

RENEWABLES 2019 GLOBAL STATUS REPORT



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10th International Forum on Energy for
Sustainable Development 2019
Bangkok

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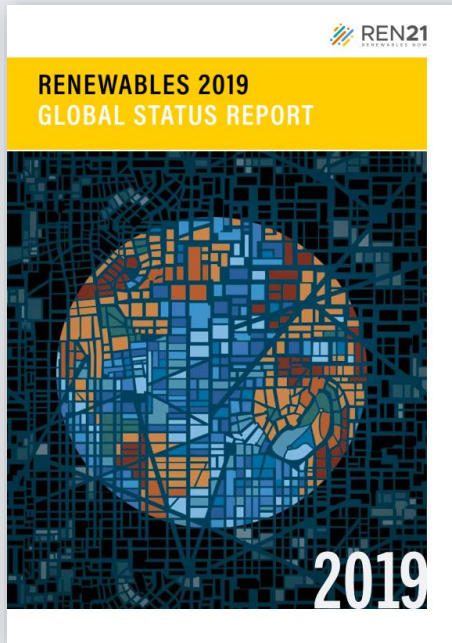
2019

Evidence and knowledge to shape the global energy debate



Renewables 2019 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: Renewable Energy in Cities



Over

1,500

experts have contributed to the GSR since its start in 2005.



70%

of these experts have participated in more than one GSR.



Over

350

experts contributed to GSR 2019, working alongside an international authoring team and the REN21 Secretariat.



45%

of these were new experts.

Another strong year for renewable energy

- **Total global capacity rose 8% in 2018**
 - 2,378 GW capacity including hydropower
- **Non-hydro capacity grew 15%**
 - 1,246 GW by the end of 2018
- **181 GW** of renewable power additions led by
 - Solar PV with 100 GW (55% of new additions)
 - Wind power: 51 GW (28%)
 - Hydropower: 20 GW (11%)
- **Global reach of renewable power:**
 - over 90 countries have more than 1 GW
 - over 30 countries have more than 10 GW

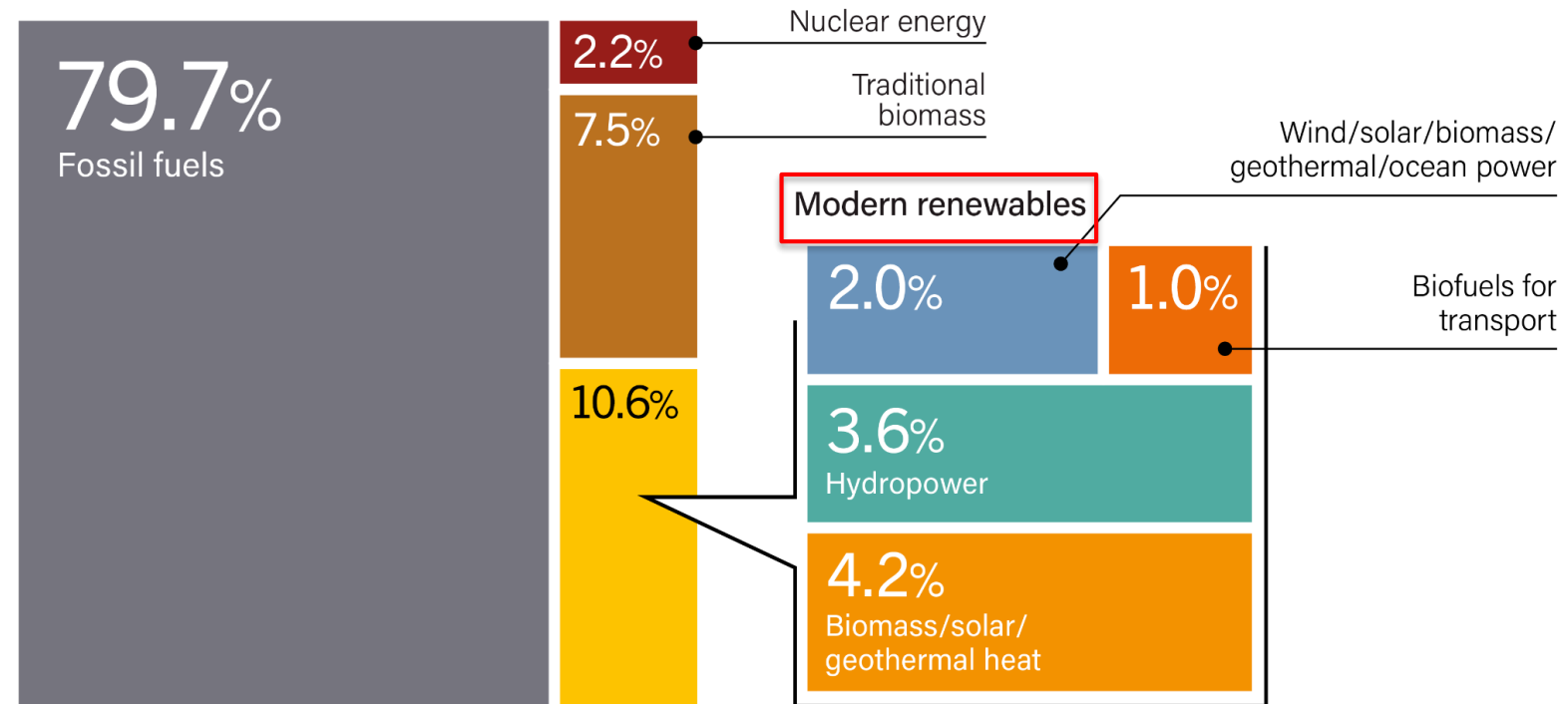
RENEWABLE ENERGY INDICATORS 2018

		2017	2018
INVESTMENT			
New investment (annual) in renewable power and fuels ¹	billion USD	326	289
POWER			
Renewable power capacity (including hydropower)	GW	2,197	2,378
Renewable power capacity (not including hydropower)	GW	1,081	1,246
Hydropower capacity ²	GW	1,112	1,132
Wind power capacity	GW	540	591
Solar PV capacity ³	GW	405	505
Bio-power capacity	GW	121	130
Geothermal power capacity	GW	12.8	13.3
Concentrating solar thermal power (CSP) capacity	GW	4.9	5.5
Ocean power capacity	GW	0.5	0.5
Bioelectricity generation (annual)	TWh	532	581
HEAT			
Solar hot water capacity ⁴	GW _{th}	472	480
TRANSPORT			
Ethanol production (annual)	billion litres	104	112
FAME biodiesel production (annual)	billion litres	33	34
HVO biodiesel production (annual)	billion litres	6.2	7.0

Modern renewables slowly gaining ground in final energy demand

- **Modern renewable energy** accounted for **10.6%** of final energy demand in 2017.
 - Increase from 10.4% in 2016
- Considering traditional biomass, renewable energy covered **18.1%** of final energy demand
- Modern renewable heat supplied 4.2% of demand, hydropower 3.6%, non-hydro power 2% and transport biofuels 1%

Estimated Renewable Share of Total Final Energy Consumption, 2017

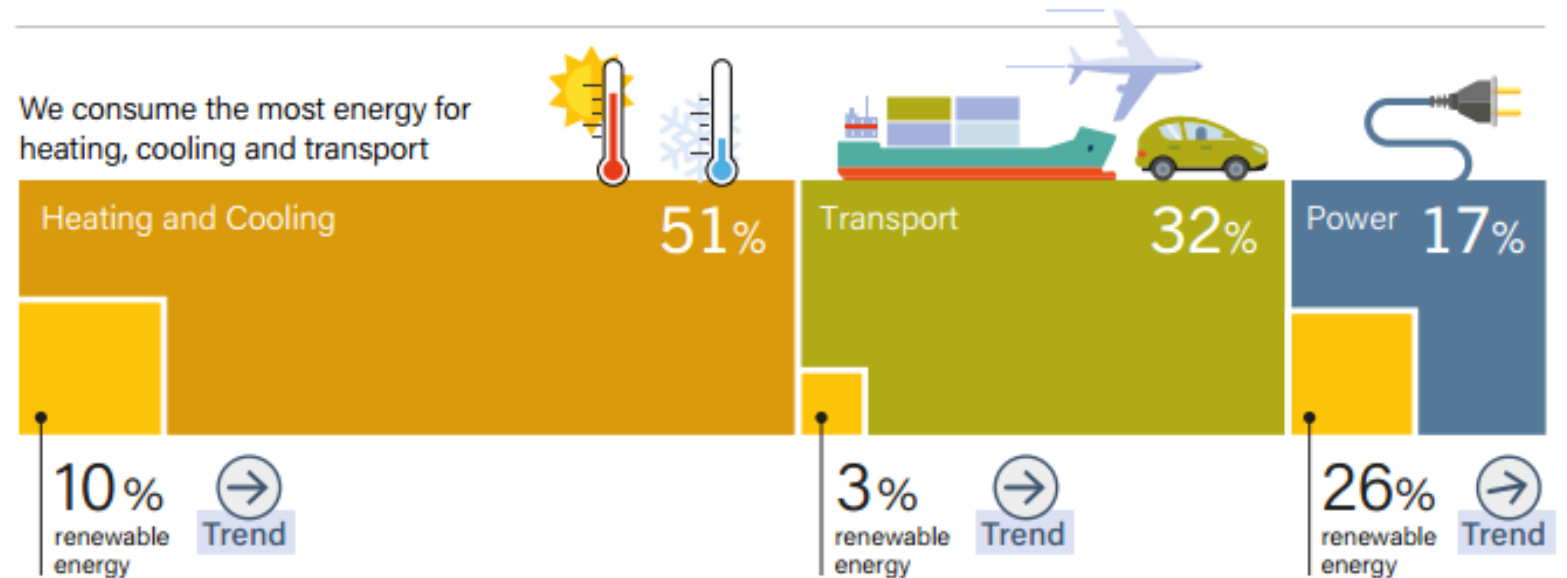


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Source: OECD/IEA and IEA SHC.

Beyond Power: Over 80% of demand for heating, cooling, and transport

- **Over half** of final energy demand is from the heating and cooling sector
 - Less than 10% of this demand is supplied by renewable energy
- **32%** of final energy demand is for transport end-uses
 - Just over 3% is renewable and primarily met by biofuels
 - Renewable electricity still plays small role
- Around **26%** of electricity was renewable in 2016

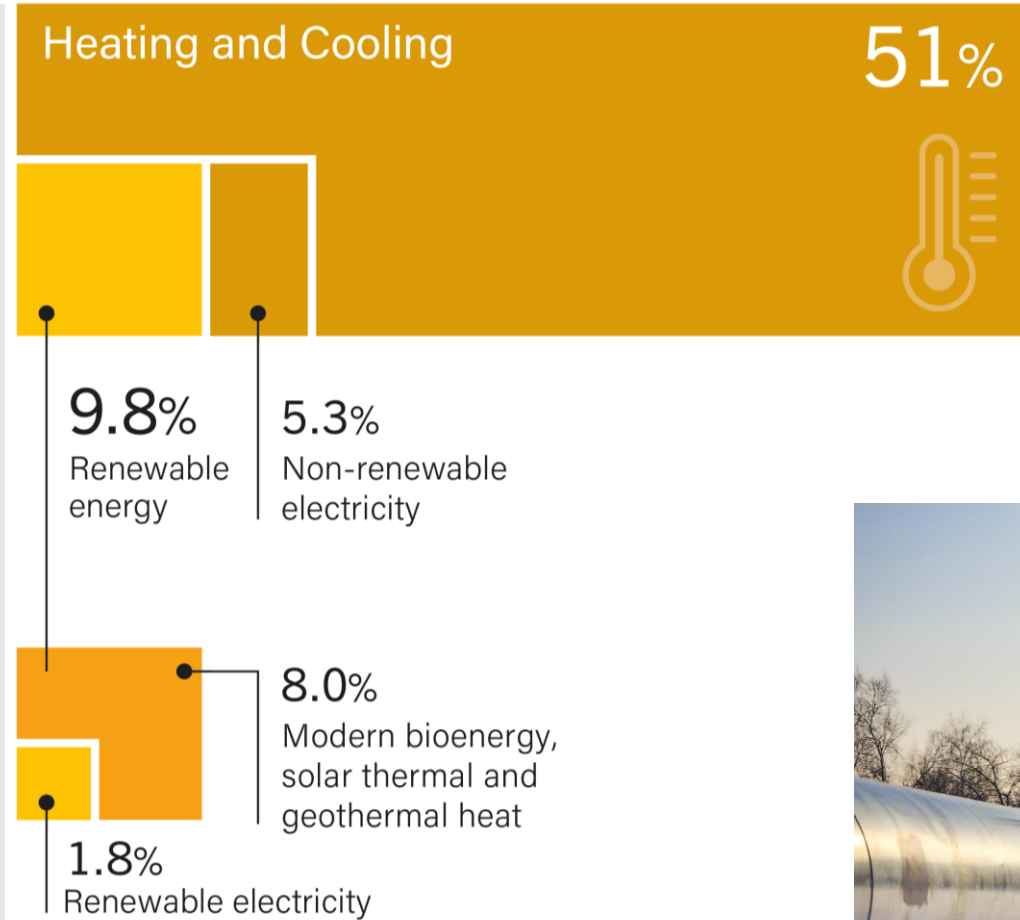


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Source: OECD/IEA.

Renewables in heating and cooling increasing very slowly

- Modern renewables account for just **10% of heating and cooling demand**
 - Demand growth is minimal (1.8%/year)
- **Lack of policy support** in the sector
 - Number of countries with regulatory policies fell from 21 to 20
 - Only 47 countries had targets for RHC
- Bio-heat provides majority but integration with **power sector** is key



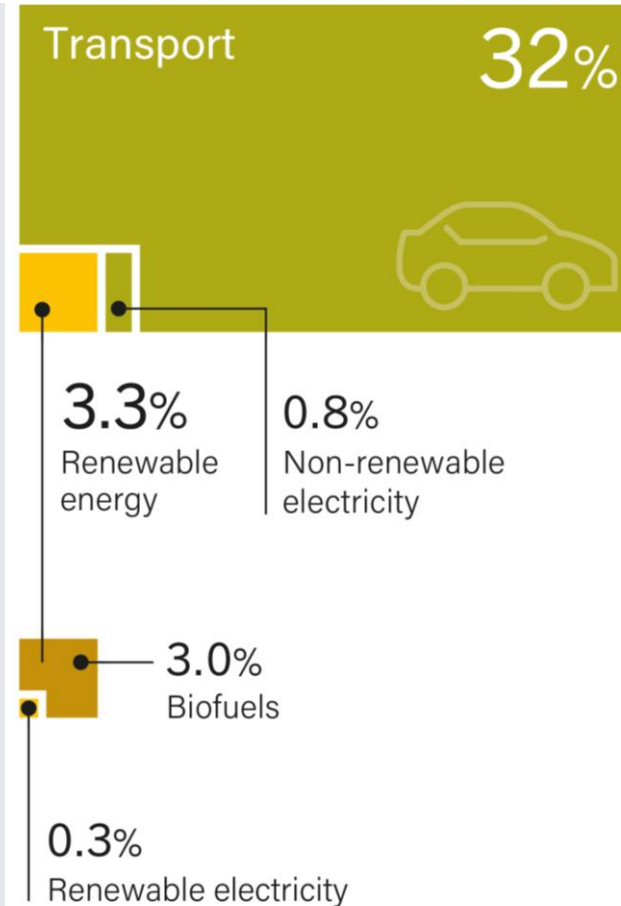
Source: OECD/IEA.

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Biofuels and EVs growing but renewable share in transport remains low

- Global energy demand in transport increased **45%** since 2000
- Transport accounts for **23%** of global CO₂ emissions
- The renewable share of transport grew slightly to **3.3%**
- Biofuels make up majority of renewable contribution, but sector increasingly open to electrification



Source: OECD/IEA.

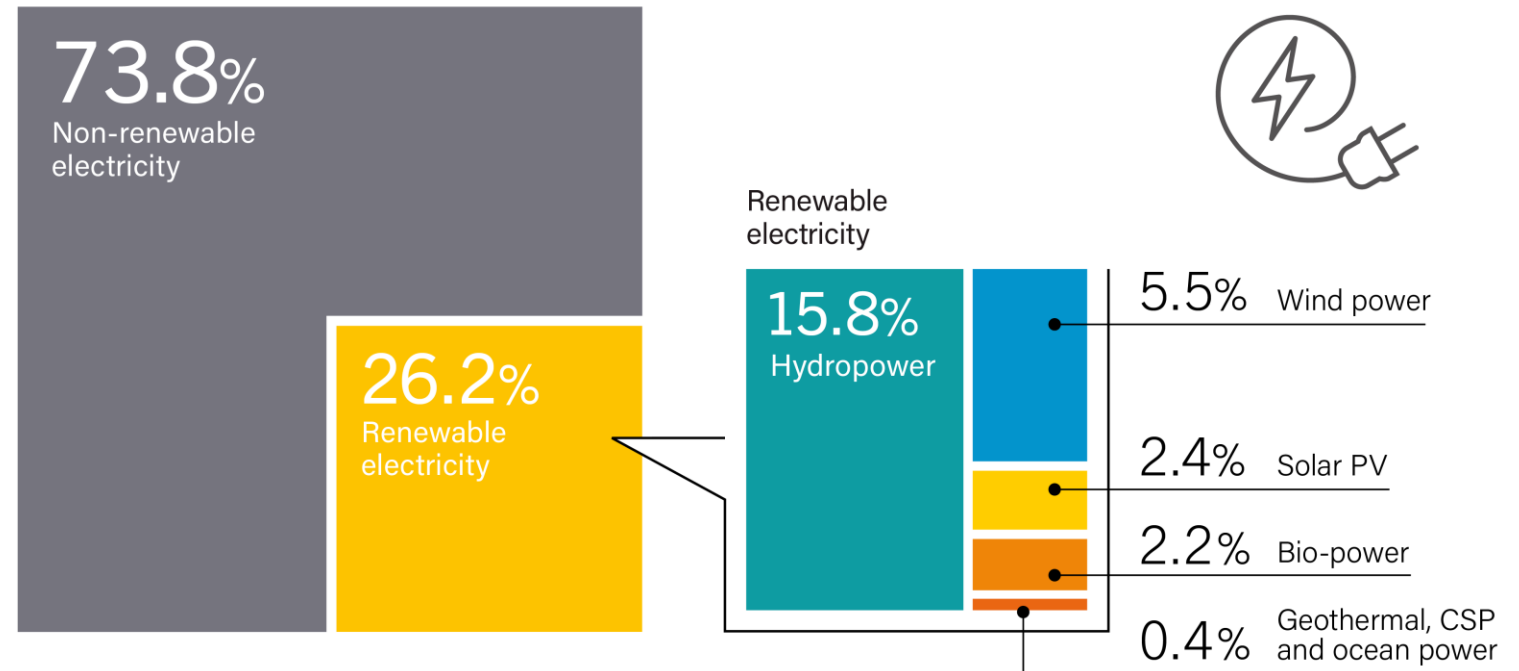
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Power sector leading: Renewables supply more than 26% of global electricity

- Renewables supplied an estimated 26.2% of global electricity at the end of 2018
- For the first time, more electricity was from solar PV than bio-power
- Strong growth in renewable generation, but rising electricity demand (up 4% in 2018) makes it challenging to achieve larger share

Estimated Renewable Energy Share of Global Electricity Production, End-2018



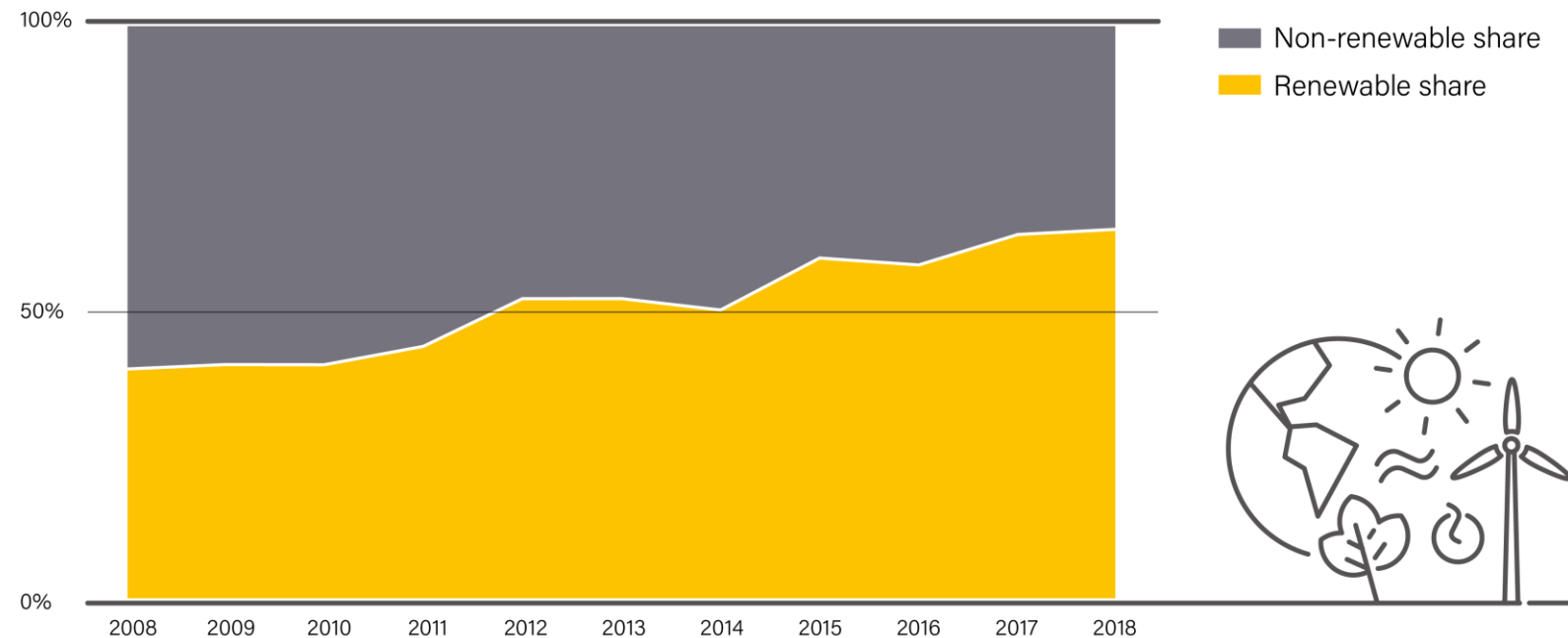
Note: Data should not be compared with previous version of this figure due to revisions in data and methodology.

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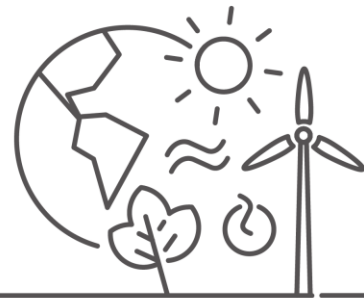
More renewable power capacity added than fossil fuel and nuclear power

- In 2018, nearly twice as much renewable power capacity added as all other sources, **the highest share ever**
- Fourth consecutive year that net additions of renewable power were **more than 50%**
- 2011 was the last year that clearly more non-renewable capacity was added than renewable

Share of Renewables in Net Annual Additions of Power Generating Capacity, 2008-2018



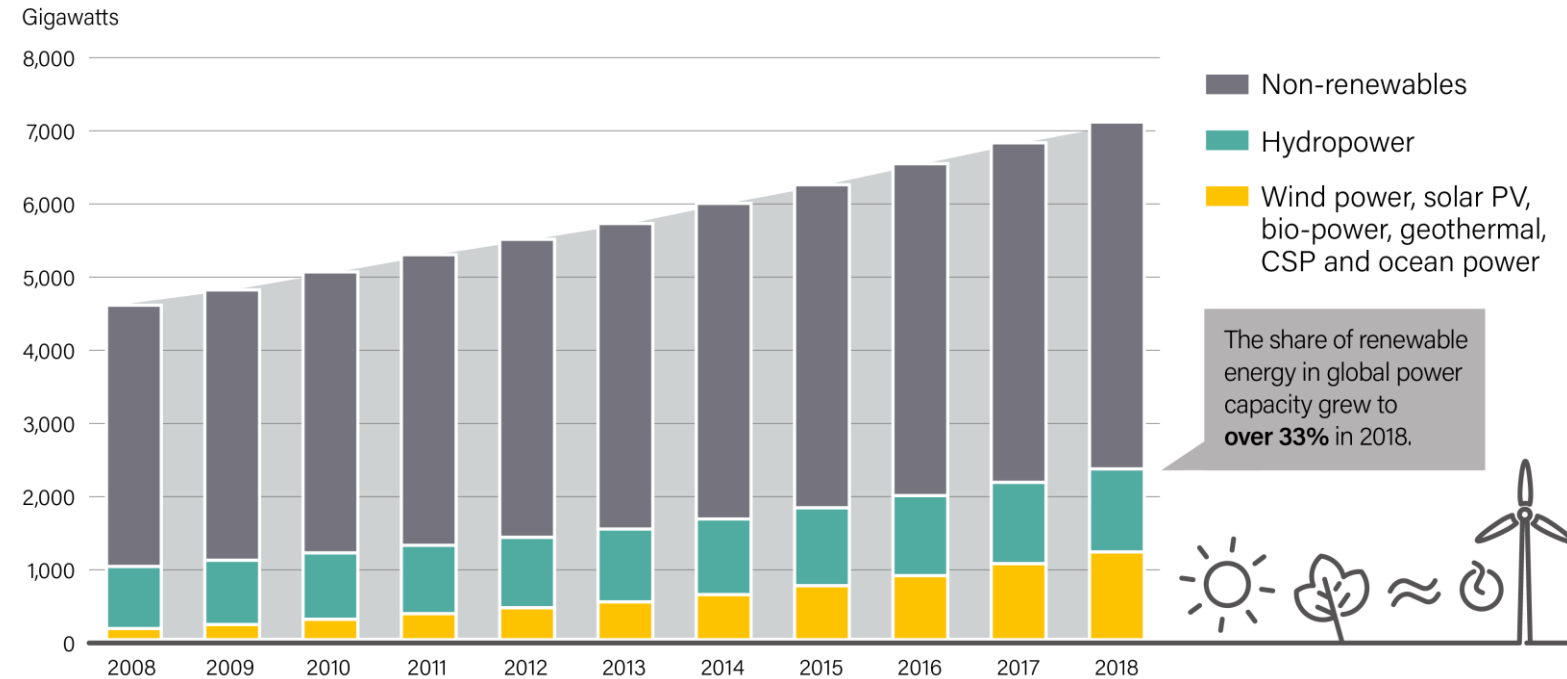
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Renewable power now makes up over one-third of global capacity

- Renewable energy is now **more than 33%** of global installed power generating capacity
- Within renewable capacity, hydropower (1,132 GW) no longer makes up half of installed capacity
- Wind power (592 GW) accounts for 25% and solar PV (505 GW) covers over 21%
- Remaining 6% of bio-power, geothermal power, CSP and ocean

Global Power Generating Capacity, by Source, 2008-2018

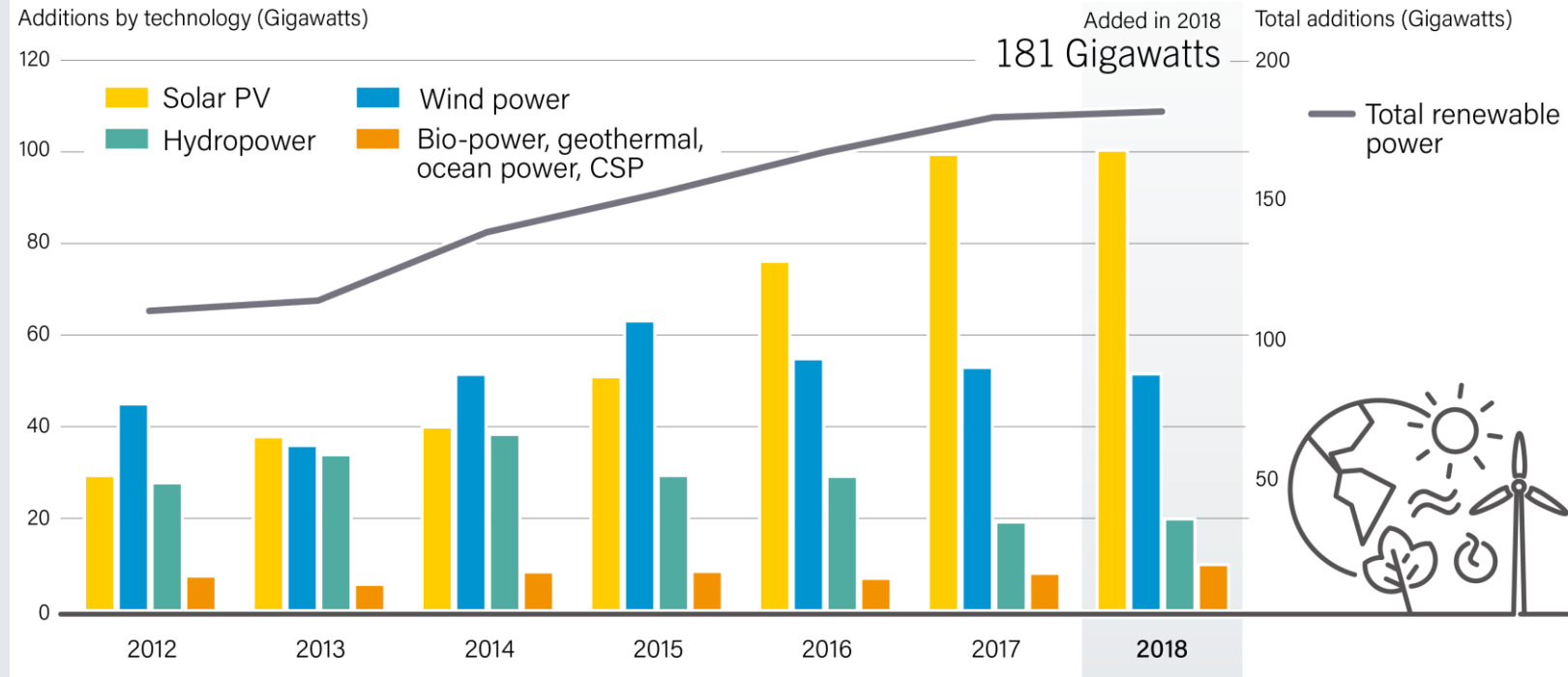


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181 gigawatts of renewable power added in 2018

- Around **55%** of these new additions were solar PV
- Added in 2018:
 - 100 GW of solar PV
 - 51 GW of wind power
 - 20 GW of hydropower
 - 10 GW of bio-power, CSP and geothermal power
- 2018 was the **4th** consecutive year that **more than 50 GW of wind power** was added

Annual Additions of Renewable Power Capacity, by Technology and Total, 2012-2018



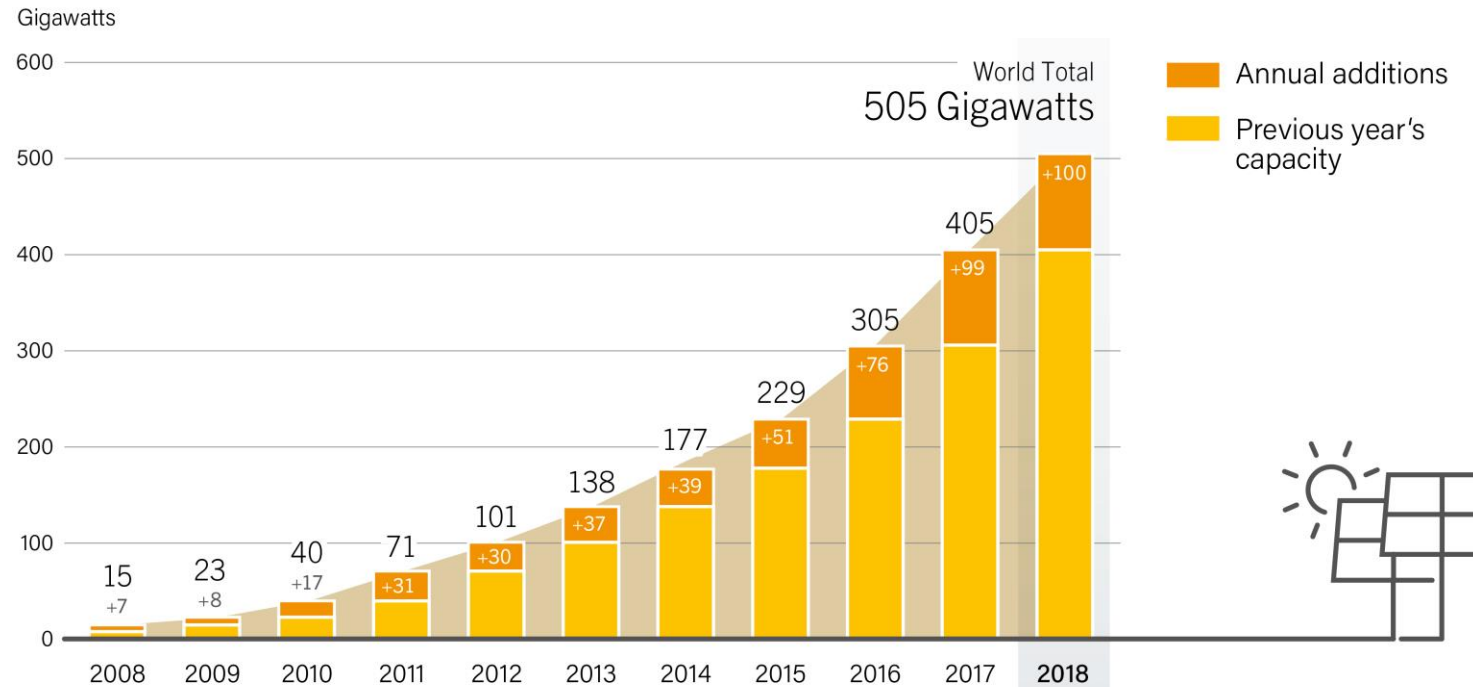
Note: Solar PV capacity data are provided in direct current (DC).

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Solar PV capacity additions pass 100 GW mark

- Solar PV capacity additions were **more than 100 GW** for the first time
- Cumulative capacity reached **505 GW**, an increase of **25%** from 2017
- **11** countries added more than 1 GW in 2018

Solar PV Global Capacity and Annual Additions, 2008-2018



Note: Data are provided in direct current (DC). Totals may not add up due to rounding.

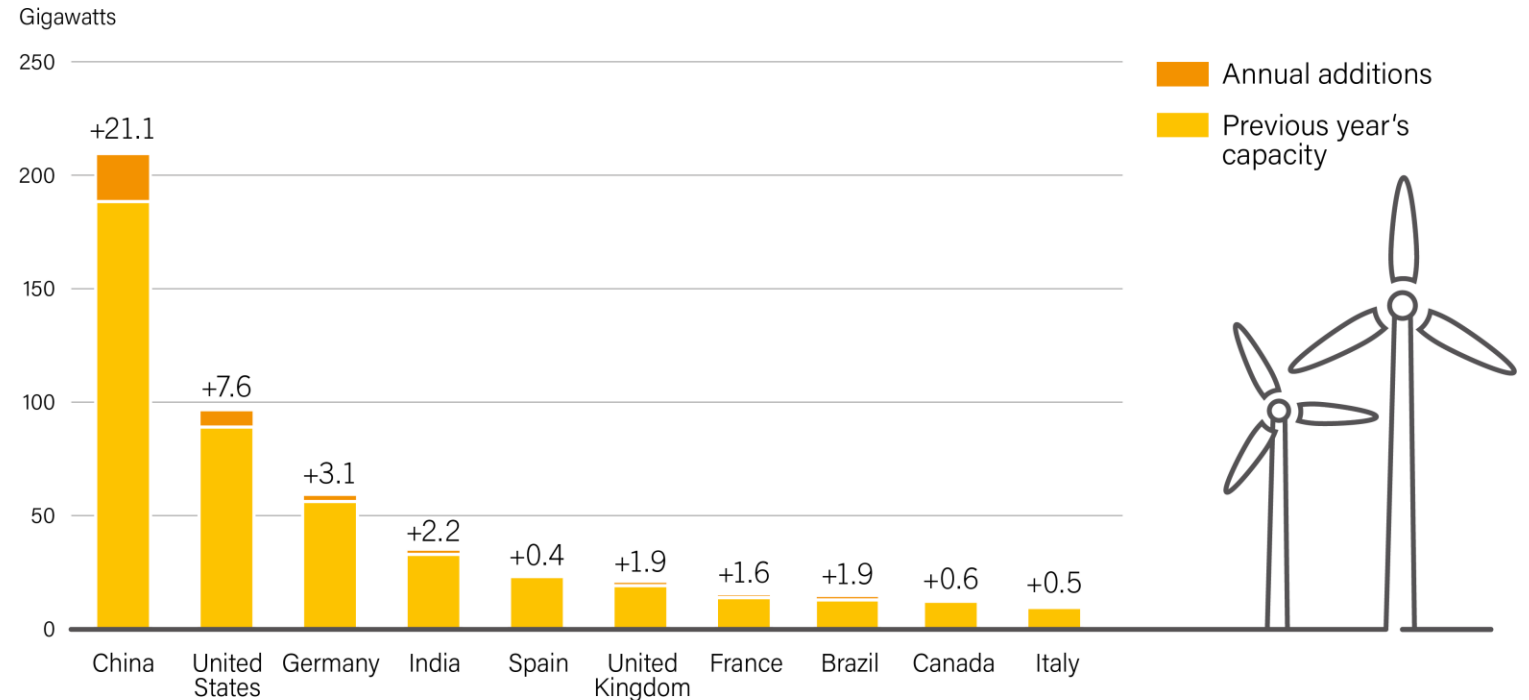
Source: Becquerel Institute and IEA PVPS.

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Wind power capacity continues to increase steadily year-on-year

- The additions in 2018 pushed cumulative capacity up **9%** to **591 GW**
- China became the **first country to exceed 200 GW** of capacity and saw an increase in new installations after two years of decline

Wind Power Capacity and Additions, Top 10 Countries, 2018



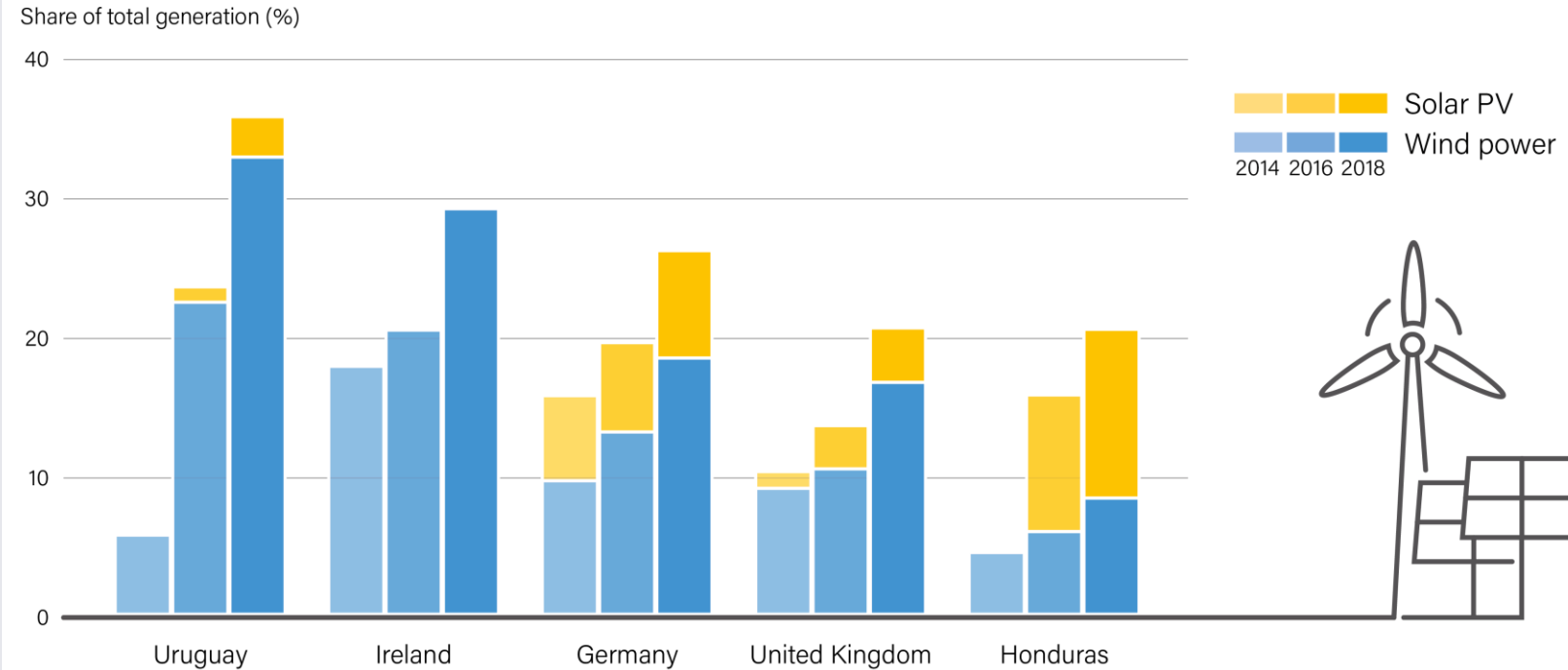
Note: Additions are net of decommissioning.

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Variable renewable shares have grown dramatically in some countries

- The power sector is transforming rapidly in some countries
- Variable renewables have seen penetration rates **above 20%** in at least nine countries in 2018
- Average annual growth rates of **more than 10%** in at least five countries

Share of Electricity Generation from Variable Renewable Energy, Selected Countries, 2014, 2016, 2018

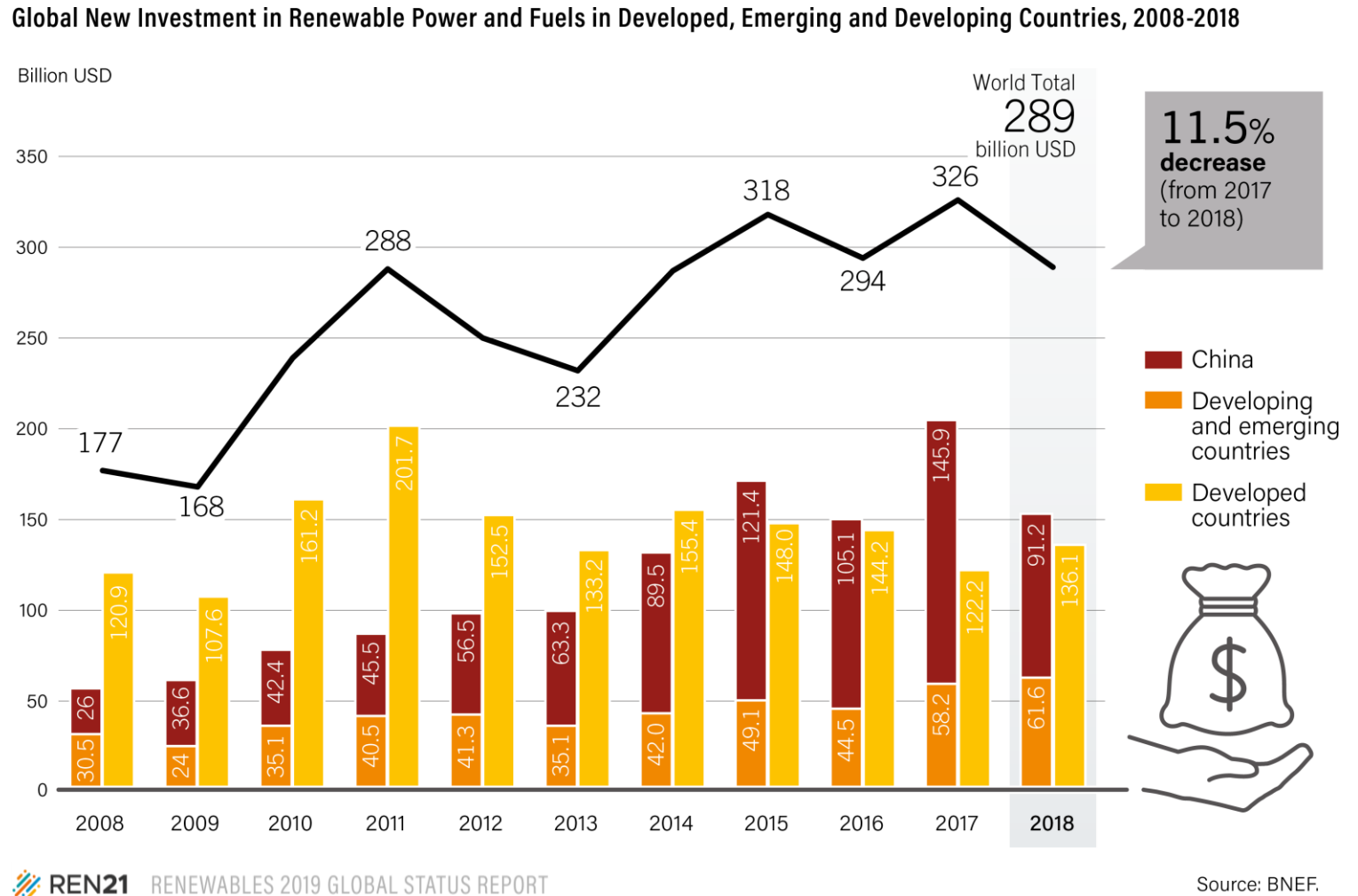


Note: This figure includes selected countries with high shares of variable renewable energy according to the best available data at the time of publication. Factors including annual weather variations may significantly impact generation from VRE in a particular year. Trends shown are not meant to imply assumed future growth of generation shares.

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Investment in renewable energy fell in China, rose elsewhere

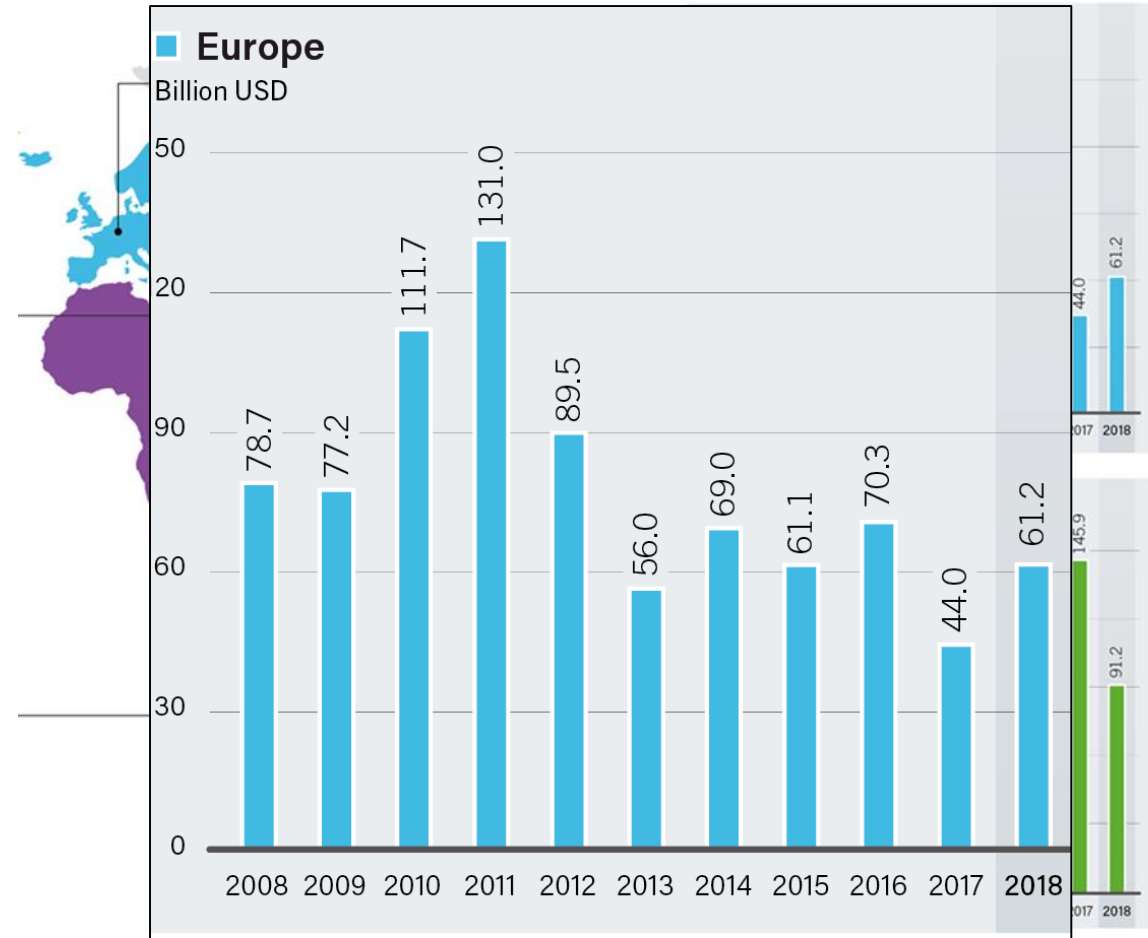
- Global investment in renewable power and fuels totalled **USD 288.9 billion**, a decrease of **11.5%**
 - Fall driven mainly by China
- **Fifth consecutive year** in which investment topped USD 280 billion
- Investment in developing and emerging countries exceeded that in developed countries for the **fourth consecutive year**



Investment in renewable power and fuels grew 39% in Europe

- European investment grew to USD 61.2 billion after a low in 2017
 - Also rising the Middle East and Africa, Asia and the United States
 - Falling in the Americas, China and India
- Europe accounted for 21% of global investment
- China still accounted for majority (32%) of investment despite the decline in its market

Global New Investment in Renewable Power and Fuels, by Country or Region, 2008-2018



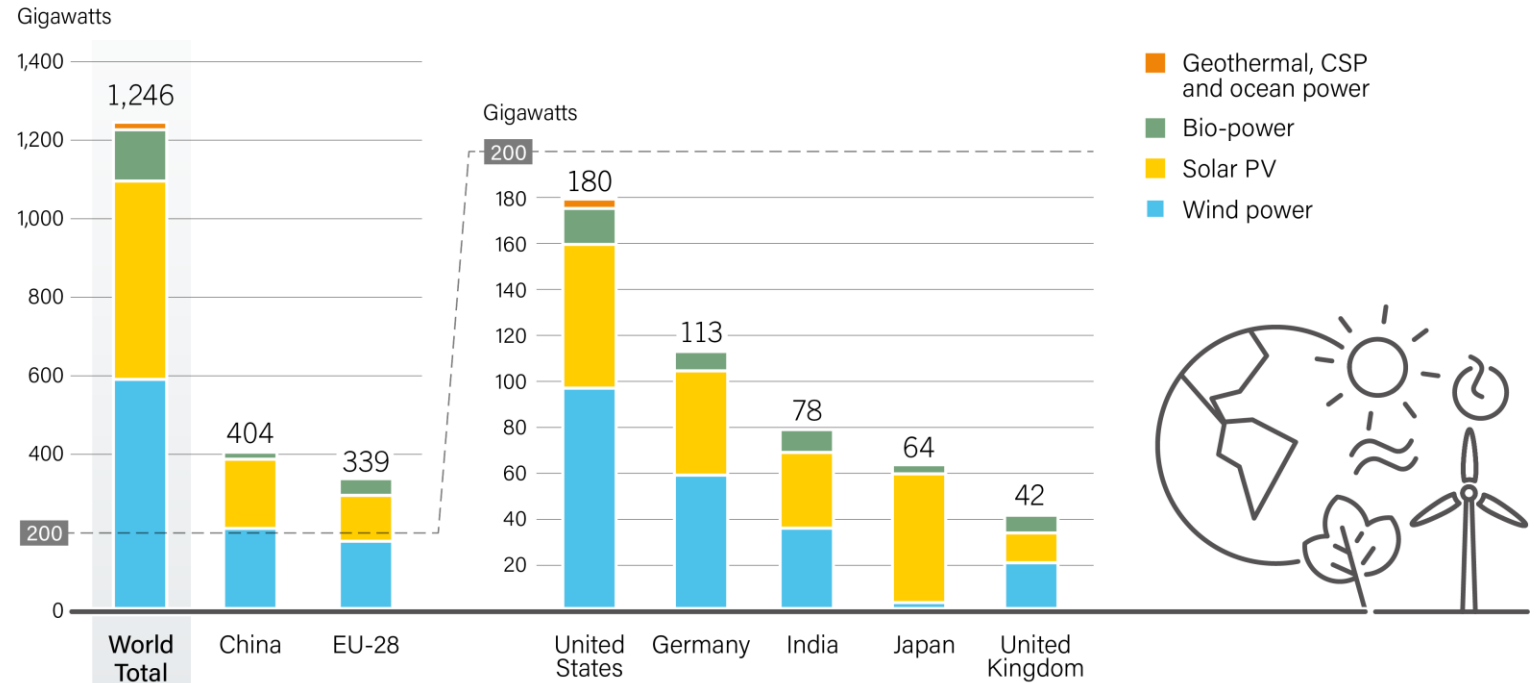
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Source: BNEF.

European Union has 27% of the world's non-hydro renewable capacity

- More than **90** countries had at least **1GW** of generating capacity
- Considering non-hydro capacity:
 - 32% in China
 - 27% in the European Union
 - 14% in the United States
- At least **45** countries have over **1GW** of non-hydro renewables,
 - **17** countries have more than **10 GW** combined of wind power, solar PV, bio-power and geothermal power

Renewable Power Capacities in World, EU-28 and Top 6 Countries, 2018



Note: Not including hydropower.

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European markets for variable renewable energy

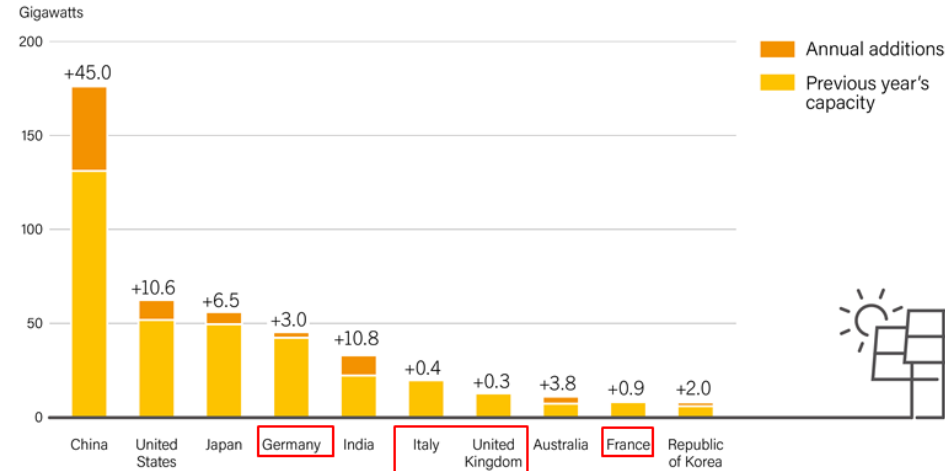
→ Solar PV in Europe

- 8.3 GW added for a total capacity of 115 GW
- Maintained **second-place** regional ranking for global capacity
- Largest markets in 2018: DE, NL, FR, IT

→ Wind power in Europe

- Around 10.1 GW added for a total capacity of 179 GW
 - 2.7 GW offshore
 - Market down 35% on 2017, most reductions DE and UK
- Wind power is nearly 20% of Europe's installed power capacity

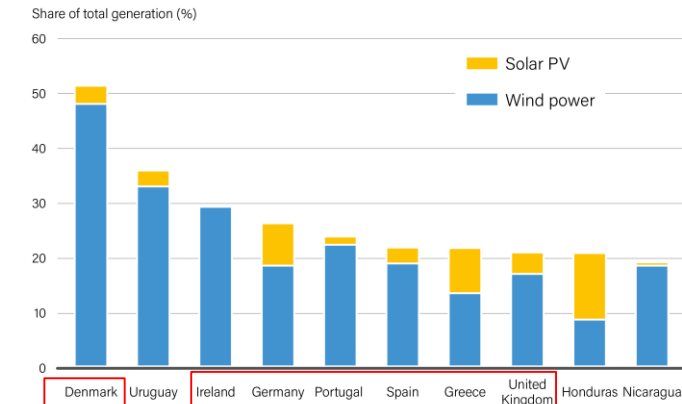
Solar PV Capacity and Additions, Top 10 Countries, 2018



Note: Data are provided in direct current (DC).
Data for India are highly uncertain.

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Share of Electricity Generation from Variable Renewable Energy, Top 10 Countries, 2018



Note: This figure includes the top 10 countries according to the best available data known to REN21 at the time of publication.

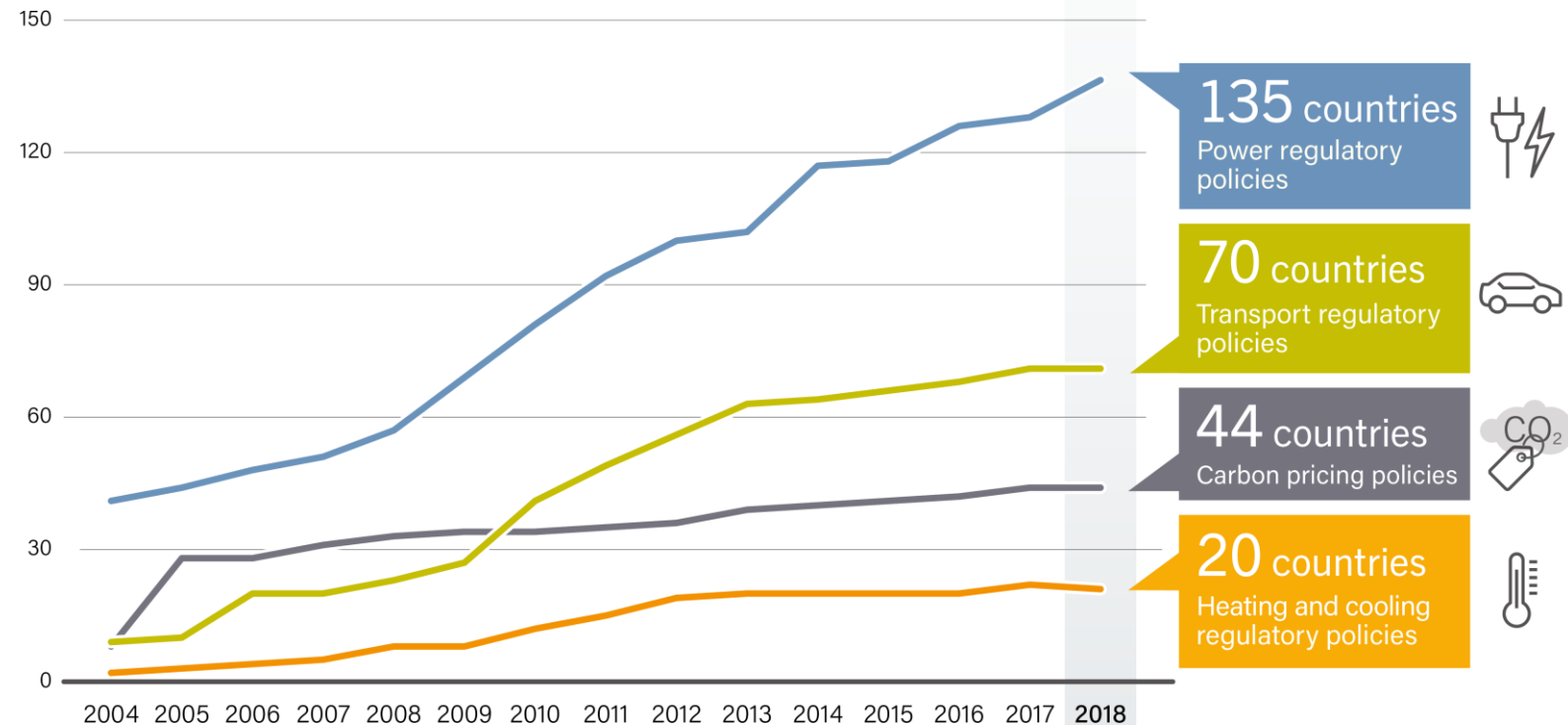
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More than 15% of EU's electricity in 2018 came from wind & solar PV

Advances in power made possible by policy support, other sectors lacking

- Renewable power **auctions** were held in at least **48** countries
- **FITs** in place in **111** countries
- **No new countries** adopted biofuels mandates
- The number of countries with H&C regulatory policies **fell by 1**

Number of Countries with Renewable Energy Regulatory Policies and Carbon Pricing Policies, 2004-2018

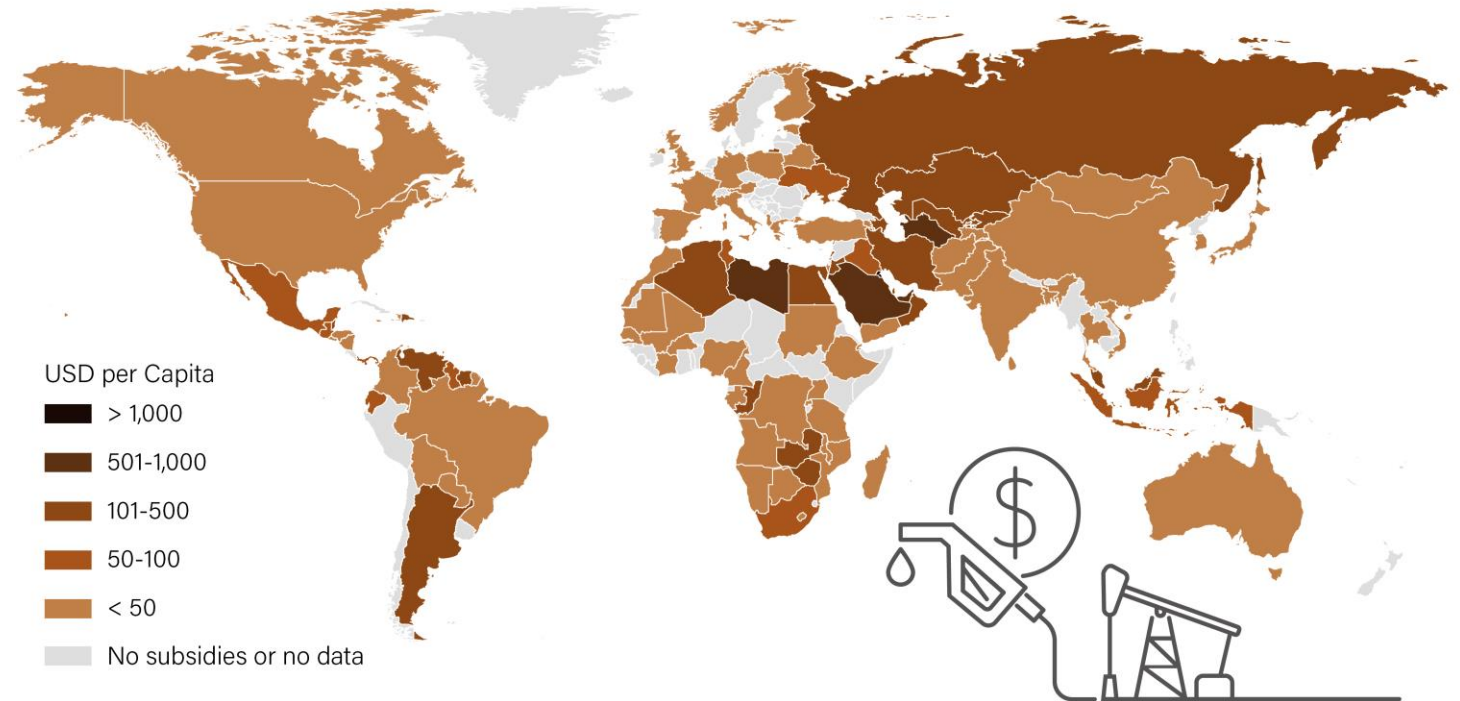


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Not a level playing field: Fossil fuel subsidies are still widespread

- Global subsidies for fossil fuel consumption reached an estimated **USD 300 billion** in 2017
 - an 11% increase from the year before
 - about double the estimated support for renewable power generation
- Fossil fuel subsidies remained in place in at least **115 countries** in 2017
- 73 countries provide subsidies of **more than USD 100 million** each

Fossil Fuel Subsidies, per Person, by Country, 2017



Note: Shading depicts pre-tax consumption subsidies only.

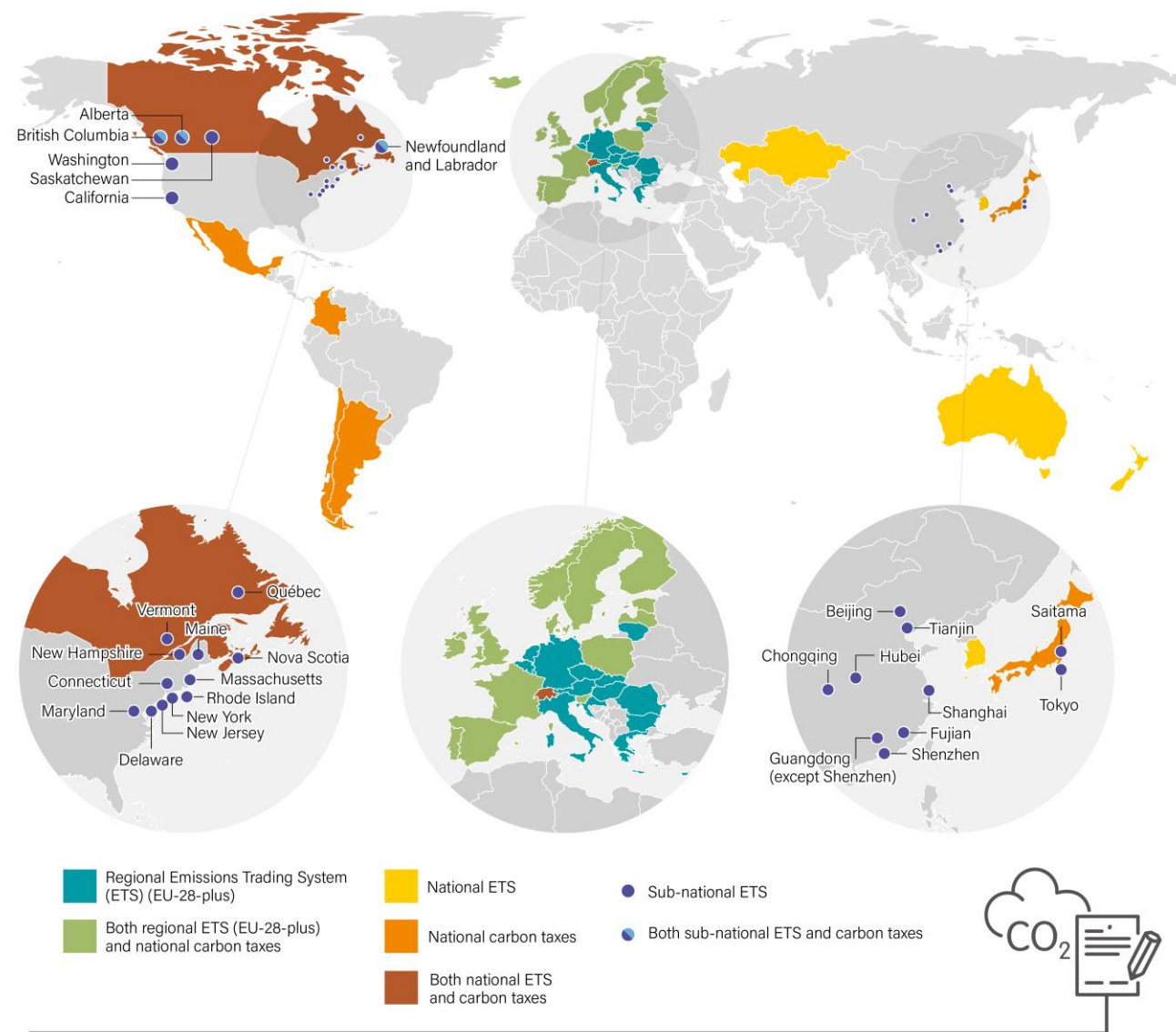
Source: IMF.

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Carbon pricing slowly expanding

- At least **54** carbon pricing initiatives implemented by end-2018
 - 27 emission trading systems
 - 27 carbon taxes
 - Covering 44 countries
- Covering only **13%** of global greenhouse gas emissions

Carbon Pricing Policies, End-2018



A sustainable energy future requires stronger policy action now

THE WORLD IS **NOT ON TRACK**...

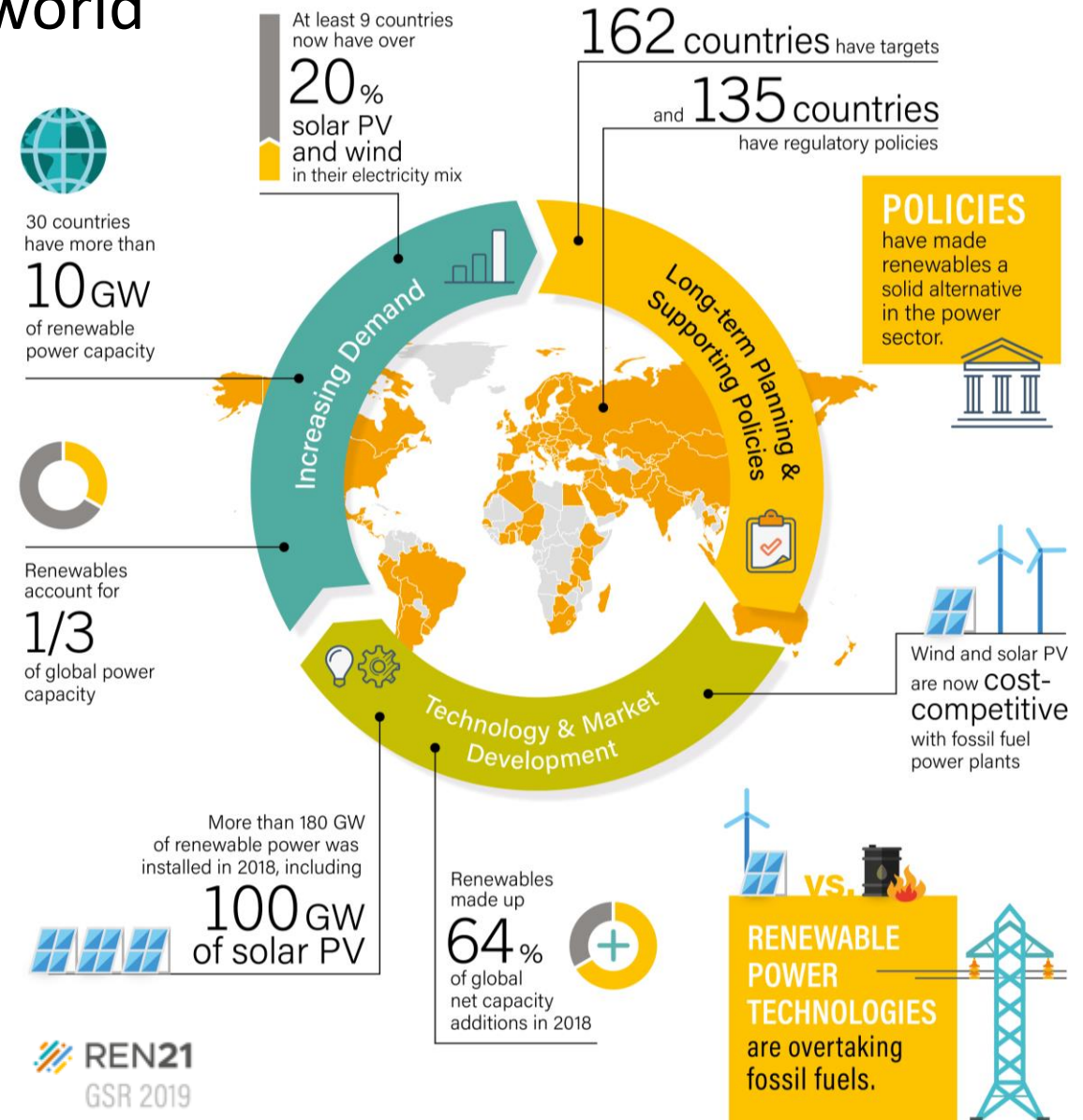
- ... to **limit global warming** to 1.5°C as outlined in the Paris Agreement
- ... to **achieve SDG7 goals** for renewables, energy efficiency and energy access

→ CLIMATE AND DEVELOPMENT CHALLENGES
CALL FOR **ACCELERATING THE TRANSITION**
FROM FOSSIL FUELS TO **RENEWABLE ENERGY**



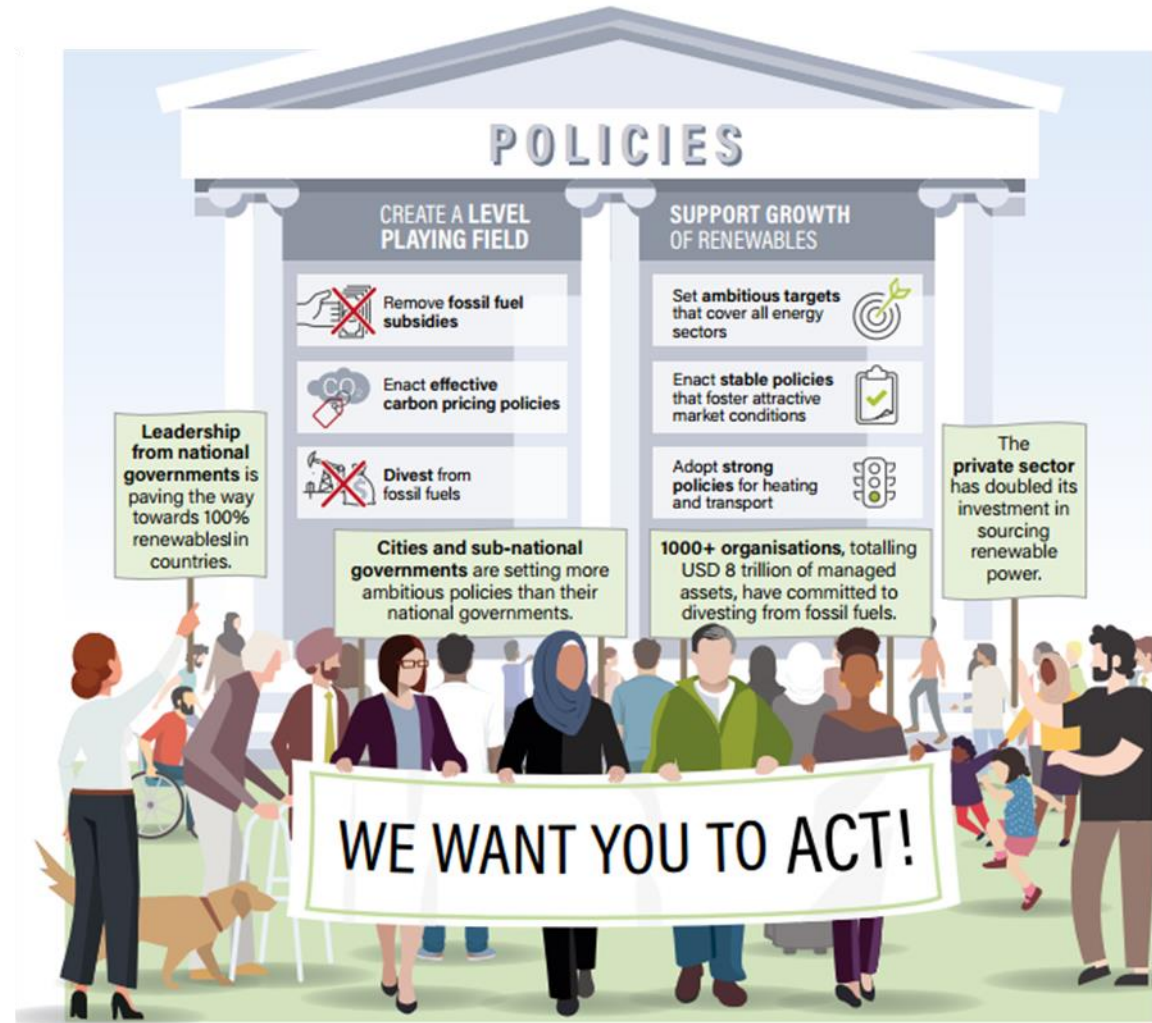
Renewable energy is powering the world

Reliable and
Mainstream:
Renewable
power is here
to stay!



The transition is possible – positive examples are showing the way!

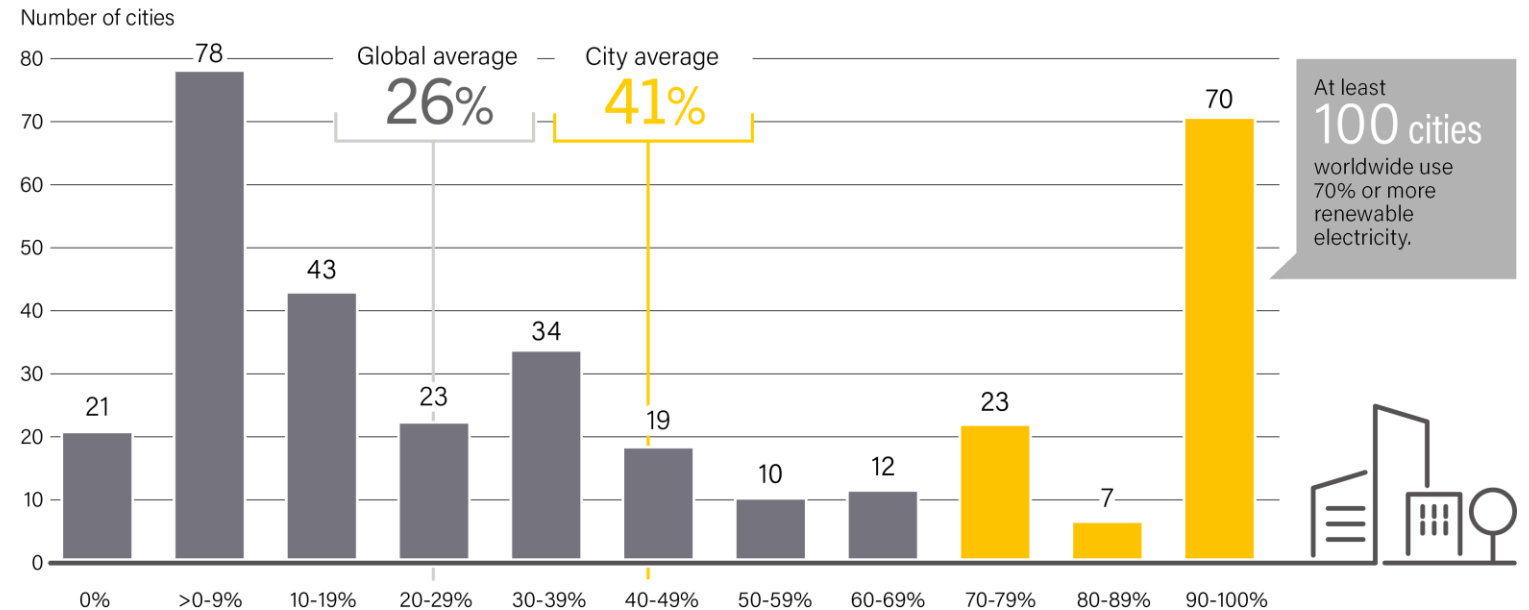
- **Leadership from national governments** is paving the way towards 100% renewables in countries.
- **1000+ organisations**, totaling USD 8 trillion of managed assets, have committed to divesting from fossil fuels.
- The **private sector** has doubled its investment in sourcing renewable power.
- **Cities and sub-national governments** are setting more ambitious policies than their national governments.



Cities are advancing renewables to achieve diverse goals

- Cities account for **65%** of global energy demand
- Some cities able to accomplish more ambitious renewables goals than national and state/provincial bodies
 - At least **100 cities** sourcing **70% or more** of their electricity from renewables
 - More than **40 cities** were already powered by **100%** renewables

Renewable Power in Cities*, by Number of Cities and Renewable Share, 2017



* The figure shows shares of renewables in the electricity consumption of 340 cities that self-reported to CDP.

Source: CDP.

Note: City average is calculated based on the 340 cities shown. Categories include all values below the lower limit of adjacent category.

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From an electricity transition to an energy system transformation

- **Create a level playing field** by removing fossil fuel subsidies and adopting carbon pricing
- **Encourage sector integration** among power, heating and cooling, and transport
- **Align policies** across the national, sub-national and local levels
- **Link to energy efficiency** in renewable energy policy initiatives

