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Investment flows signal a reorientation of the global energy system





USD 1.8 trillion



An 8% reduction in 2015 global energy investment results from a \$200 billion decline in fossil fuels, while the share of renewables, networks and efficiency expands

Energy efficiency and low fossil fuel prices



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Unprecedented wave of investment cuts in the upstream oil and gas industry

Global upstream capital spending 2010-2017



Cost deflation, efficiency improvements and reduced activity levels might lead for the first time to a three consecutive years of investment decline

Conventional field development investment is inadequate for a decarbonising system



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Gas as a heavy duty transport fuel



- An electric heavy duty truck would need a 5 tons battery
- Urban particulate pollution from diesel trucks
- High mileage and often stopgo traffic
- Shipping: SO2 regulation on bunker fuel

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Coal and gas-fired power investment in Asian markets (2015)



Asian markets comprised 85% of global coal power investment, while N. America and Middle East, with robust infrastructure, favoured gas for new fossil fuel power

"Aging" coal capacity

Young and old coal capacity, 2015



A third of global coal capacity is less than 10 years old, their operation can constrain gas demand for years to come

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CCS good news depend on oil market developments





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EOR oil pays for clean coal

Large oil and gas projects with an integrated CCS component

For every single CCS project that has succeeded in real life hydrocarbon revenues played an important role

Global nuclear investment is driven by China and Russia





- China: a new reactor every quarter
- Rosatom: 9 reactors under construction in Russia with vertical integration
- Technology + construction + finance agreements in
 Vietnam, Turkey, Belarus,
 Egypt etc
- Are the financing packages sustainable at 50 \$/barrel?

In Europe and the US new construction failed to compensate for decomissionings

Renewables investment buys much more electricity Investment

Global renewable power investment

USD 2015 billion 350 +0% 300 250 200 150 100 50 0 2011 2013 2015

Generation from investment in capacity



Investment from renewables-based capacity more than covers 2015 global electricity growth. Wind leads, surging 35% in 2015 on economics and record offshore growth.

Renewable costs: technology, financing and location

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Wind and solar PV average investment costs and PPA prices in the United States



EU electricity: asset write downs and new renewable world Energy 20 Investment 16



The so called "Decentralized" renewables





Despite attractive valuations, physical investment is stagnating

Electricity networks investment per total network length, 2010-15

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Most renewable deployment is integrated into a legacy network

North American flaring

LTO slowdown enables midstream to catch up

Russia, Nigeria, Iraq

Investment capability, geopolitics, and other priorities...

Distribution

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Investment capability of utilities