

RENEWABLES 2017

GLOBAL STATUS REPORT



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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

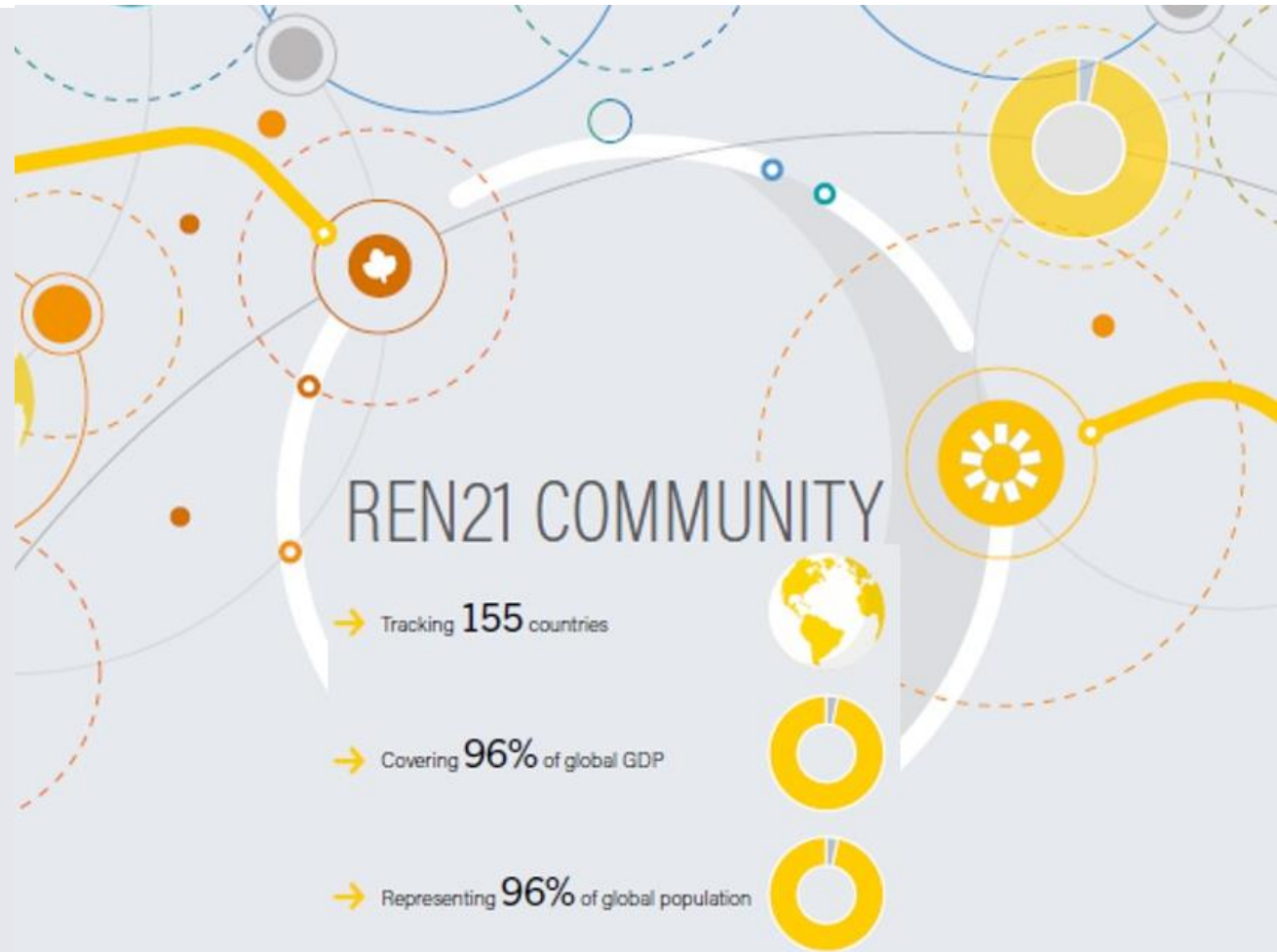
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REN21 Community

GSR Network:

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



REN21 Renewables Interactive Map

- Research tool for tracking the development of renewable energy worldwide
- Complements perspectives and findings of REN21's **Global and Regional Status Reports** with **infographics** and detailed, exportable **data packs**

www.ren21.net/map

REN21 Interactive Map

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Etats-Unis
Russie
Chine
Inde
Australie
Brasil

Topic (Tout) Technology (Tout)

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In 2016 investors were able to acquire more renewable energy capacity for less money.

- 176 countries had **renewable energy targets**, renewable energy auctions were held in 34 countries in 2016 – more than double the year before
- **Newly installed renewable power capacity set new records** in 2016, with 161 gigawatts (GW) added, increasing the global total by almost 9% relative to 2015.
- For the fifth consecutive year, **investment in new renewable power capacity** was roughly **double the investment in fossil fuel generating capacity**, reaching USD 249.8 billion.
- 2016 was the **third year in a row where global CO₂ emissions** from the energy sector remained stable despite a 3% growth in the global economy and an increased demand for energy.

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%**

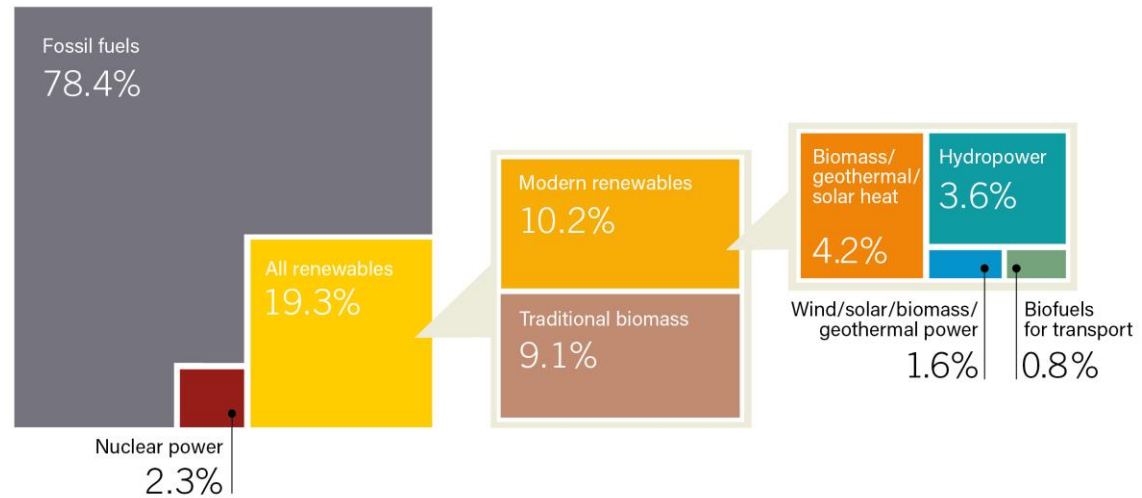
		2015	2016
INVESTMENT			
New investment (annual) in renewable power and fuels ¹	billion USD	312.2	241.6
POWER			
Renewable power capacity (total, not including hydro)	GW	785	921
Renewable power capacity (total, including hydro)	GW	1,856	2,017
 Hydropower capacity ²	GW	1,071	1,096
 Bio-power capacity	GW	106	112
 Bio-power generation (annual)	TWh	46.4	50.4
 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



Renewable Energy in the World

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

Estimated Renewable Energy Share of Total Final Energy Consumption, 2015

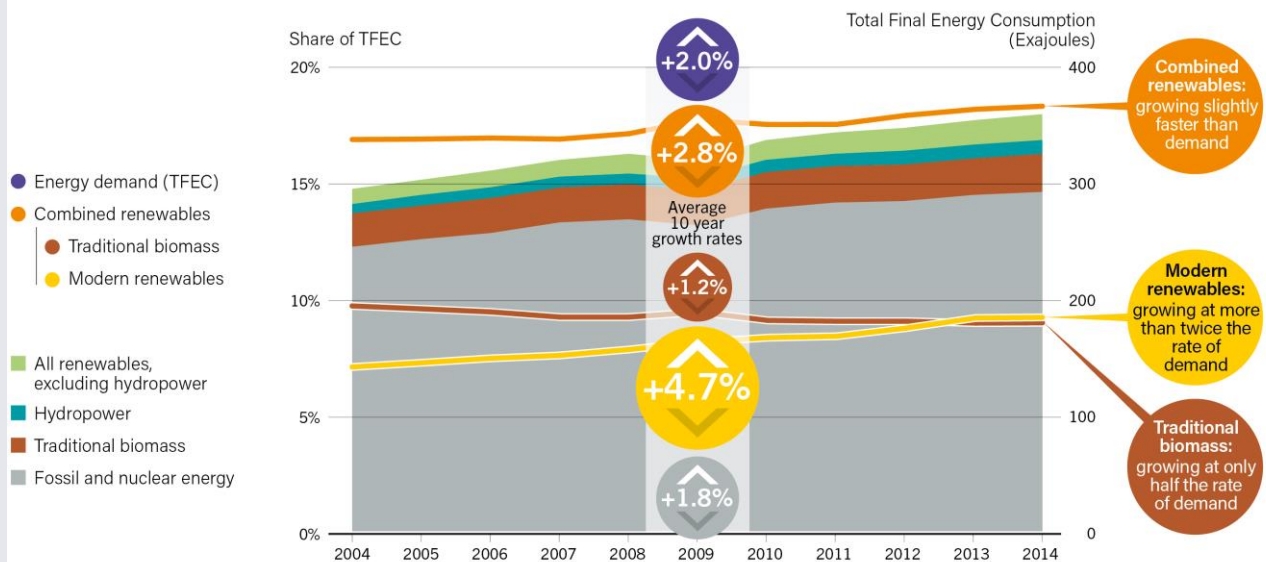


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Renewable Energy in the World

Growth in Global Renewable Energy Compared to Total Final Energy Consumption, 2004-2014



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





Source: based on IEA World Energy Balances, 2016.



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

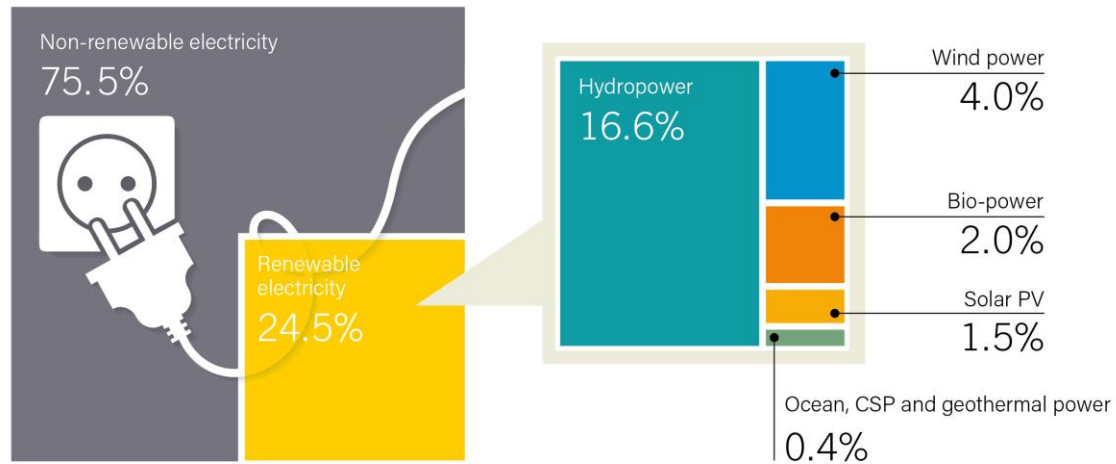


Power Sector

Renewables comprised **30%** of the world's power generating capacity and **24.5%** of global electricity demand

China is home to more than **one-quarter** of the world's renewable power capacity

Estimated Renewable Energy Share of Global Electricity Production, End-2016



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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**.



Transport

In 2016, **liquid biofuels** provided around **4%** of world road transport fuels, which account for the majority of transport energy use.

Biogas use in transport grew substantially in the **United States** and continued to gain shares of the transport fuel mix in Europe.

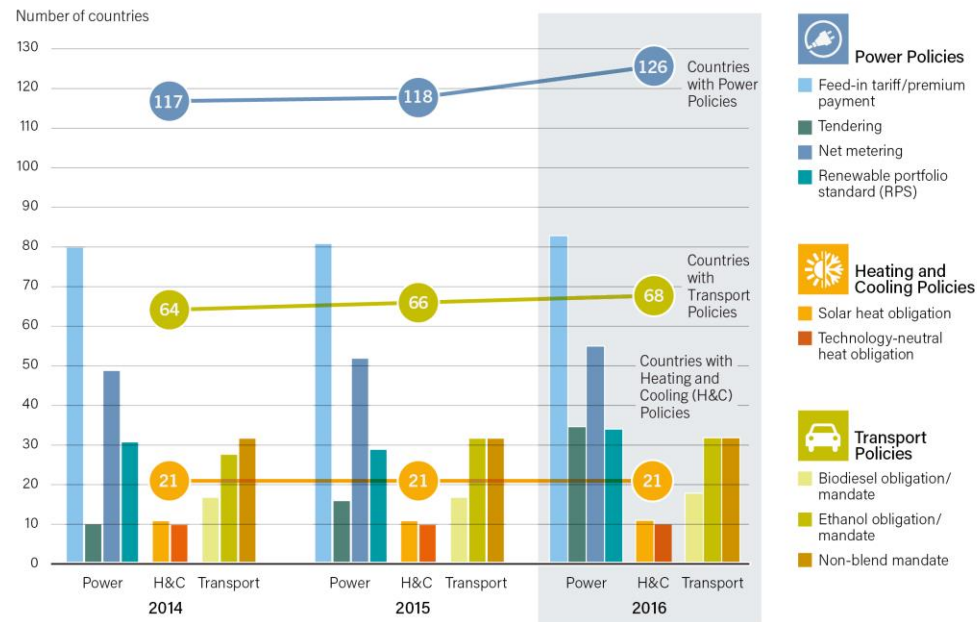
Further **electrification** of the transport sector has the potential to create a **new market** for renewable energy and to facilitate the integration of **variable renewable energy**.



Renewable Energy Policy Landscape

- **176** countries had renewable energy **targets**
- **126** countries had power policies
- **68** countries had transport policies
- **21** countries had heating and cooling policies

Number of Renewable Energy Regulatory Incentives and Mandates, by Type, 2014-2016



Note: Figure does not show all policy types in use. In many cases countries have enacted additional fiscal incentives or public finance mechanisms to support renewable energy. Heating and cooling policies do not include renewable heat FITs (i.e., in the United Kingdom). Countries are considered to have policies when at least one national or state/provincial-level policy is in place. A country is counted a single time if it has one or more national and/or state/provincial-level policies. Some transport policies include both biodiesel and ethanol; in this case, the policy is counted once in each category (biodiesel and ethanol). Tendering policies are presented in a given year if a jurisdiction has held at least one tender during that year.

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Source: REN21 Policy Database.

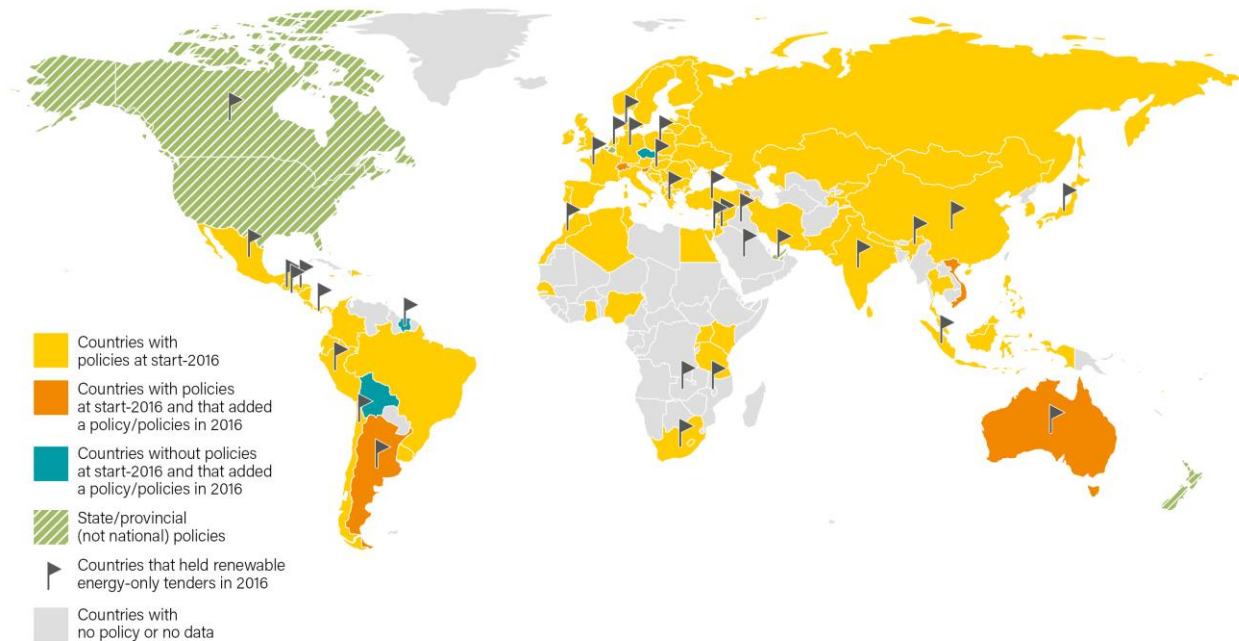


Renewable Energy Policy Landscape

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

Countries with Renewable Energy Power Policies, by Type, 2016



Note: Figure shows countries with Renewable Portfolio Standards, feed-in tariffs/premium payments and net metering policies. Countries are considered to have policies when at least one national-level policy is in place; these countries may have state/provincial-level policies in place as well. Diagonal lines indicate that countries have no policies in place at the national level but have at least one policy at the state/provincial level.

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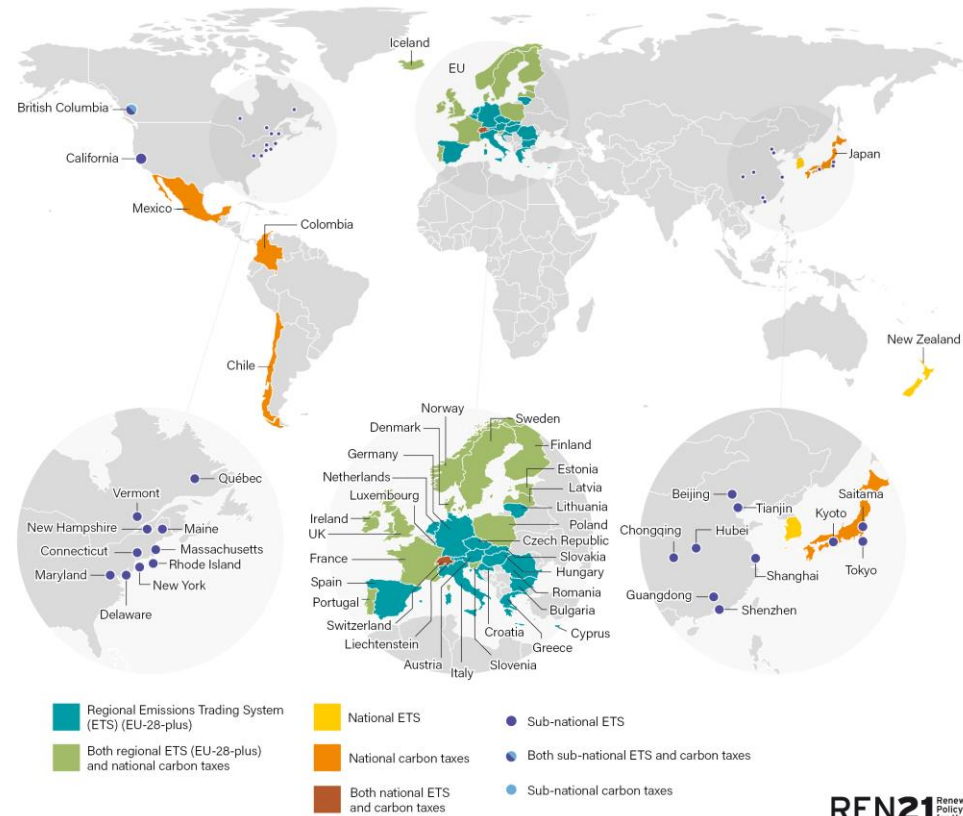
Source: REN21 Policy Database.



Carbon Pricing Policies

Carbon pricing policies were in place in **57 jurisdictions** worldwide in 2016

Carbon Pricing Policies, 2016



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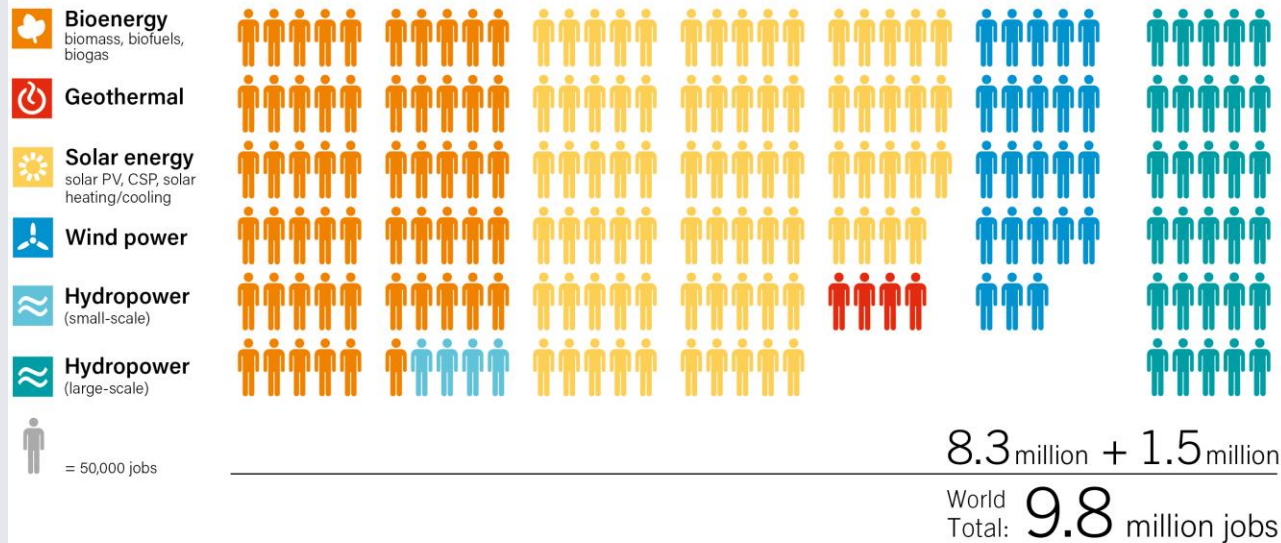


Jobs in Renewable Energy

The renewable energy sector employed

9.8 million people in 2016 - a **1.1% increase** over 2015

Jobs in Renewable Energy



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Source: IRENA.

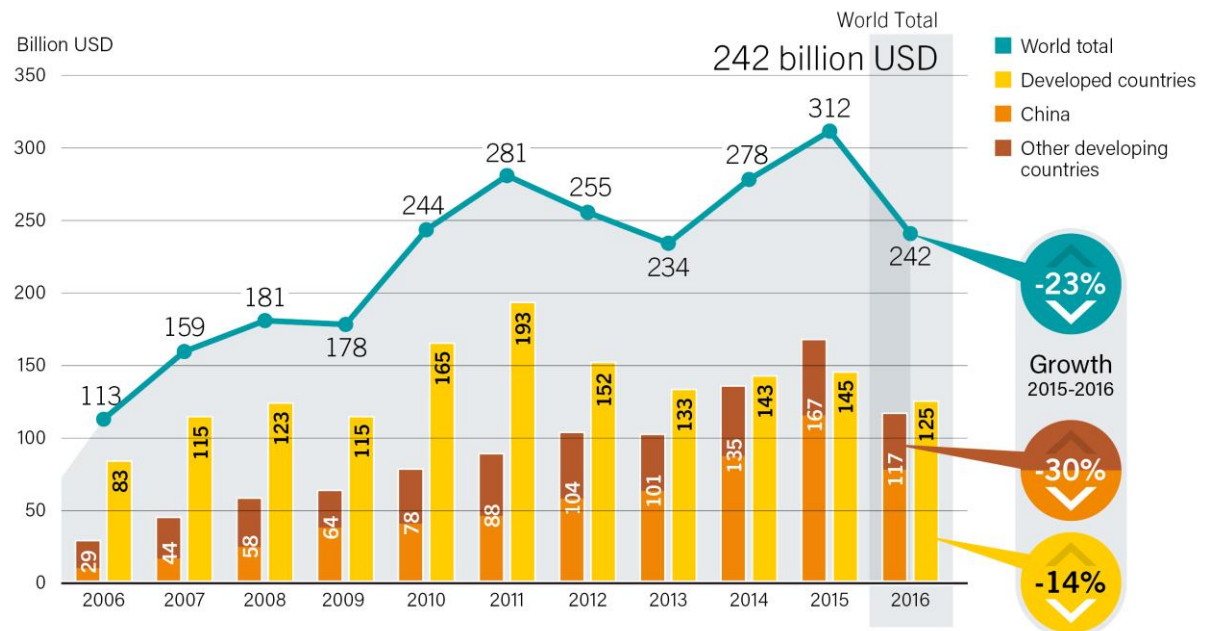


Global Investment in Renewable Energy

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



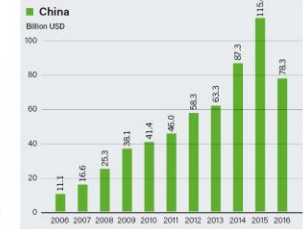
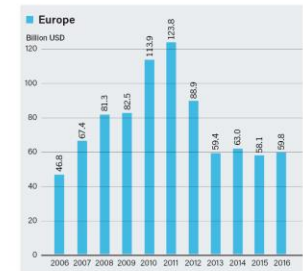
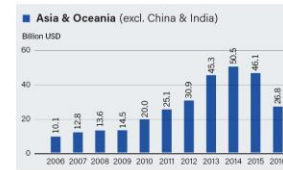
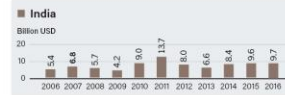
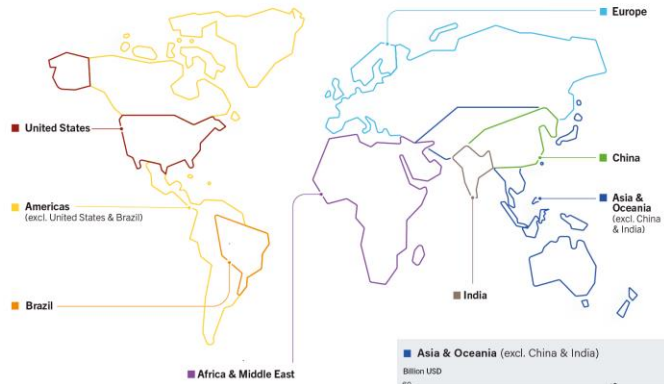
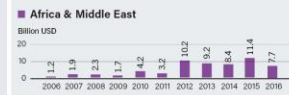
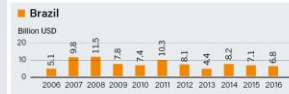
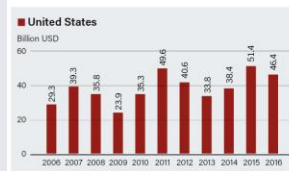
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Source: BNEF.



Global Investment in Renewable Energy

Global New Investment in Renewable Power and Fuels, by Country and Region, 2006-2016



Note: Data include government and corporate R&D.

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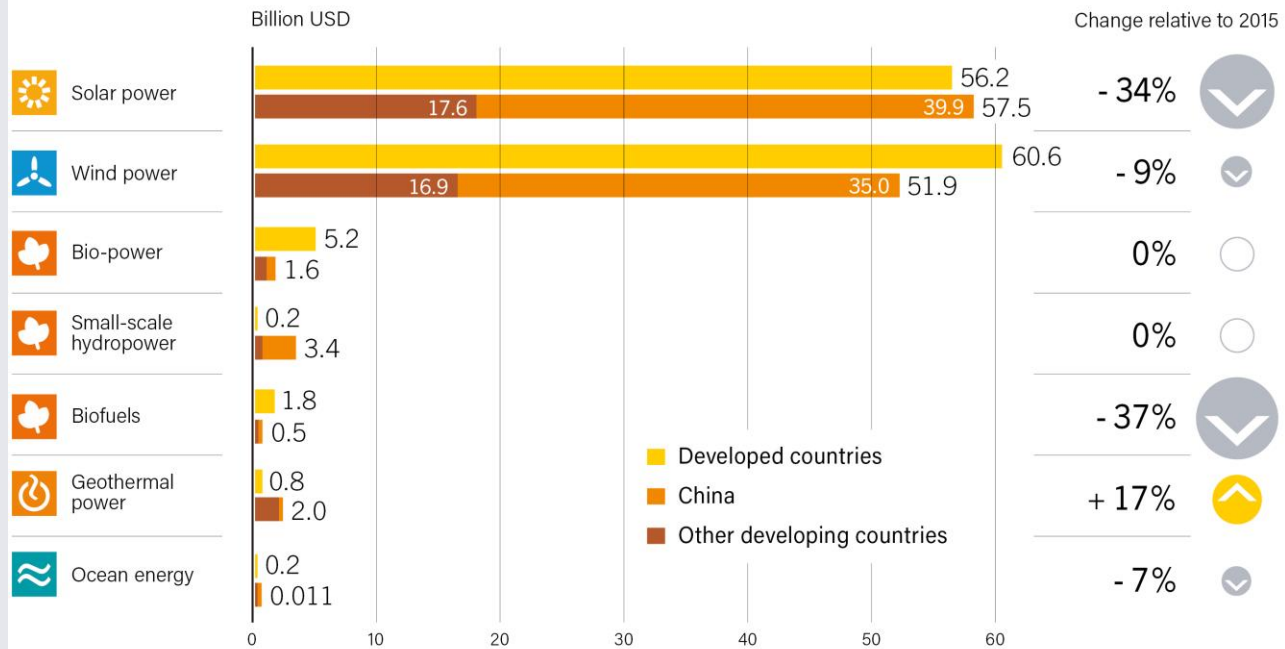


Source: BNEF.

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

Global New Investment in Renewable Energy by Technology, Developed and Developing Countries, 2016



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Source: BNEF.

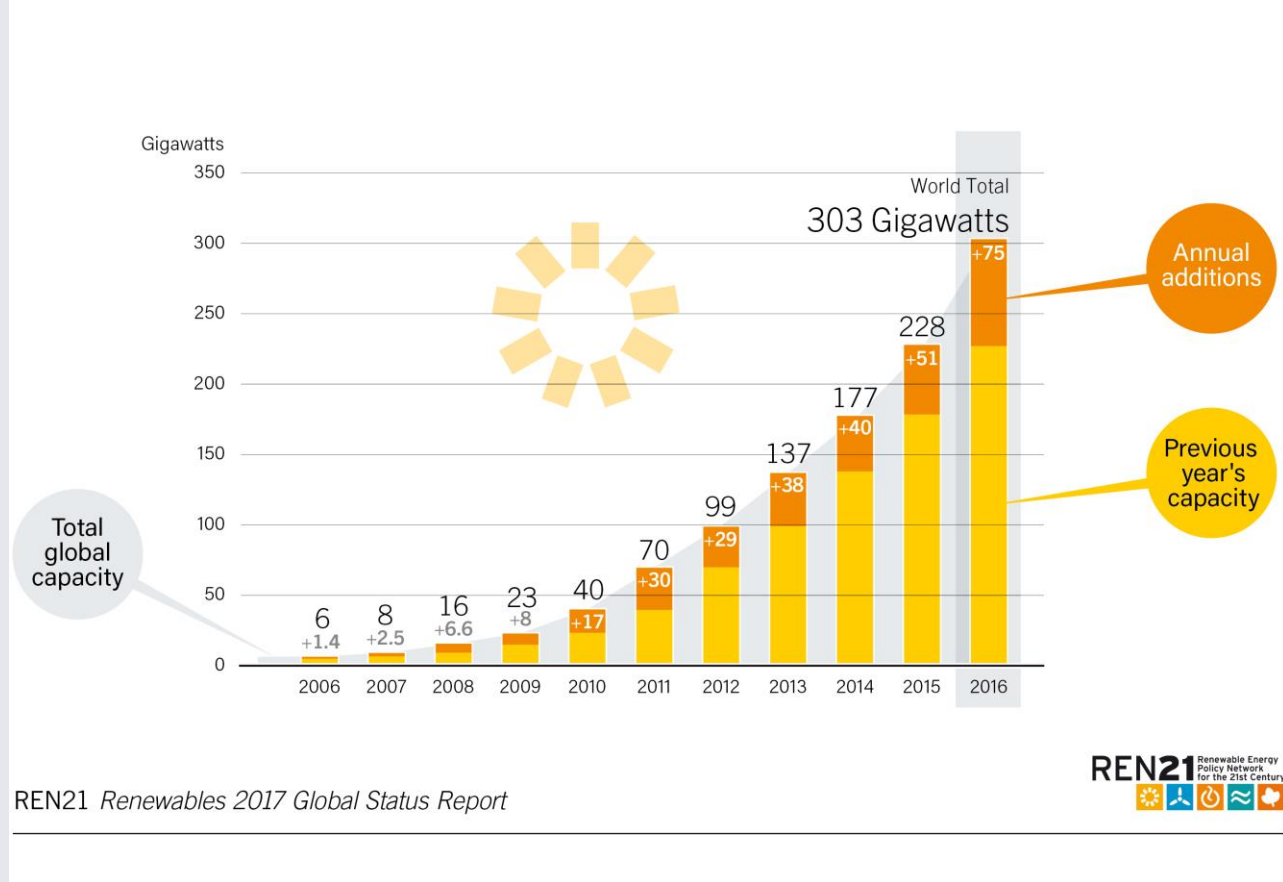


Solar PV

75 GW of solar PV capacity was added worldwide

Global solar PV capacity totaled **303 GW**

Solar PV Global Capacity and Annual Additions, 2006-2016

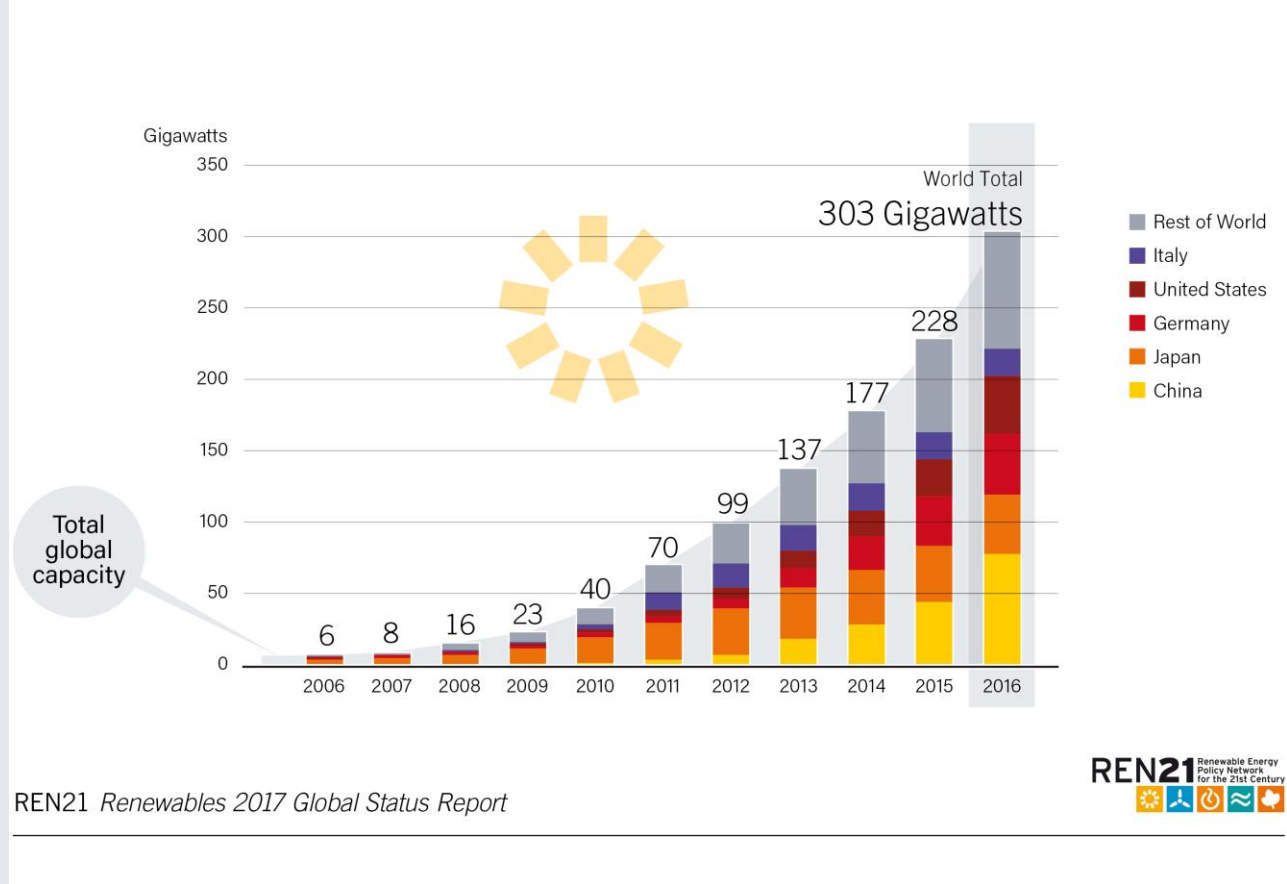


Solar PV

By end-2016:

- Every continent had installed at least **1 GW**
- At least 24 countries had **1 GW** or more of capacity
- At least 114 countries had more than **10 MW**

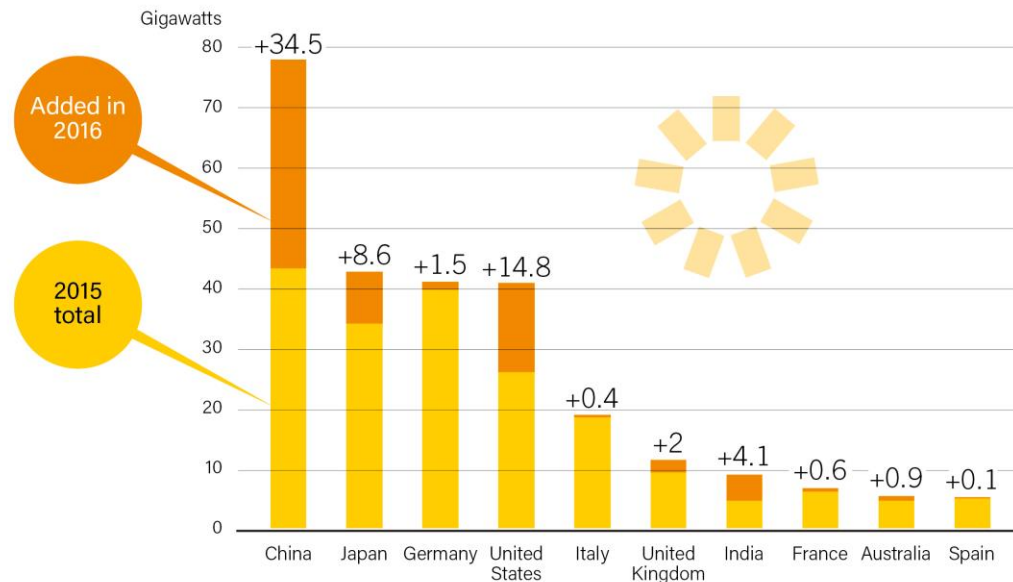
Solar PV Global Capacity, by Country and Region, 2006-2016



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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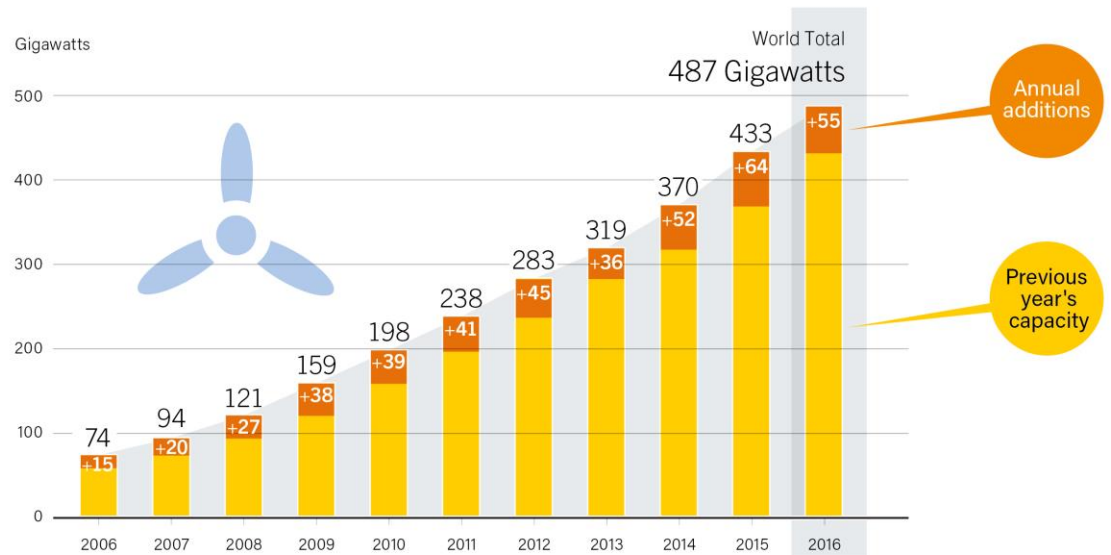


Wind Power

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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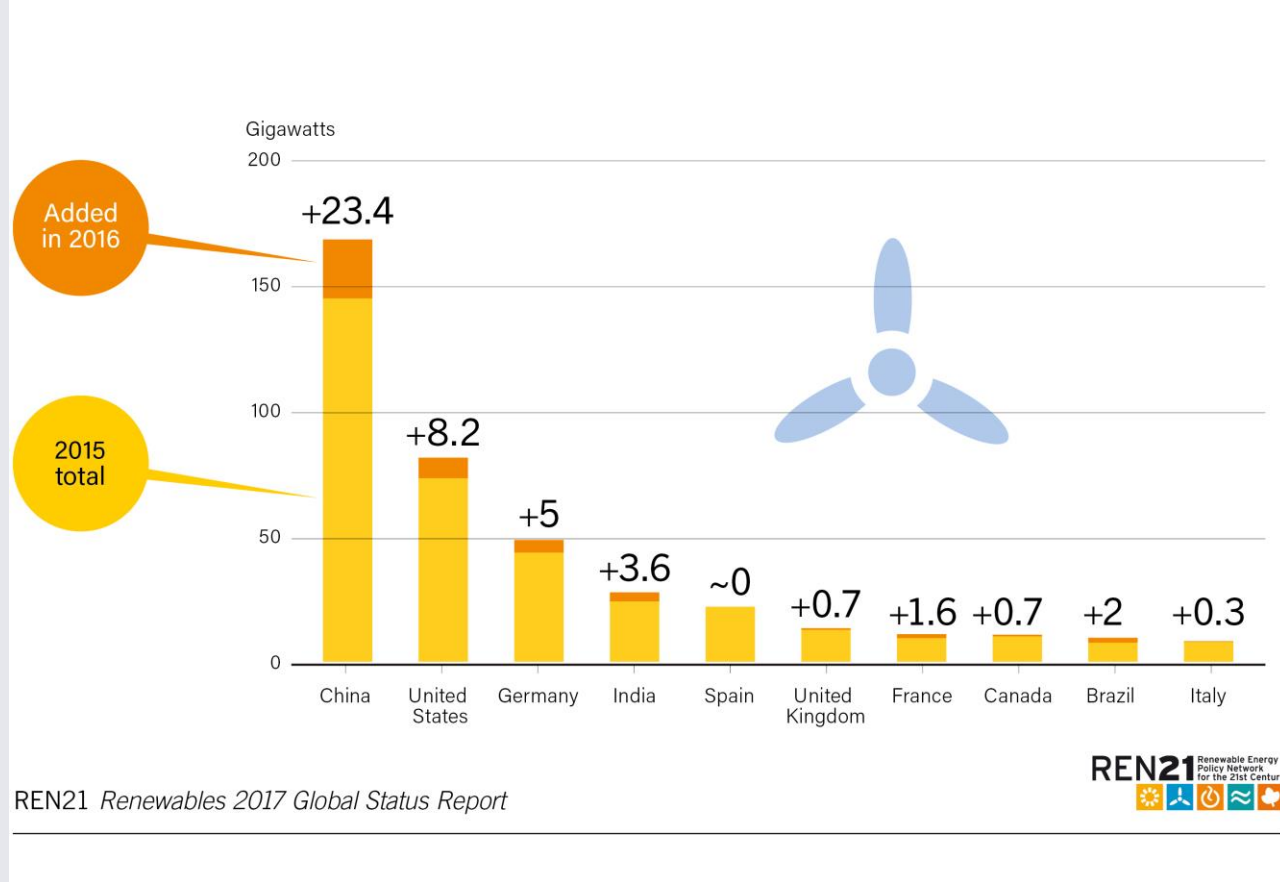


Wind Power

The global wind power market contracted in 2016

China added most new installations:
23.4 GW

Wind Power Capacity and Additions, Top 10 Countries, 2016



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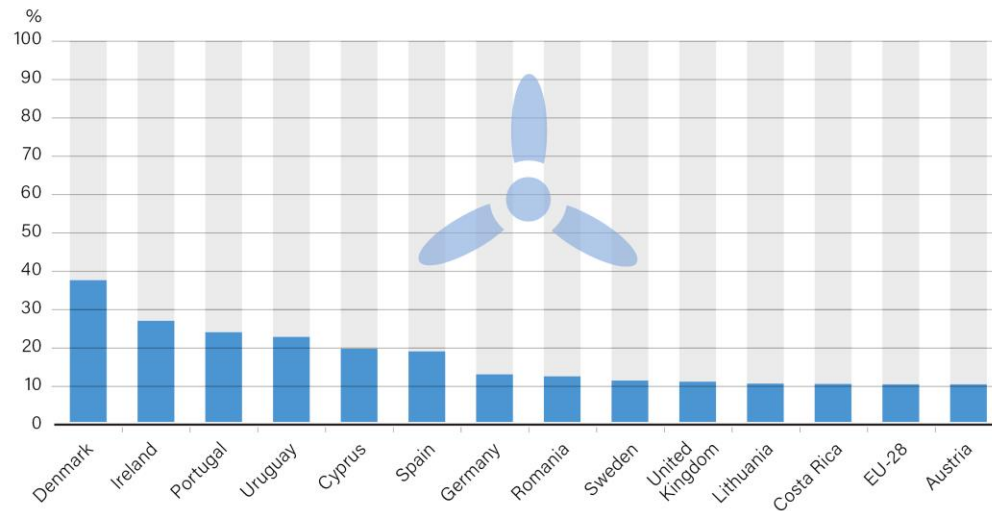


Wind Power

At least **24** countries met **5%** or more of their annual electricity demand with wind power

Enough global capacity to meet **4%** of total electricity consumption

Share of Electricity Demand Met by Wind Power, Selected Countries with over 10% and EU-28, 2016



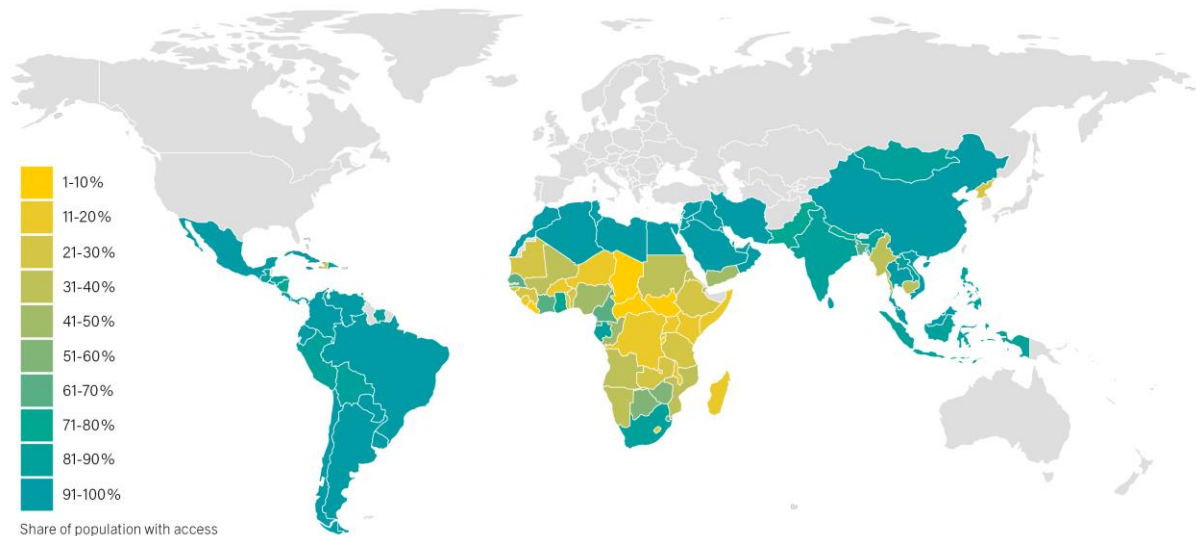
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Distributed Renewable Energy for Energy Access

16% of the global population lived **without electricity** - approx. 1.19 billion people

Electricity Access in Developing Countries, 2014



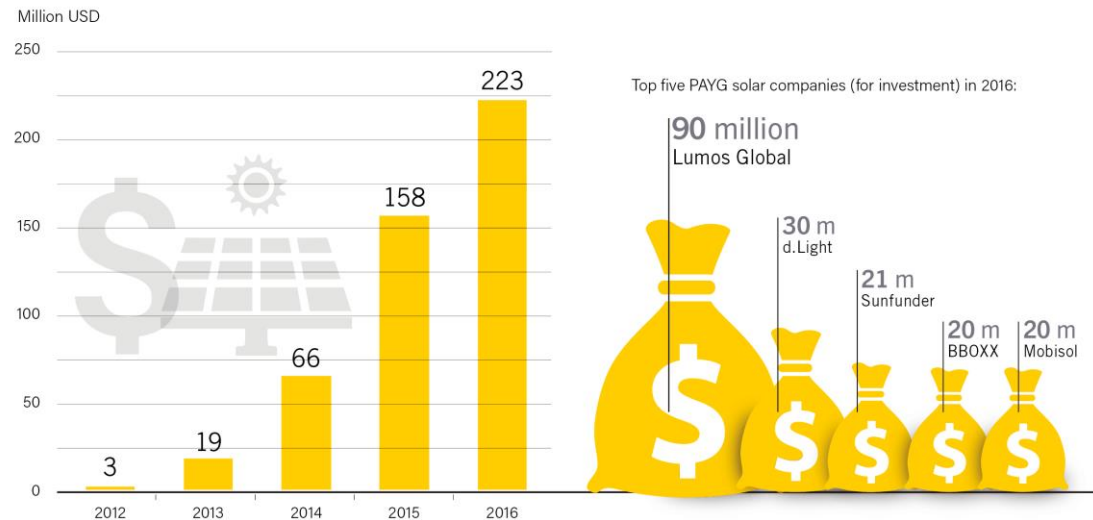
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Distributed Renewable Energy for Energy Access

USD 223 million raised by PAYG solar PV companies, an increase of about **40%** from 2015

Investment in Pay-As-You-Go Solar Companies, 2012-2016



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Enabling Technologies and Energy Systems Integration

Storage can provide **system benefits** and **flexibility** to customers, system managers and utilities

Can be applied from the **household level** to **utility-scale**

Storage Applications in Electric Power Systems



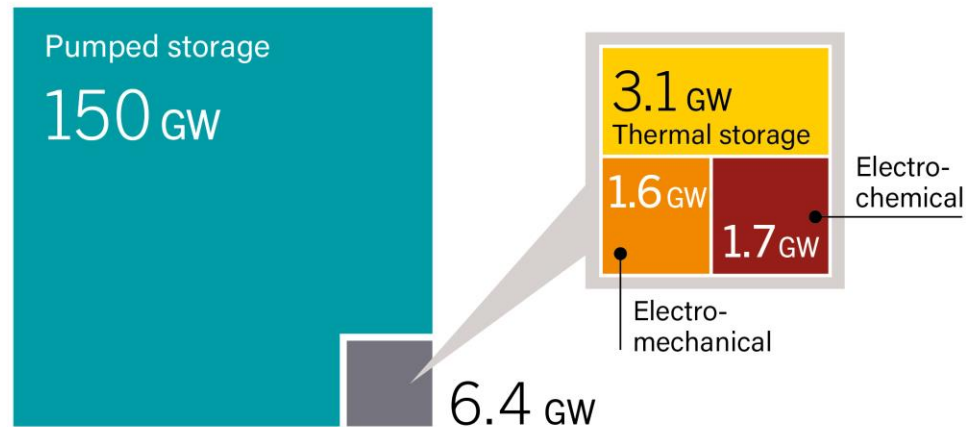
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Enabling Technologies and Energy Systems Integration

Global grid-connected and stationary energy storage capacity in 2016 totalled an estimated **156 GW**

Global Grid-Connected Energy Storage Capacity, by Technology, 2016



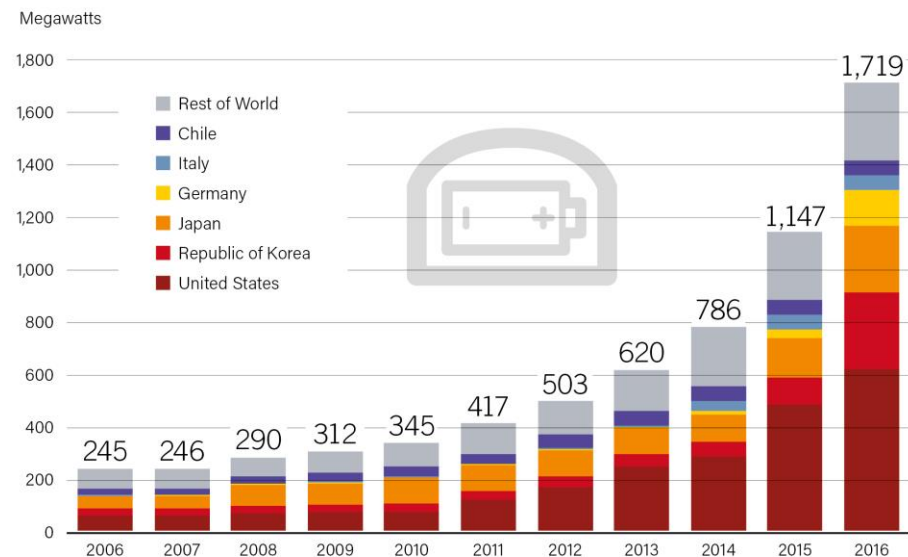
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Enabling Technologies and Energy Systems Integration

Grid-connected battery storage grew by **50%** in 2016

Global Grid-Connected Stationary Battery Storage Capacity, by Country, 2006-2016



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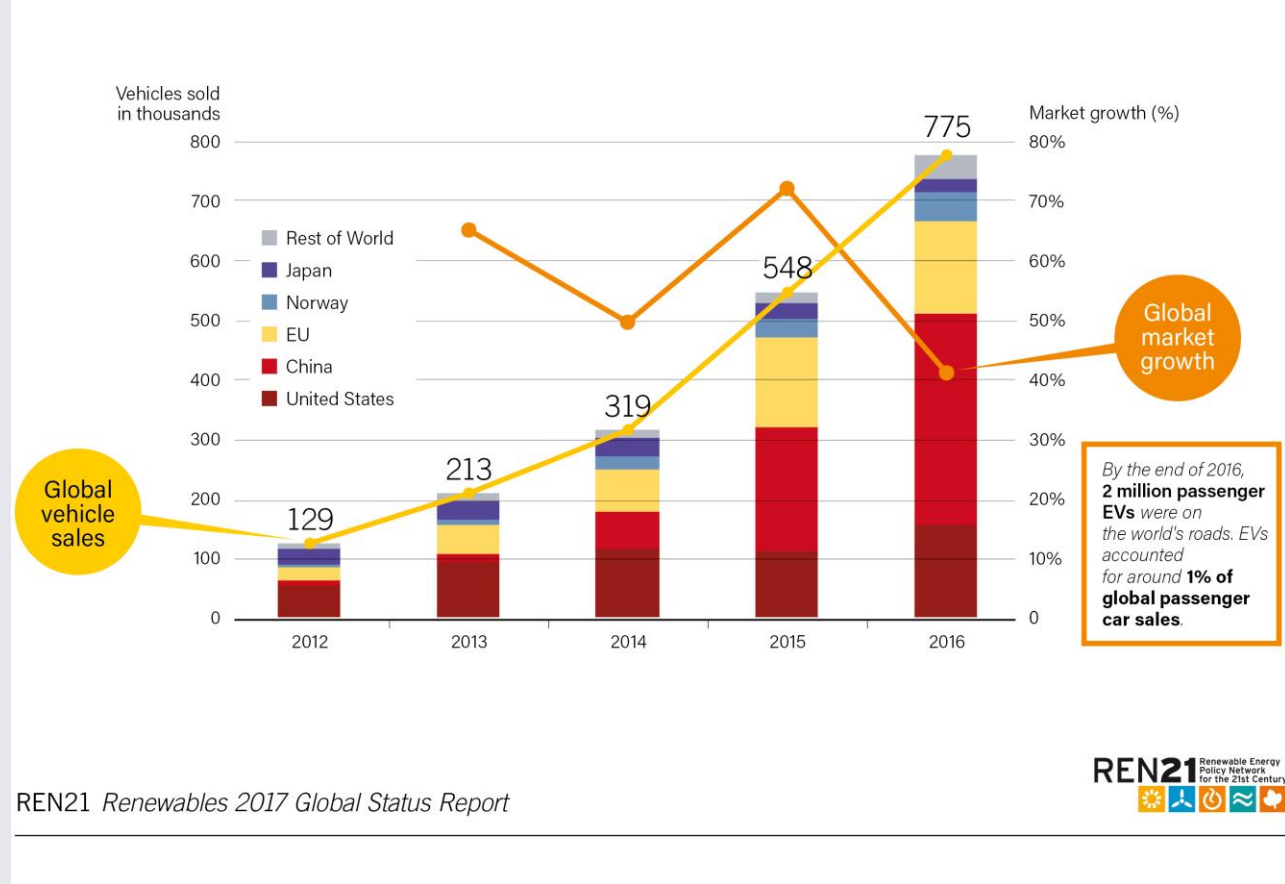
Enabling Technologies and Energy Systems Integration

Global sales of EVs reached **775,000 units**

More than **2 million passenger EVs** were on the world's roads by year's end (1% of the light vehicle market)

So far, little linking of renewable energy and electric mobility

Global Passenger Electric Vehicle Market (Including PHEVs), 2012-2016



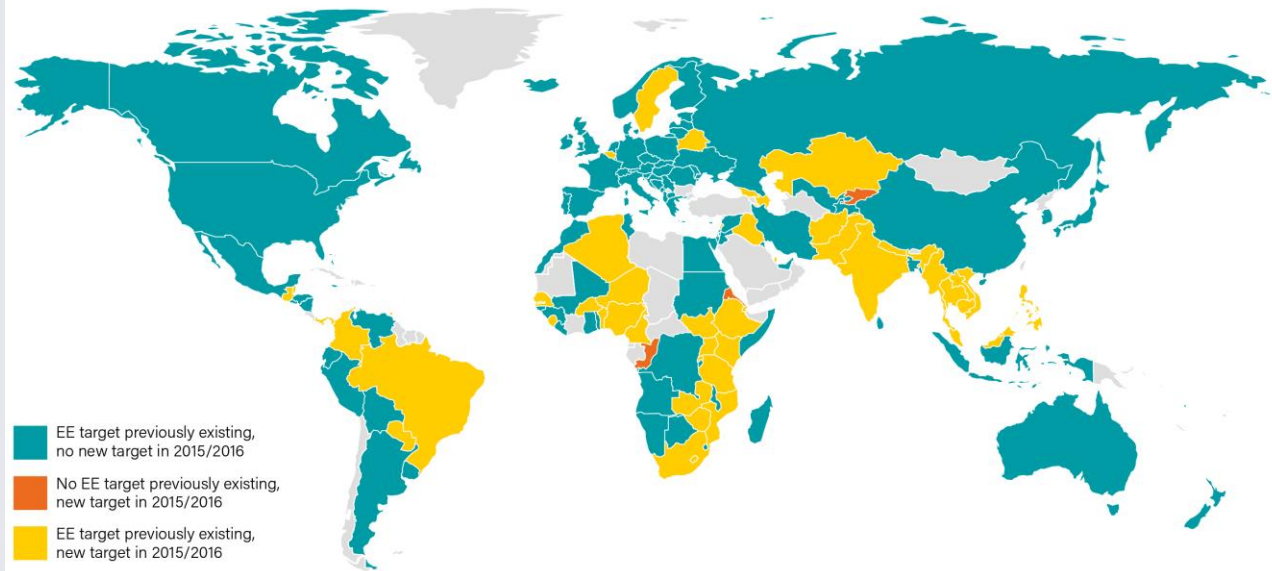
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Energy Efficiency

By end-2016, at least **149** countries had enacted one or more energy efficiency targets.

Of these countries, **56** adopted a new target in 2015 or 2016

Countries with Energy Efficiency Targets, 2016



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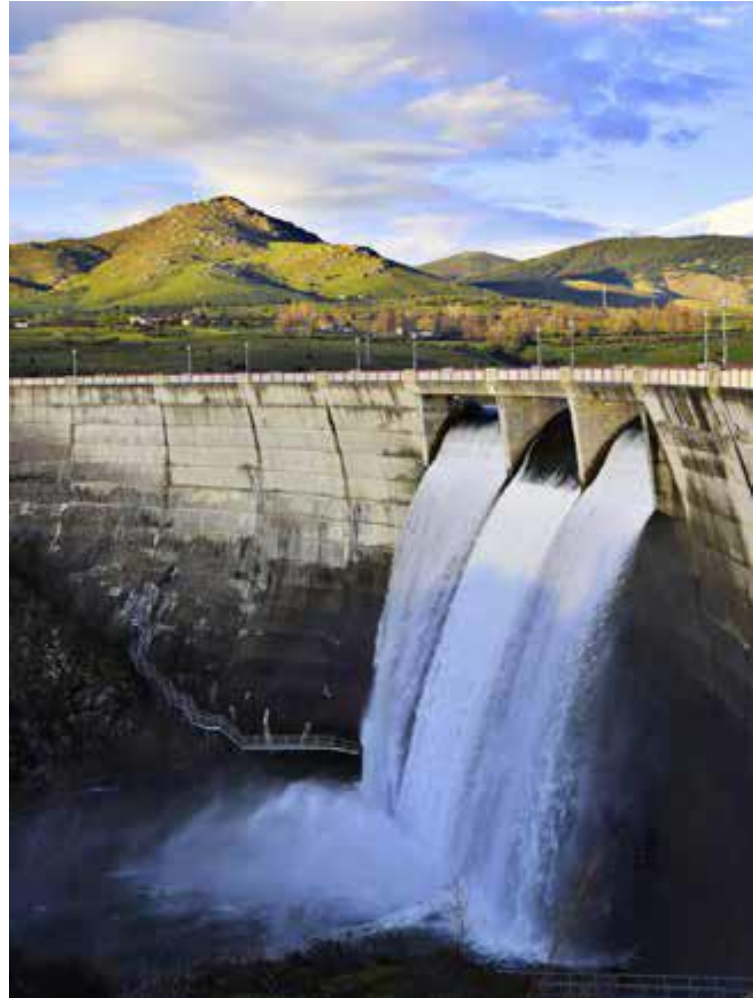


Source: REN21 Policy Database.



Feature: Deconstructing Baseload

- Traditional baseload generators such as coal and nuclear are beginning to lose their economic advantage and may no longer be the first to dispatch energy.
- A number of countries and regions – including **Denmark, Germany, Uruguay and Cabo Verde** – have integrated high shares (from **20-40%**) of variable renewable energy.



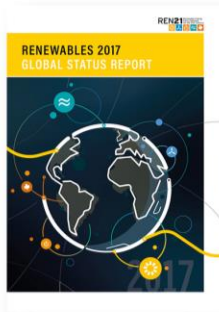
Conclusions

- **Record installed capacity, however progress not fast enough to reach Paris Agreement goals**
- Fossil fuels must be left in the ground
- Focus on dispatchable renewable energy & flexibility options to integrate high-shares of renewables – shift away from baseload
- Increased effort to speed up sustainable energy access
- Policy matters: system approach needed for linking power, heating and cooling as well as transport sector
- More use of enabling technologies such as storage, EVs, etc.

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