



Renewables 2017

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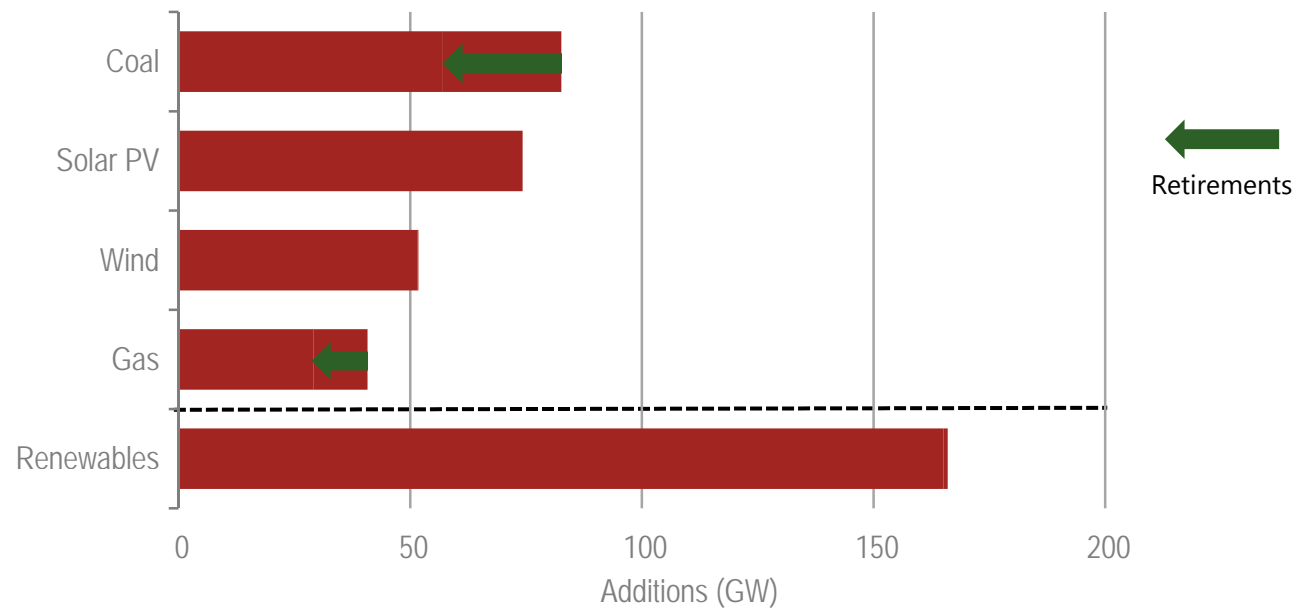
Spanish Energy Club, Madrid – 29 January 2018

- Three numbers and three core global energy challenges:
 - *6.5 million premature deaths each year can be attributed to air pollution*
 - *2.7 degrees is the temperature increase under current climate pledges*
 - *1.2 billion people don't have access to electricity and universal access to modern energy remains a distant goal*
- Renewables contribute to meeting all these challenges

Solar PV breaking records



Power capacity additions by fuel 2016

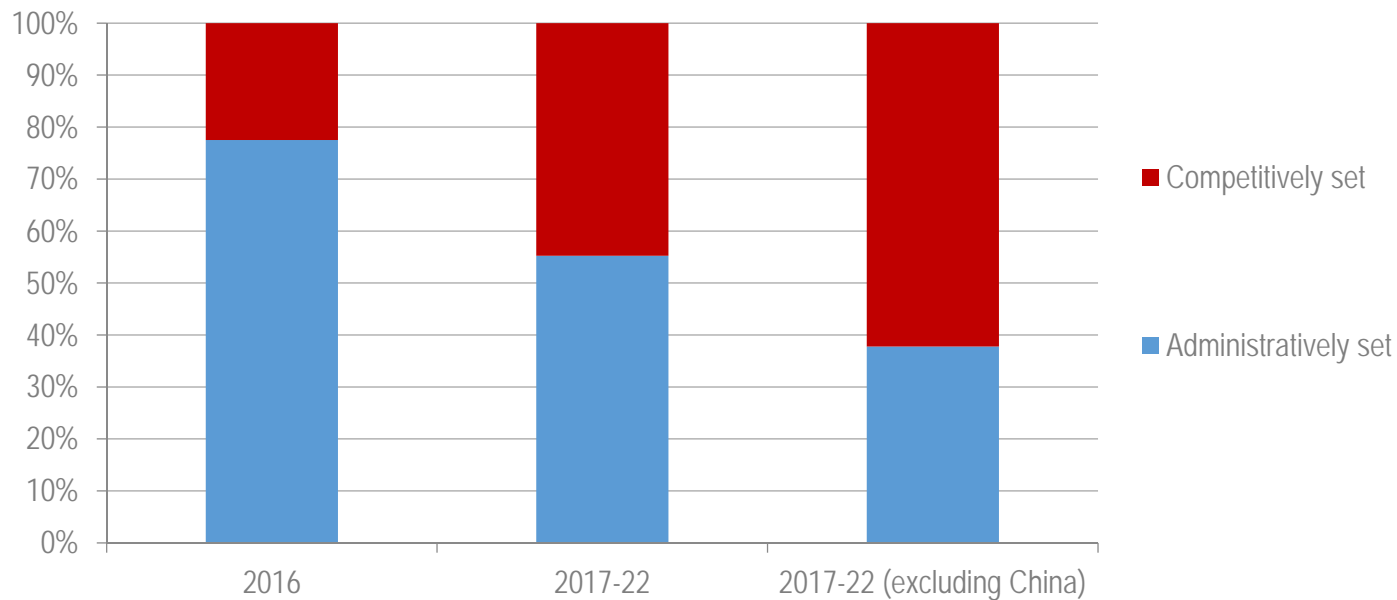


**Renewables breaking an all-time record accounting for two thirds of global net capacity additions;
For the first time solar PV becoming the global leader in net capacity growth**

Renewable policies spurring more competition



Renewable capacity growth by type of policy defining remuneration levels

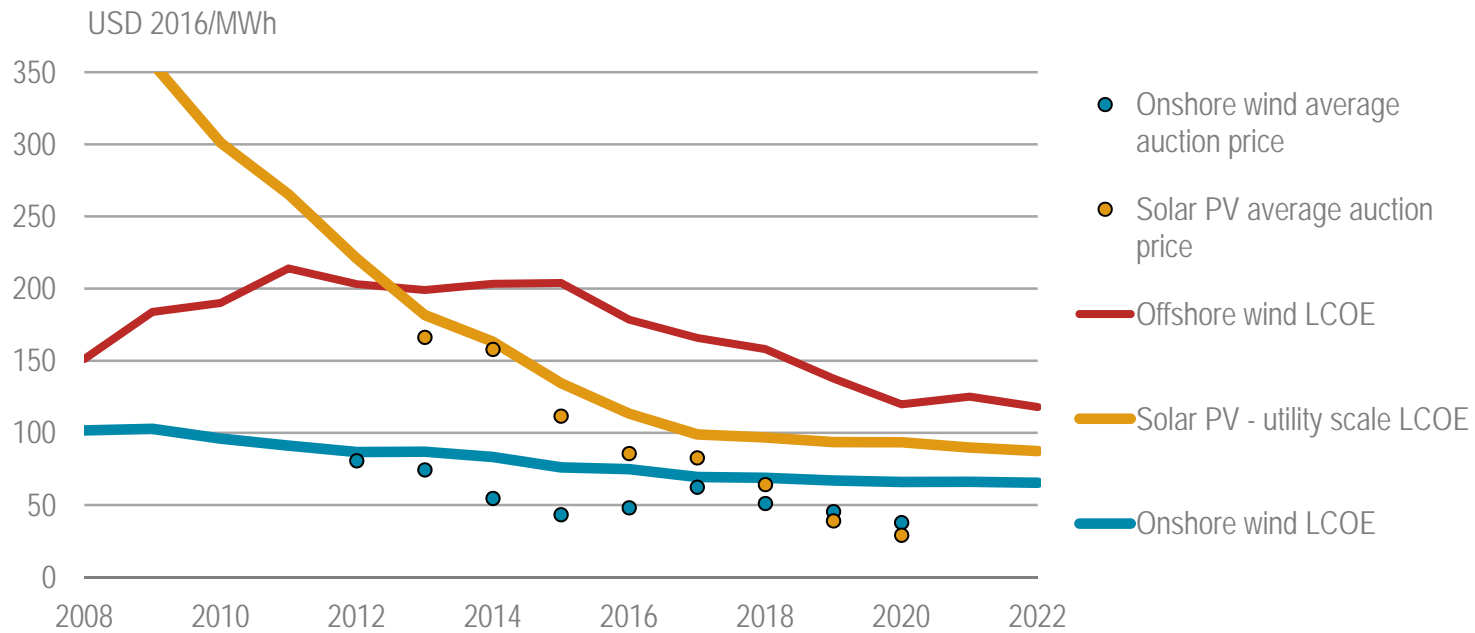


Competitive tenders with long-term contracts will drive almost half of new capacity growth globally; the timing of policy transition in China may accelerate further this trend

Competition driving costs down



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

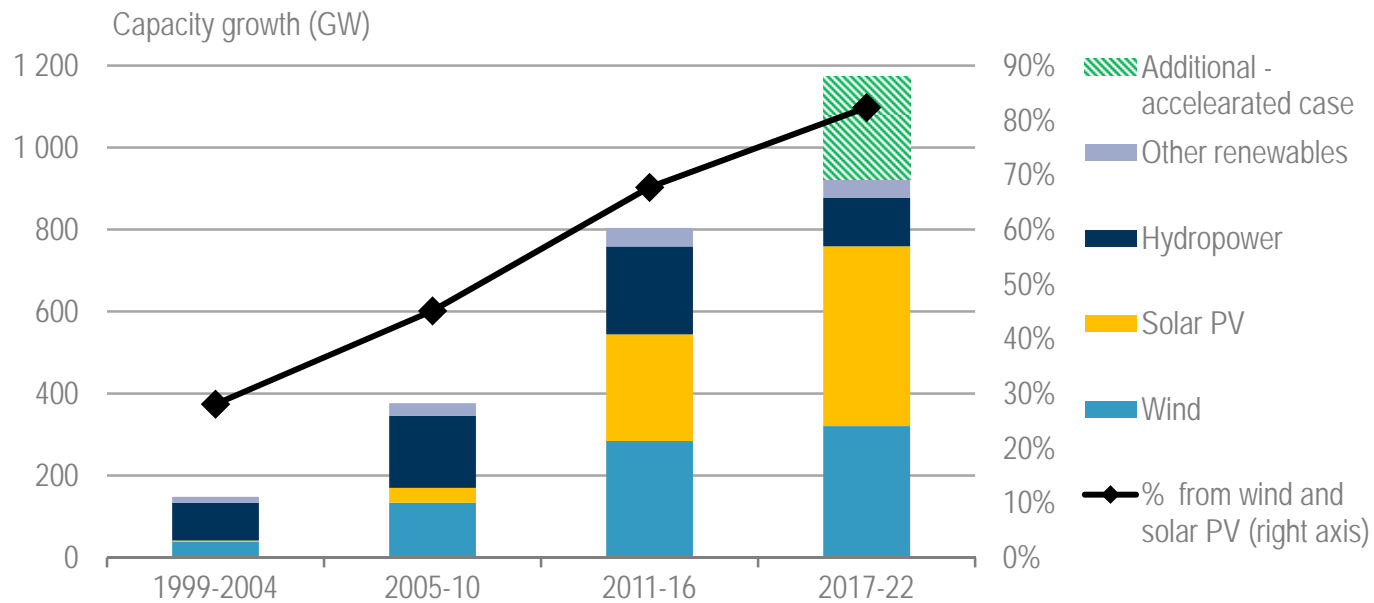


Price discovery through competitive auctions effectively reduces costs along the entire value chain

Renewables growth more and more dependent on wind and solar



Renewable electricity capacity growth by technology

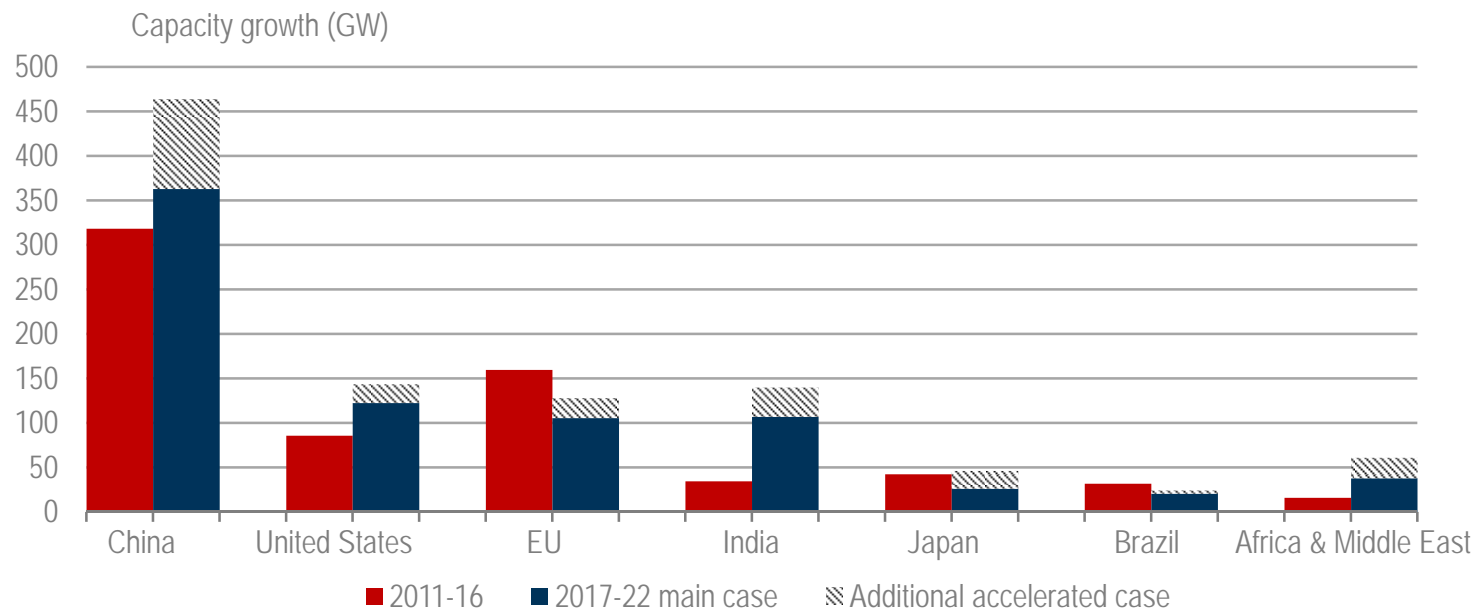


Solar PV enters a new era, becoming the undisputed leader in renewable power capacity growth; PV also accounts for 60% of the upside potential in the accelerated case

China continues to lead growth while India overtakes the EU



Renewable capacity growth by country/region

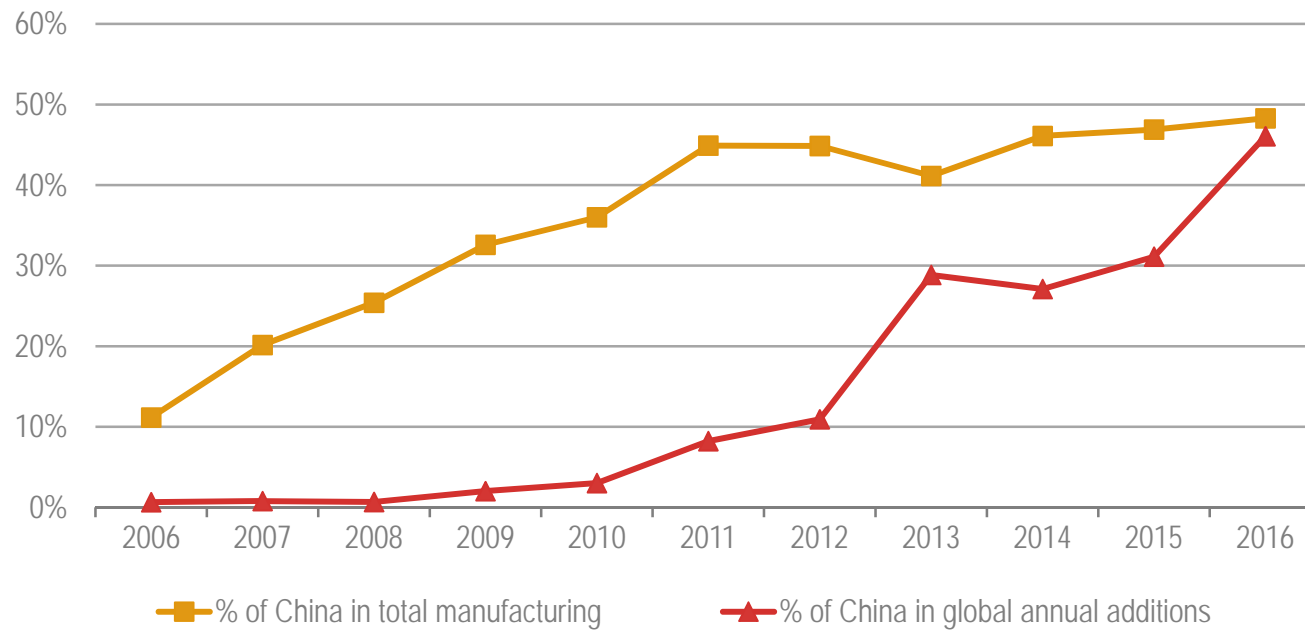


The forecast is 12% more optimistic vs. last year mainly due to solar PV revisions in China and India; Growth could be 27% higher with enhanced policies addressing regulatory uncertainties and grid integration

China holds the key to the new solar PV era



China's share in global solar PV manufacturing and demand

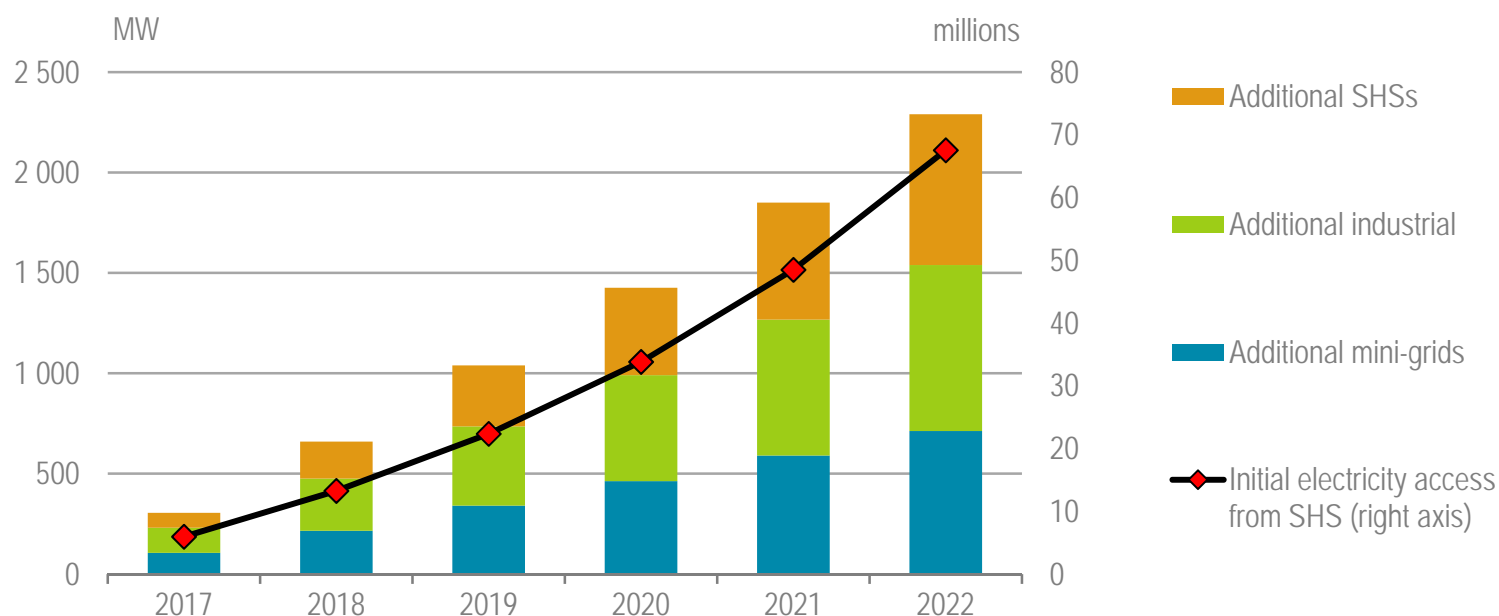


China influences the global market volumes and prices of solar PV

Solar PV enabling electrification in India, Bangladesh and sub-Saharan Africa



Cumulative growth of off-grid solar PV applications in developing Asia and sub-Saharan Africa

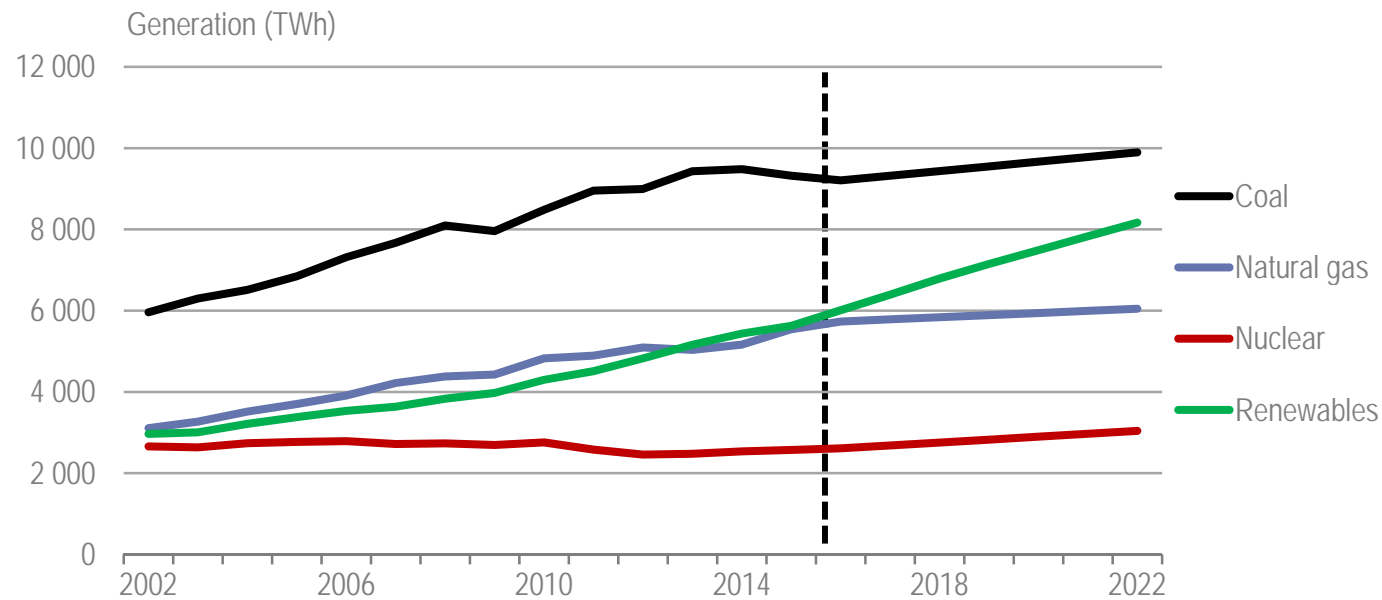


With government policies and innovative business models, off-grid PV capacity triples in Africa and developing Asia. Small home systems bring initial electricity access to almost 70 million by 2022

Renewables closing the gap with coal



Electricity generation by fuel

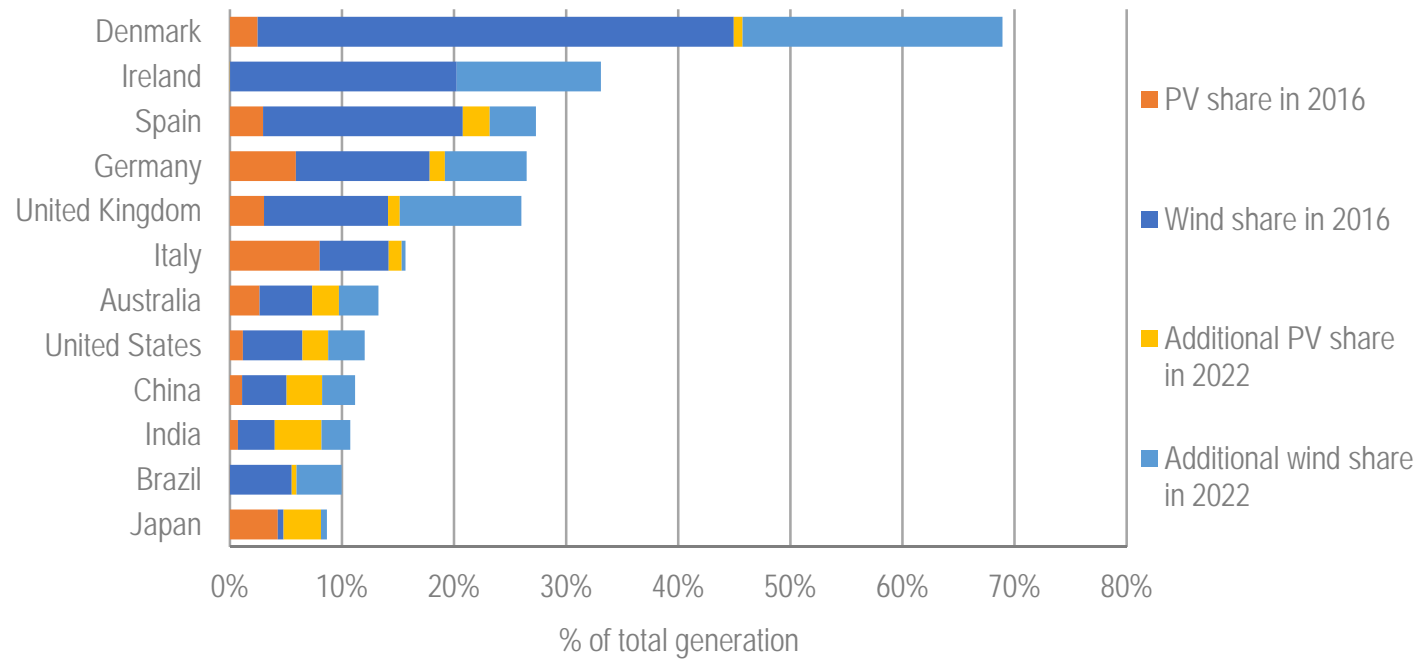


Renewable generation to expand by over a third with its share increasing from 24% in 2016 to 30% in 2022, rapidly closing the gap with coal

Wind and solar transforming power sector - system integration becomes key



VRE share in annual electricity generation 2016-22

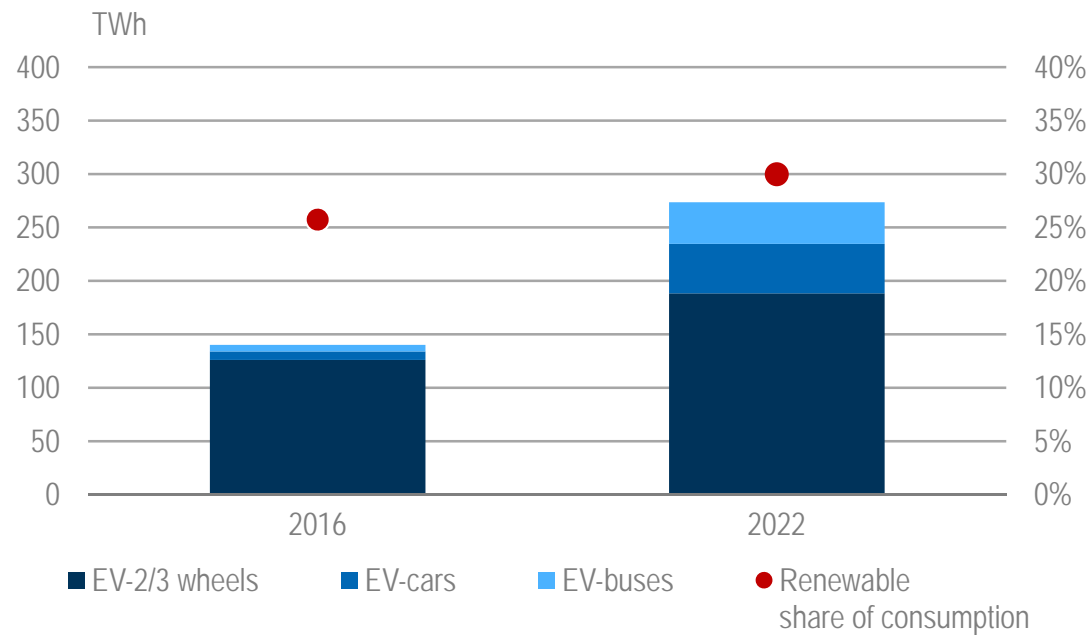


More flexible power systems, adapted market design and policies will have to play a key role in integrating larger shares of wind and solar in a secure and cost-effective way

Renewables to supply almost a third of EV demand in 2022



Global electricity consumption by EVs and share of renewable consumption in 2016 and forecast for 2022

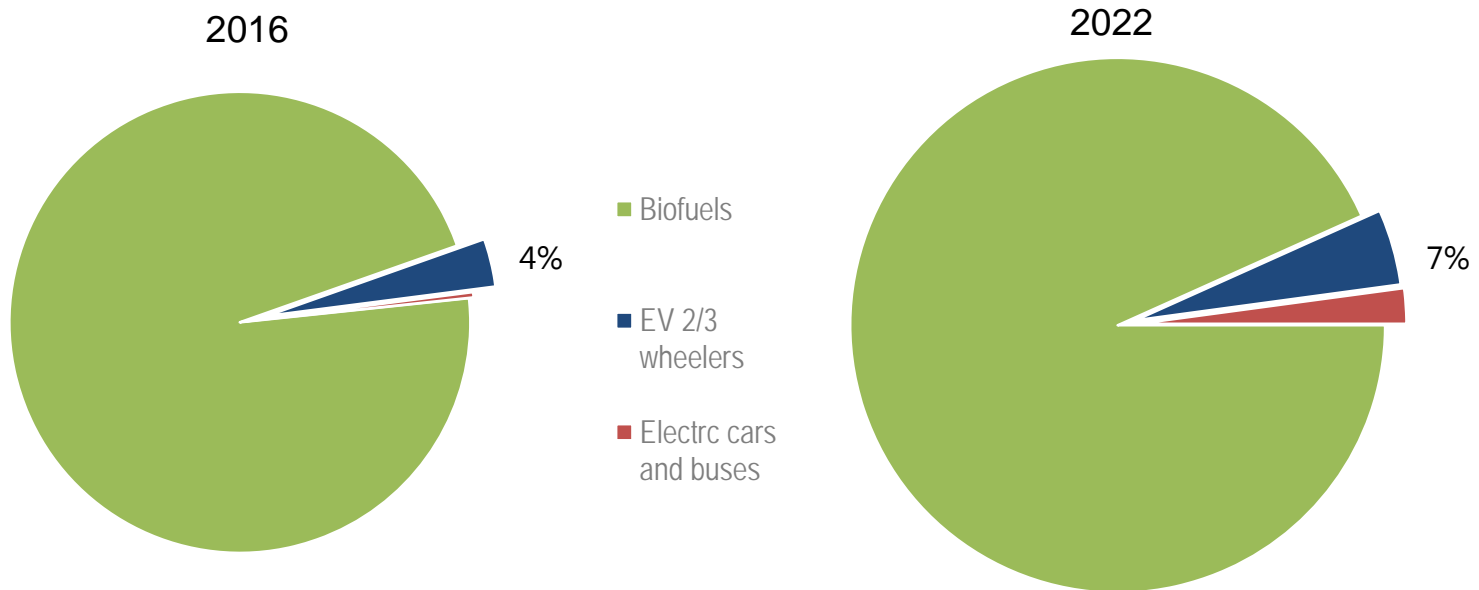


China accounts for almost 90% of global EV electricity consumption in 2022, mostly from 2/3 wheelers, and remains the largest electric car market, followed by Europe and the United States.

Surging EVs to complement biofuels in renewable transport

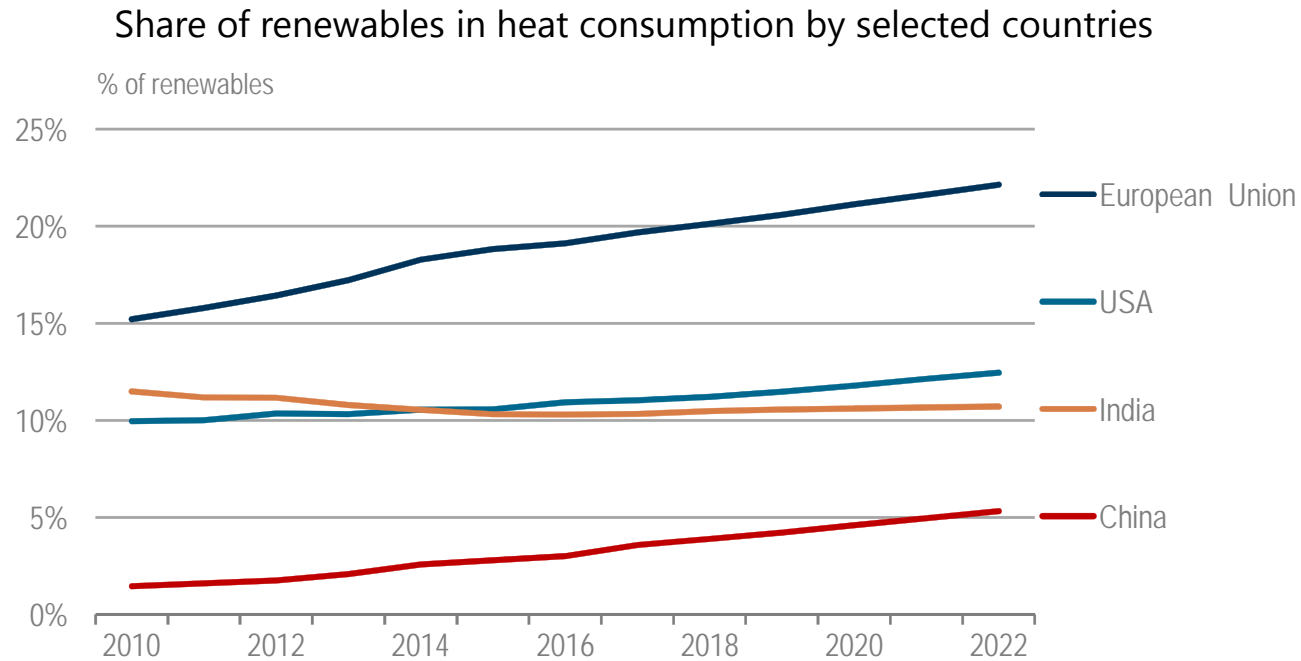


Biofuels and electric vehicles contribution to renewable energy consumption in road transport



**Share of renewables in road transport increases from 4% in 2016 to almost 5% in 2022
Biofuels represent 80% of the growth in the next five years led by Asia & Brazil**

Progress in renewable heat depends on strong policies

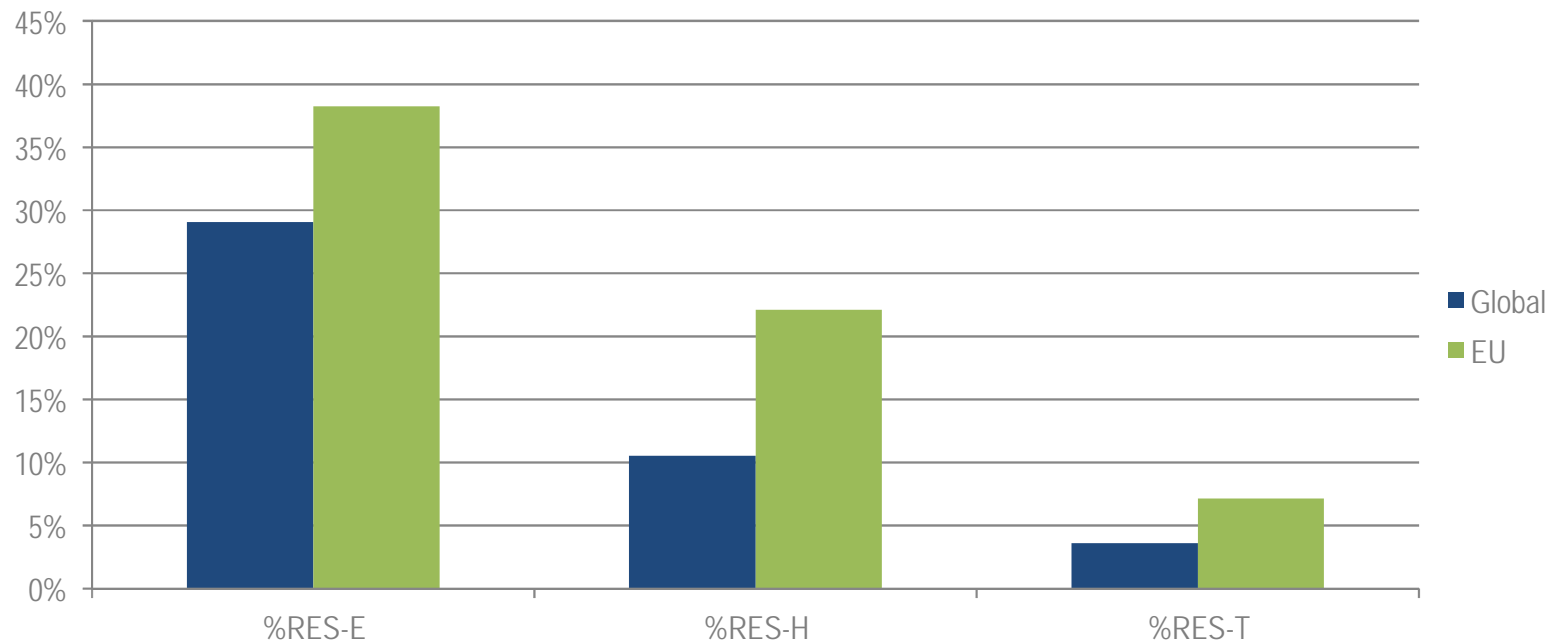


Renewables share in heat consumption rises from 9% in 2016 to 11% in 2022. China leads absolute growth with new targets; EU remains the largest renewable heat consumer while total heat demand outpaces renewables growth in India

Europe: Higher renewable penetration than global average



Share of renewable penetration by sector (2022) in EU vs Global average



Electricity only accounts for around one fifth of total final energy demand today. The next rise in renewables will require multiplying their uses in buildings, industry and transport

Concluding remarks

- Renewables rise by 1,000 GW to 2022, equal to half of current total coal capacity
- Renewables generation exceeds 8,000 TWh by 2022, equal to total electricity consumption of China, India & Germany combined
- Solar PV enters a new era leading the growth in renewables, driven by a rapid expansion in deployment & manufacturing capacity in China
- Despite rapid growth in EVs, decarbonisation of transport is a long way off
 - *Only 30% of electricity used by EVs is sourced from renewables*
 - *Advanced biofuels require specific incentives to bolster deployment*
- Policymakers have to turn their focus to system integration & expanding the use of renewables for heating & cooling

Thank you



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