**China**
US remains undisputed leader of gas production

Rise in US shale gas output versus the steepest ramp-up in gas production in the Soviet Union

**US shale growth between 2008 and 2023 is probably unprecedented in gas markets, exceeding the growth achieved by the Soviet Union between 1974 and 1989**
Shale boom is turning US into major energy exporter

The US is set to become the largest LNG exporter by the mid-2020s and a net-exporter of oil in the late 2020s
LNG ushers in a new global gas order

Asia’s growing gas import requirements are largely met by LNG, with exports from the US accelerating a shift towards a more flexible, liquid global market.
Industry leads the growth in gas demand

Growth in natural gas demand by sector 2016-2040

- Industry
- Power
- Buildings
- Transport
- Other

Gas demand growth in industry – especially in the geographically dispersed light industries – requires costly infrastructure roll-out
Analysis of historical demand trends in the US, the UK and Germany shows that gas use increased at prices below $6/MBtu, but declined at prices above $8/MBtu.
Financing new projects gets trickier

Already contracted versus projected global LNG capacity in the New Policies Scenario

From the early 2020s onwards, new contracts may be needed to underpin investment decisions for the construction of additional liquefaction capacities
A new strategy for energy & sustainable development

The Sustainable Development Scenario reduces CO₂ emissions in line with the objectives of the Paris Agreement, while also tackling air pollution and achieving universal energy access.
The lifecycle emissions of gas are lower than coal.

Greenhouse-gas emission intensity of natural gas compared with coal:

- The global average emission intensity of gas is low enough for gas to result in fewer GHG emissions than coal regardless of the timeframe considered.

- The diagram shows the comparison between coal and gas in terms of methane leakage rate and CH$_4$ conversion to CO$_2$. The data is based on IPCC (2014) for GWP$_{100}$ and GWP$_{20}$.

- The chart indicates that gas is generally better than coal, except in cases where electricity generation is the only consideration.
How long is the bridge?

Average CO$_2$ emissions intensity of power generation in the Sustainable Development Scenario

The situation varies by region, but the role of gas-fired generation evolves quickly as the power sector decarbonises.