International Energy Agency

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WORLD ENERGY INVESTMENT OUTLOOK

Special Report

London, 3 June 2014

The context

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Special Report

- **Today's investments lock in patterns of consumption, fuel use & emissions for long into the future**
- **Capital costs to produce energy have doubled since 2000**
- **Investment surge to meet rising Asian demand, but shale in US & renewables in Europe also show dynamic growth**
- **Difficult task for investors to navigate policy & market uncertainty**
  - *Geopolitical concerns a reminder of risks to reliable supply*
  - *Disconnect between climate change goals & the necessary actions*
  - *High oil prices & persistent regional price variations for gas & power*
- **Growing public pressure on energy & environmental issues**

After the rapid rise in investment in the 2000s, a pause

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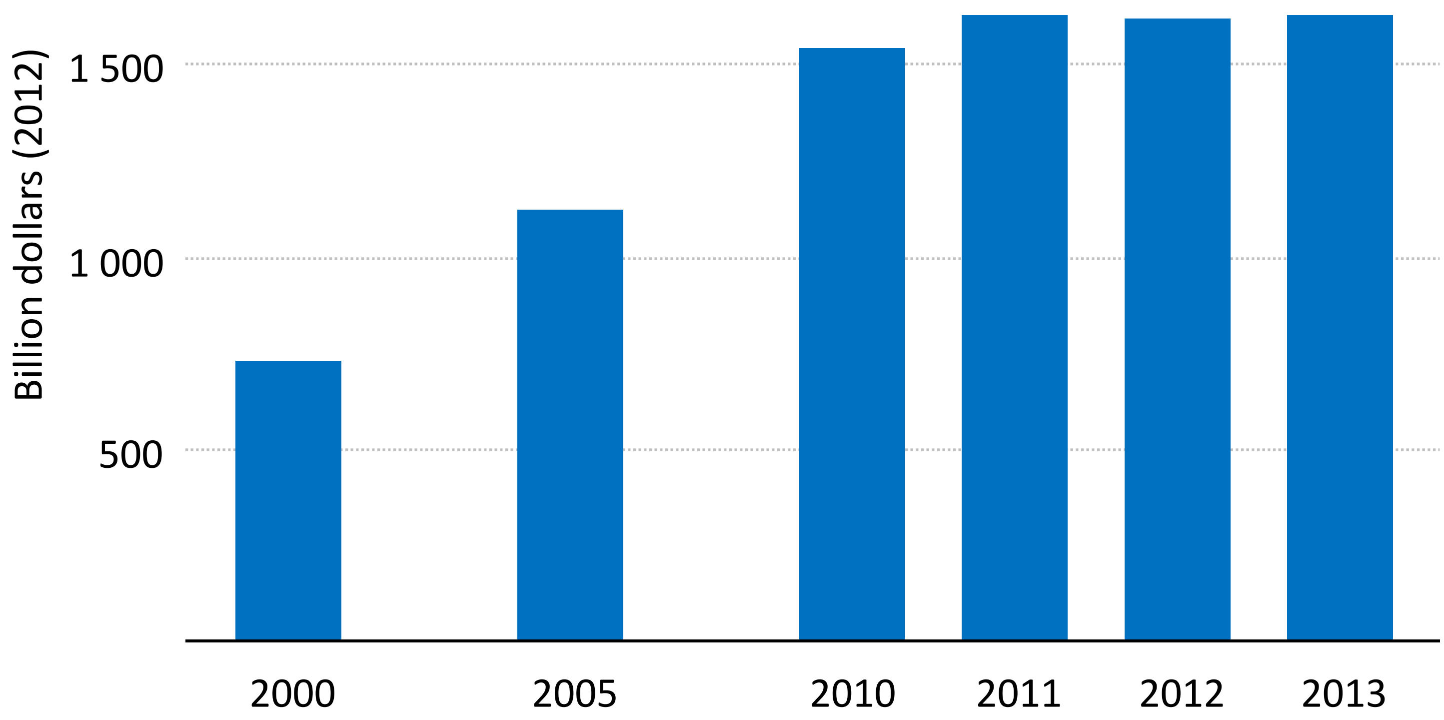
Annual energy supply investment



$1.6 trillion was invested in 2013 to provide consumers with energy, a figure that has more than doubled in real terms since 2000

Renewables come of age, but fossil fuel investment still dominant

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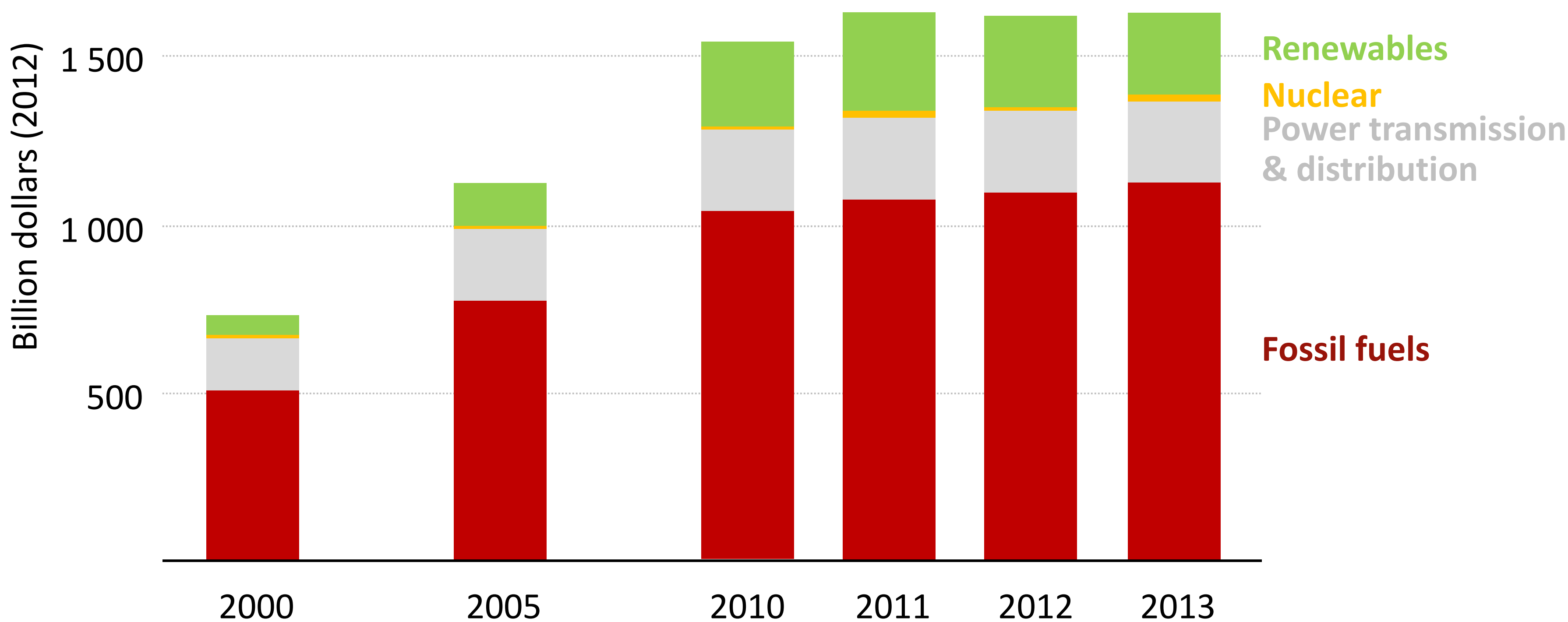
Annual energy supply investment

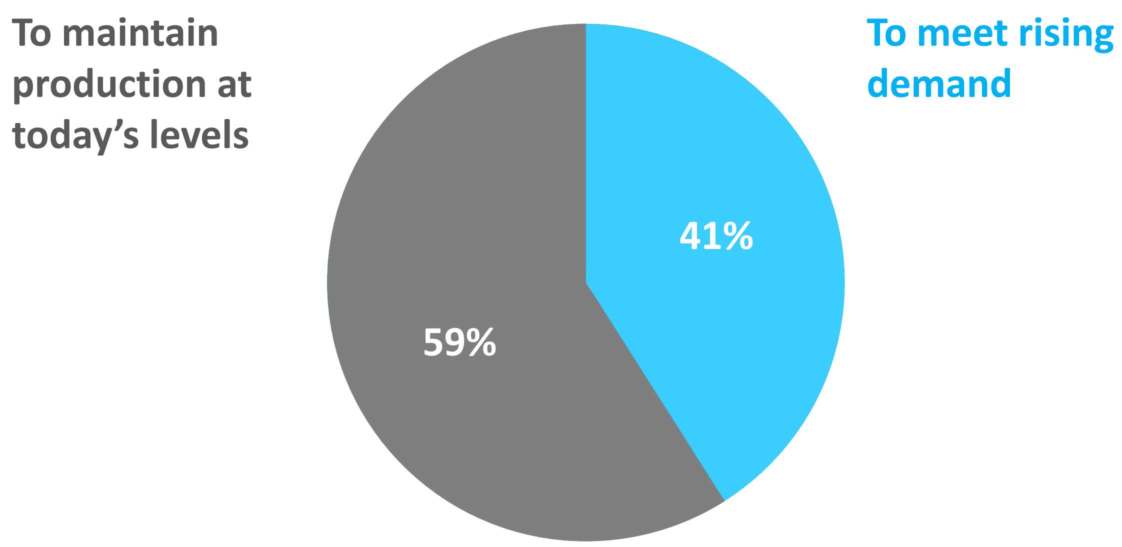


Investment in renewables rose from $60 billion in 2000 to a high point approaching $300 billion in 2011, before falling back since

Running fast to stand still

Investment in energy supply, 2014-2035

Total: $40.2 trillion



Over 80% of upstream oil & gas investment offsets output declines at today's fields: over 40% of power generation investment is to replace plants that retire

A step-change on efficiency

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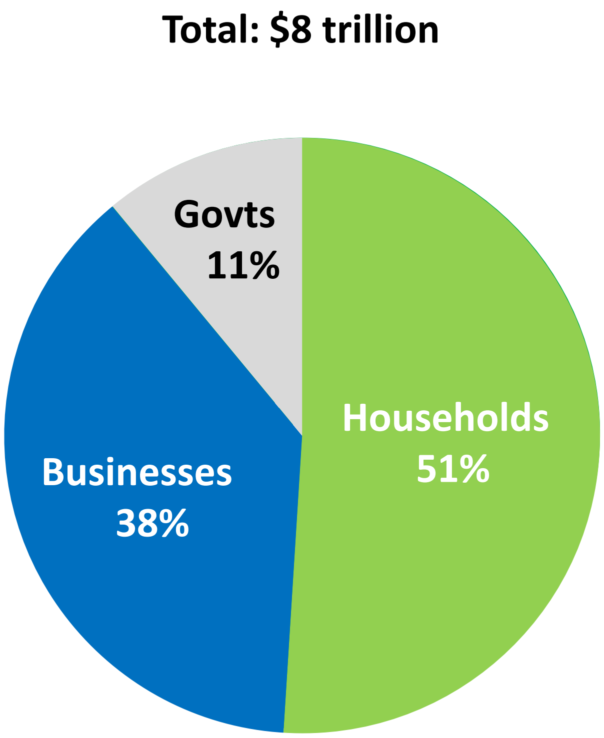
Investment in energy efficiency, 2014-2035



Increasing annual efficiency spending from \$130 billion today to \$550 billion by 2035 will require new models & sources of financing, from banks & capital markets

States hold many of the cards

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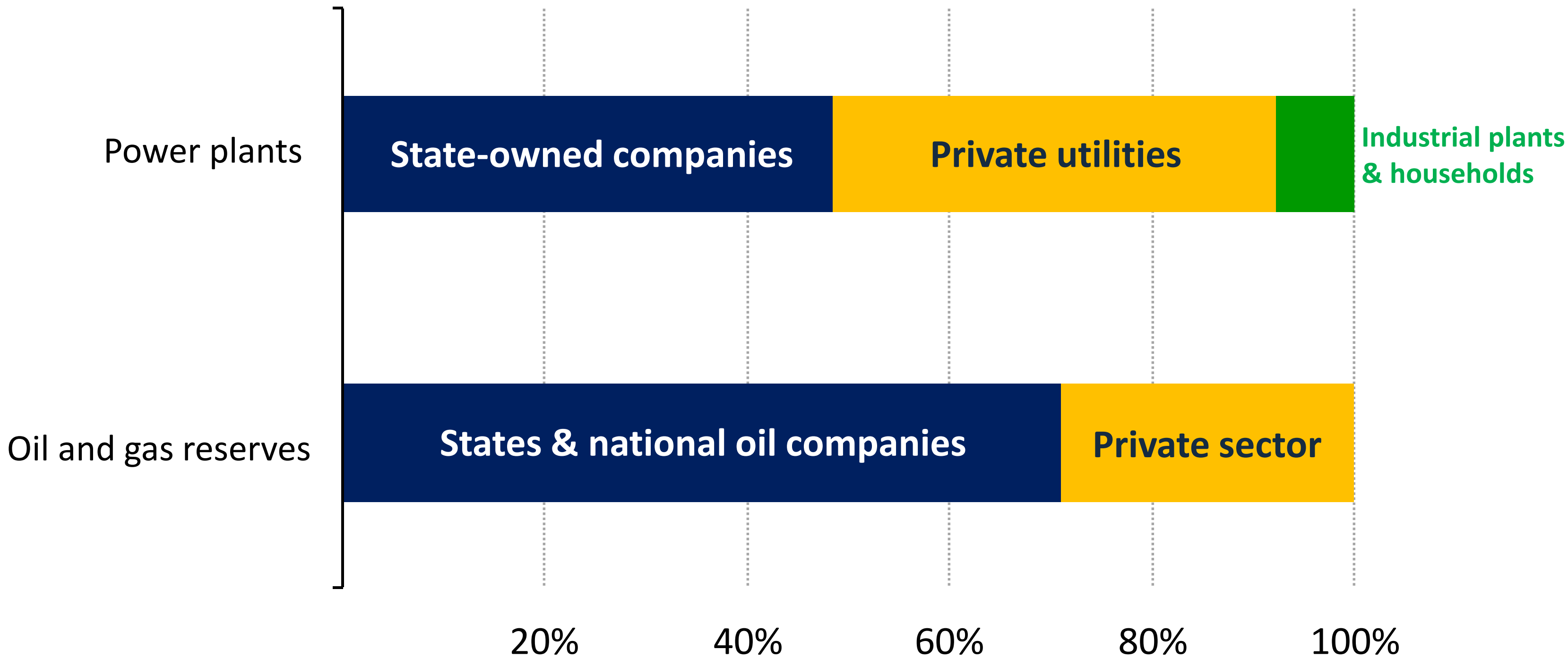
Ownership of worldwide power generation capacity & oil and gas reserves



Alongside investment by the private sector, the objectives, corporate culture & financing of state-owned companies are critical to future energy investment flows

Governments, not market signals, are driving power sector investment

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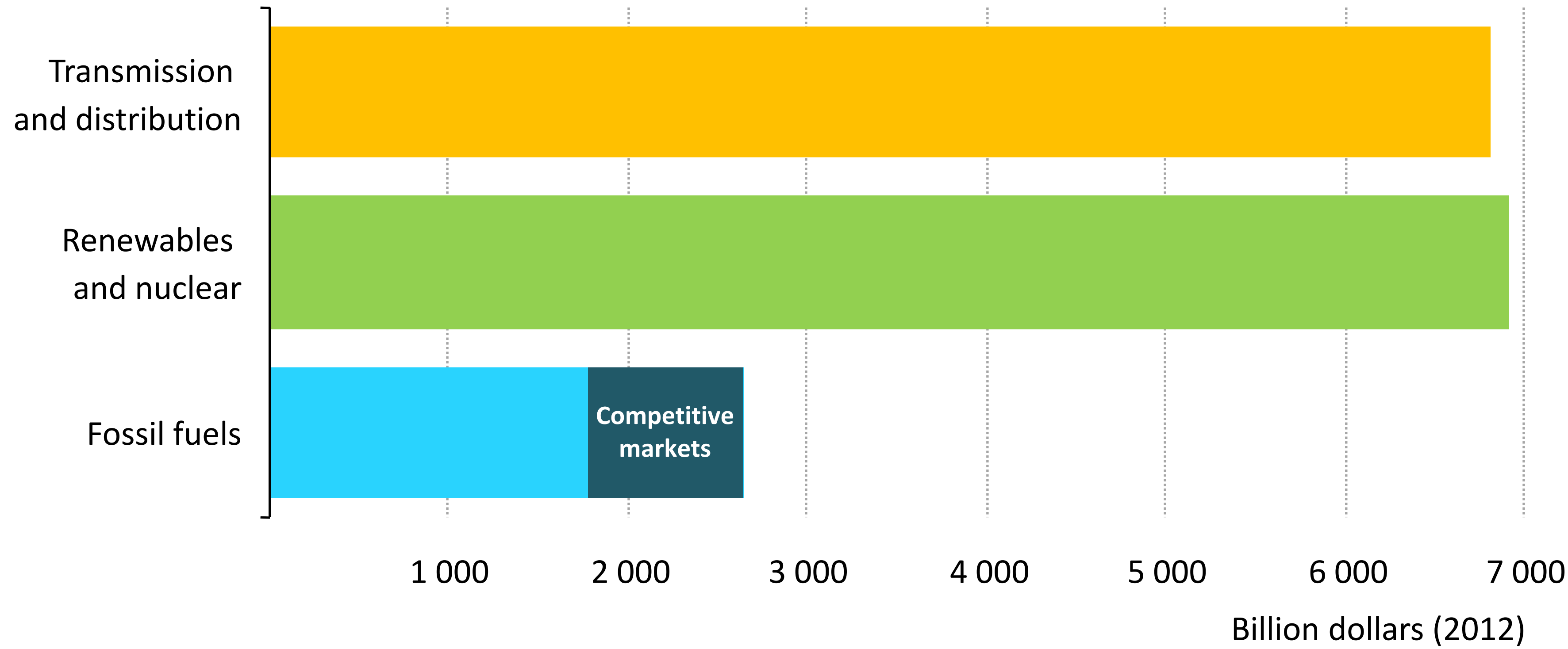
Power sector investment, 2014-2035



With current market designs, competitive parts of markets require less than $1 trillion of cumulative investment to 2035 out of total power sector needs of $16.4 trillion

Will Europe keeps the lights on?

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- Over the past decade, four-fifths of investment in European power generation went to renewables, 60% just to wind and solar PV
- Europe needs to invest $2.2 trillion (2nd largest after China) to 2035 to replace ageing infrastructure & meet decarbonisation goals
- Current overcapacity offers some breathing space, but 100 GW of new thermal plants is needed before 2025 to safeguard reliability
- This investment won't happen with current market rules: wholesale power prices are 20% (or 20$/MWh) below cost-recovery levels
- Higher wholesale prices could increase end-user bills, adding to the strain on households & on competitiveness of EU industry

Middle East investment is critical to the global oil outlook

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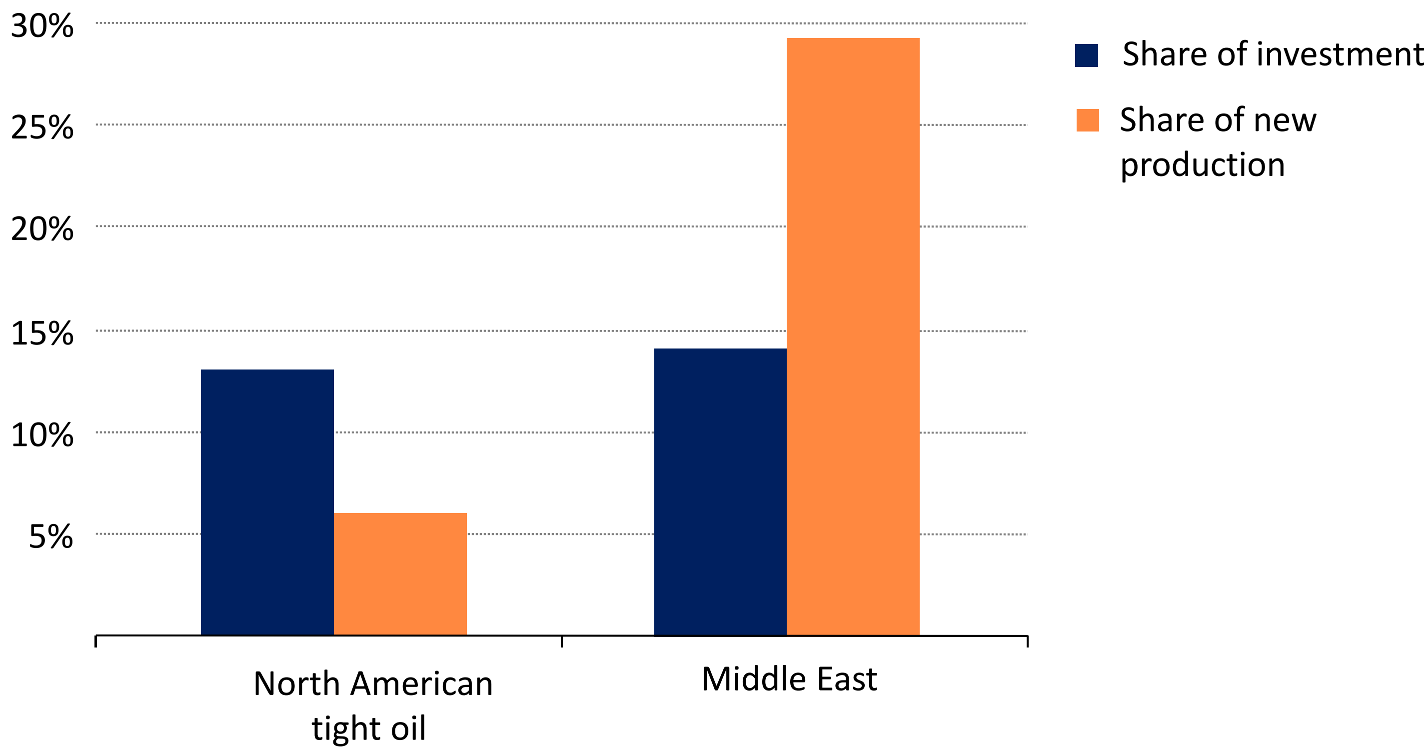
Share of upstream oil investment and of new production, 2014-2035



Once the current rise in non-OPEC supply runs out of steam, a shortfall in Middle East investment would lead to volatile markets & prices $15/barrel higher in 2025

A new cast of major LNG suppliers

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Over $700 billion invested in LNG infrastructure helps to globalise gas markets, but the high cost of transporting gas dampens importers' hopes for much cheaper gas

A new investment landscape for a 2 °C world

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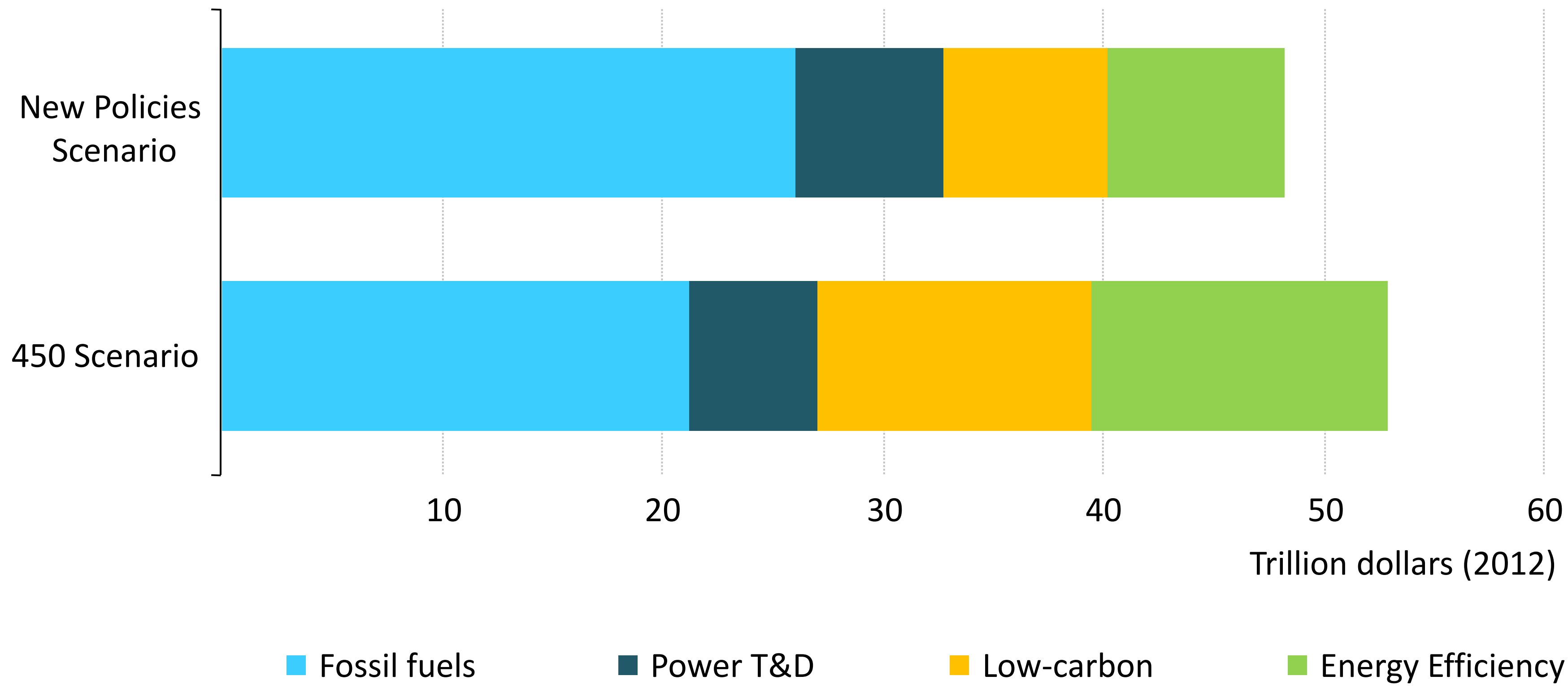
Investment in the New Policies and 450 Scenarios, 2014-2035



Efficiency spending is $6 trillion higher & the composition of supply investment changes: CCS is widely deployed, $300 billion of fossil fuel investment is left stranded

Committing capital in a fast-changing energy world

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- **The role of governments in energy markets is on the rise, while private investors are wary of political and regulatory risks**
- **Energy investments are moving to areas with high up-front costs, complicating the task of securing finance**
- **Without reform to power markets, the reliability of Europe's electricity supply is under threat**
- **Investment in gas rises almost everywhere, but meeting future growth in oil demand depends heavily on the Middle East**
- **Credible policy & pricing signals, plus new financing vehicles, are essential to re-direct capital flows towards a 2 °C target**