



# Energy investment and the low carbon transition

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Economics and Investment Office  
APERC Summit, Tokyo 30 May 2018



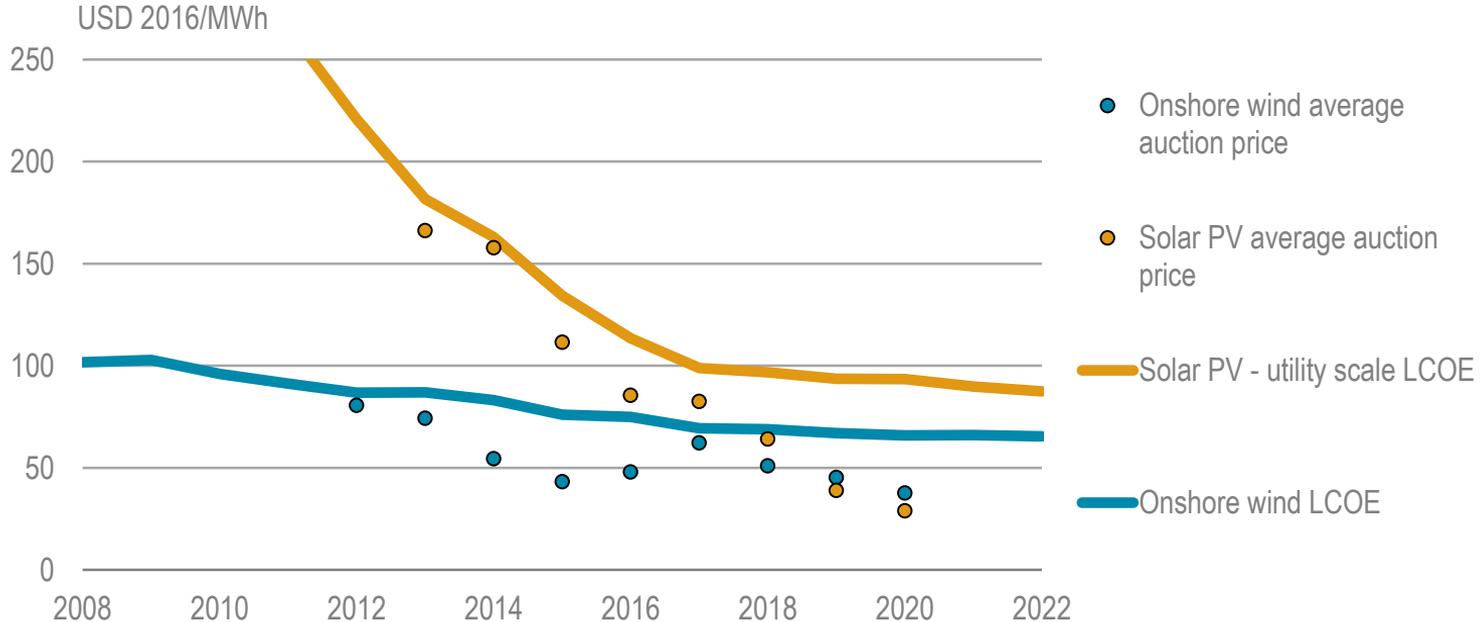
# On the journey towards a clean energy system

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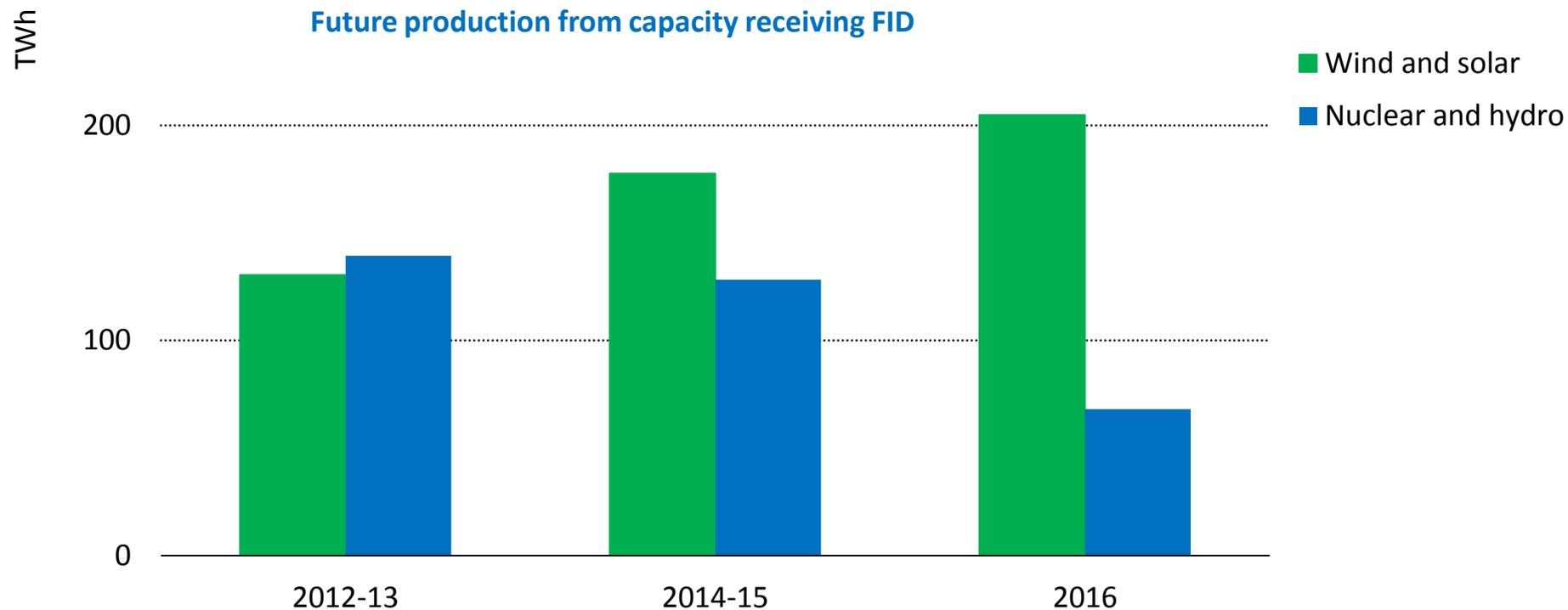
**We made it to the base camp, with a tough climb ahead**

## Wind and solar PV average LCOEs and auction results by commissioning date



**Competitive auctions combine technology incentives with ultra low cost of capital**

# The headwind of the hydro and nuclear slowdown



**New low-carbon investment covers only around half of the global electricity demand increase.**

# The so called “decentralized” renewables



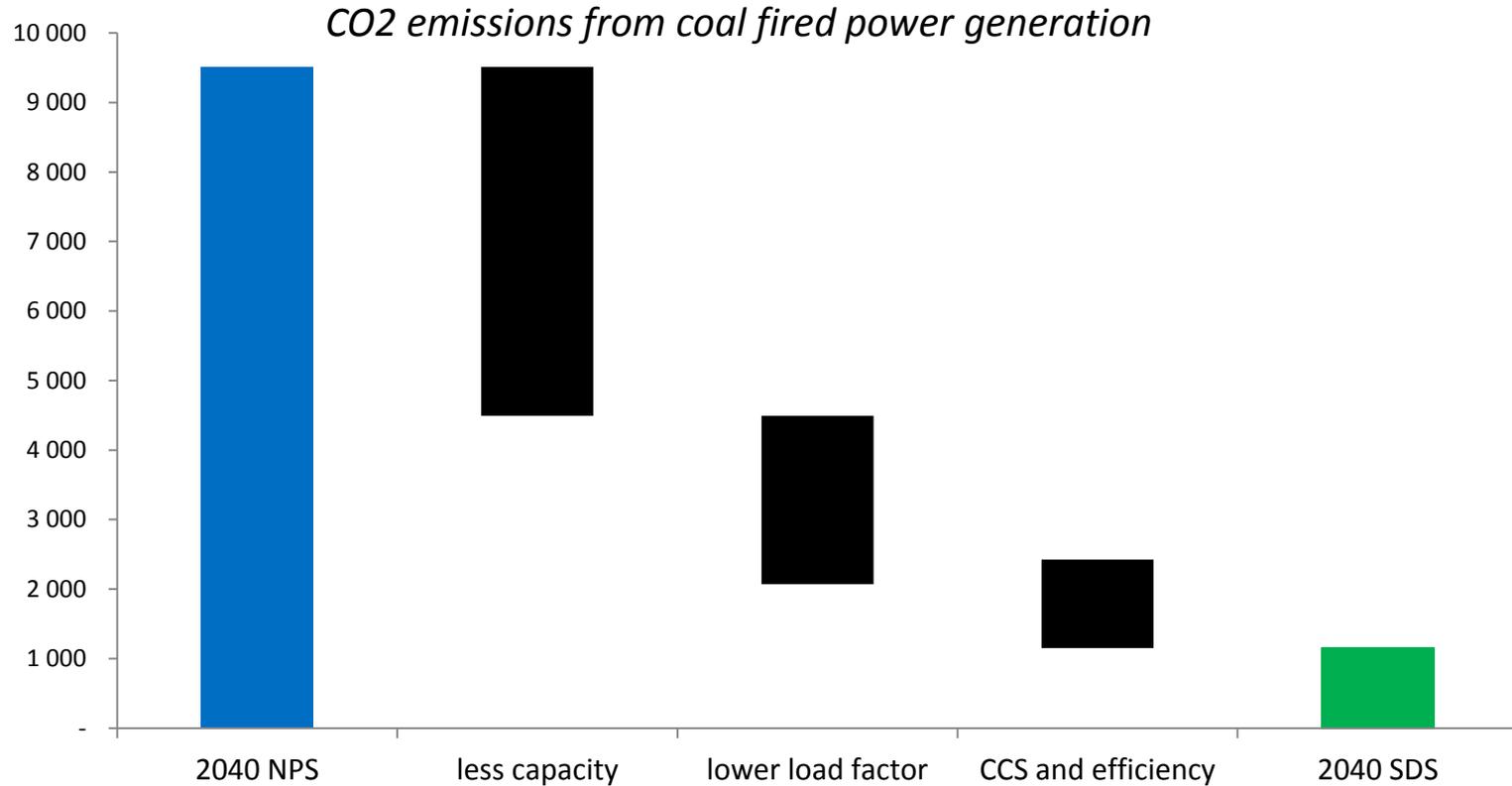
**Investment into the electricity network is an essential component of the transition**

# Energy efficiency of buildings: overcoming Baumol's curse



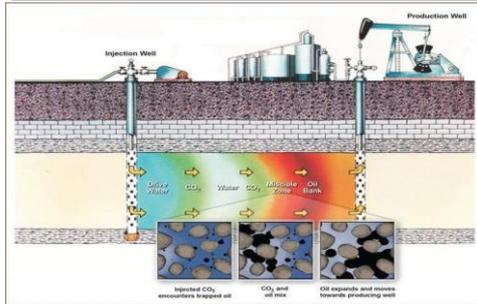
**Strong building standards, targeted financing policies and a focus on air conditioning is essential to put the building sector on track**

# Hardly any room for coal plant emissions in the carbon budget



**In SDS there is little new coal plant investment and most face CCS retrofit or early retirement**

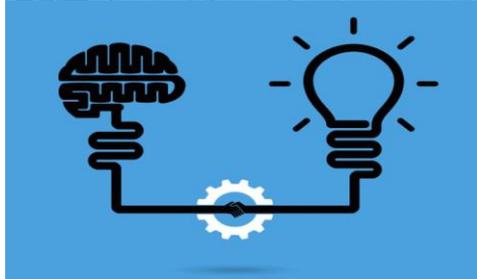
# Carbon capture and storage: coming back to the game



USA: 45Q creates a new, viable business model for CCUS



China: the first CCS/coal conversion project started construction



EU/Japan: increasing interest and venture capital funding into innovative utilisation pathways through H2

**CCUS investment is indispensable for a well below 2 degrees stabilization**

## *The three best selling vehicles in North America*



**In most major car markets the average size of new cars is increasing.**

# A self driving electric future for transport, this time for real



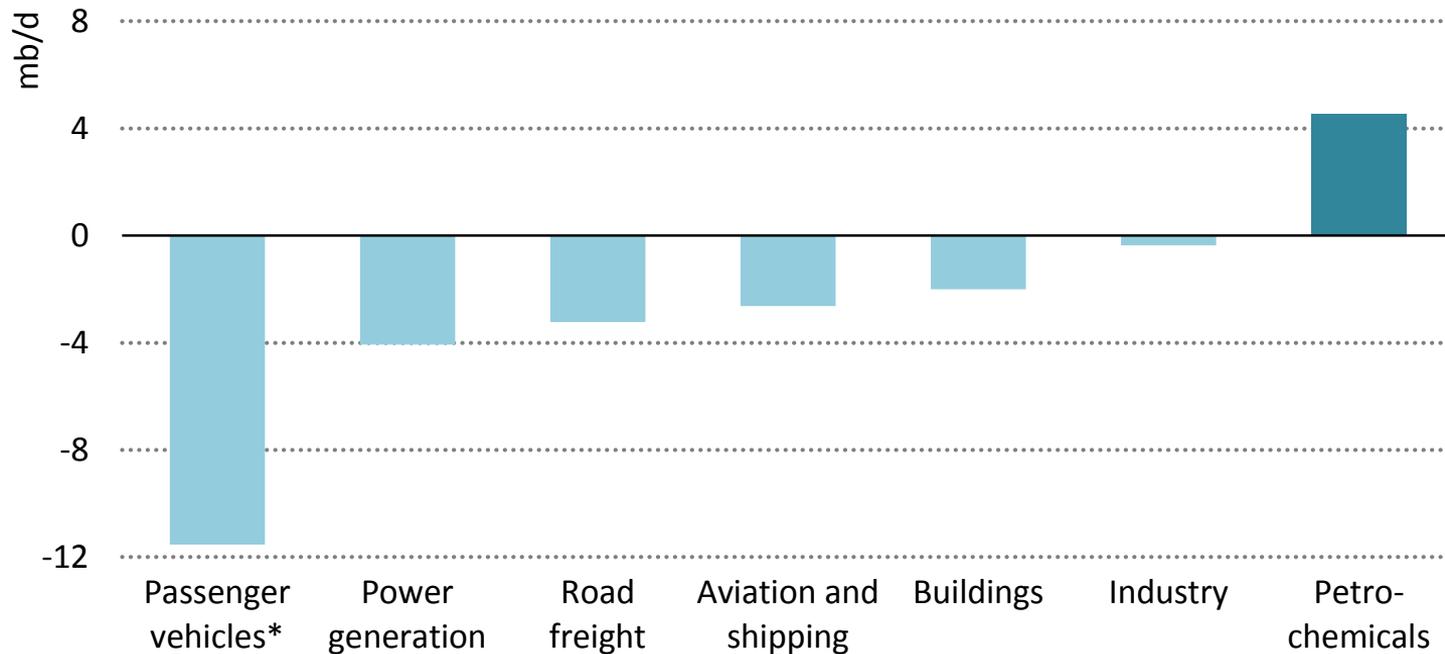
**ELECTRICITY MAY BE THE DRIVER.** One day your car may speed along an electric super-highway, its speed and steering automatically controlled by electronic devices embedded in the road. Highways will be made safe — by electricity! No traffic jams . . . no collisions . . . no driver fatigue.

## Power Companies Build for Your New Electric Living

# In SDS by 2030s global oil demand decline exceeds 1 million B/day annually



*Change in global oil demand in the Sustainable Development Scenario*



**But even in SDS, oil serves the majority of transport energy needs till 2040.**

## GE to Cut 12,000 Jobs in Its Power Business

By **Rick Clough**

07 December 2017 12:09 Updated on 07 December 2017 16:50

January 26, 2018 6:05 am JST

### Renewable energy rise forces layoffs at Mitsubishi Hitachi Power

Rival manufacturers of fossil-fuel power stations also cutting jobs

BUSINESS NEWS NOVEMBER 16, 2017 / 4:05 PM / 3 MONTHS AGO

## Siemens to cut 6,900 jobs to tackle flailing turbines business

### *G.E. Cuts Jobs as It Navigates a Shifting Energy Market*

By TIFFANY HSU and CLIFFORD KRAUSS DEC. 7, 2017

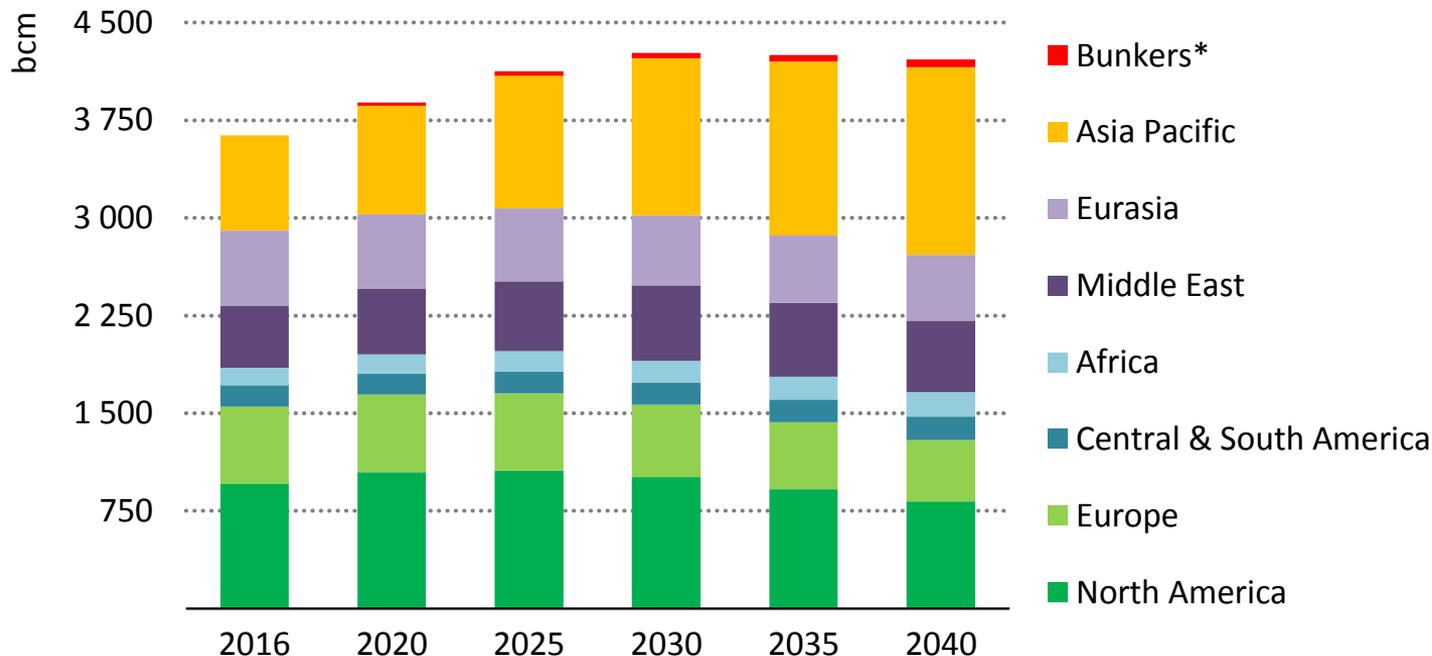
## GE and Siemens: power pioneers flying too far from the sun

The two industrial titans are struggling to cope with the disruption to their business models from wind and solar

by **David Crooks** in New York and **Patrick McGee** in Frankfurt NOVEMBER 12, 2017

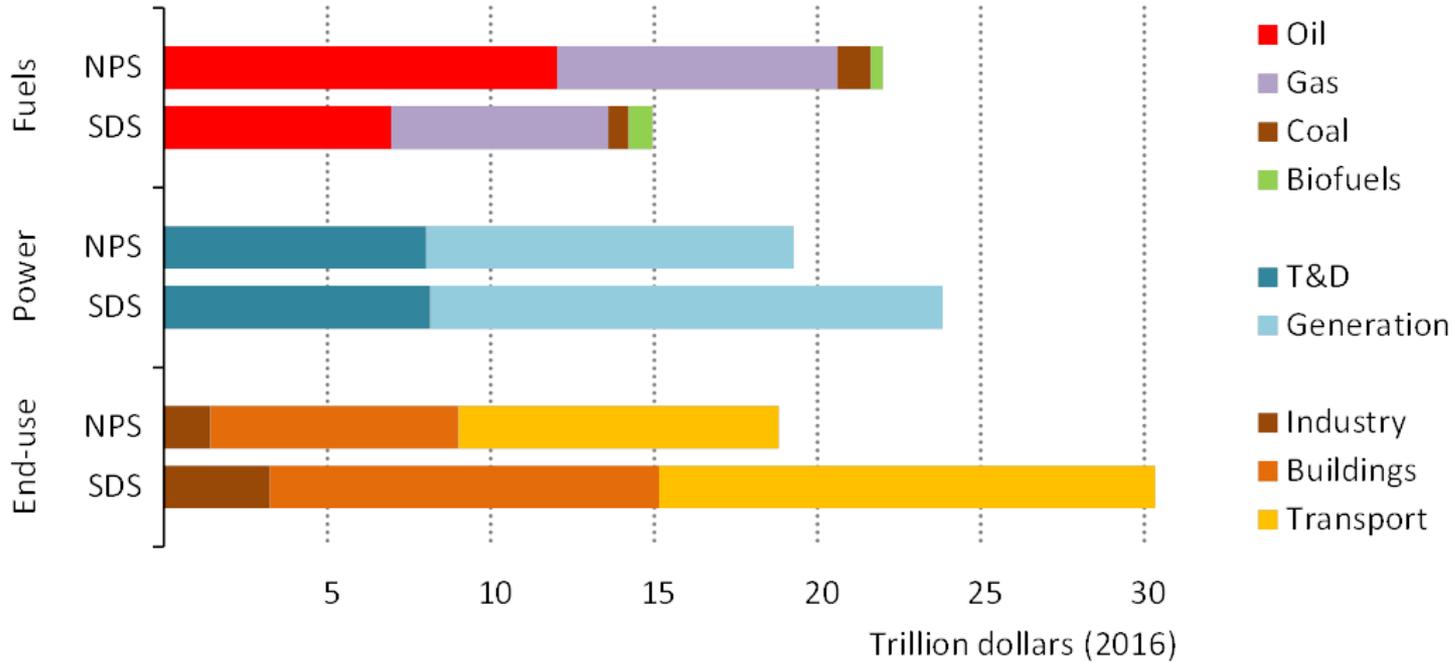
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# Gas benefits from switching from coal and growth in chemicals and remains essential for electricity security and balancing renewables



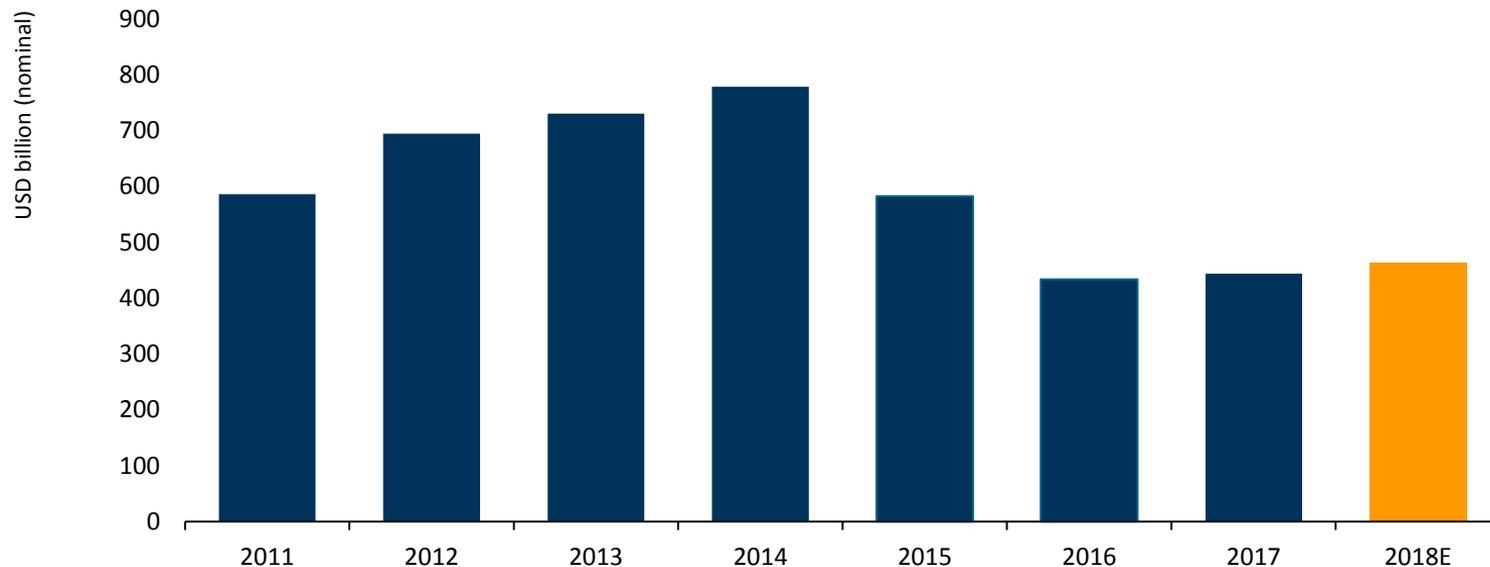
**Due to the current dominance of coal, Asia represents a higher share of global gas demand in SDS than in NPS maintaining a need for LNG investment.**

# Oil and gas investment remains substantial in SDS



**Even the robust policy assumptions of SDS lead to a lower demand decline than the natural depletion of production.**

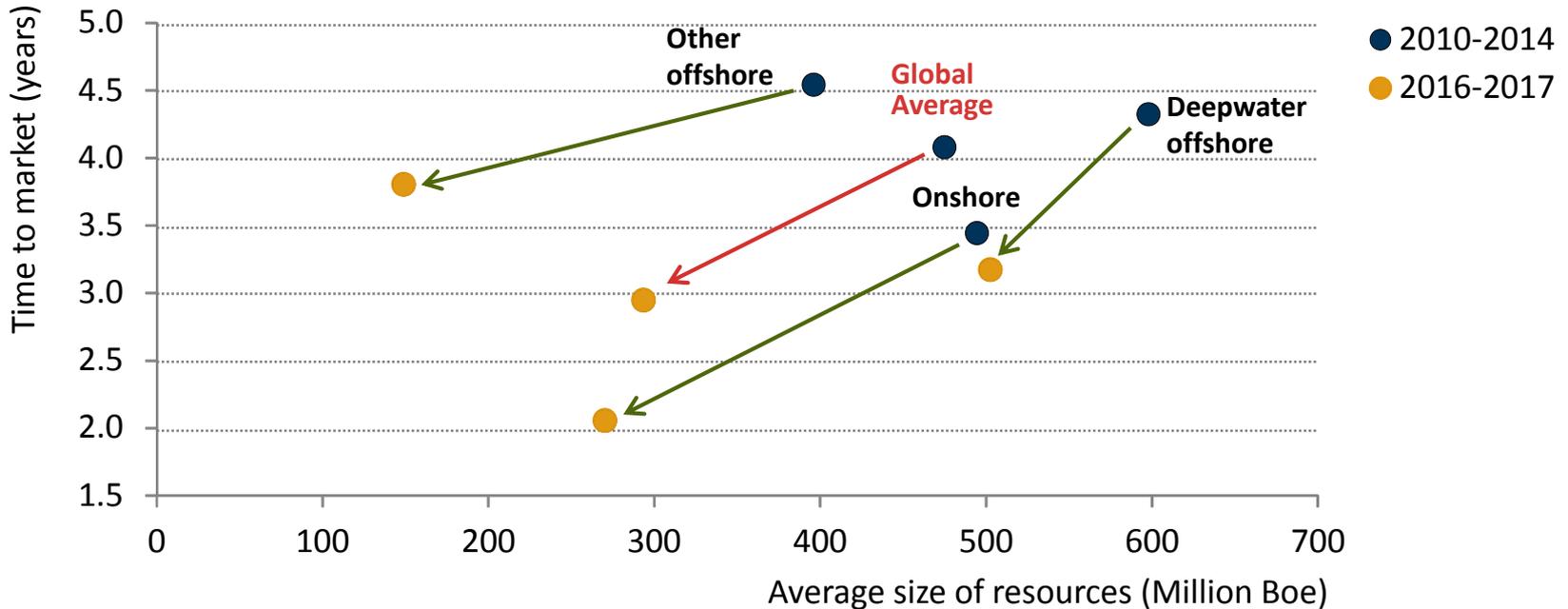
## Global oil and gas upstream capital spending 2010-2017



**The cyclical downturn from 2015 generated a proportionally bigger investment decline in two years than the NPS to SDS transition.**

# 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.**

