

RENEWABLE ENERGY



Medium-Term Market Report 2013

Medium-Term Renewable Energy Market Report 2013

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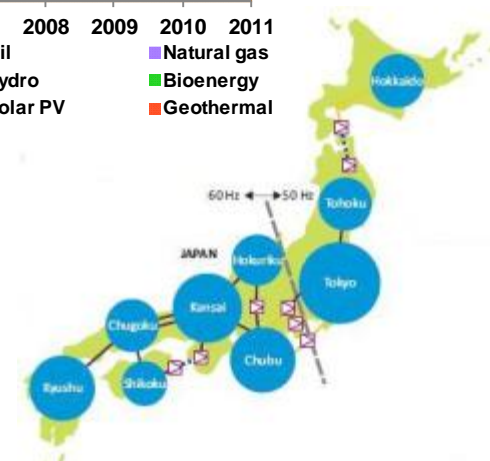
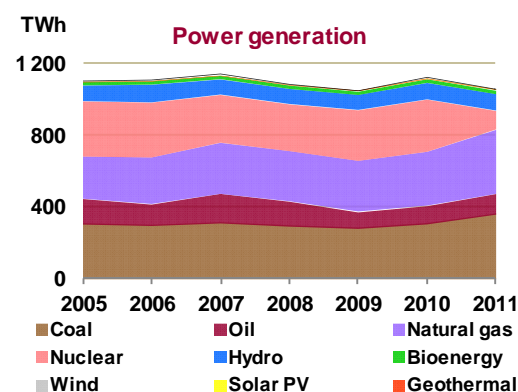
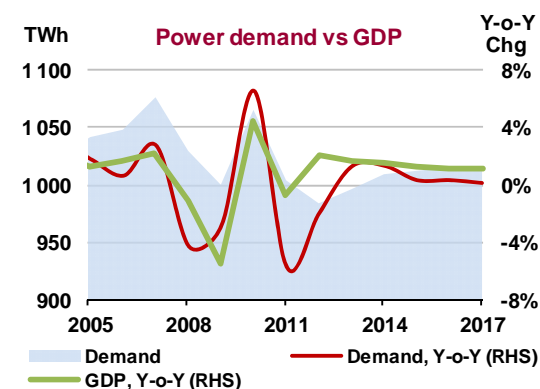
Market Trends and Projections to 2018

MTRMR methodology and scope



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- Analysis of drivers and challenges for RE deployment at country level
 - Regulatory framework, power demand, competition with other fuels, grid integration
- Bottom-up, global RE power capacity and generation forecast, with case studies:
 - USA, **Canada, Chile, Mexico**
 - Japan, **Korea, Australia**
 - Denmark, France, Germany, **Ireland**, Italy, Spain, Turkey, UK
 - China, Brazil, India, **Thailand, Morocco, South Africa**
- Global biofuels production by country
- Regional breakdown RE for heat

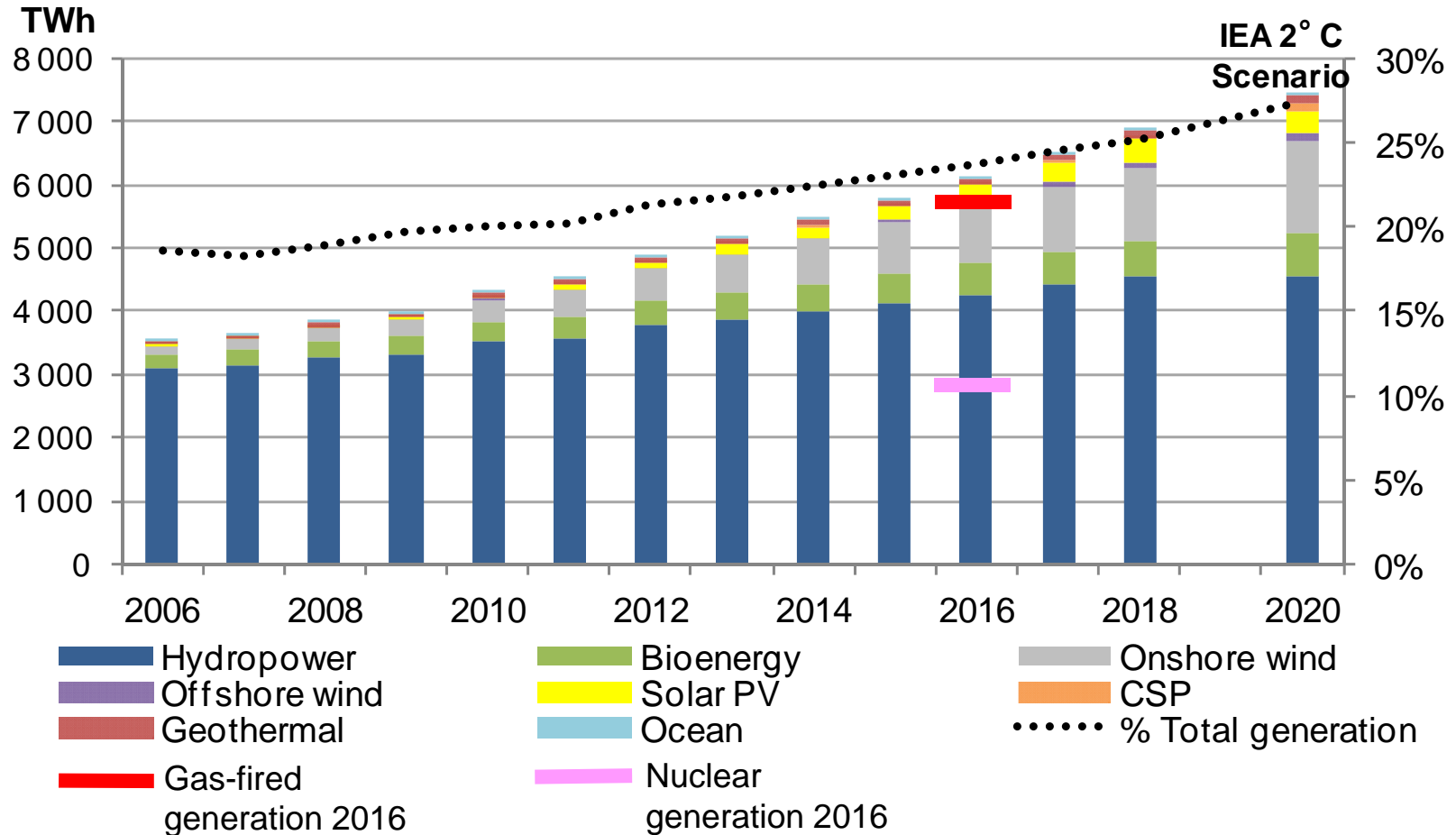


Positive outlook for renewable electricity



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Global renewable electricity production, by technology (TWh)



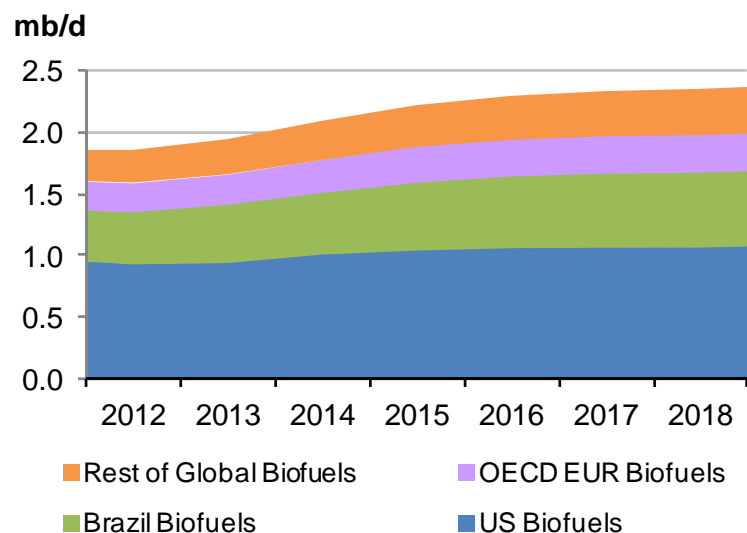
■ Renewable electricity projected to scale up by 40% from 2012 to 2018

Biofuels production growing but leveling off

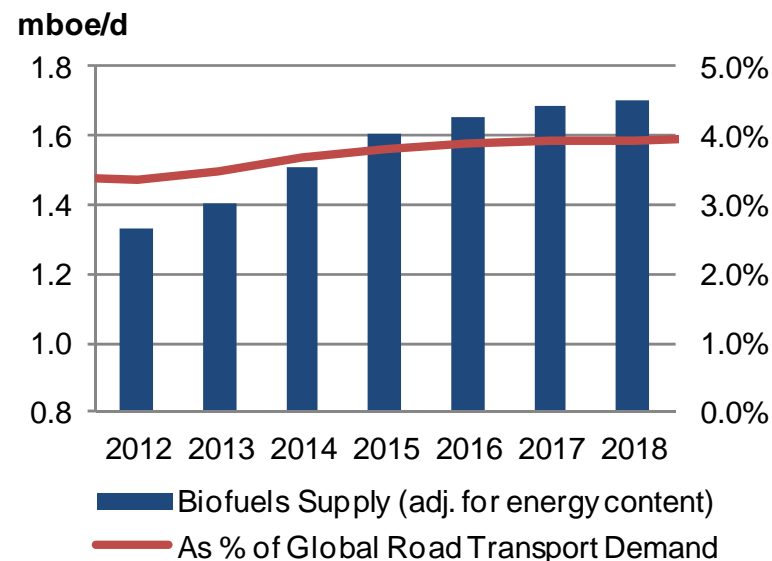


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Biofuels supply by region



Global biofuels supply adjusted for energy content vs road transport oil demand



- Biofuels to cover 3.9% of global road transport by 2018,
- But downside risk from growing policy uncertainty in the EU and US; and advanced biofuels not making enough progress

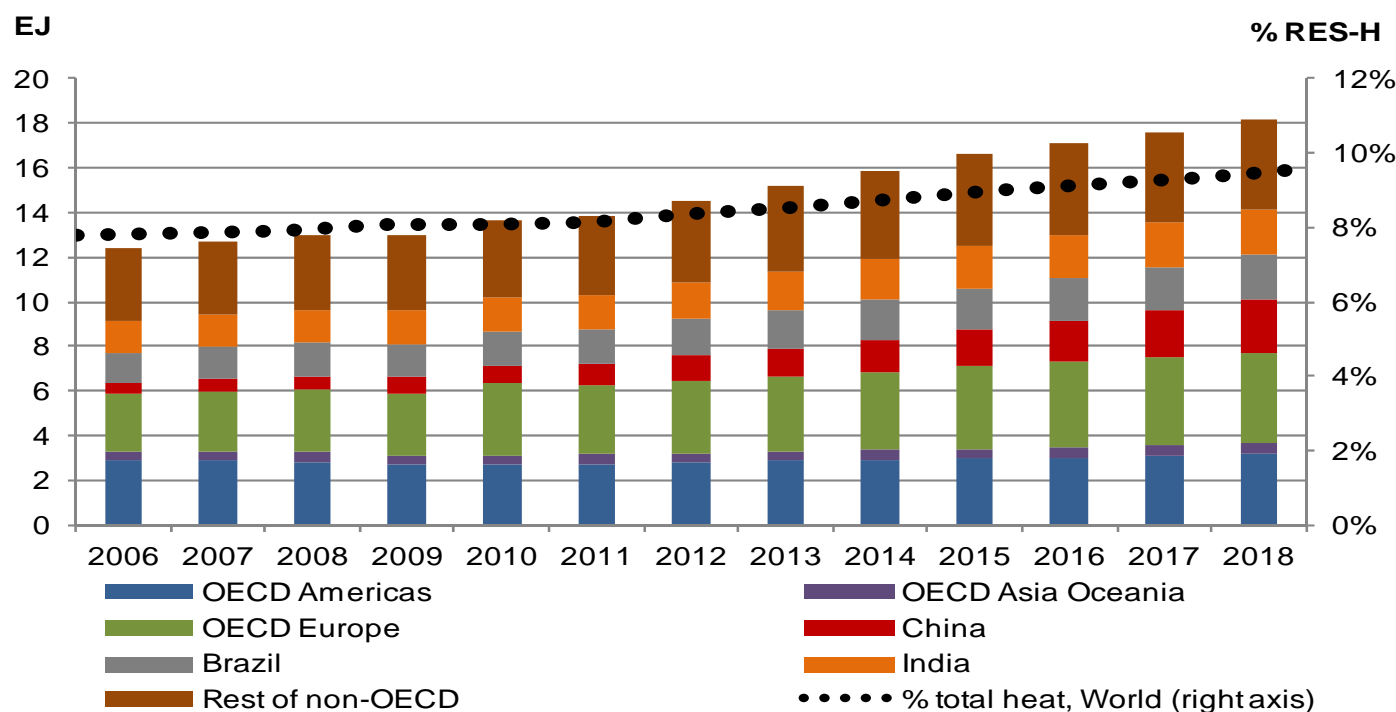
Final energy use of renewables for heat rises by 24%



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- As % of final energy consumption for heat, renewables rise to almost 10% in 2018, up from just over 8% in 2012 and 8% in 2006
- China accounts for 39% of global growth
- OECD Europe drives 22% of growth, with EU 2020 targets and rising bioenergy (direct use and commercial heat) and solar thermal use

Final energy use of renewable sources for heat (including commercial heat) by region



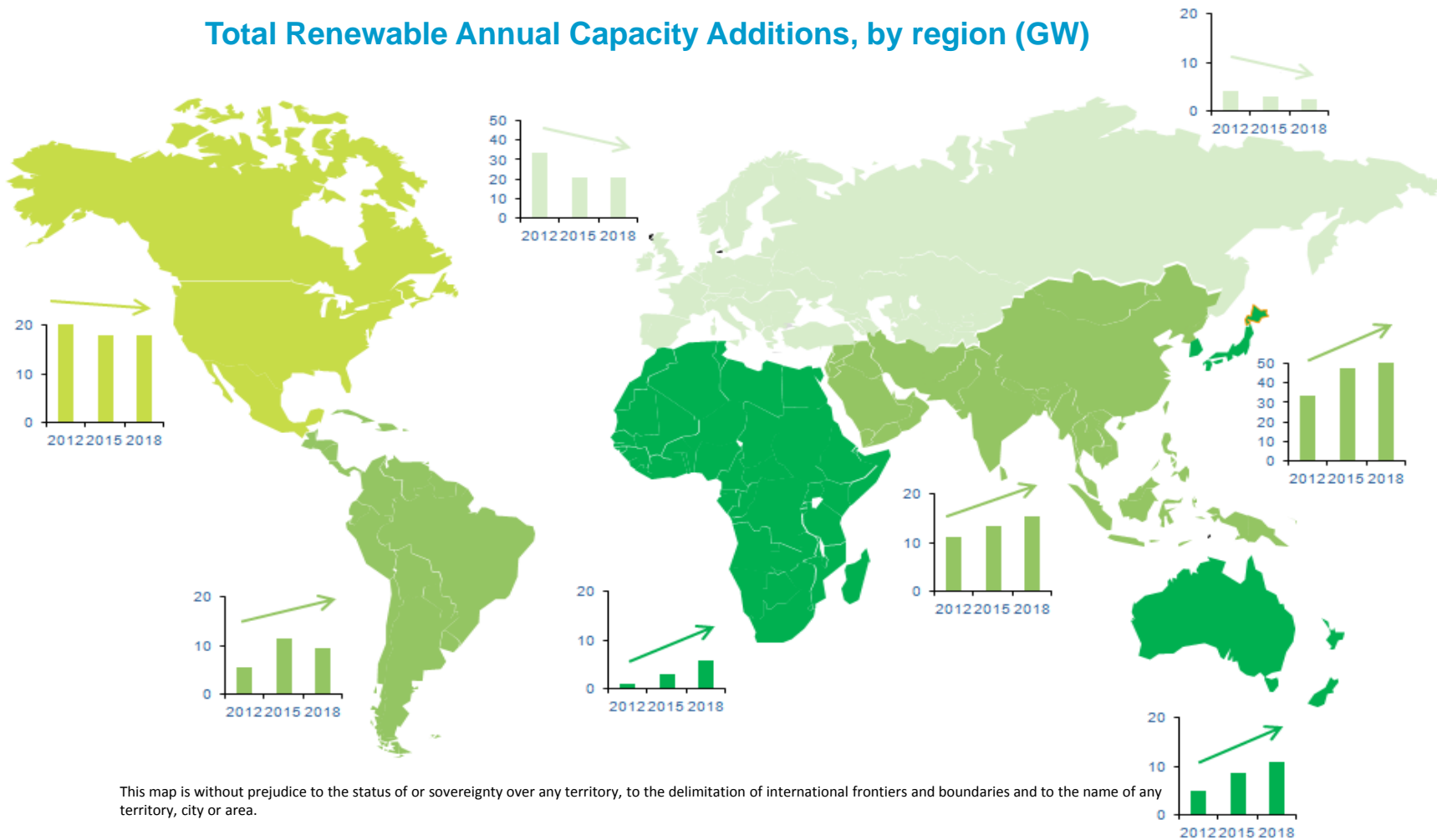
Note: excludes traditional biomass

Renewable power spreading out everywhere



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Total Renewable Annual Capacity Additions, by region (GW)



This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

- Emerging markets more than compensate for slowing growth and volatility in markets such as Europe and the US

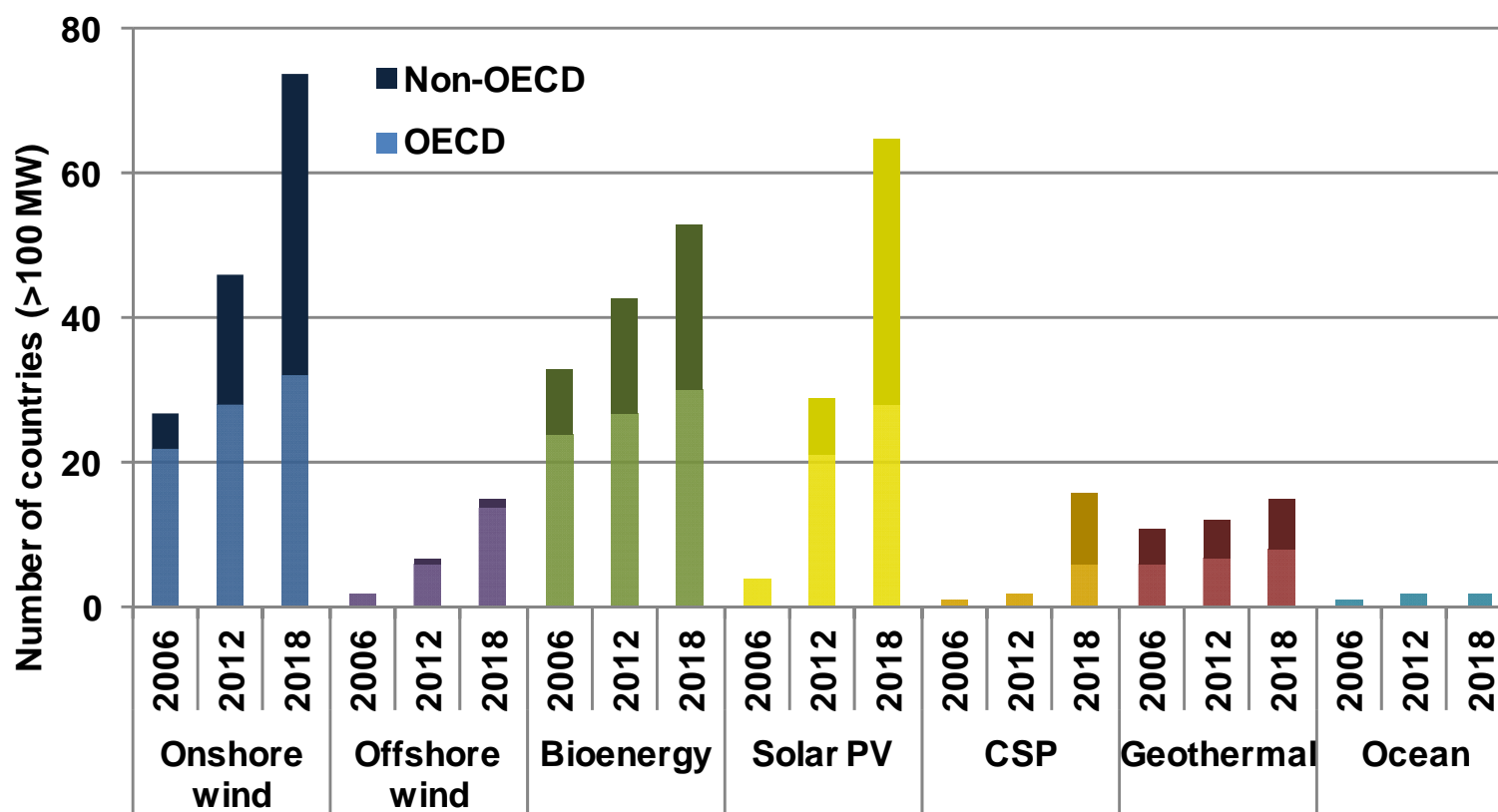
Deployment transitioning to more markets



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- Non-hydro renewable electricity development becoming increasingly widespread – *more optimistic than MTRMR 2012*

Number of countries with non-hydro renewable capacity above 100 MW



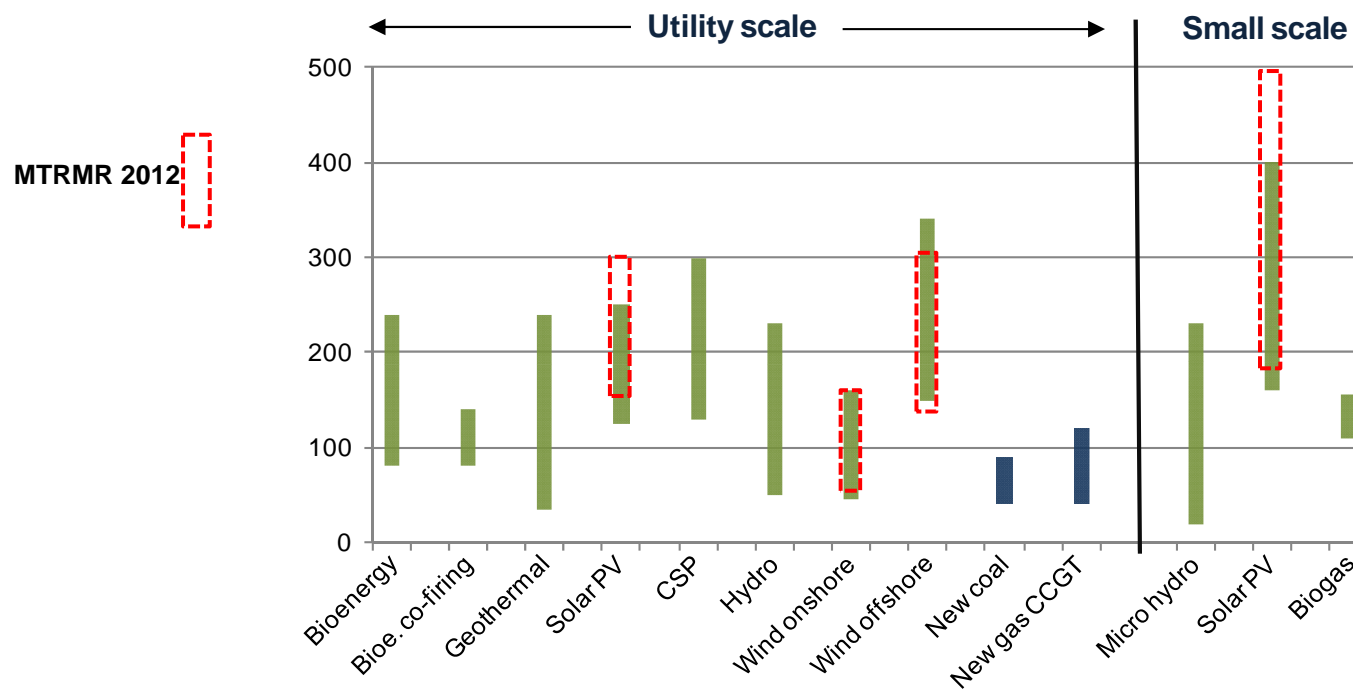
Improving competitiveness for renewable power



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- Most dynamic technologies – onshore wind and solar PV – increasingly competitive in a number of markets
- But market framework matters
 - Deployment with little support occurring in some areas with rising energy needs, good resources, and predictable long-term revenues

Global levelised costs of power generation ranges (USD per MWh)



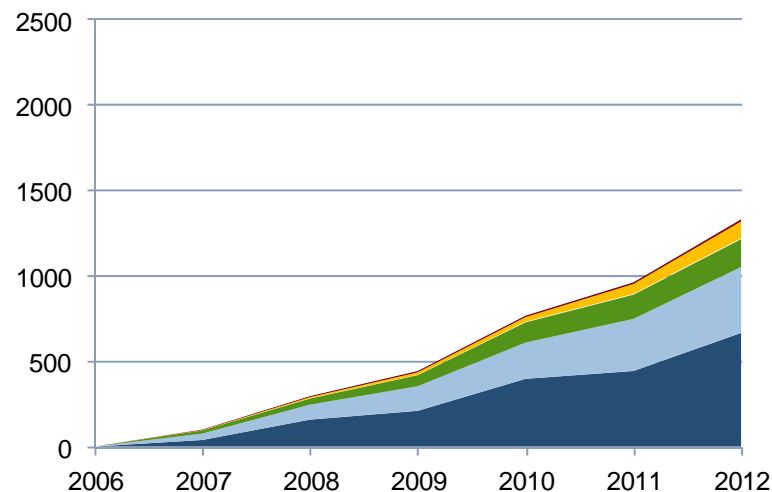
Note: costs reflect differences in resource, local conditions, and the choice of sub-technology.

Growth of renewable power accelerating



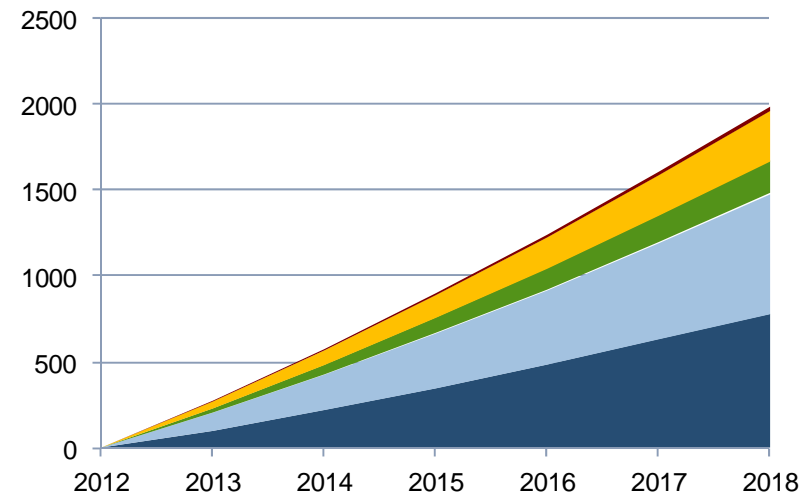
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Historical cumulative additions (TWh)



■ Geothermal ■ Solar ■ Bioenergy ■ Wind ■ Hydro

Forecast cumulative additions (TWh)



■ Geothermal ■ Solar ■ Bioenergy ■ Wind ■ Hydro

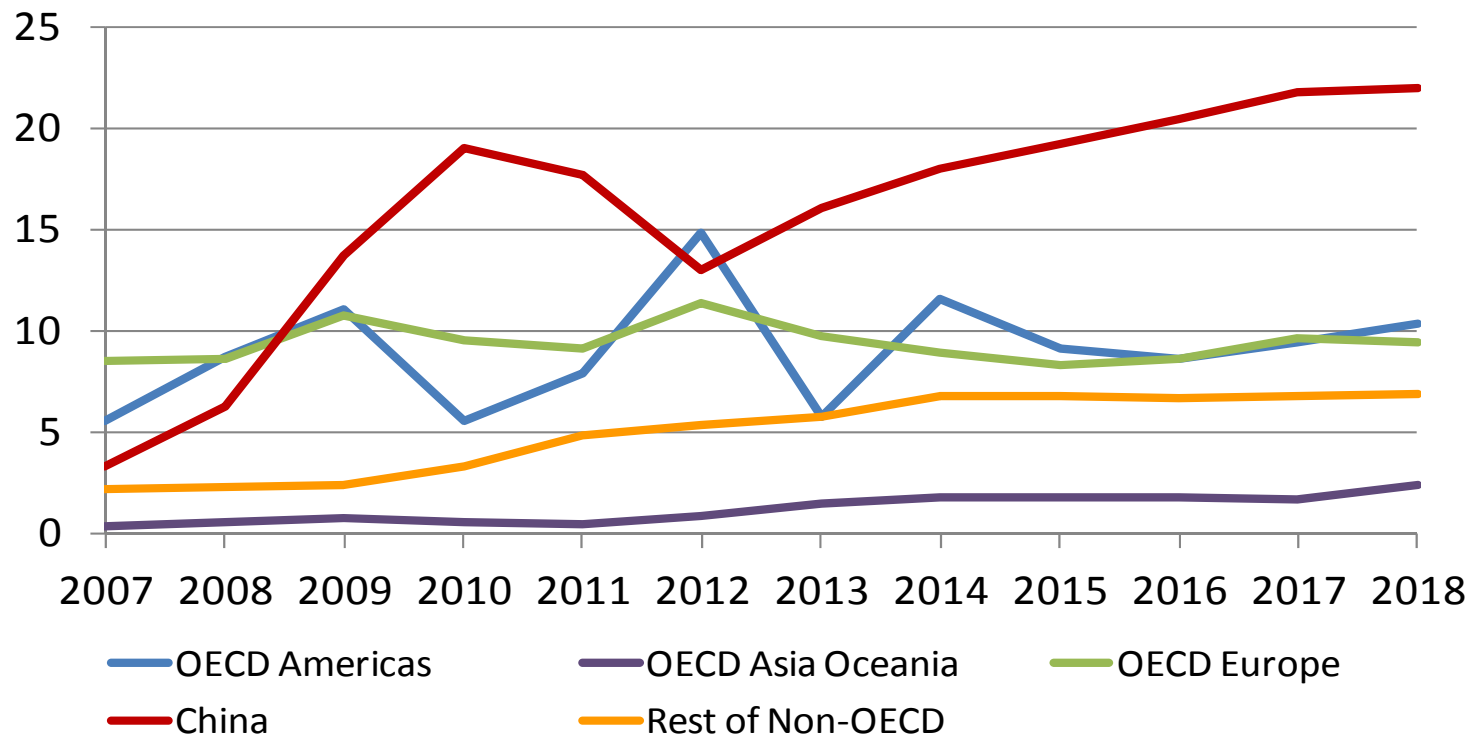
- **Hydropower remains the largest increasing single renewable technology in electricity generation**
- **But for the first time additional generation expected from all non-hydro sources exceeds that from hydropower; and additional capacity led by wind**

Global RE capacity additions led by wind



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Total wind (onshore + offshore) annual capacity additions by region (GW)



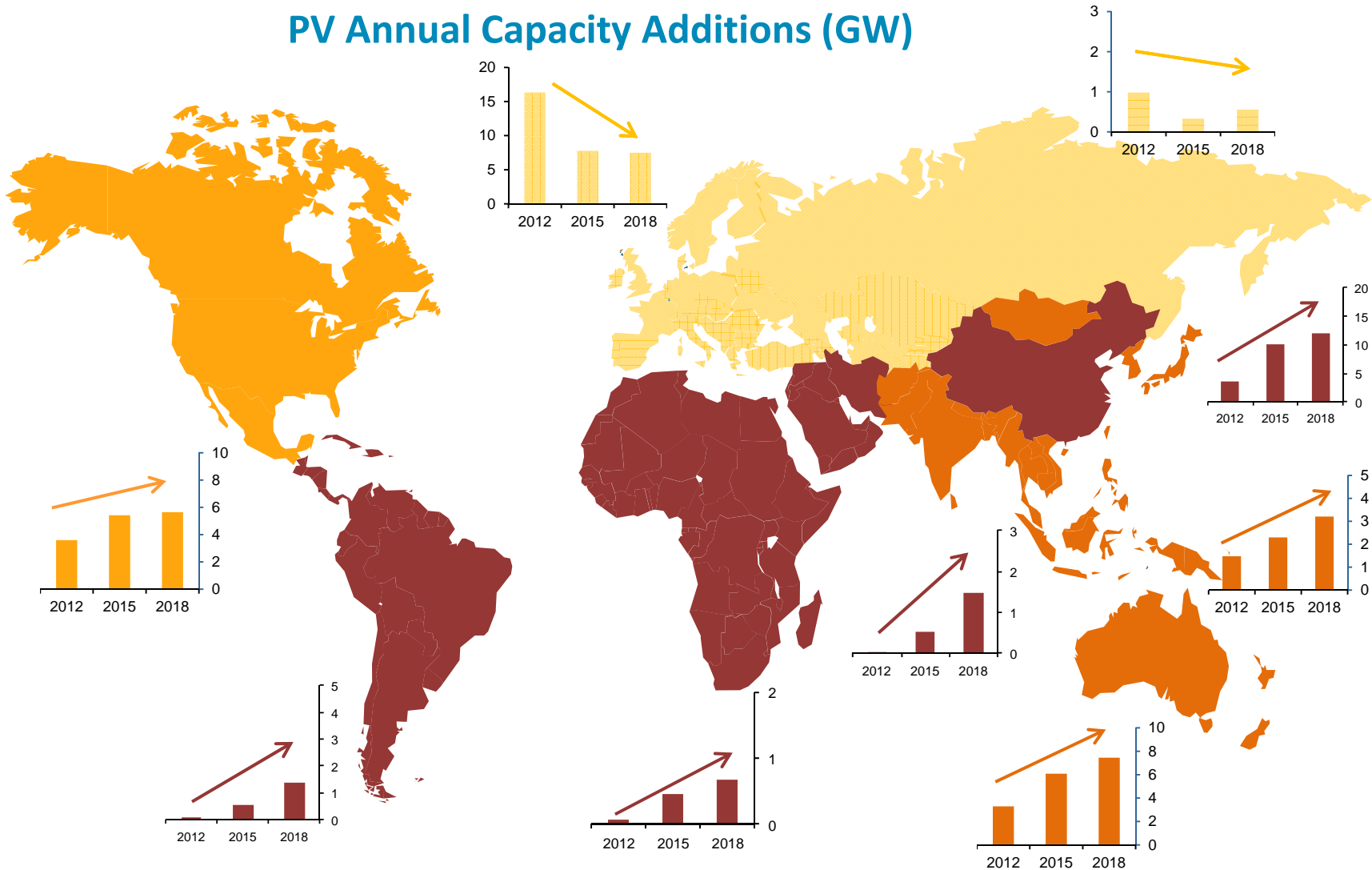
- Onshore outlook more optimistic than in *MRMR 2012*
- Policy uncertainties make additions volatile in some areas
- Offshore wind outlook more pessimistic than *MRMR 2012*, with financing and integration challenges

Solar PV growing out of Europe



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PV Annual Capacity Additions (GW)



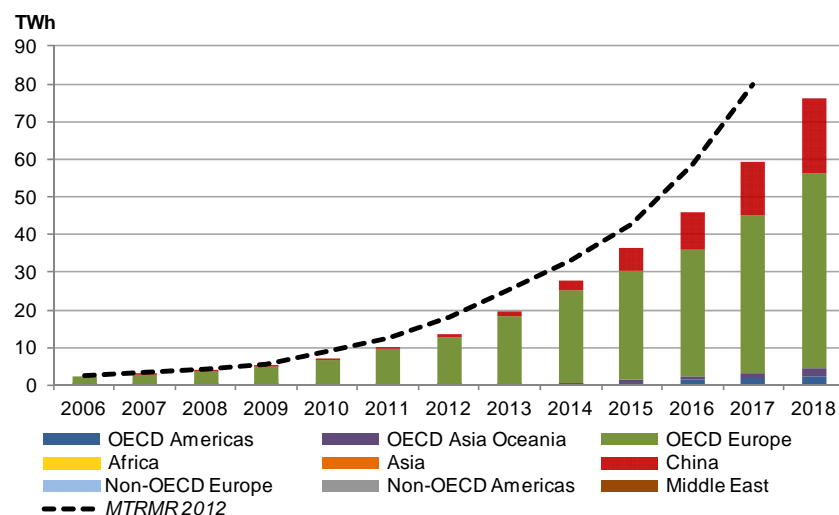
■ Strong growth seen in China, Africa, Middle East, and Latin America

But other technologies lagging behind

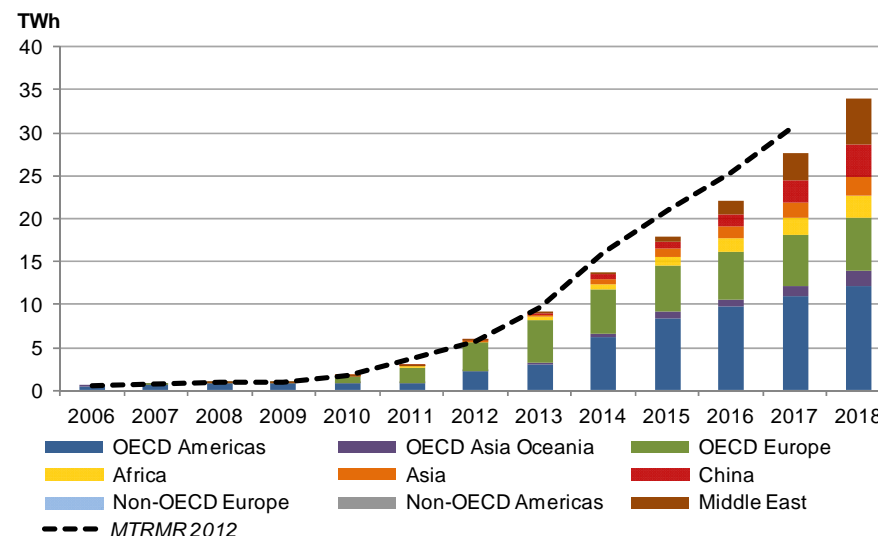


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Wind offshore generation projection



Concentrating solar power generation projection



- Potential of offshore power remains high, but technical, financial and grid connection issues pose challenges
- Storage adds value to CSP, but deployment hampered by relatively high costs

Progress tracked on different scales



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Incremental TWh (2012-18)	
1. China	+ 750
2. USA	+ 150
3. Brazil	+ 130
4. India	+ 95
5. Germany	+ 70

Avg annual growth (2012-18)	
1. Morocco	+ 24.9%
2. South Africa	+ 20.1%
3. Korea	+ 14.1%
4. Australia	+ 14.0%
5. UK	+ 13.0%

- Detailed reporting only on 21 focus countries in above tables
- But other countries also show very significant progress (e.g. Saudi Arabia, UAE, Cambodia, Tunisia, Ethiopia, Kenya)

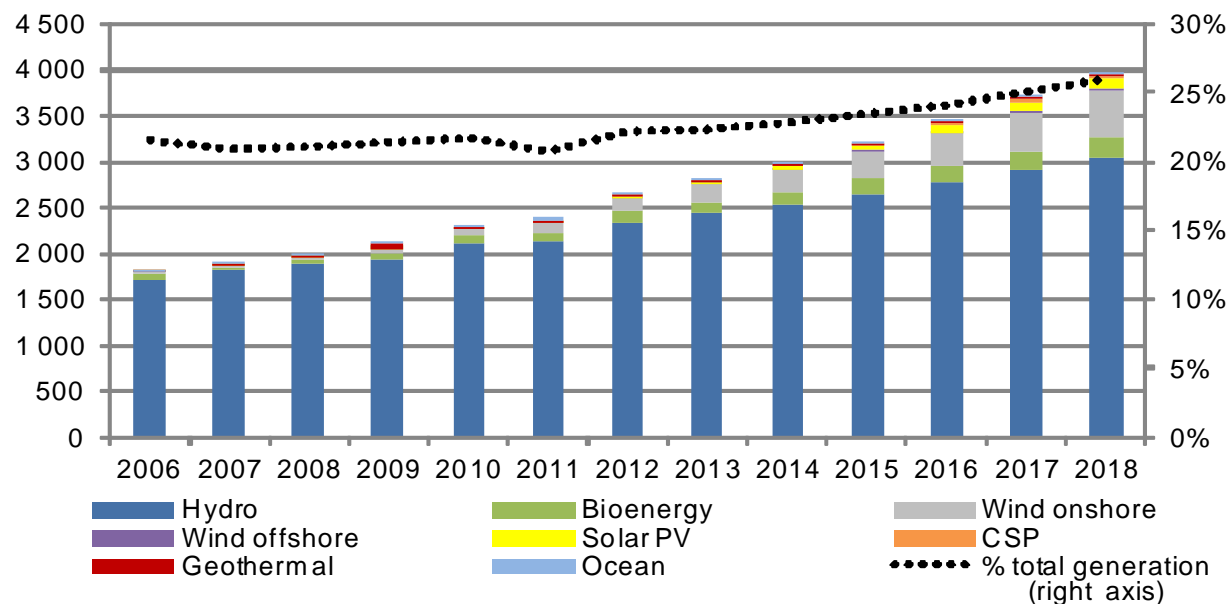
Non-OECD accounts for two-thirds of renewable power growth



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- In 2018, non-OECD comprises 58% of total renewable generation, up from 54% in 2012 and 51% in 2006
- China alone accounts for 40% of growth
- Other key markets:
 - Brazil (wind, bioenergy), India (wind, solar, bioenergy), South Africa and Morocco (wind, solar), Thailand (bioenergy), Middle East (solar, wind)

Non-OECD renewable generation by source (TWh)



China sees strong deployment across all RE but grid integration remains challenging



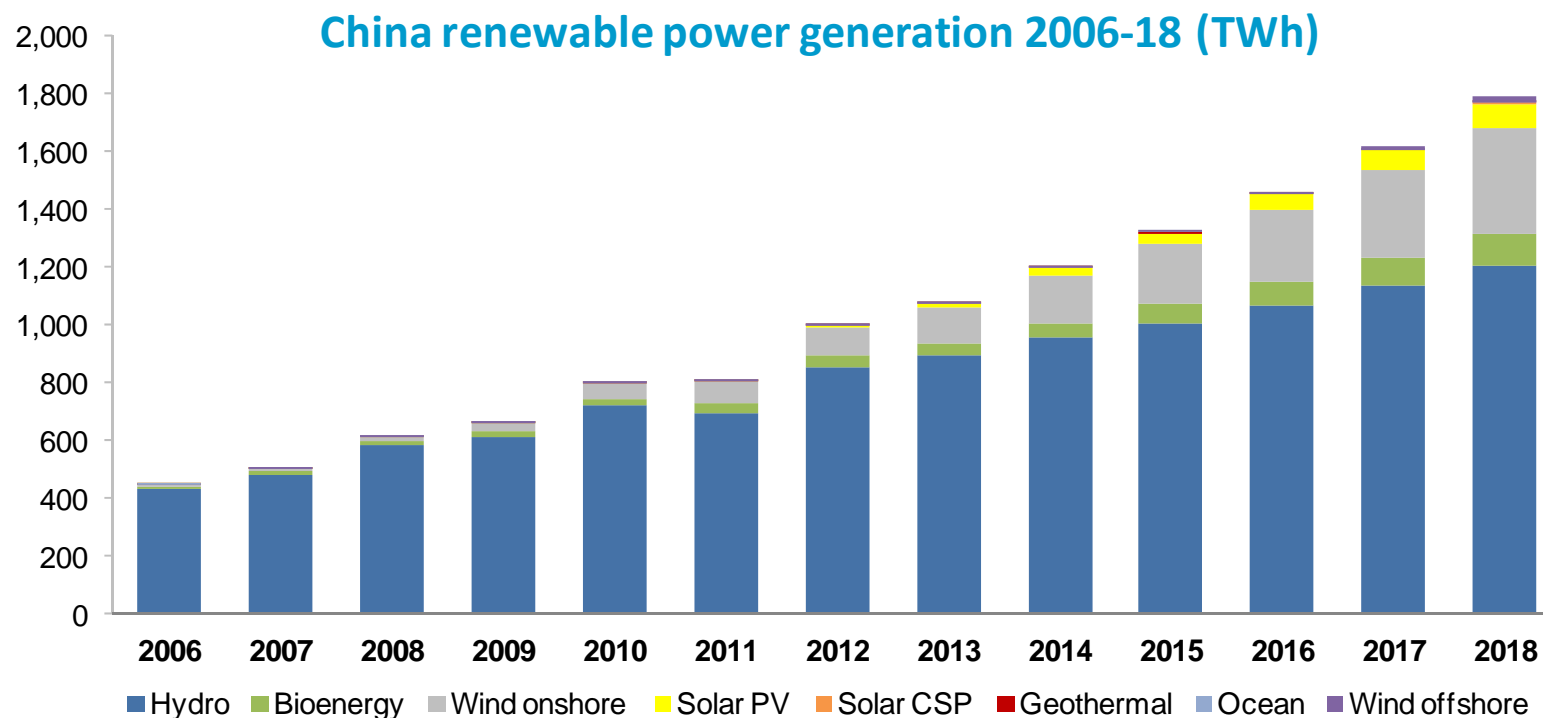
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Drivers

- strong government support through FYPs
- availability of low-cost financing
- eased rules for grid connections and new incentives for small scale projects
- robust manufacturing and tech. develop.

Challenges

- lack of market pricing and priority dispatch in practice
- grid planning and upgrading for renewables
- lack of deployment history for less-mature technologies

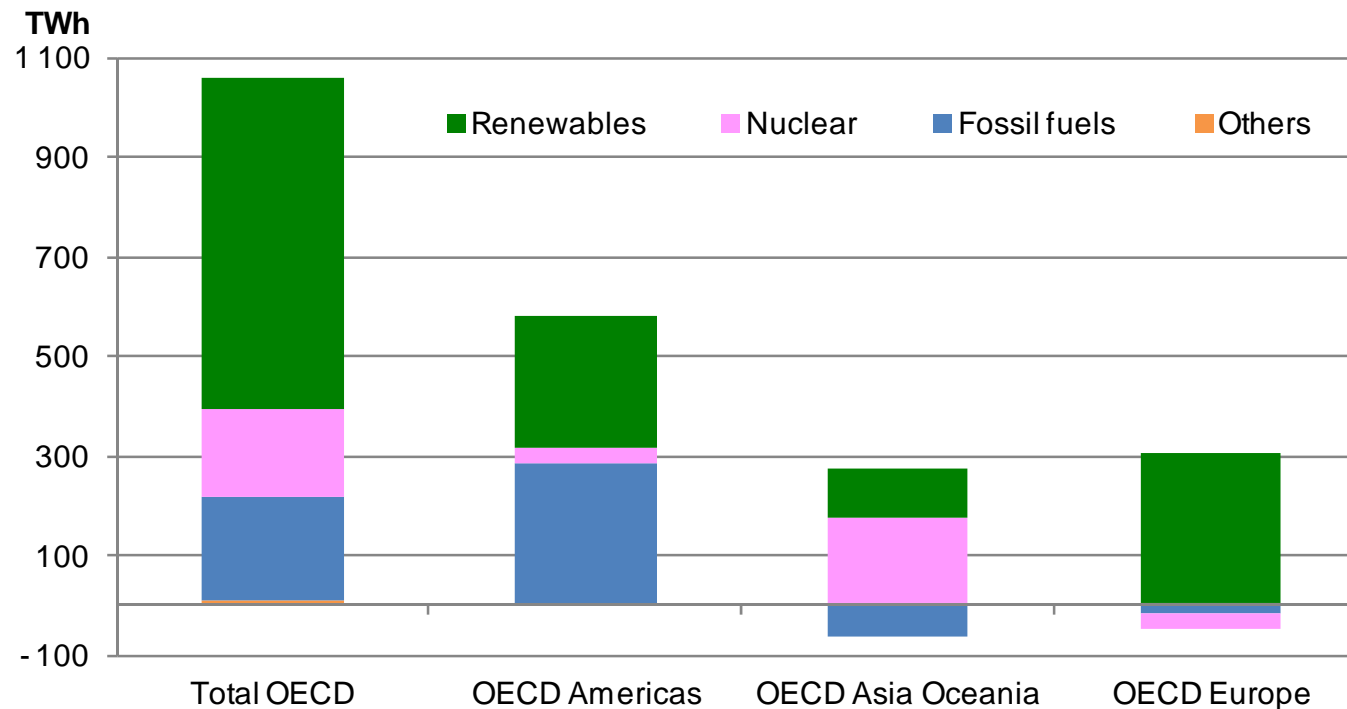


RE largest contributor to total electricity increase in OECD



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Changes in power generation by source and region, OECD, 2012-18



- Renewables expected to grow almost like fossil fuels in OECD Americas, and more than total demand in Europe

Renewable power and natural gas



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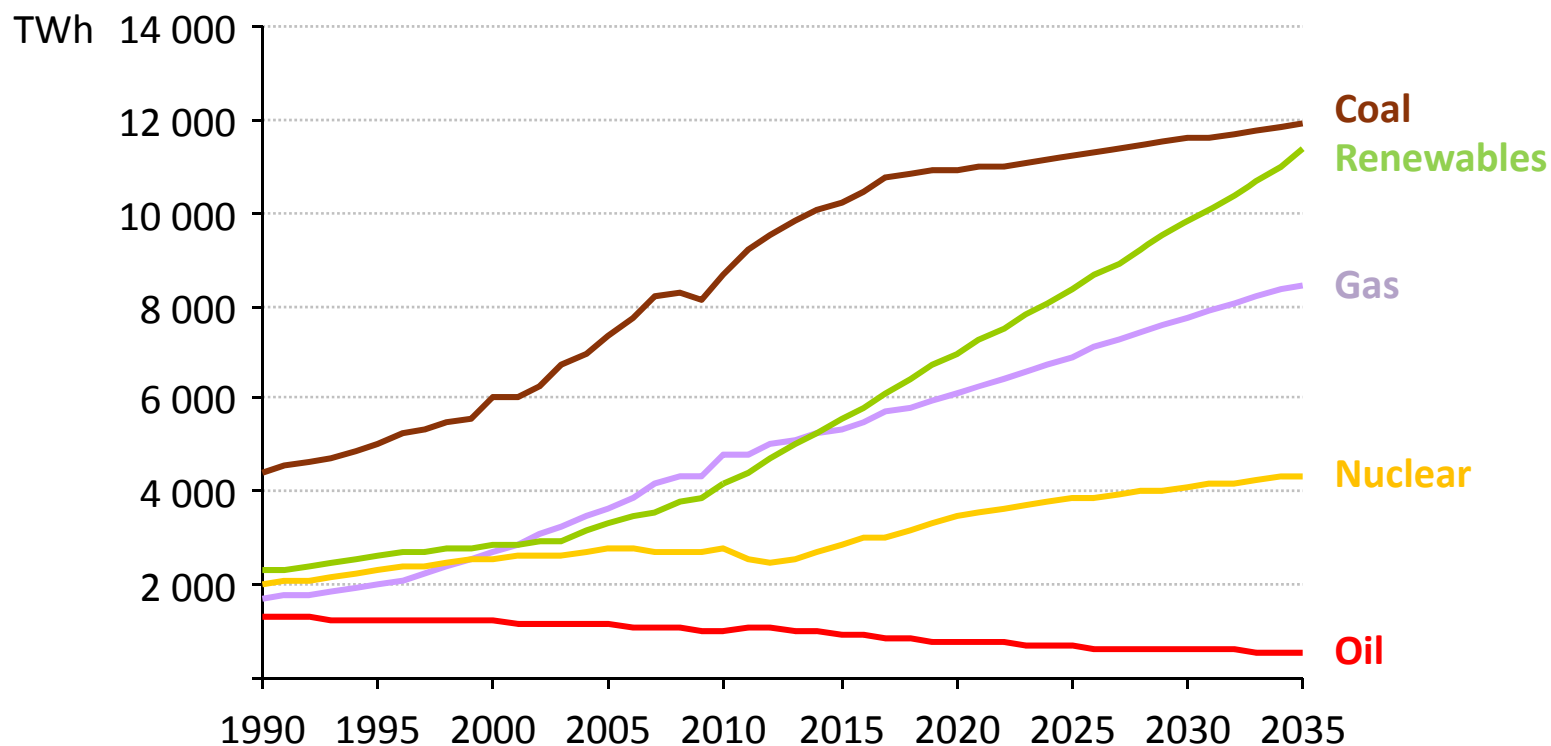
- **Gas generation to crowd out renewables? Or vice-versa?**
 - Renewables and gas can both grow strongly...
- **Globally:** coal-to-gas switching can lead to large reductions in CO₂ emissions, but gas is not enough to meet 2DS
- **USA:** some competition, but strong RE drivers even with low power prices; RE enhances diversification, gas helps balance variable RE; large scope for coal replacement
- **Europe:** slow demand growth, high gas prices, overcapacity in some markets; RE crowding out gas; still, gas provides important balancing for rising variable RE
- **Asia:** portfolio of low-carbon solutions needed to meet rapid demand growth; high LNG prices make RE attractive

Over the long term, the power generation mix is set to change



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Global electricity generation by source, 2010-2035



Source: IEA World Energy Outlook 2012 NPS

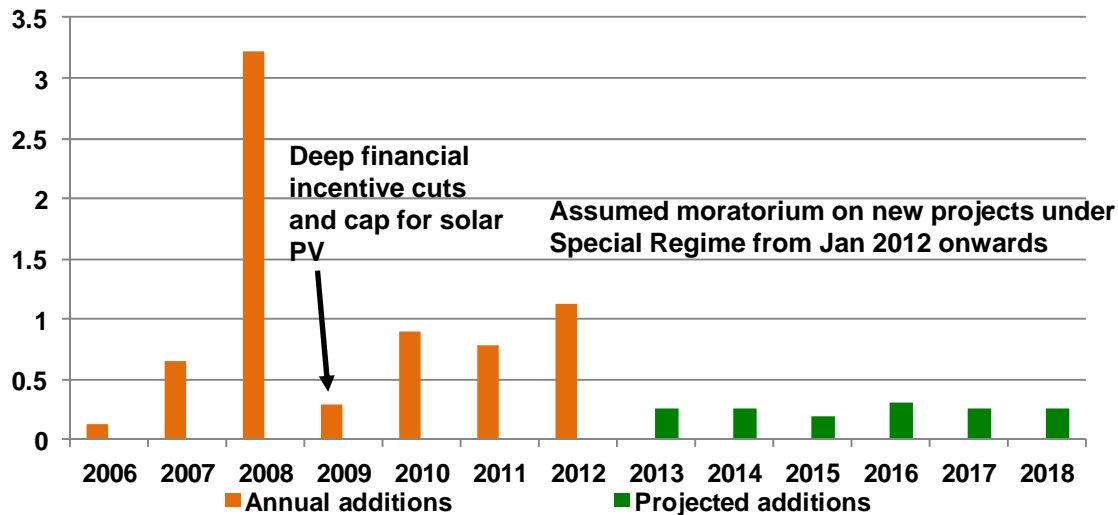
Renewables electricity generation overtakes natural gas in the next few years and almost reach coal by 2035 in the New Policies Scenario

Policy uncertainty is the number one risk



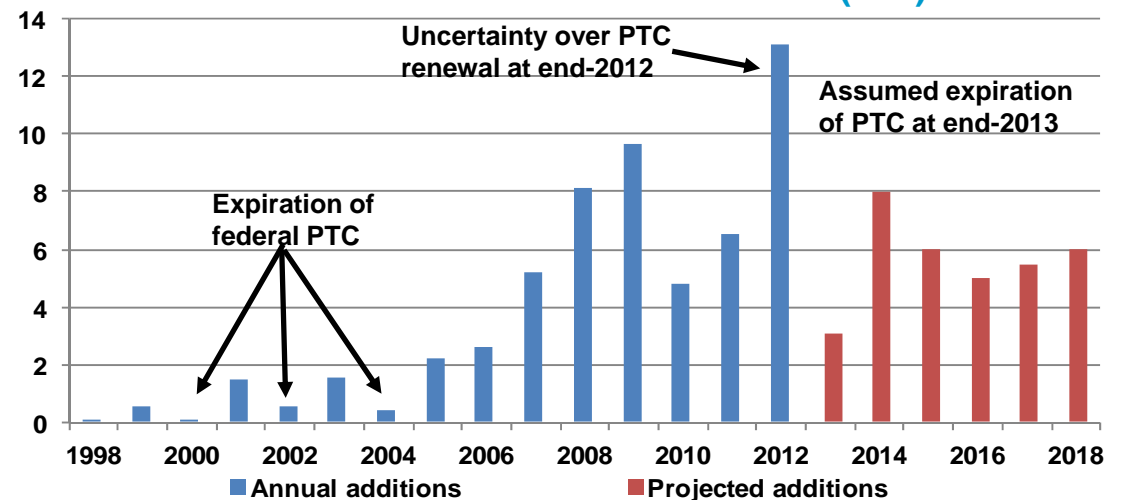
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Spain solar PV + CSP annual additions (GW)



Abrupt, retroactive policy changes

US onshore wind annual additions (GW)



Stop & go policies

Conclusions for policy-making



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- Many renewables no longer require high economic incentives
- But they do need long-term policies that continue to provide a predictable and reliable market and regulatory framework compatible with societal goals
- Consistent policy framework more important than specific RE incentive type
- Competitiveness of renewables depends on market design
 - Fair rules for up-front capital intensive technologies and distributed generation will be key

For further insights and analysis...



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- The Medium-Term Renewable Energy Market Report 2013 can be purchased online at:

www.iea.org

- Thank you for your attention!