



Renewables 2018

Analysis and Forecasts to 2023

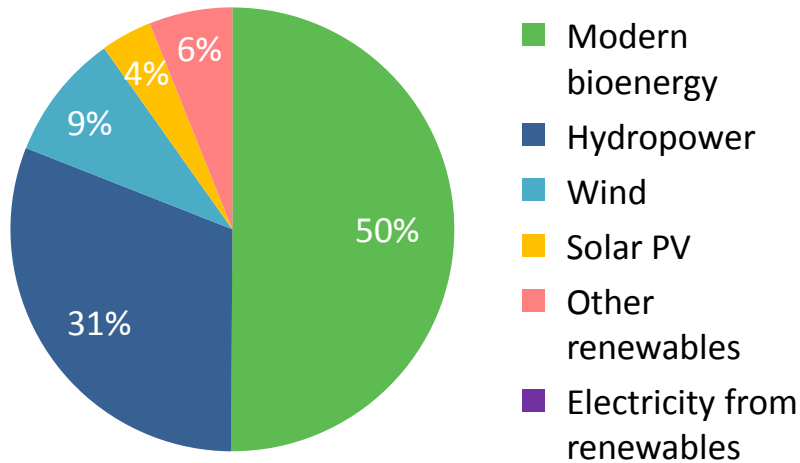
Cédric Philibert, Renewable Energy Division

CEEW&TERI, New Delhi, 13 November 2018

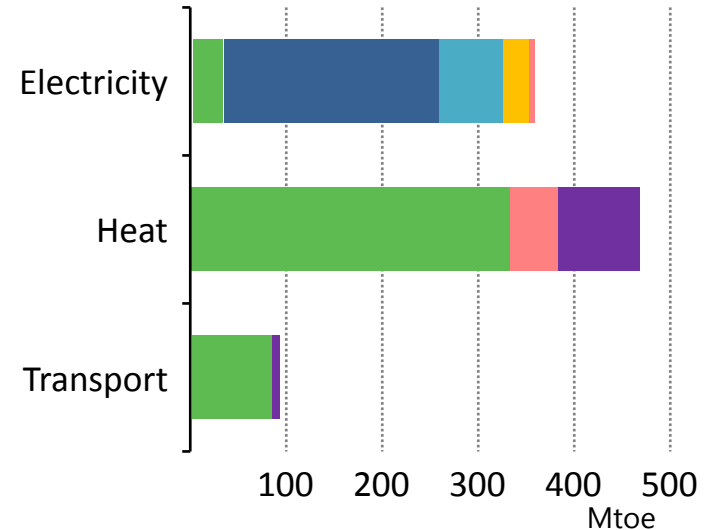


Modern bioenergy: the overlooked giant of renewables

Total final energy consumption from renewables, 2017



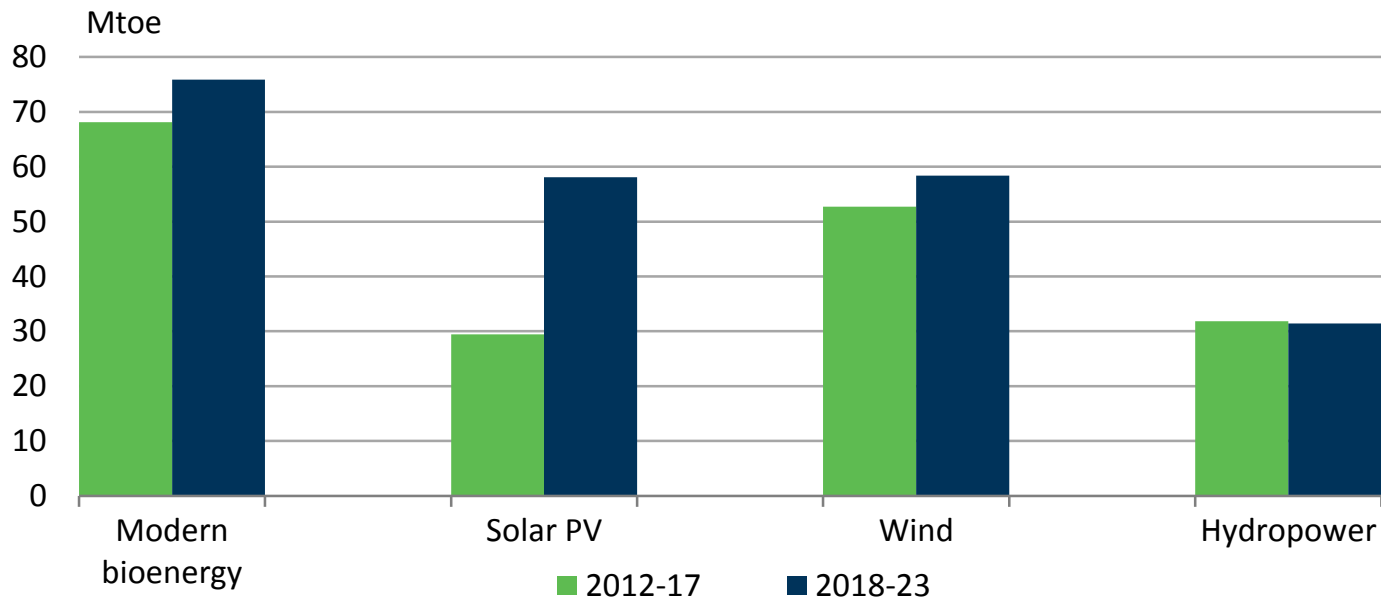
Total final energy consumption from renewables by sector, 2017



Modern bioenergy is the only renewable source that can provide electricity, direct heat and transport fuels
Two thirds of modern bioenergy heat is used in industry

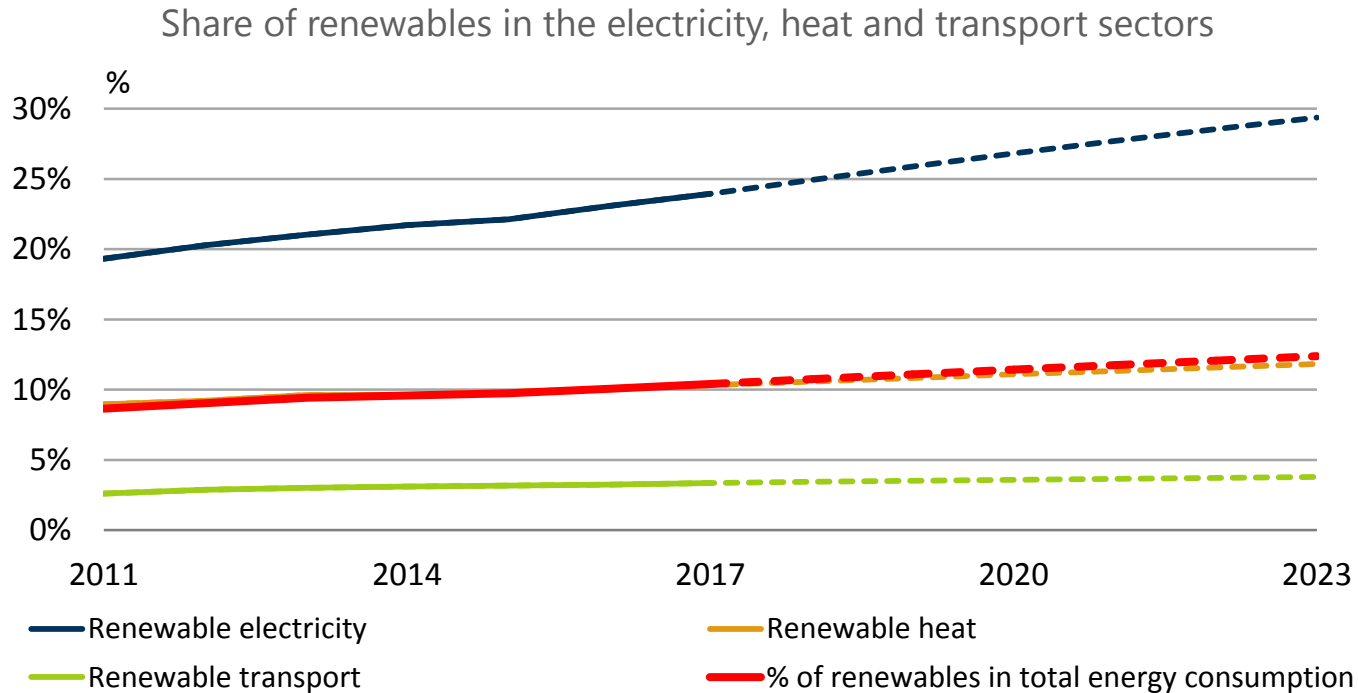
Modern bioenergy set to lead renewables growth

Total energy consumption growth of renewables over 2012-23



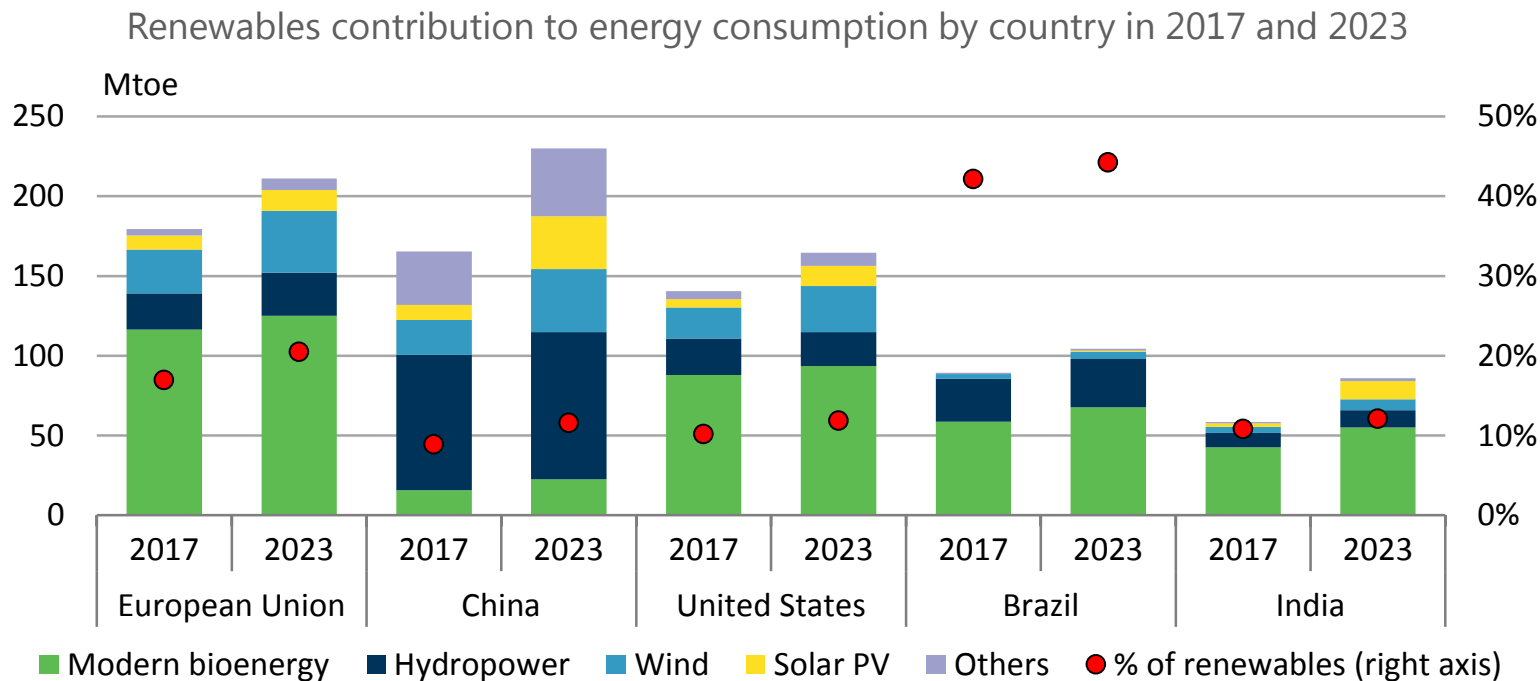
Total renewable energy consumption is expected to increase by almost 30% over 2018-2023, covering 40% of global energy demand growth

Renewables share of energy consumption increases by one-fifth



Electricity contributes to two-thirds of renewables growth but heat remains the largest end-use by 2023
Overall, renewables are not on track to meet long-term climate goals

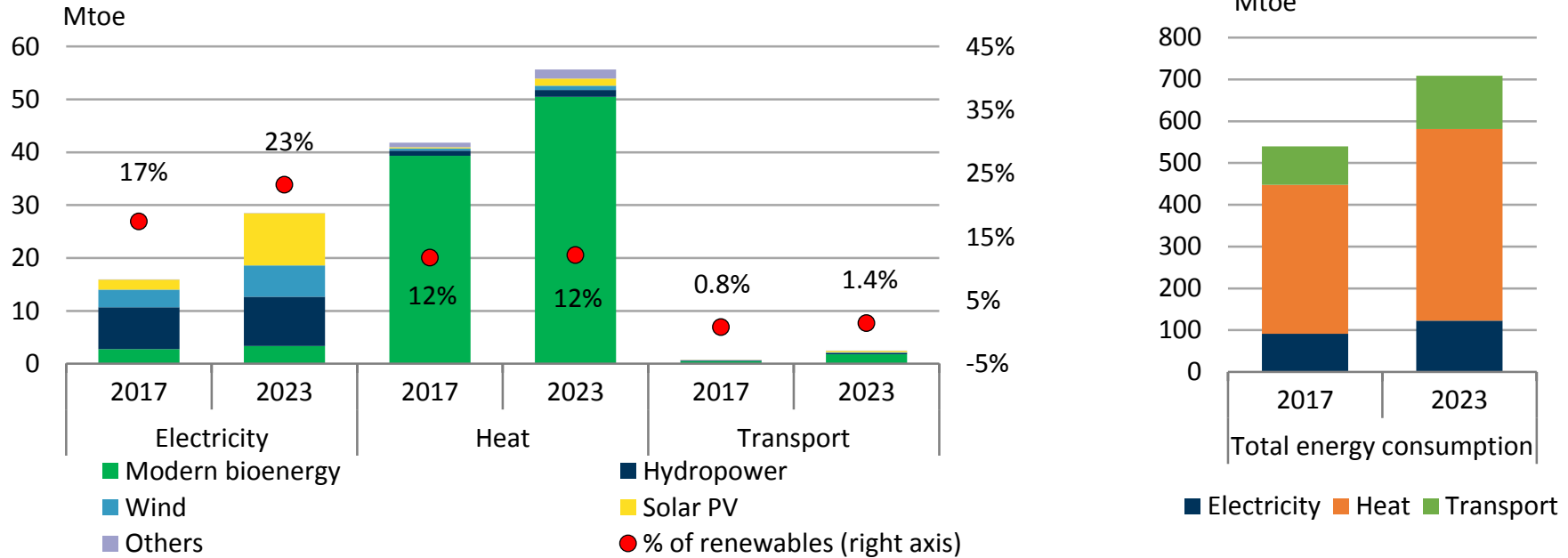
China becomes the largest RE consumer, Brazil has the highest share



China accounts for the largest absolute growth over the forecast period surpassing the EU, while renewable energy consumption in India increases by 50%

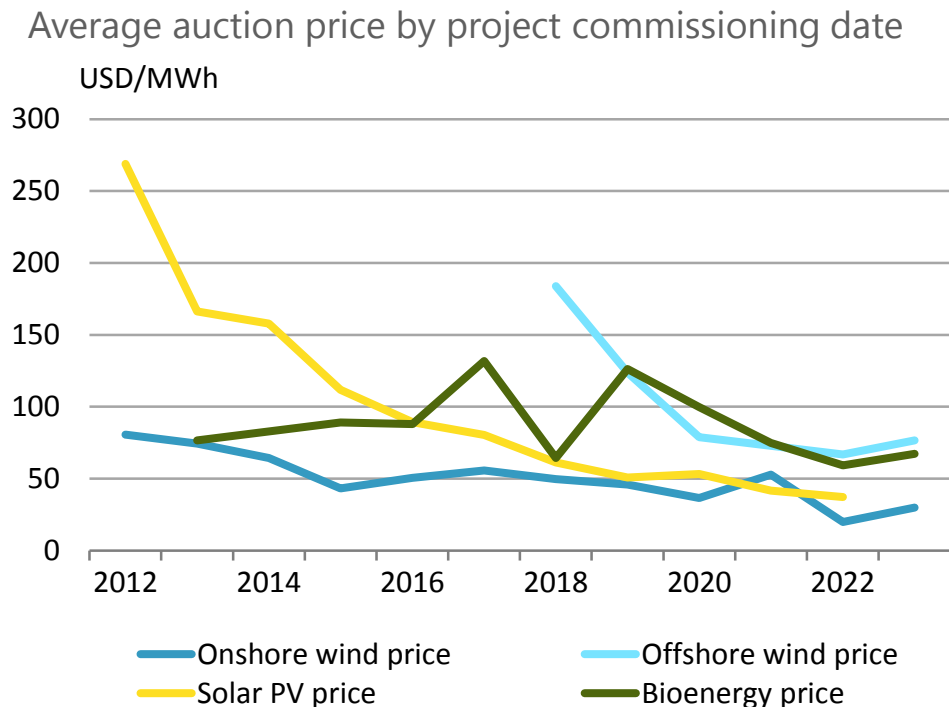
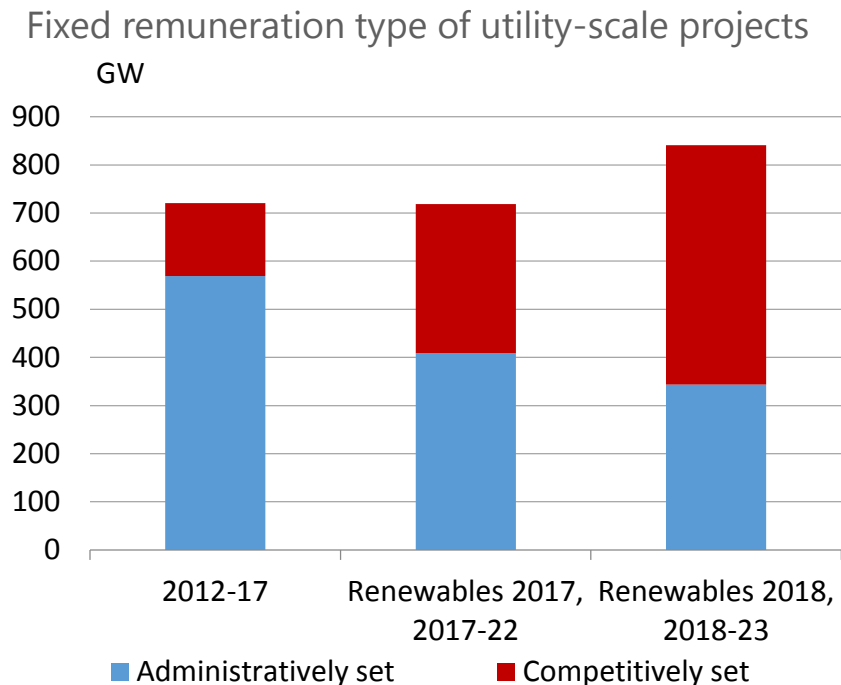
India's renewable growth led by bioenergy, PV and wind

Renewables contribution to energy consumption in India, 2017 and 2023



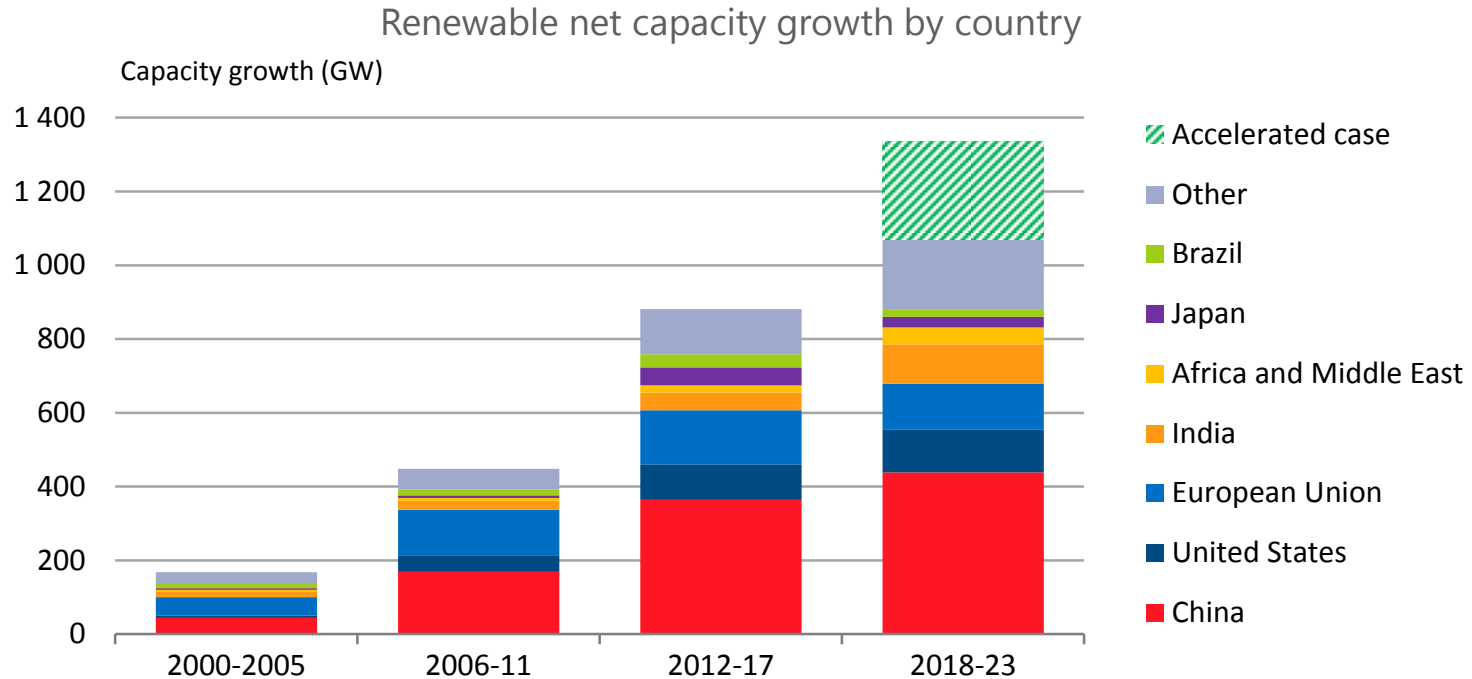
Renewables share in heat remains at 12% over 2018-23 as demand in industry and buildings to increase rapidly while renewables progress faster in the electricity sector

Competition accelerating cost reductions



Around 60% of renewable capacity additions over 2018-23 driven by competitive remuneration schemes
Announced contract prices need to be verified as project delivery schedules and final costs may differ

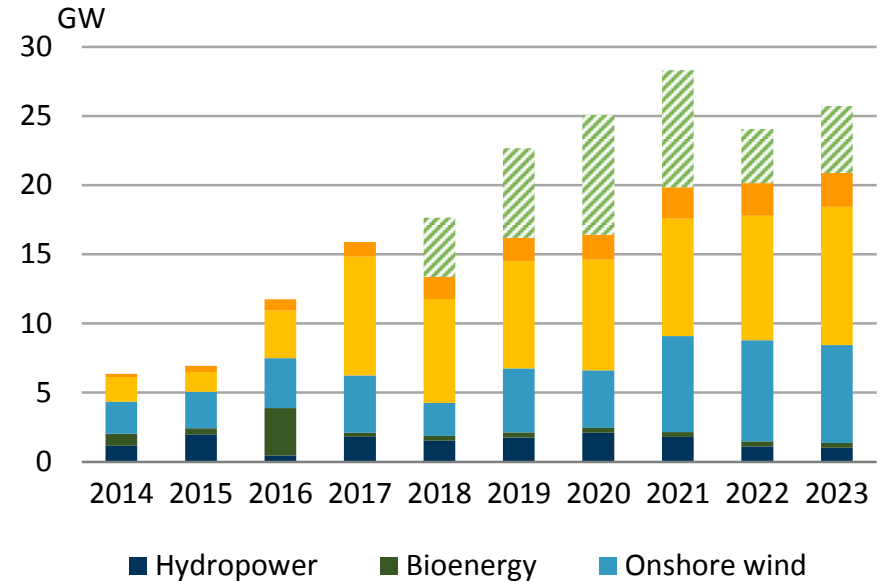
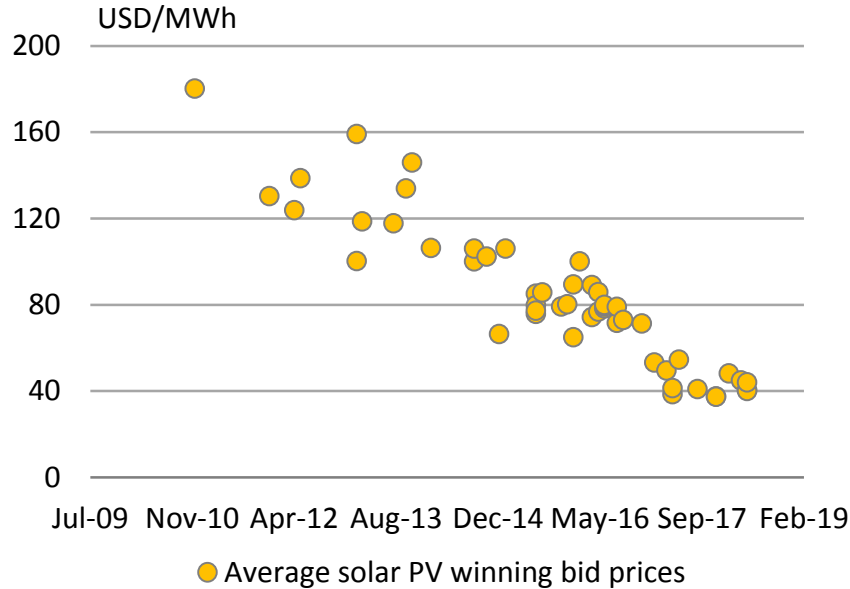
Renewables account for 70% of global capacity expansion



In the accelerated case, renewable capacity could expand by 25% more reaching 1.3 TW, if governments address challenges concerning policy uncertainty, grid integration and affordable financing

Solar PV to account for 60% of India's renewable capacity growth

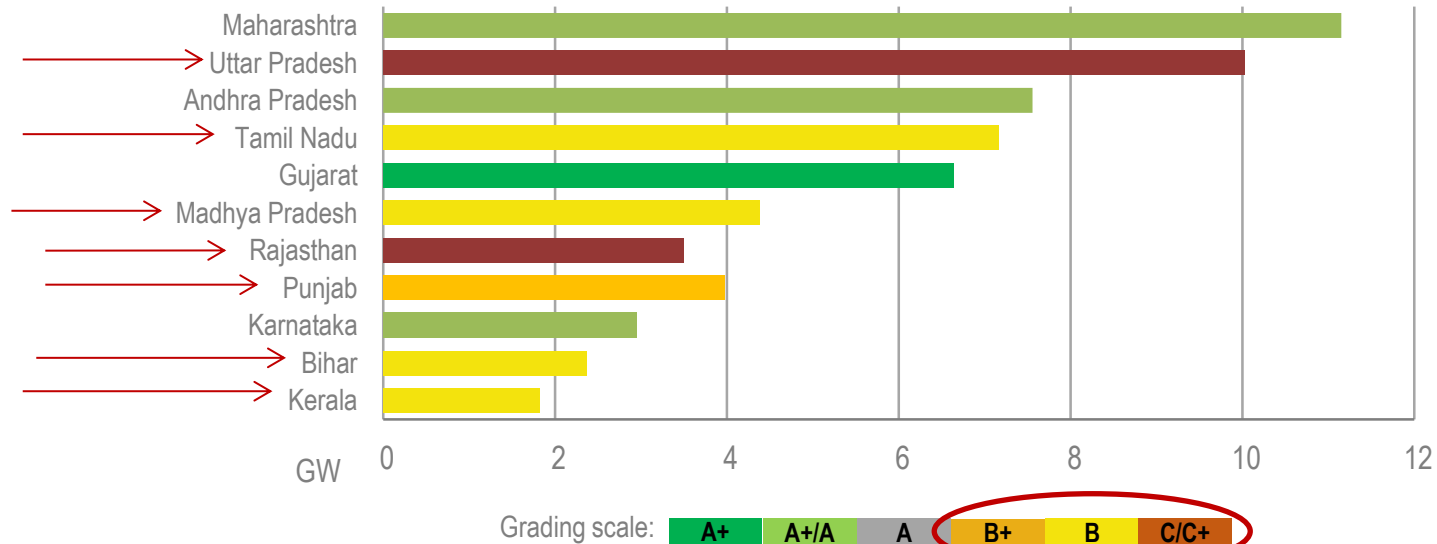
India renewable capacity additions main and accelerated case and average winning PV bids



India's renewable capacity to double over 2018-23 but this growth could be a third higher under the accelerated case with improved financial health of DISCOMs, grid infrastructure and faster DG

Financial health of DISCOMs remain a key challenge

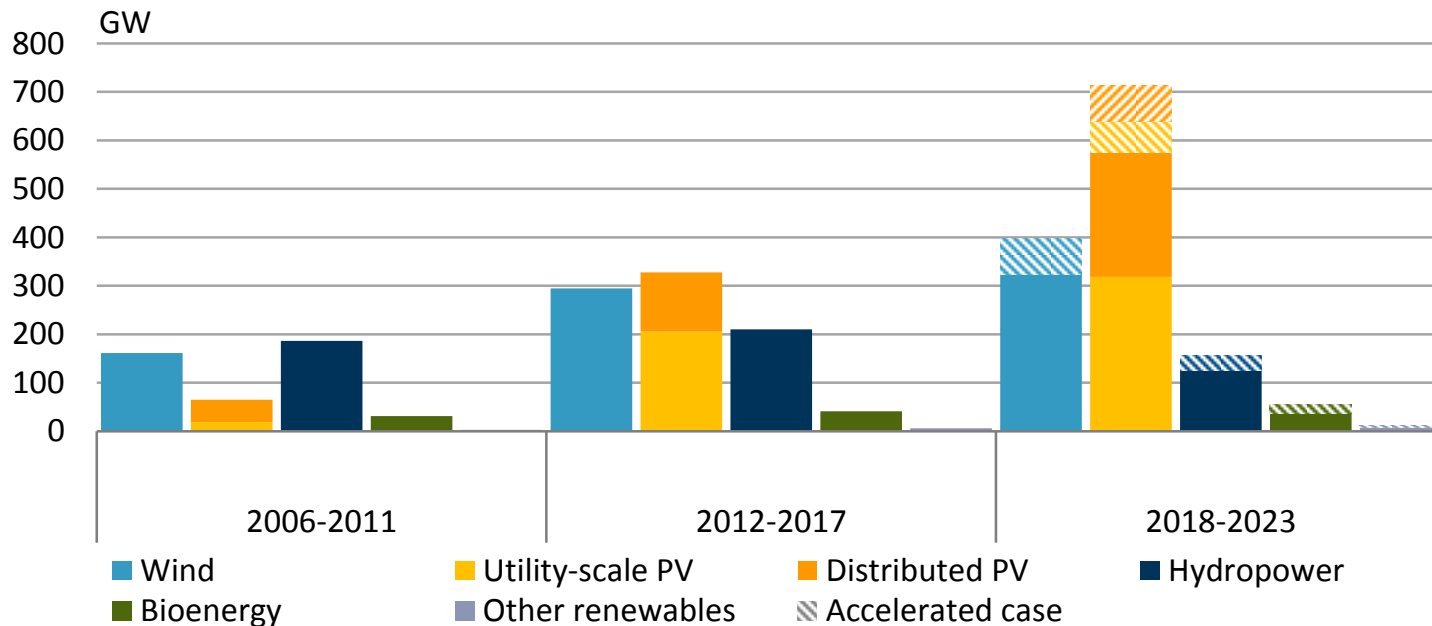
Solar PV capacity needed to reach 2022 targets vs financial health of utilities per state as of July 2018



Almost 40% of the PV capacity needed to reach 2022 targets occurs in states where the financial health of distribution companies is below average

Solar PV expansion in electricity larger than all renewables combined

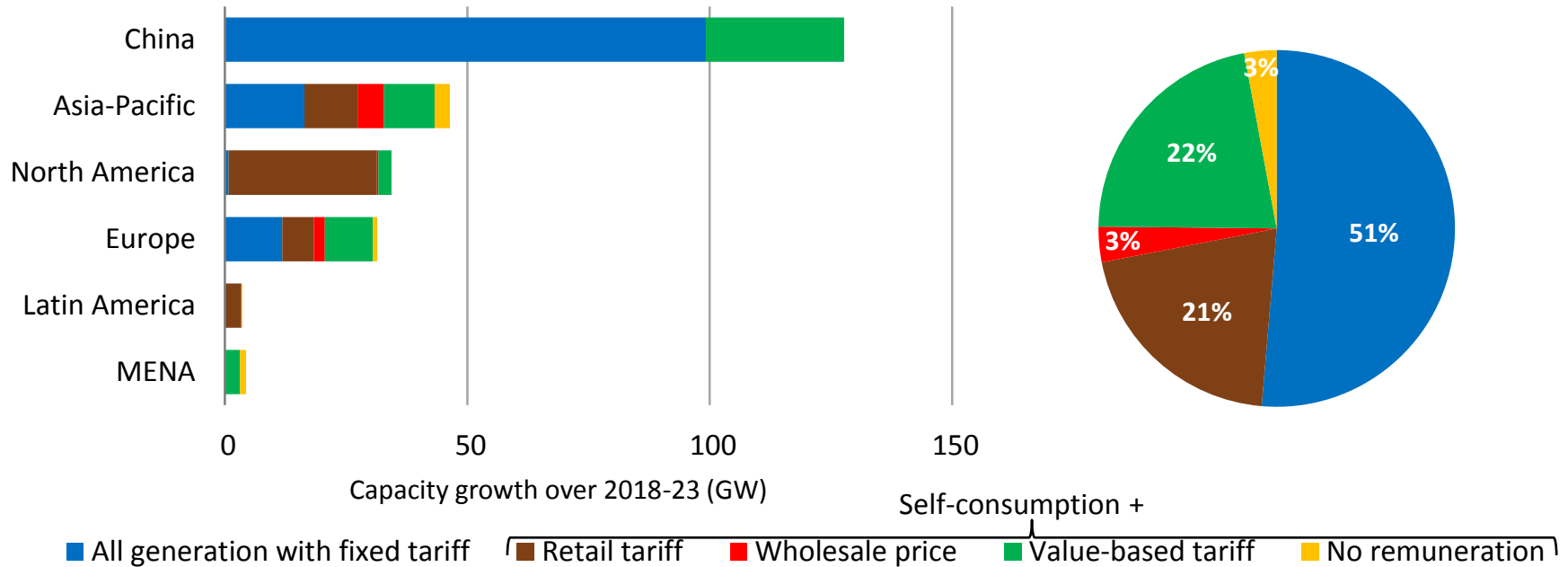
Renewable electricity capacity growth by technology



Distributed generation capacity growth makes the difference in solar PV's leadership
Cumulative PV capacity could reach 1.1 TW and wind over 0.9 TW by 2023 under the accelerated case

Policies for remuneration to play a key role for distributed generation

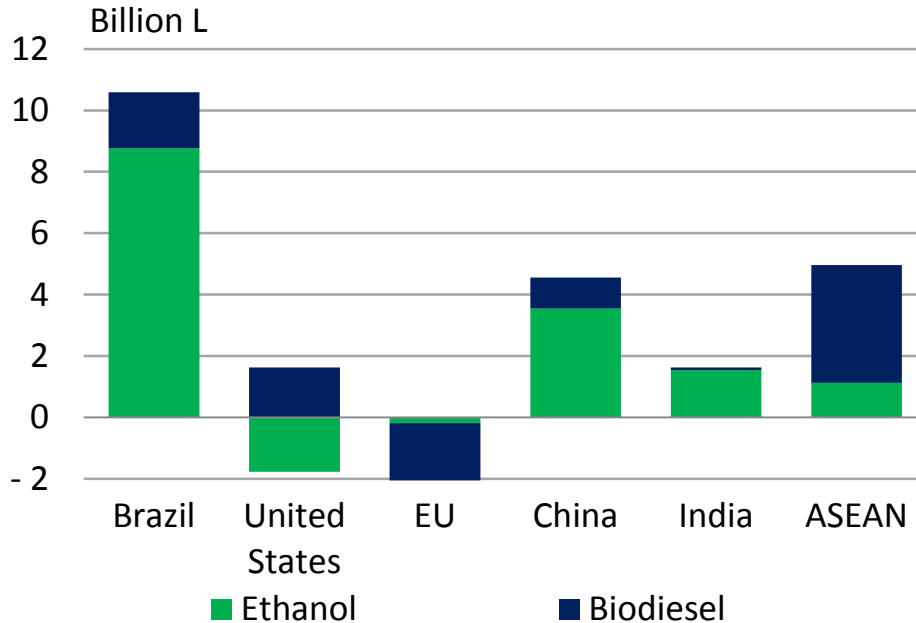
Distributed PV capacity growth by policy type for remuneration of excess generation



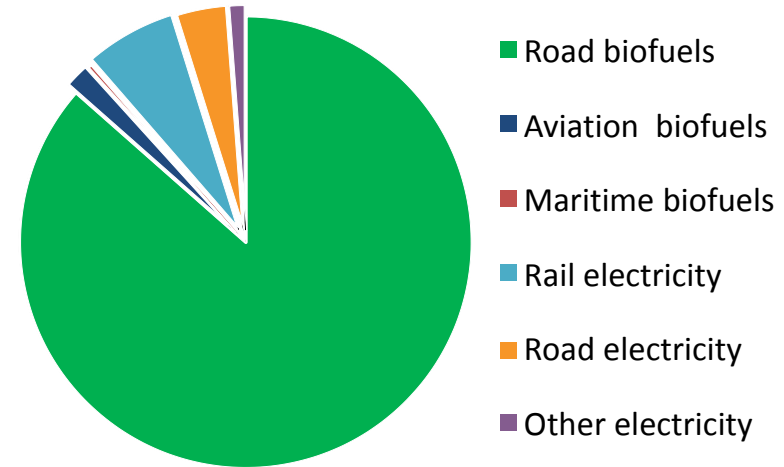
Utilities revenue losses due to self-consumption to almost quadruple (USD 12 bln) by 2023 but accounting for less than 0.3% of total retail bill collection revenues

Asia and Latin America dominate biofuel production growth

Biofuel production growth 2018-23

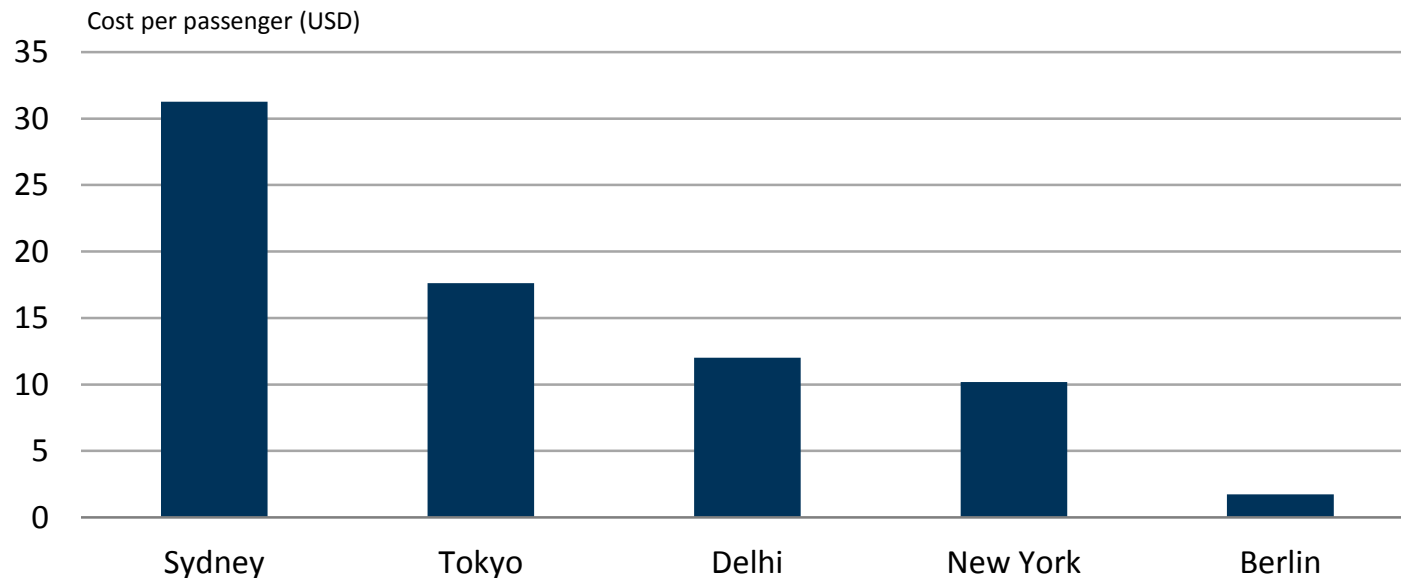


Renewables consumption in transport in 2023



Biofuels production grows by 16%; EVs electricity consumption triples, with renewables providing 30% of demand from electrified transport by 2023

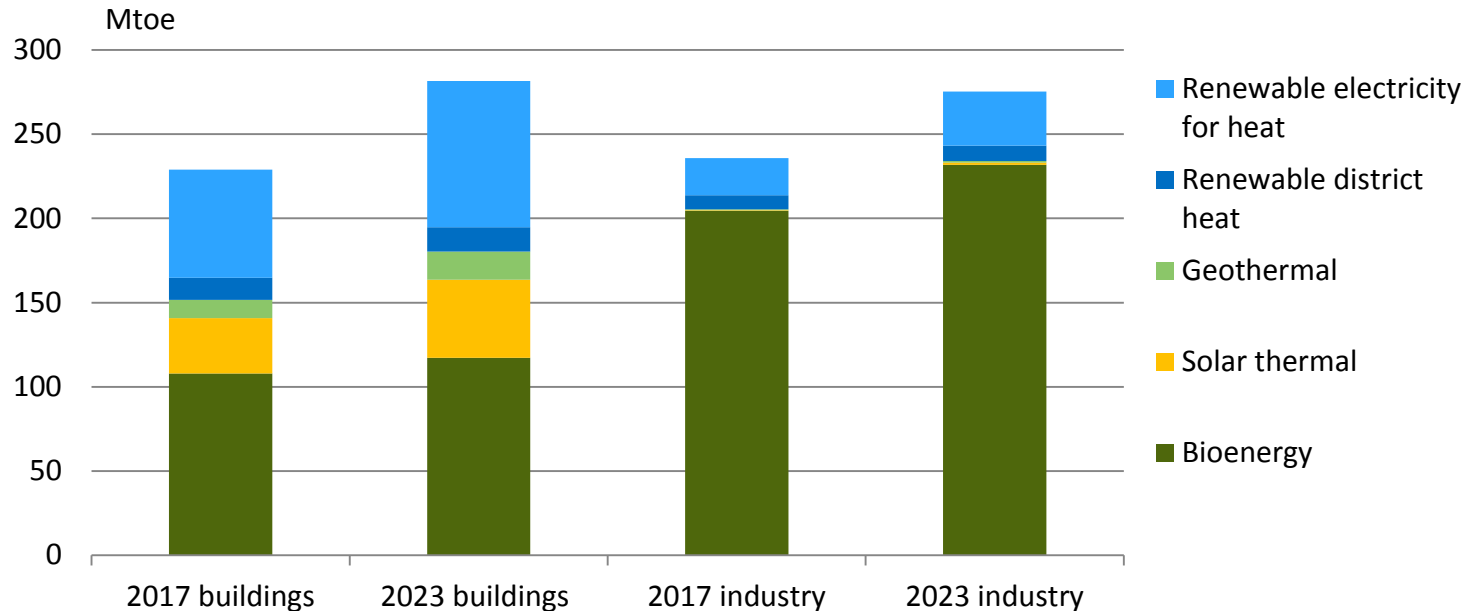
Cost premium of commercial aviation biofuels (15% blend) per passenger from London



Policies remain key to bridge the cost gap between aviation biofuels and fossil jet fuels
The most efficient aircraft could reduce fuel costs by around 15%

Bioenergy to continue dominating renewable heat consumption

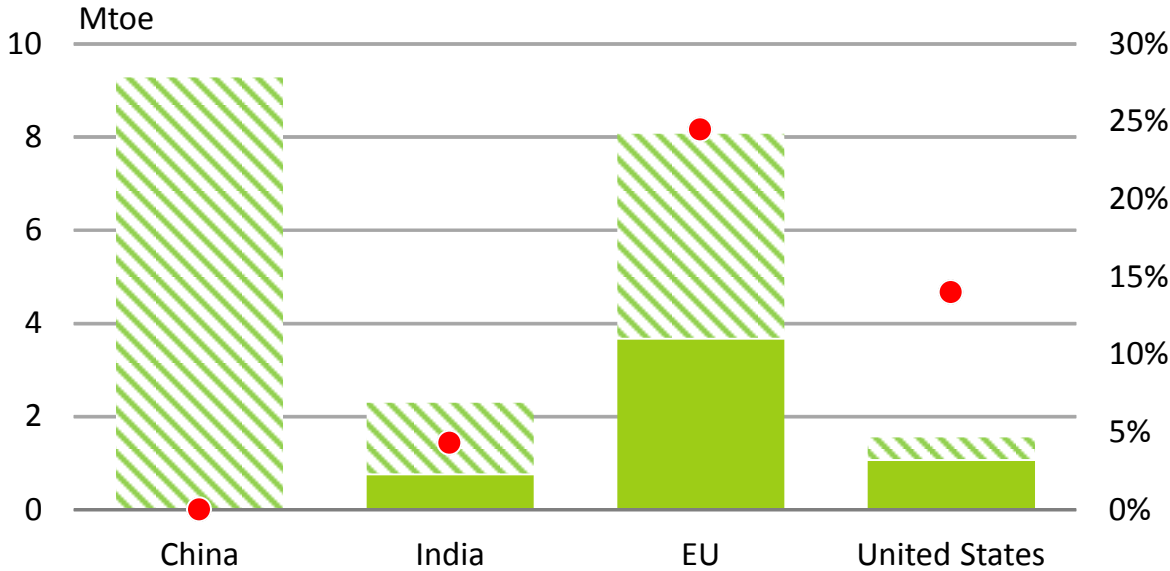
Renewable heat consumption by source in buildings and industry



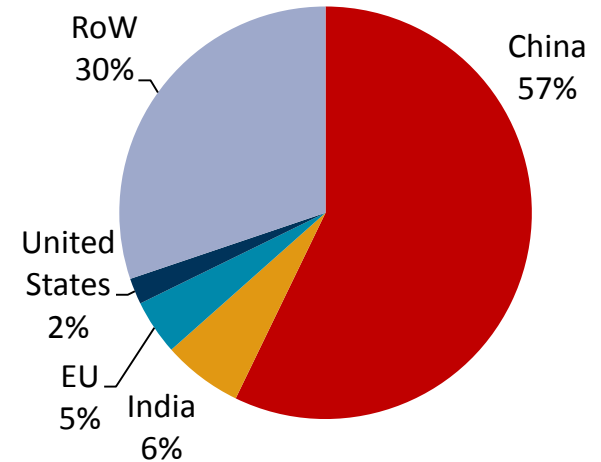
Bioenergy is particularly prevalent in industry, whereas in buildings growth in solar heat and renewable electricity is pushing bioenergy from the top spot.

Waste: a key resource for “greener” cement production

Bioenergy and waste consumption in the cement industry by country



Cement production by country, 2017



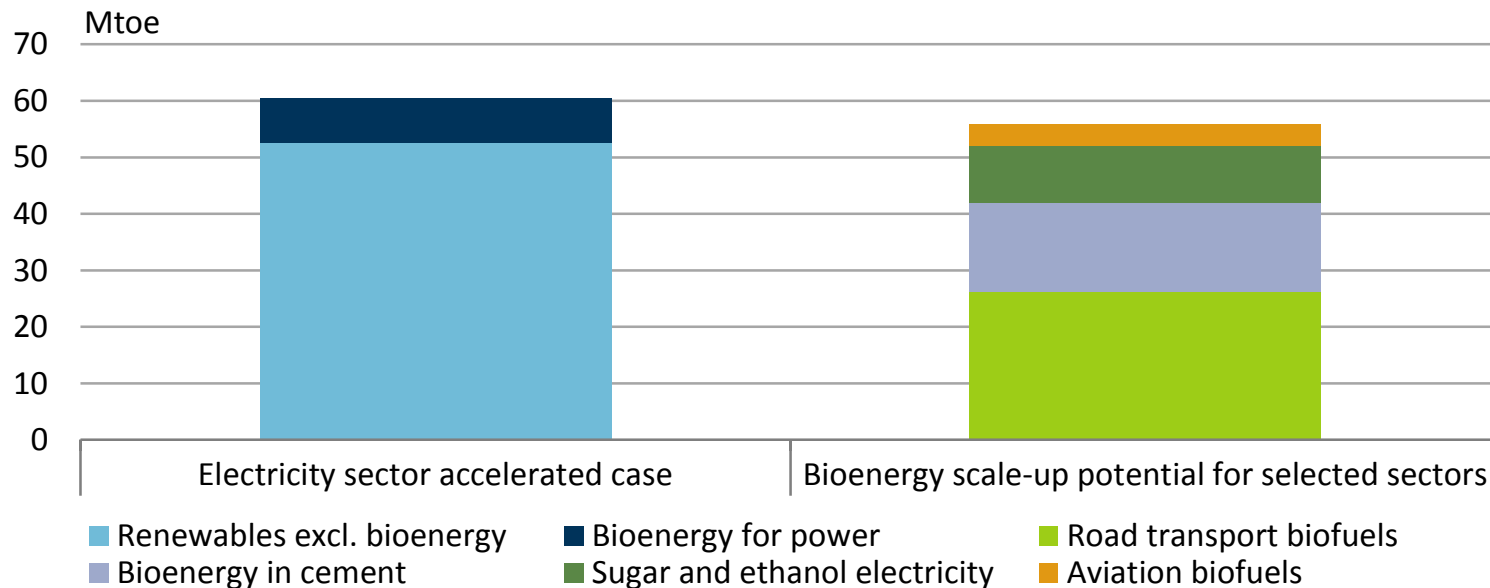
■ Bioenergy and waste consumption in 2017 ● % of bioenergy and waste in 2017 (right axis)

▨ Bioenergy and waste 2023 potential

The share of bioenergy and waste in the cement industry could be doubled if the robust waste management frameworks present in Europe were replicated in large producing countries

Accelerated deployment is possible with right policies

Renewables upside potential over 2018-23



Policies could accelerate renewable electricity growth by 25%; bioenergy could accelerate consumption across all sectors with an enhanced use of available waste resources

Conclusions

- Even with ongoing cost reductions, government policy remains crucial to attract investment in renewables, ensure appropriate market design and reliable & cost-effective system integration
- Modern bioenergy will continue to lead renewables growth in the next five years and its untapped potential remains huge particularly in China, India, Brazil and the EU
- Further accelerating the use of modern bioenergy hinges on policies & incentives to foster innovation and on rigorous sustainability frameworks
- Greater use of solar, wind, bioenergy & other renewables – together with energy efficiency & other clean energy technologies – is needed in all sectors for emissions to peak rapidly then decline
 - Electrification of end-use sectors
 - Better alignment of energy efficiency and renewable energy policies
 - Enhanced direct renewable heat uses
 - Stronger renewables penetration in industry, including through hydrogen-based fuels & feedstocks

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