

# RENEWABLES 2017

## GLOBAL STATUS REPORT



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**ENERGY TRANSITION:  
THE NEW PARADIGM  
EU-RUSSIA ENERGY AND  
CLIMATE CONFERENCE**  
Moscow, 29<sup>th</sup> June 2017

2017

**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

**Industry Associations:**

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

**Science & Academia:**

Fundacion Bariloche, IIASA, ISES,  
NREL, SANEDI, TERI,

**International Organisations:**

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

**National Governments:**

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



# 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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# GSR2017 HIGHLIGHTS in RUSSIAN



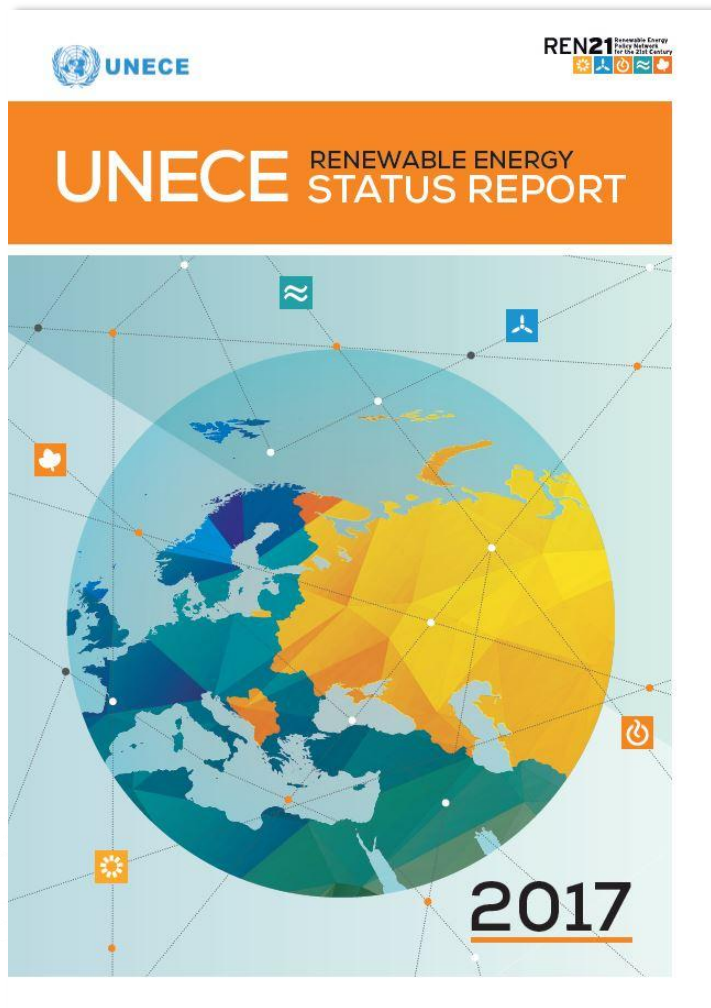
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# UNECE Renewable Energy Status Report 2017



- Detailed look at the status of renewable energy in select 17 countries in the UNECE region
- 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



- 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











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

- 176 countries had **renewable energy targets**, renewable energy has become global phenomenon.
- **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 CO<sub>2</sub> emissions** from the energy sector remained stable despite a 3% growth in the global economy and an increased demand for energy.
- Cities, regions and corporations commit to 100 % RE targets.

# 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%**

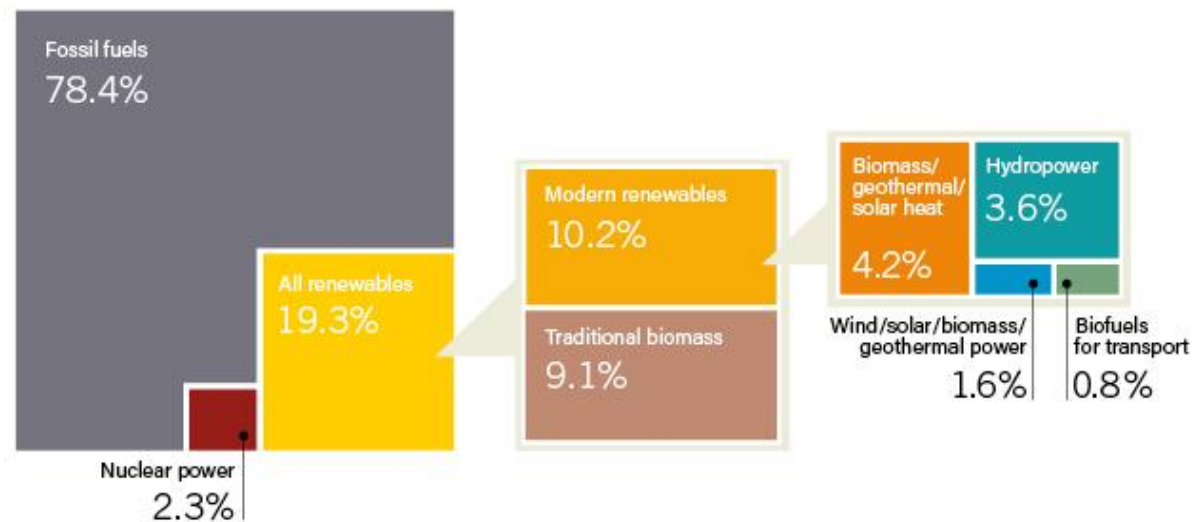
		2015	2016
<b>INVESTMENT</b>			
New investment (annual) in renewable power and fuels <sup>1</sup>	billion USD	312.2	241.6
<b>POWER</b>			
Renewable power capacity (total, not including hydro)	GW	785	921
Renewable power capacity (total, including hydro)	GW	1,856	2,017
 Hydropower capacity <sup>2</sup>	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
<b>HEAT</b>			
 Solar hot water capacity <sup>3</sup>	GW <sub>th</sub>	435	456
<b>TRANSPORT</b>			
 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 “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)	<b>China</b>	United States	United Kingdom	Japan	Germany
Investment in renewable power and fuels per unit GDP <sup>1</sup>	<b>Bolivia</b>	Senegal	Jordan	Honduras	Iceland
 Geothermal power capacity	<b>Indonesia</b>	Turkey	Kenya	Mexiko	Japan
 Hydropower capacity	<b>China</b>	Brazil	Ecuador	Ethopia	Vietnam
 Solar PV capacity	<b>China</b>	United States	Japan	India	United Kingdom
 Concentrating solar thermal power (CSP) capacity <sup>2</sup>	<b>South Africa</b>	China	–	–	–
 Wind power capacity	<b>China</b>	United States	Germany	India	Brazil
 Solar water heating capacity	<b>China</b>	Turkey	Brazil	India	United States
 Biodiesel production	<b>United States</b>	Brazil	Argentina/Germany/Indonesia		
 Fuel ethanol production	<b>United States</b>	Brazil	China	Canada	Thailand



# Renewable Energy “Champions”

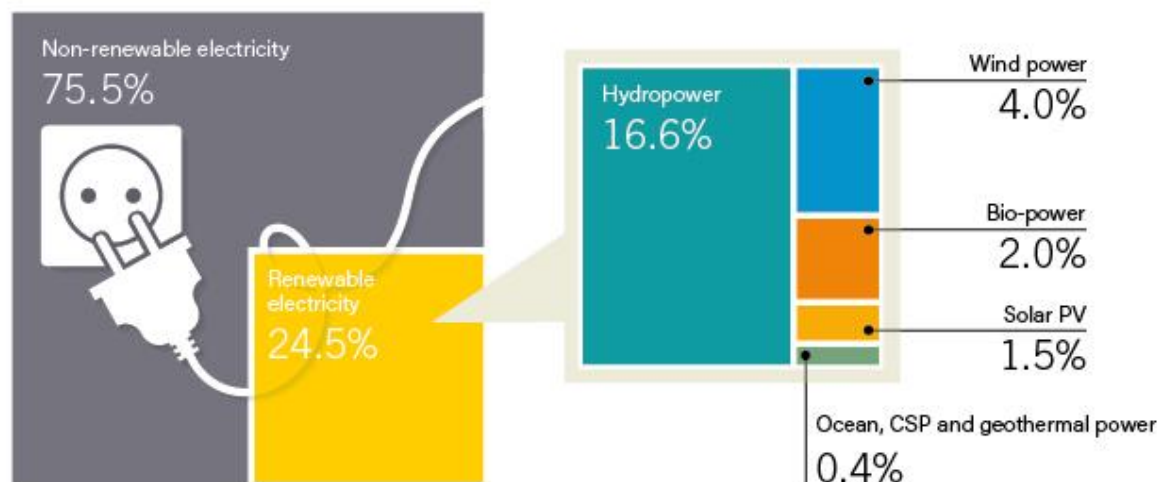
Total capacity or generation as of end-2016

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

# Power Sector

By year's end, renewables comprised an estimated **30%** of the world's power generating capacity and **24.5%** of global electricity demand

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 transportfuel 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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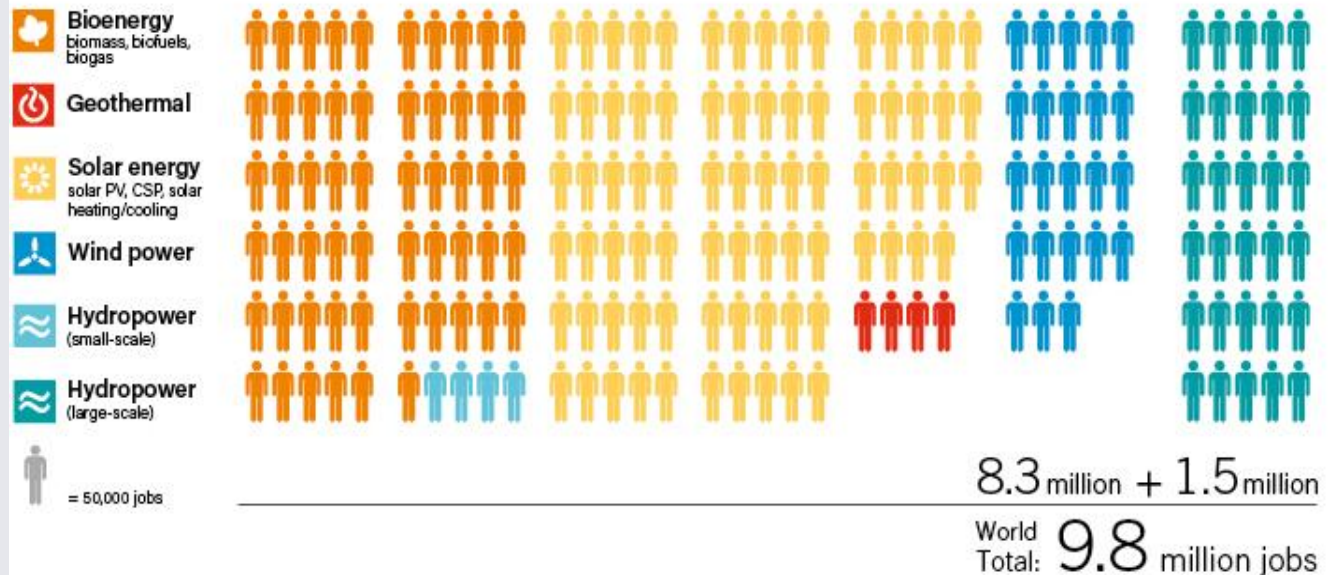
Source: REN21 Policy Database.

# 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.

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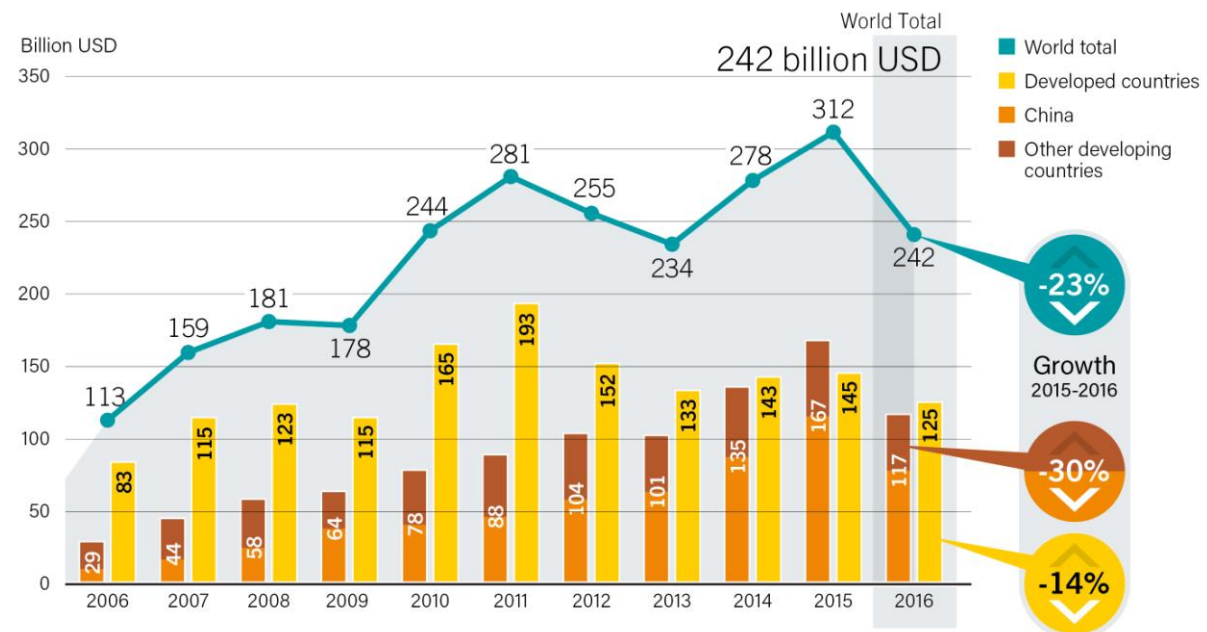


# Global Investment in Renewable Energy

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

Developing/emerging economies invest nearly as much in renewables as developed countries

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



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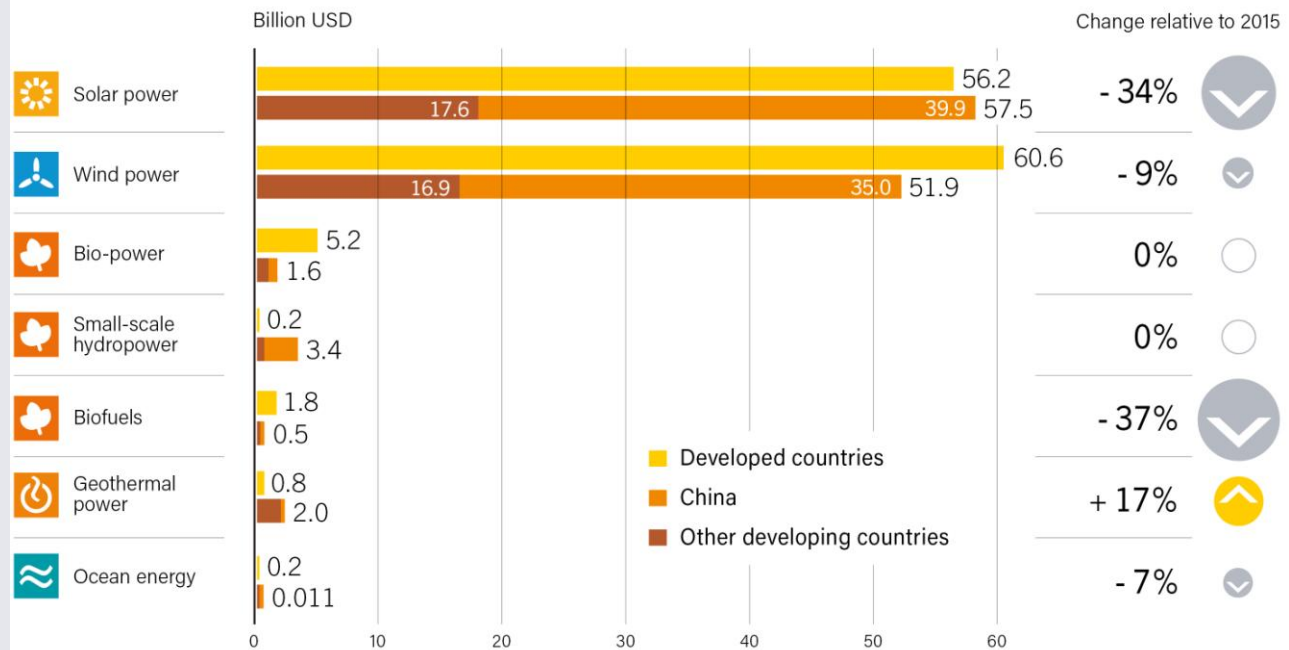
Source: BNEF.

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# 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



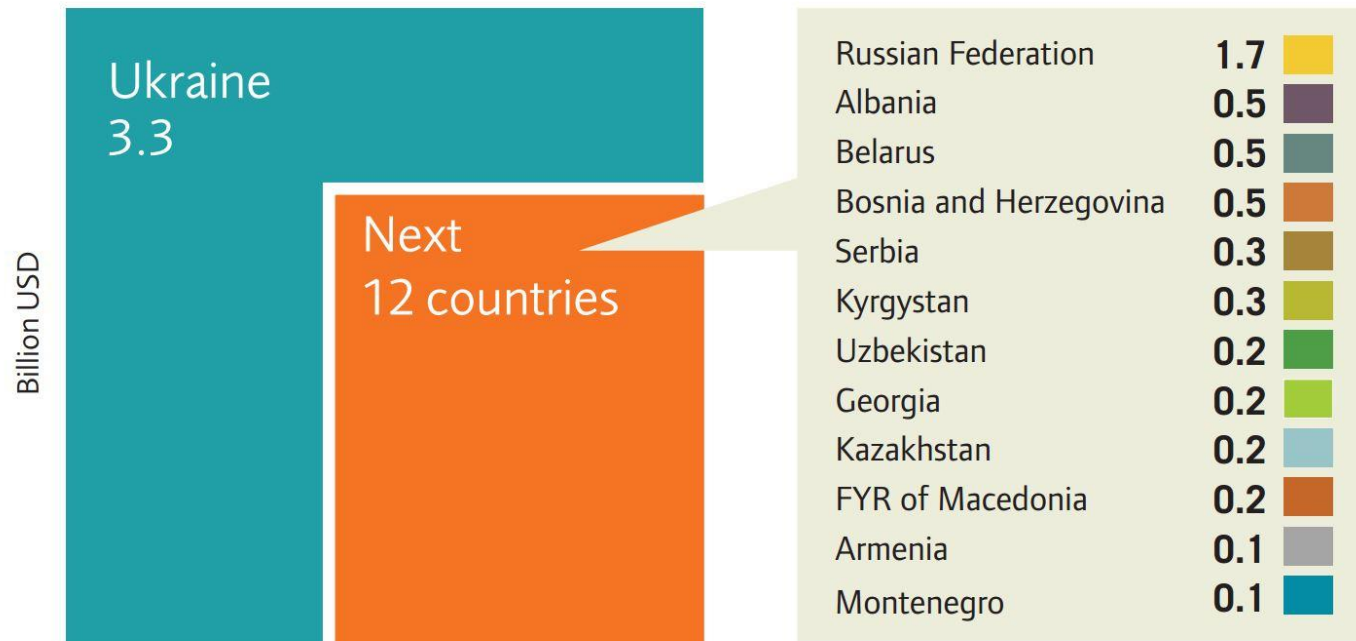
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Source: BNEF.



# Investment flows in UNECE (17)

## Renewable Energy Investment Overview, 2004 – 2014 – selected countries



- Investment is unevenly distributed (regionally and by sector)
- Funding sources mainly originating in national governments, international donors and multilateral development banks.

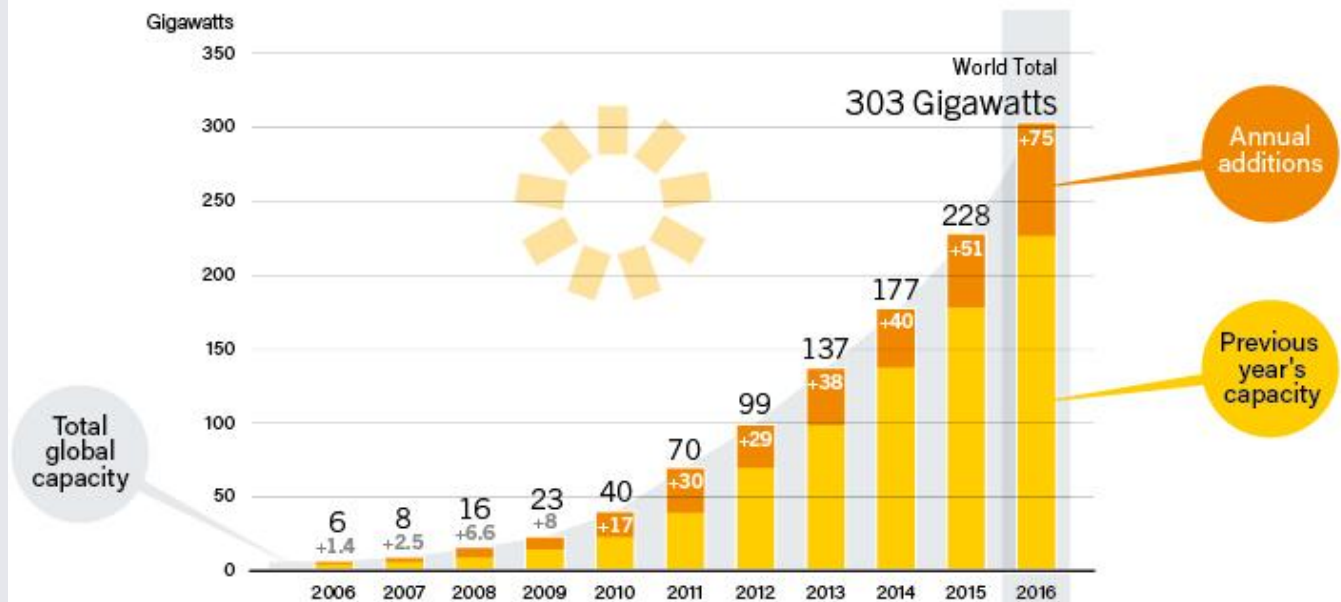


# Solar PV

**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



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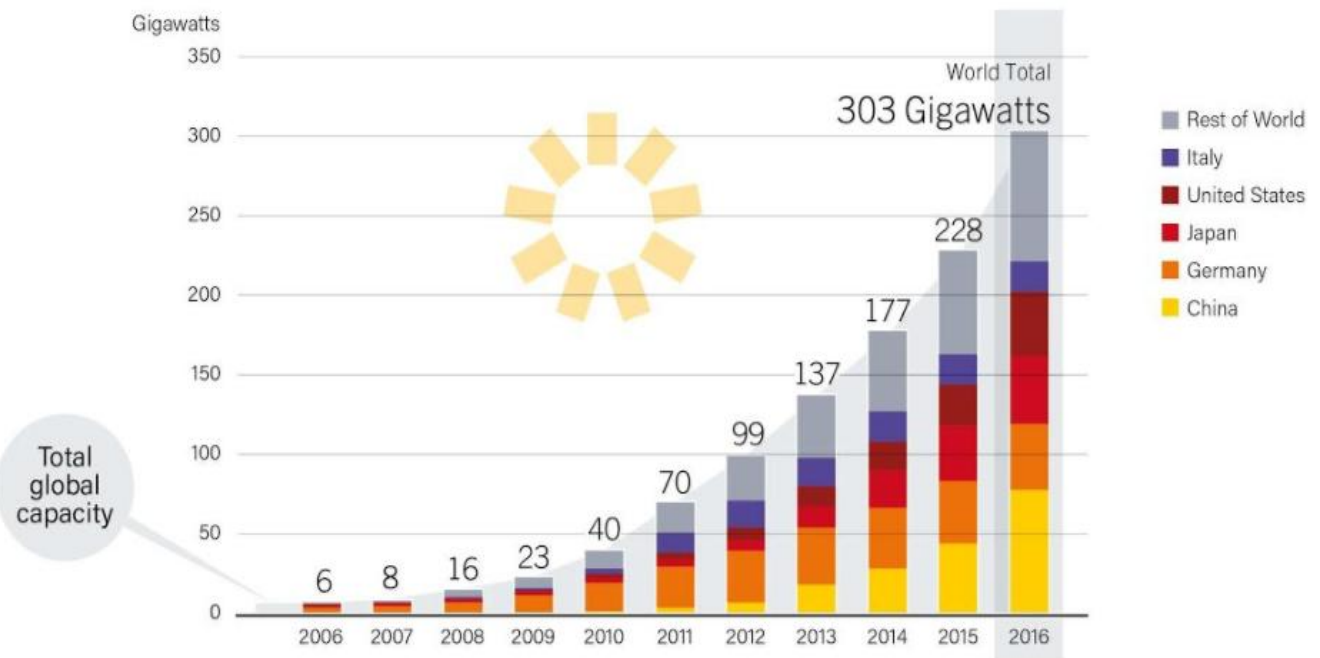


# Solar PV

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



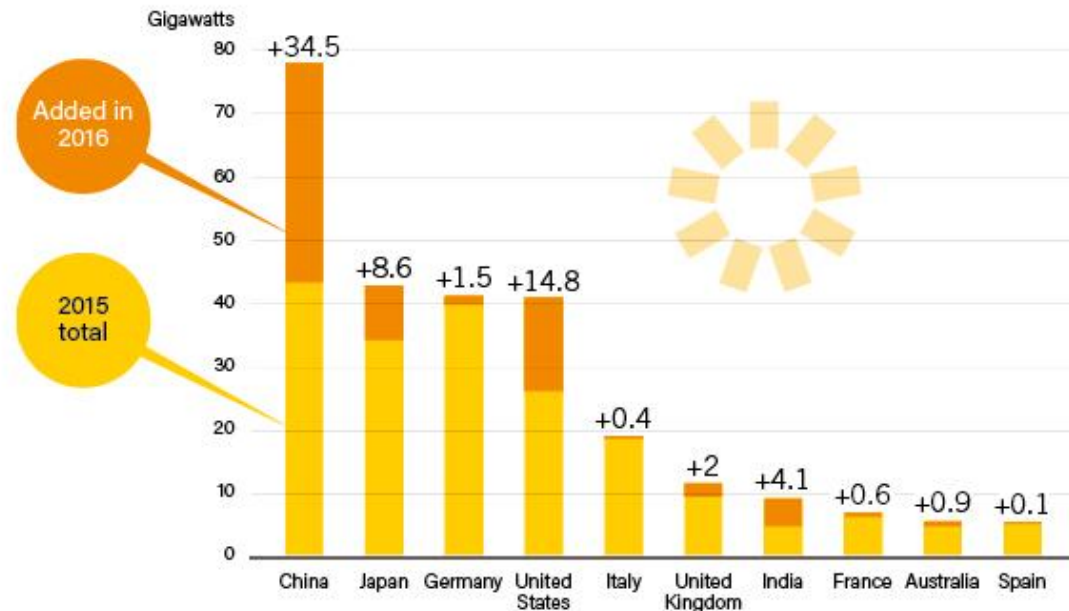
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# Solar PV

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

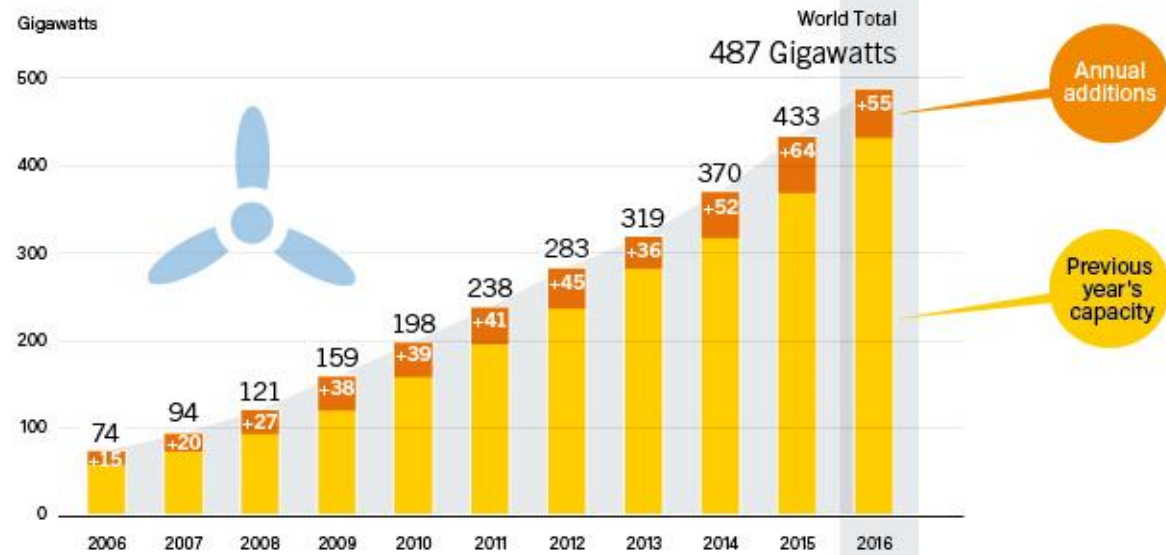


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# Wind Power

Wind Power Global Capacity and Annual Additions, 2006-2016



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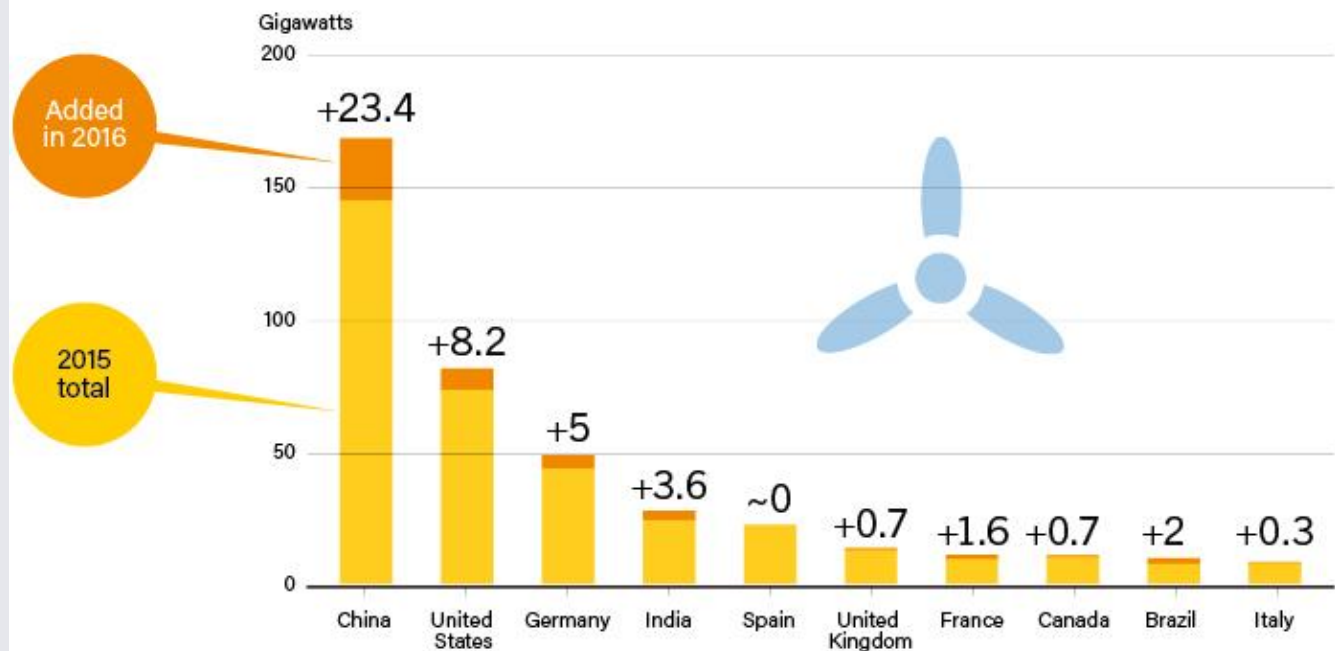


# Wind Power

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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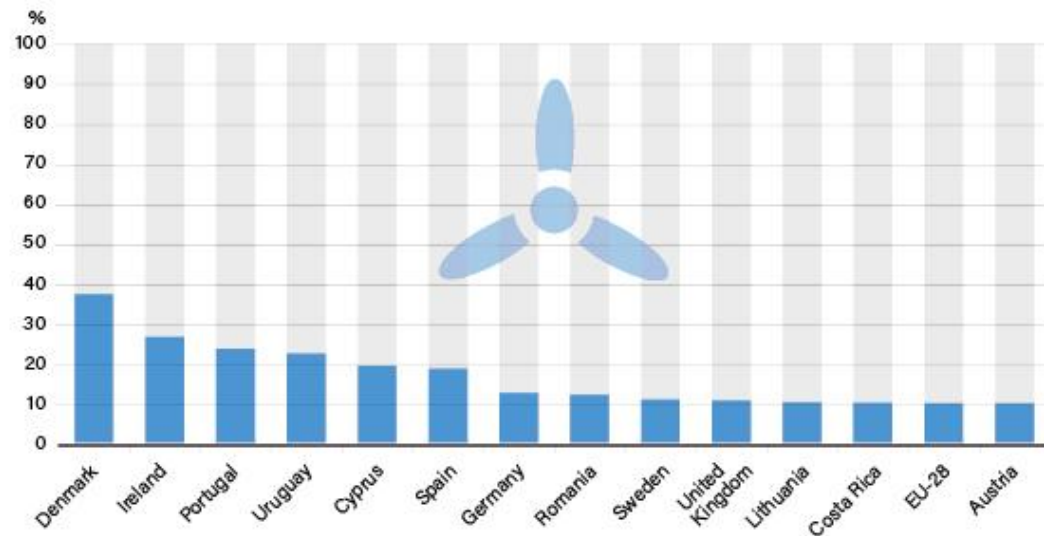


# Wind Power

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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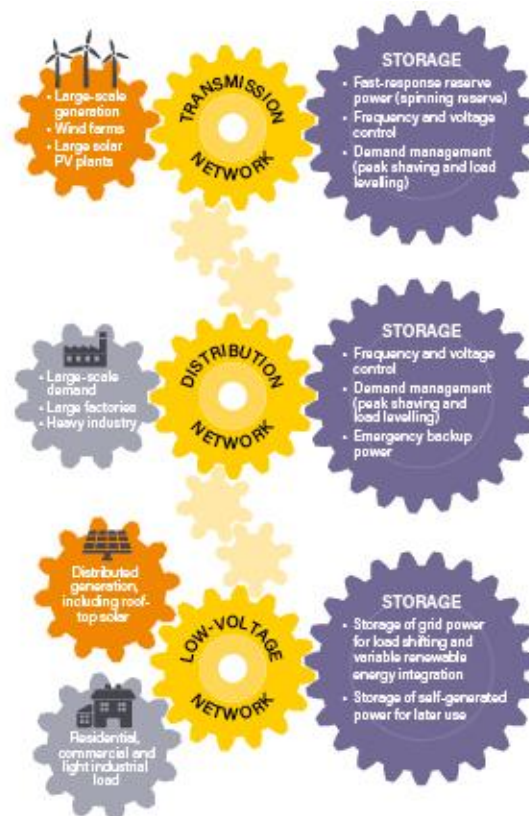


# Enabling Technologies and Energy Systems Integration

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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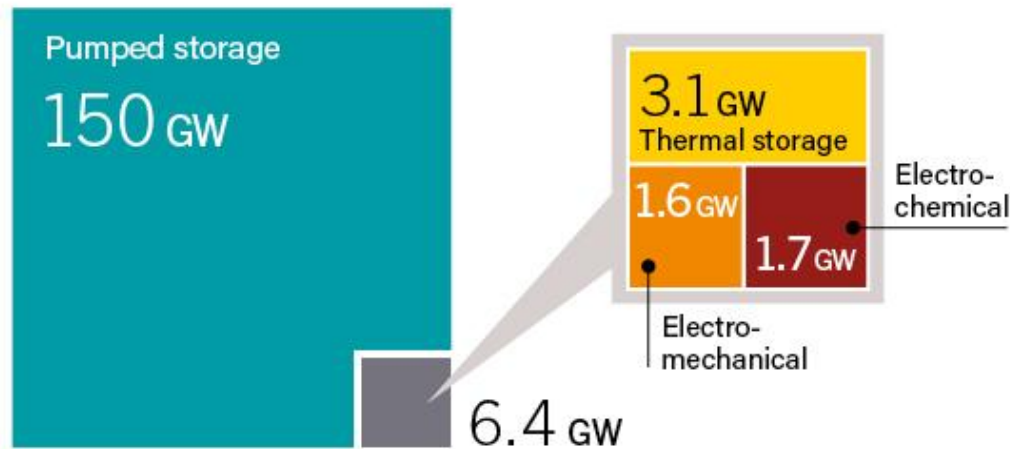
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# Enabling Technologies and Energy Systems Integration

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

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



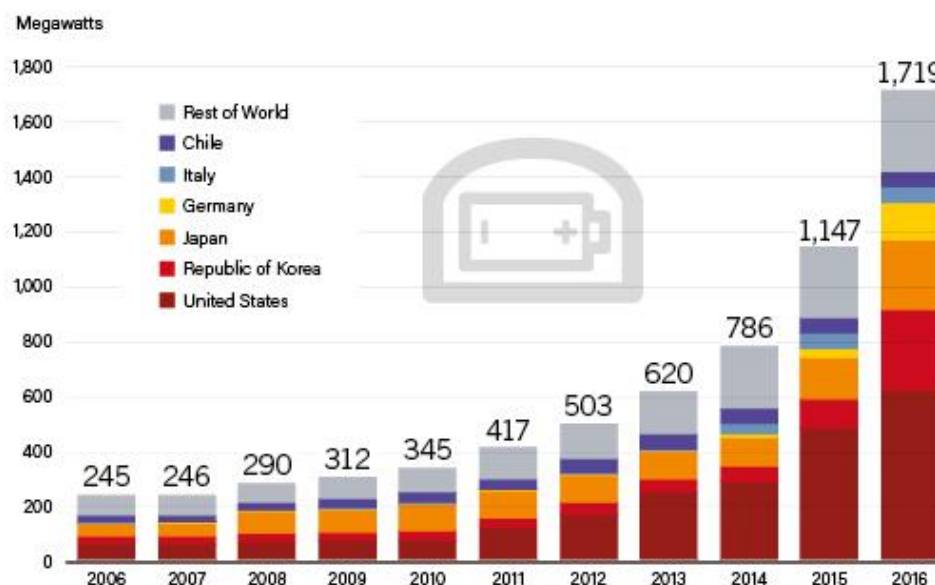
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# Enabling Technologies and Energy Systems Integration

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

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



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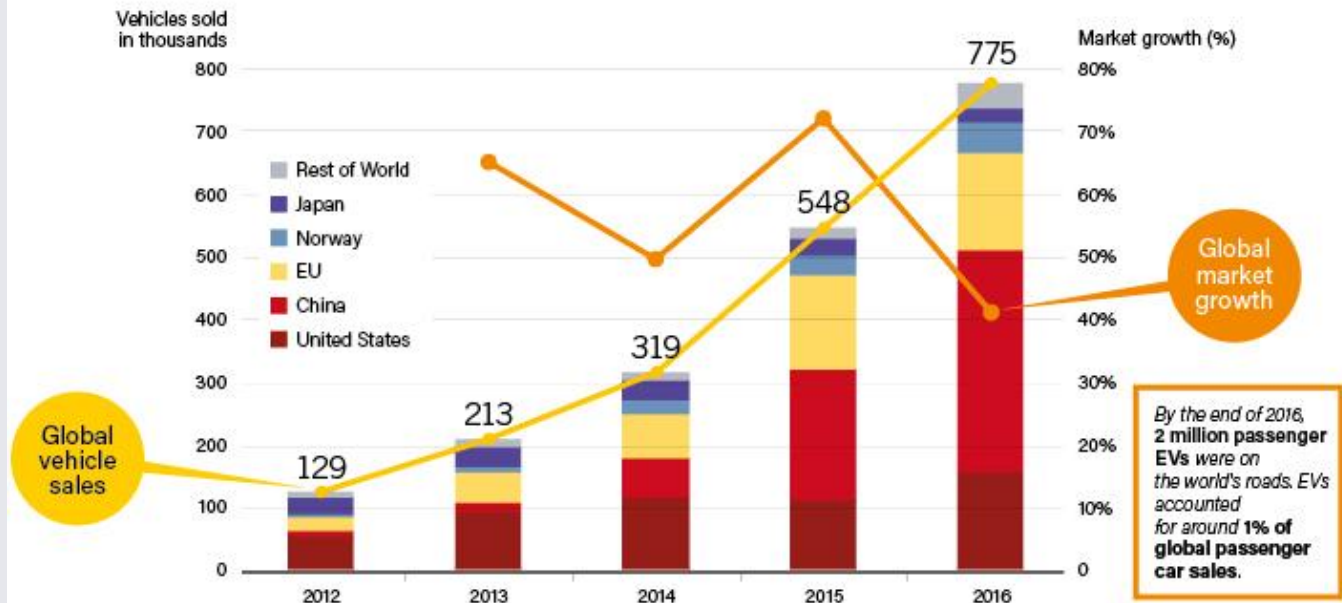
# Enabling Technologies and Energy Systems Integration

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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# Conclusions

- Global renewable energy transition advancing with record capacity additions and rapidly falling costs – more capacity installed for less money
- **However, progress not fast enough to reach Paris Agreement goals**
- Better-integrated sectoral planning (electricity, heating and cooling, transport)
- Smarter, more flexible systems integrating variable renewables
- More use of enabling technologies
- Meteorology increasingly important as the share of variable renewables increases

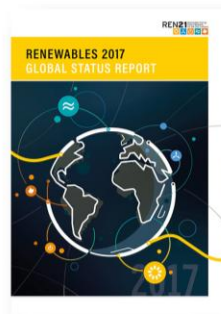


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