

RENEWABLE ENERGY

Medium-Term Market Report 2015

Medium-Term Renewable Energy Market Report 2015:

*Renewables poised to lead
world power market growth*

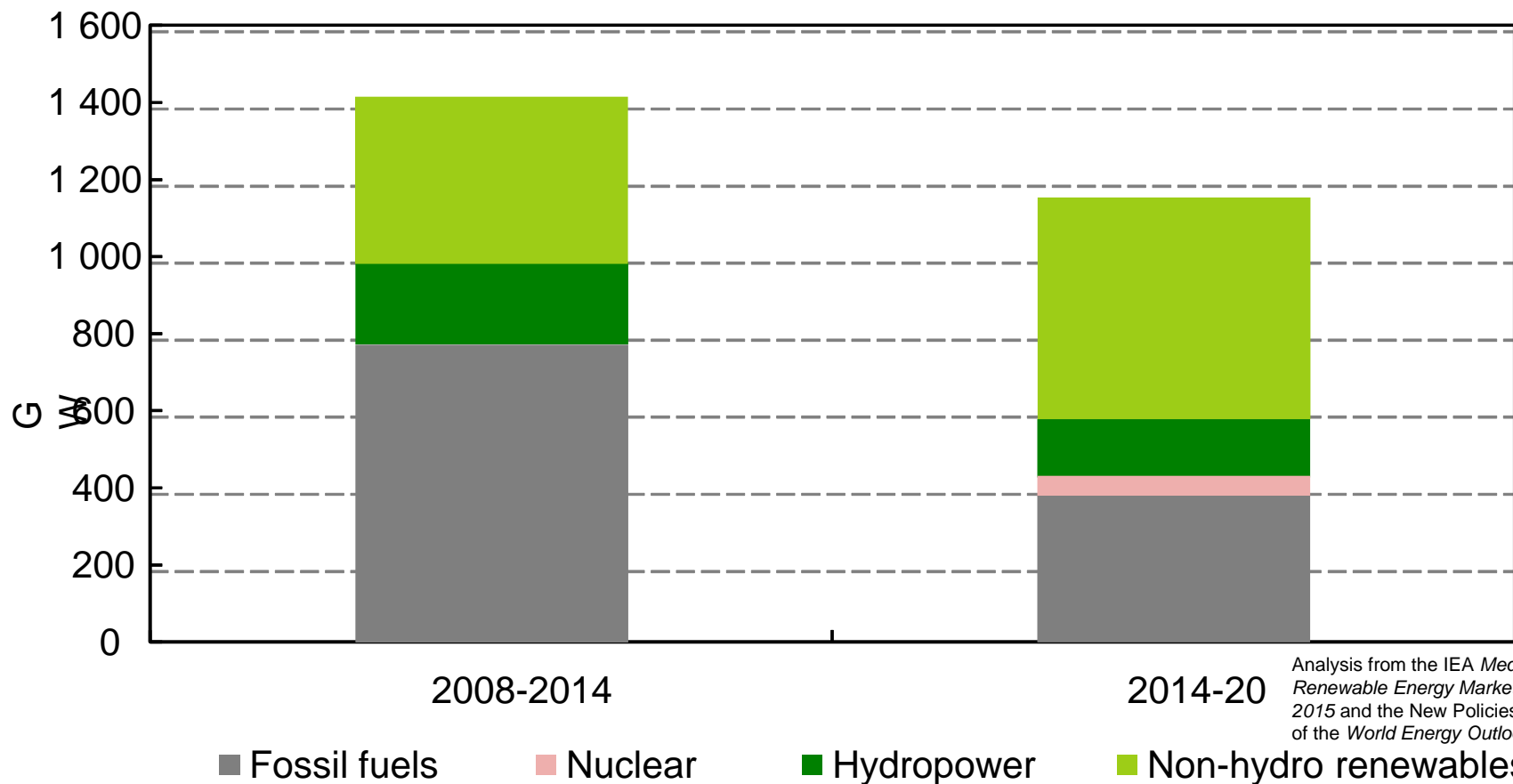
Dr. Paolo Frankl
Renewable Energy Division
International Energy Agency

Market Analysis and Forecasts to 2020

Brazilian launch, 15-16 December 2015

Renewables are becoming the largest source of new power generation capacity

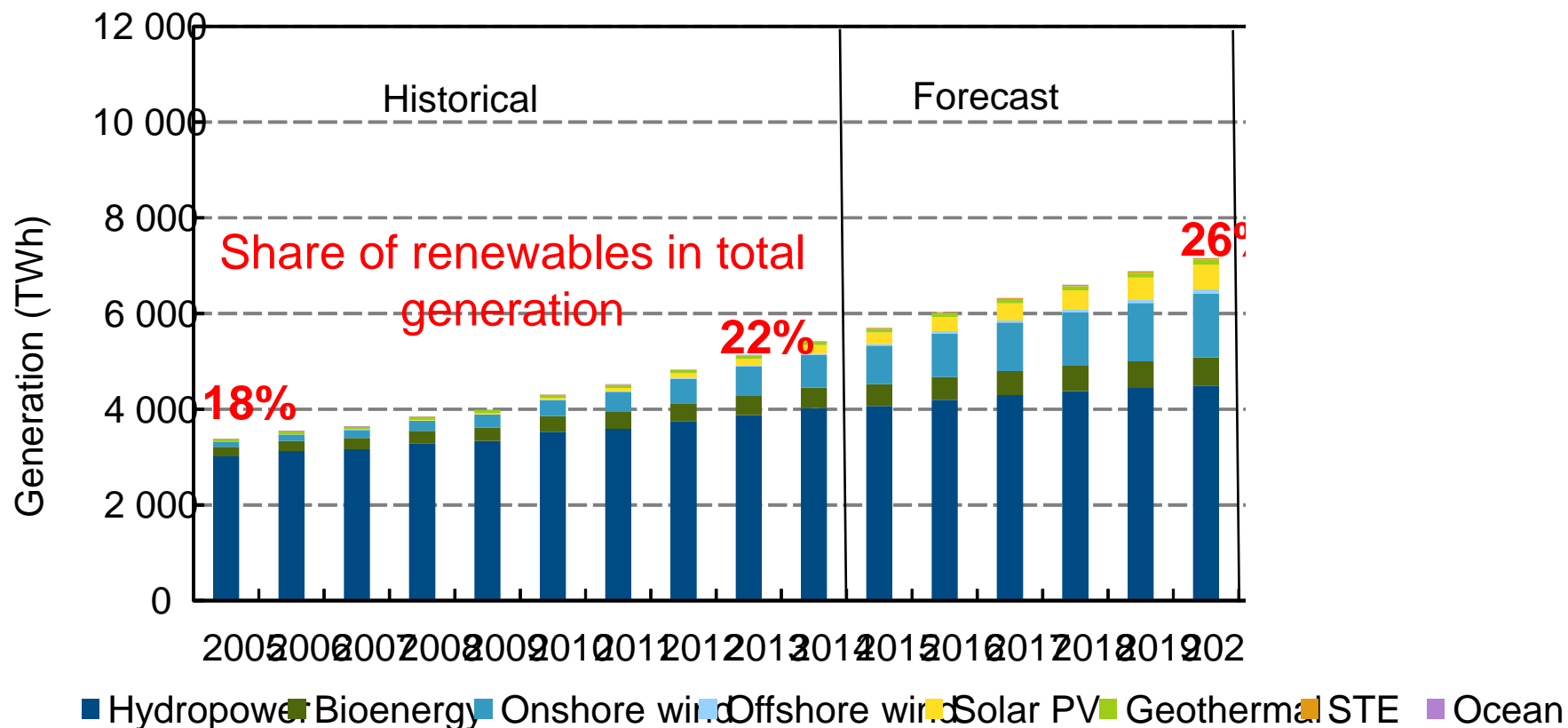
World net additions to power capacity



The share of renewables in net additions to power capacity continues to rise with non-hydro sources reaching nearly half of the total

Strong momentum for renewable generation growth

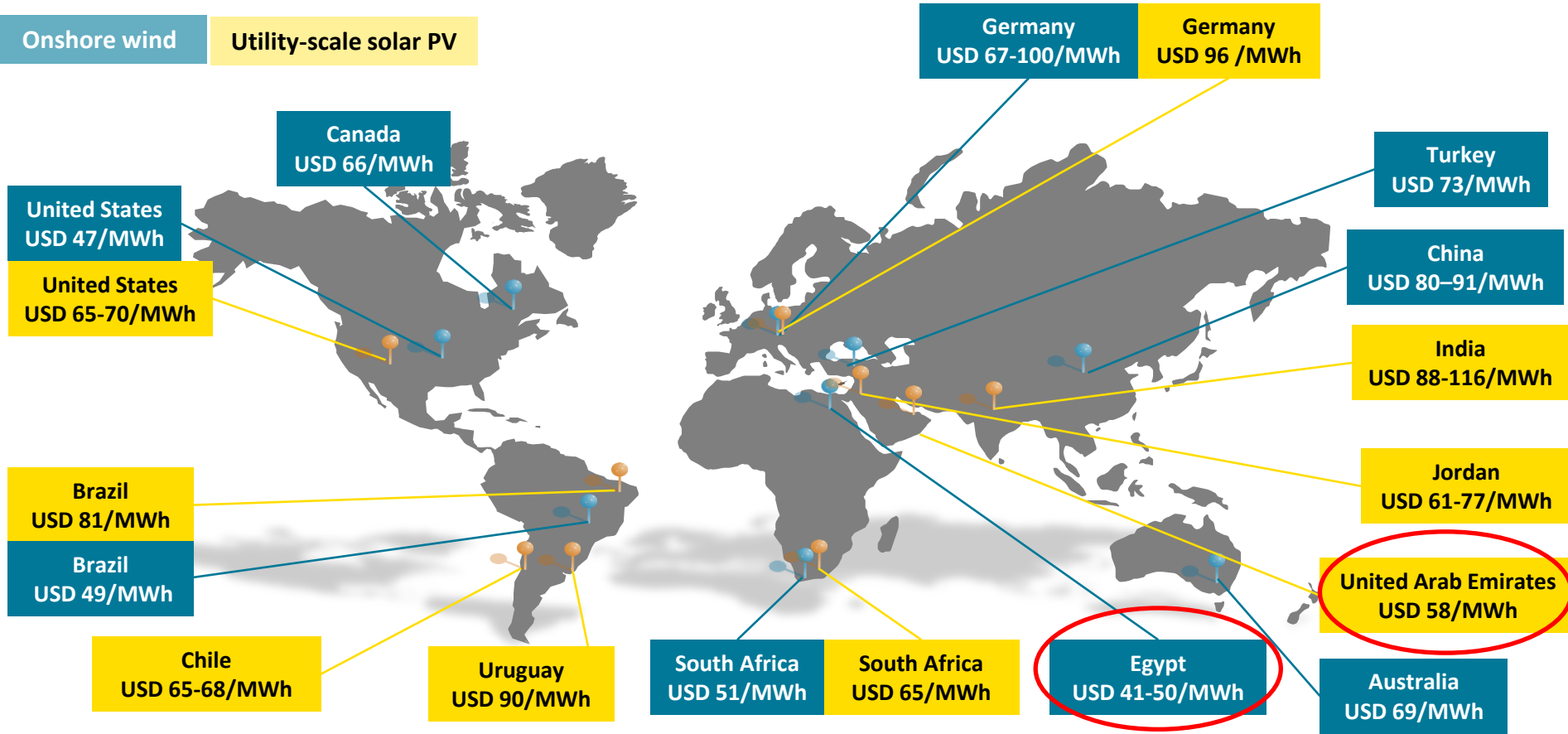
Renewable generation by technology, *main case* forecast and scenario analysis



Share of non-hydropower in renewable electricity generation is expected to increase significantly, but an acceleration is needed to meet climate change objectives

Evidence of lower costs on the horizon

Recent announced long-term contract prices for new renewable power

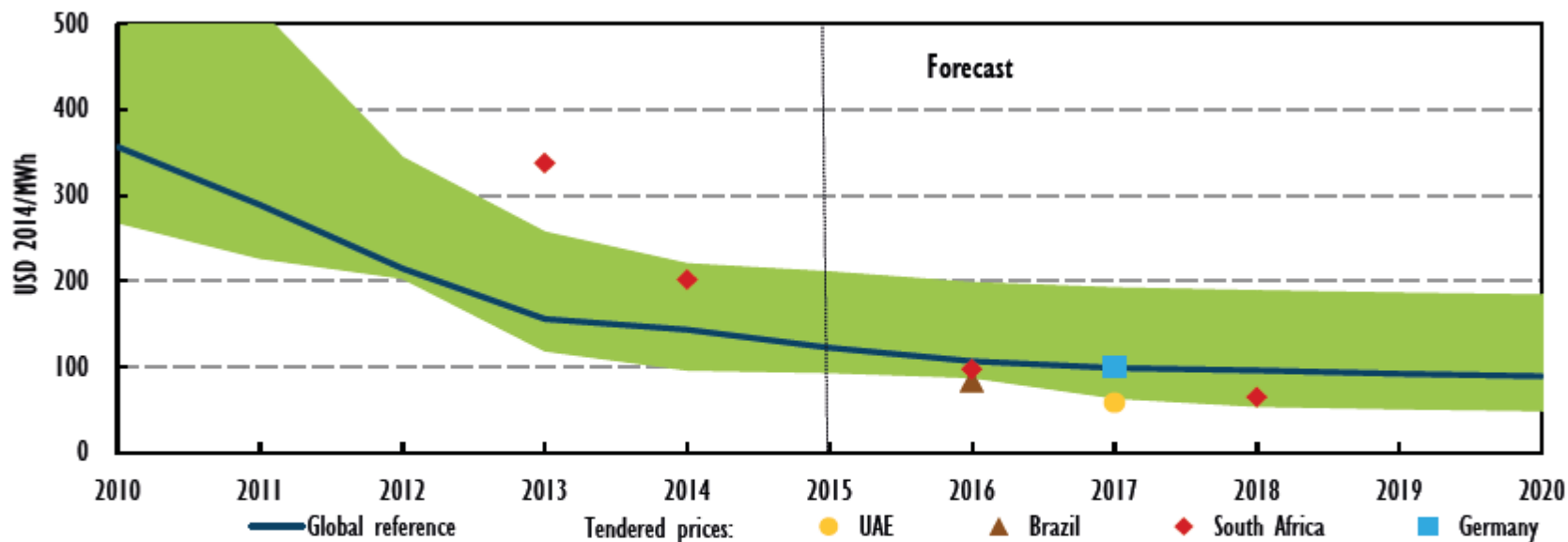


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A combination of price competition, long-term contracts, good resources and financial de-risking measures is creating deployment opportunities in newer markets and at lower costs

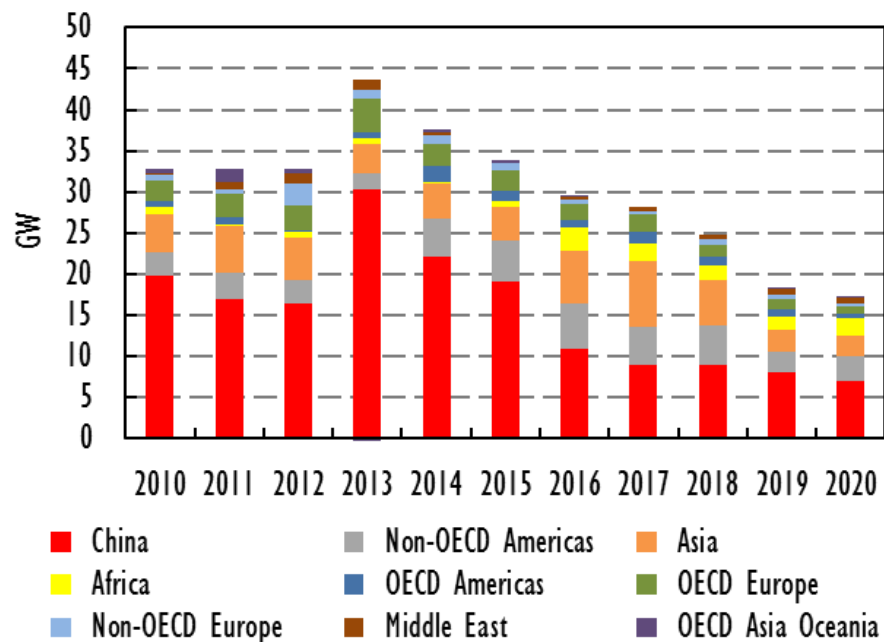
How quickly can RE costs converge towards best world benchmarks?

Typical utility-scale solar PV levelised costs of electricity generation (2010-2020)



Great differences in generation costs persist not only due to solar irradiation levels but also due to different system prices and cost of financing

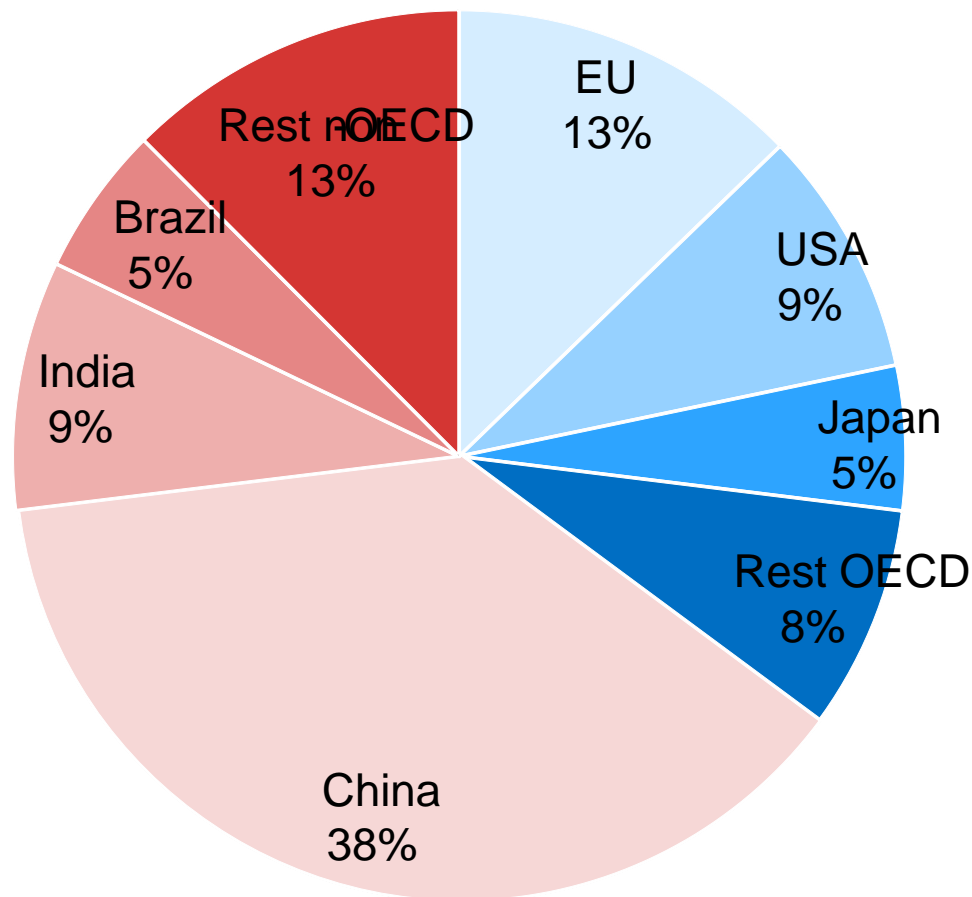
Slower hydropower deployment expected but untapped potential remains



Slower hydropower additions expected by 2020 as permitting delays and droughts push back projects, but high potential for growth over the longer term in Africa, Asia, and South America

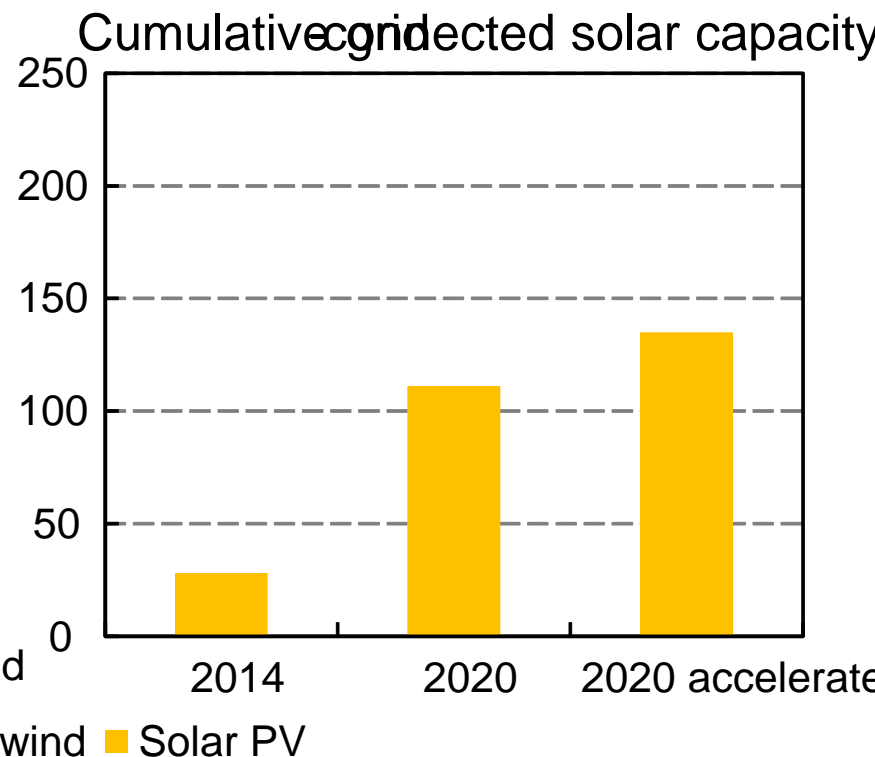
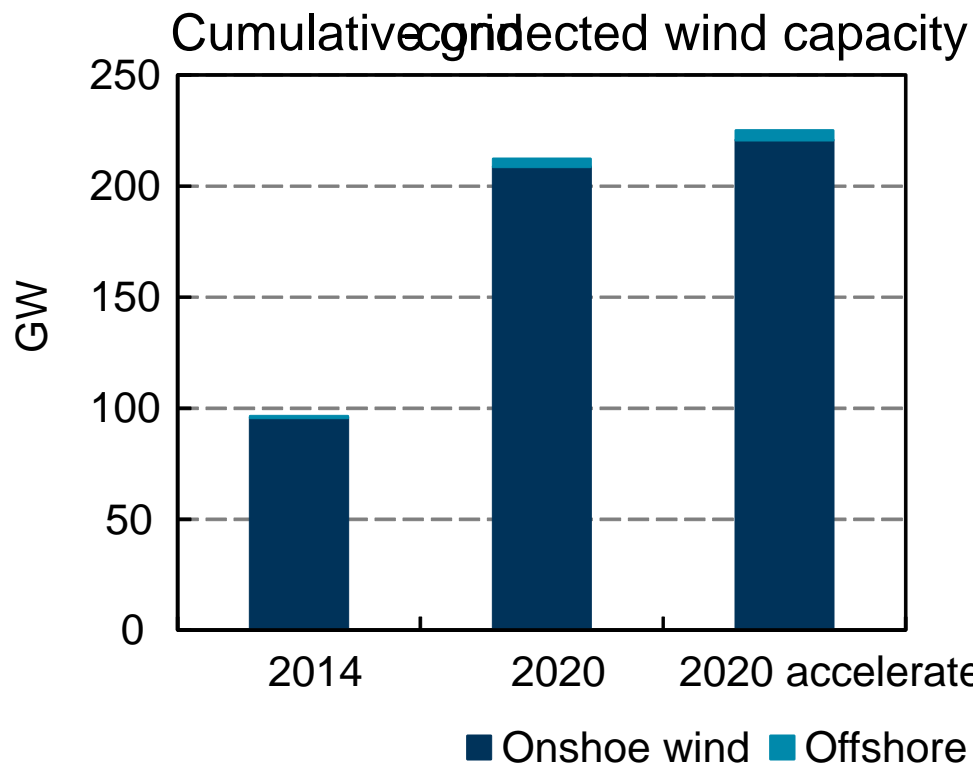
Growth shifting to emerging markets and developing countries

Shares of net additional renewable power capacity, 2014-20



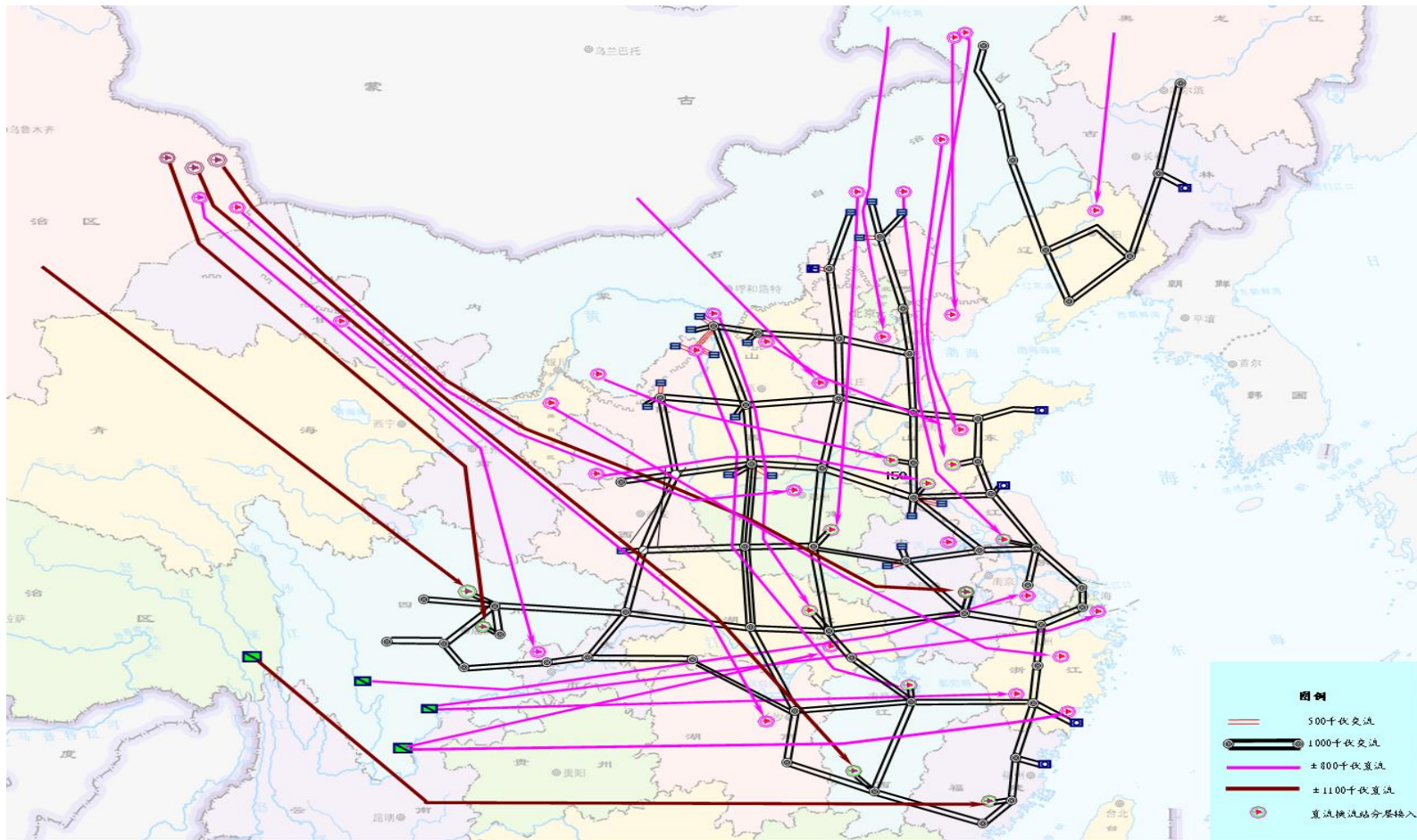
As the OECD slows, non-OECD countries account for two-thirds of renewable growth, driven by fast-growing power demand, diversification needs and local pollution concerns

China to be market leader in both wind and solar PV by 2020



China's cumulative wind capacity to more than double while solar PV to quadruple in 2020 but further growth is possible if higher targets are set

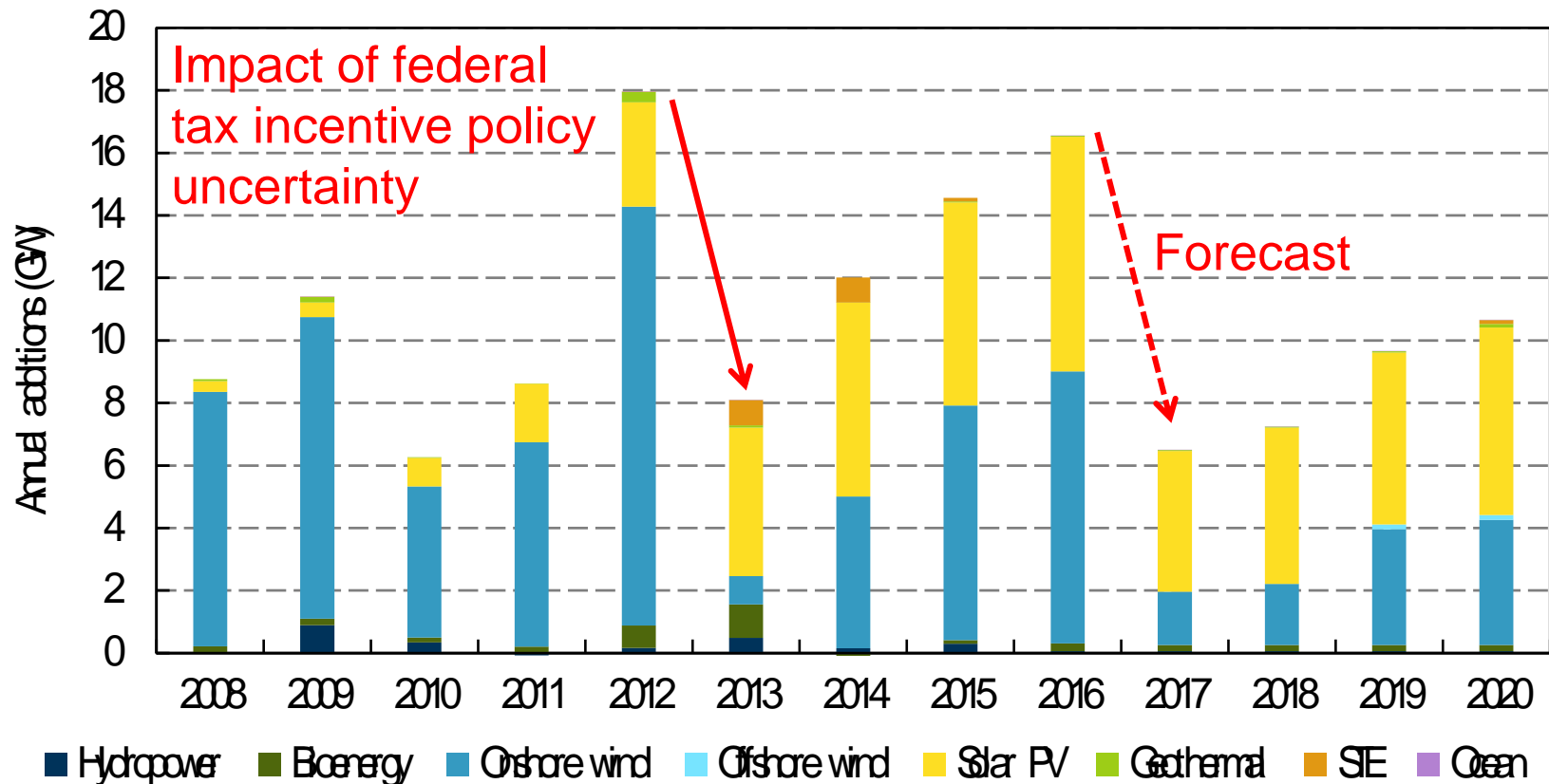
China - Grid and interconnections are key



By 2020, more than 22 UHVDC lines will link over 200 GW wind power turbines and 100 GW solar power plants to the Chinese load centers

Federal tax incentive uncertainty drives bumpy US renewable growth

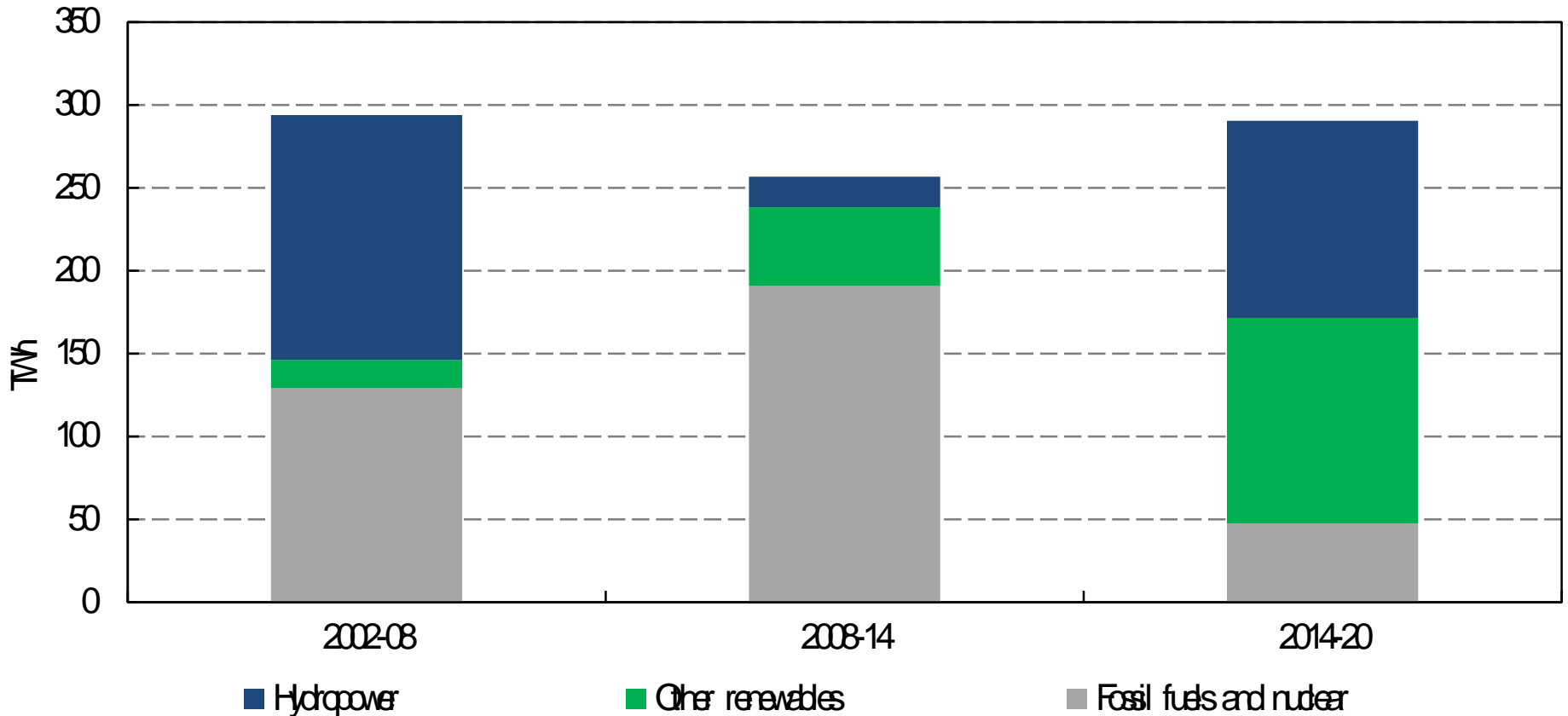
US annual net additions to renewable capacity



After China and Europe, the US is the third largest market for new renewable generation, but federal and state-level policy uncertainties create volatile deployment pattern

Renewables are powering Latin America's economic growth

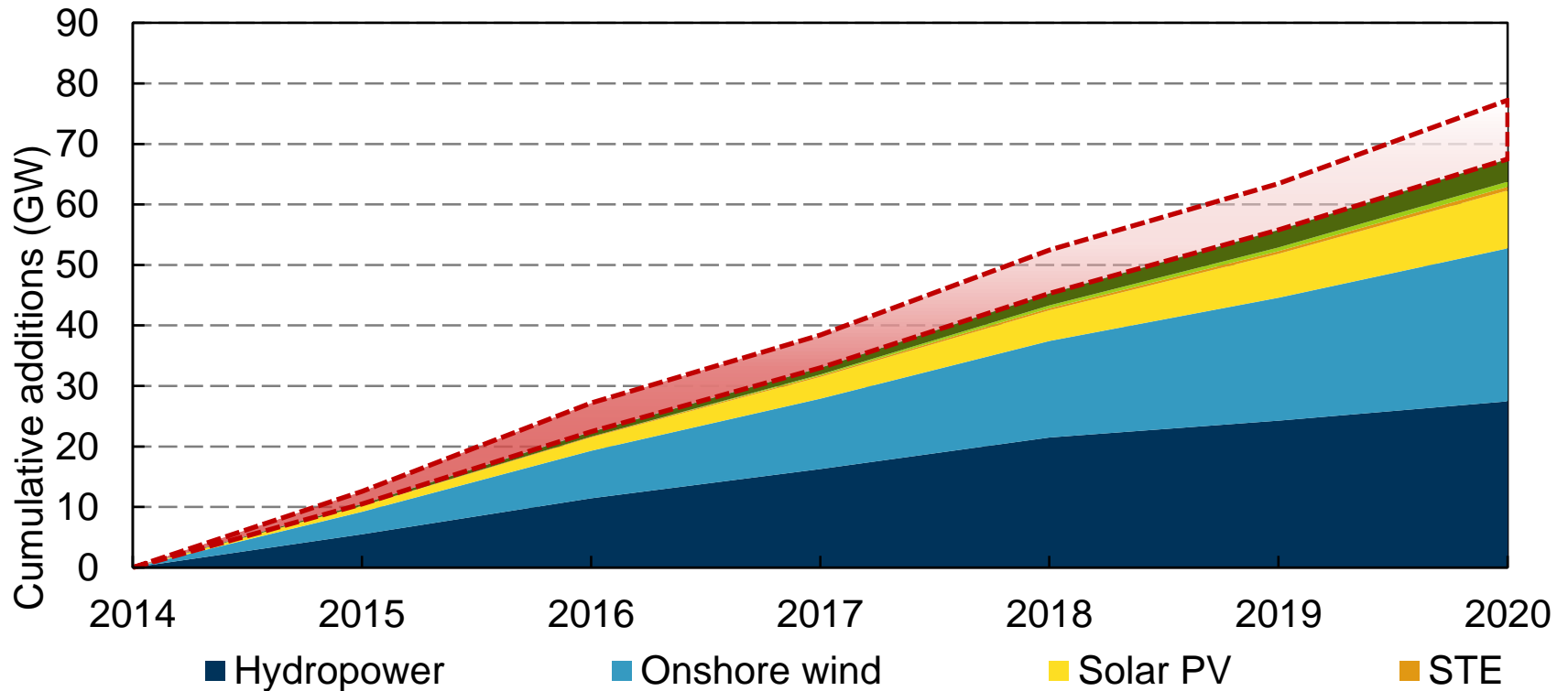
Latin America power demand growth versus new renewable generation



Excellent resources have underpinned hydropower's strong role. Now, with policy momentum, attractive economics and diversification needs, other renewable sources grow more rapidly

Renewable growth in Latin America underpinned by hydro, wind and solar PV

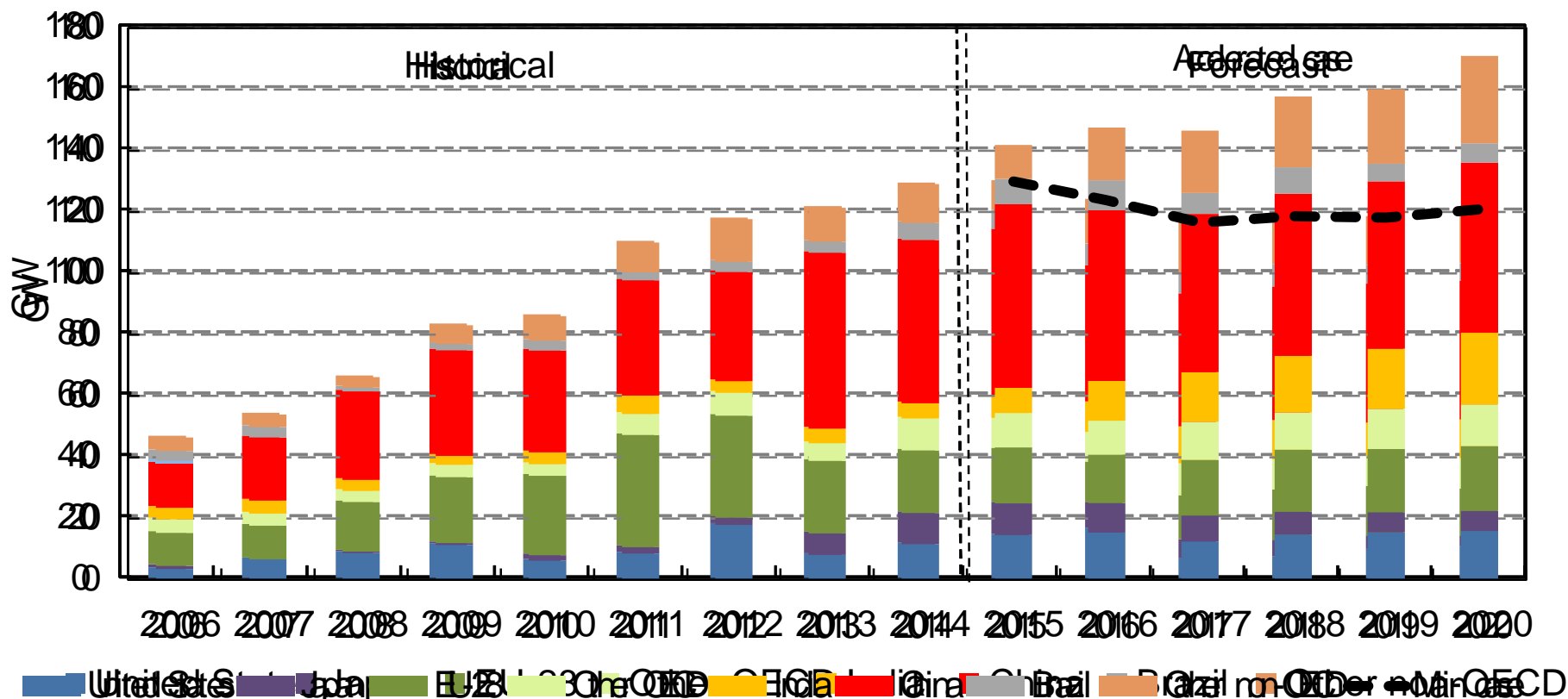
Latin America cumulative renewable capacity growth (2014-20)



Brazil accounts for most of Latin America's accelerated case with a 6GW increase possible with faster commissioning of hydro projects, more wind auctions and a clearer market framework for distributed PV

Can renewables get back on track to meet climate change goals?

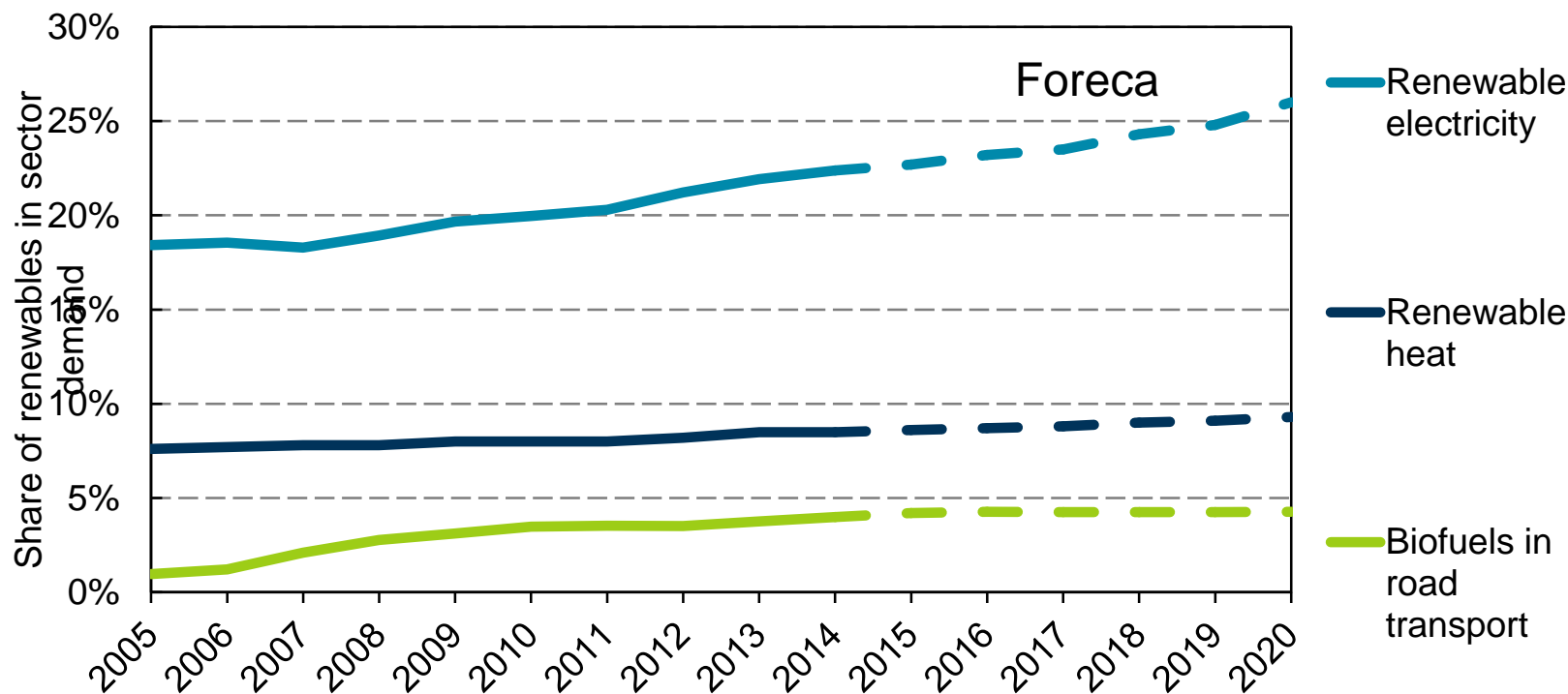
World renewable power capacity growth, main versus accelerated case



Policy enhancements can ensure continued renewables deployment growth and put the power sector back on track to meet long-term climate change goals

Persistent challenges slow growth in heat and transport

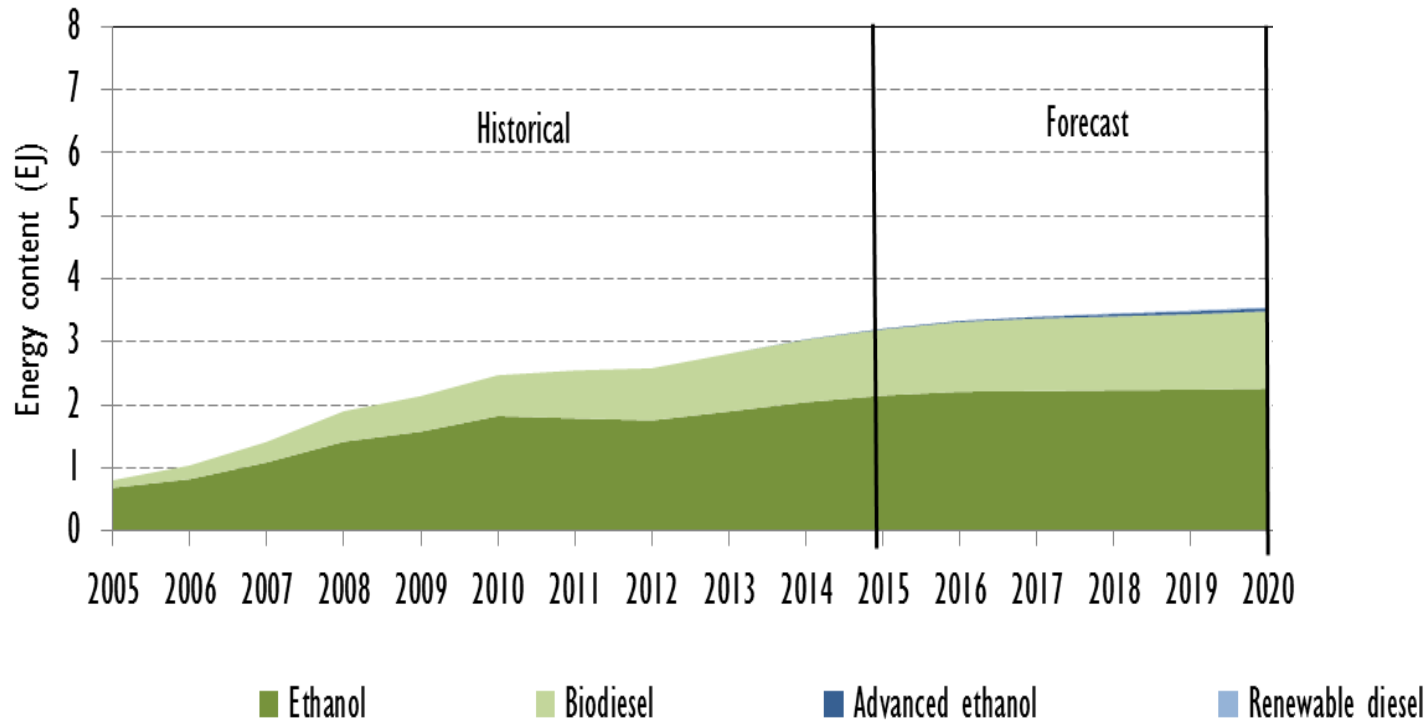
Historical and forecast share of renewables in electricity, heat and transport sectors 2005-20



Growth of renewable electricity generation is increasing, while renewable heat and transport are falling behind.

An acceleration of Biofuels growth is required

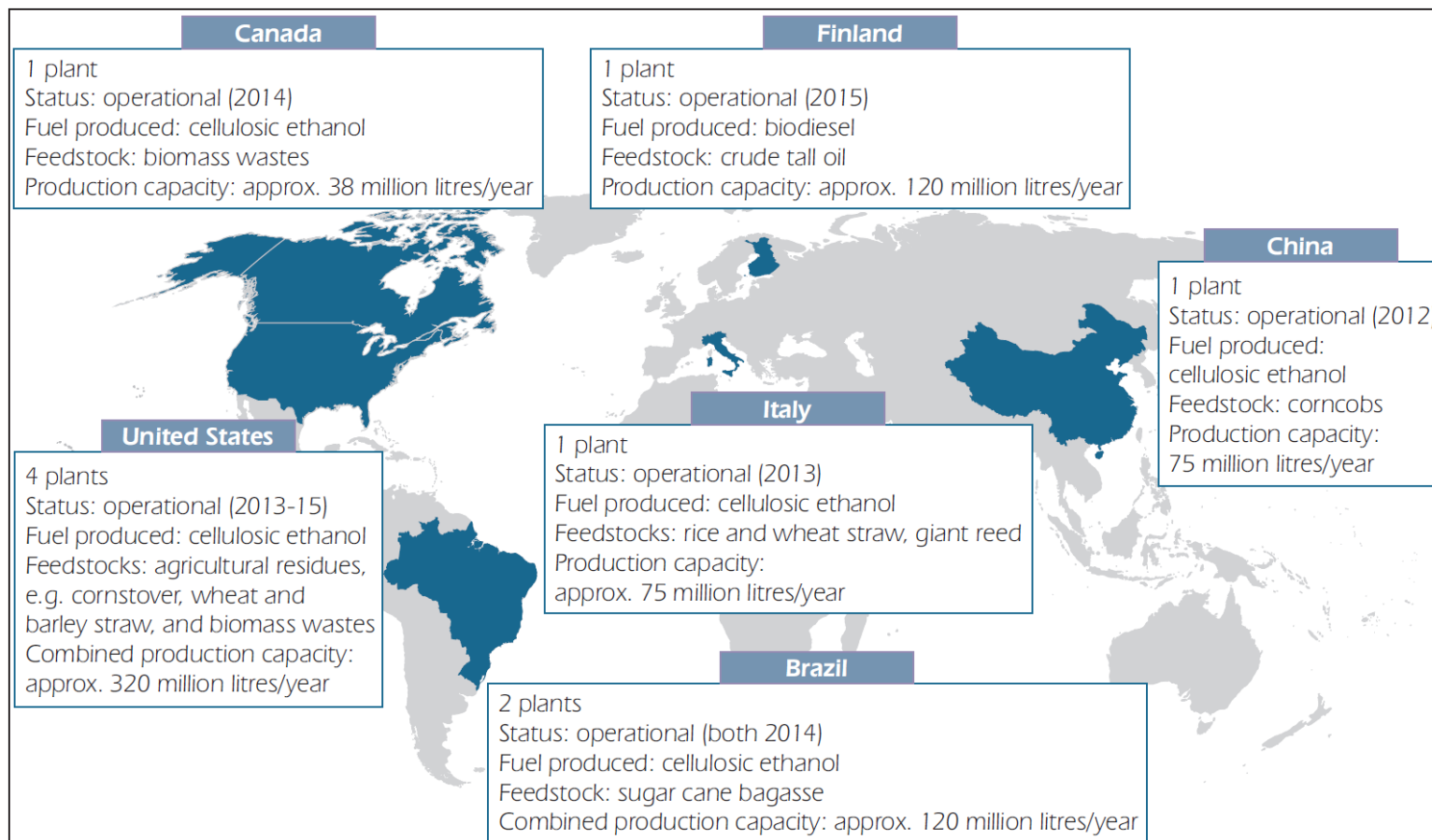
Global biofuels production and medium-term forecast



Transport accounts for 20% of global energy related CO₂ emissions, meaning a strong biofuels industry, alongside improved fuel economy and EV roll-out, is central to decarbonisation

Early signs of commercialisation in the advanced biofuels sector

Commissioned commercial scale advanced biofuel plants

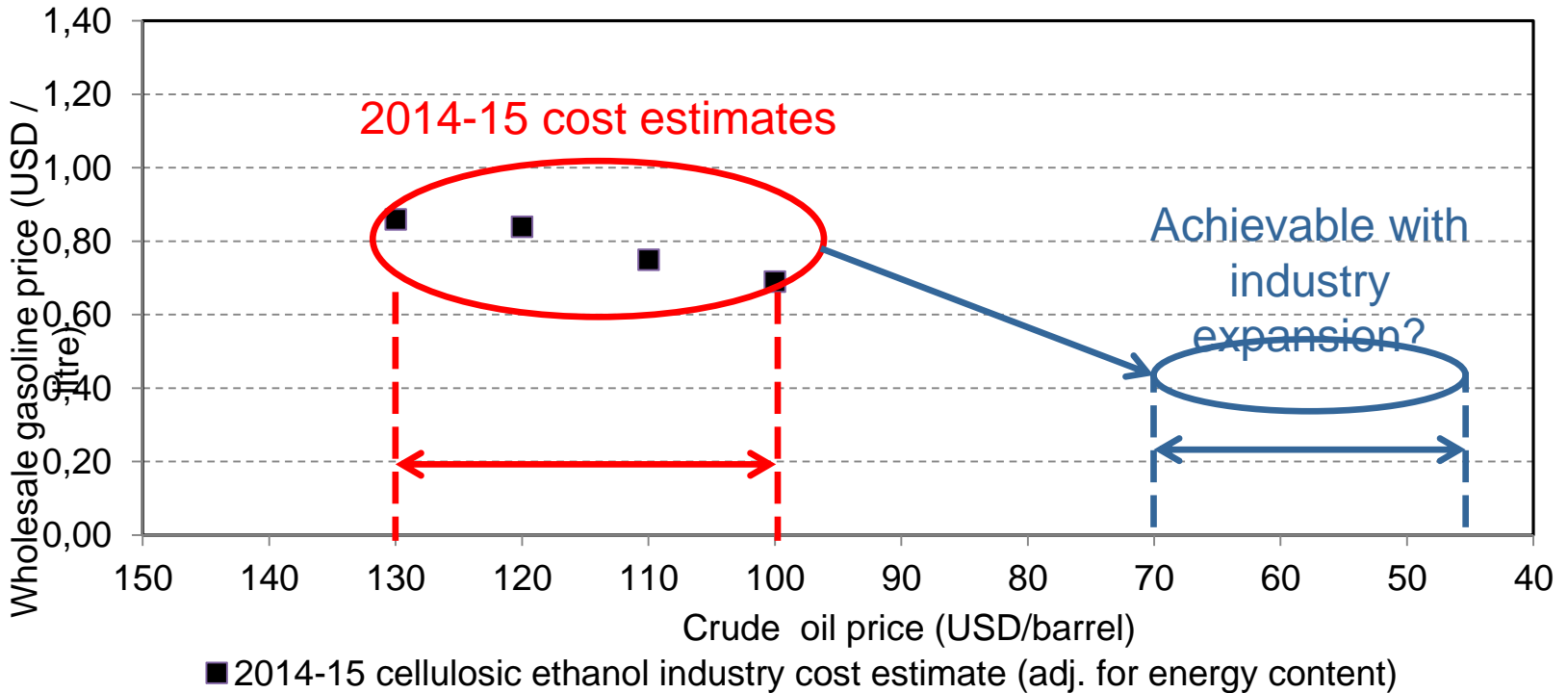


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Advanced biofuels – needed for long-term decarbonisation of the transport sector – are starting to scale up, but development requires further policy support.

Challenging for cellulosic ethanol to compete at current low oil prices

Cellulosic ethanol breakeven crude oil price for competitiveness with gasoline



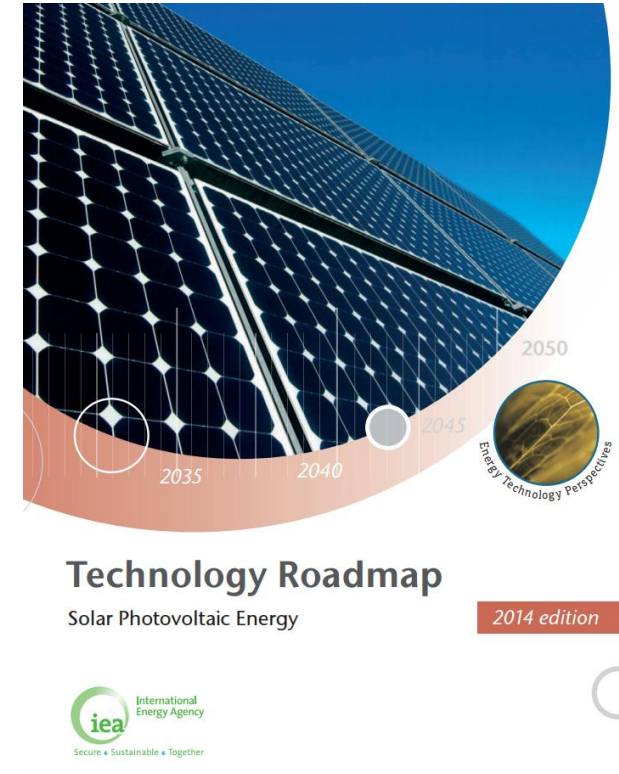
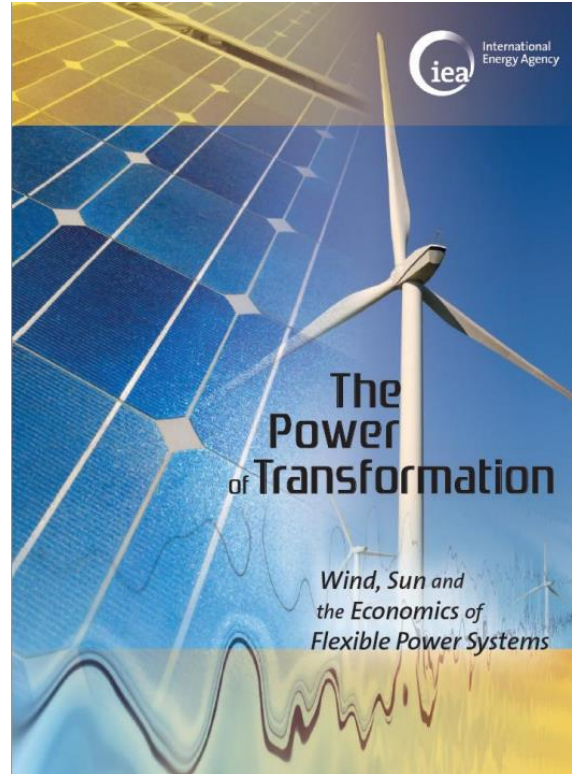
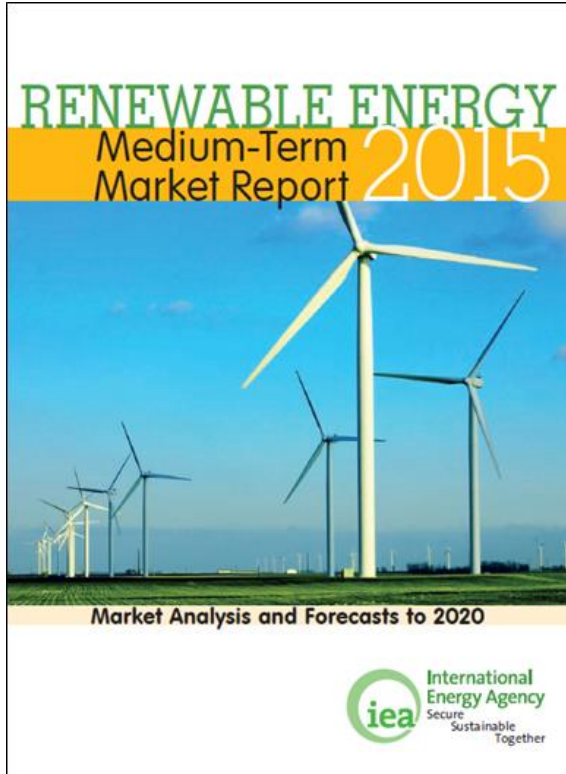
Note: Equivalent wholesale gasoline prices are based on a USD 10/barrel margin on crude oil price.

Current production cost estimates suggest breakeven with gasoline at USD 100-130/barrel crude oil prices, but realising significant scope for cost reduction could change this picture

A decisive moment for the future of renewables

- Increasingly affordable renewables are set to dominate the growing power systems of the world
- The impact of the lower oil price environment on global deployment of renewables is limited – particularly in the power sector
- While variability of renewables is a challenge energy systems can learn to adapt to, variability of policies poses a far greater risk
- Accelerated growth of renewables to meet energy security, local pollution and climate protection goals is feasible
- With great resource potential in Latin America, affordable renewables are seen contributing to energy diversification and sustainable development
- COP21 Paris framework agreement could significantly boost renewables deployment by:
 - Fostering clear and predictable policies and providing strong signals to markets
 - Improving financing conditions for low-C technologies

IEA work on renewables



- The MTRM 2015 can be purchased at: www.iea.org/bookshop/
- Renewables analysis a crucial part of IEA long-term scenario analysis: e.g. *World Energy Outlook*, *Energy Technology Perspectives*, *Tracking Clean Energy Progress*
- IEA renewables website: <http://www.iea.org/topics/renewables/>
- Renewable Policies and Measures Database:
<http://www.iea.org/topics/renewables/renewablesiea/policiesmeasuresdatabasepams/>