

# RENEWABLES 2018

## GLOBAL STATUS REPORT



**Rana Adib**  
Executive Secretary

ISES/REN21 Webinar  
5 July 2018

2018

**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:**

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

**Science & Academia:**

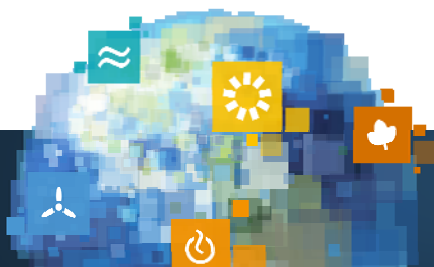
Fundacion Bariloche, IIASA, ISES, NREL, SANEDI, TERI

**International Organisations:**

ADB, APERC, ECREEE, EC, GEF, IEA, IEC, IRENA, RCREEE, UNDP, UN Environment, UNIDO, World Bank

**National Governments:**

Afghanistan, Brazil, Denmark, Germany, India, Mexico, South Africa, Spain, UAE, USA



# Renewables Global Status Report



**Collaborative annual reporting since 2005 building on international expert community. The report features:**

- 01.** Global Overview
- 02.** Policy Landscape
- 03.** Market & Industry Trends
- 04.** Distributed Renewables for Energy Access
- 05.** Investment Flows
- 06.** Energy Systems Integration and Enabling Technologies
- 07.** Energy Efficiency
- 08.** Feature: Corporate Sourcing of Renewables

## REN21 COMMUNITY INVOLVEMENT IN GSR:



**60%** new experts in the community every year



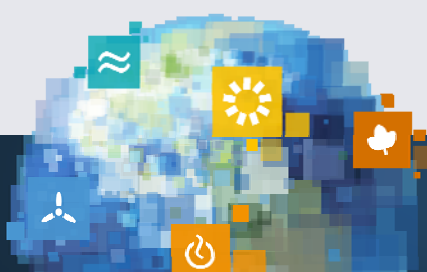
**40%** have been involved at least twice



Over **900** experts internationally



**400** experts actively involved in 2018 edition



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Policy Network  
for the 21st Century



# Another Extraordinary Year for Renewable Energy

- **Total global capacity:** almost **9%** compared to 2016, **2,195 GW** at year's end (**1,081 GW** not incl. hydro)
- **Share in newly installed renewable power capacity:**
  - Solar PV: 55%
  - Wind: 29%
  - Hydropower: 11%
  - Bio-power: 4.6%

## RENEWABLE ENERGY INDICATORS 2017

		2016	2017
<b>INVESTMENT</b>			
New investment (annual) in renewable power and fuels <sup>1</sup>	billion USD	274	<b>279.8</b>
<b>POWER</b>			
Renewable power capacity (including hydro)	GW	2,017	<b>2,195</b>
Renewable power capacity (not including hydro)	GW	922	<b>1,081</b>
Hydropower capacity <sup>2</sup>	GW	1,095	<b>1,114</b>
Bio-power capacity	GW	114	<b>122</b>
Bio-power generation (annual)	TWh	501	<b>555</b>
Geothermal power capacity	GW	12.1	<b>12.8</b>
Solar PV capacity <sup>3</sup>	GW	303	<b>402</b>
Concentrating solar thermal power (CSP) capacity	GW	4.8	<b>4.9</b>
Wind power capacity	GW	487	<b>539</b>
Ocean energy capacity	GW	0.5	<b>0.5</b>
<b>HEAT</b>			
Solar hot water capacity <sup>4</sup>	GW <sub>th</sub>	456	<b>472</b>
<b>TRANSPORT</b>			
Ethanol production (annual)	billion litres	103	<b>106</b>
FAME biodiesel production (annual)	billion litres	31	<b>31</b>
HVO production (annual)	billion litres	5.9	<b>6.5</b>

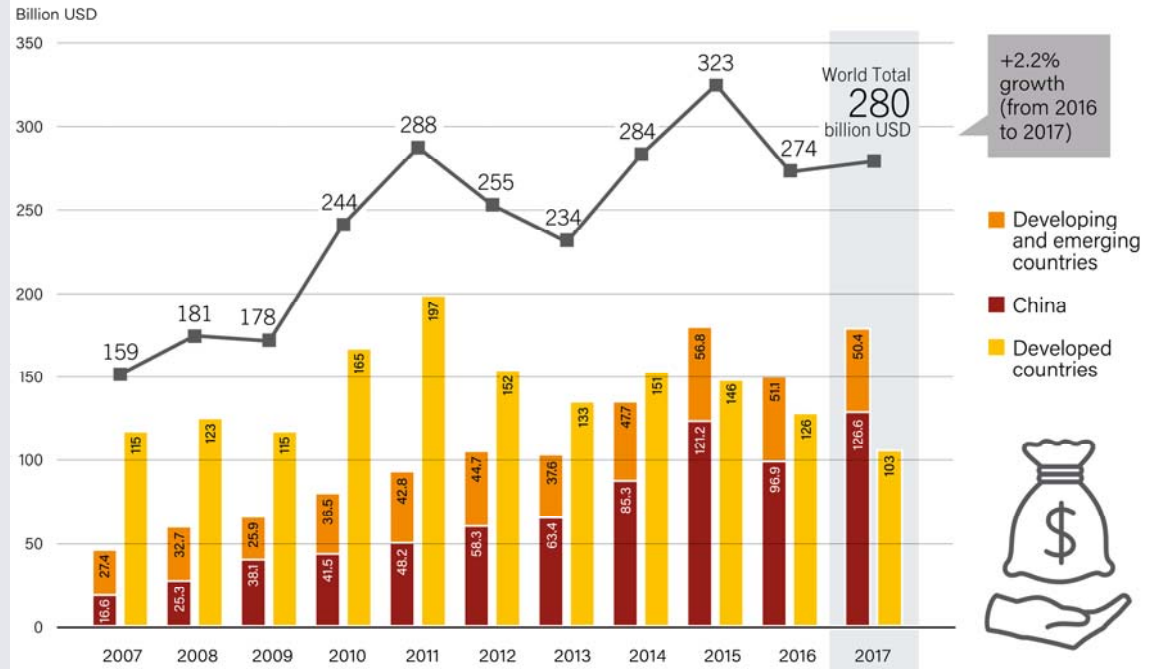
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# Global Investment in Renewable Energy


- Global new investment in renewable power and fuels in 2017: **USD 279.8 billion (+2%)** (USD 319.8 billion incl. large hydropower)
- Investment in new renewable power capacity was roughly **three times** that in new fossil fuel capacity

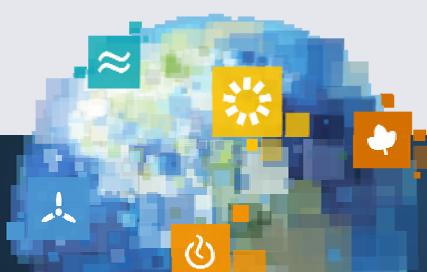
Global New Investment in Renewable Power and Fuels in Developed, Emerging and Developing Countries, 2007-2017



Source: BNEF

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 USD 2.4 billion

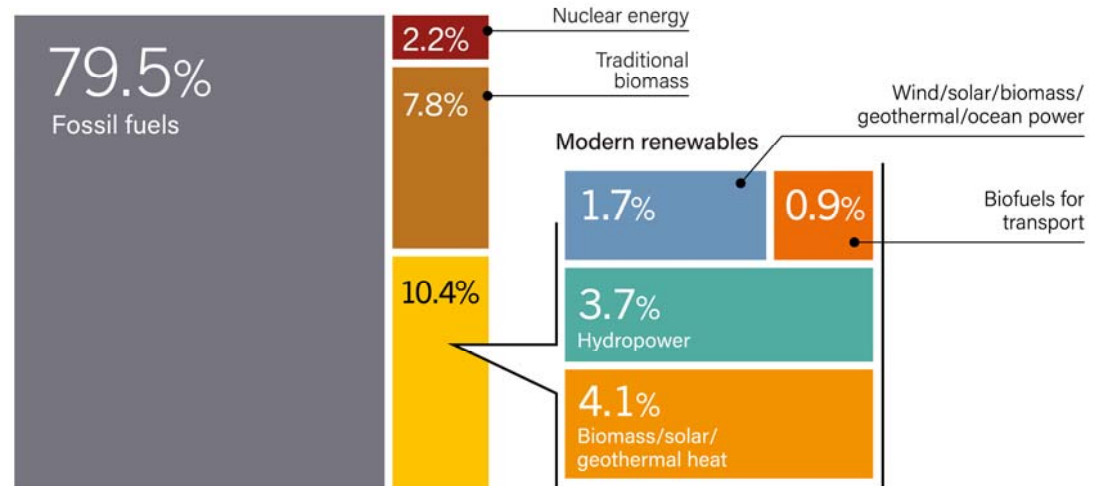


# Renewable Energy in Total Final Energy Consumption

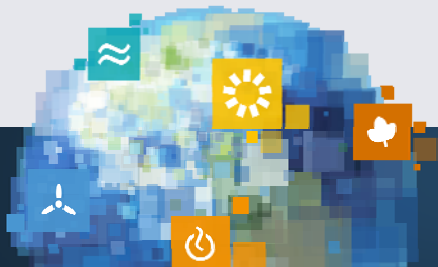
→ As of **2016**, renewable energy provided **18.2%** (est.) of **global final energy consumption**

- **10.4% modern renewables** (+0.2% compared to 2015)
- **7.8% traditional biomass** (-2.4% than 2015)

Estimated Renewable Share of Total Final Energy Consumption, 2016



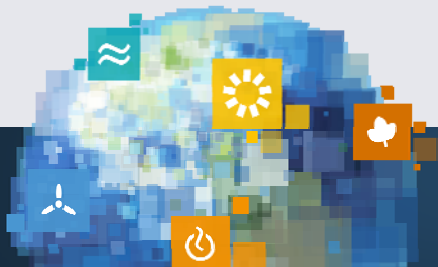
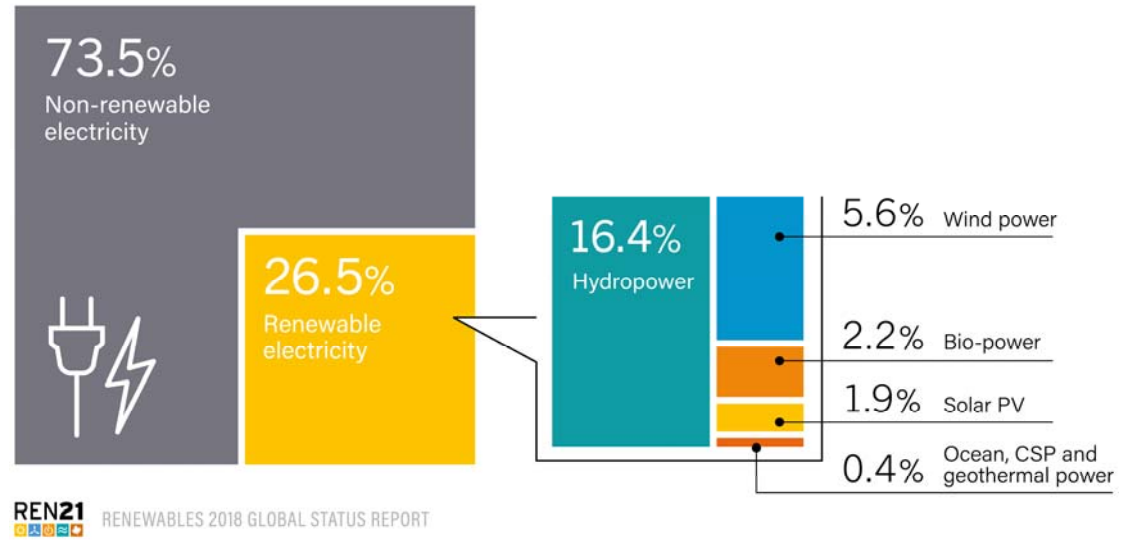
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# Power Sector

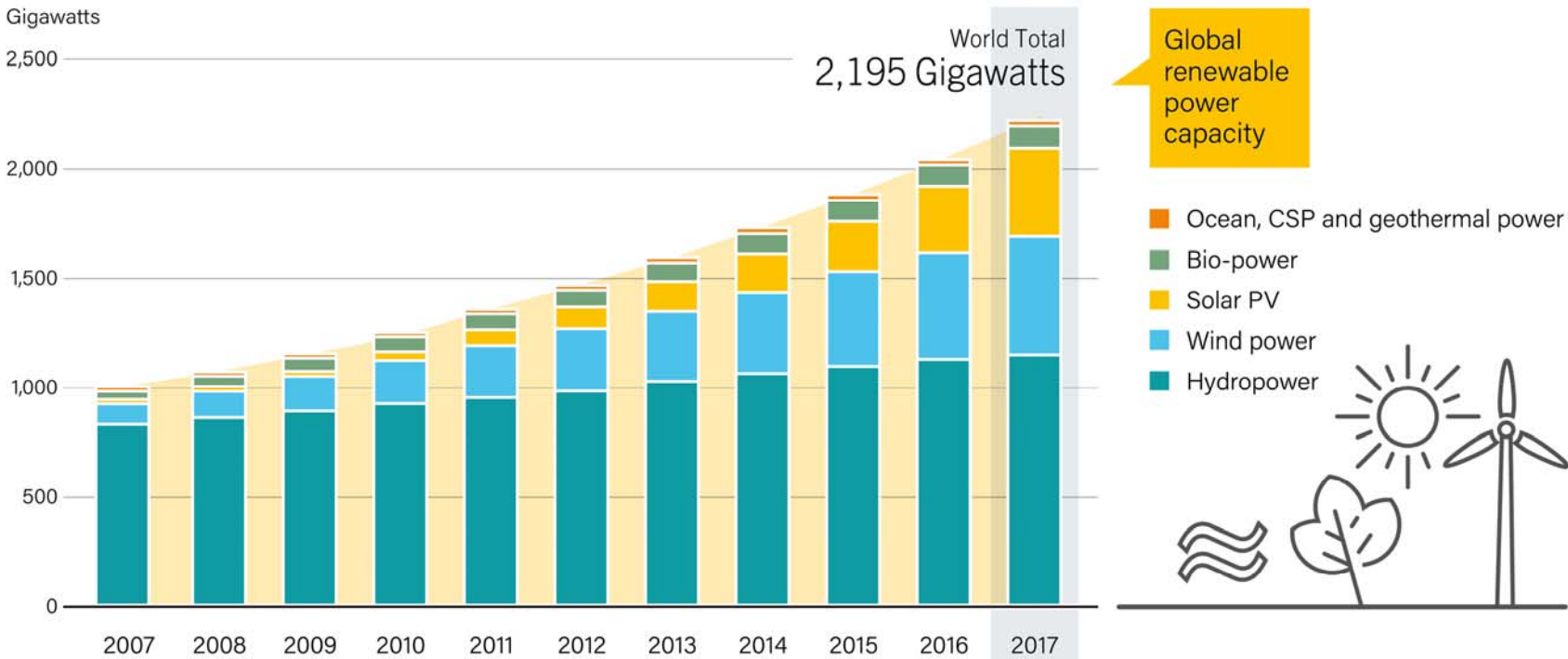
- In 2017, renewables accounted for: **70% of net additions** to global power generation capacity
- RE supplied an estimated **26.5% of global electricity**
- **Progress in the power sector shows that the transition to renewable energy is possible!**

Estimated Renewable Energy Share of Global Electricity Production, End-2017



# Global Renewable Power Capacity

Global Renewable Power Capacity, 2007-2017



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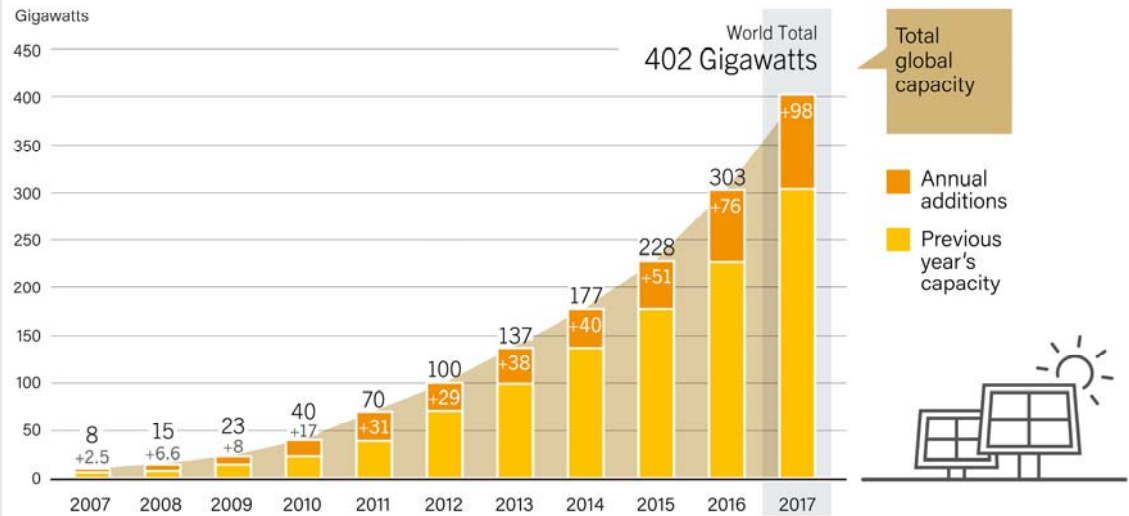
REN21 Renewable Energy Policy Network for the 21st Century



# Solar PV

- **98 GW** of solar PV capacity added in 2017
- Global total increased **33% to 402 GW** (40,000 PV panels every hour)
- **More solar PV was installed than the net capacity additions of fossil fuels and nuclear power combined**

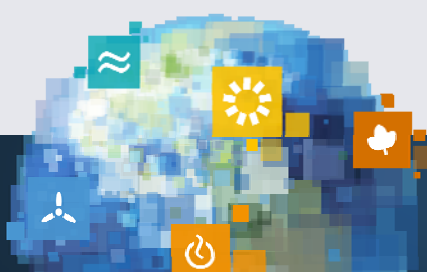
Solar PV Global Capacity and Annual Additions, 2007-2017



Source: IEA PVPS

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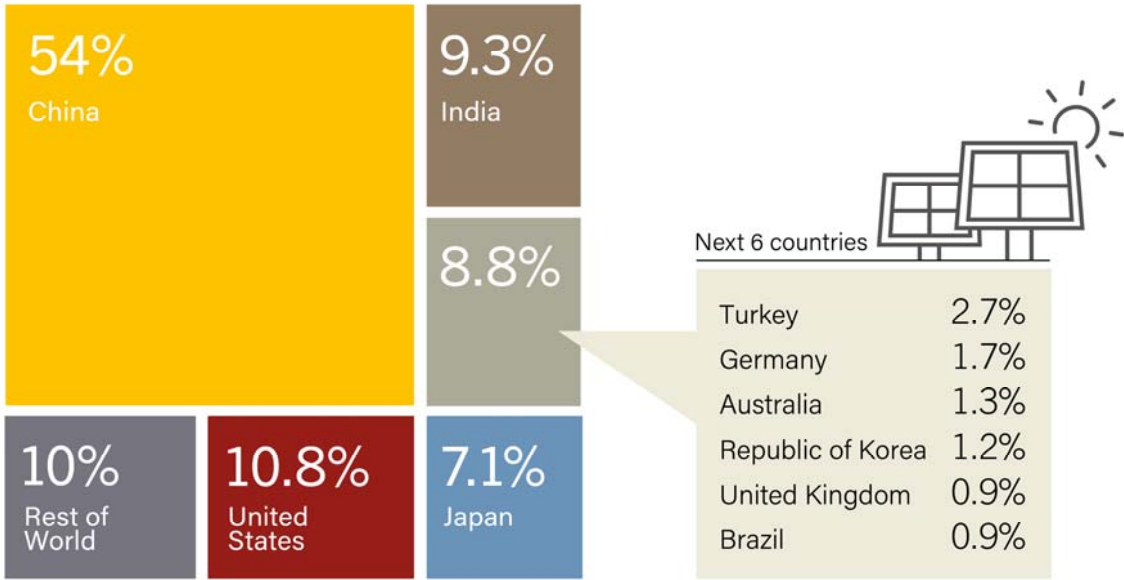
 0.9 GW added, 8.1 GW total



# Solar PV

- **China added 53.1 GW in 2017, more than was added worldwide in 2015, increasing its total solar PV capacity to 131.1 GW**
- **China reached its 2020 target for solar installations in 2017**

Solar PV Global Capacity Additions, Shares of Top 10 Countries and Rest of World, 2017



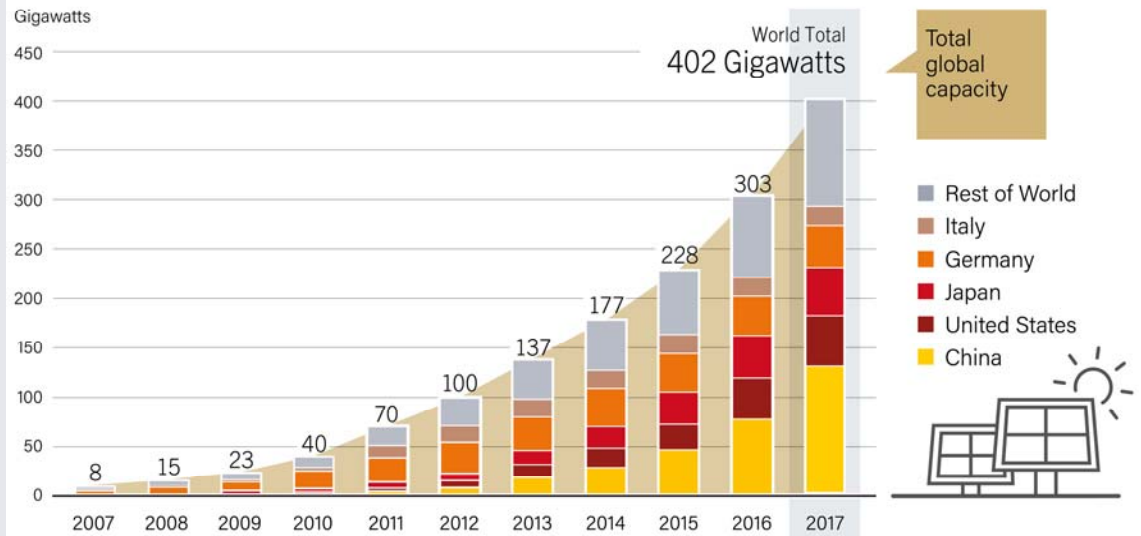
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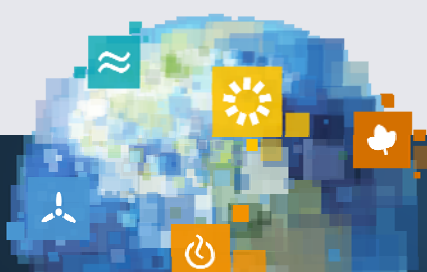
# Solar PV Capacity by Country or Region

- By the end of 2017, **every continent had installed at least 1 GW**
- **At least 29 countries had 1 GW or more of capacity**
- The size and number of large projects continued to grow during 2017
- By year's end, **at least 196 solar PV plants of 50 MW and larger** were operating in **at least 28 countries**

Solar PV Global Capacity, by Country or Region, 2007-2017



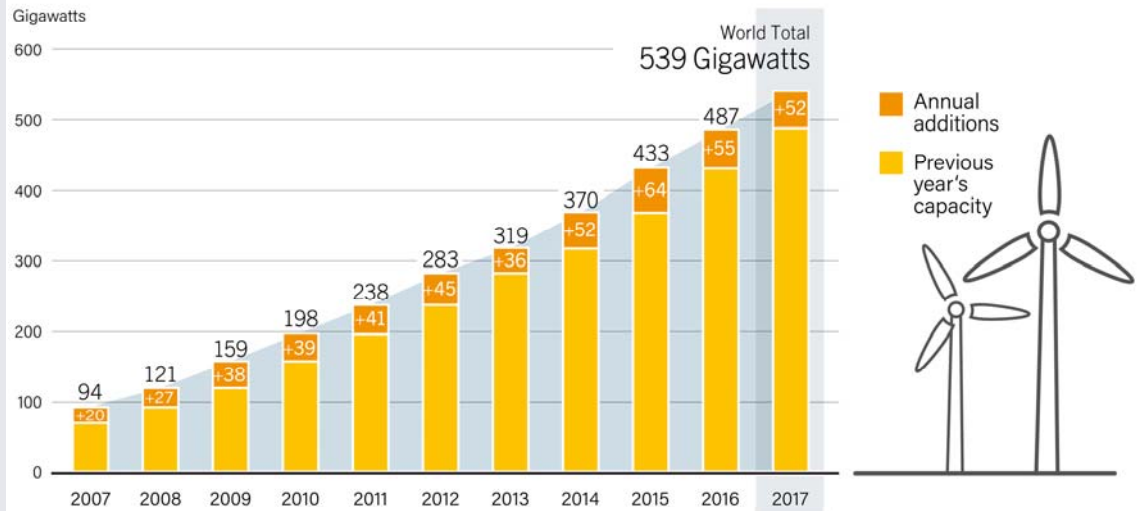
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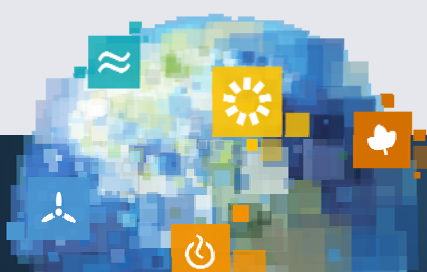
# Wind Power

- **52 GW** of wind power capacity added in 2017, increasing global total by **11% to 539 GW**
- **China:** lead position for wind power as well, adding nearly **19.7 GW**, reaching a total of **188.4 GW**
- onshore wind = majority of installed capacity
- increase of **+30%** in **global offshore capacity**

Wind Power Global Capacity and Annual Additions, 2007-2017

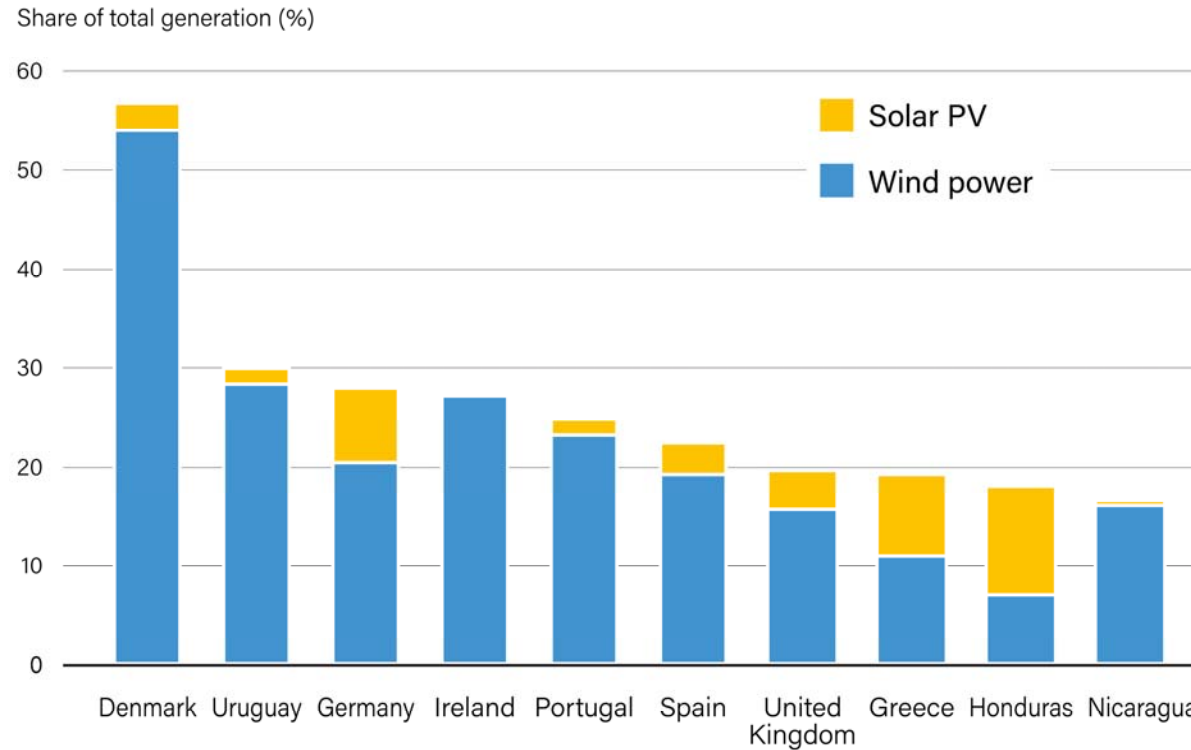


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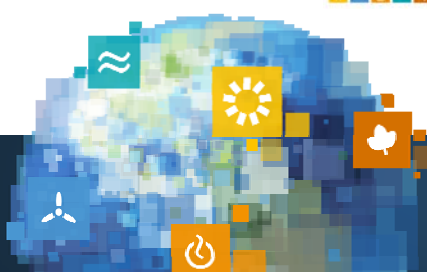


# High Shares of Variable Renewable Power on the Grid

Share of Electricity Generation from Variable Renewable Energy, Top 10 Countries, 2017



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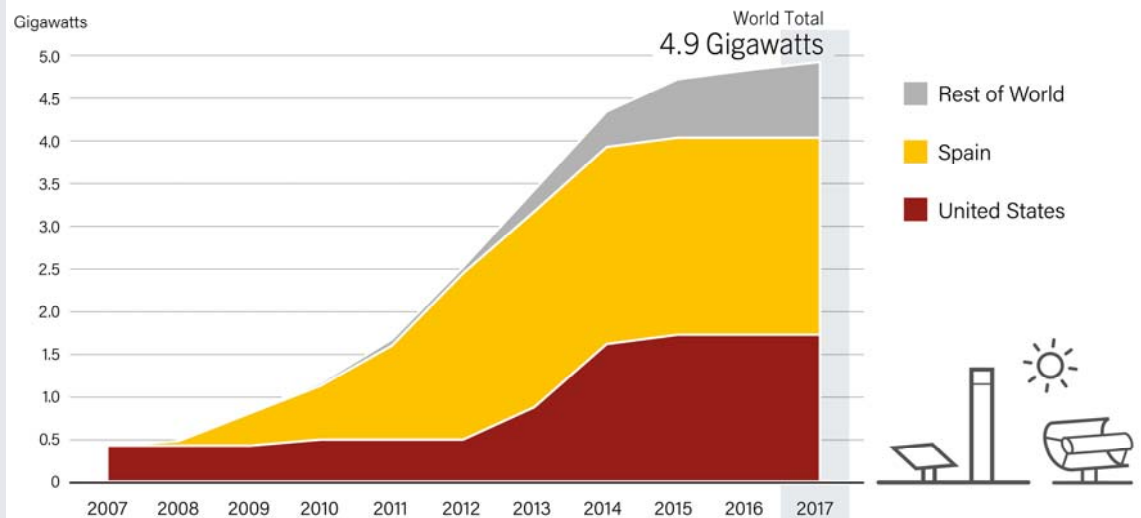
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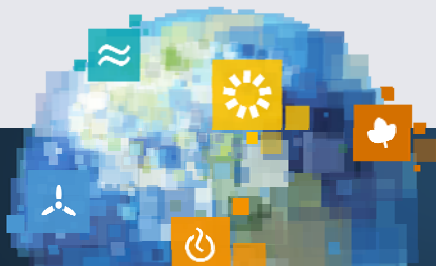
# Concentrating Solar Thermal Power (CSP)

- **100 MW** of capacity came online in 2017; global capacity: **4.9 GW**
- Several projects that were due to enter operation during the year were delayed until 2018 and later
- Global capacity increased by just over **2%**
- Pipeline of about **2 GW** of projects **under construction** (particularly in China and in the Middle East and North Africa region)

Concentrating Solar Thermal Power Global Capacity, by Country and Region, 2007-2017



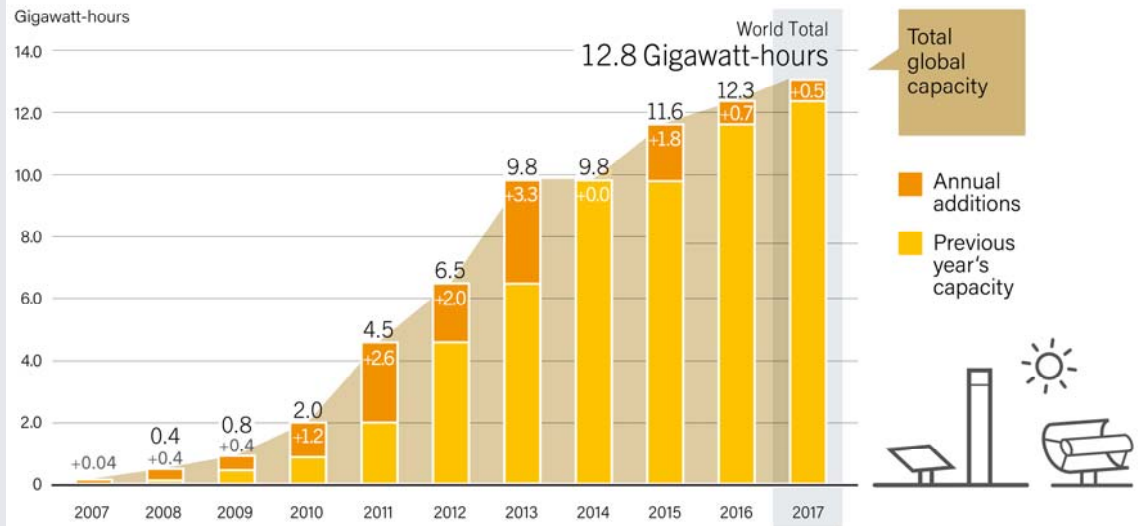
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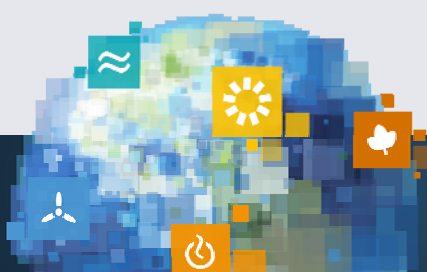
# CSP Thermal Energy Storage Capacity

- **100 MW** of capacity came online in 2017; global capacity: **4.9 GW**
- Pipeline of about **2 GW** of projects **under construction**
- **13 GWh** of thermal energy storage (TES), almost entirely molten salts
- Vast majority of CSP plants under construction will incorporate some form of TES (central to competitiveness of CSP)

CSP Thermal Energy Storage Global Capacity and Annual Additions, 2007-2017



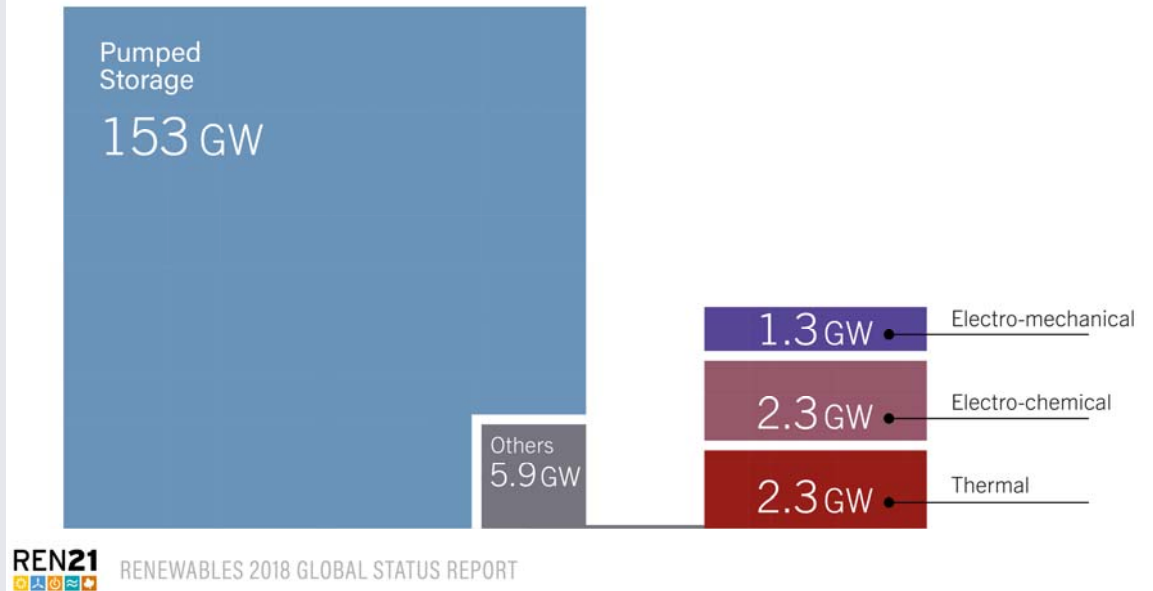
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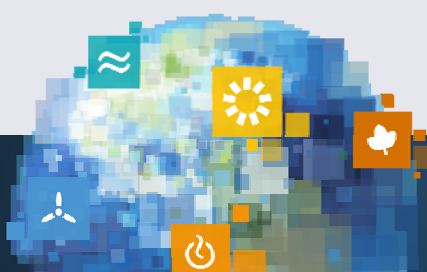
# Utility-Scale Energy Storage Capacity

- Global stationary and grid-connected energy storage capacity: **159 GW** (est.)
- **>3 GW of pumped storage** capacity commissioned (approx. 153 GW by year-end)
- Pumped storage is followed distantly by **thermal storage** (molten salt storage at CSP plants: 82%), then by **battery (electro-chemical)** and **electro-mechanical storage**

Global Utility-Scale Energy Storage Capacity, by Technology, 2017



Enabling technologies can help to accommodate higher shares of VRE by contributing to **more flexible and integrated systems.**

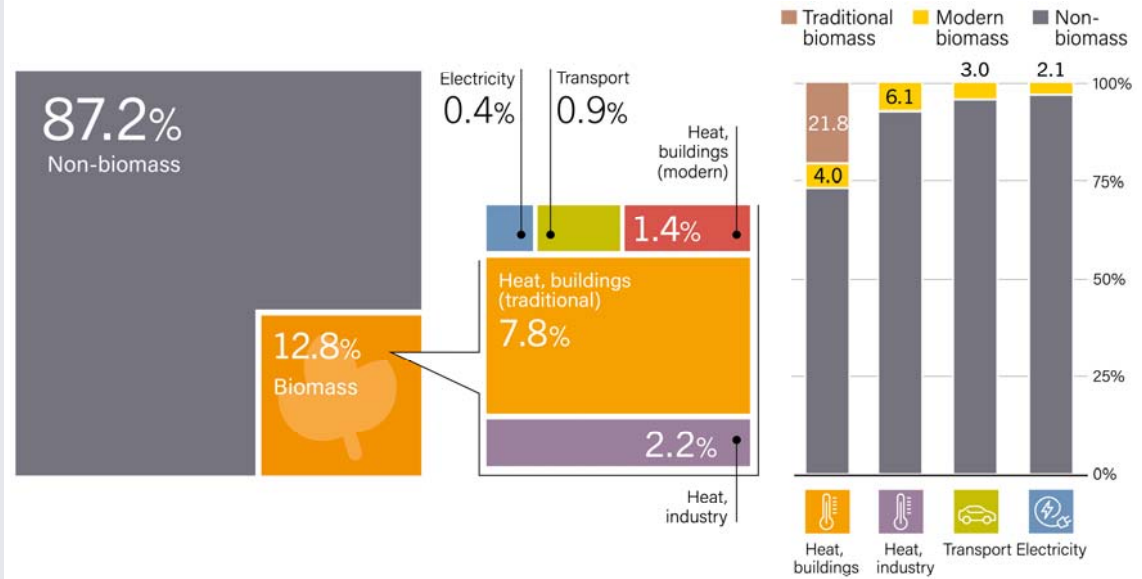




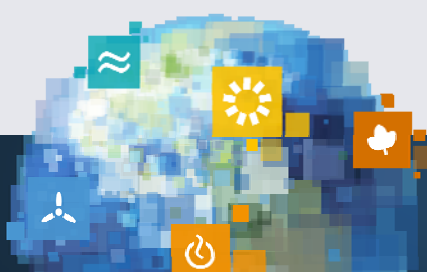
# Heating and Cooling

- Modern RE share in heating and cooling: **10.3%**
- Deployment of renewable technologies in H&C still constrained by: **low fossil fuel prices** and **lack of policy support**
- Majority of **renewable heat** supplied by: **biomass** with smaller contributions from **modern renewables**, incl. **solar thermal** and **geothermal** energy

Shares of Bioenergy in Total Final Energy Consumption, Overall and by End-Use Sector, 2016



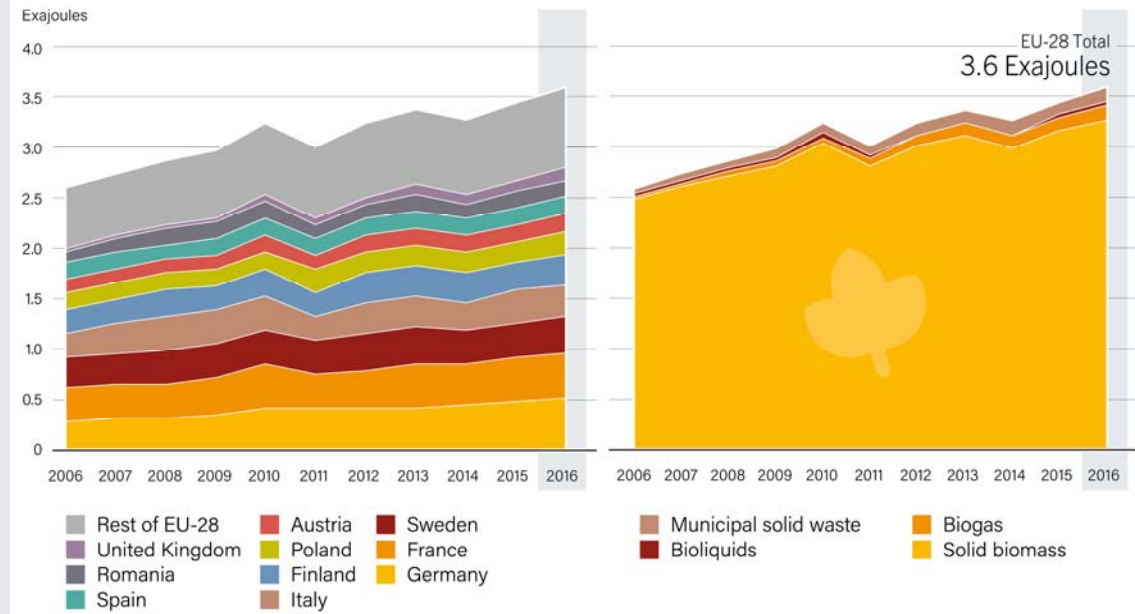
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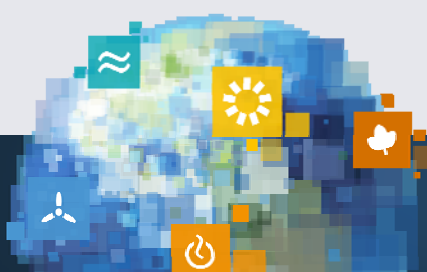
# Bio-heat

- **EU Member States** used an estimated **3.6 EJ** of bio-heat in 2016
- **91%** of which was supplied by **solid biomass**
- **Germany** is the largest consumer (0.52 EJ) of bio-heat in the EU, followed by France (0.45 EJ), Sweden (0.36 EJ), Italy (0.32 EJ) and Finland (0.30 EJ)

Consumption of Heat from Bioenergy in the EU-28, by Country and Fuel Source, 2006-2016



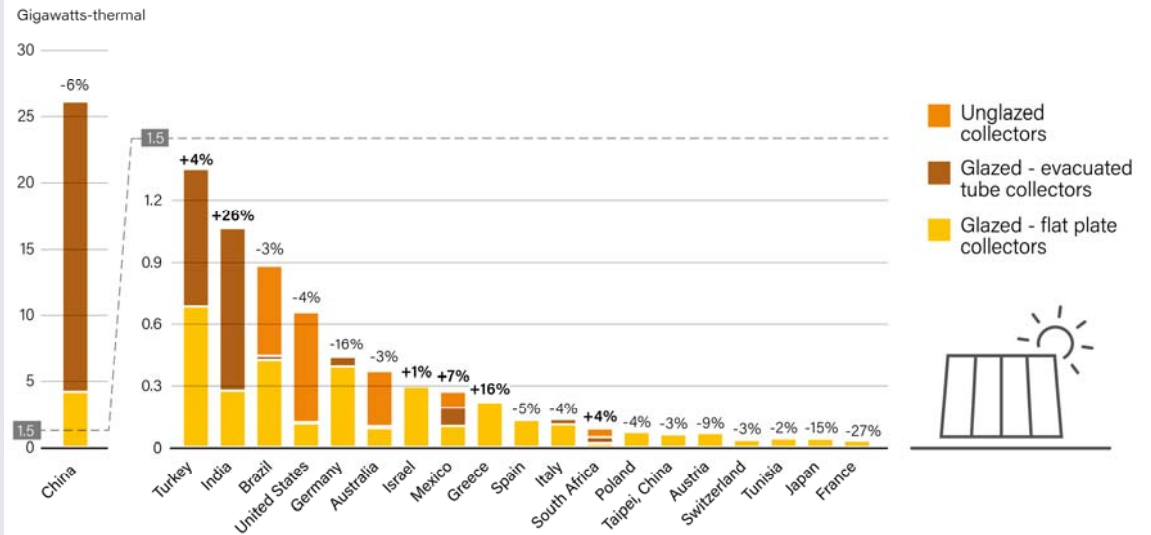
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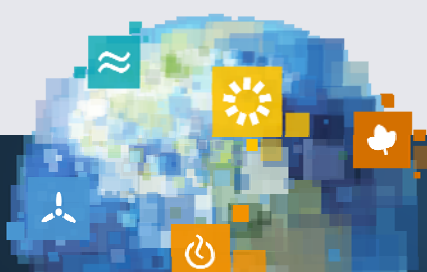
# Solar Water Heating Collector Additions

- 6 leading countries for new installations in 2017 were again: **China, Turkey, India, Brazil, the United States and Germany**
- **Top 20** countries for solar thermal installations with glazed and unglazed collectors accounted for an estimated **93%** of the global market in 2017

Solar Water Heating Collector Additions, Top 20 Countries for Capacity Added, 2017



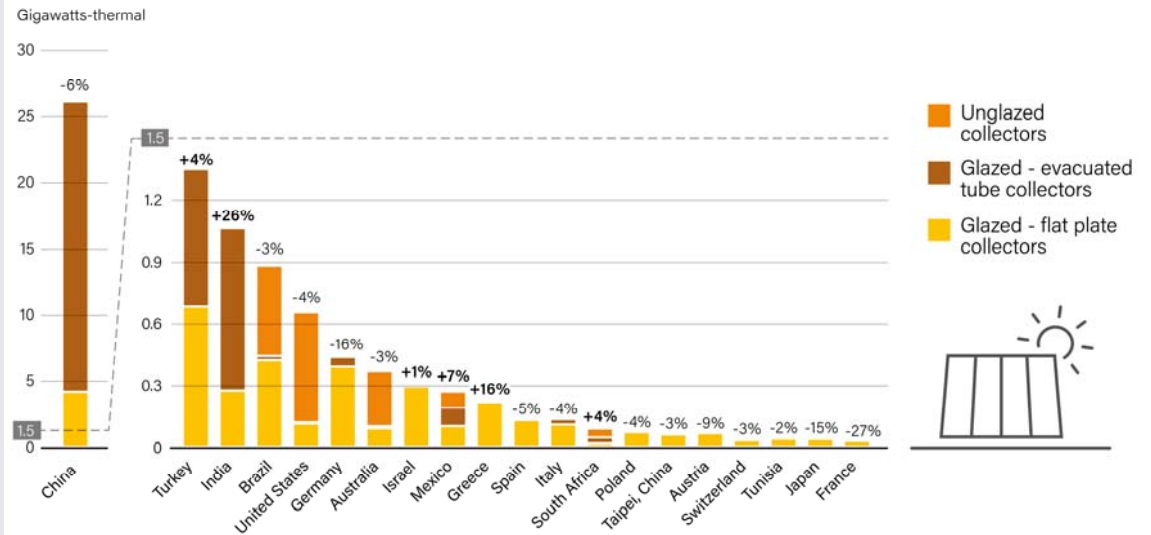
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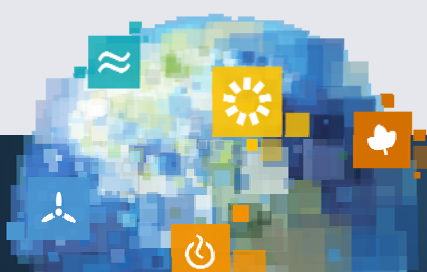
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Solar Water Heating Collector Additions, Top 20 Countries for Capacity Added, 2017



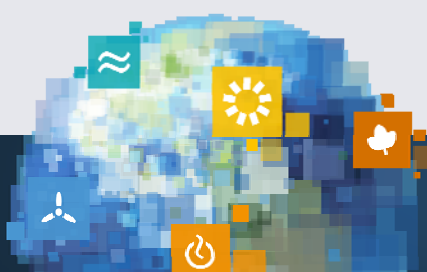
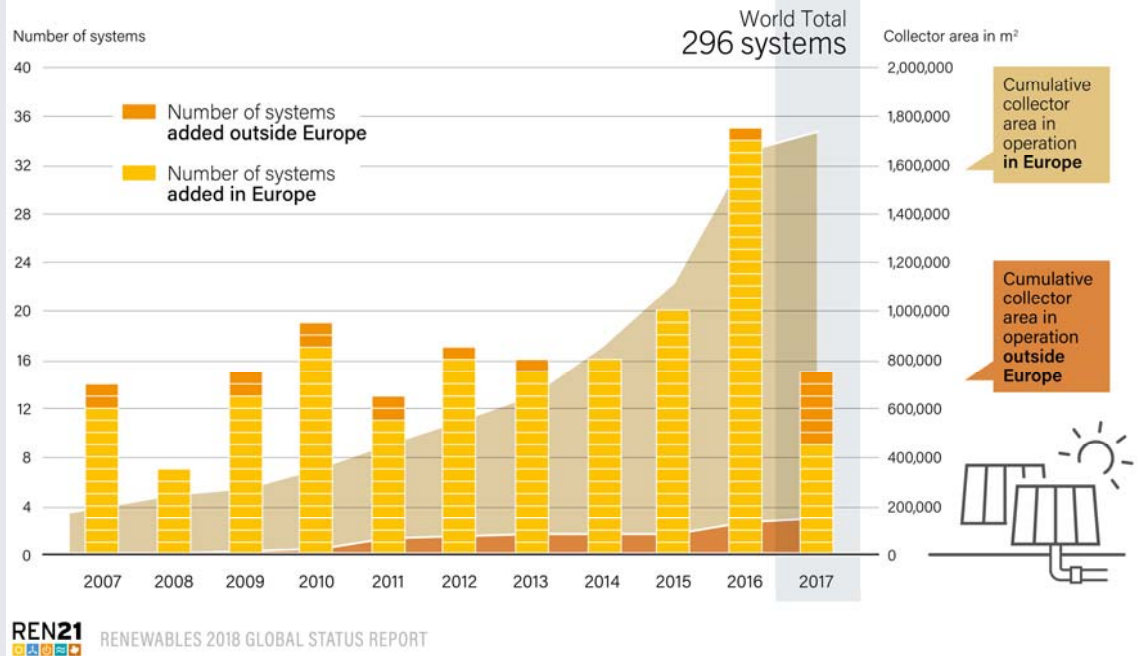
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# Solar District Heating Systems

- By end-2017, at least **296 large-scale solar thermal systems** connected to district heating networks or provided space heating for large residential, commercial and public buildings
- **Total of 1.2 GWth in operation**, incl. glazed and concentrating solar thermal collectors
- **90%** of solar thermal capacity for district heating was in **Europe**

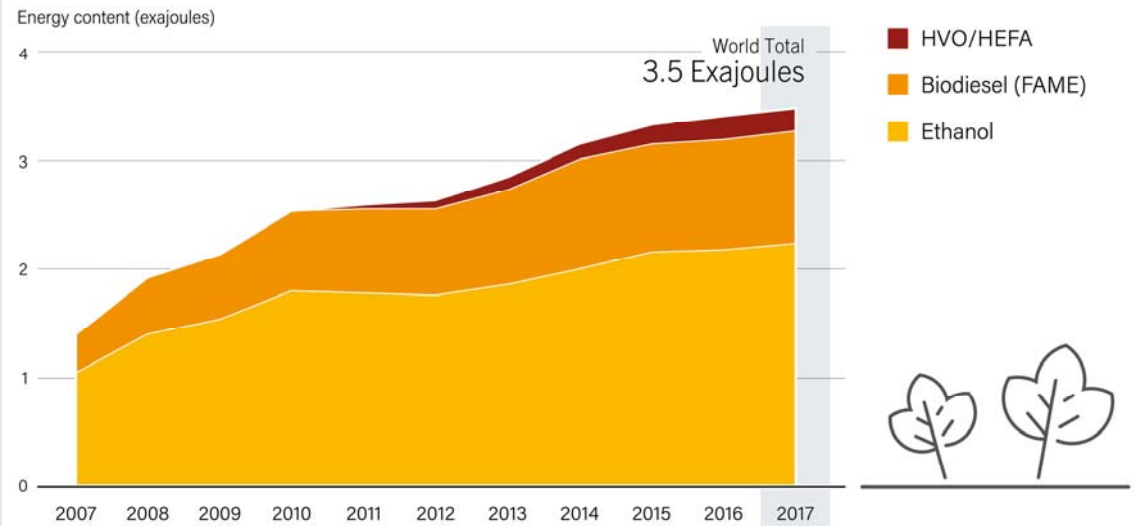
Solar District Heating Systems, Global Annual Additions and Total Area in Operation, 2007-2017



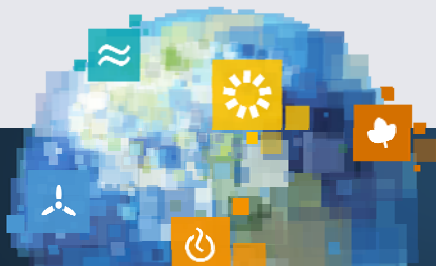
# Transport

- Share of renewable energy in transport: **3.1%** mainly provided by biofuels (90%)
- In 2017, **global biofuels production** increased nearly **2.5%**, to **143 billion litres**
- Biofuels production and use are very **concentrated geographically**, > **80%** production takes place in the **United States, Brazil and the EU**

Global Trends in Ethanol, Biodiesel and HVO/HEFA Production, 2007-2017



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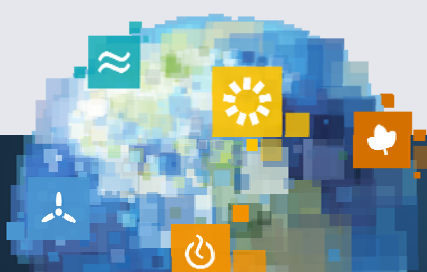
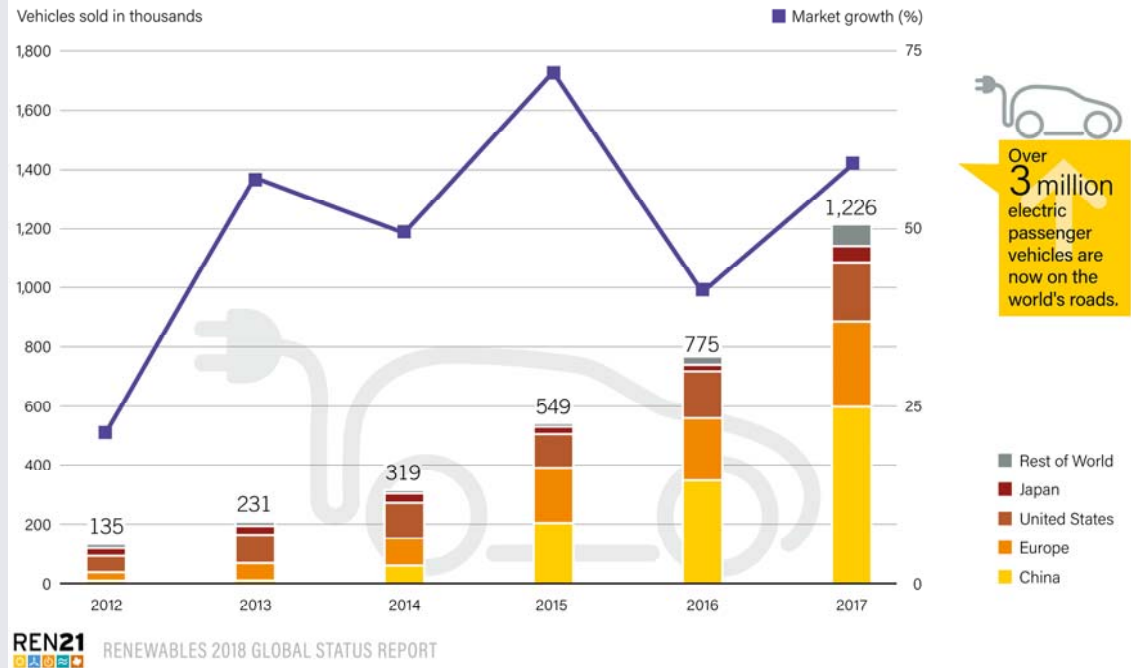
# Transport

→ **Electrification trend:**

- Rail and light rail
- EVs on the road passed the 3 million mark in 2017 (+70%, but only 1% of light vehicle market)

→ Potential to create a **new market for renewable energy** and facilitate the **integration of higher shares of VRE**

Global Passenger Electric Vehicle Market (including PHEVs), 2012-2017



**HM1**

EVs make up 1% but many transport initiatives were launched in 2017 that included EVs and decarbonising the sector - for example, the Global EV Initiative that aims for EVs to reach 30% of market share by 2030, and many countries' banning sales of diesel cars by 2030 or 2040

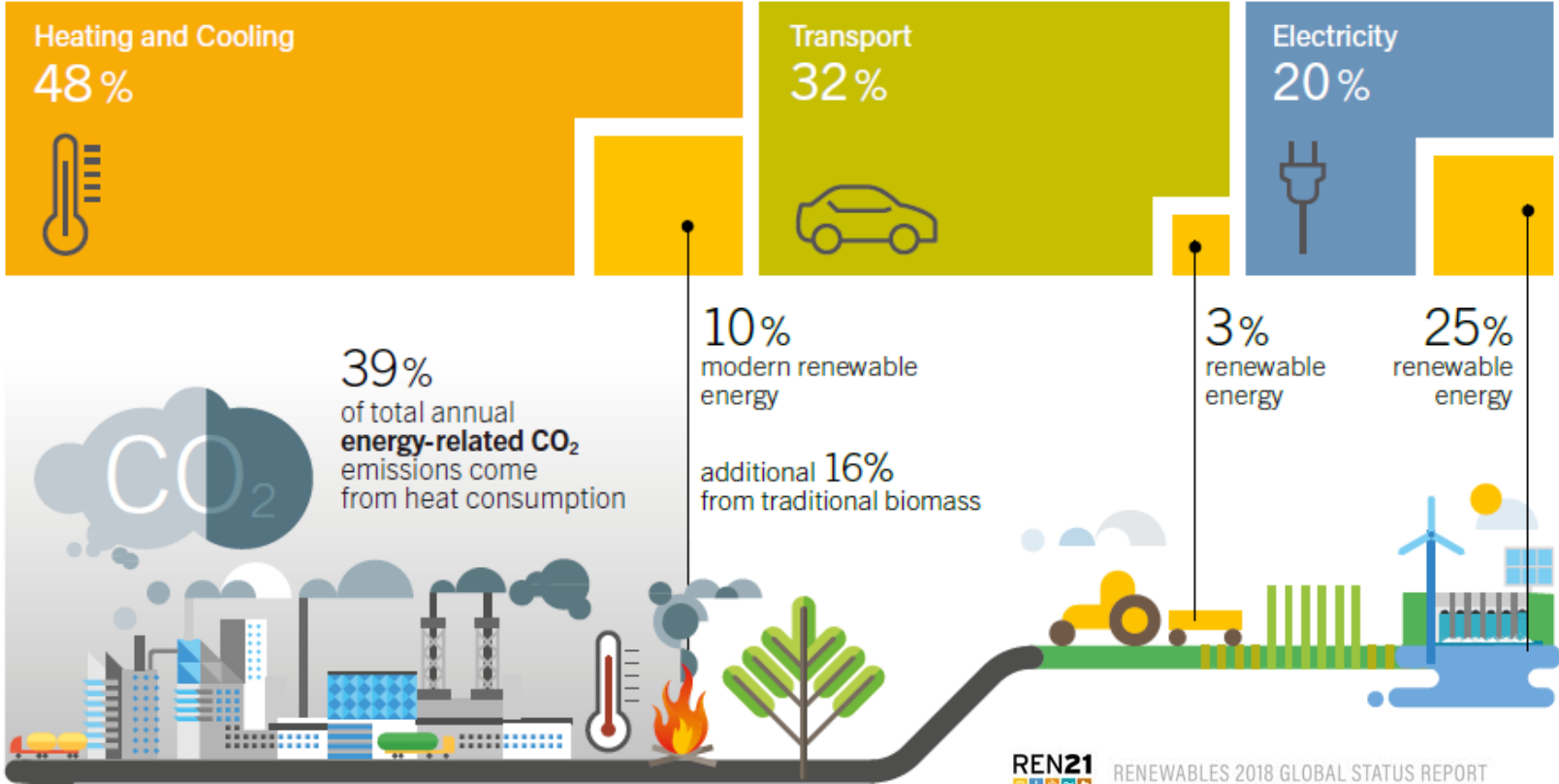
Hannah Murdock; 01.06.2018



# The “Sectoral Disconnect”

## WE CONSUME THE MOST ENERGY FOR HEATING, COOLING, AND TRANSPORT

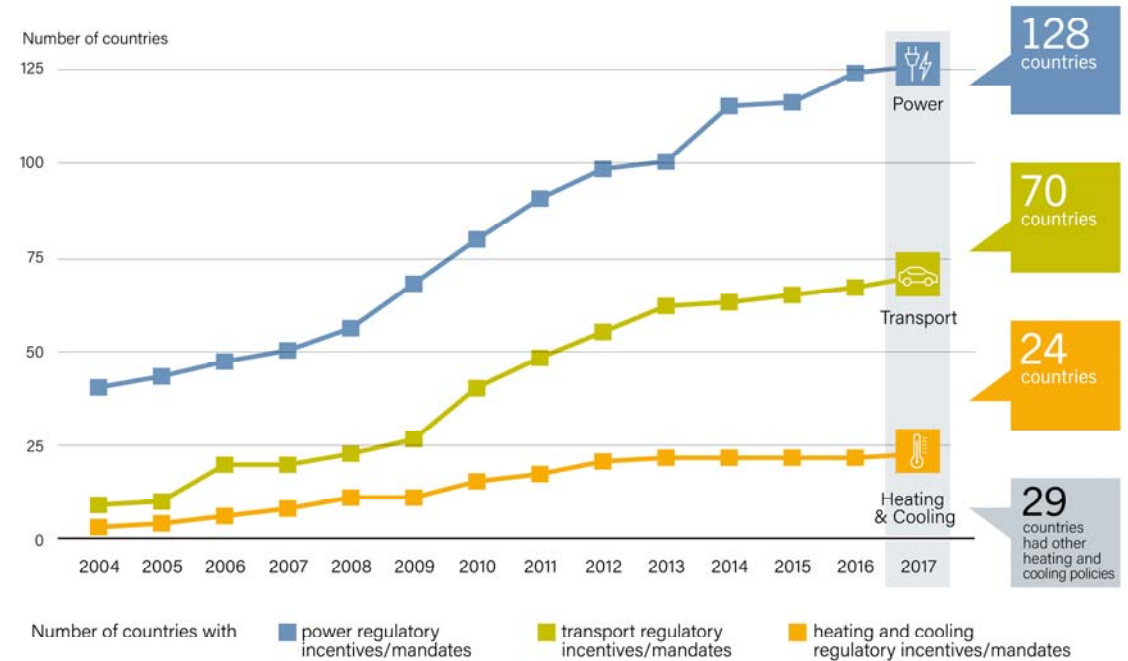
Modern Renewable Energy in Final Energy Use by Sector, 2015



# Renewable Energy Policy Landscape

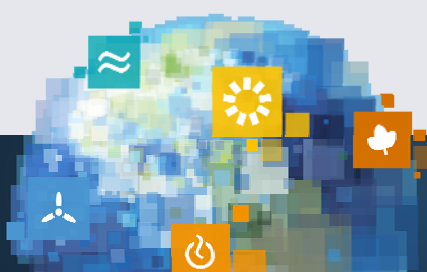
- **179** countries had renewable energy **targets**
- **146** countries had **power targets**
- **42** countries had **transport targets**
- **48** countries had **heating and cooling targets**

Number of Countries with Renewable Energy Regulatory Policies, by Sector, 2004-2017



Source: REN21 Policy Database

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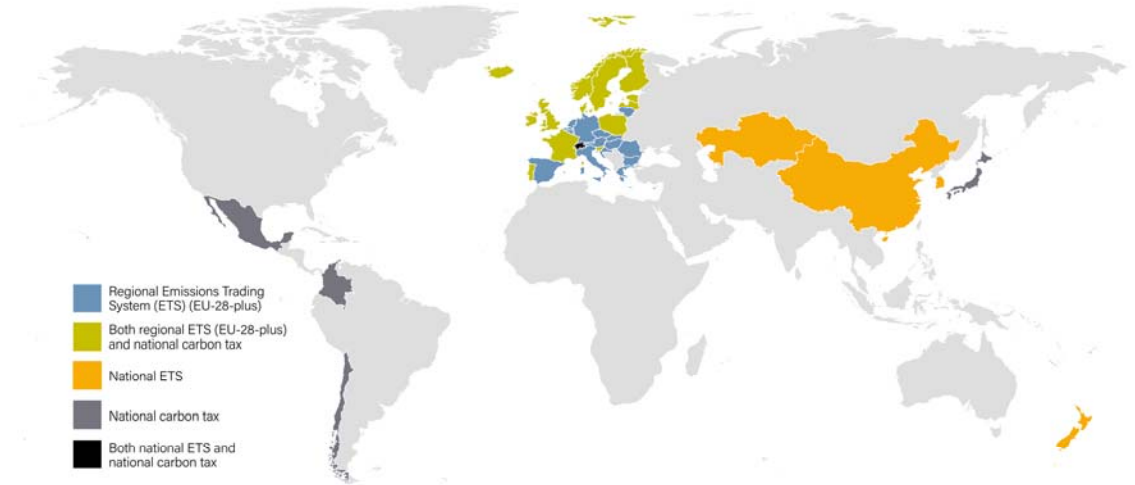
# Carbon Pricing Policies

→ Carbon pricing policies in place in **64 jurisdictions** worldwide in 2017



Carbon Pricing Policies, 2017

## NATIONAL POLICIES



## SUB-NATIONAL POLICIES



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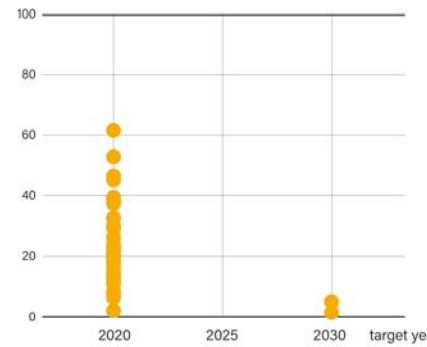
# Renewable Energy Targets

National Sector-Specific Targets for Share of Renewable Energy by a Specific Year, by Sector, in Place at End-2017

## HEATING AND COOLING

● = one target

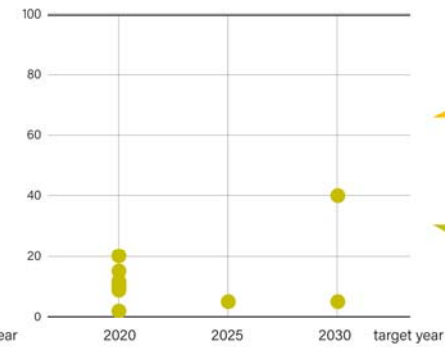
Targets for share of heating and cooling from renewable sources in %



## TRANSPORT

● = one target

Targets for share of transport energy from renewable sources in %



Most national targets focus on the power sector, where the level of ambition is typically higher than for heating and cooling and for transport.

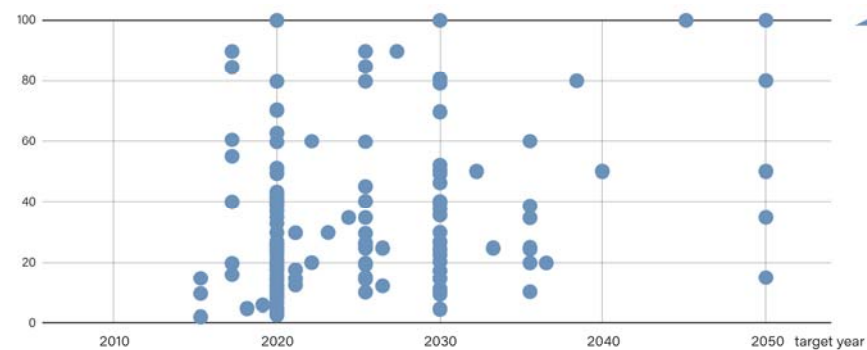
48 countries have national targets for renewable energy in heating and cooling.

42 countries have national targets for renewable energy in transport.

## POWER

● = one target

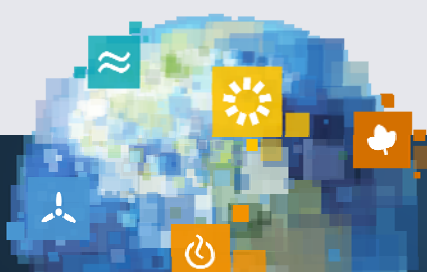
Targets for share of electricity generation from renewable sources in %



146 countries have national targets for renewable energy in power.

Source: REN21 Policy Database



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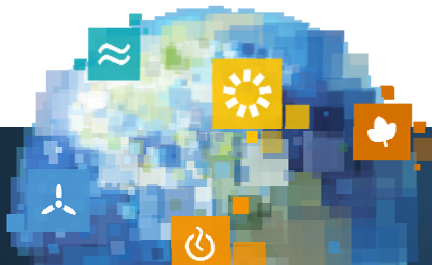
# Renewable Energy “Champions”

## TOP 5 COUNTRIES 2017

### Annual Investment / Net Capacity Additions / Production in 2017

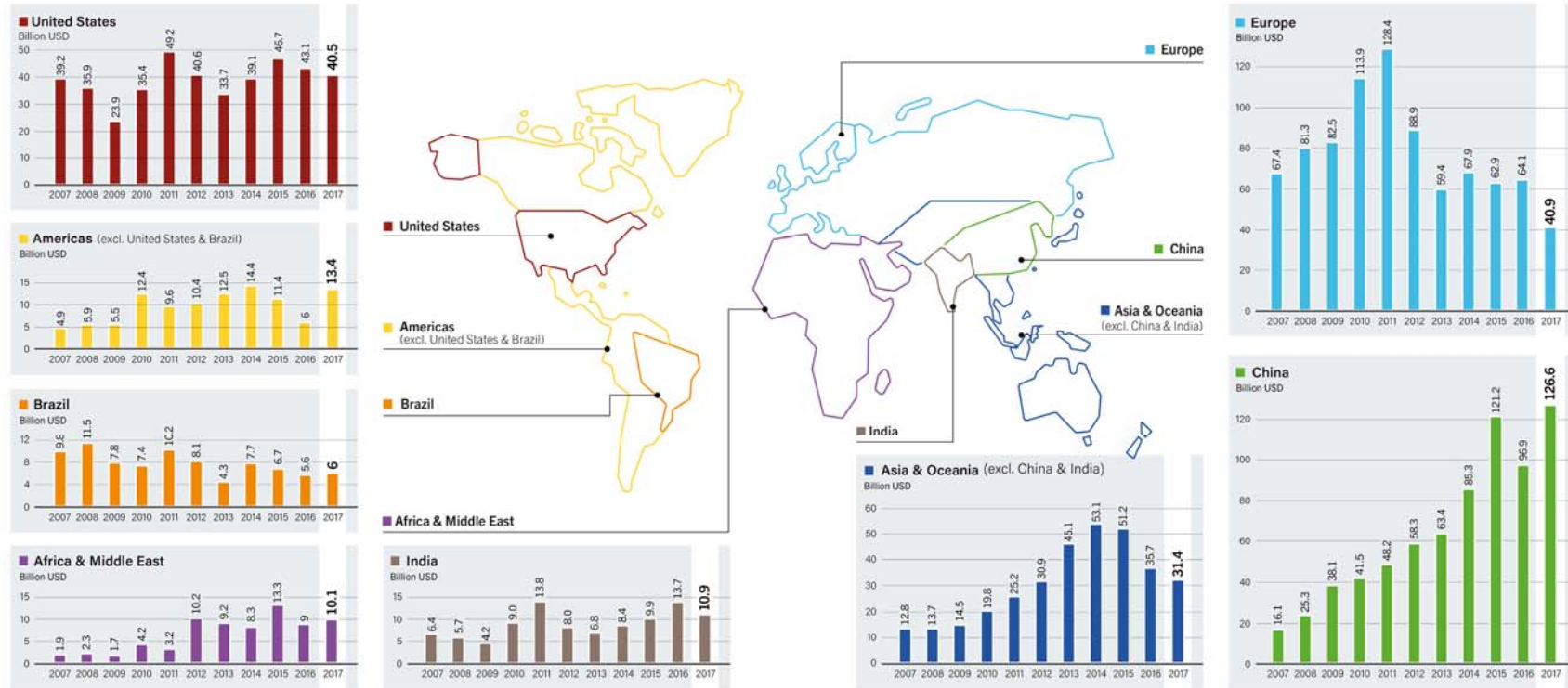
	1	2	3	4	5
Investment in renewable power and fuels (not including hydro over 50 MW)	<b>China</b>	United States	Japan	India	Germany
Investment in renewable power and fuels per unit GDP <sup>1</sup>	<b>Marshall Islands</b>	Rwanda	Solomon Islands	Guinea-Bissau	Serbia
 Geothermal power capacity	<b>Turkey</b>	Indonesia	Chile	Iceland	Honduras
 Hydropower capacity	<b>China</b>	Brazil	India	Angola	Turkey
 Solar PV capacity	<b>China</b>	United States	India	Japan	Turkey
 Concentrating solar thermal power (CSP) capacity <sup>2</sup>	<b>South Africa</b>	-	-	-	-
 Wind power capacity	<b>China</b>	United States	Germany	United Kingdom	India
 Solar water heating capacity	<b>China</b>	Turkey	India	Brazil	United States
 Biodiesel production	<b>United States</b>	Brazil	Germany	Argentina	Indonesia
 Ethanol production	<b>United States</b>	Brazil	China	Canada	Thailand

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# Global Investment in Renewable Energy by Region

Global New Investment in Renewable Power and Fuels, by Country or Region, 2007-2017



Source: BNEF

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# Distributed Renewables for Energy Access

## → In 2016:

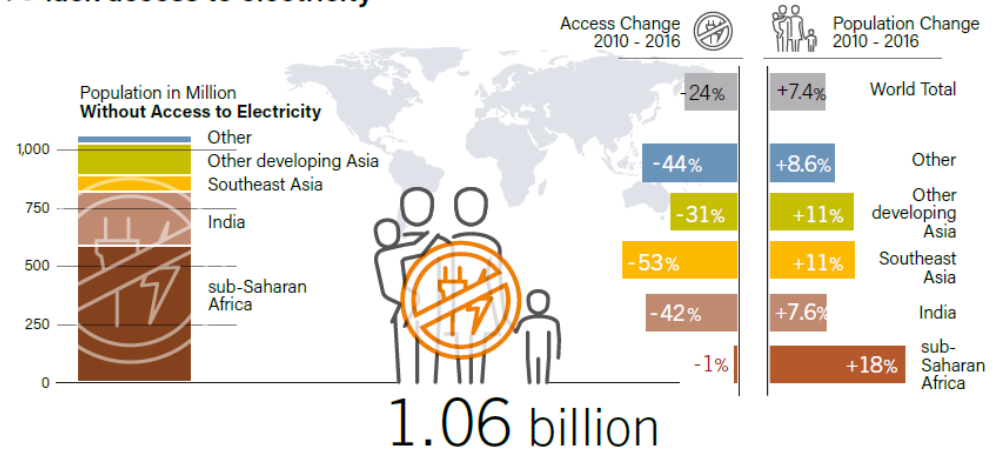
- ~14% of the global population lived **without electricity** – approx. 1.06 billion people
- DREA systems were serving ~360 million people by end-2016

- PAYG companies raised USD 263 million (+19% from 2016)



WE MUST ACCELERATE RENEWABLES DEPLOYMENT TO REACH UNIVERSAL ELECTRICITY ACCESS IN 2030

14% of the global population still lack access to electricity



Renewable energy is already a reality in developing countries...

266 GW  
grid-connected renewable power capacity

Distributed renewable energy systems power

360 million people



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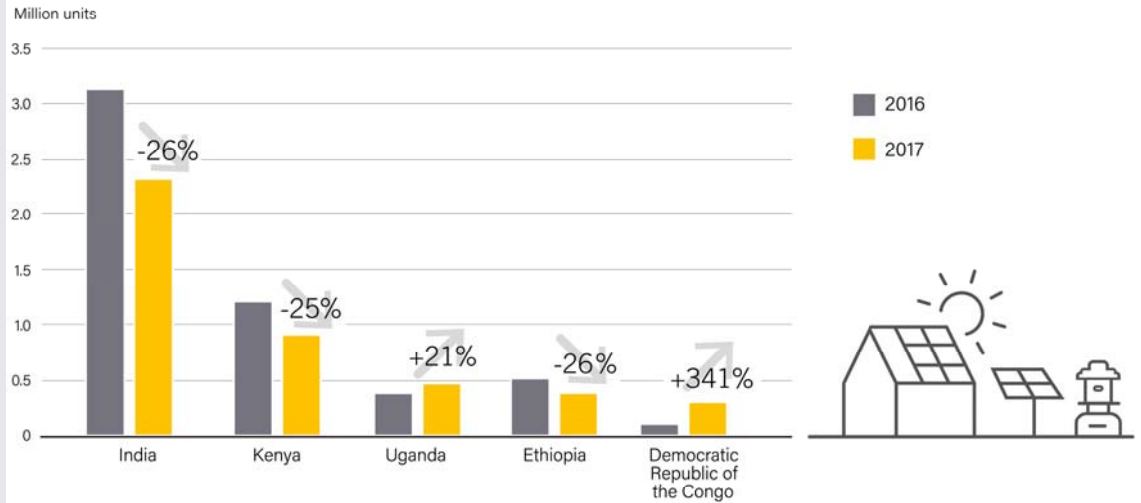
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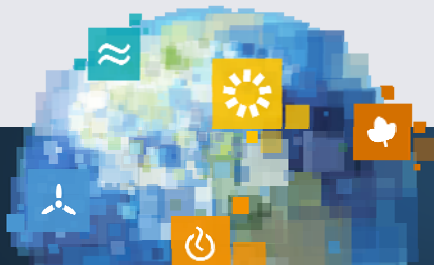
# Off-grid Solar Systems

- Off-grid solar systems' sales: **-16%** in 2017 in **East Africa and South Asia**, (66% of global sales)
- **Market in Central Africa: +173%**
- **Markets in East Asia and the Pacific: +41%**

Number of Off-Grid Solar Systems Sold by GOGLA Affiliates in Top 5 Countries, 2016 and 2017



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# Jobs in Renewable Energy

→ The renewable energy sector employed **10.3 million** people in 2017 – a **5% increase** over 2016



### Jobs in Renewable Energy



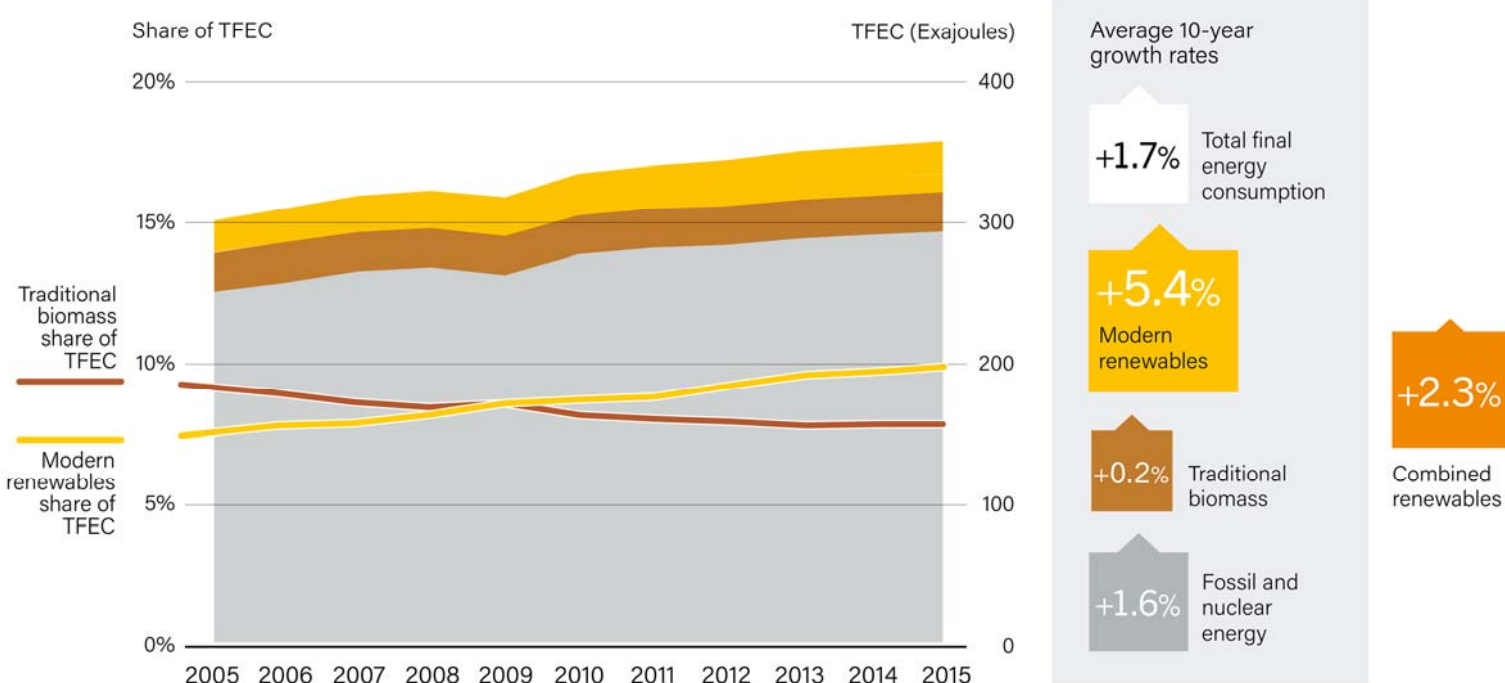
Source: IRENA

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# Growth in Renewable Energy

Growth in Global Renewable Energy Compared to Total Final Energy Consumption (TFEC), 2005-2015



Source: IEA

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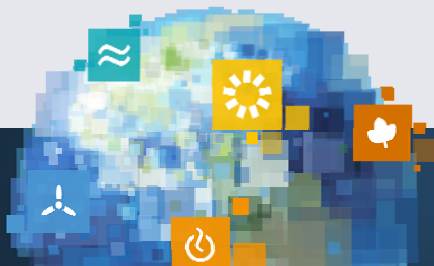


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# Conclusions

- Global renewable power transition advancing with record capacity additions and rapidly falling costs – **The transition is possible!!**
- However, **progress not fast enough** to reach **Paris Agreement goals** and **SDGs**
- **Better-integrated sectors** - planning, policies and regulatory frameworks
- Systems approach: link **energy efficiency** and **renewable energy**
- Create a **level playing field** for renewables and decentralised off-grid renewables
- **Make all trends visible:** Much is happening, but data is not consolidated – renewables at local and sub-national level, distributed off-grid renewables, innovative business models



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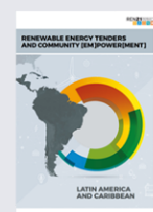
*Global Status Report:  
yearly publication since 2005*



*Regional Reports*



*Global Futures  
Reports*



*Thematic  
Reports*



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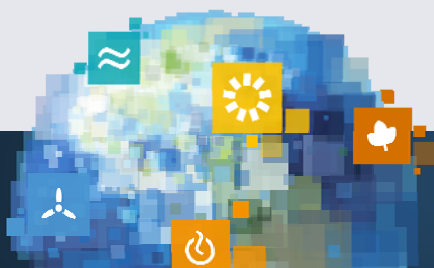


*International  
Renewable Energy  
Conferences*

**SAVE THE DATE:**  
**22-25 October 2019**  
Seoul, Republic of Korea

[www.ren21.net/gsr](http://www.ren21.net/gsr)

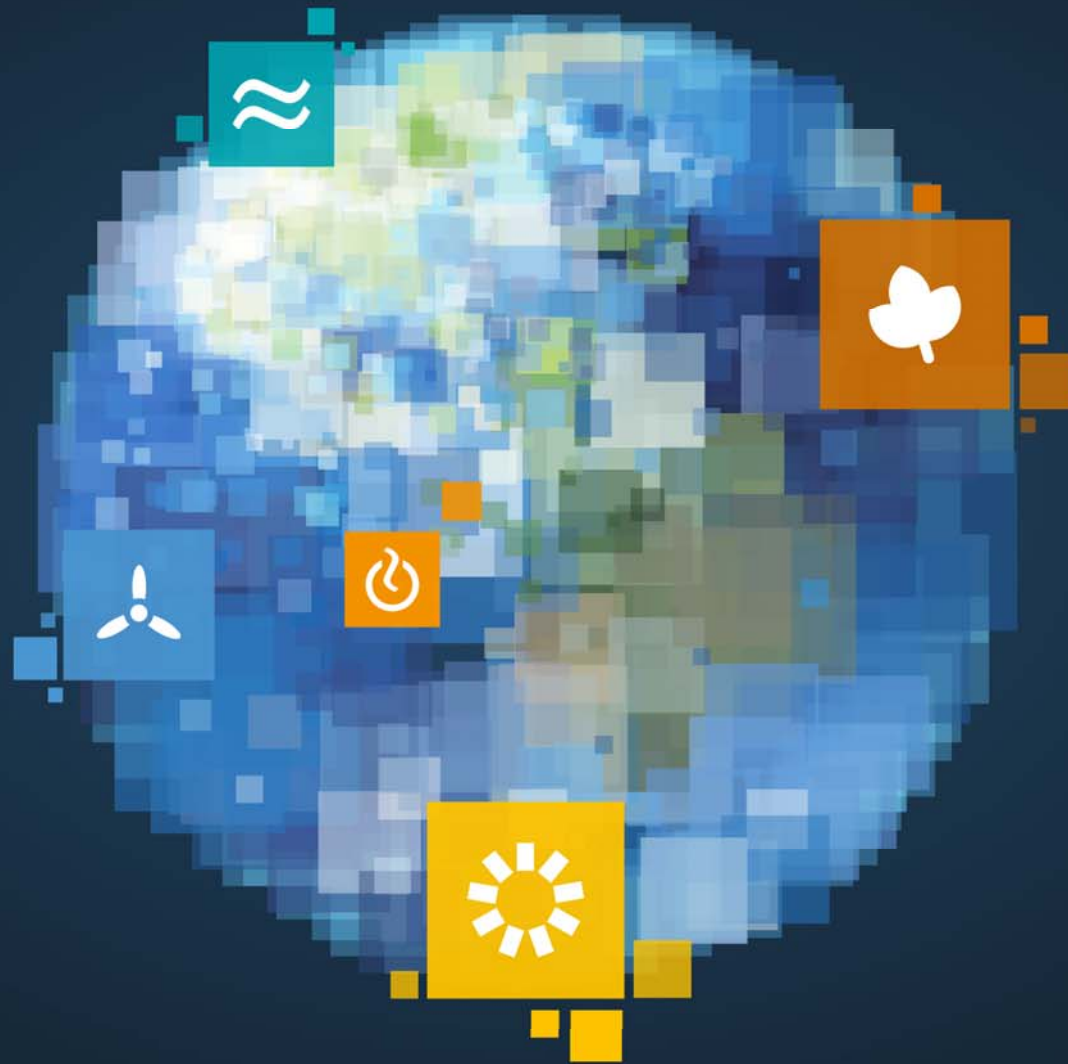
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