

RENEWABLE ENERGY

Medium-Term Market Report 2016

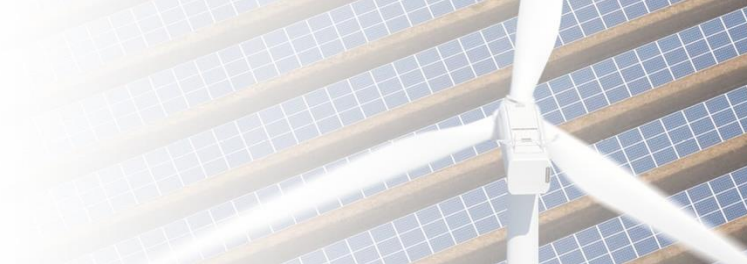
Medium-Term Renewable Energy Market Report 2016

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Market Analysis and Forecasts to 2021

Columbia University SIPA, New York, 01 November 2016

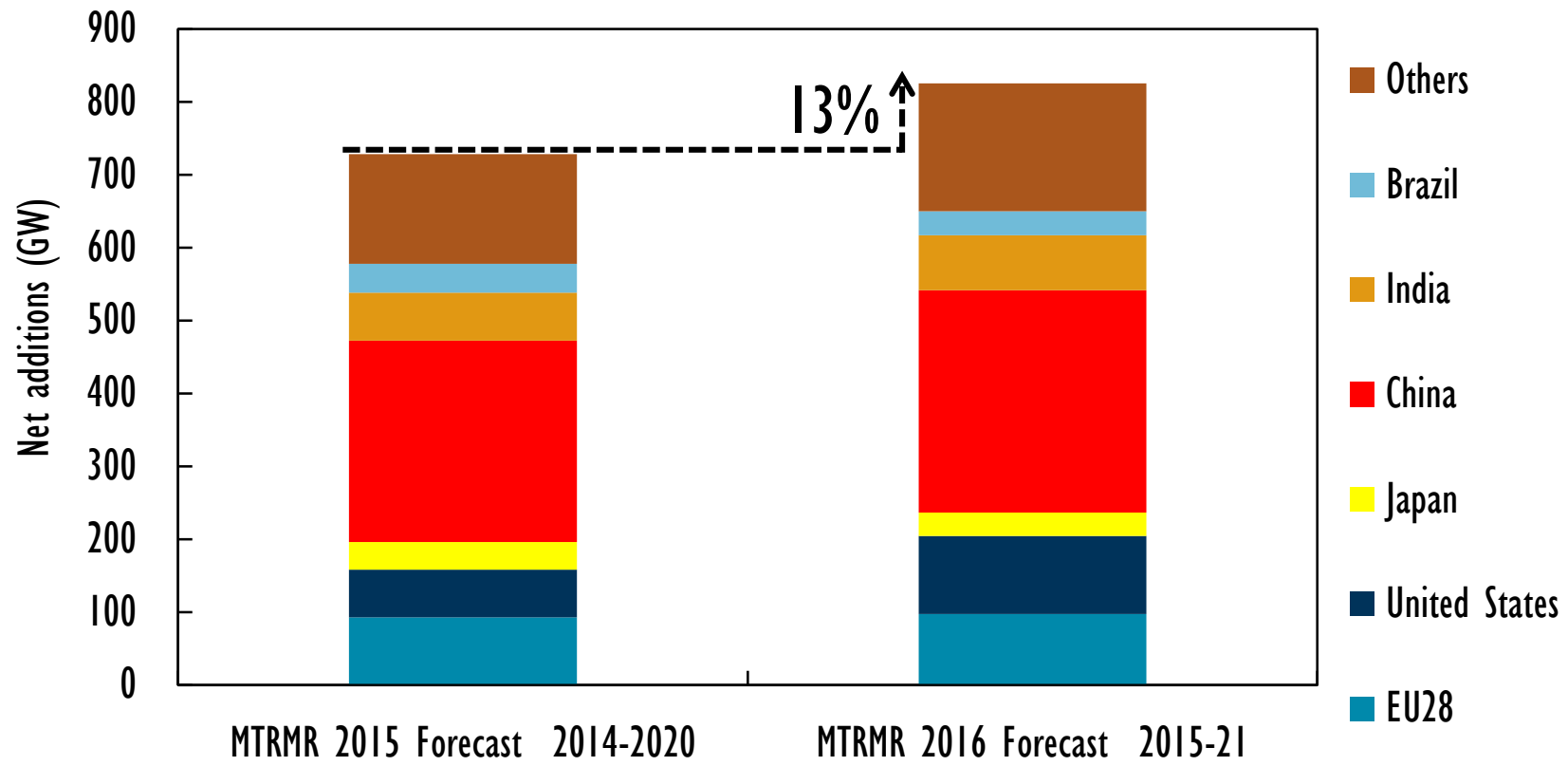
Context



- **A year of records for renewable electricity**
 - *A record amount of new capacity was installed in 2015*
 - *Total capacity has now overtaken coal*
- **COP21 Paris Agreement gives momentum to renewables**
- **Local air pollution & energy security are also key drivers**
- **Energy investment flows confirm shift to renewables**
- **But policy makers need to heighten their commitments and provide investors more clarity & certainty**

New policies underpin a more bullish forecast for renewables

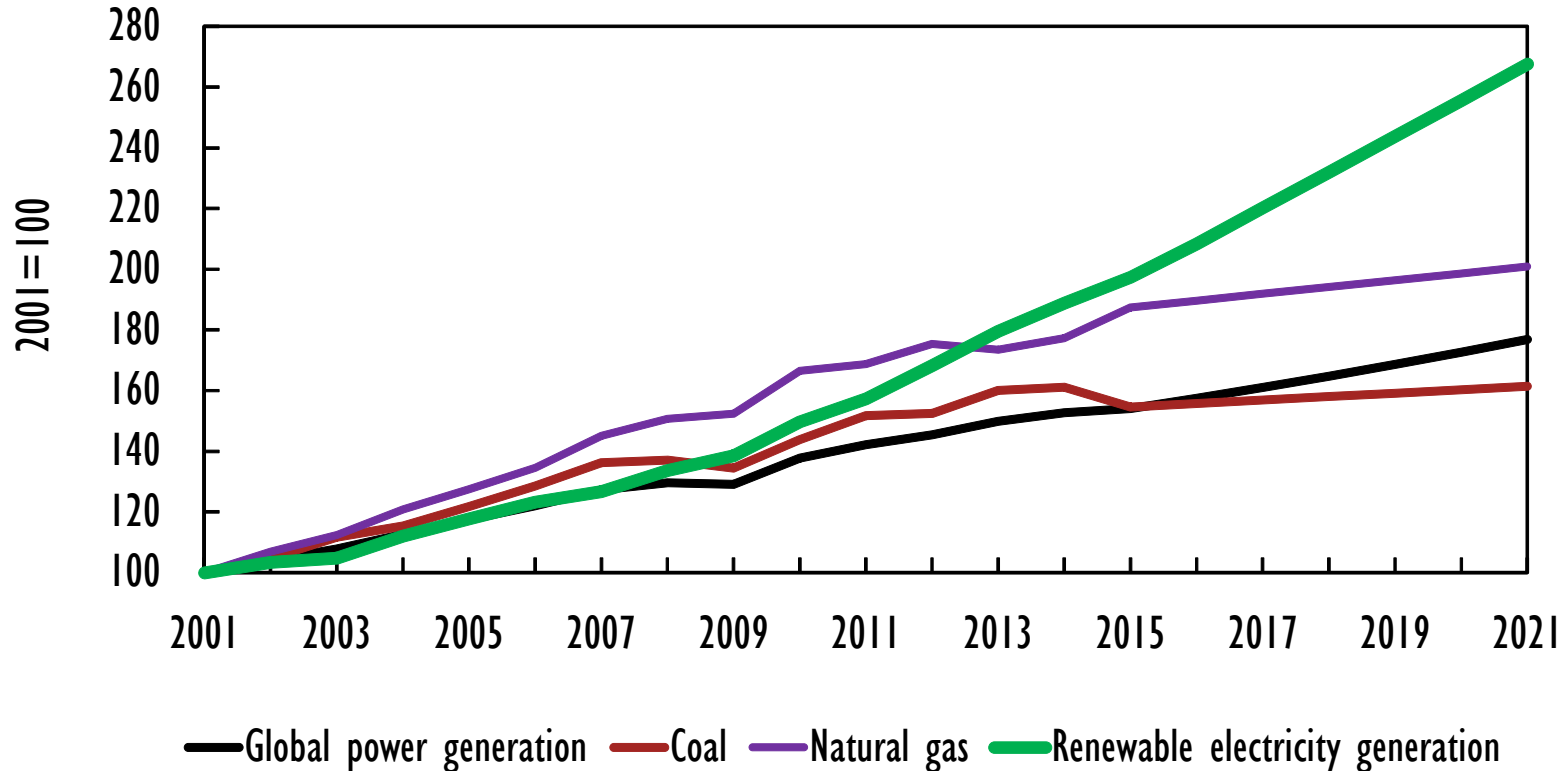
Renewable electricity capacity growth (GW) in MTRMR's main case



China remains key growth market for renewable capacity, while the United States surpasses the EU for the first time

Renewables to remain fastest growing source of electricity generation

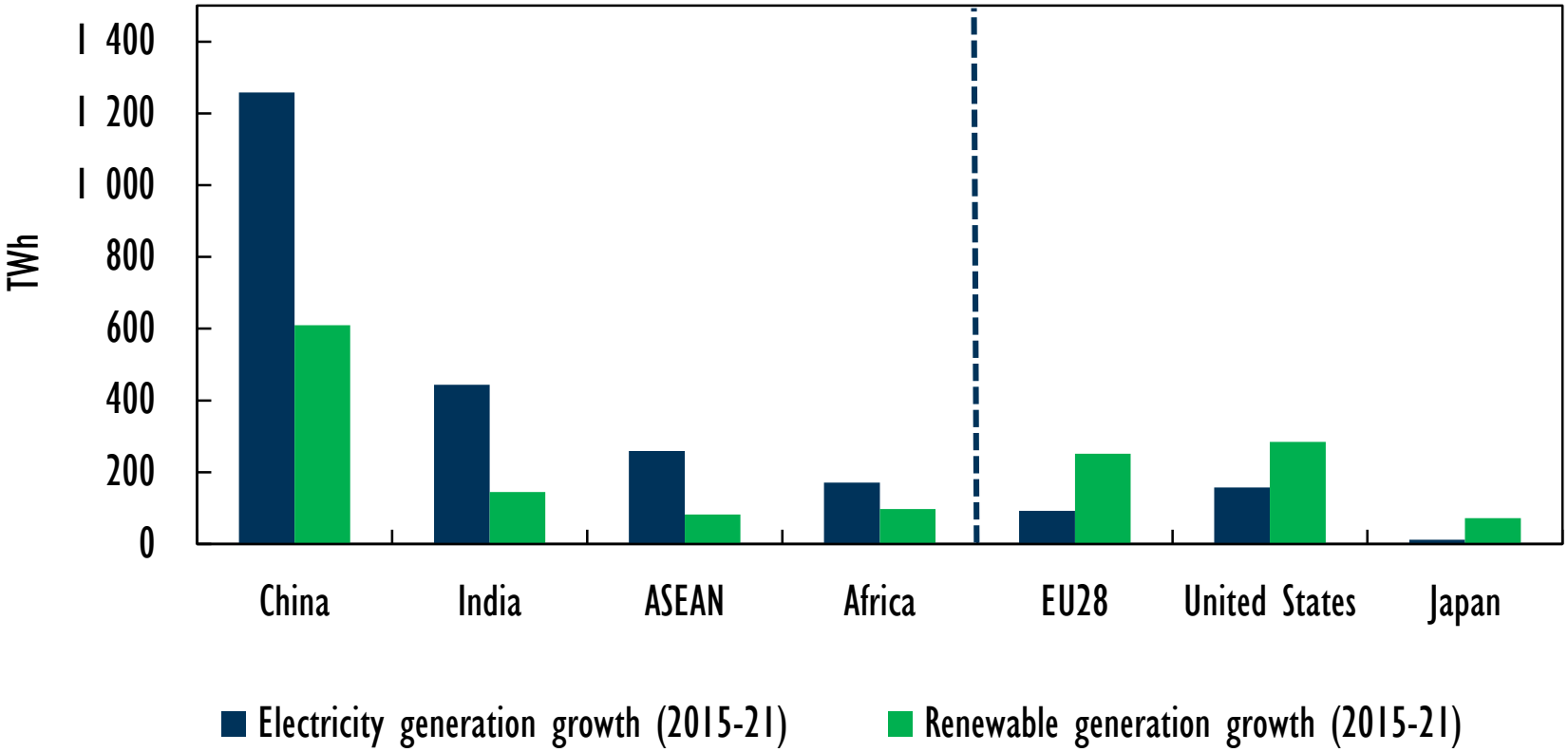
Indexed electricity generation by fuel (2001-21)



Generation from renewables to rise by almost two-fifths over 2015-2021, pushing their share of total electricity generation from 23% to 28%

A two-speed world for renewable electricity

Electricity and renewable generation growth by country/region

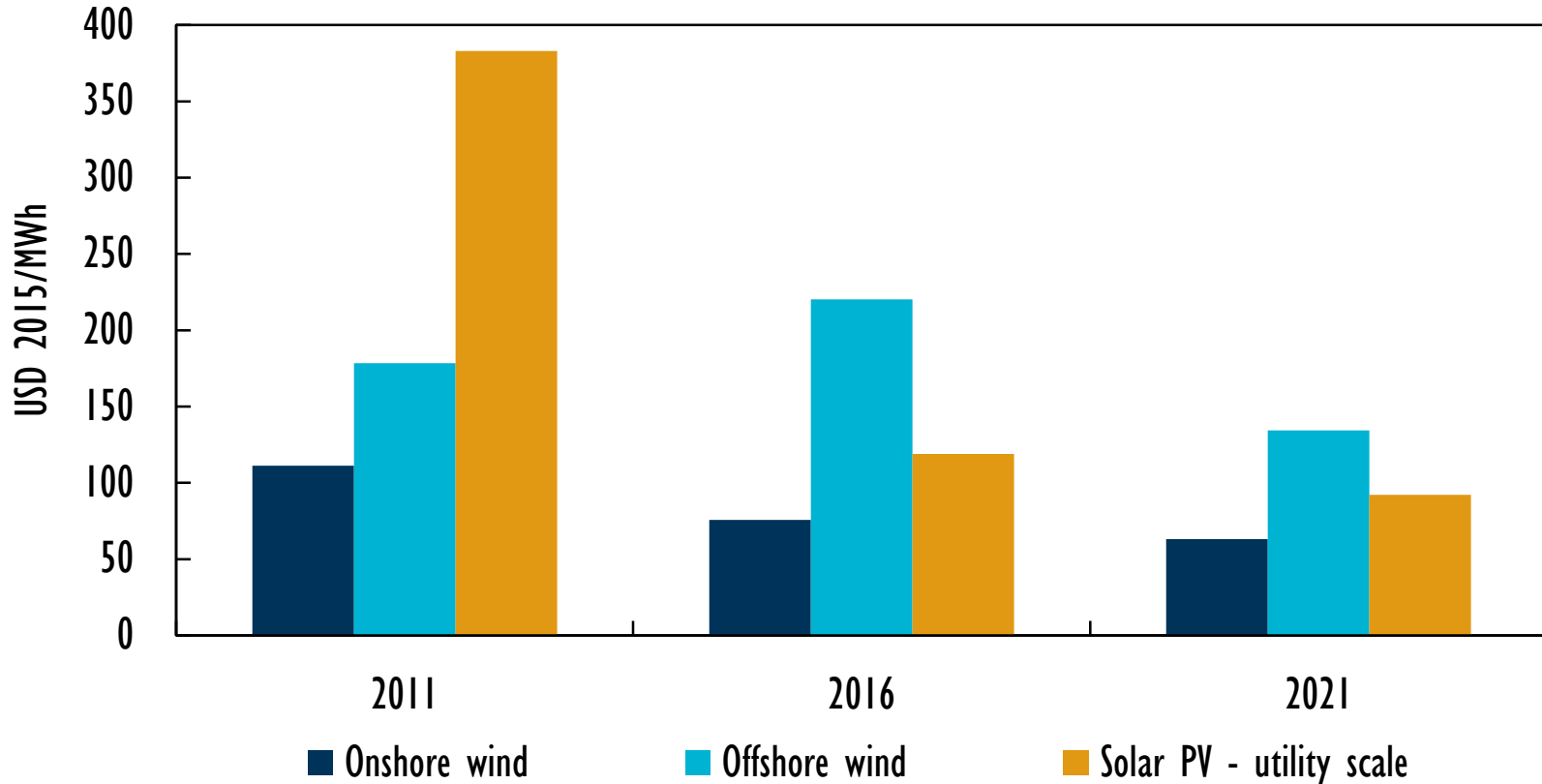


Source: Total electricity generation from World Energy Outlook 2016, forthcoming.

The increase in generation from renewables in 2015-2021 represents 60% of the global increase in electricity output, but prospects vary across regionally

Renewable costs reductions to remain an important driver for future growth

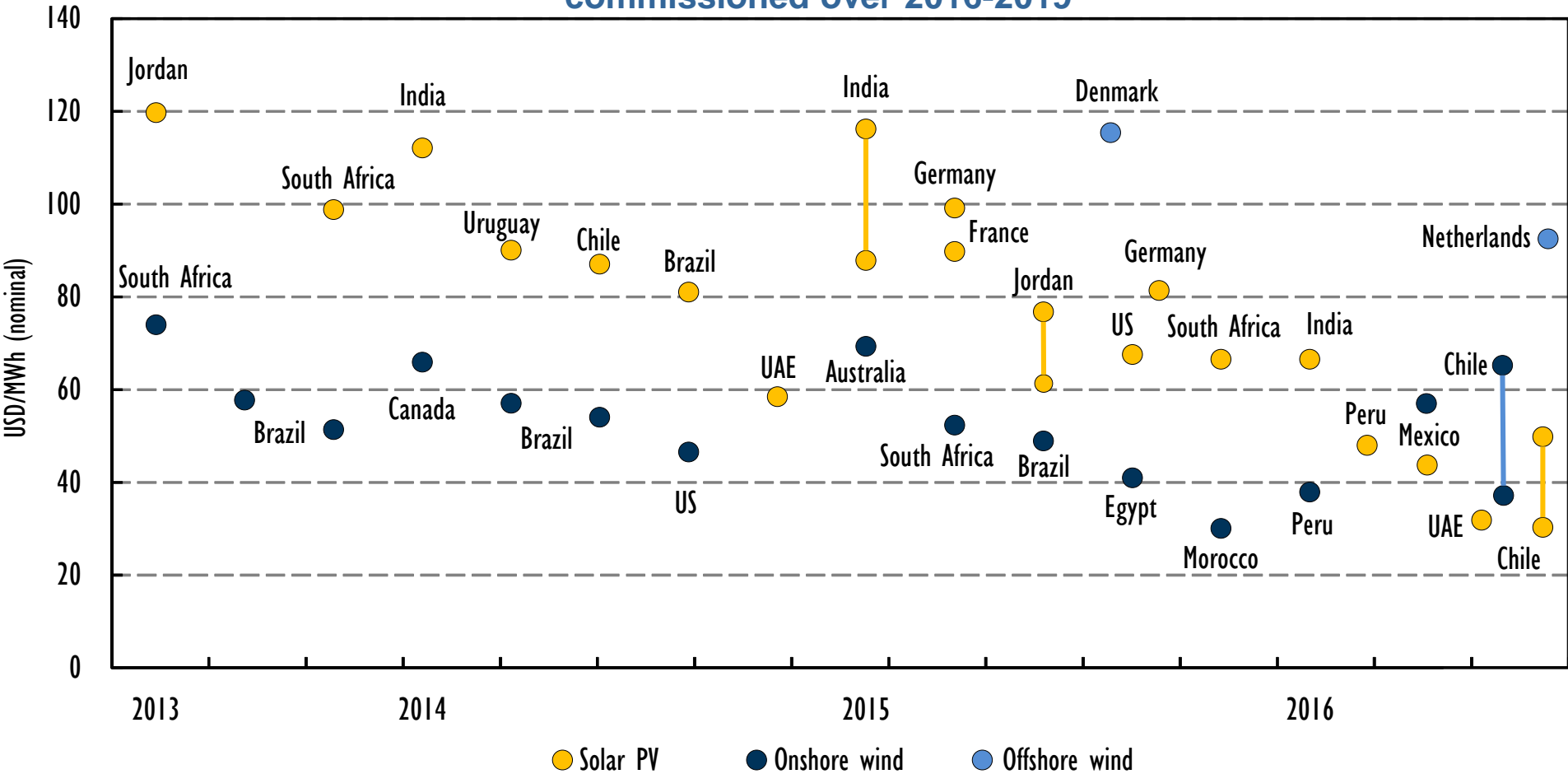
Weighted average generation costs for solar PV and wind



Utility-scale solar PV generation costs to fall by another quarter and onshore wind by 15% over 2015-21, largest absolute cost reduction expected from offshore wind

Policy transition from government-set tariffs to policy-driven auctions/tenders

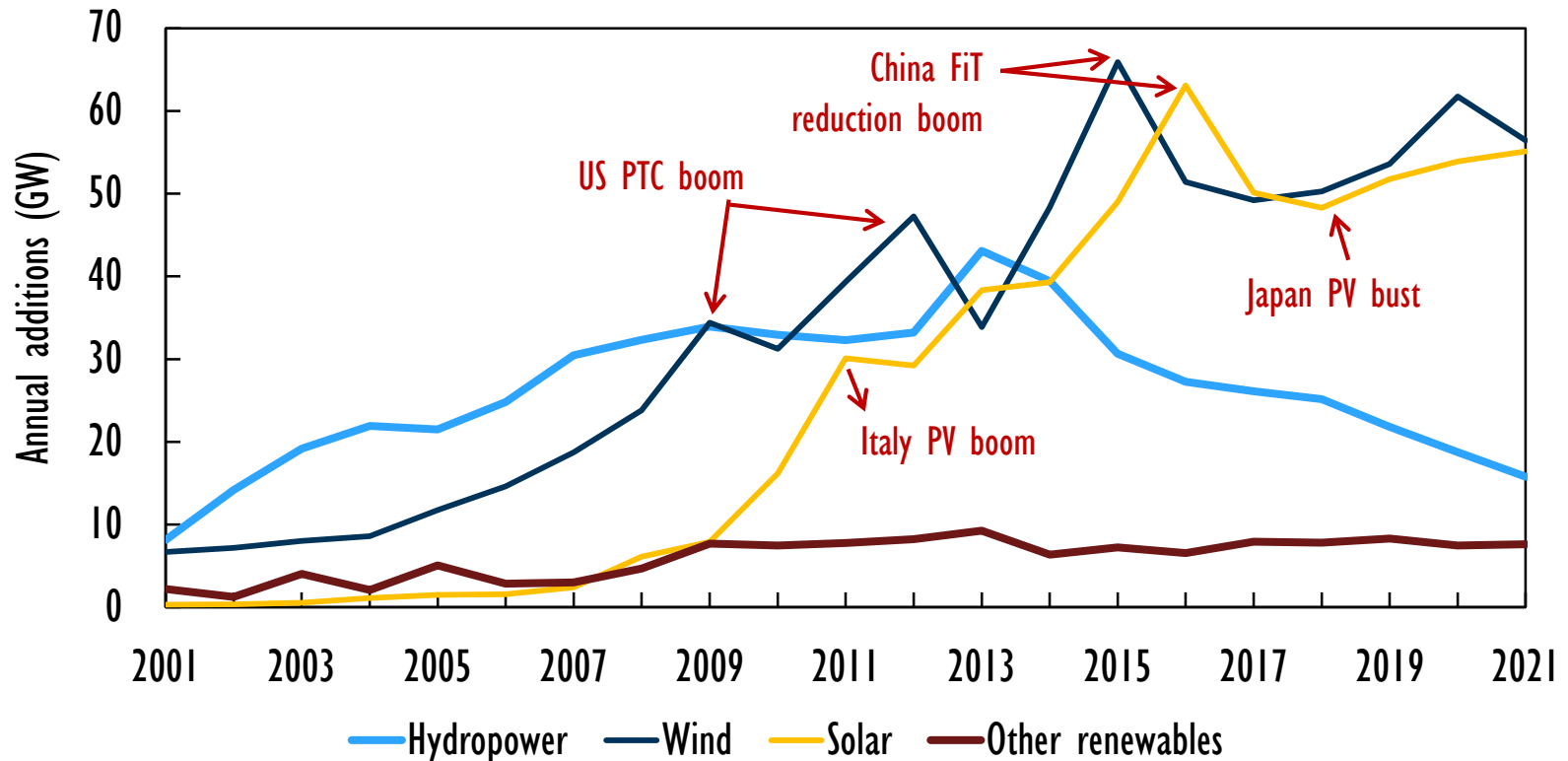
Recent announced long-term contract prices for new renewable power to be commissioned over 2016-2019



Best results occur where price competition, long-term contracts and good resource availability are combined

Wind and solar PV compensate for slower hydropower growth

Renewable electricity capacity additions by technology (2001-21)

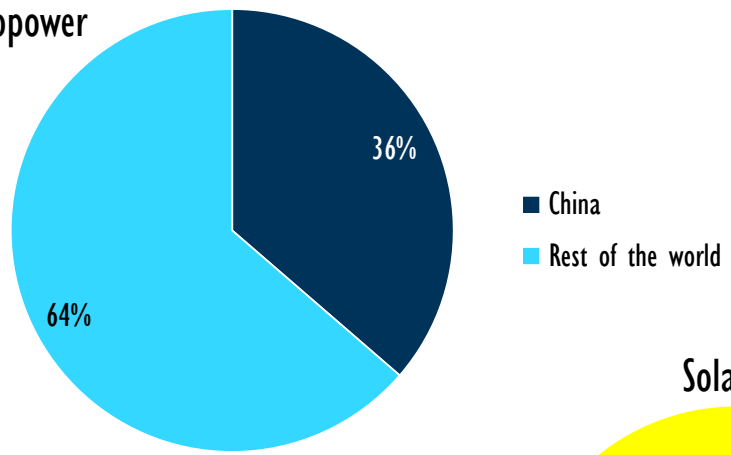


Predicting policy-driven boom and bust cycles remains a challenge, which is expected to continue over the medium-term.

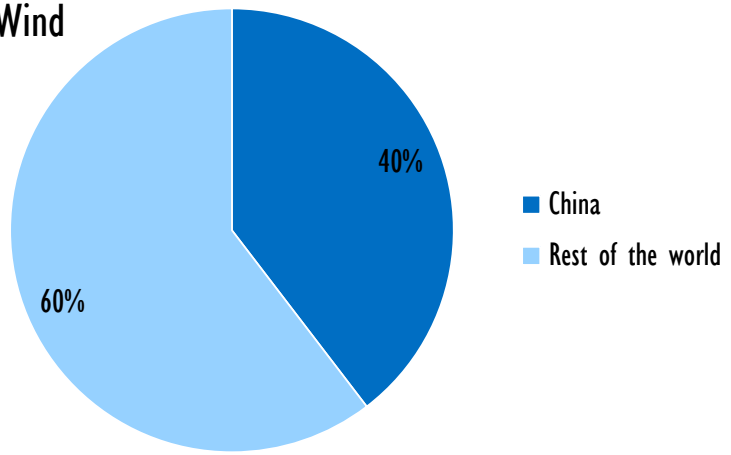
China is the undisputed leader of renewable capacity growth

Share of China in global renewable capacity growth(2015-21)

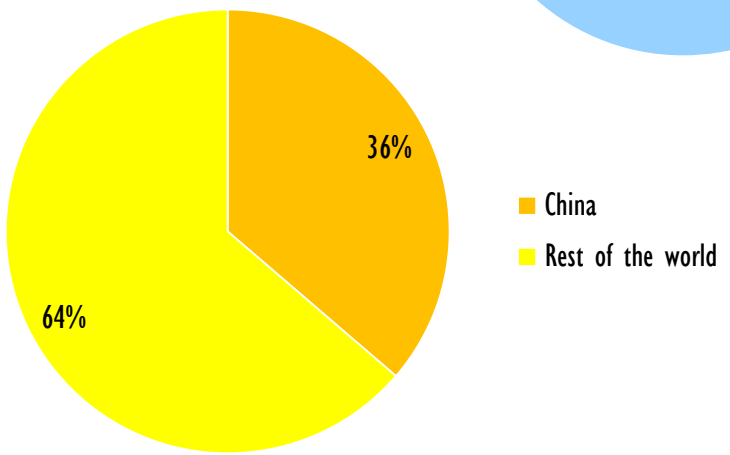
Hydropower



Wind



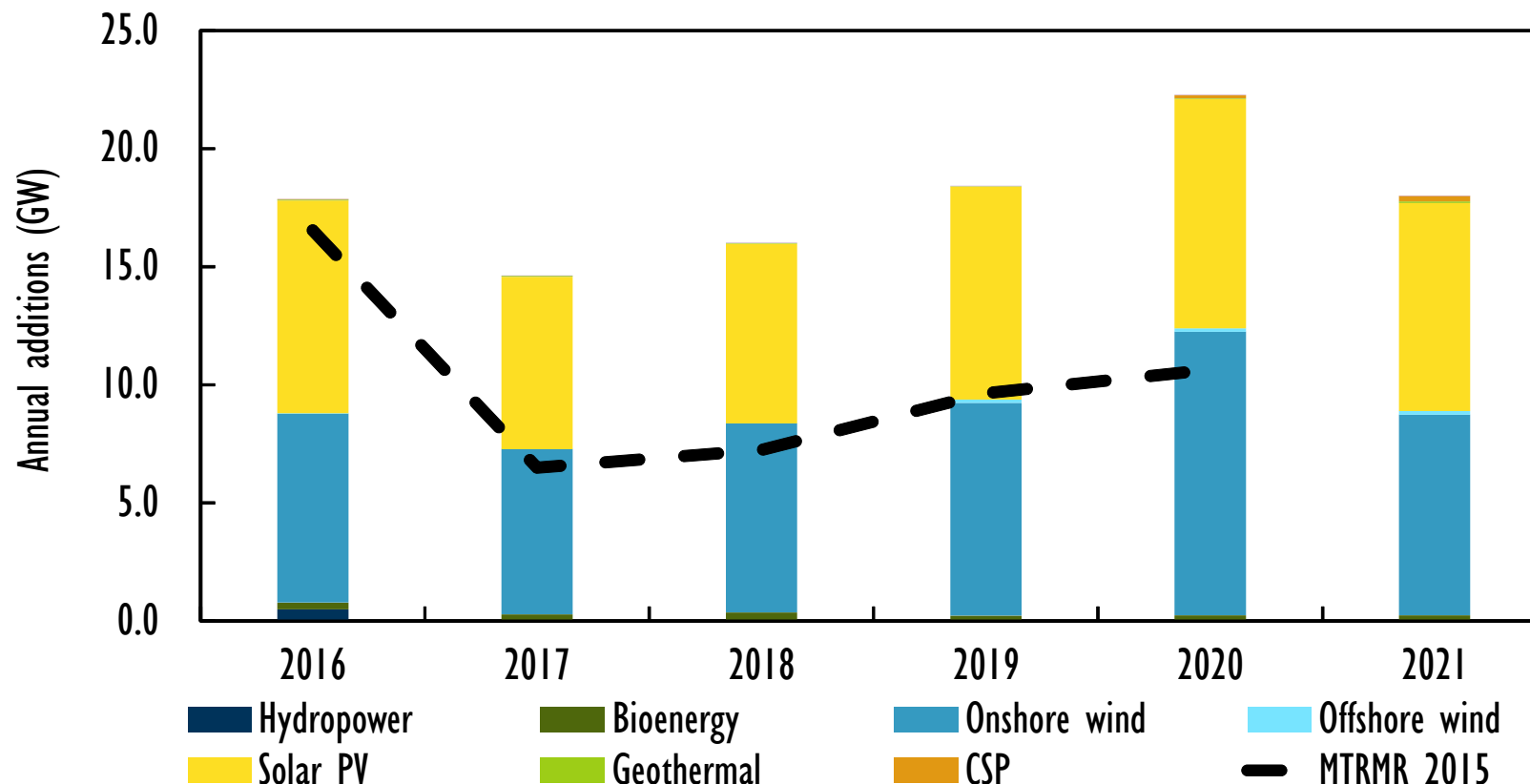
Solar PV



Despite strong growth, grid integration remains an important challenge along with overcapacity in the power sector

US multi-year tax credit extension to drive 60% more growth

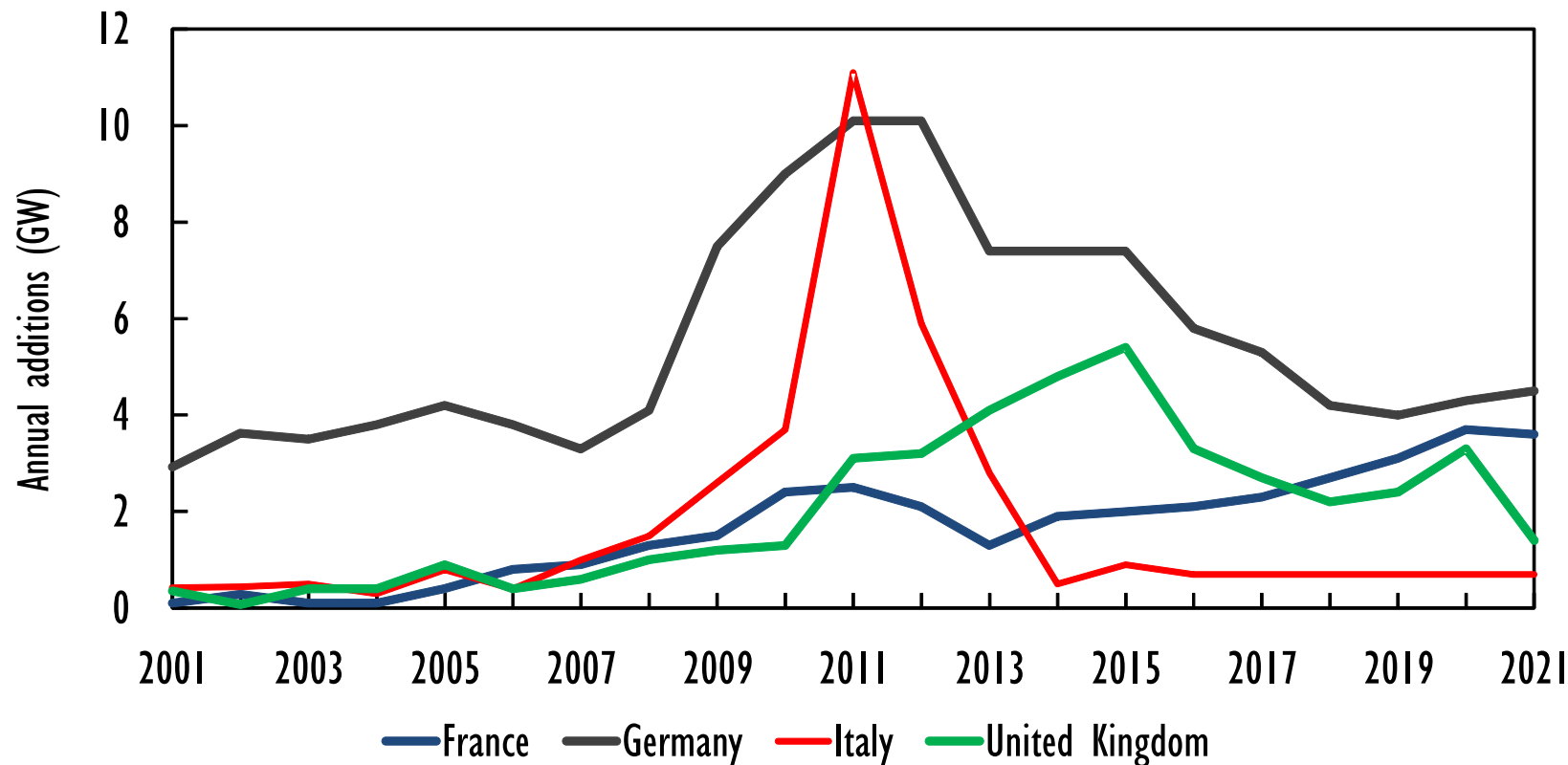
United States annual renewable capacity additions



ITC and PTC extension to give more policy visibility to wind and solar developers but uncertainty remains for other renewables

Slower growth in Europe as policy transition continues

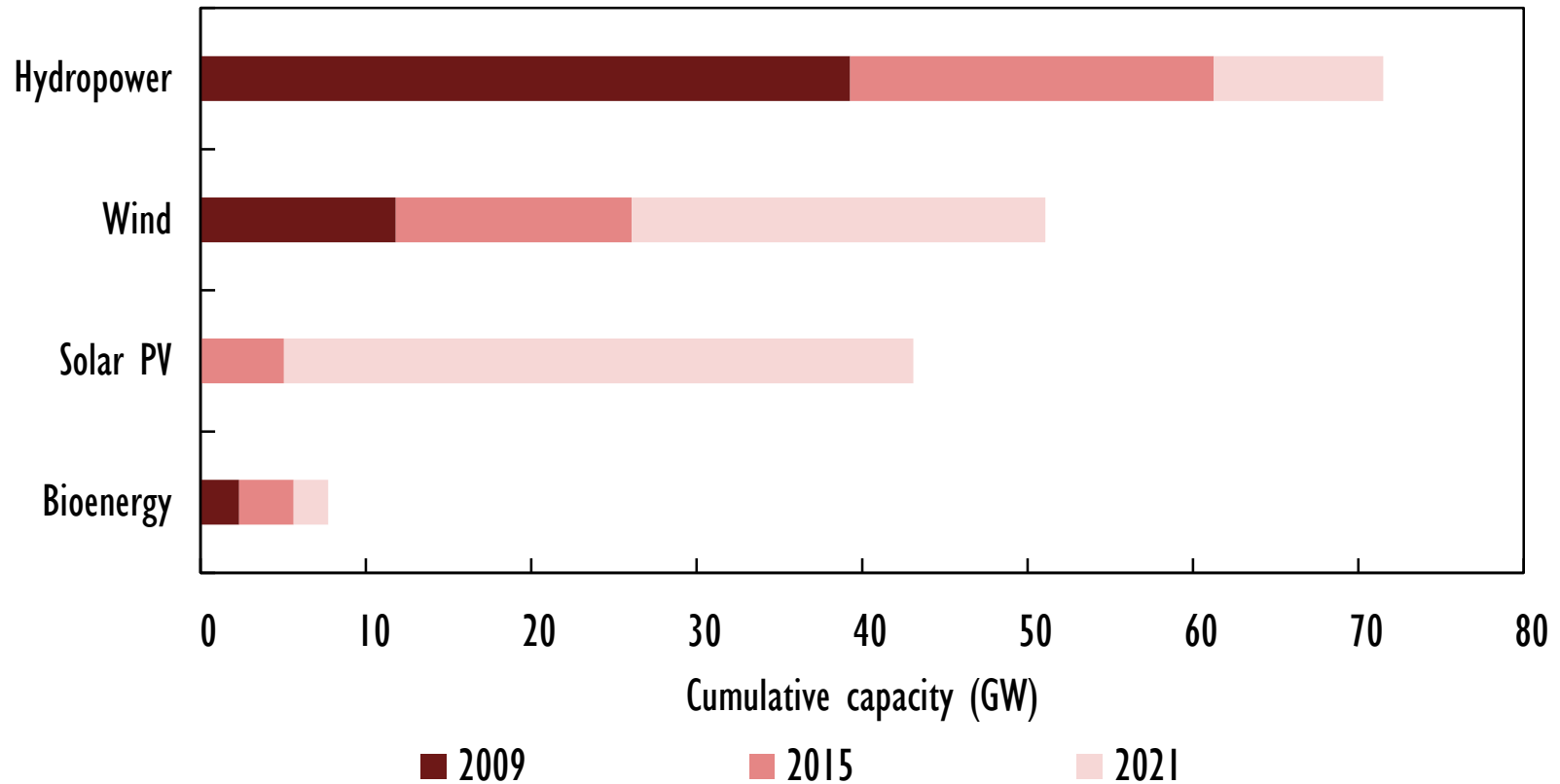
Annual renewable additions for France, Germany, Italy and UK



Pending EU legislations concerning 2030 renewable targets, incentive reductions, policy uncertainties at country level and overcapacity remain challenges

Solar PV to drive India's forecast but meeting the target remains a challenge

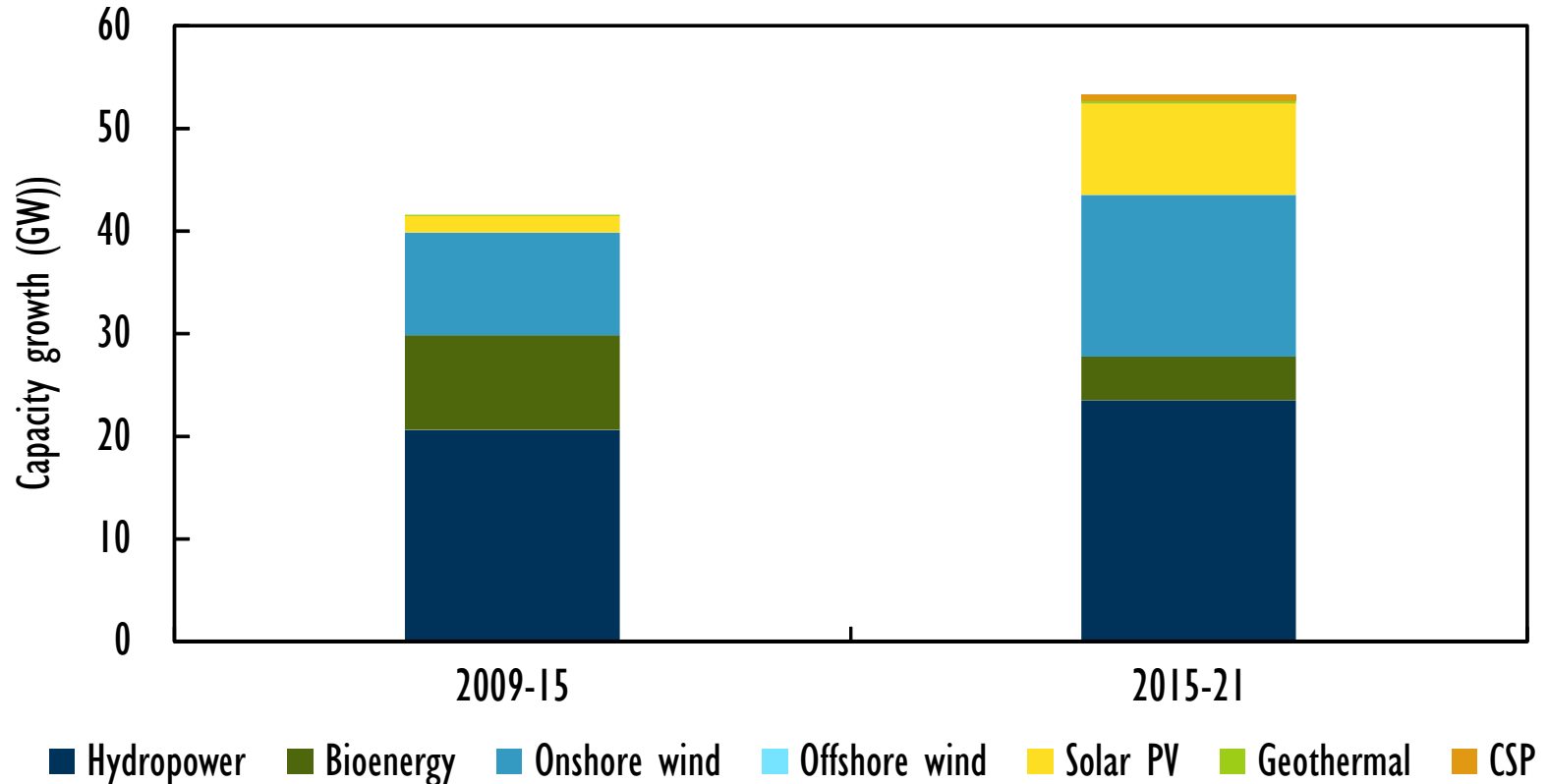
India renewable capacity by technology



Financial health of utilities, better state-level implementation of RPOs, faster grid infrastructure expansion and reducing land acquisition barriers remain challenges

Latin America to take advantage of more affordable solar PV and onshore wind

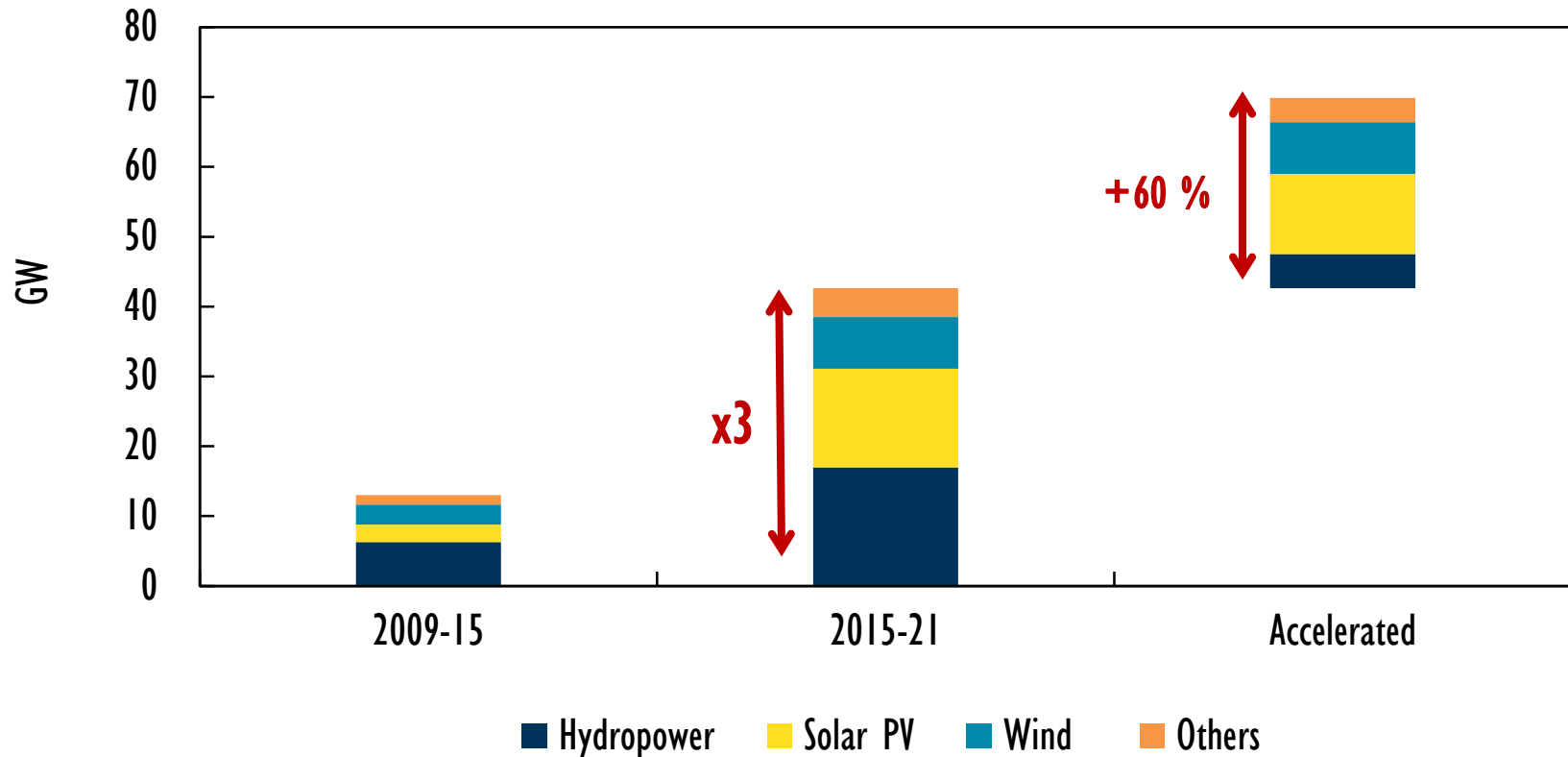
Latin America renewable capacity growth (GW)



Diversification needs, energy security concerns and decreasing prices, drive solar and wind expansion in Latin America while large-scale hydropower growth will continue.

Demand and diversification drive growth in Middle East & Africa

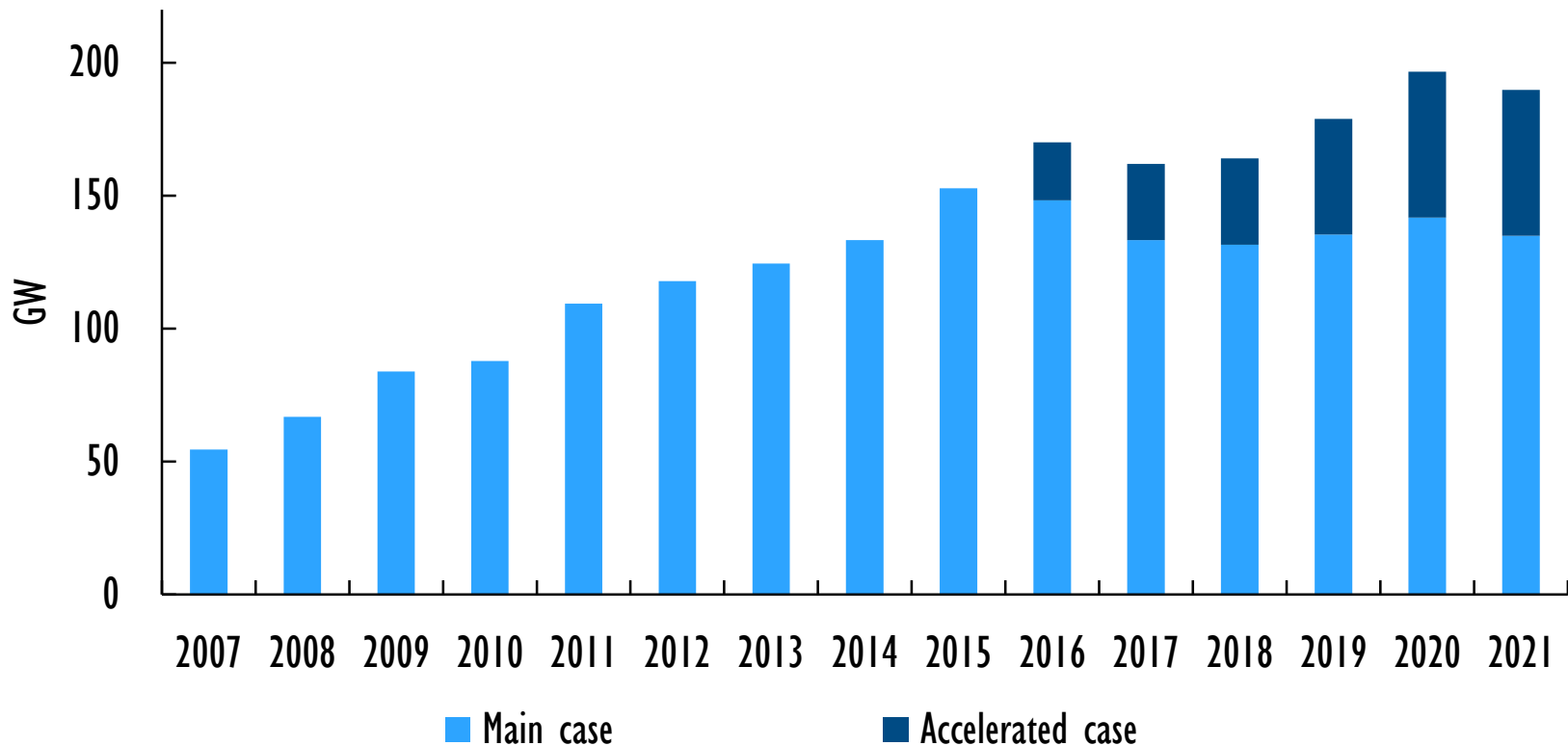
Net additions to capacity (GW)



Non-hydro pace dictated by auction schedules and grid integration; faster growth possible with quicker implementation and more access to low-cost financing

More ambitious policies could further enhance the outlook in line 2°C target

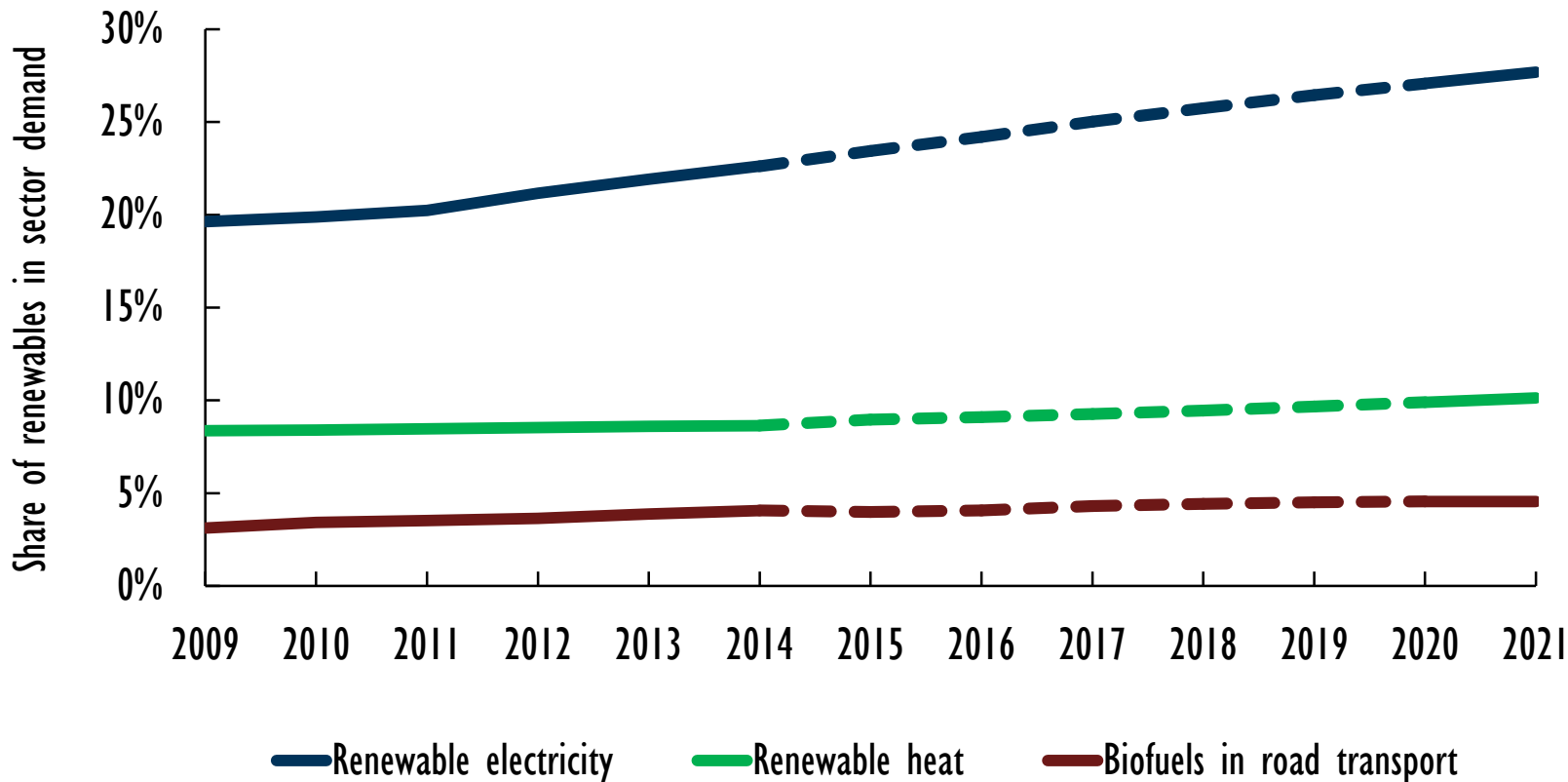
Renewable electricity capacity additions in Accelerated Case vs. Main Case



Renewables are in line with NDC pledges by 2030 but reducing policy uncertainty and overcoming financing & grid integration challenges remain key to achieve 2°C target

Renewables to dominate electricity growth, but less progress in heat and transport

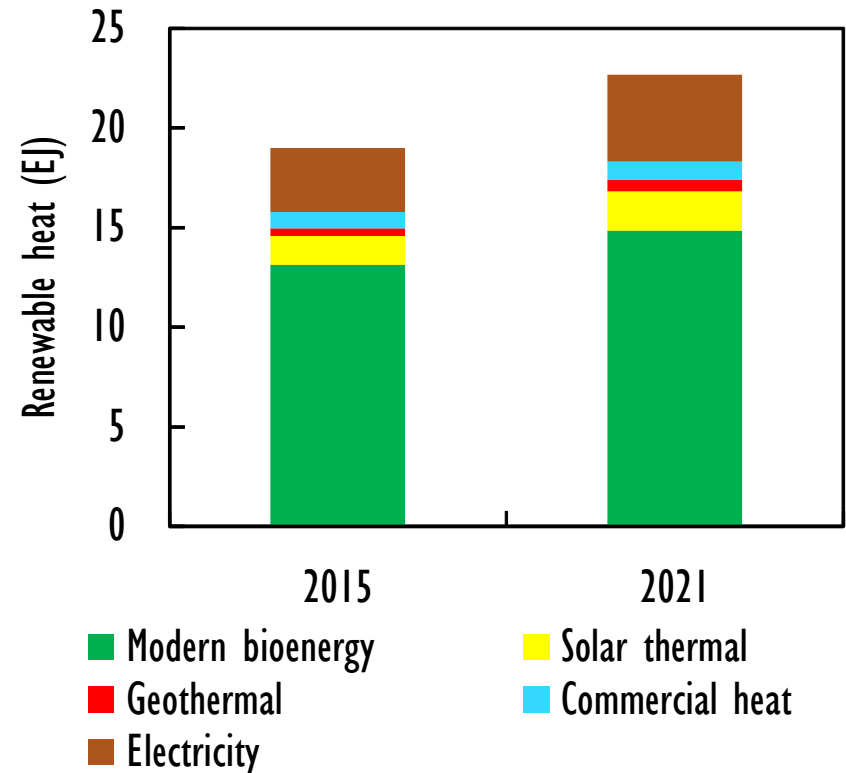
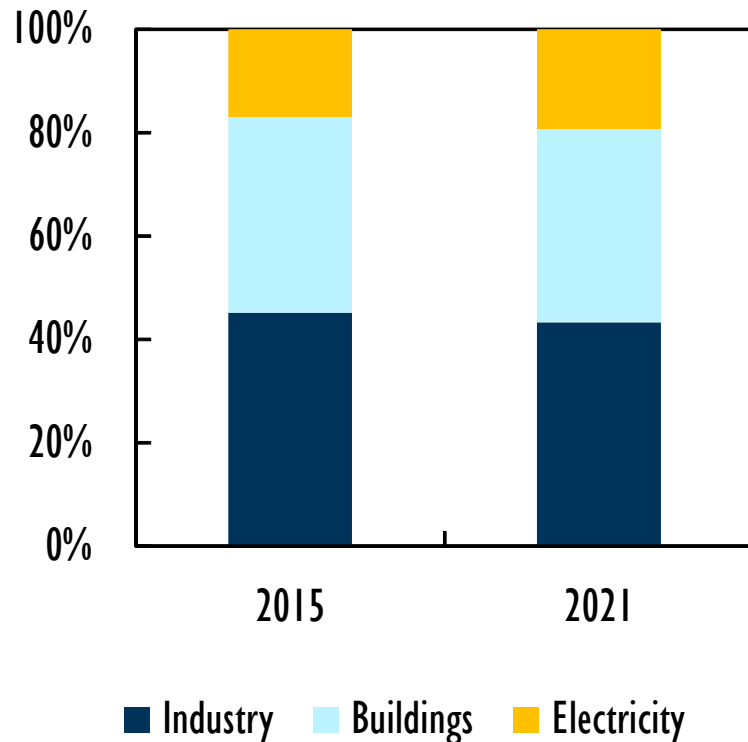
Share of renewables in electricity, heat and transport sectors



The share of renewables rises in all sectors, despite persistent challenges in heat & transport; interactions between energy efficiency & renewables become critical

Renewable heat grows slowly as barriers remain in both building and industry

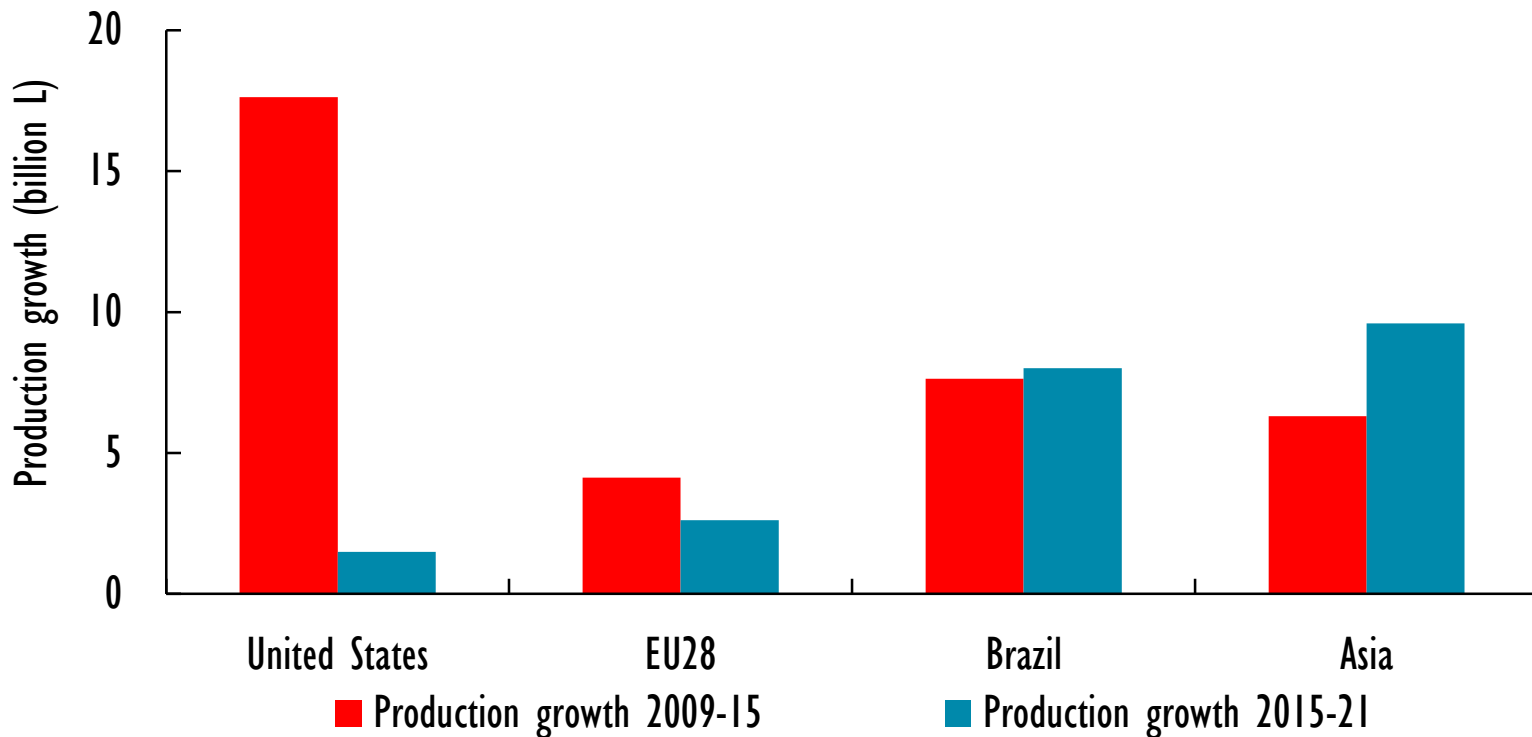
Final renewable heat consumption by sector and source (2015-21)



Heat accounts for 54% of final energy consumption and 38% of CO₂ emissions
Bioenergy continue to dominate heat production over the medium term

Biofuel production shifts to Asia, as EU and US slows

Biofuels production growth (billion litres)



Structural challenges in the US & policy uncertainty post-2020 in the EU slow growth; Thailand, India & Indonesia have strengthened policies despite low oil prices

Conclusions

- **Prospects for renewables electricity revised upwards, driven by policy improvements, cost reductions & efforts to improve air quality**
- **The impact of lower fossil fuel prices on renewables varies by sector. Wind (onshore) & solar PV are the only technologies on track for a 2°C scenario**
- **Competition in Asia between renewables & coal/gas will be critical to meeting global decarbonisation targets**
- **Attracting investment in renewables hinges on appropriate market rules & regulations, particularly in markets with slow electricity demand growth**
- **IEA is working to accelerate energy transition with its analysis on policy & technology and system integration of renewables.**

Questions?

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