



cutting through complexity™

New international relationships: Economic geo trends and roles of energy dynamics

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The Future of Energy
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Navigating the sea of change



Economic



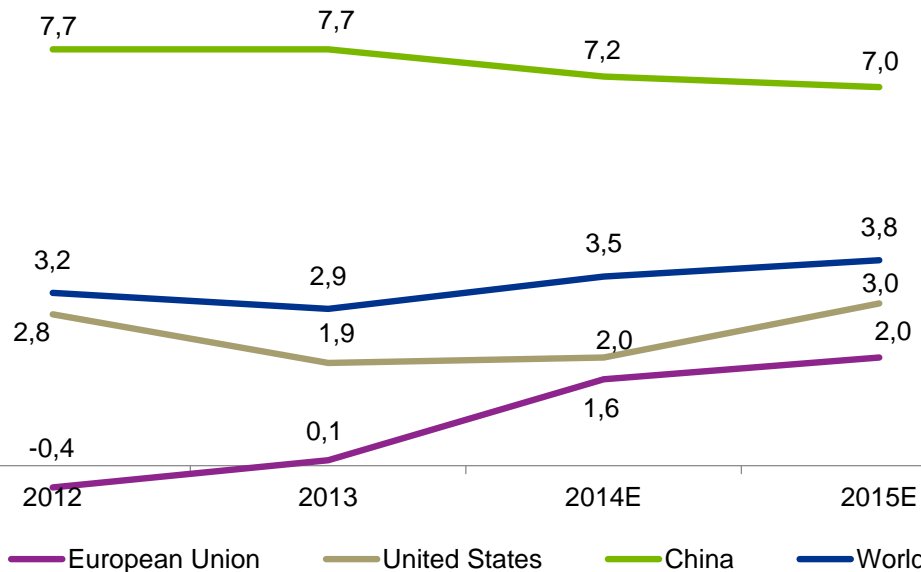
Geopolitical



Regulatory

Economic uncertainty

Real GDP Growth Rates (%)



Europe / US - current moderate growth (1-2% EU, 2-3% US;), projected to grow further

Shift from mature to emerging markets – Europe's share of global GDP down to 16.7% in 2019 (from 24.8% in 2000); China up to 14.7 percent (from 7% in 2000)

EU business confidence at 105.8 percent in July 2014

Sources: European Economy Forecast, European Commission, March 2014; "The Economy in 2013", The White House, <http://www.whitehouse.gov/blog/2013/12/19/economy-2013>, accessed May 2014; "United States Purchasing Managers Index (PMI)", Trading Economics, <http://www.tradingeconomics.com/country-list/business-confidence> accessed Jul 2014

Geopolitical uncertainty



Regulatory uncertainty

How the EU's energy trilemma can be answered?



Energy efficiency

Investing in infrastructure

completion of the internal energy market

Energy price and Competitiveness

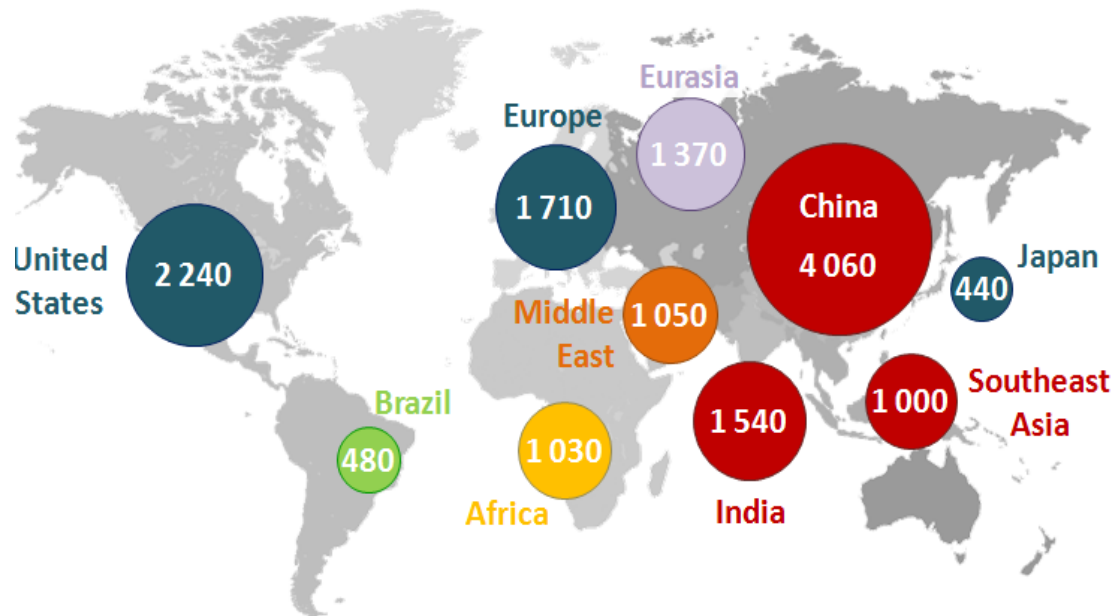
Shale gas exploration

20-20-20 targets, efficient policy for cost-effective renewables

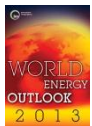
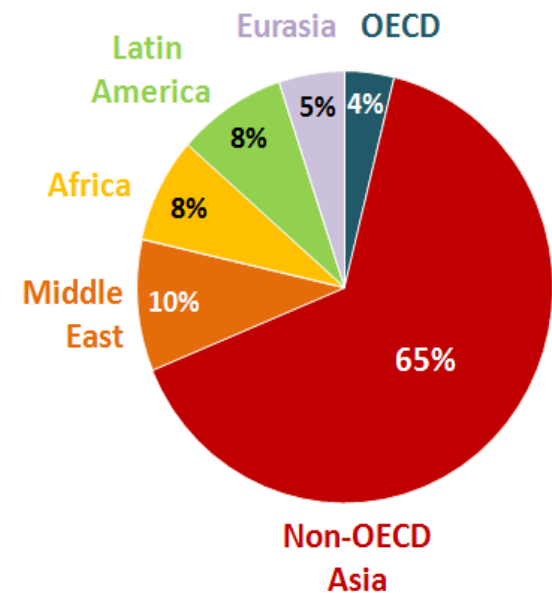
ETS reform

The engine of energy demand growth moves to South Asia

Primary energy demand, 2035 (Mtoe)

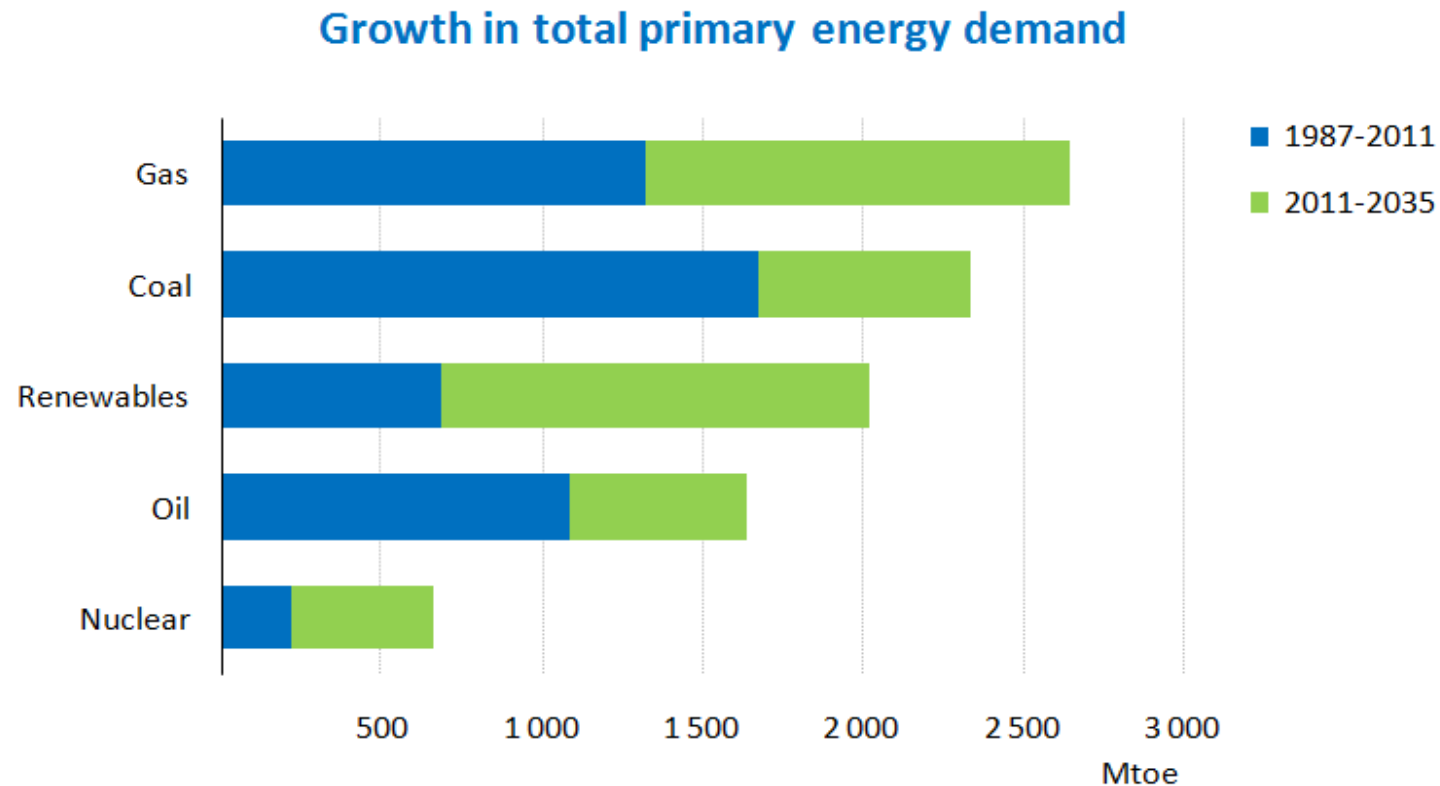


Share of global growth 2012-2035

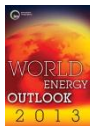


Source: World Energy Outlook 2013 presentation made by Dr. Fatih Birol, IEA's Chief Economist at the KPMG Global Power & Utilities Conference 2013 in Berlin, Germany

A mix that is slow to change

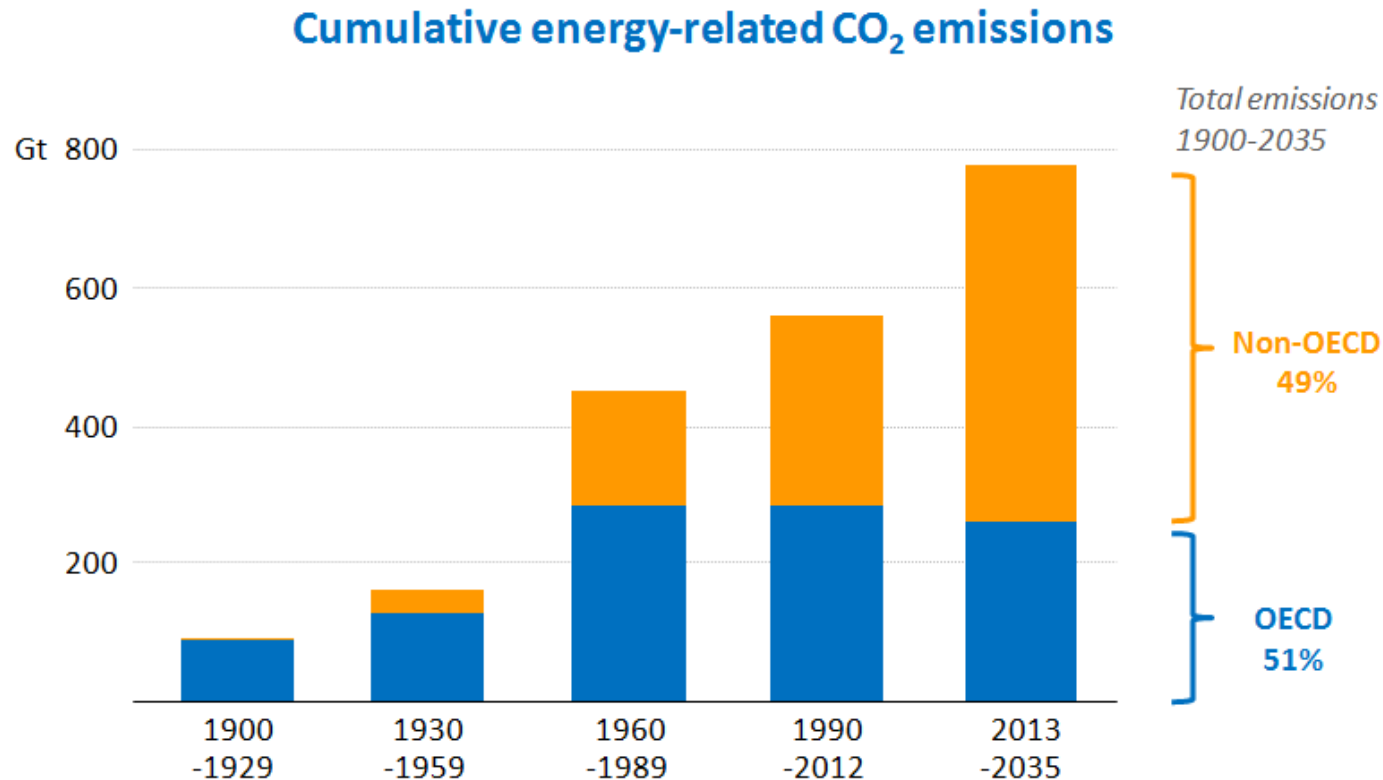


Today's share of fossil fuels in the global mix, at 82%, is the same as it was 25 years ago; the strong rise of renewables only reduces this to around 75% in 2035

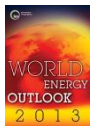


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Emissions off track in the run-up to the 2015 climate summit in France



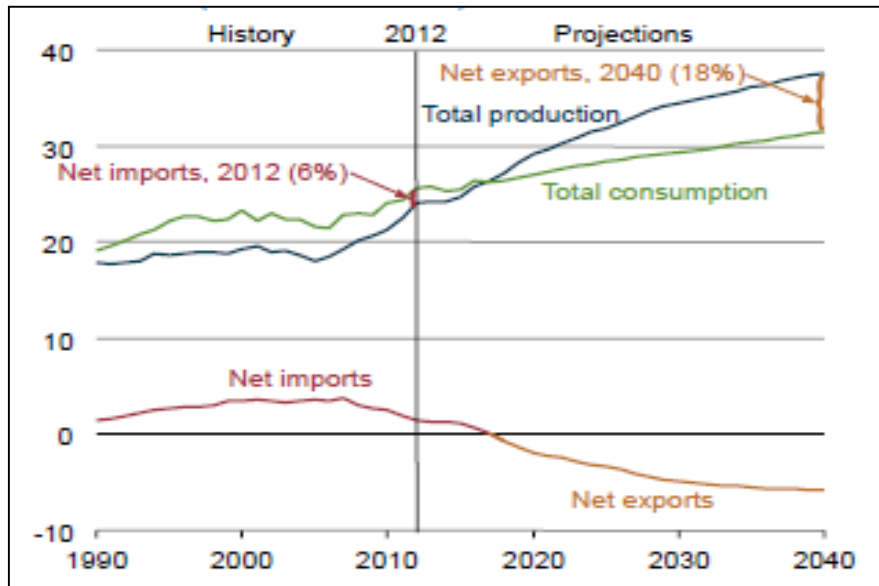
Non-OECD countries account for a rising share of emissions, although 2035 per capita levels are only half of OECD



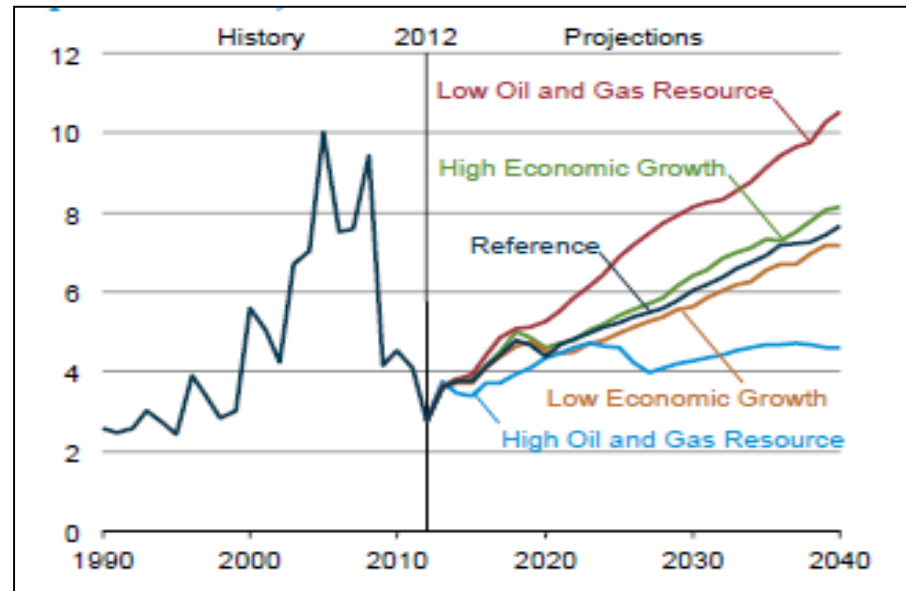
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Ability to Anticipate and Respond: Gas Prices Stay Under \$6?

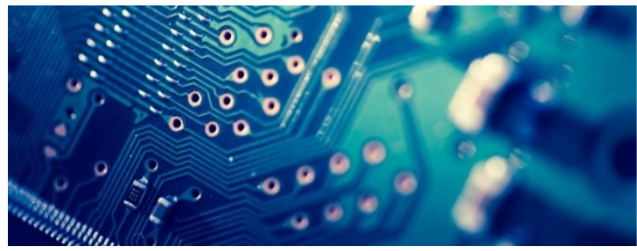
US natural gas production, consumption and net imports



Henry Hub Gas Price



We Can't Predict the Future - 4 Things to Consider



Technology



Talent



Risk



Delivery



Renewables contribution to total power generation expected to be about ~33 percent for EU, ~15 percent for United States and ~10 percent for China by 2035



30 percent crude extracted from off-shore production



Electric vehicles will have range of over 500 miles within the next 10 years



Worldwide revenue from microgrids is expected to grow 400 percent by 2020 to over \$20 billion

<i>50 percent over 45 years old</i>	The average age of Oil & Gas workers is 56
<i>50 percent retiring</i>	More than 50% of the current industry workforce will be eligible to retire in 2015
<i>40 percent pessimistic</i>	Over 40 percent (ages 46–55) note themselves as pessimistic re: company ability to address knowledge gap
<i>Competition #1</i>	Losing employees to competitors is the #1 reason identified for attrition
<i>Generation gap</i>	Significant motivational difference between Gen Y and Boomers



Cyber

Target stores data breach cost the CEO and CIO their jobs

30,000 websites each day are hacked



Aging Infrastructure

\$100 billion in T&D investment needed over the next 15 years



Weather

Increasing frequency of extreme weather events

Total economic losses related to 296 natural disaster events reached \$192 billion in 2013

**True understanding
of end-to-end enterprise risk
is critical**



Urban population growth

Approximately two-thirds of the total global population will live in cities by 2050 compared to 50 percent today

More than 90 percent increase in urban growth in underdeveloped regions



Pipeline infrastructure

More than 100 years of recoverable gas now exists in North America

Up to \$200 billion is needed in U.S. natural gas infrastructure over the next 15 years

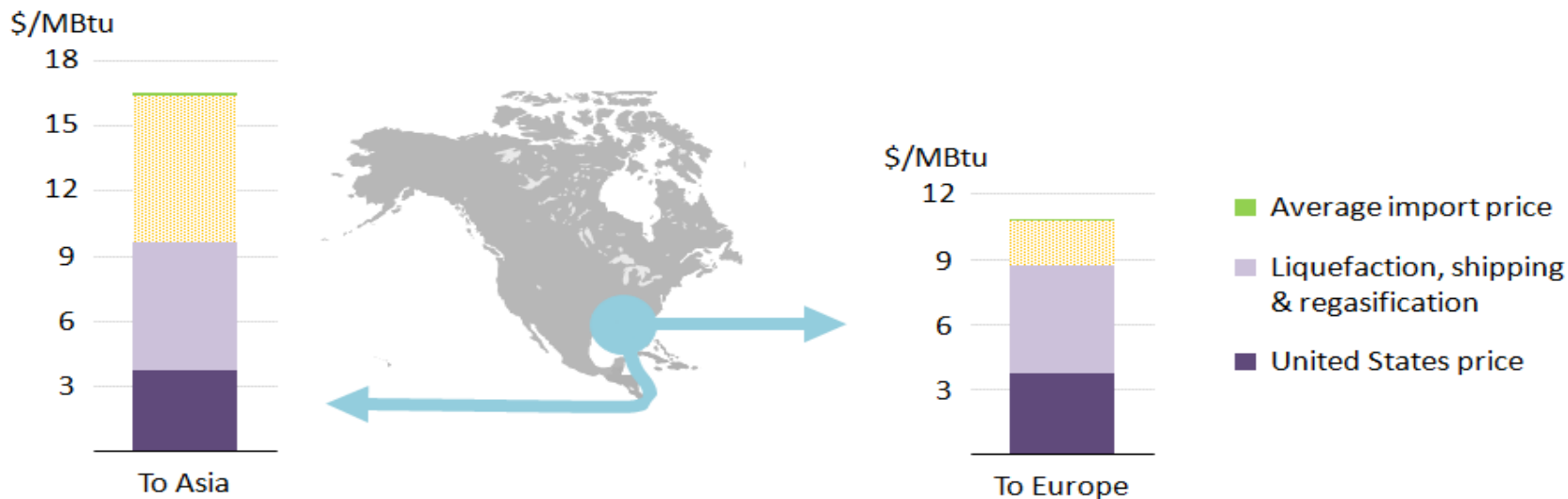


LNG capacity

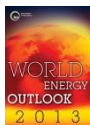
86 liquefaction trains and >420 regasification storage terminals are operational worldwide

\$300 billion needed in investment globally to exploit resource base

Indicative economics of LNG export from the US Gulf Coast (at current prices)



New LNG supplies accelerate movement towards a more interconnected global market, but high costs of transport between regions mean no single global gas price



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Thank you for your attention



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