RENEWABLES 2017
GLOBAL STATUS REPORT

REN21 Renewable Energy Policy Network for the 21st Century

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REN21 is a **global multi stakeholder network** dedicated to the rapid uptake of **renewable energy worldwide.**

NGOs:
CAN, CEEW, FER, GACC, GFSE, Greenpeace International, ICLEI, ISEP, MFC, SLoCaT, REI, WCRE, WFC, WRI, WWF

Science & Academia:
Fundacion Bariloche, IIASA, ISES, NREL, SANEDI, TERI,

International Organisations:
ADB, APERC, ECREEE, EC, GEF, IEA, IRENA, RCREEE, UNDP, UNEP, UNIDO, World Bank

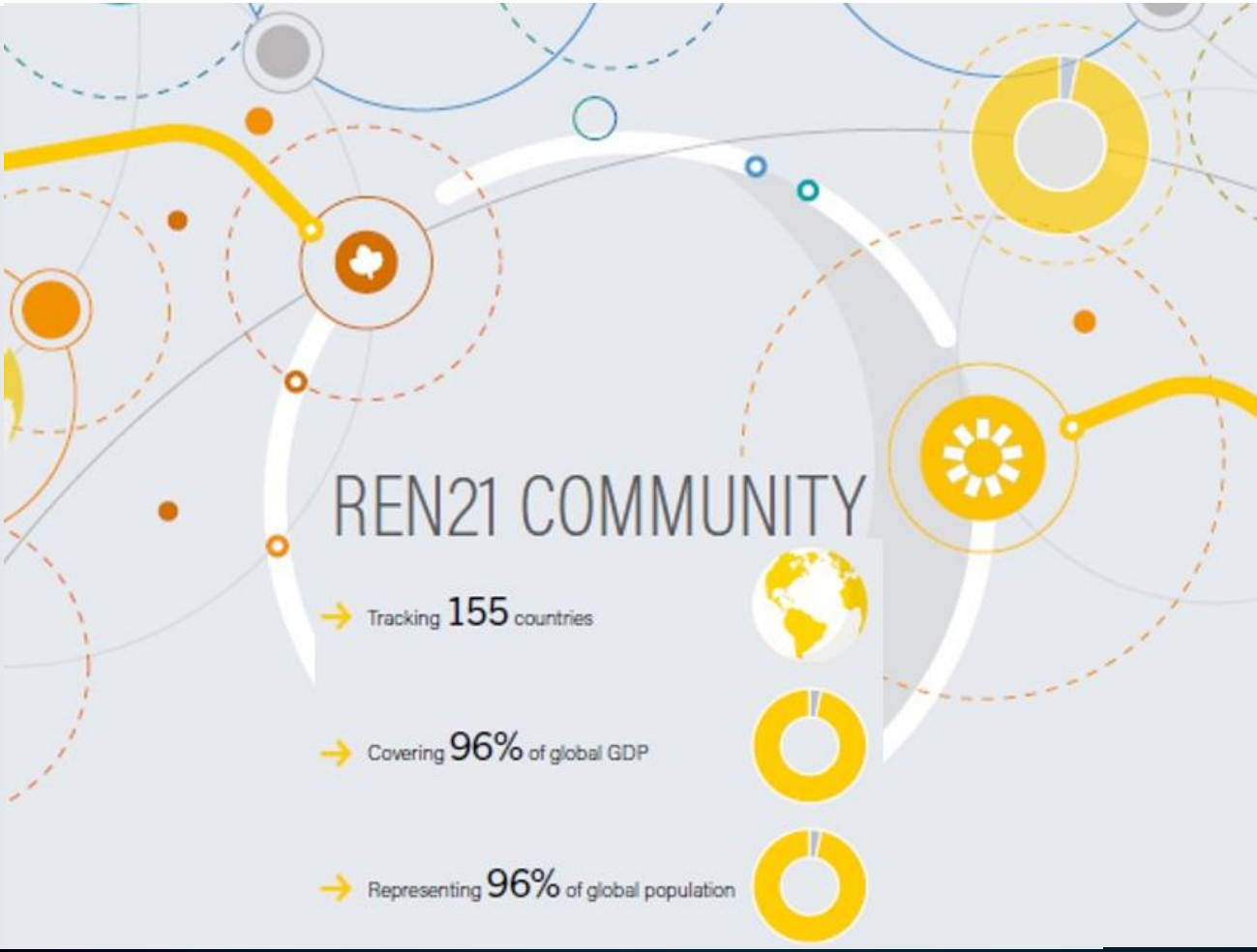
Industry Associations:
ACORE, ALER, APREN, ARE, CREIA, CEC, EREF, GOGLA, GSC, GWEC, IGA, IHA, IREF, RES4MED, WBA, WWEA

National Governments:
Afghanistan, Brazil, Denmark, Germany, India, Norway, South Africa, Spain, UAE, UK, USA

REN21 Community

GSR Network:

- Over **800** active contributors and reviewers
- Tracking **155** countries
- Covering **96%** of global GDP
- Representing **96%** of global population



REN21 Renewables 2017 Global Status Report

- **The report features:**
  - Global Overview
  - Market & Industry Trends
  - Distributed Renewable Energy for Energy Access
  - Investment Flows
  - Policy Landscape
  - NEW: Enabling Technologies and Energy Systems Integration
  - Energy Efficiency
  - Feature: Deconstructing Baseload

Another extraordinary year for renewable energy

Total global capacity was **up 9%** compared to 2015, to more than **2,016 GW** at year's end (**920 GW** not including hydro)

- → Solar PV - **47%** of newly installed renewable power capacity in 2016
- → Wind - **34%**
- → Hydropower - **15.5%**

		2015	2016
INVESTMENT			
New investment (annual) in renewable power and fuels[1]	billion USD	312.2	**241.6**
POWER			
Renewable power capacity (total, not including hydro)	GW	785	**921**
Renewable power capacity (total, including hydro)	GW	1,856	**2,017**
Hydropower capacity[2]	GW	1,071	**1,096**
Bio-power capacity	GW	106	**112**
Bio-power generation (annual)	TWh	464	**504**
Geothermal power capacity	GW	13	**13.5**
Solar PV capacity	GW	228	**303**
Concentrating solar thermal power capacity	GW	4.7	**4.8**
Wind power capacity	GW	433	**487**
HEAT			
Solar hot water capacity[3]	GW_{th}	435	**456**
TRANSPORT			
Ethanol production (annual)	billion litres	98.3	**98.6**
Biodiesel production (annual)	billion litres	30.1	**30.8**

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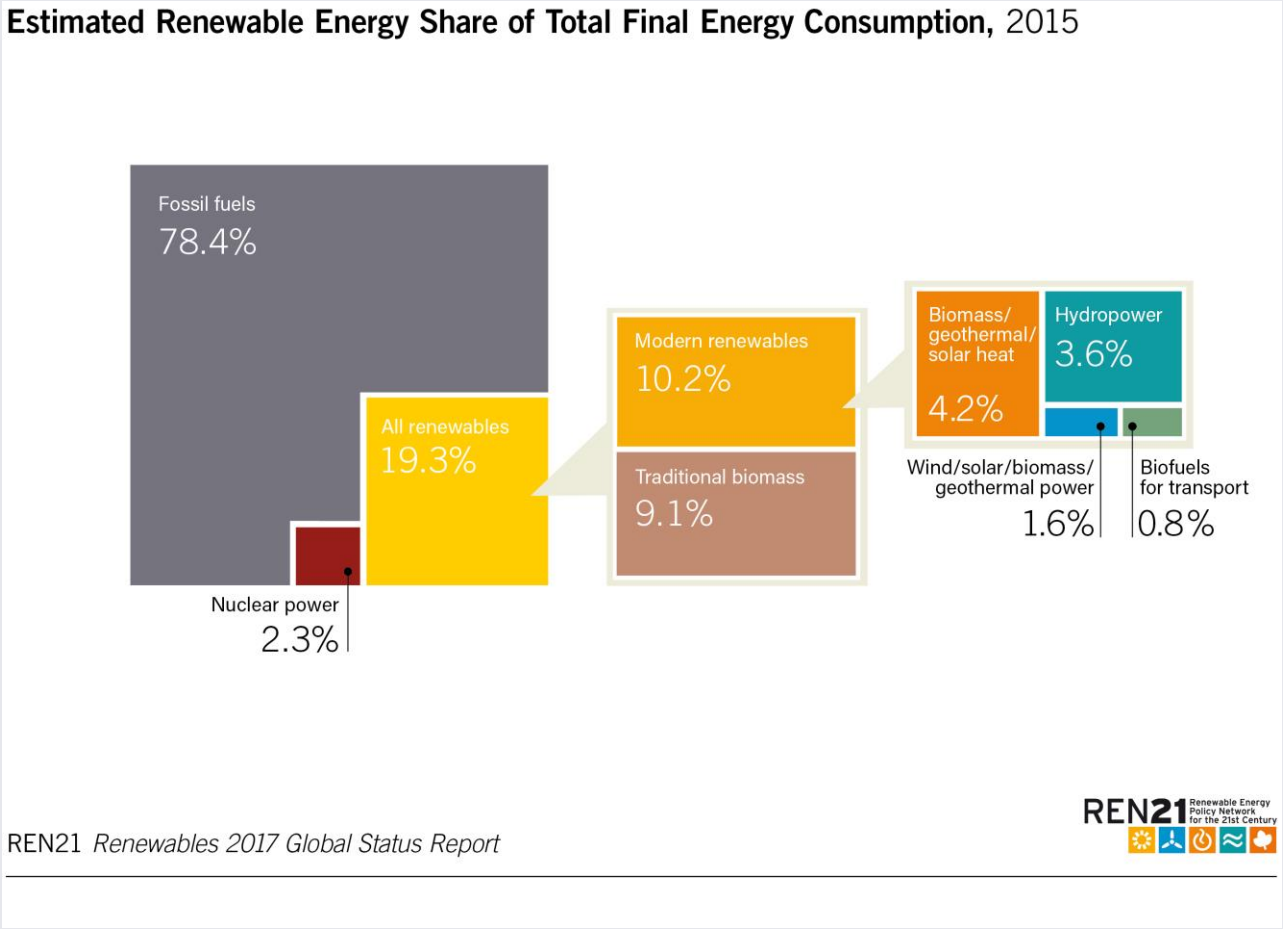
Renewable Energy in the World

As of 2015, renewable energy provided an estimated **19.3%** of global final energy consumption



Renewable Energy “Champions”

Annual Investment/Net Capacity Additions/Production in 2016

	1	2	3	4	5
Investment in renewable power and fuels (not including hydro > 50 MW)	**China**	United States	United Kingdom	Japan	Germany
Investment in renewable power and fuels per unit GDP[1]	**Bolivia**	Senegal	Jordan	Honduras	Iceland
Geothermal power capacity	**Indonesia**	Turkey	Kenya	Mexiko	Japan
Hydropower capacity	**China**	Brazil	Ecuador	Ethopia	Vietnam
Solar PV capacity	**China**	United States	Japan	India	United Kingdom
Concentrating solar thermal power (CSP) capacity[2]	**South Africa**	China	–	–	–
Wind power capacity	**China**	United States	Germany	India	Brazil
Solar water heating capacity	**China**	Turkey	Brazil	India	United States
Biodiesel production	**United States**	Brazil	Argentina/Germany/Indonesia		
Fuel ethanol production	**United States**	Brazil	China	Canada	Thailand

Renewable Energy "Champions"

Total capacity or generation as of end-2016

	1	2	3	4	5
POWER					
Renewable power (incl. hydro)	**China**	United States	Brazil	Germany	Canada
Renewable power (not incl. hydro)	**China**	United States	Germany	Japan	India
Renewable power capacity *per capita* (among top 20, not including hydro[3])	**Iceland**	Denmark	Sweden/ Germany	Spain/Finland	–
Biopower generation	**United States**	China	Germany	Brazil	Japan
Geothermal power capacity	**United States**	Philippines	Indonesia	New Zealand	Mexico
Hydropower capacity[4]	**China**	Brazil	United States	Canada	Russian Federat.
Hydropower generation[4]	**China**	Brazil	Canada	United States	Russian Federat.
CSP	**Spain**	United States	India	South Africa	Morocco
Solar PV capacity	**China**	Japan	Germany	United States	Italy
Solar PV capacity *per capita*	**Germany**	Japan	Italy	Belgium	Australia/Greece
Wind power capacity	**China**	United States	Germany	India	Spain
Wind power capacity *per capita*	**Denmark**	Sweden	Germany	Ireland	Portugal
HEAT					
Solar water heating collector capacity[5]	**China**	United States	Turkey	Germany	Brazil
Solar water heating collector capacity *per capita*[5]	**Barbados**	Austria	Cyprus	Israel	Greece
Geothermal heat capacity[6]	**China**	Turkey	Japan	Iceland	India
Geothermal heat capacity *per capita*[6]	**Iceland**	New Zealand	Hungary	Turkey	Japan

Heating and Cooling

Modern renewable energy supplies approx. **9%** of total global heat demand.

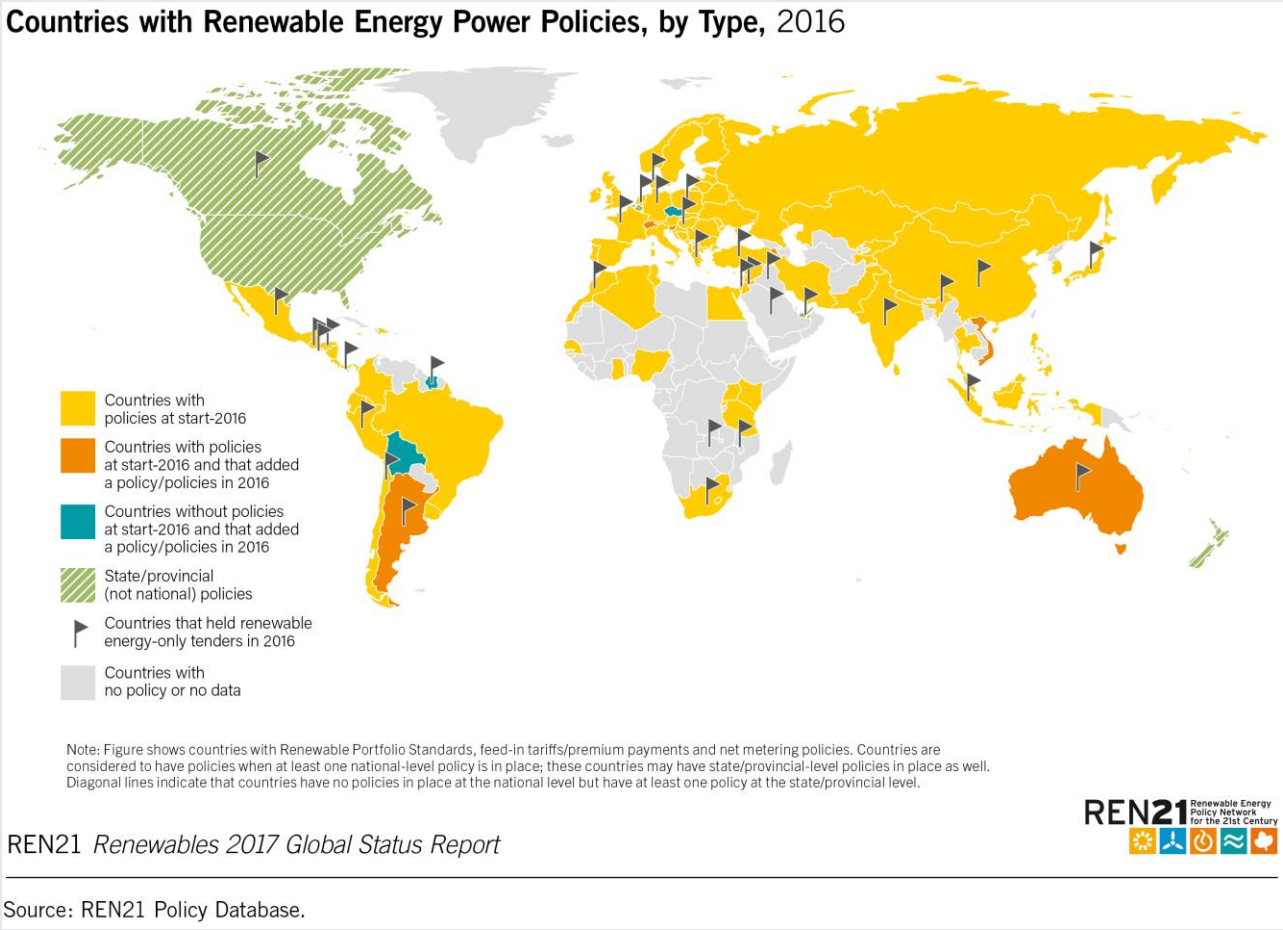
In 2016, the vast majority of renewable heat continued to be supplied by **biomass**, with smaller contributions from **solar thermal** and **geothermal** energy.

Deployment of renewable technologies in this market continued to be constrained by factors such as comparatively **low fossil fuel prices** and a relative **lack of policy support.**

Renewable Energy Policy Landscape

Auctions are the most rapidly expanding form of renewable energy policy support.

Renewable energy auctions **held in 34 countries** in 2016 – more than double the year before

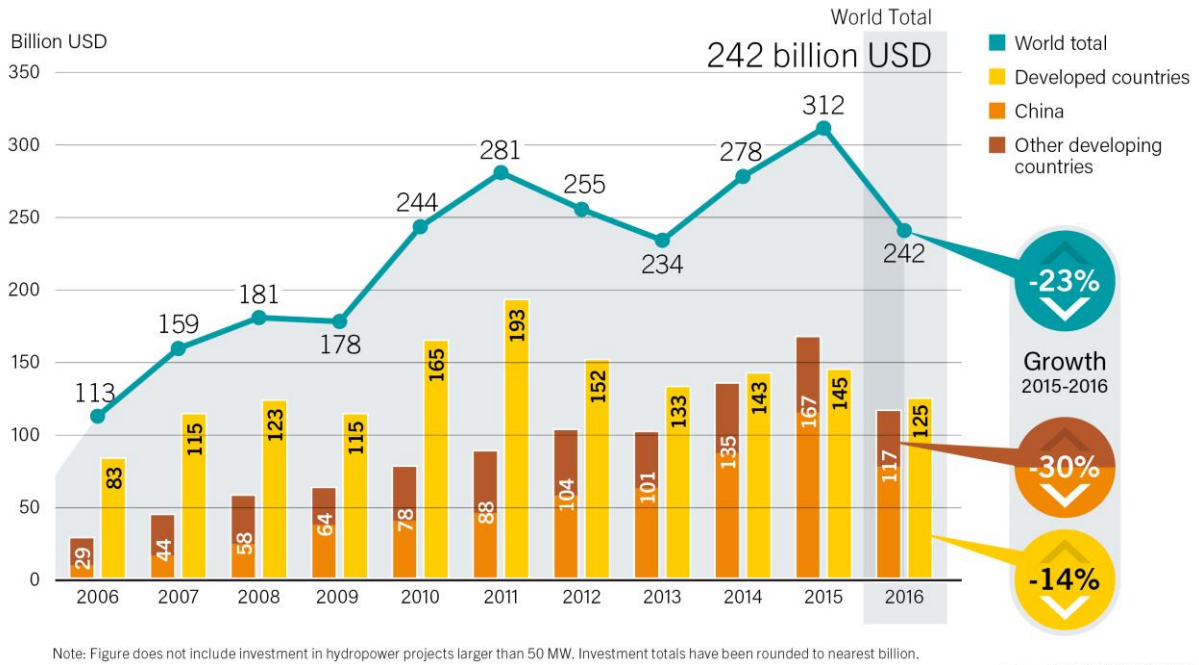


Global Investment in Renewable Energy

Global new investment in renewables was **USD 241.6 billion** in 2016

For the fifth consecutive year, **investment in new renewable power** capacity was roughly **double that in fossil fuel** capacity.

Global New Investment in Renewable Power and Fuels, Developed, Emerging and Developing Countries, 2006-2016



Note: Figure does not include investment in hydropower projects larger than 50 MW. Investment totals have been rounded to nearest billion.

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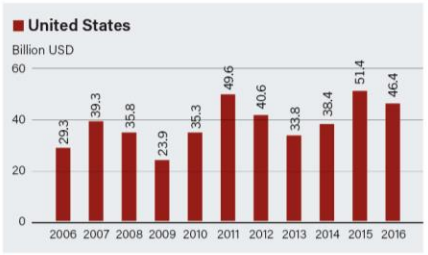
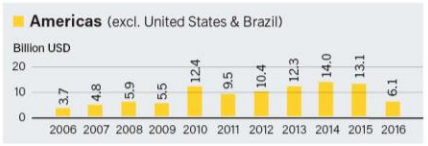
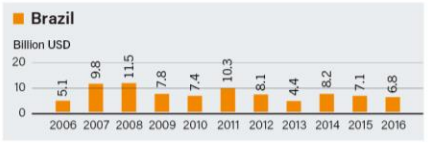
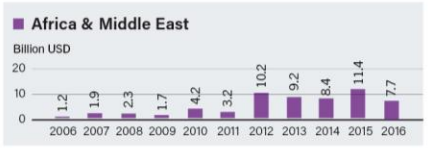
Source: BNEF.

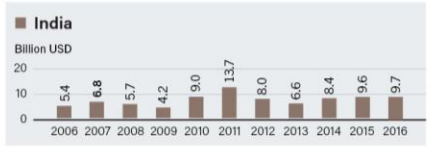
Global Investment in Renewable Energy

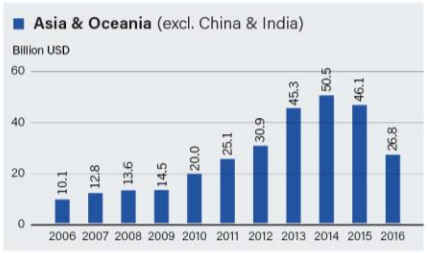


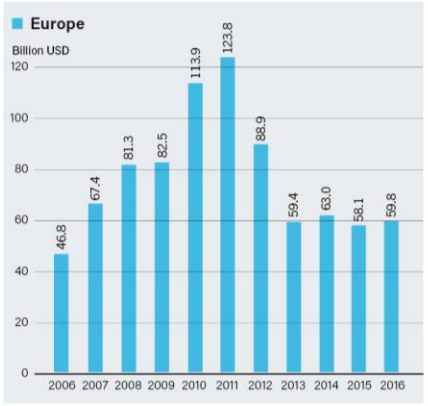


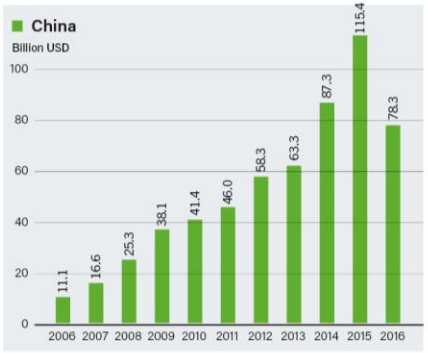








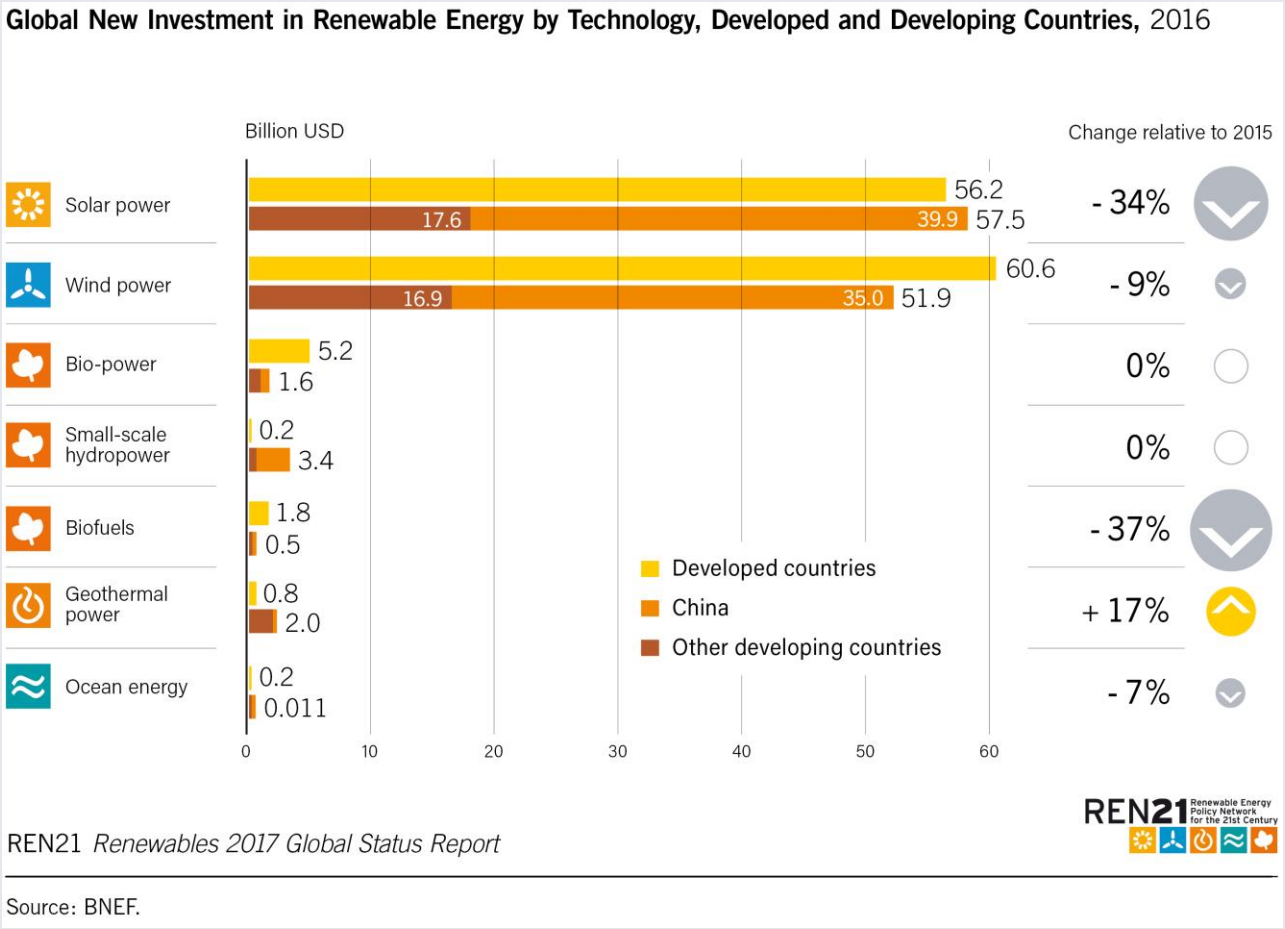




Note: Data include government and corporate R&D.

Global Investment in Renewable Energy

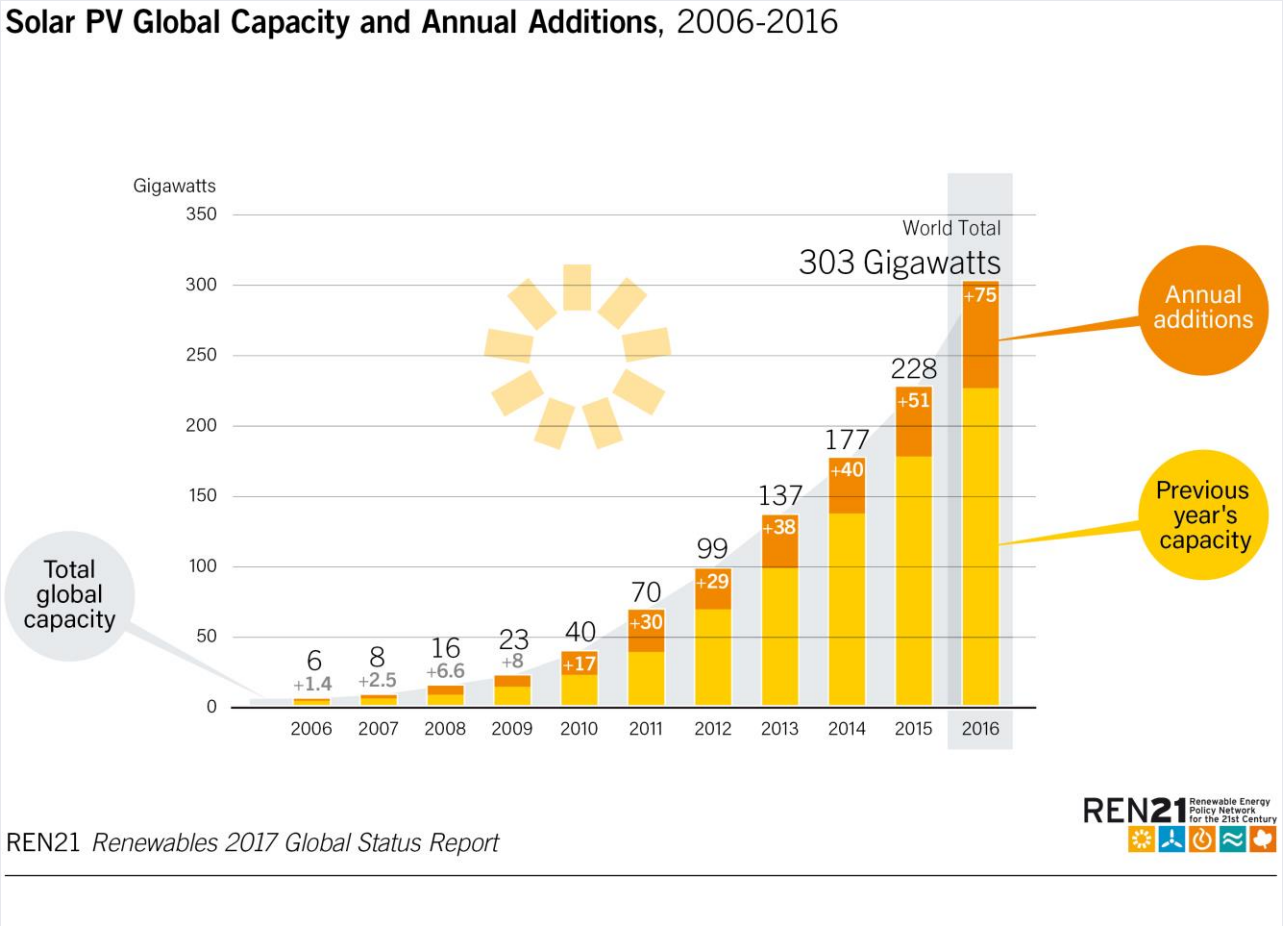
Solar and wind power continue to lead for money committed during 2016, each accounting for roughly **47%** of total investment



Solar PV

75 GW of solar PV capacity was added worldwide

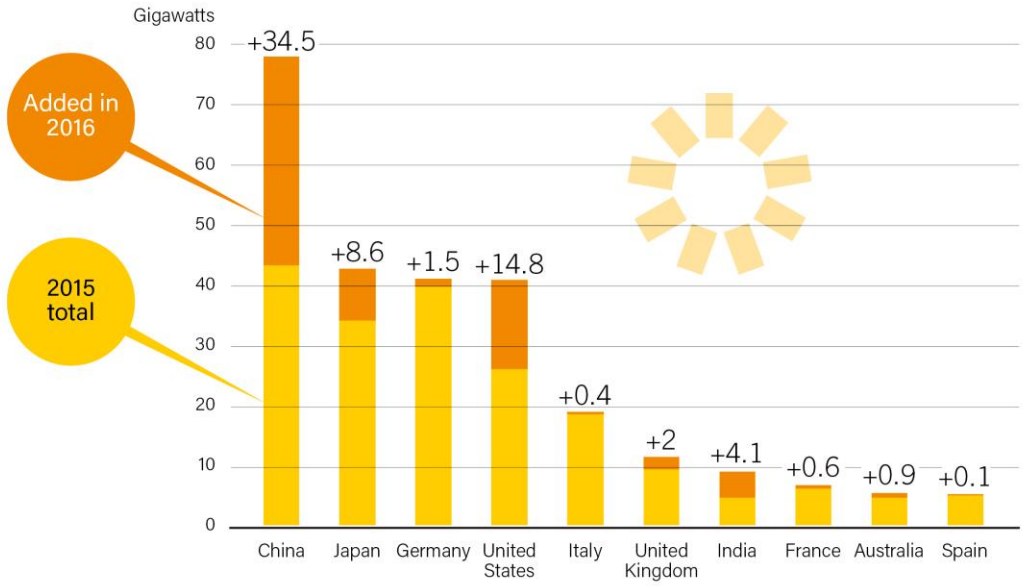
Global solar PV capacity totaled **303 GW**



Solar PV

China added **34.5 GW** (up 126% over 2015), increasing its total solar PV capacity 45% to **77.4 GW**, far more than that of any other country

Solar PV Capacity and Additions, Top 10 Countries, 2016



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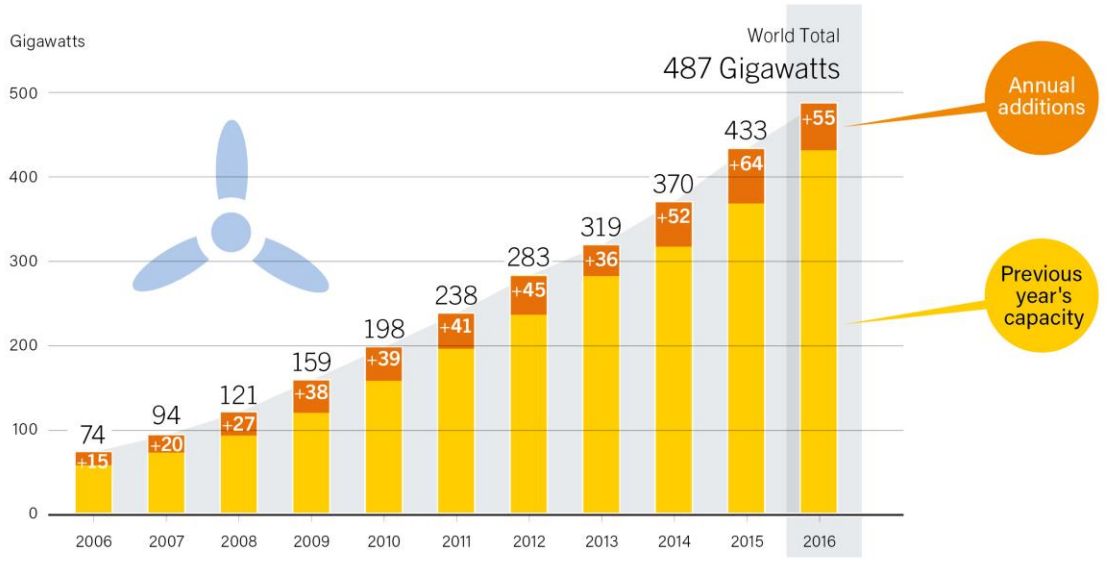
Wind Power

55 GW of wind power capacity added

Global total increased 12% to **487 GW**

Wind Power Global Capacity and Annual Additions, 2006-2016



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The UNECE Renewable Energy Status Report 2017

- Detailled look at the status of renewable energy in select 17 countries in the UNECE region
- Part of the initiatives of the UNECE Group of Experts on Renewable Energy (GERE) – building on existing process
- Utilisation of the established REN21 global data collection process from formal and informal sources
- Objective to obtain a reliable data baseline for increased investment activity
- Strong Involvement of governments, international organisations (IEA, EBRD, European Commission, World Bank, UNDP, etc.) and civil society during data collection and review

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UNECE

Gefördert durch:

Bundesministerium für Wirtschaft und Energie

aufgrund eines Beschlusses des Deutschen Bundestages

iea International Energy Agency

- Covered countries very diverse in terms of territory, economic, social and political characteristics
- Overall population of over 300 Million
- Density ranges from 6,4 persons/km to 123,9 persons/km
- Three countries amongst coldest globally in terms of heating degree days
- Countries partake in different forms of regional energy cooperation

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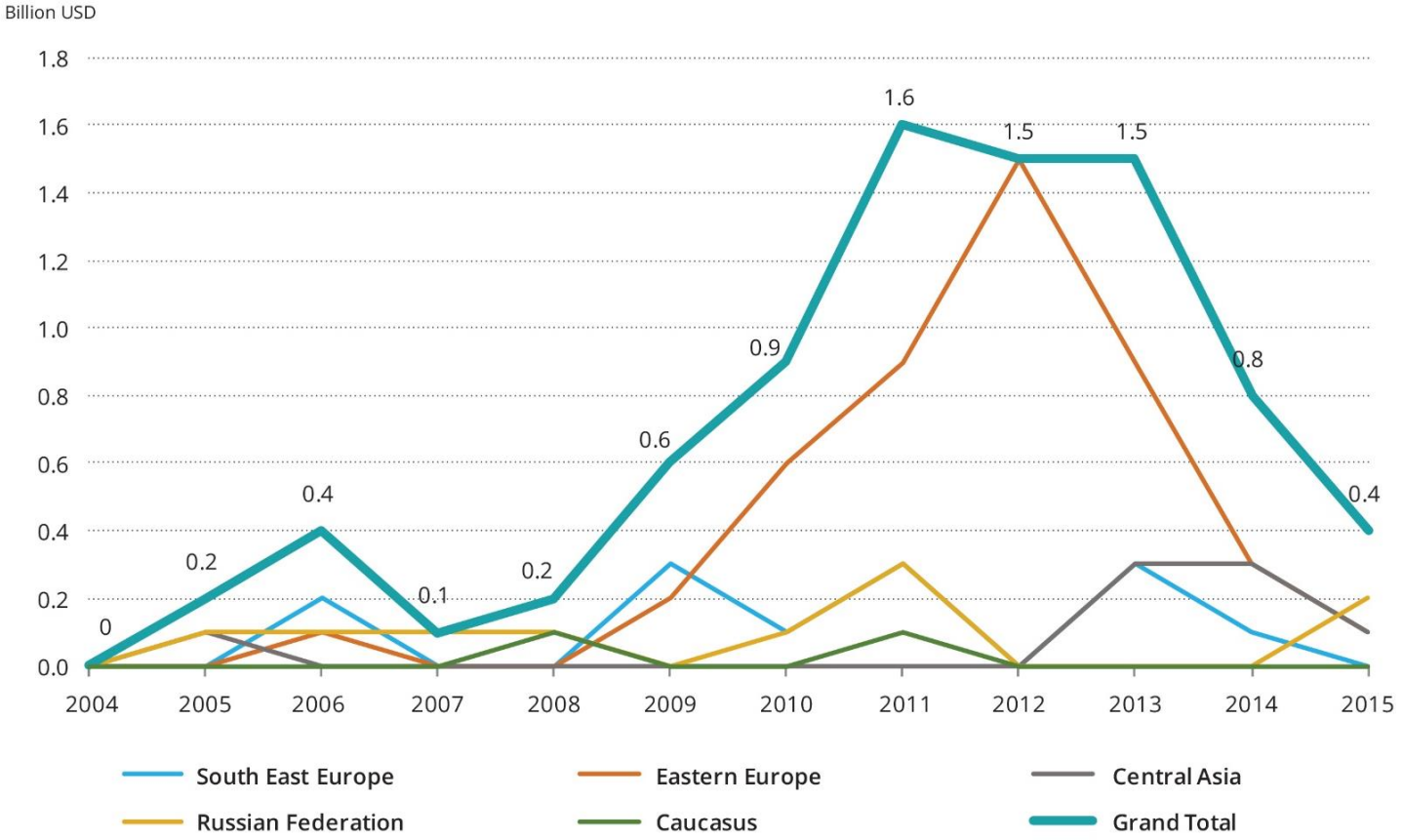
Investment flows in UNECE (17)

Renewable Energy Investment Overview, 2004 - 2014

- The covered countries only represent 0.2 % of new RE investment in 2015 worldwide

- Investment attraction remains an issue for RE development in the region



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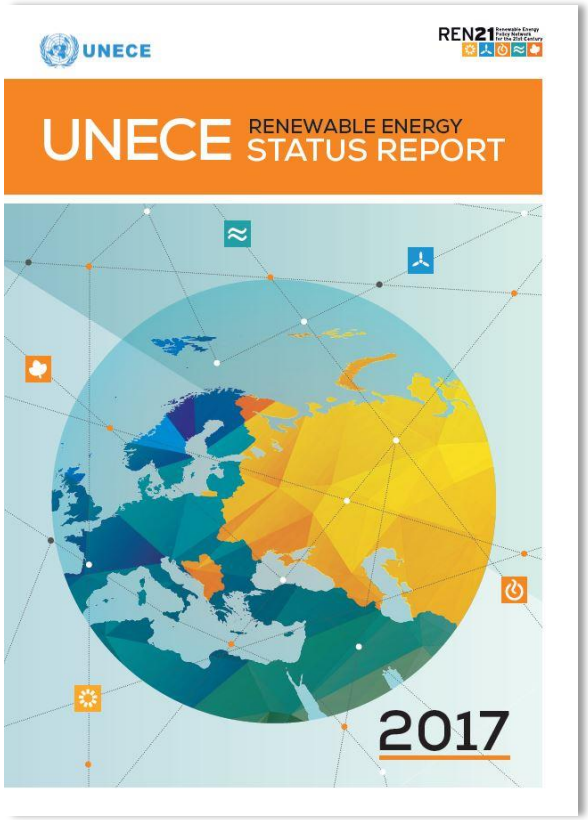
Conclusion UNECE

- South East and Eastern Europe, Caucasus, Central Asia and Russian Federation made strides into the realm of renewable energy and energy efficiency over the past two decades

- Governments advance in developing targets and policies that promote renewable energy sources present abundantly in different forms across the region

- Numerous barriers remain (energy subsidies, legal & administrative complexities, awareness of affordability, etc.) and delay projects implementation

- Viewed from global perspective, capacity and investment in the covered 17 countries remain marginal



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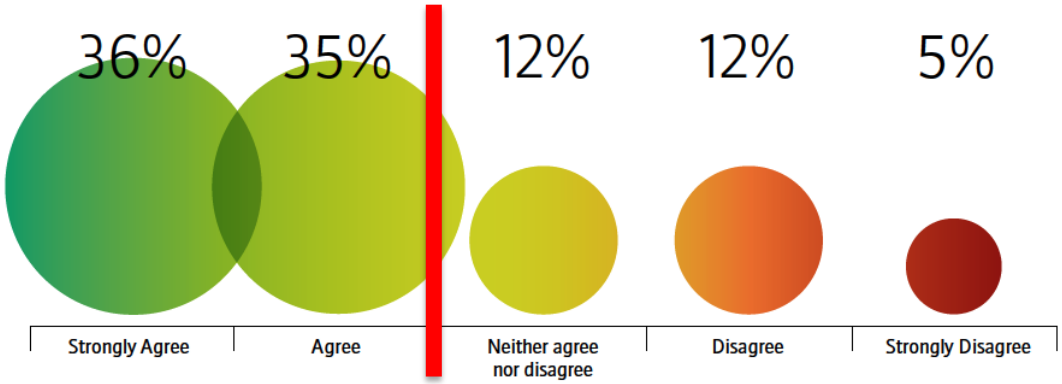
100% Renewables: Pipe dream or reality?

- **114 experts interviewed**
- **Conservative , moderate, progressive perspectives**
- **Giving their opinion on:**
  - feasibility of 100% renewable energy future
  - macro-economic impact of such a future
- **All regions of the world represented**
- **Not prescriptive but a starting point for debate**
- **12 Great Debates**

1. 100% Renewables: A logical consequence of the Paris Agreement?

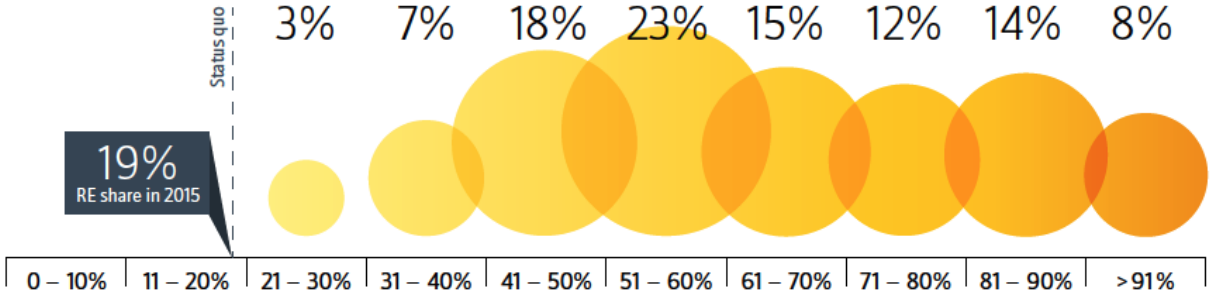
"Is the transition to 100% renewables on a global level feasible and realistic?"

71% agree with this statement



What will be the share of global renewable final energy consumption by 2050?

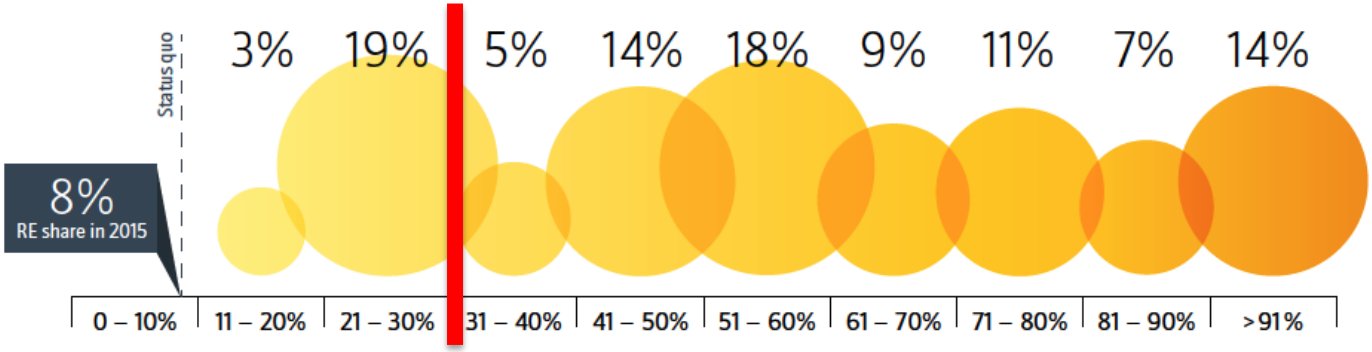
72% of the experts expect RE share will double or even triple with the next 3 decades.



4. The Future of Heating: Thermal or electrical application?

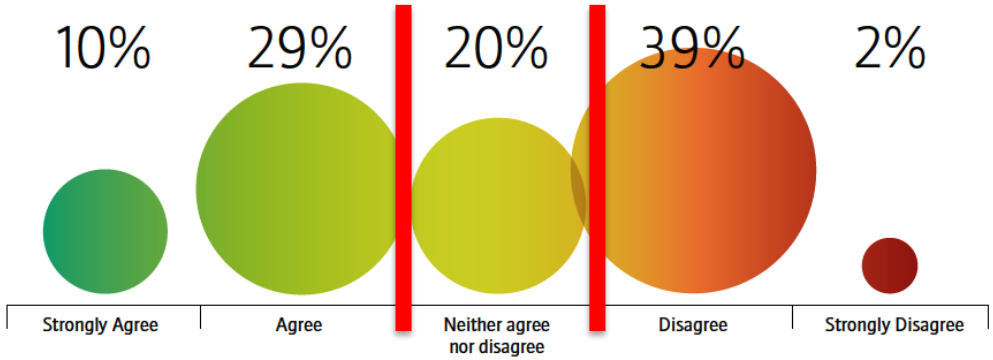
What will be the share of global renewable heating energy consumption by 2050?

78% expect the renewable heating share at least to triple within the next 30 years



"The electrification of the heating sector will continue and will lead to an almost complete electrification."

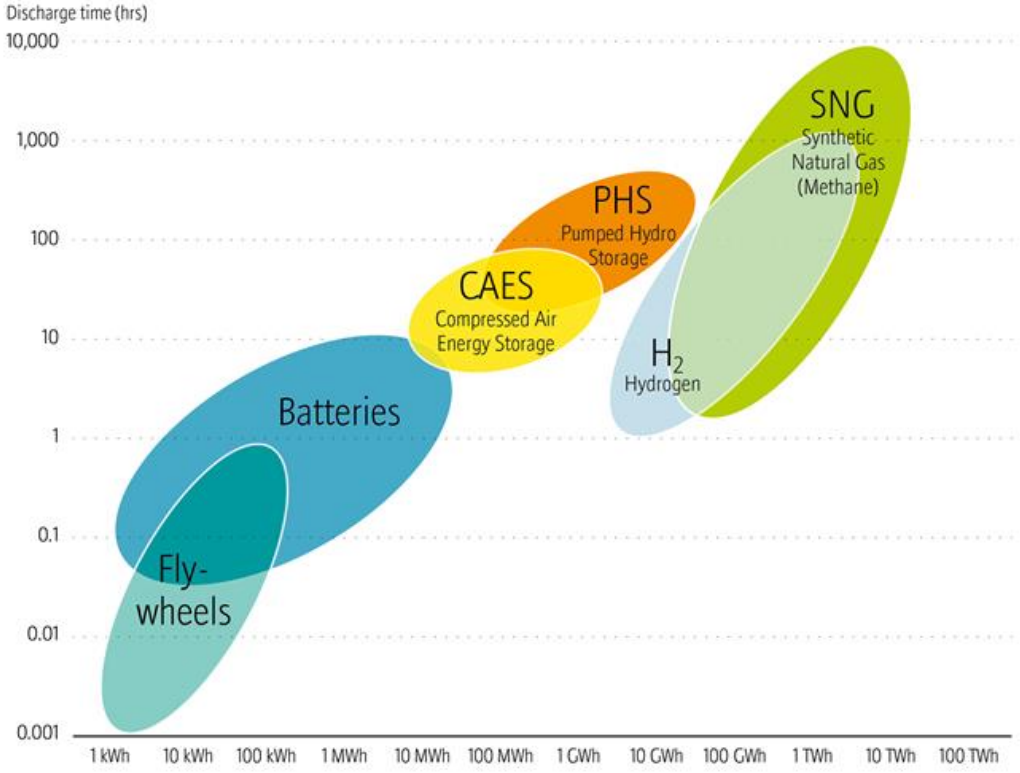
39% agree
41 % disagree
20% undecided
>> the race is still wide open



7. Storage: Supporter or competitor of the power grid?

Various storage technologies for various purposes. There is no “on-size-fits-all” application.

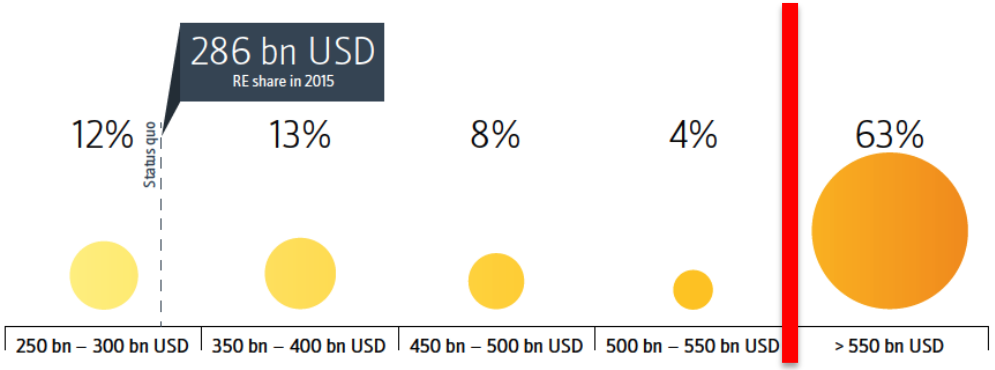
Overview storage capacity of different energy storage systems



9. Scaling-up Investments and Work Force: 100% renewables for socio-economic change

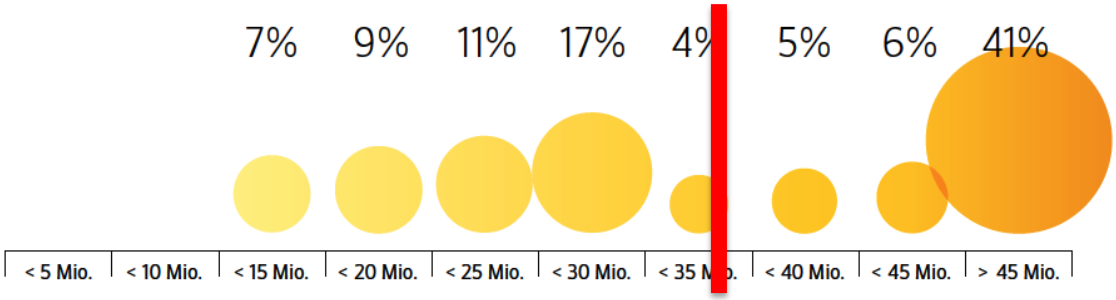
What will the annual global investment volume in renewable energy be by 2050?

63% believe that the RE investment volume will at least double



How many people will be employed in this sector by 2050? (8.1 million in 2016)

56% expect the workforce to quadruple by 2050



In Conclusion – Global Futures Report

- More than 70% of the experts interviewed consider a global transition to 100% renewable energy to be both feasible and realistic.

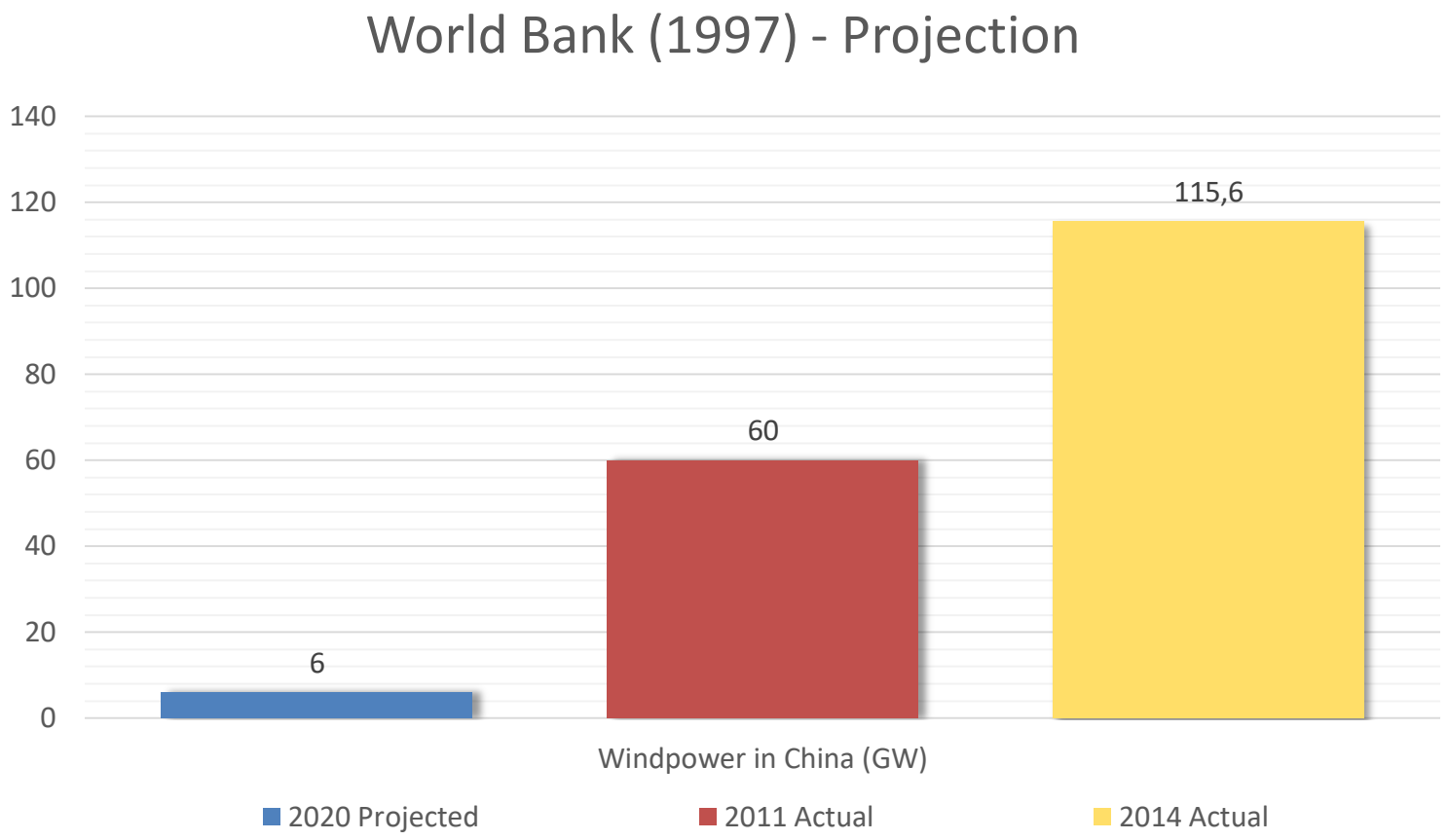
- There is an overwhelming consensus that renewable power will dominate in the future, with many noting that even large international corporations are increasingly choosing renewable energy products either from utilities or through direct investment in their own generating capacity.

- Numerous companies, regions, islands and cities have set 100% renewable energy targets.

Conclusions – Global Status Report

- Global renewable energy transition advancing with record capacity additions and rapidly falling costs – more capacity installed for less money
- 2016 was the third year in a row where decoupling of economic growth and energy-related CO_2 emissions occurred
- **However, progress not fast enough to reach Paris Agreement goals**
- Better-integrated sectoral planning
- Smarter, more flexible systems integrating variable renewables
- More use of enabling technologies

Historic Projections Fall Short…



"The future of renewable energy is fundamentally a choice. All of the resources and technologies are there, but legislators and governments have to choose a long-term renewables path."

In 1997, the World Bank predicted 6 GW of wind in China for 2020, nearly 10 times lower and 60 GW was reached in 2011.

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Mexico International Renewable Energy Conference (MEXIREC) 11-13 September 2017

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