RENEWABLE ENERGY
Medium-Term Market Report 2012

International Energy Agency

Medium-Term Renewable Energy Market Report 2012

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Market Trends and Projections to 2017

Objective and scope

- With the increasing role of a portfolio of maturing renewable technologies in the power mix…
- The IEA is publishing its first medium-term report focused on renewable energy
  - Bottom-up, global renewable *forecast* of renewable electricity capacity and generation over 2011-17
  - Detailed analysis of 12 OECD countries (Austria, Denmark, France, Germany, Italy, Japan, Norway, Spain, Sweden, Turkey, UK, US) and China, India, Brazil (~80% of world renewable electricity)
- For 2012 edition, focus on 8 technologies in power sector with some analysis on solar thermal heating
- Completes slate of IEA MT forecasts: oil, gas, coal
- Methodology consistent with other MT reports

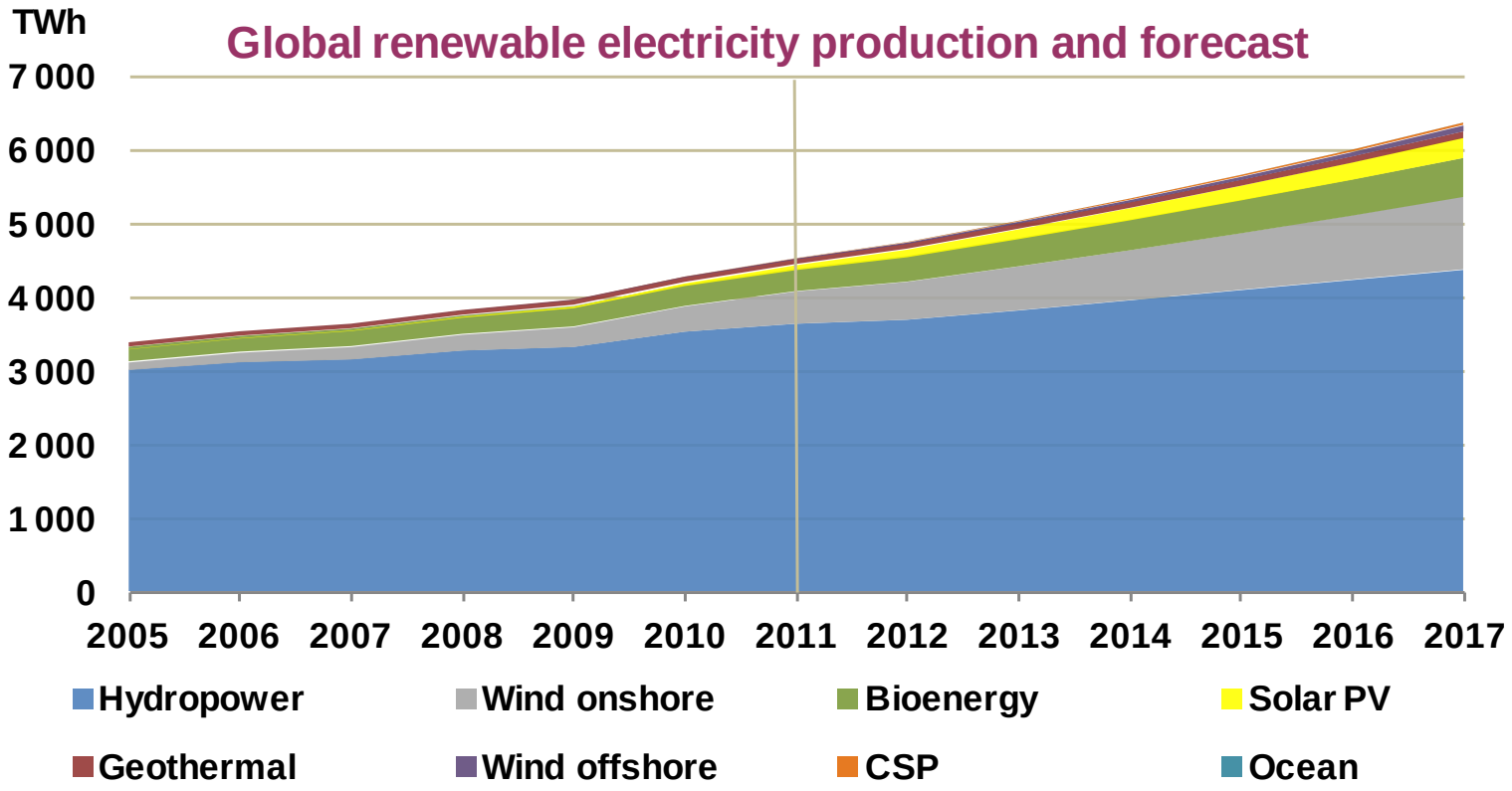
Global Overview

Key trends

- As a portfolio of renewable technologies matures, global renewable power generation is forecast to rise 40%
  - Supported by policy/market frameworks and economic attractiveness in increasing range of countries and circumstances
  - Technology cost developments, grid/system integration, cost/availability of financing also weigh as key variables
  - High level of economic/policy uncertainty in some countries
- This projected growth is an acceleration vs previous period
  - Growth is 60% higher over 2011-17 versus 2005-11
- Renewable deployment is projected to spread out geographically, with increased activity in emerging markets
  - Deployment spurring economies of scale in some technologies - virtuous cycle of improved competition and cost reductions

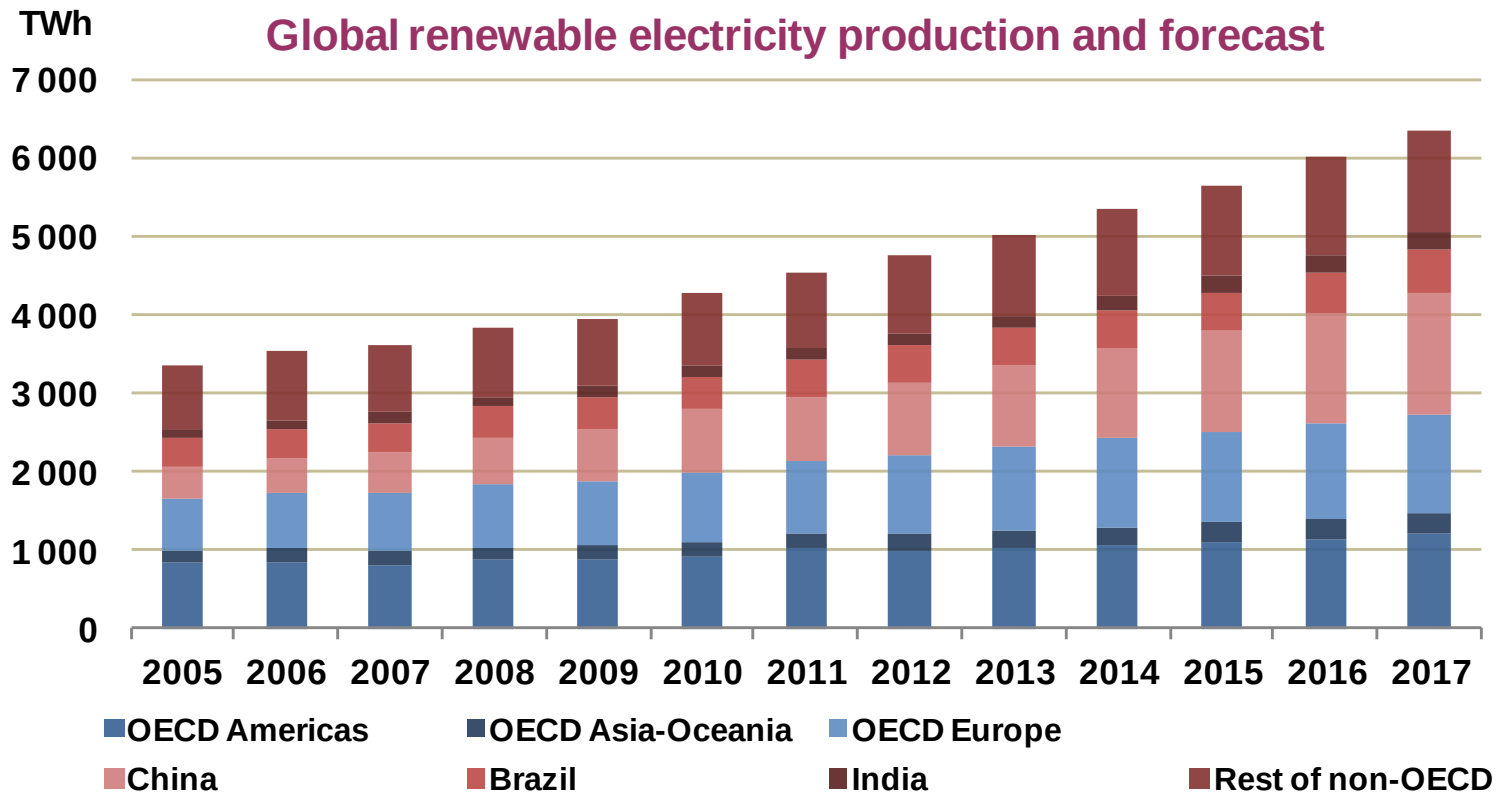
Growth in renewable power is forecast to accelerate

- Hydropower remains the main renewable power source (+3.1% p.a.)
- Non-hydro renewable sources grow at double-digit annual percentage rates (+14.3% p.a.)



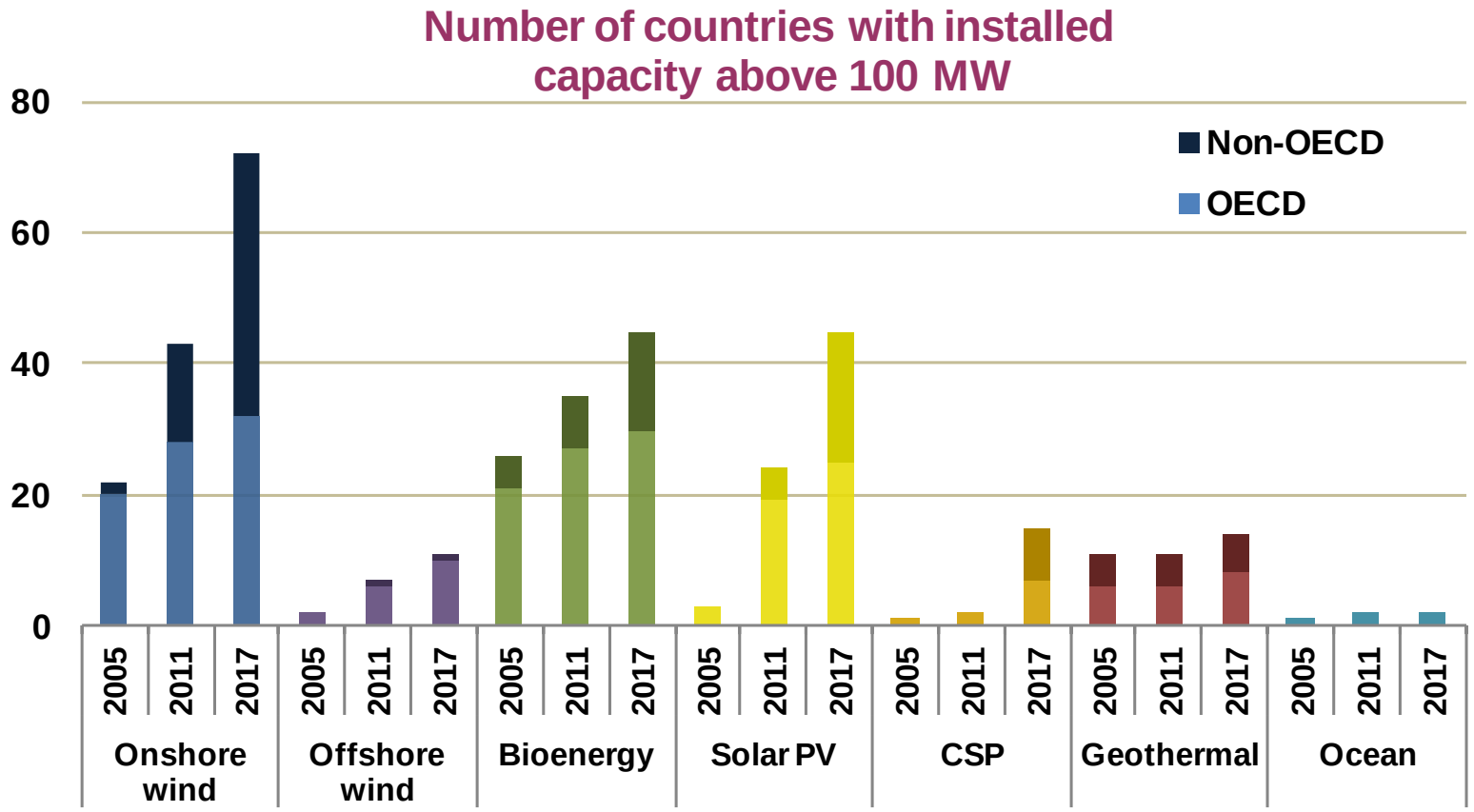
Growth is led by non-OECD countries

- Non-OECD accounts for two-thirds of the overall growth
  - China, Brazil, India lead; others grow significantly as well
- OECD growth still largely driven by Europe but Americas and Asia-Oceania make significant contributions



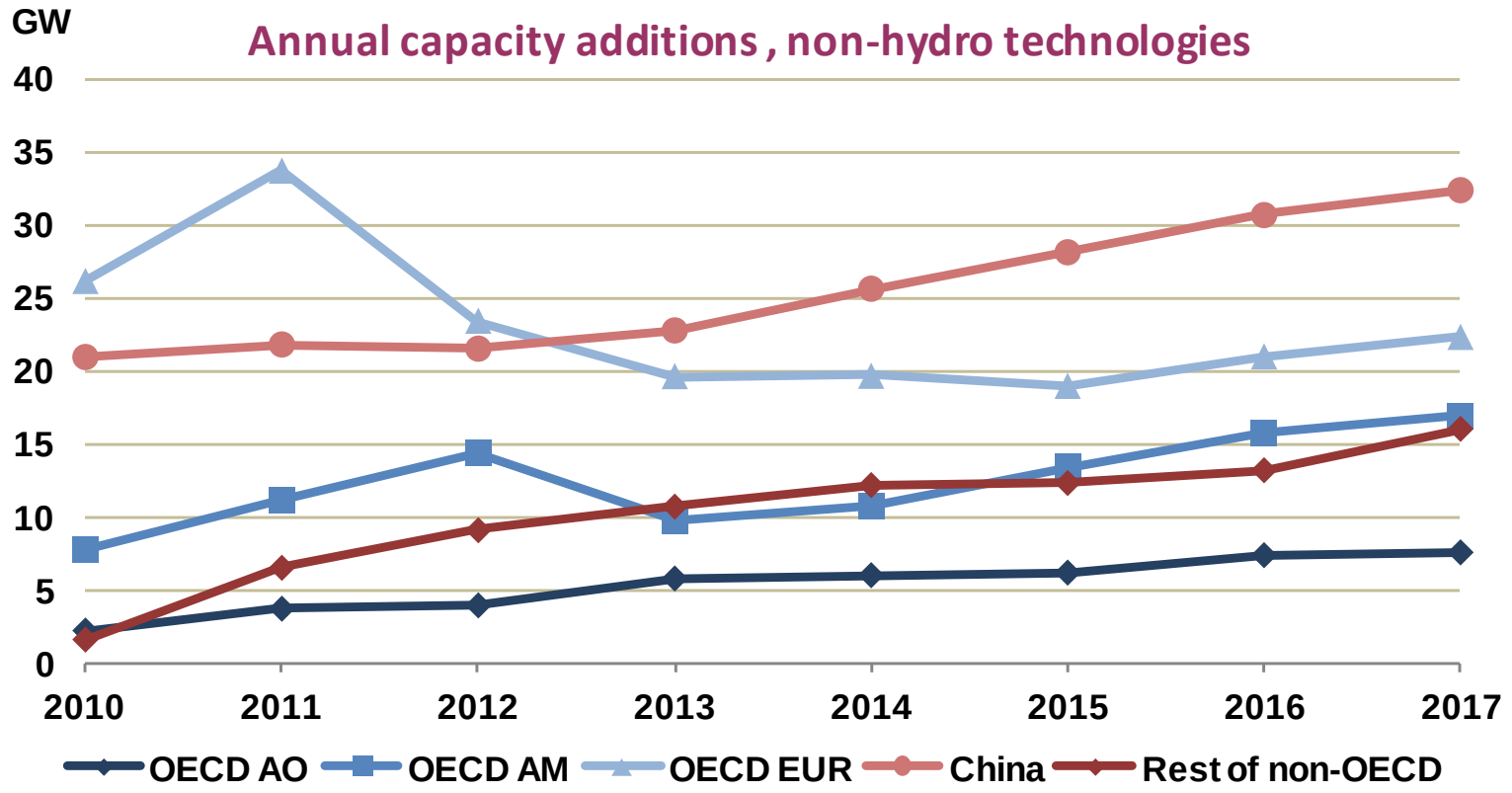
Non-hydro technology deployment spreads out

- Number of countries with cumulative capacity larger than 100MW (can cover consumption of 100k households) increases significantly
- Growth areas include Asia, Africa, Latin America and the Middle East



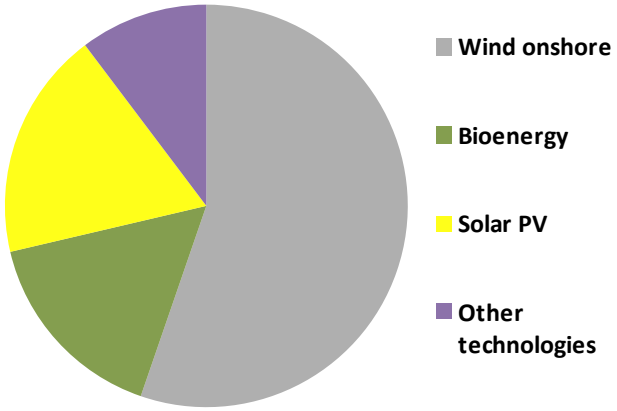
Annual growth patterns for non-hydro technologies vary significantly

- China becomes deployment leader
- OECD Europe deployment growth slows
- OECD Americas growth reflects US policy uncertainties

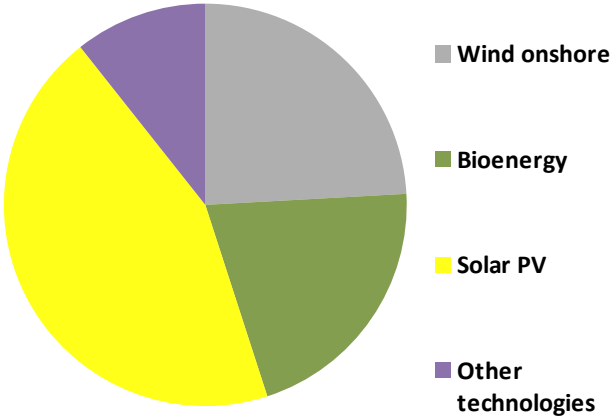


Generation additions over 2011-17 differ across regions and technology portfolios

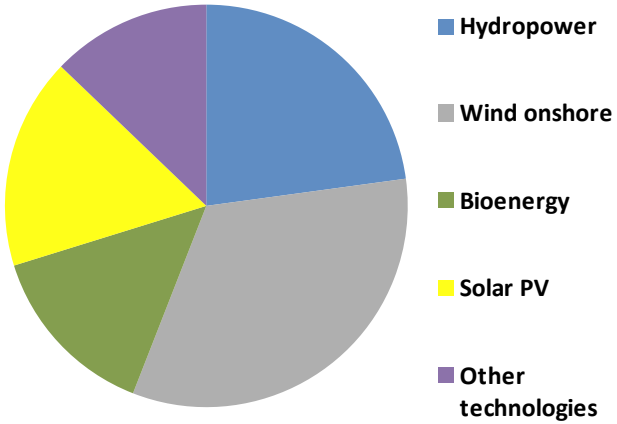
OECD Americas (+179 TWh)



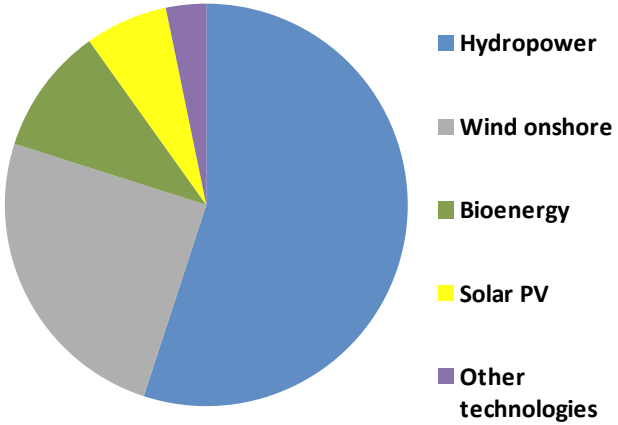
OECD Asia-Oceania (+77 TWh)



OECD Europe (+365 TWh)



Non-OECD (+1 220 TWh)

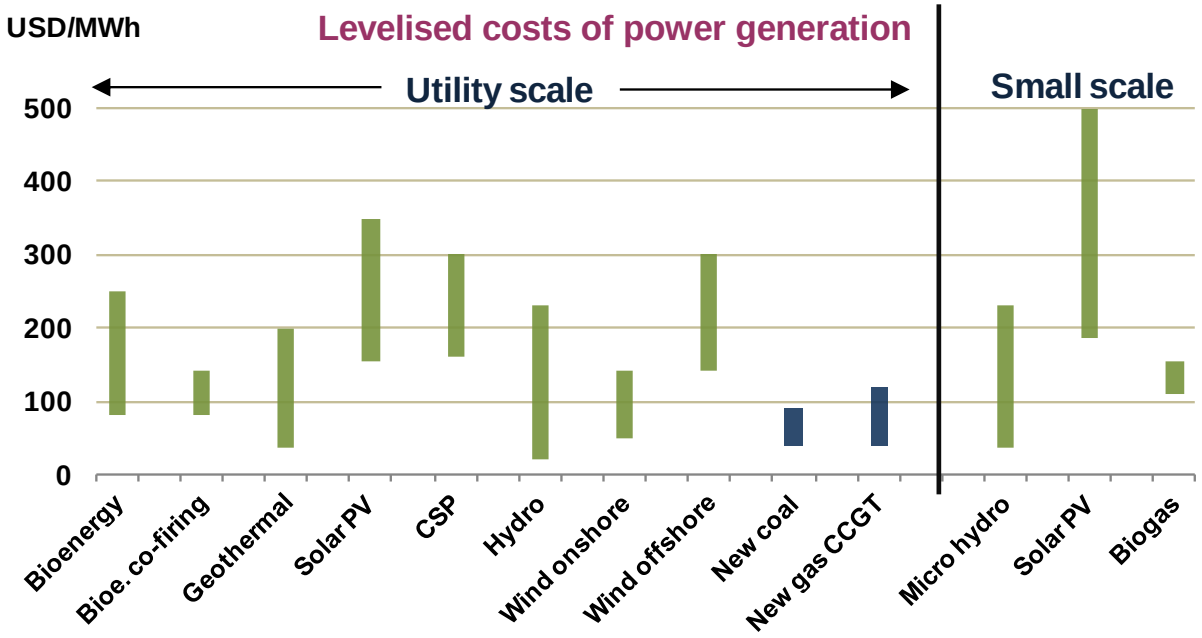


Investment in renewable electricity

- Annual investment topped USD 250 billion in 2011
  - Most recent quarterly data suggest some slowing
- Economic and credit risks weigh on medium-term picture
  - European bank project finance and utility finance more strained
- Other sources/structures of finance play increasing role
  - Development banks
  - New institutional and non-traditional corporate investors
  - Smaller scale financial innovation for small distributed capacity
- Ultimately, cost and availability of financing to depend most on prevailing policy and technology environments

Renewable technologies compete better in a wider range of circumstances

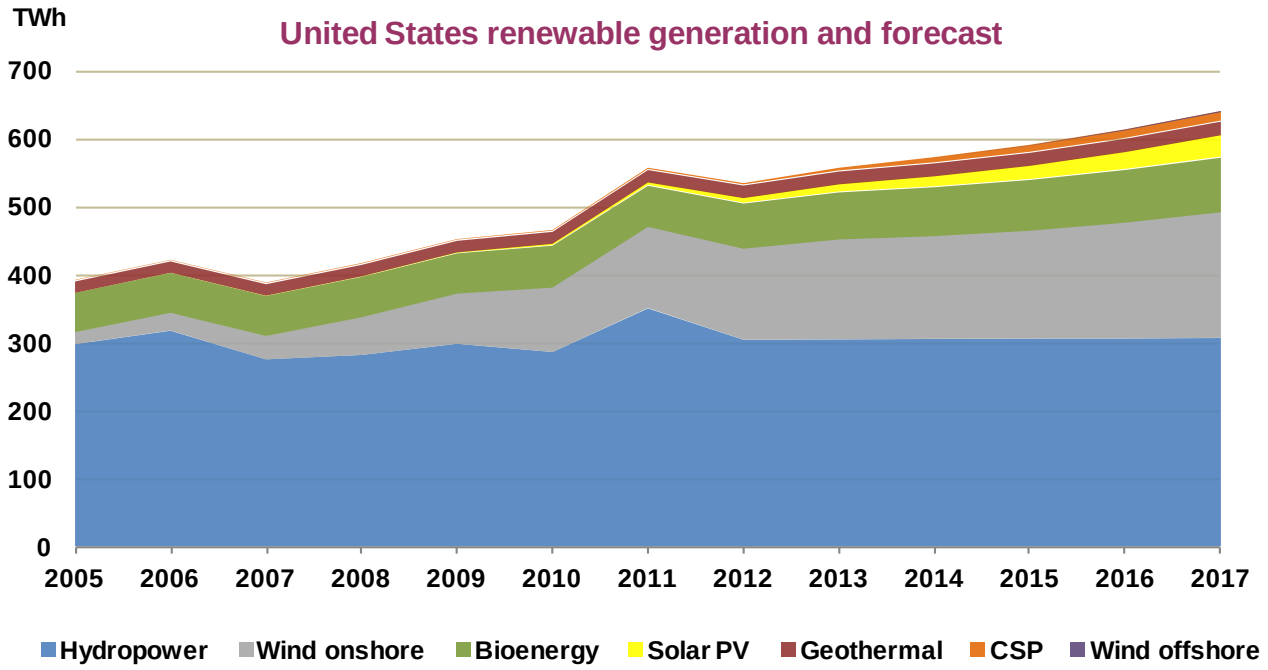
- Renewable generation in general still more expensive than bulk power but…
  - Hydropower and geothermal mostly competitive
  - Onshore wind competes well in good resource areas
  - Solar PV approaches peak gen. costs in places with summer peak
  - Residential PV can be cheaper than average retail power prices



Country and Regional Outlooks

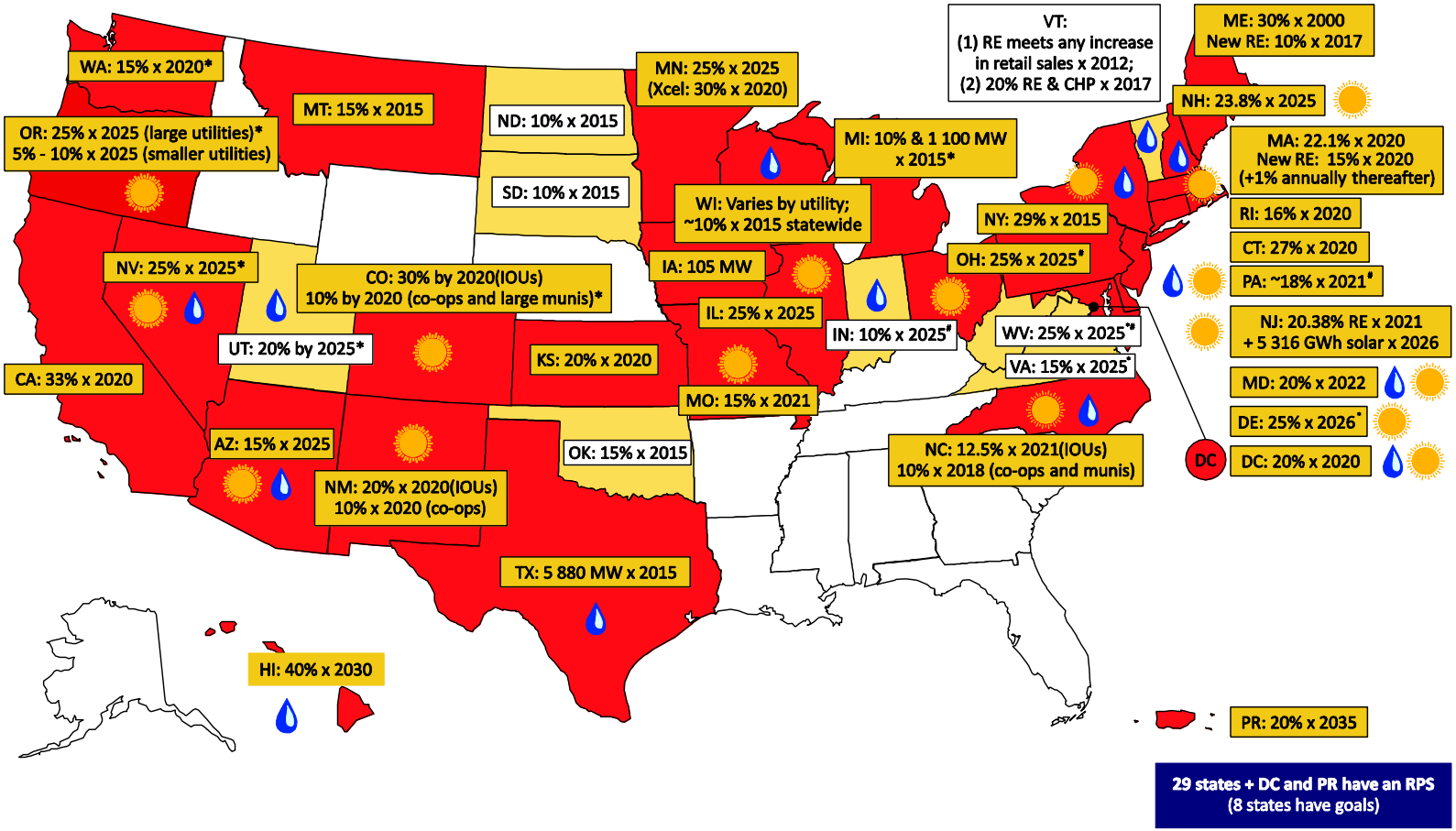
US renewable generation to grow steadily

- Average renewable growth of 2.4% annually over 2011-17
- Non-hydropower growth at stronger rate, + 8.4% annually
  - Onshore wind, solar PV and bioenergy grow strongest
  - CSP and geothermal growth are large in global terms
- % of total power gen: 9% (2005), 13% (2011), 14-15% (2017)



State mandates drive the US picture

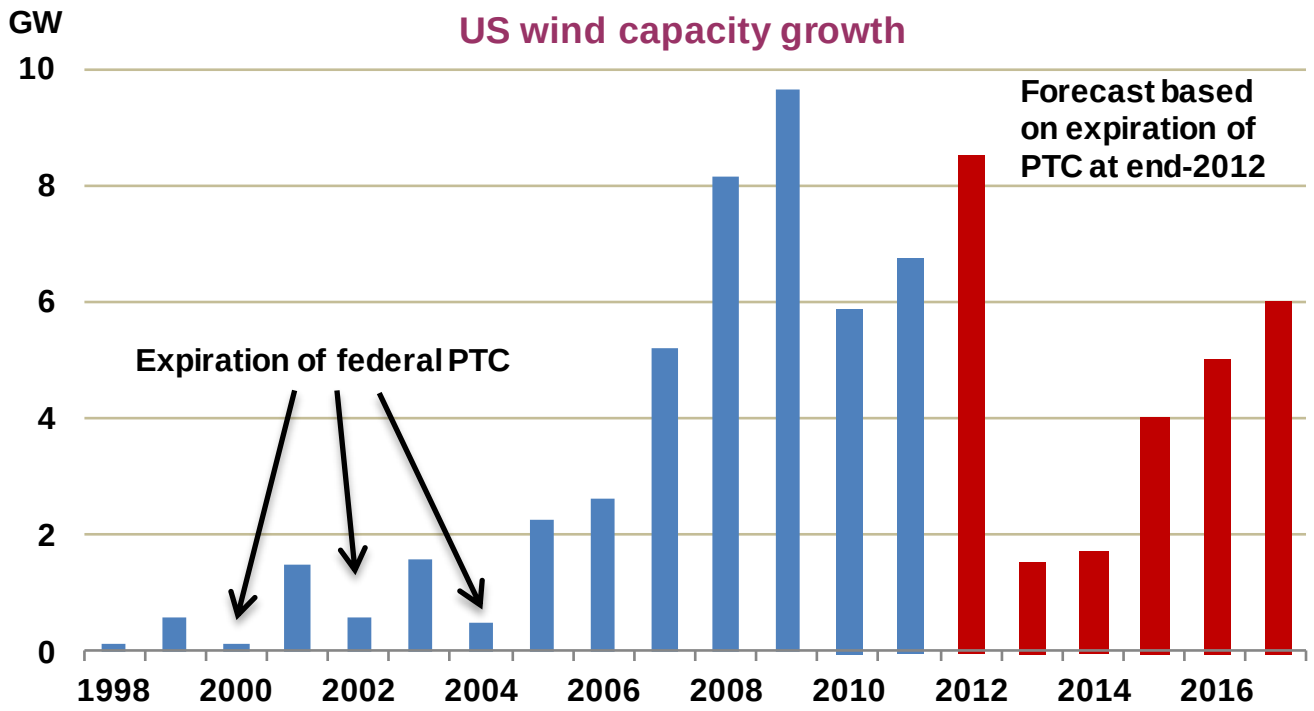
- **Main US deployment drivers: state RPSs, federal financial incentive levels, ample grid capacity, innovative financing**



Source: DSIRE (March 2012).

But other challenges remain in the US

- Main US deployment challenges:
  - Duration of federal incentives
    - Wind production tax credit (PTC) expires at end-2012; but investment tax credit for solar goes through 2016
  - Competition with natural gas
  - Cost and availability of tax equity finance



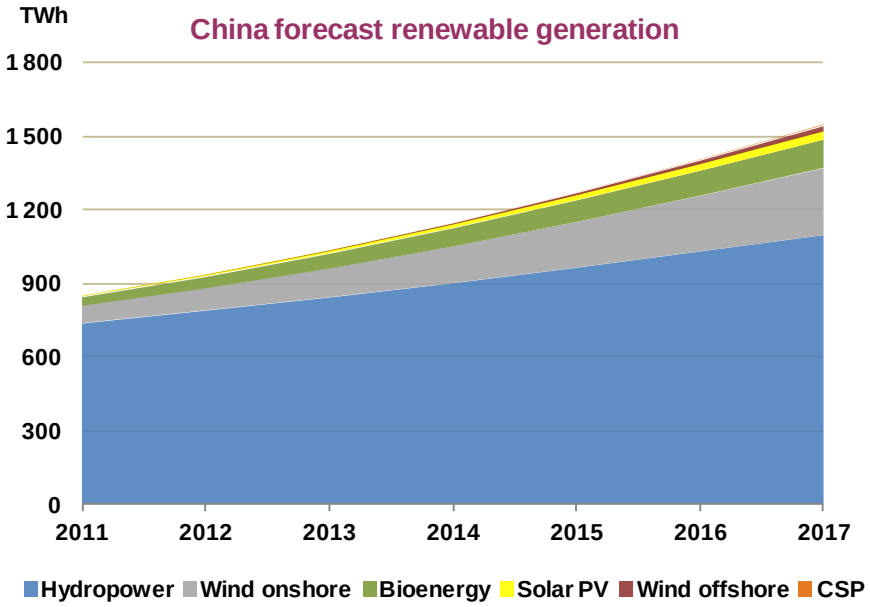
China accounts for 40% of global growth

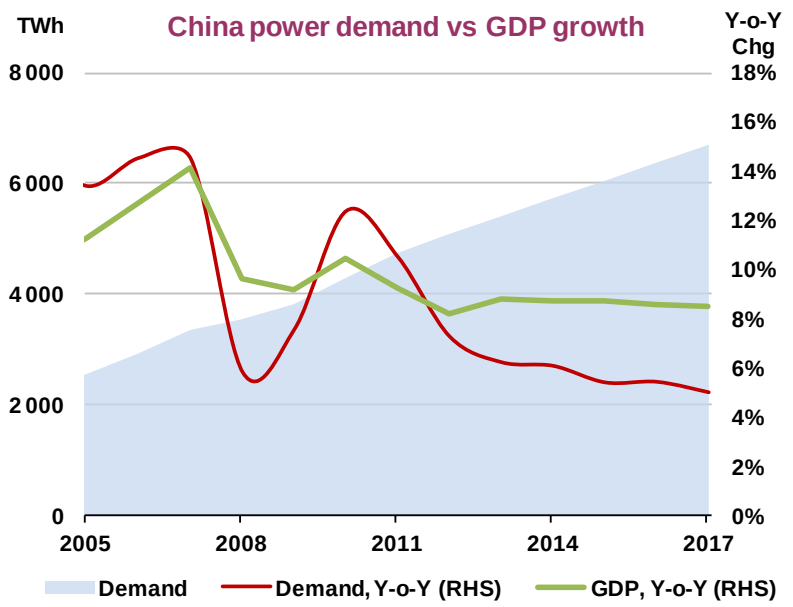
Drivers:

- Growing energy needs
- Diversification
- Government targets
- Ample low-cost finance
- Robust manufacturing

Challenges:

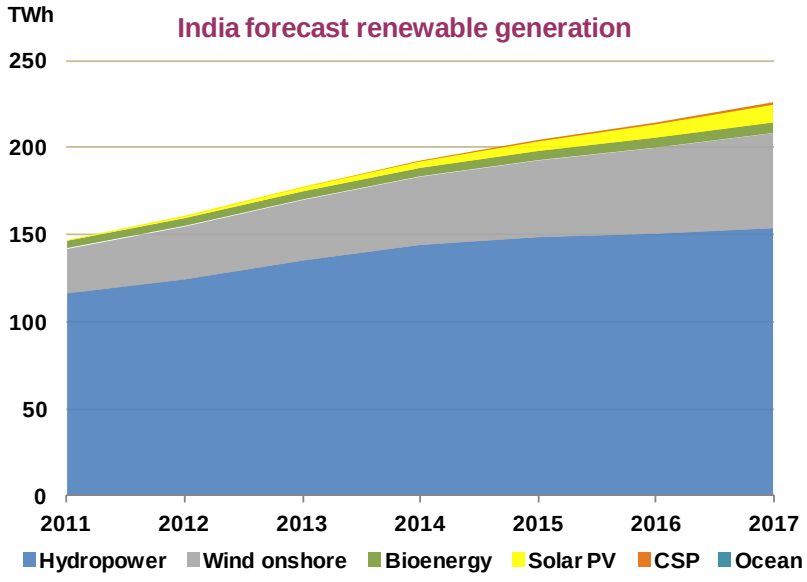
- Pricing framework
- Priority dispatch
- Grid upgrades
- Prohibitive licensing for small-scale systems

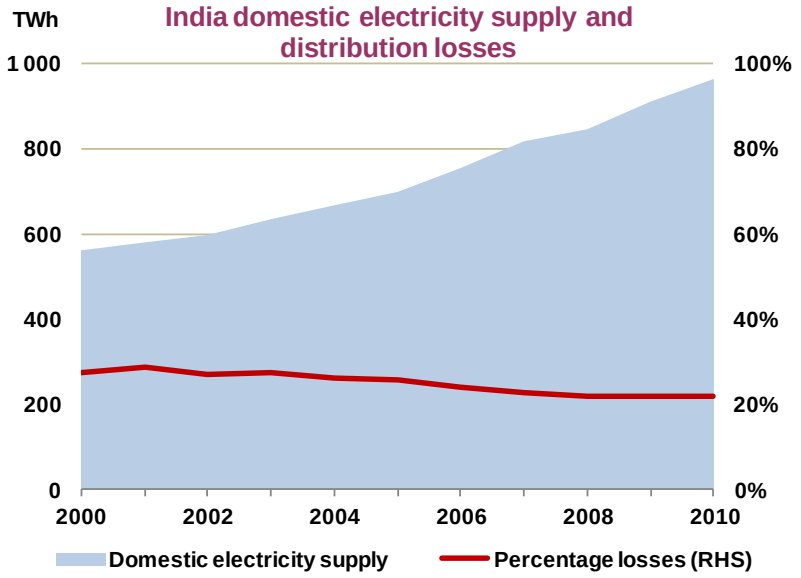




India sees strong hydropower, wind and solar growth

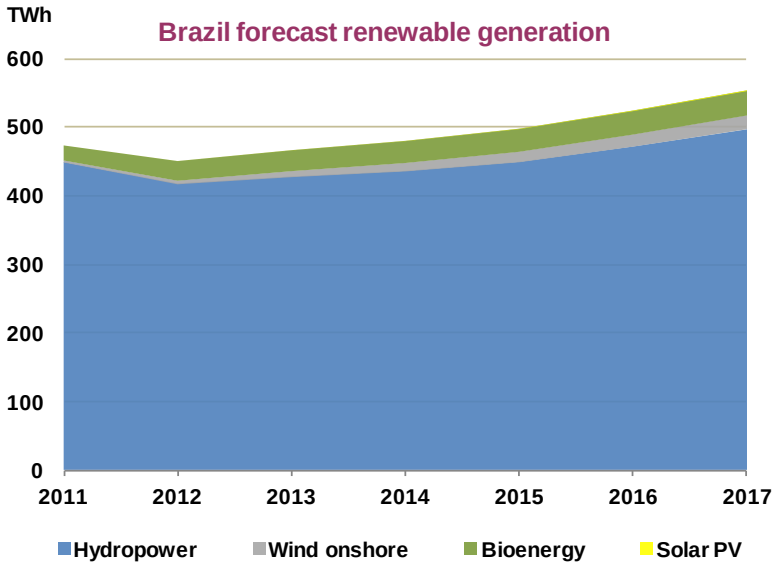
- **Drivers:**
  - Supportive policy environment: Five-Year Plan targets, diverse financial incentives
  - Low-cost financing from dev. banks and private sector
  - Rural electrification needs – distributed generation
- **Challenges:**
  - High distribution losses and regulated prices
  - Grid strengthening and expansion needed
  - Complex administrative requirements for projects

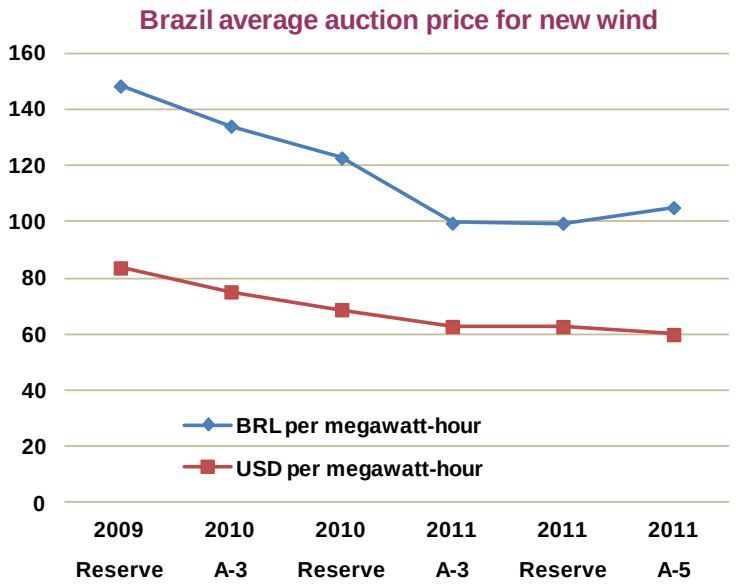




Brazil's hydropower and wind grow strongly

- **Drivers:**
  - Government sponsored power auctions
  - Cost reductions – wind recently outbid natural gas
  - Pipeline of hydropower projects
  - Low-cost financing from dev. banks and private sector
- **Challenges:**
  - Adequate margins for wind projects (?)
  - Environmental licensing
  - Economic attractiveness of solar PV (?)





Thank You
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Questions