



World Energy Investment 2017

Economics and Investment Office

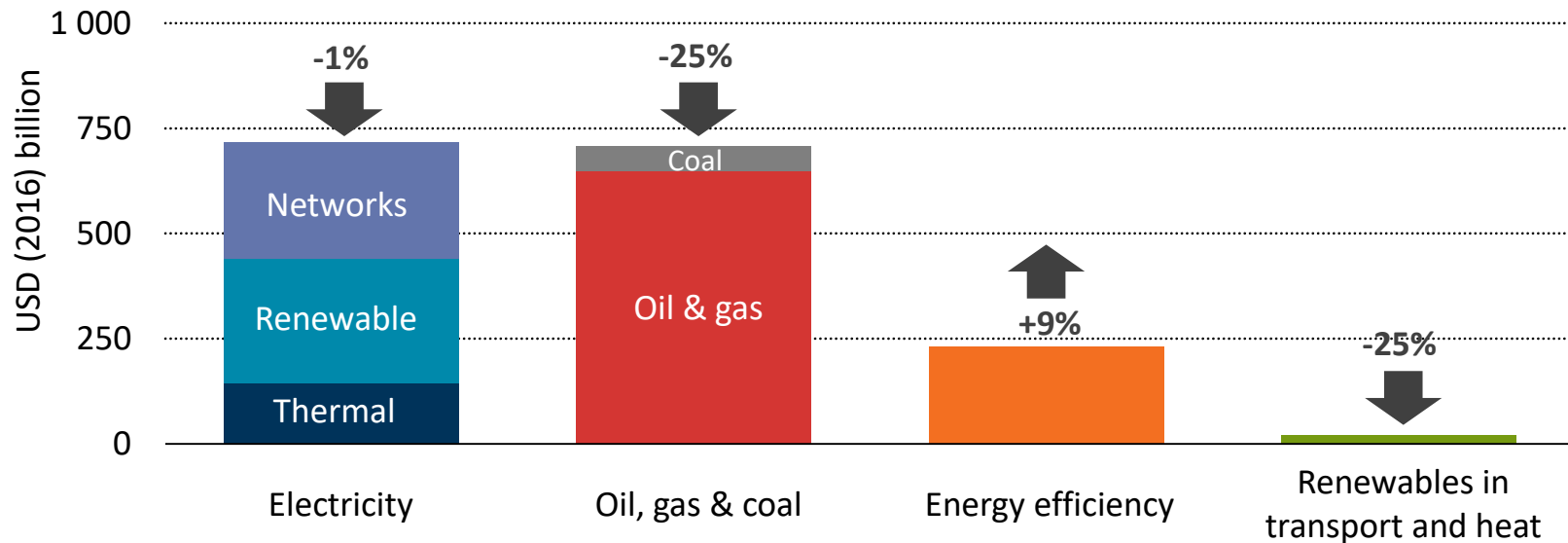
14 June 2017



Global energy investment fell 12% in 2016, a second consecutive year of decline



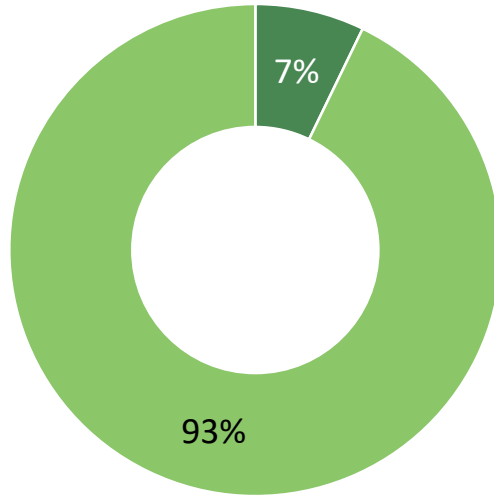
Global energy investment 2016



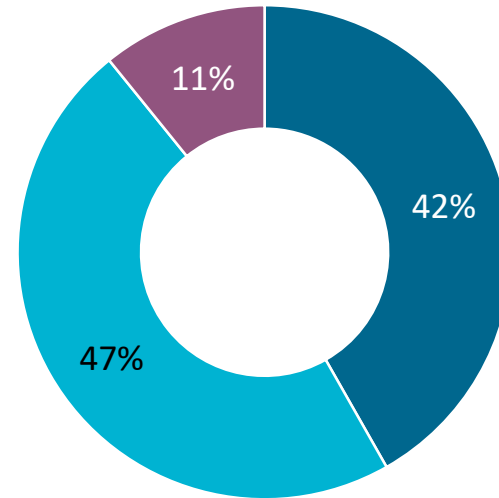
Electricity sector investment overtook oil and gas for the first time

The role of state actors in energy investments has increased

Sources of finance by financing mechanism and type of organisation for world energy investment in 2016



- Project finance
- Balance sheet



- Government/SOEs
- Private sector
- Households, communities and self-consumption

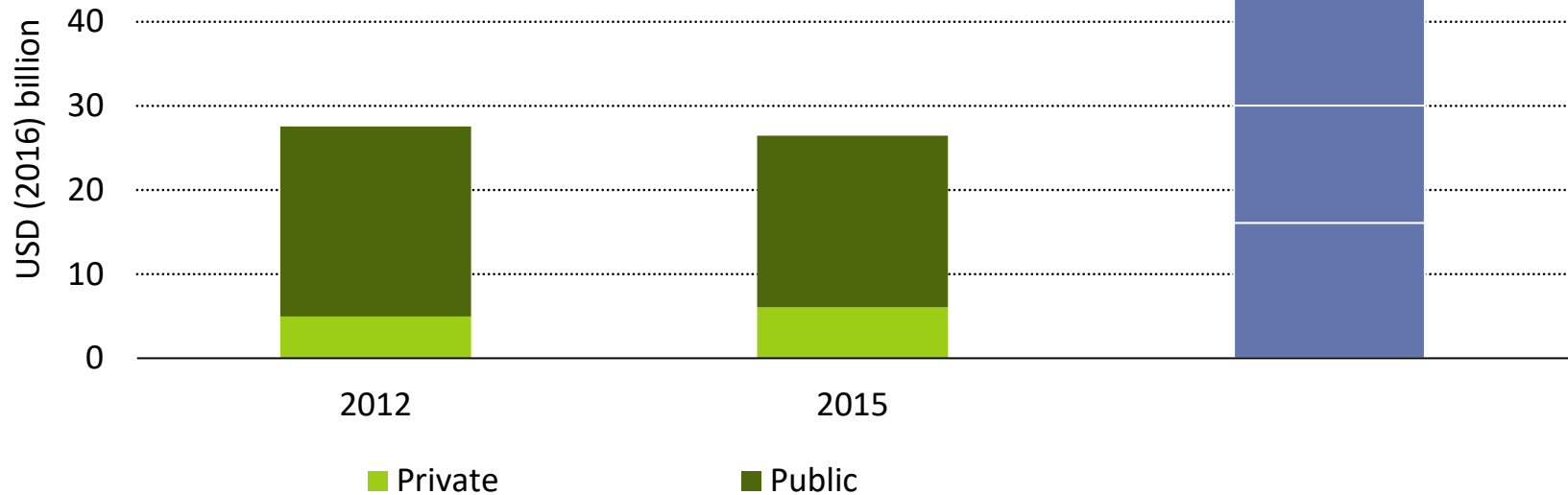
The share of state actors in total energy investment rose from 39% in 2011 to 42% in 2016, largely thanks to state-owned enterprises in electricity sector investment, notably in China, and NOCs in upstream oil & gas

Global clean energy R&D funding needs a strong boost



Global clean energy R&D spending

Top 3 IT company R&D spenders



Global R&D spending on clean energy plateaued at \$26 billion/year, with much room for growth from the private sector. As a share of GDP, China's leads spending on energy R&D, after overtaking Japan

Appliance standards lock in electricity end use efficiency



Electricity demand shows similar stagnation in the US and Europe despite very different end user prices

The so called “decentralised” renewables

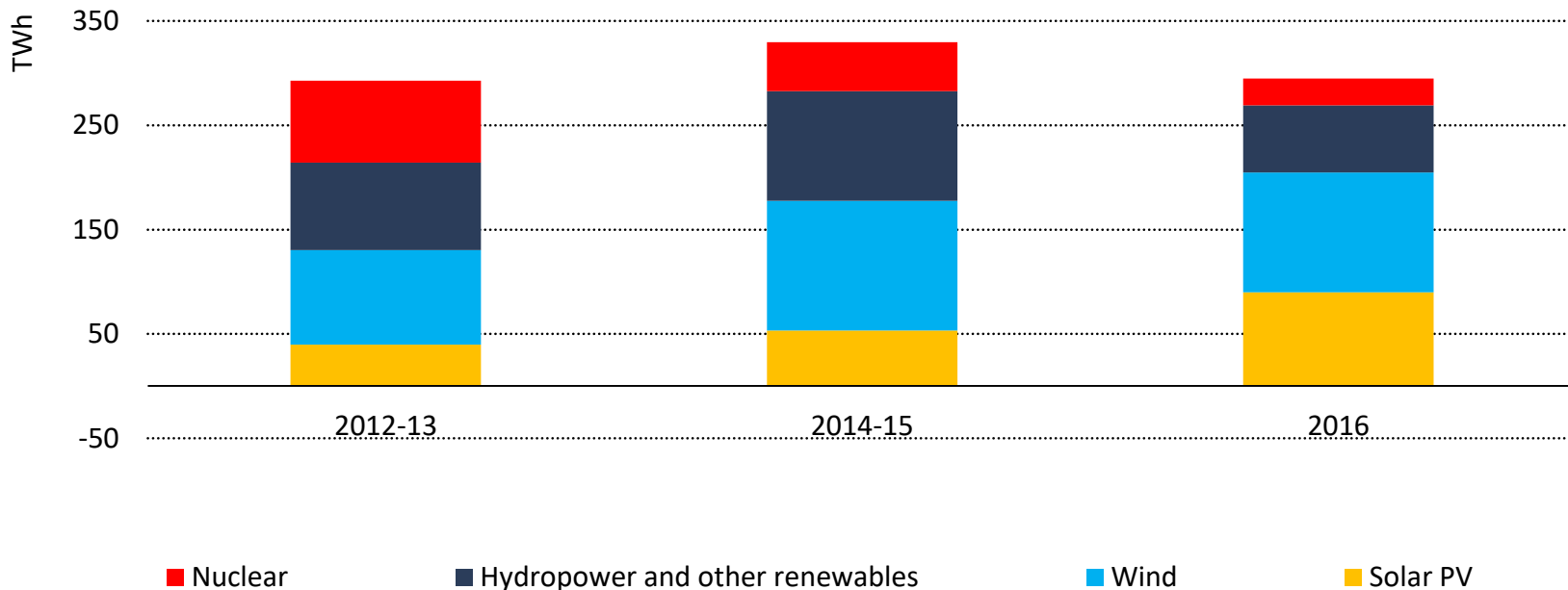


All of wind and the large majority of solar deployment relies on an interconnected network

Investment in low-carbon electricity is not keeping pace with demand



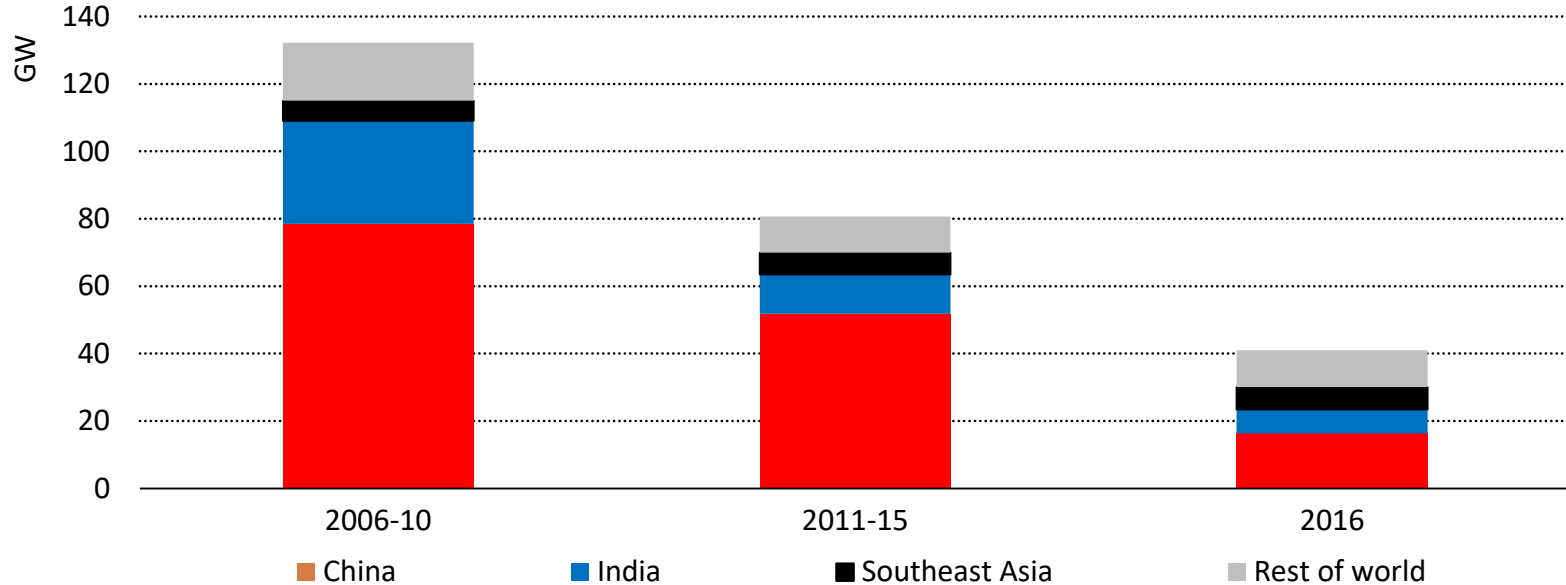
Expected annual power generation from final investment decisions for new low-carbon generation



While the annual contribution of new solar PV and wind has grown by three quarters, FIDs for nuclear and hydropower have sharply slowed, leaving expected low-carbon generation 35% short of average demand growth the past five years.

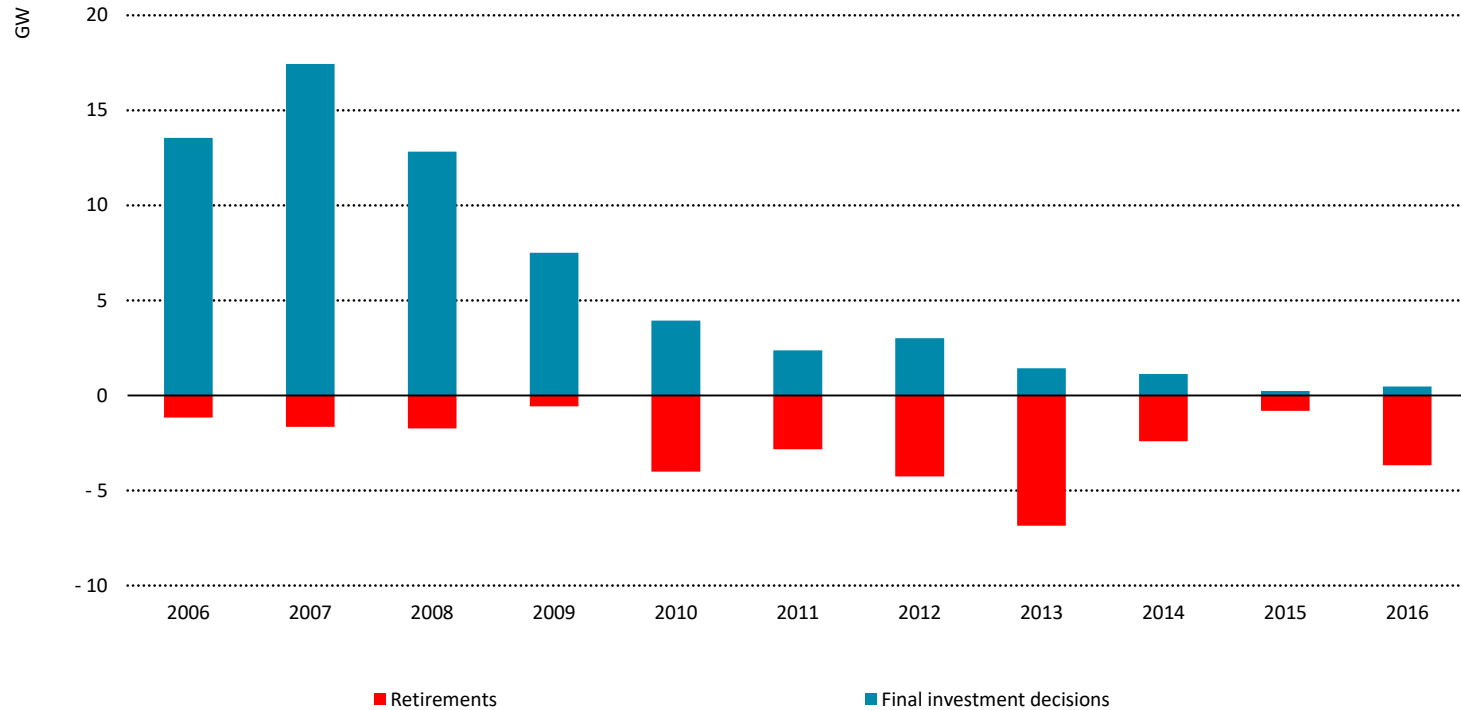
A wave of coal power investment is coming to a pause

Average annual final investment decisions for new coal-fired power capacity



In 2016 the sanctioning of new coal power fell to the lowest level in nearly 15 years, hampered by competition from renewables and environmental challenges. Gas power FIDs surpassed coal for only the second time in the past decade.

Europe: gas retirements exceed FIDs by a wide margin

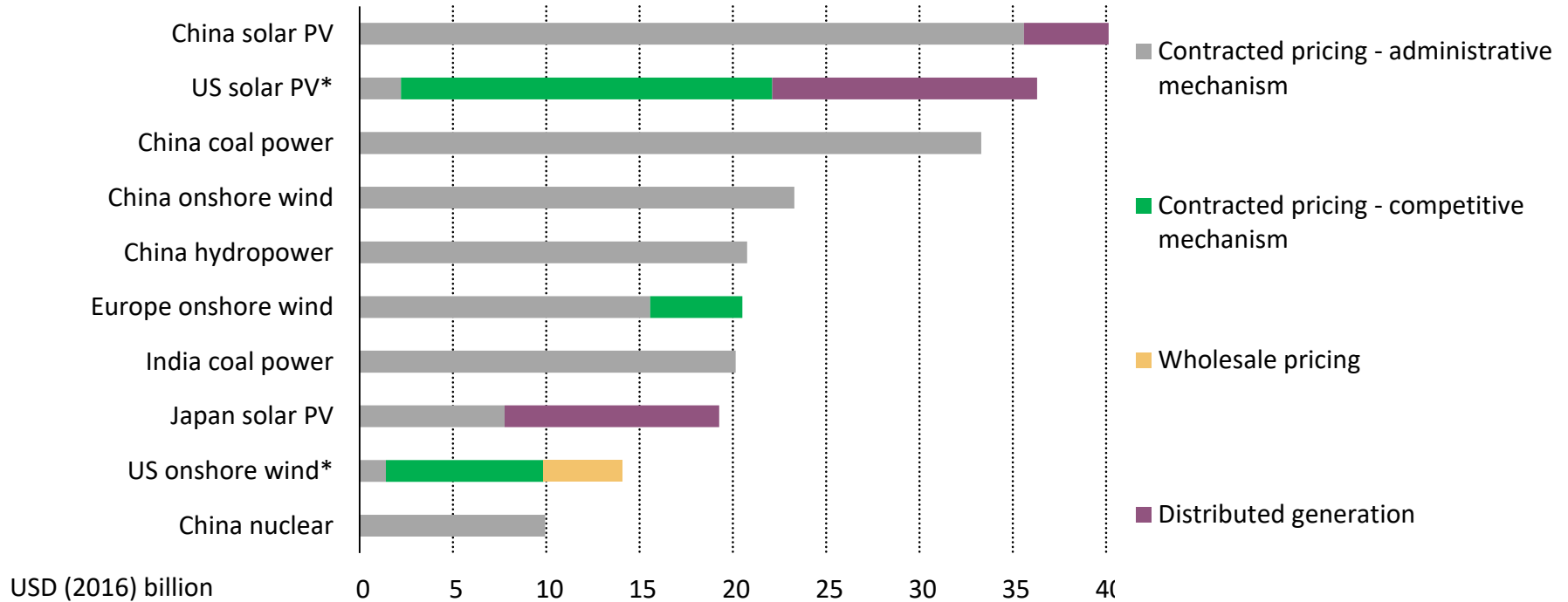


Compressed load factors, low wholesale prices and market design uncertainty disrupt the investment model of gas plants

Policies play an important role in electricity sector business models



Top 10 areas of generation investment and their main funding models, 2016

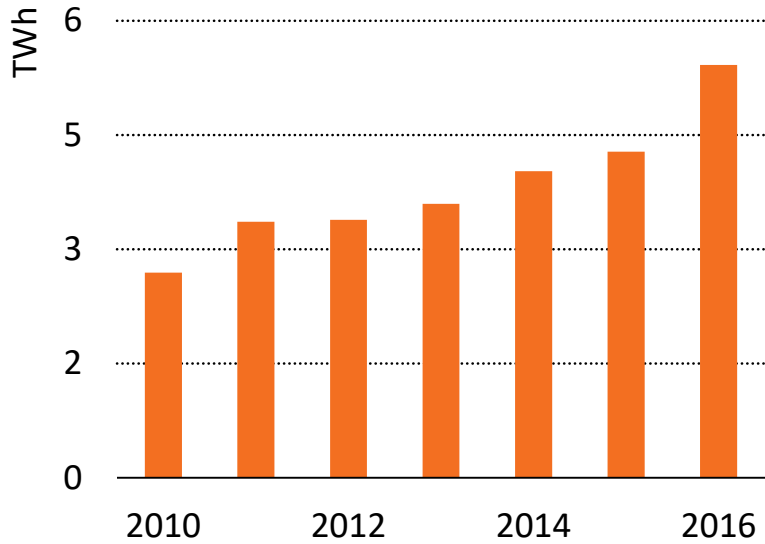


Generation investments mostly have contracted pricing that allows for long-term cost recovery of assets. Competitive mechanisms play growing role in setting renewables remuneration, at 36% of utility-scale investment vs 28% in 2011.

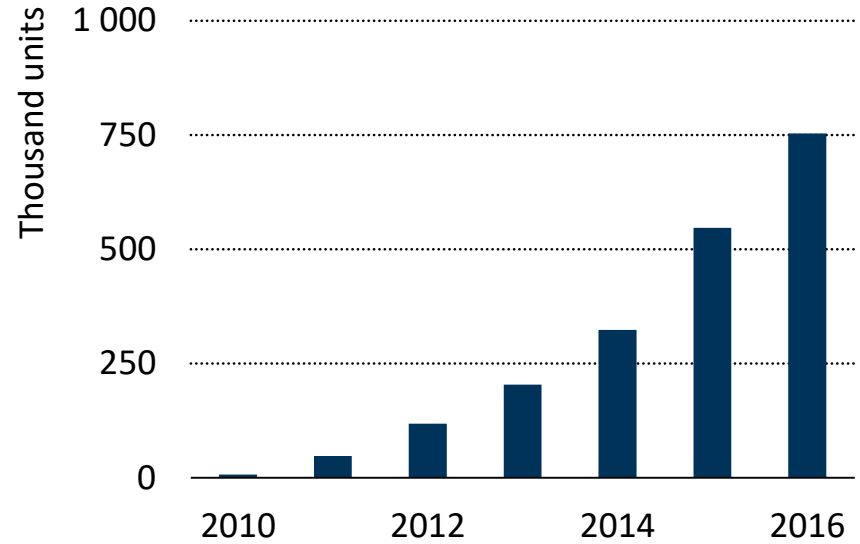
Electrification of transport and heat is progressing



Electricity demand from new heat pumps sold



Global electric vehicle sales



Electric vehicle (EV) sales grew 38% in 2016 and, at \$6 billion, now represent 10% of all transport efficiency spending. Another \$6 billion was spent globally on EV charging stations.

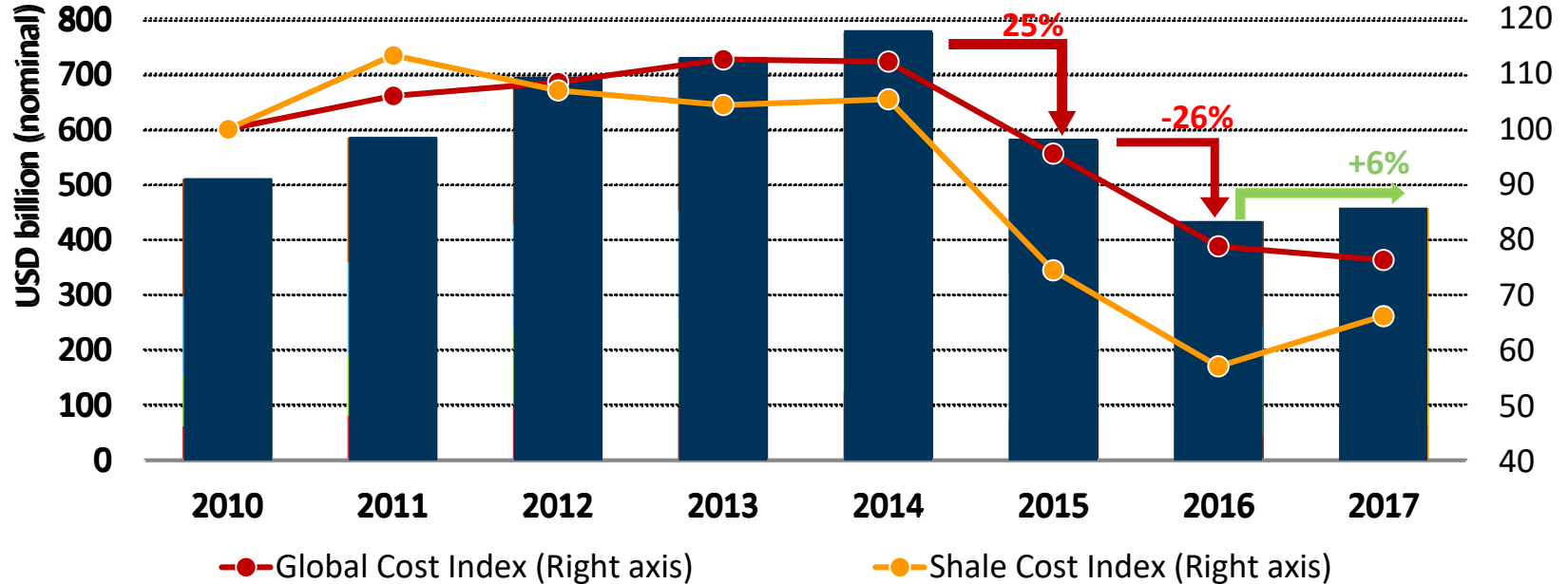
Cheap oil shifts consumer preferences towards big cars

The three best selling vehicles in North America



Global upstream investment rebounds modestly in 2017

Global oil and gas upstream capital spending 2010-2017



Ramp up of activities leads to cost inflation in US tight oil but elsewhere upstream costs decline further. NOC' share in total investment reaches another record high.

Russia: drivers of investment resilience



West Siberia brownfield: domestic service capabilities, costs are in rouble



Power of Siberia: Strong project management expertise with pipelines, Made in Russia components

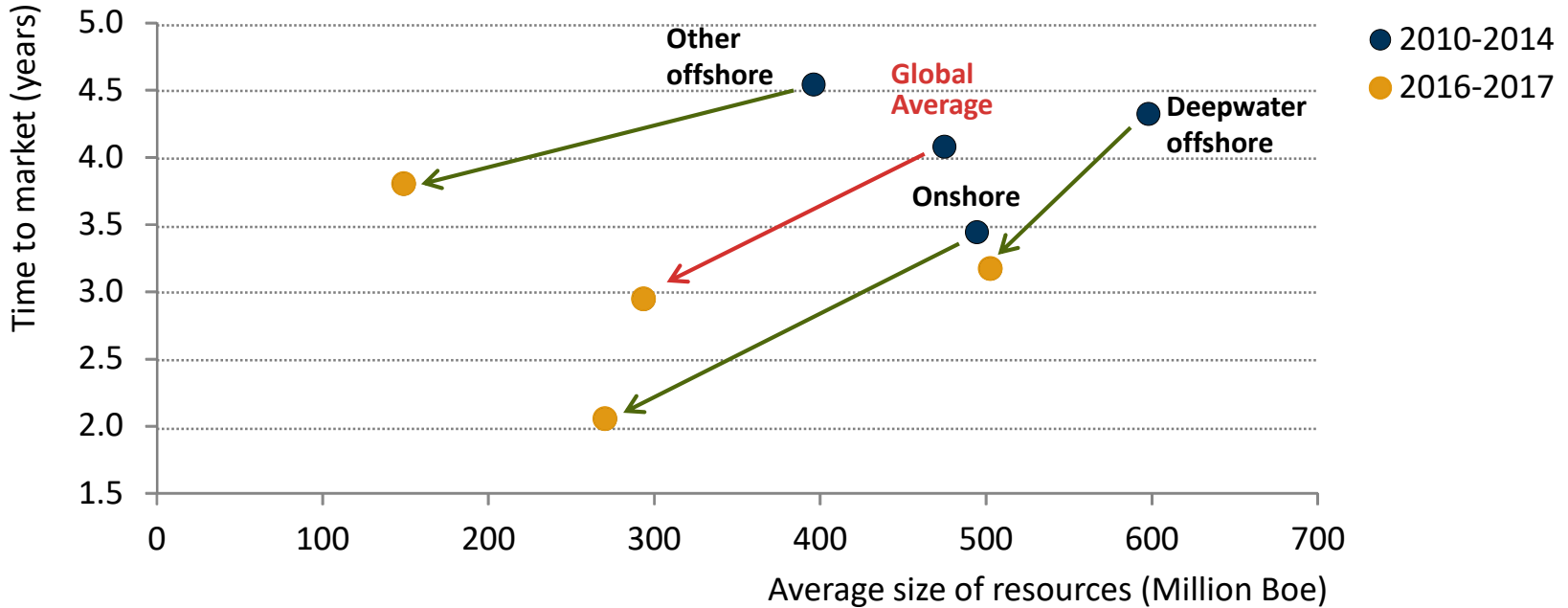


Yamal LNG: Chinese equity and project finance, EU and Japanese technology providers

Russian oil production stabilized at a level 0.6 mB/day higher than 2014 expectations

Conventional oil and gas projects becoming faster and smaller

Average size of conventional resources sanctioned and time-to-market



A shift in company strategies and technology developments leads to shorter project cycles across all the oil and gas industry

