



International
Energy Agency

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WORLD ENERGY INVESTMENT OUTLOOK

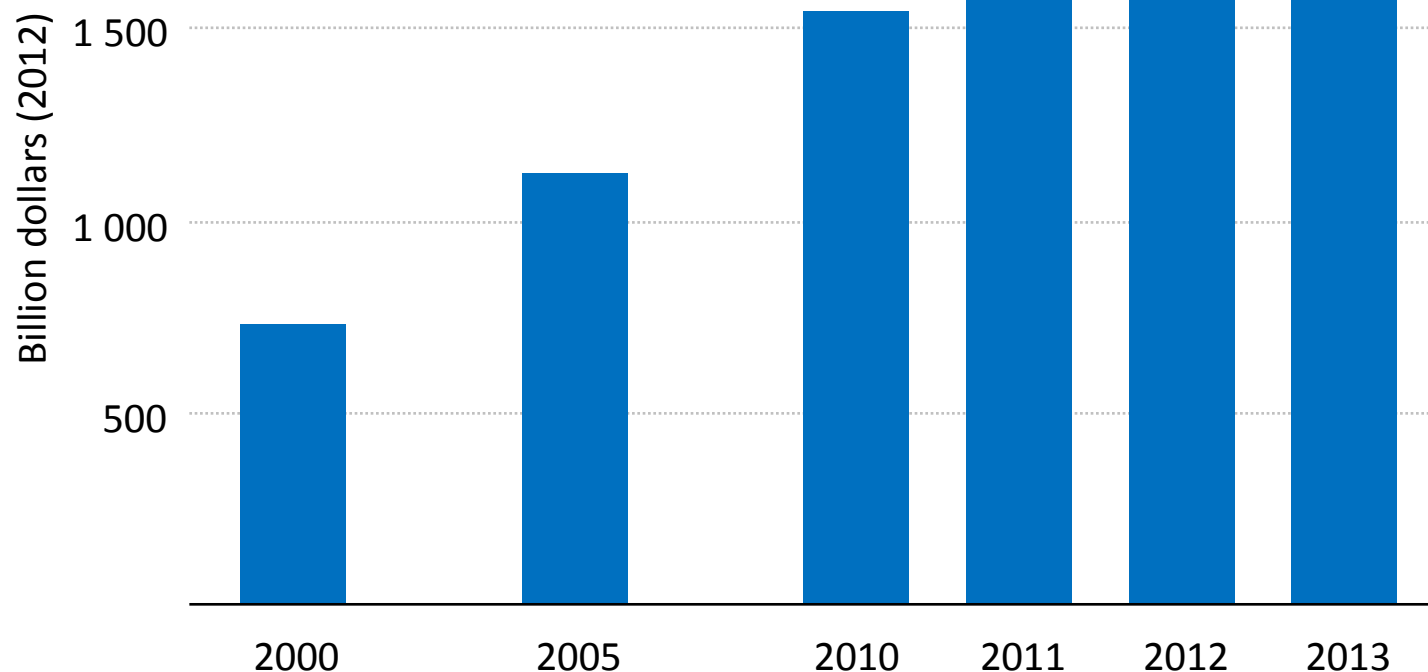
Special Report

Dr. Fatih Birol
Chief Economist
Istanbul, 13 June 2014

- **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

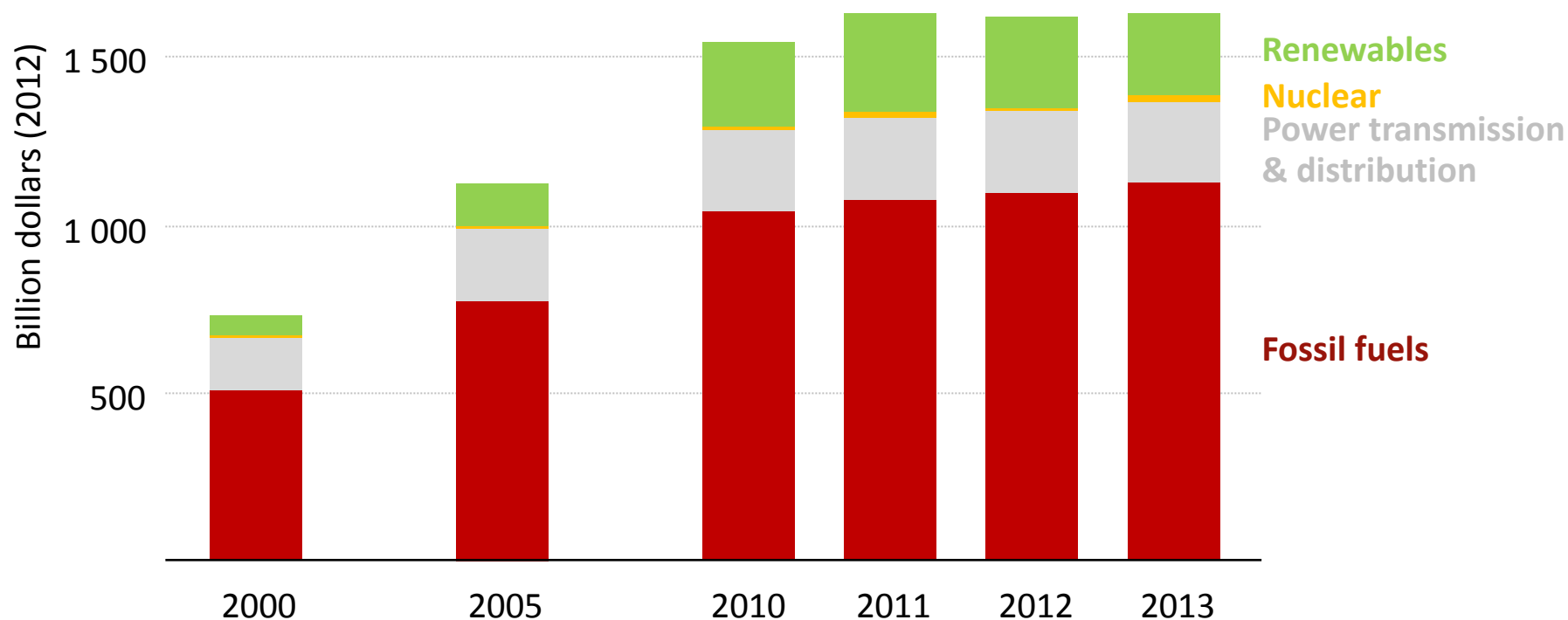
Annual energy supply investment



\$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

Annual energy supply investment



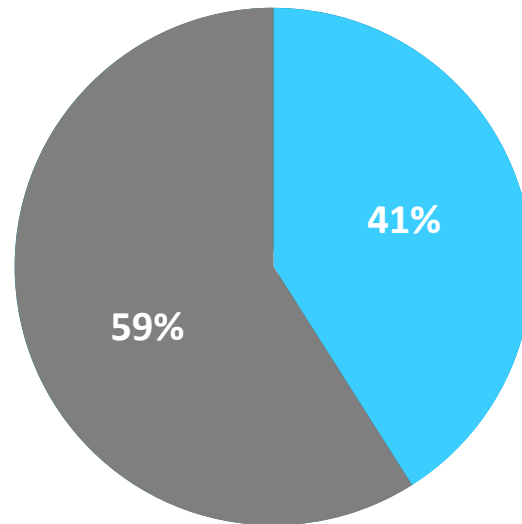
Investment in renewables rose from \$60 billion in 2000 to a high point approaching \$300 billion in 2011, before falling back since

Running fast to stand still

Investment in energy supply, 2014-2035

Total: \$40.2 trillion

To maintain
production at
today's levels



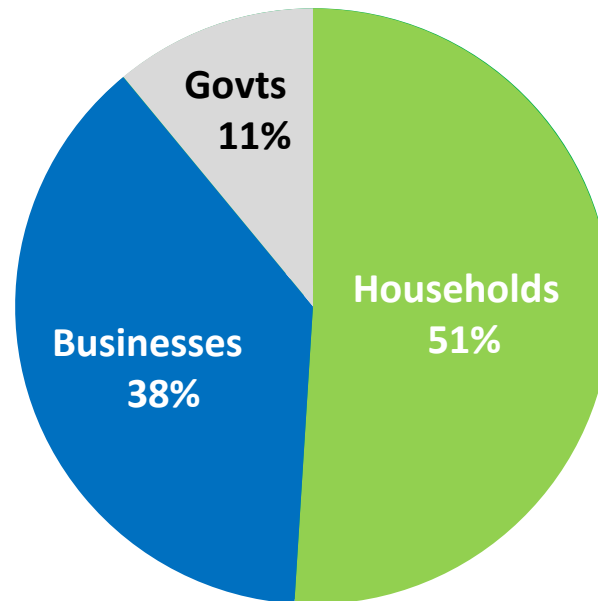
To meet rising
demand

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

A step-change on efficiency

Investment in energy efficiency, 2014-2035

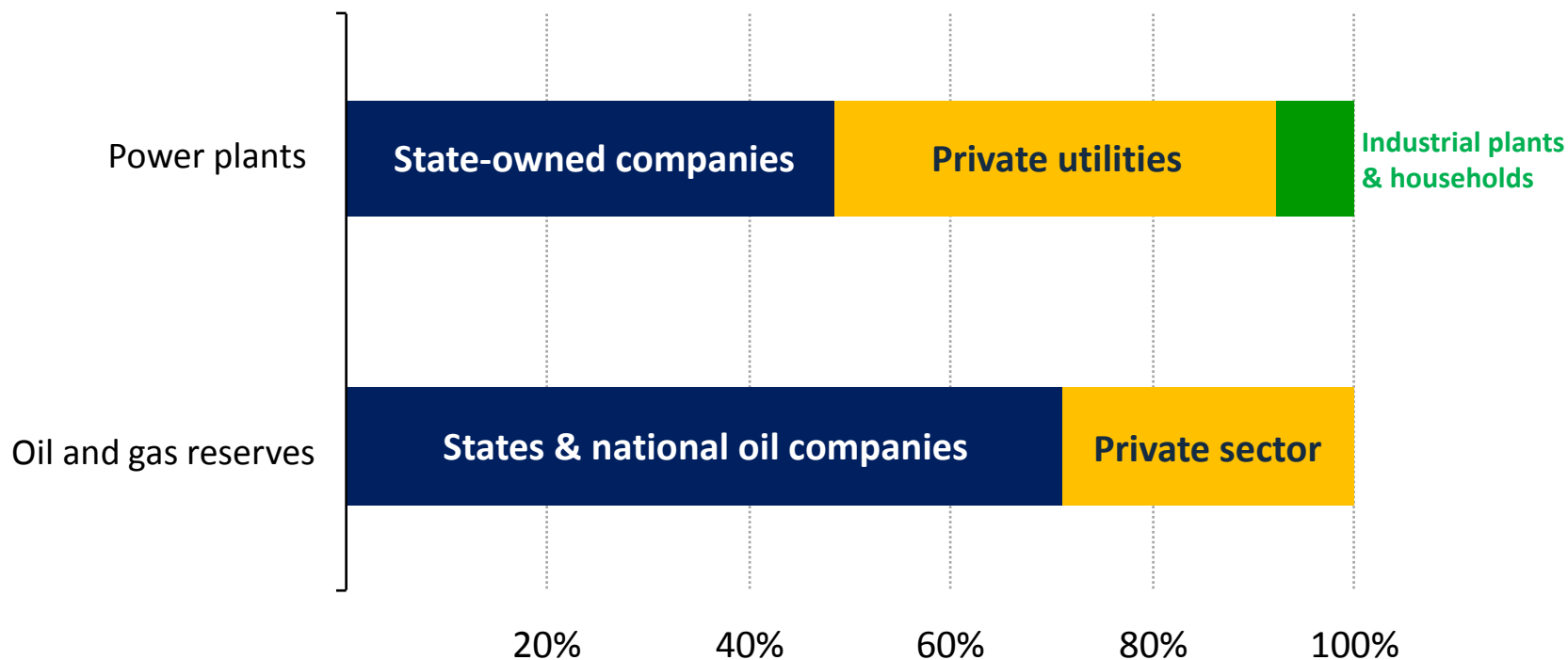
Total: \$8 trillion



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

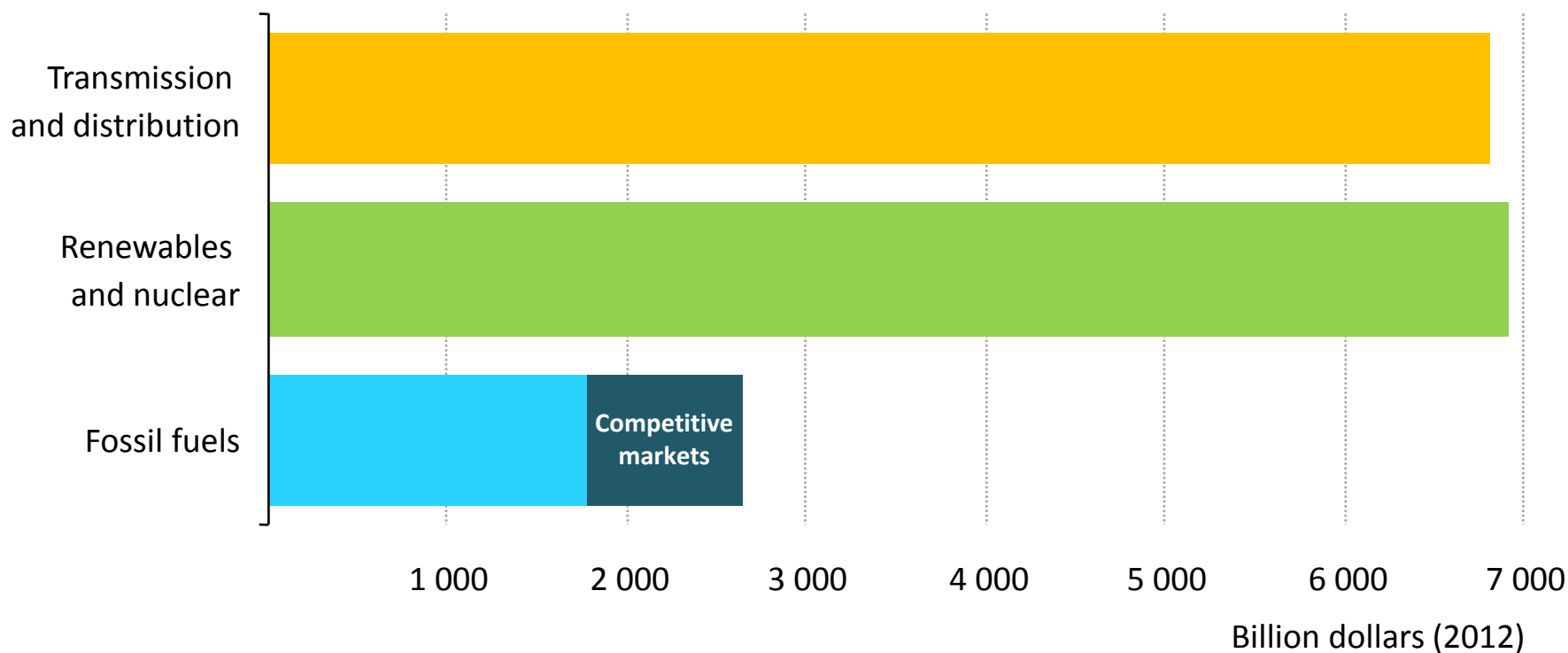
Ownership of worldwide power generation capacity & oil and gas reserves



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

Power sector investment, 2014-2035



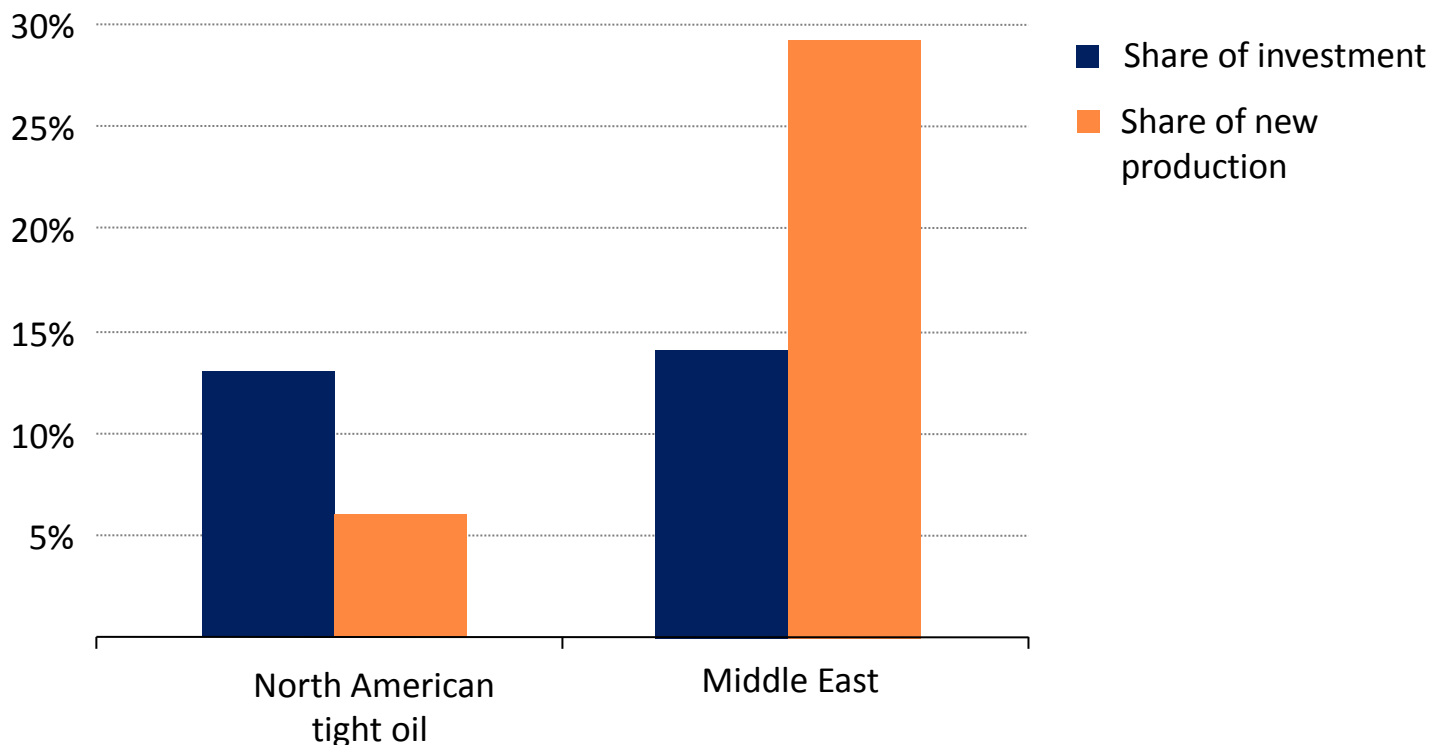
With current market designs, competitive parts of markets require less than \$1 trillion of cumulative investment to 2035 out of total power sector needs of \$16.4 trillion

Will Europe keep the lights on?

- 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

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



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

Committing capital in a fast-changing energy world

- **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**