

# RENEWABLE ENERGY

## Medium-Term Market Report 2016

# *Medium-Term Renewable Energy Market Report 2016*

*Dr. Paolo Frankl  
Head of Division  
Renewable Energy Division  
International Energy Agency*

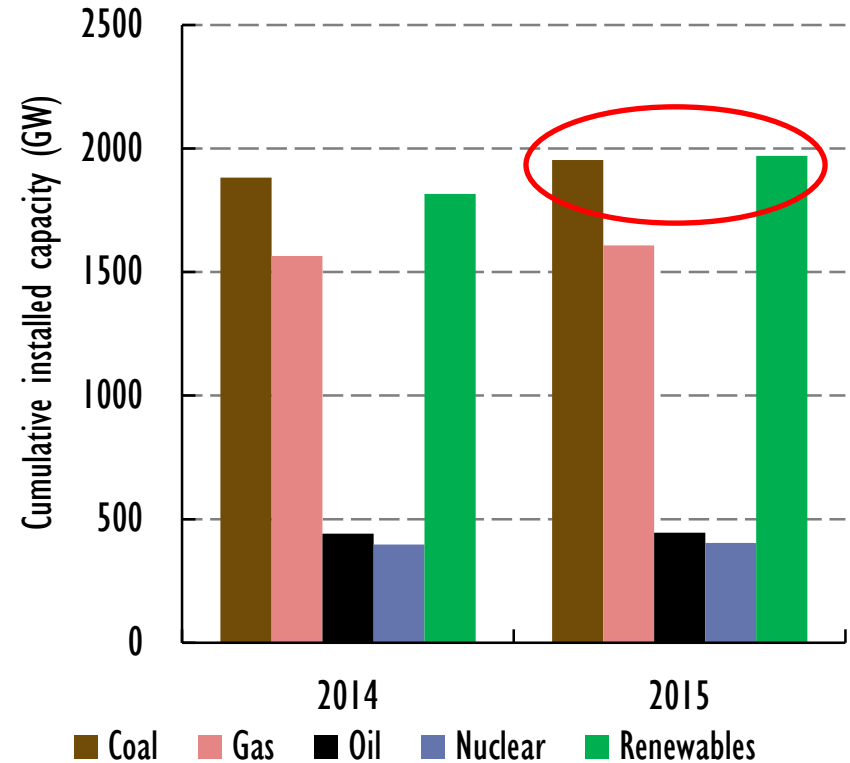
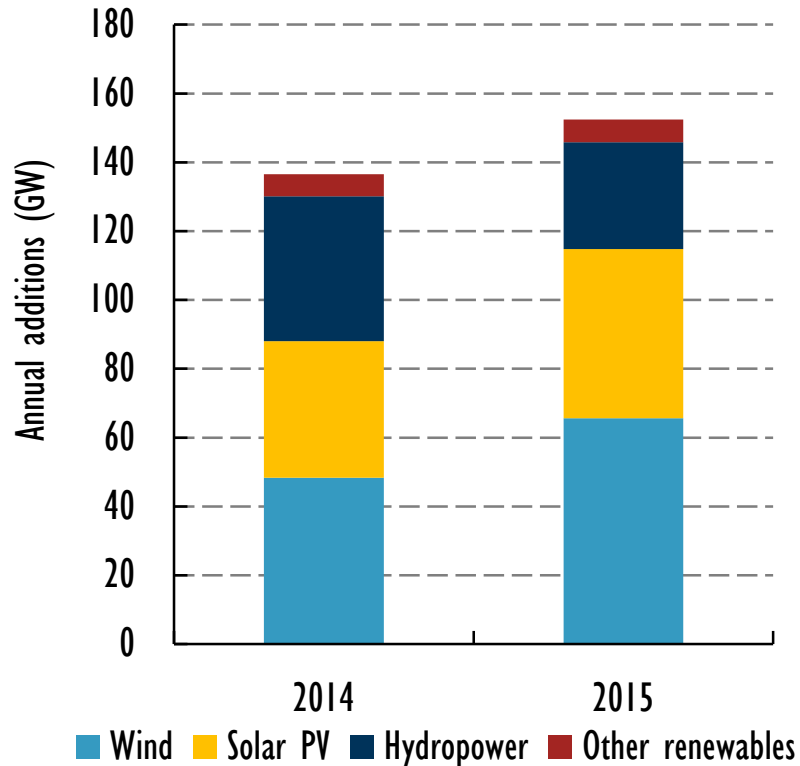
**Market Analysis and Forecasts to 2021**

Club Español de la Energía, Madrid, 25 January 2017



# 2015: a record year for renewables

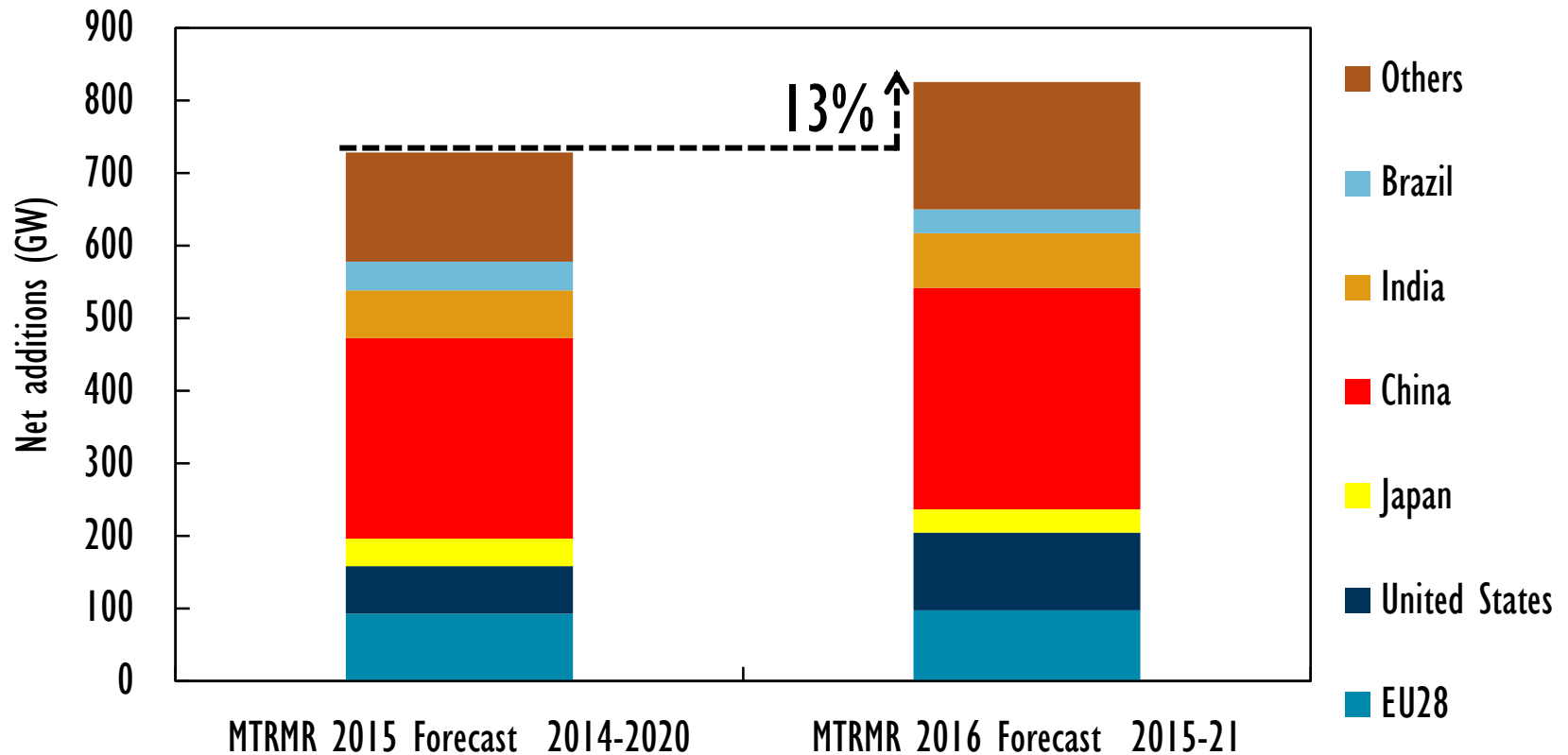
Renewable annual additions (2014-15) and cumulative installed power capacity



**New renewable annual capacity exceeded conventional for the first time**  
**Cumulative renewable capacity surpassed coal at the end of 2015**

# New policies underpin a more bullish forecast for renewables

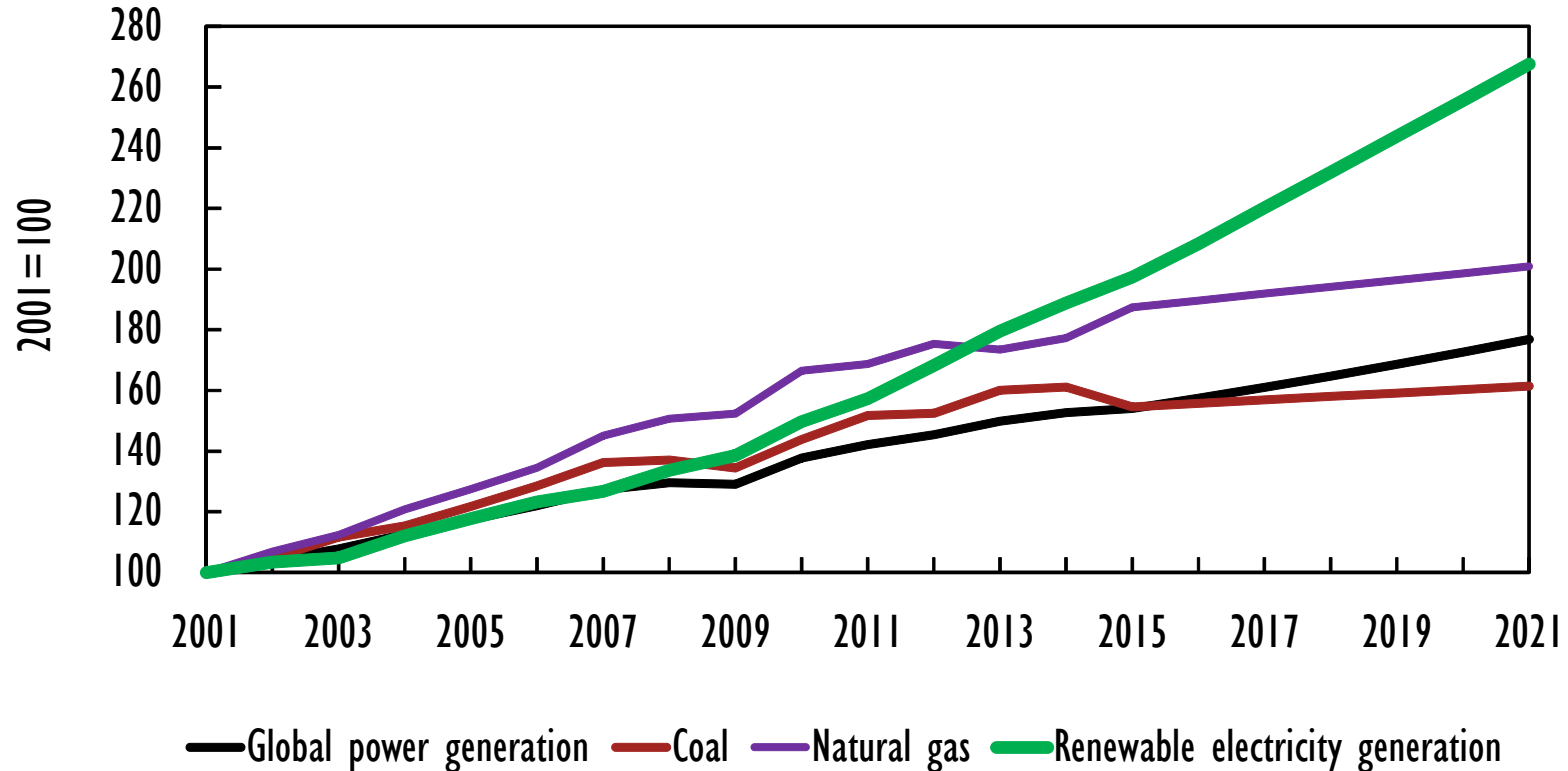
Renewable electricity capacity growth (GW) in *MTRMR's main case*



**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

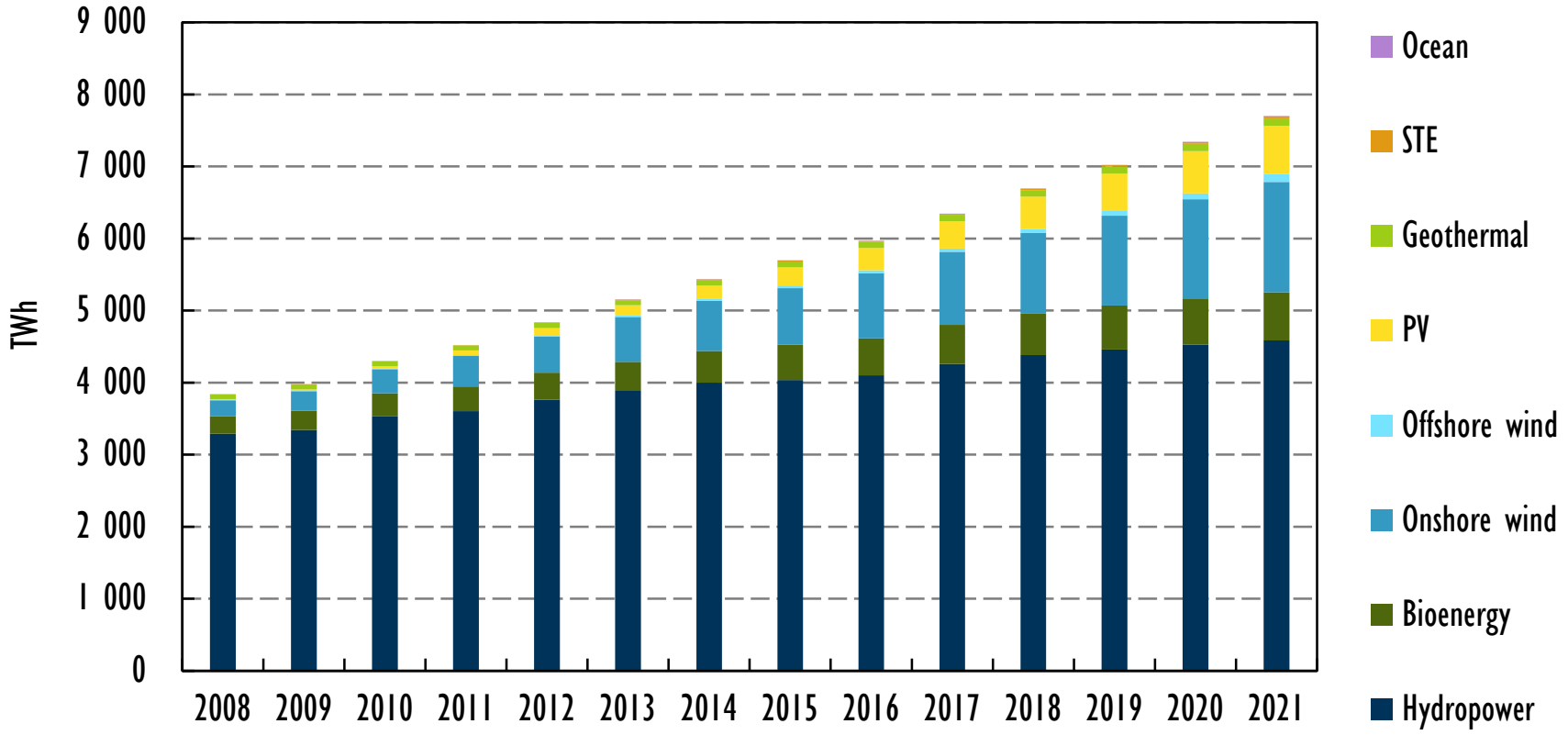
Indexed electricity generation by fuel (2001-21)



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

# Wind and solar PV compensate for slower hydropower growth

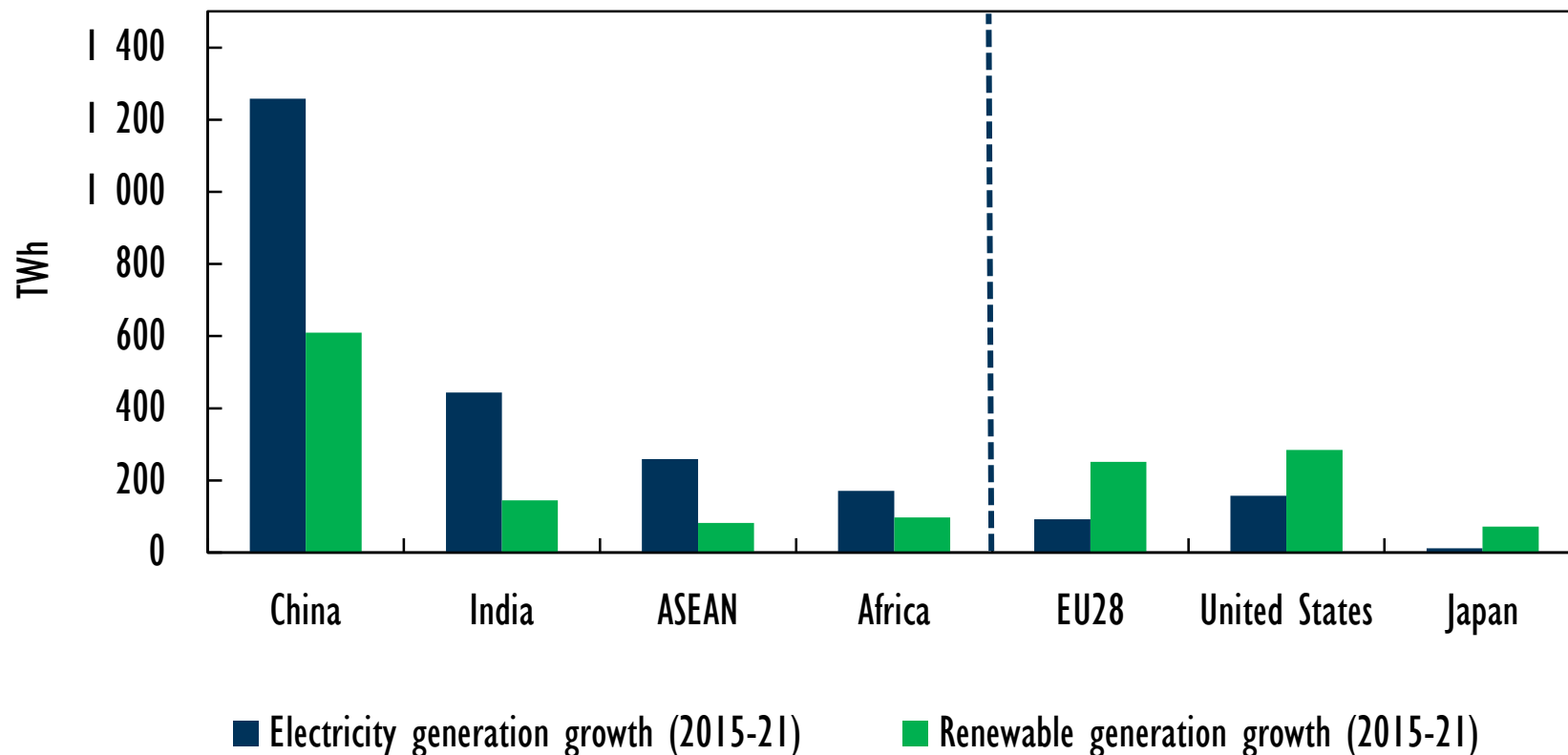
Global renewable electricity generation



**Solar PV & wind account for almost 2/3 of rise in renewables generation; total renewable electricity overpasses 7600 TWh by 2021, equivalent to EU+US today**

# A two-speed world for renewable electricity

## Electricity and renewable generation growth by country/region

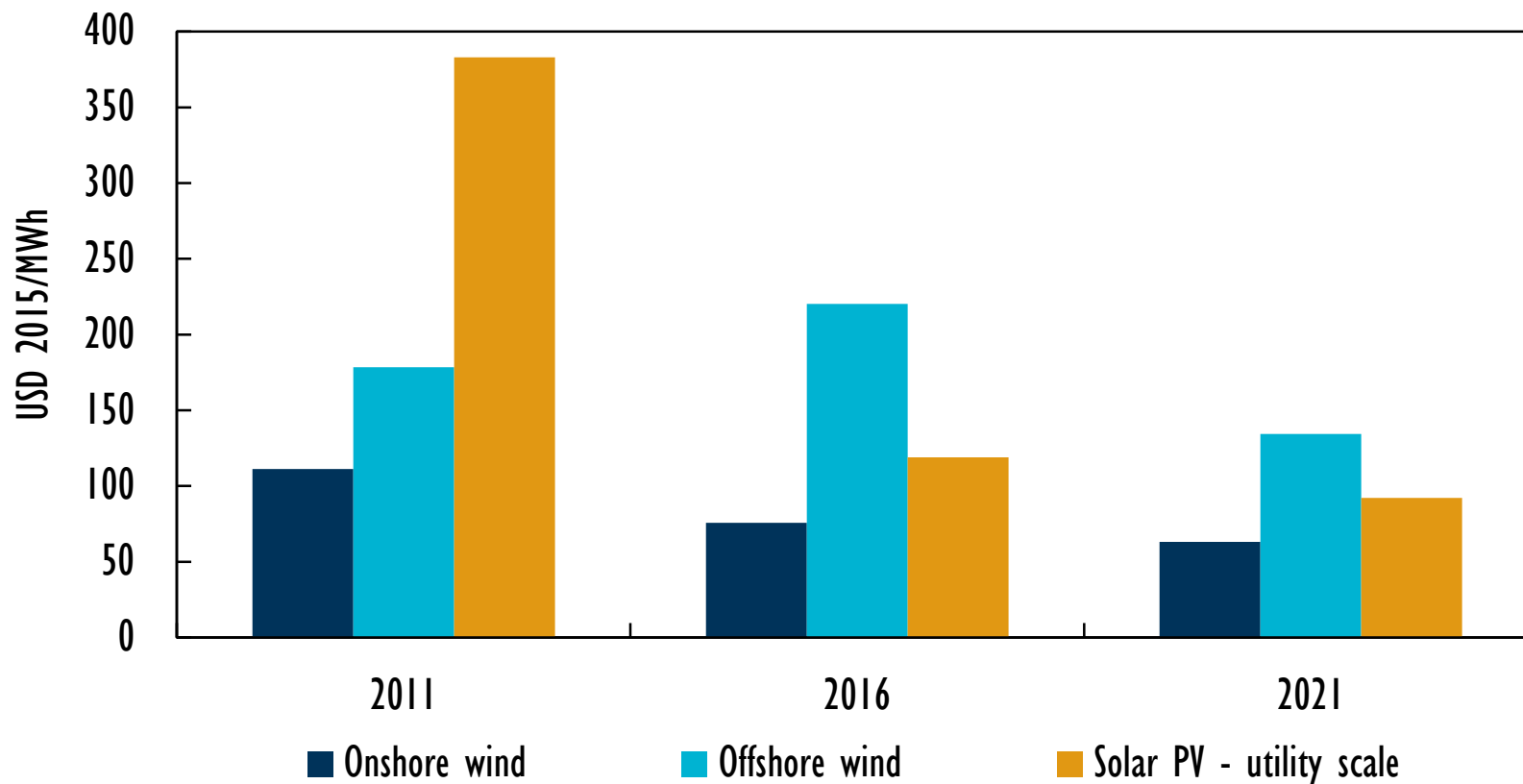


Source: Total electricity generation from World Energy Outlook 2016, forthcoming.

**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

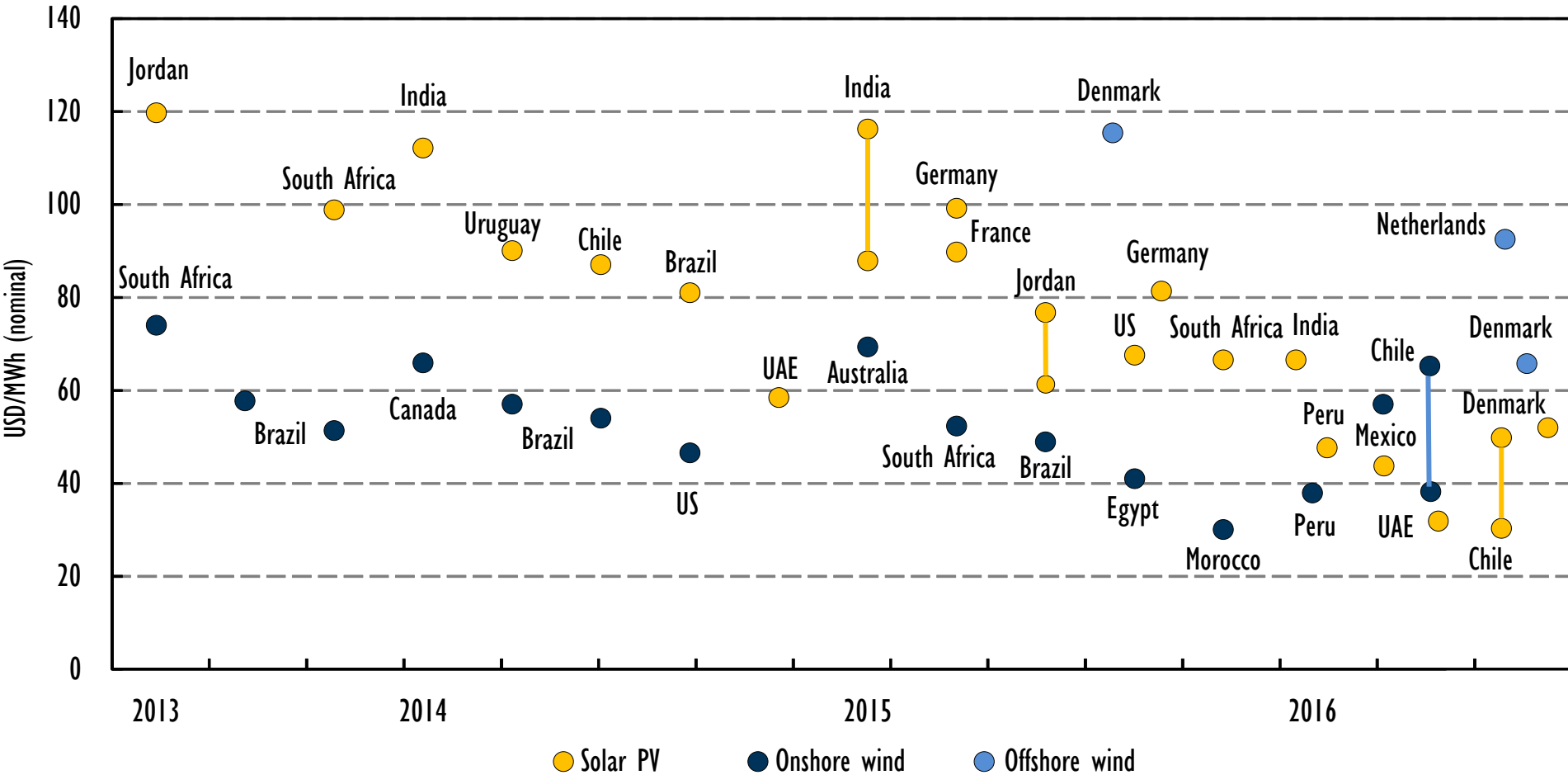
Weighted average generation costs for solar PV and wind



**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**

# Auctions driving prices down

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

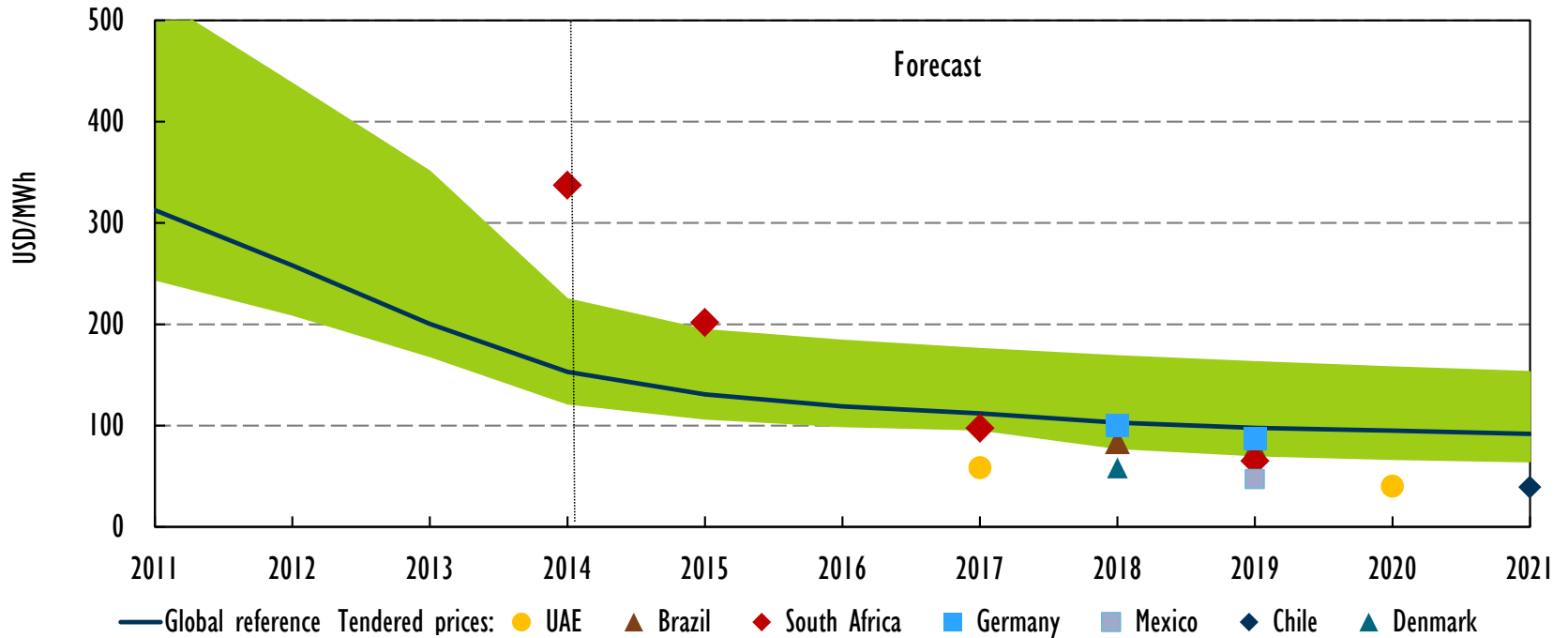


**Best results occur where price competition, long-term contracts and good resource availability are combined**



# To what extent are auctions representative?

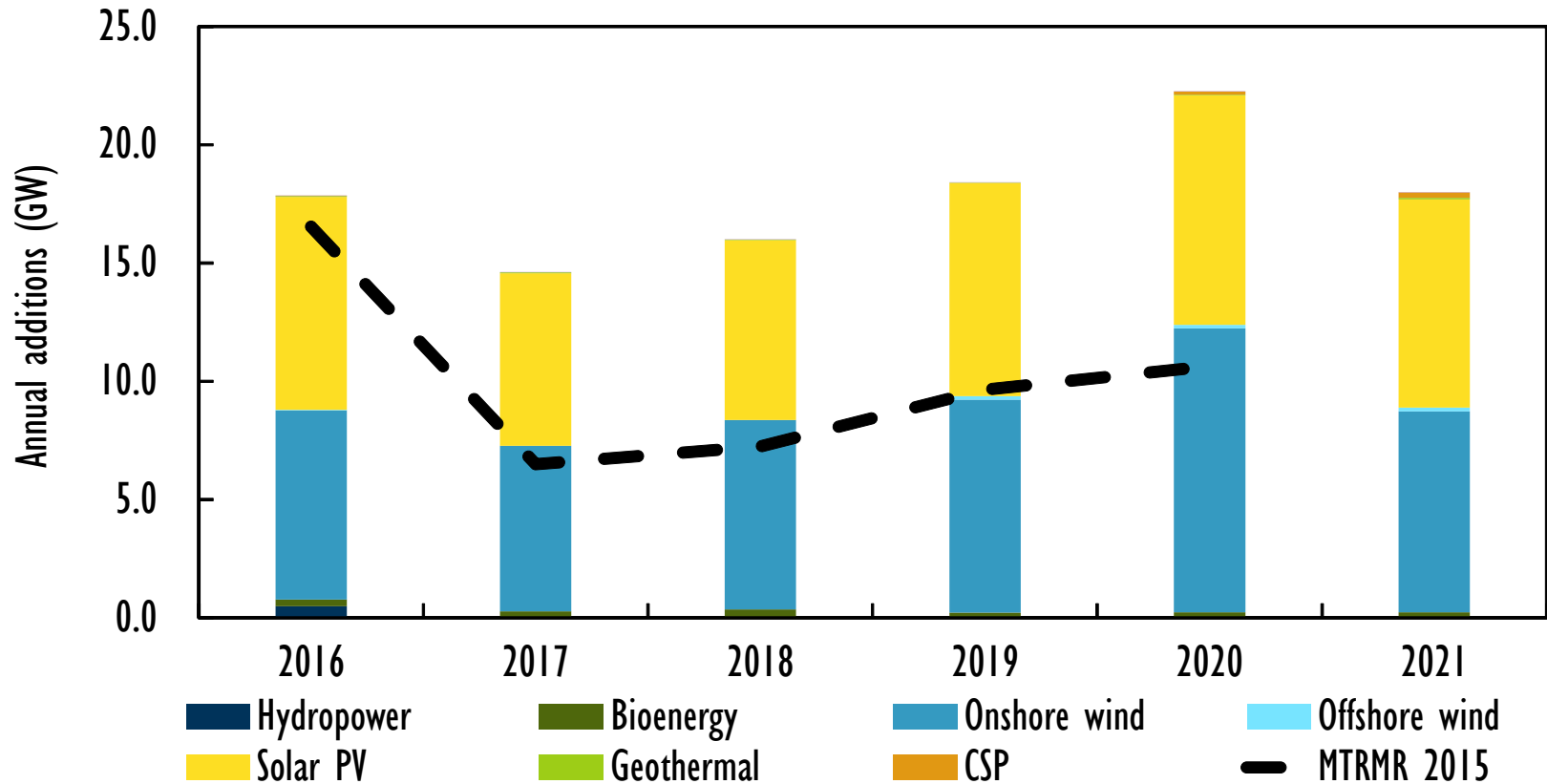
Utility-scale solar PV generation cost and contract prices



**Higher prices in China, Japan and US keep global average generation costs well above best auction announced prices**

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

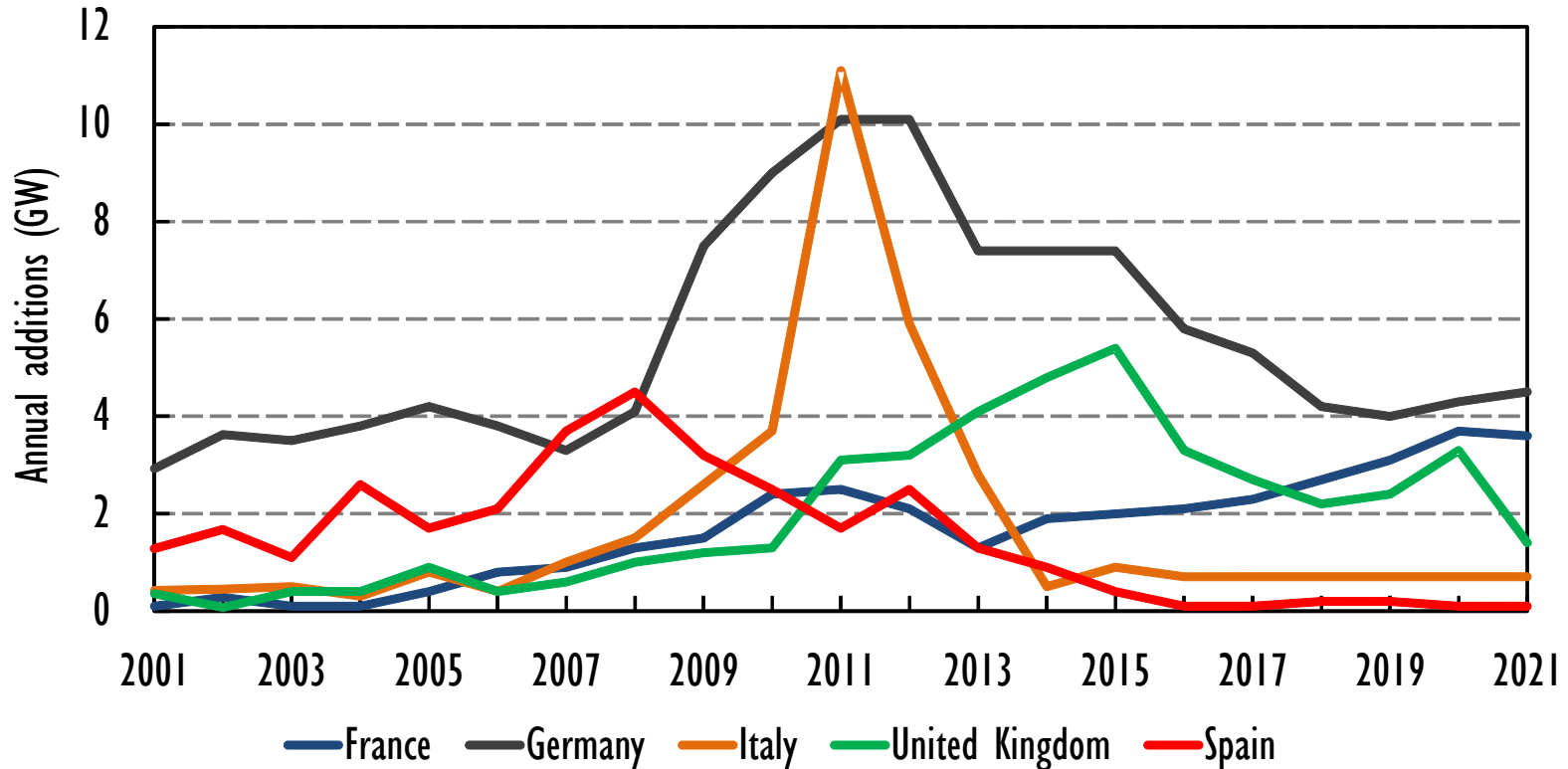
United States annual renewable capacity additions



**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

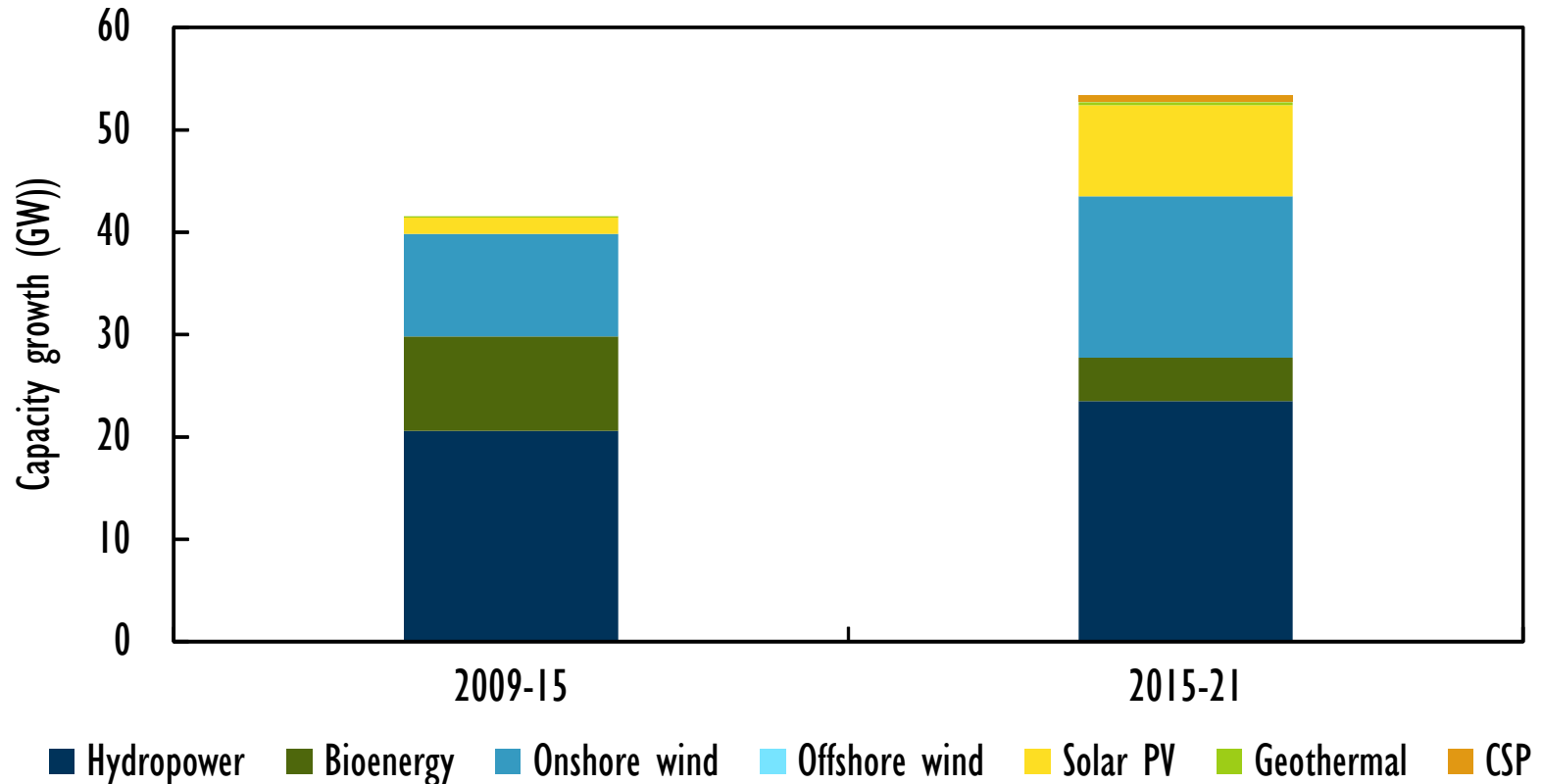
Annual renewable additions for France, Germany, Italy and UK



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

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

Latin America renewable capacity growth (GW)

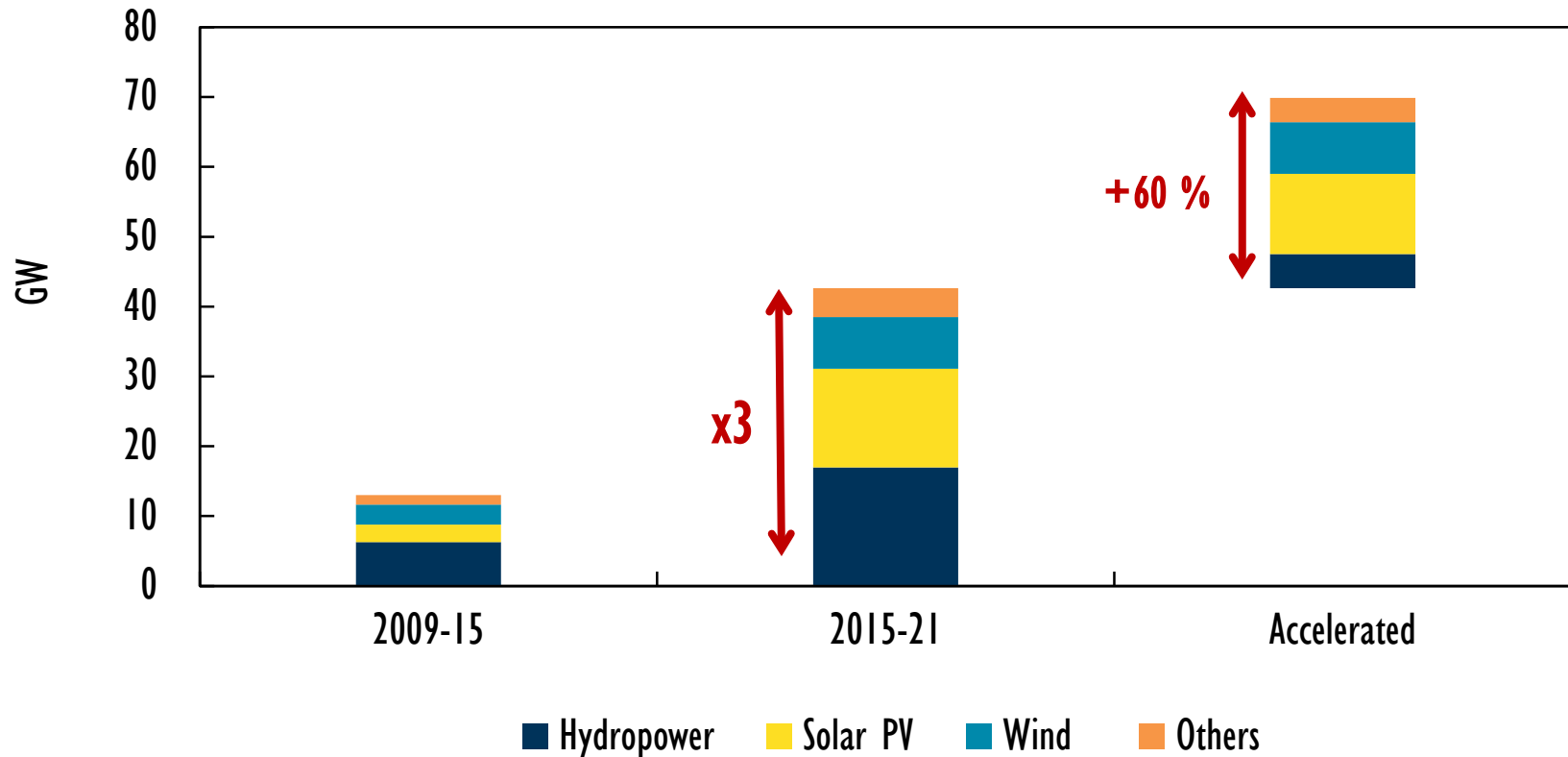


**Diversification needs, energy security concerns and decreasing prices, drive solar and wind expansion in Latin America while large-scale hydropower growth will continue.**



# Demand and diversification drive growth in Middle East & Africa

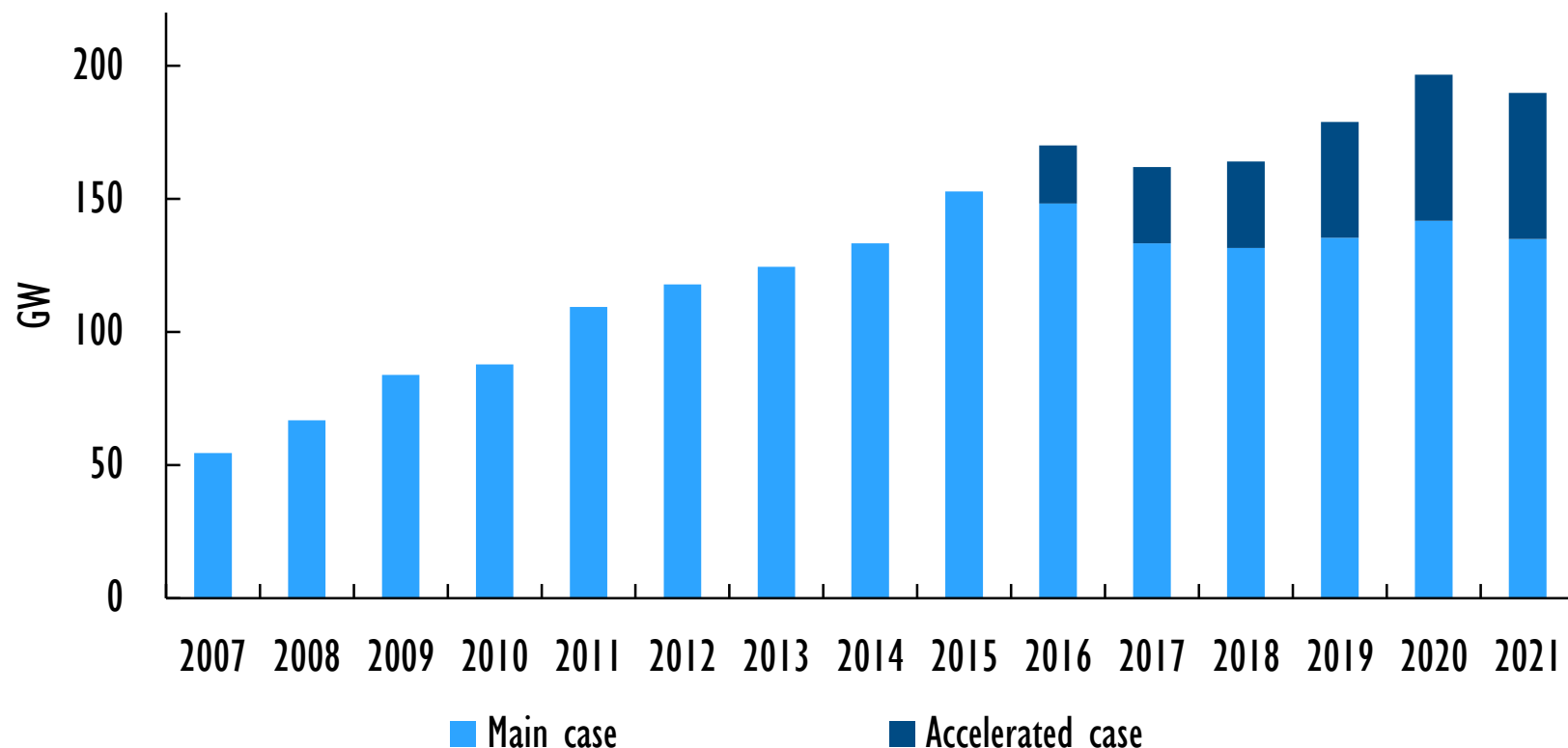
Net additions to capacity (GW)



**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

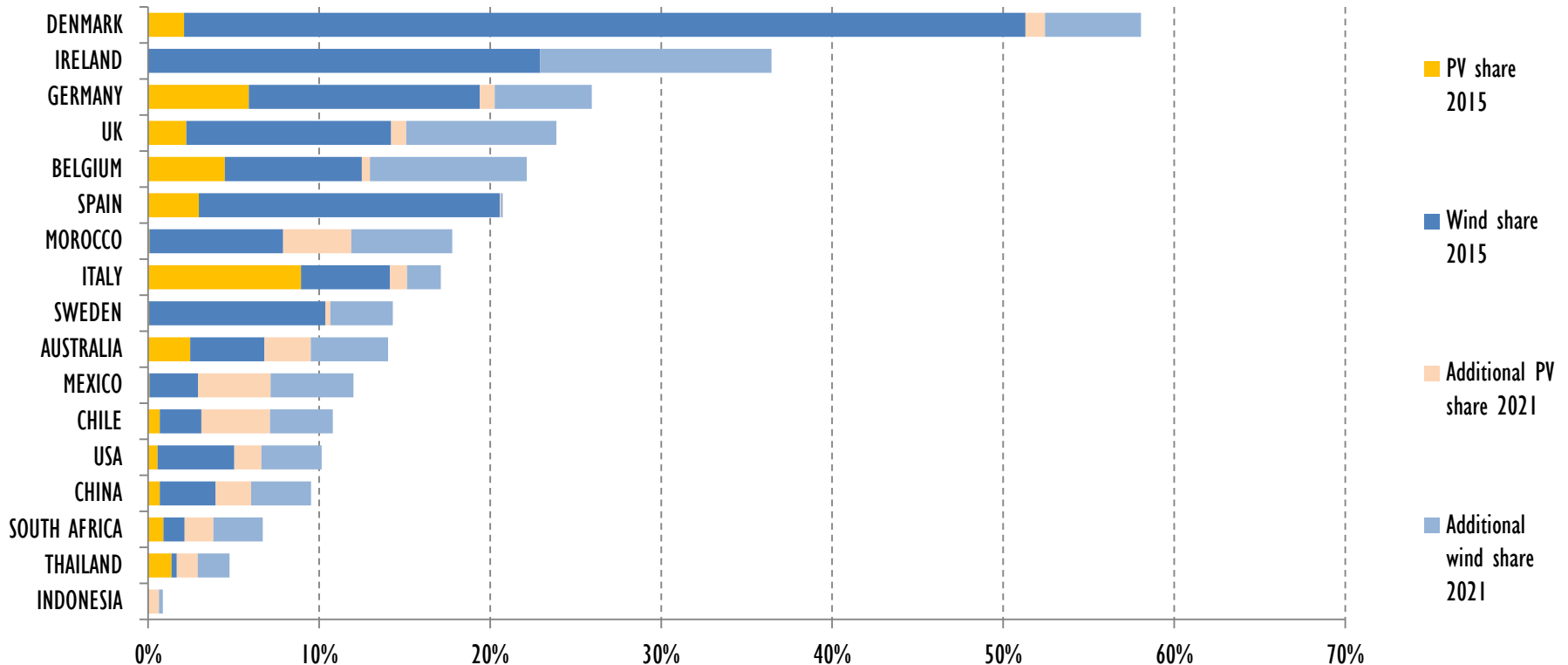
Renewable electricity capacity additions in Accelerated Case vs. Main Case



**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**

# Increasing shares of variable renewables calls for more flexibility

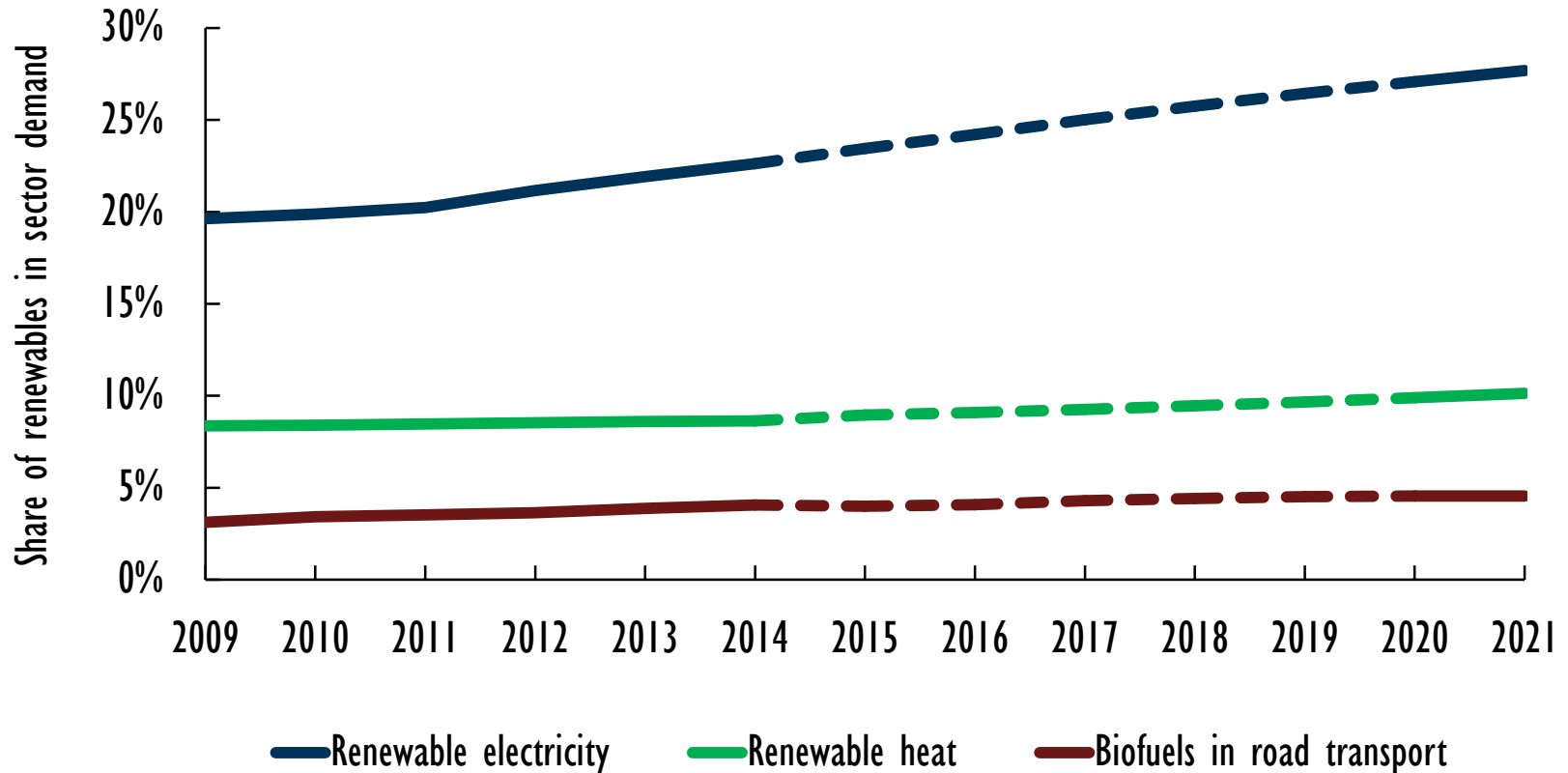
## Average annual share of variable renewables in total electricity generation



**Experience has shown that cost-effective system integration of high shares of variable renewables is possible with the right policies & investments**

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

Share of renewables in electricity, heat and transport sectors

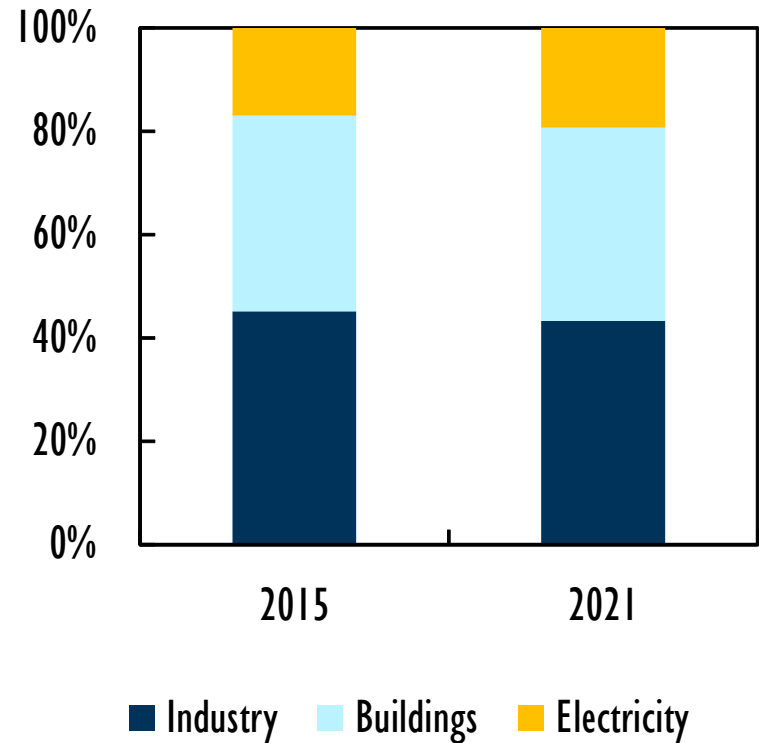
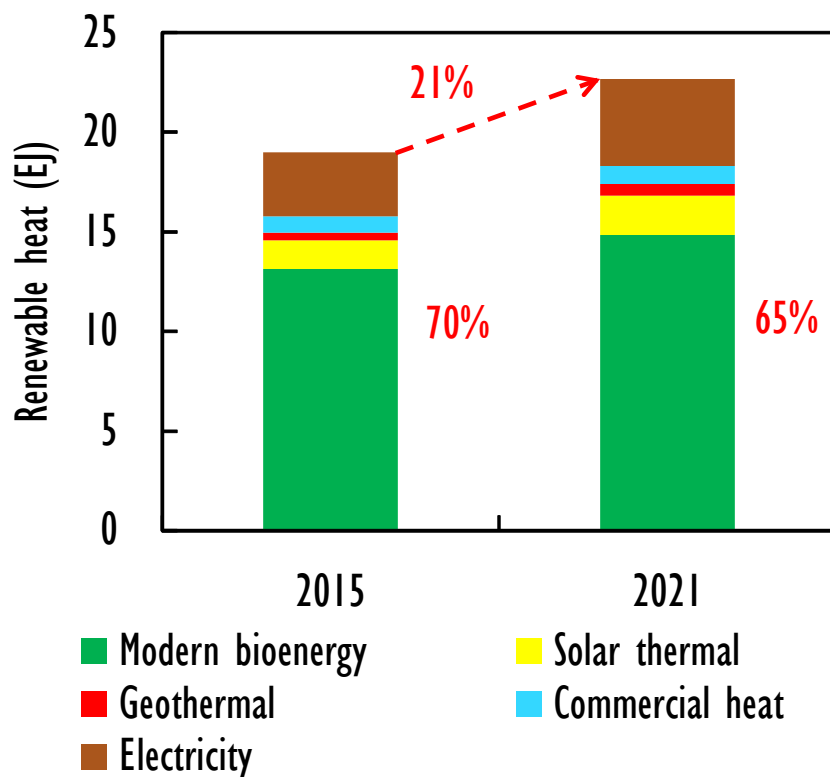


**The share of renewables rises in all sectors, despite persistent challenges in heat & transport; interactions between energy efficiency & renewables become critical**



# Renewable heat grows slowly as barriers remain in both buildings and industry

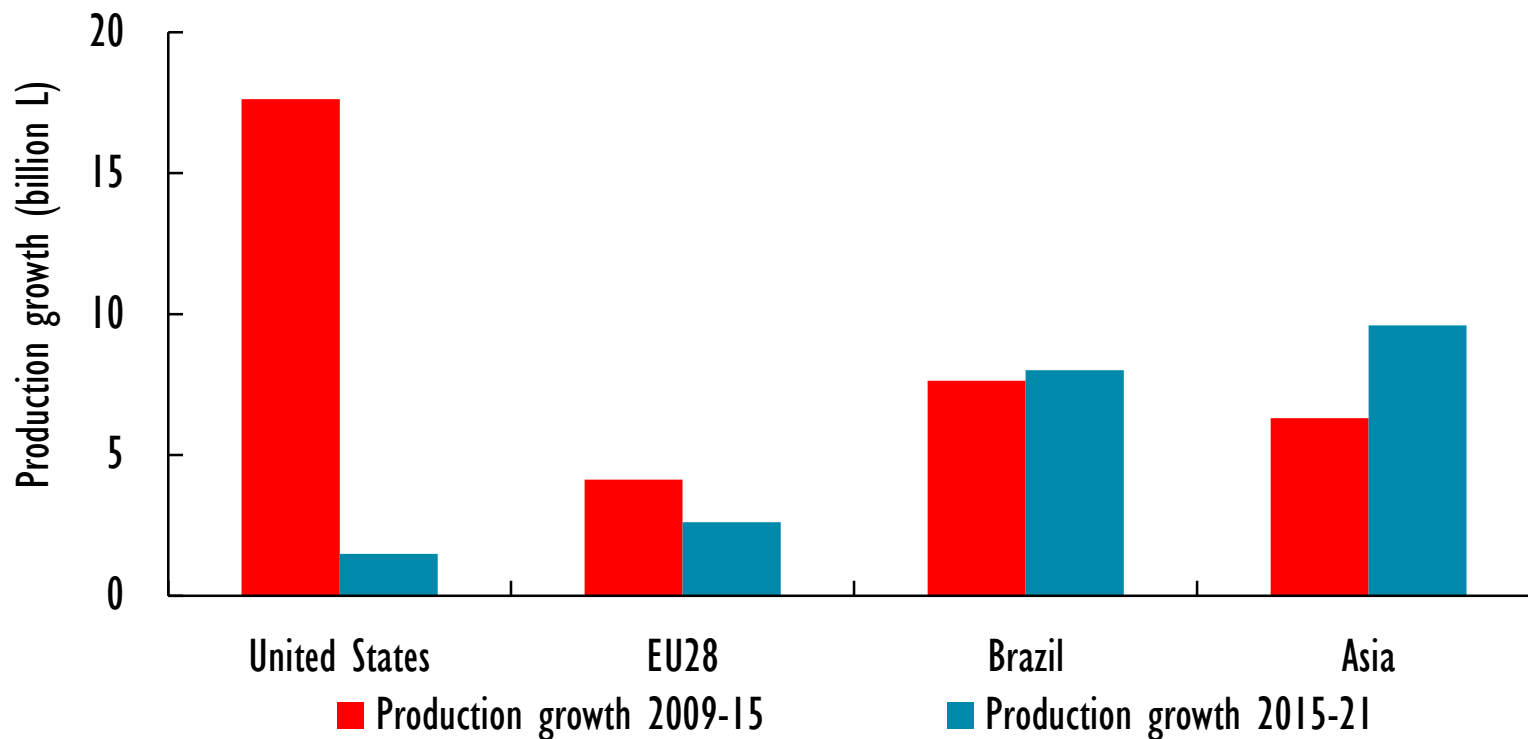
Global final renewable heat consumption by source and sector (2015-21)



**Bioenergy to dominate renewable heat consumption over the medium term, with relative consumption in the buildings & industry sectors similar in 2015 and 2021.**

# Biofuel production shifts to Asia, as EU and US slows

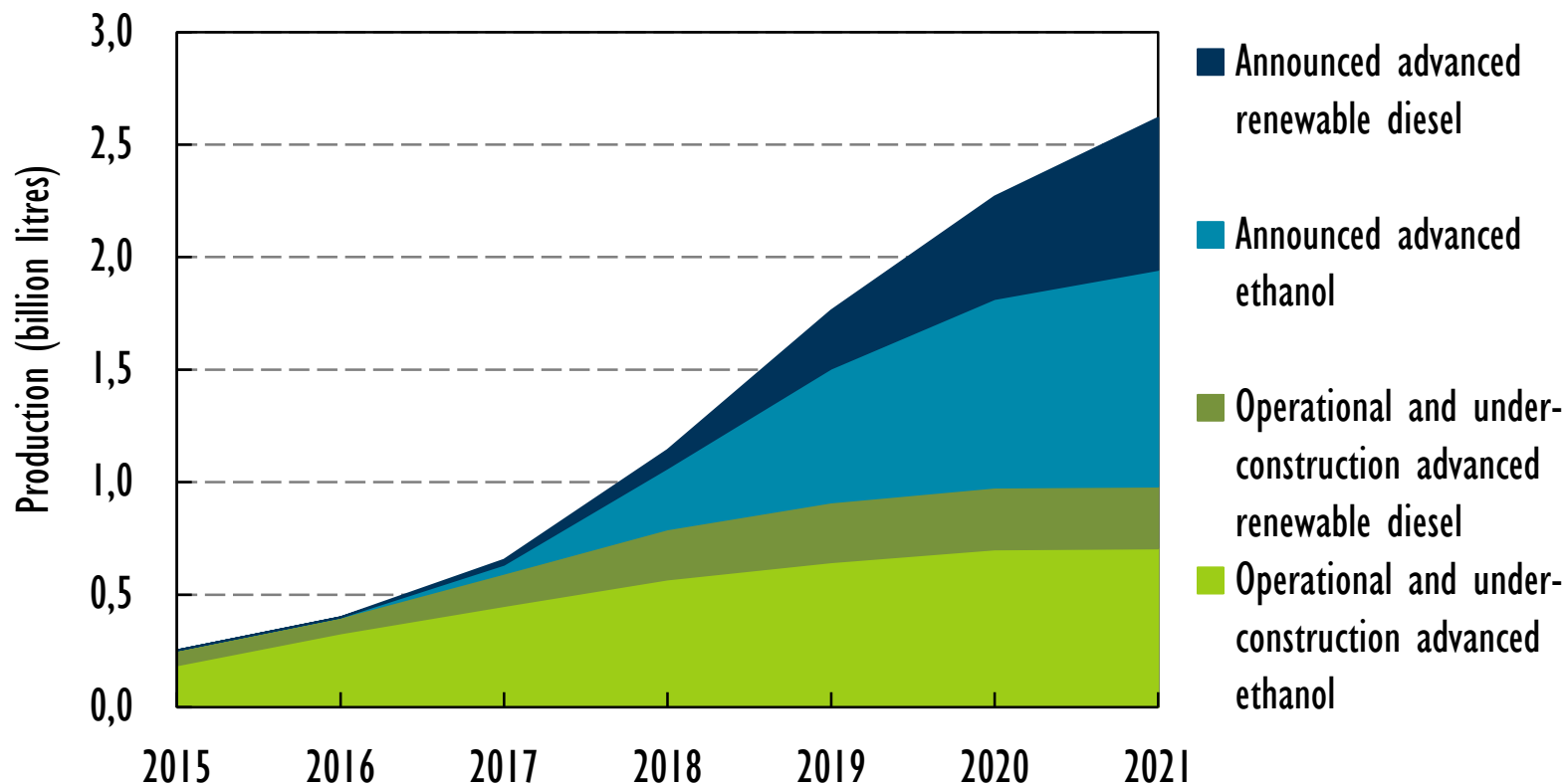
Biofuels production growth (billion litres)



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

# Advanced biofuels anticipated to scale up from current production levels

## Advanced biofuels production forecast, 2015-21



**Advanced biofuels are needed in the longer term to sustainably reduce the overall carbon footprint of the transport sector, but the industry remains in an early stage of development.**

# 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**
- **Attracting investment in renewables hinges on appropriate market rules & regulations, particularly in markets with slow electricity demand growth**
- **Progress in renewable growth in the heat and transport sectors remains slow and needs significantly stronger policy efforts.**
- **IEA is working to accelerate energy transition with its analysis on policy & technology and system integration of renewables.**