
RENEWABLES NOW

Renewables 2020 Global Status Report

The leading role of solar energy

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REN21 Secretariat
6 July 2020

REN21

THE ONLY GLOBAL RENEWABLE ENERGY MULTI-STAKEHOLDER COMMUNITY

GOVERNMENTS
Afghanistan, Brazil, Denmark, Dominican Republic, Germany, India, Mexico, Norway, Republic of Korea, South Africa, Spain, UAE, USA

NGOs
Club-ER, CLASP, CCA, CAN-I, CEEW, Energy Cities, FER, Global 100% RE, GFSE, GWNET, Greenpeace Intl, ICLEI, ISEP, IEC, JVE, MFC, Power for All, REEEP, REI, SCI, SLOCAT, WCRE, WFC, WRI, WWF

SCIENCE & ACADEMIA
AEE INTEC, Fundacion Bariloche, Higher School of Economics (Russia), IIASA, ISES, NREL, SANEDI, TERI

INTERGOVERNMENTAL ORGANISATIONS
ADB, APERC, ECREEE, EC, GEF, IEA, IRENA, IsDB, RCREEE, UNDP, UN Environment, UNIDO, World Bank

INDUSTRY ASSOCIATIONS
AMDA, ARE, ACORE, APREN, ALER, CREIA, CEC, EHP, EREF, GOGLA, GSC, GWEC, IREF, IGA, IHA, RES4Africa, WBA, WWEA

MAKE THE SHIFT TO RENEWABLE ENERGY HAPPEN – NOW!

The only **global community** of renewable energy actors from science, academia, NGOs, governments, and industry.

Our more than **2,000 community members** co-operate collecting information, changing norms and debating.

We build upon a **decentralized intelligence,** ensuring high responsiveness to an ever changing environment.

Our **annual publications** are probably the world's most comprehensive, crowdsourced reports on renewables.

RENEWABLES 2020 GLOBAL STATUS REPORT

COLLABORATIVE ANNUAL REPORTING ON RENEWABLES SINCE 2005

THE REPORT FEATURES:

- Global Overview
- Policy Landscape
- Market and Industry Trends
- Distributed Renewables for Energy Access
- Investment Flows
- Energy Systems Integration and Enabling Technologies
- Energy Efficiency
- Feature: Public Support for Renewables

RENEWABLE ENERGY CONTINUED TO GROW IN 2019

- **Total power capacity rose 8.4%**
  - 2,588 GW including hydropower
  - Non-hydropower: 14.7% increase
- **200 GW of renewable power additions**
  - Solar PV: 115 GW
  - Wind: 60 GW
  - Hydro: 16 GW
- **Renewable heat demand increased marginally**

		2018	2019
INVESTMENT			
New investment (annual) in renewable power and fuels[1]	billion USD	296.0	**301.7**
POWER			
Renewable power capacity (including hydropower)	GW	2,387	**2,588**
Renewable power capacity (not including hydropower)	GW	1,252	**1,437**
Hydropower capacity[2]	GW	1,135	**1,150**
Wind power capacity	GW	591	**651**
Solar PV capacity[3]	GW	512	**627**
Bio-power capacity	GW	131	**139**
Geothermal power capacity	GW	13.2	**13.9**
Concentrating solar thermal power (CSP) capacity	GW	5.6	**6.2**
Ocean power capacity	GW	0.5	**0.5**
HEAT			
Modern bio-heat demand (estimated)[4]	EJ	13.9	**14.1**
Solar hot water demand (estimated)[5]	EJ	1.4	**1.4**
Geothermal direct-use heat demand (estimated)[6]	PJ	384	**421**

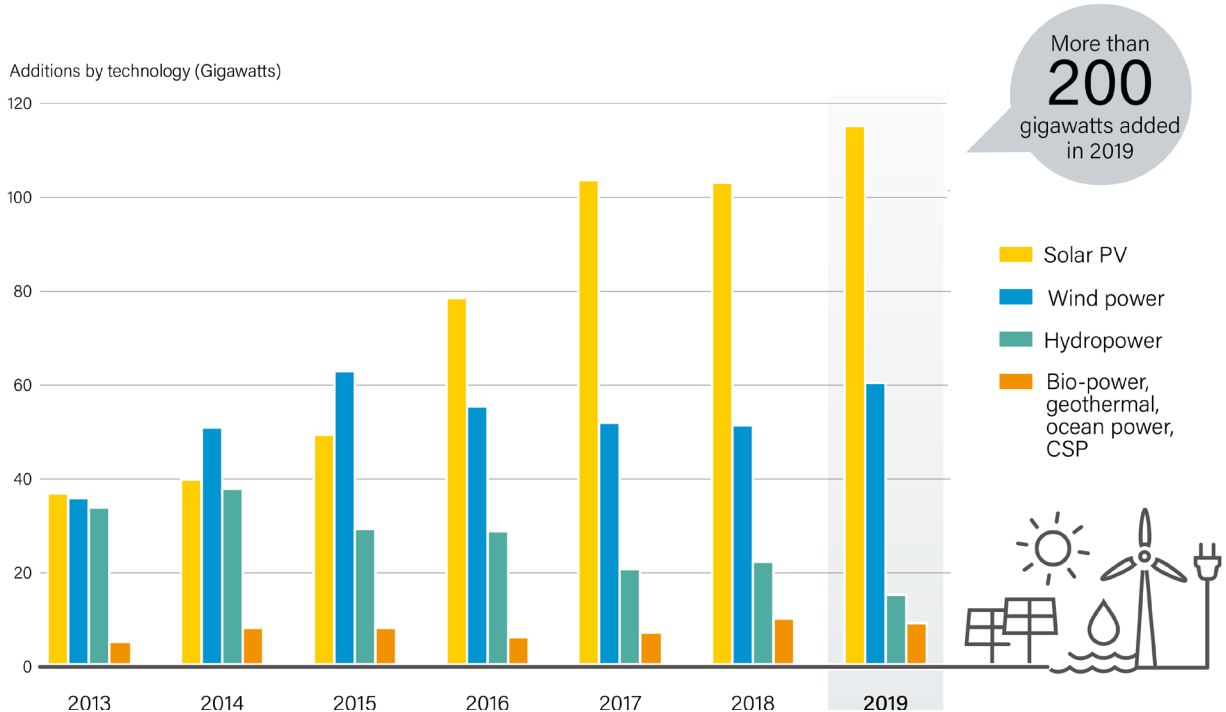
WHICH COUNTRIES LED THE WAY IN 2019?

Annual Investment / Net Capacity Additions / Production in 2019

Technologies ordered based on total capacity additions in 2019.

	1	2	3	4	5
Investment in renewable power and fuels capacity (not including hydropower over 50 MW)	**China**	United States	Japan	India	Chinese Taipei
Solar PV capacity	**China**	United States	India	Japan	Vietnam
Wind power capacity	**China**	United States	United Kingdom	India	Spain
Hydropower capacity	**Brazil**	China	Lao PDR	Bhutan	Tajikistan
Geothermal power capacity	**Turkey**	Indonesia	Kenya	Costa Rica	Japan
Concentrating solar thermal power (CSP) capacity	**Israel**	China	South Africa	Kuwait	France
Solar water heating capacity	**China**	Turkey	India	Brazil	United States

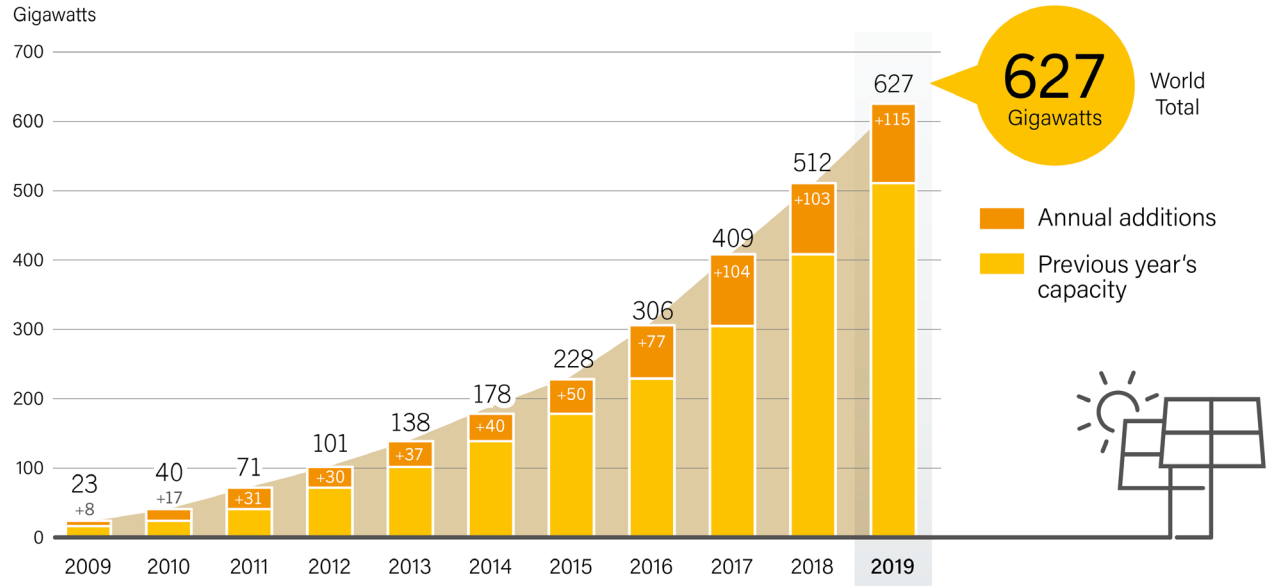
A RECORD 200 GIGAWATTS OF RENEWABLE POWER ADDED IN 2019



Annual Additions of Renewable Power Capacity, by Technology and Total, 2013-2019

Most of the additions were from **solar PV (115 GW)**, but global markets for wind power and bio-power also grew during 2019.

SOLAR PV CAPACITY ADDITIONS PASSED 115 GW MARK IN 2019



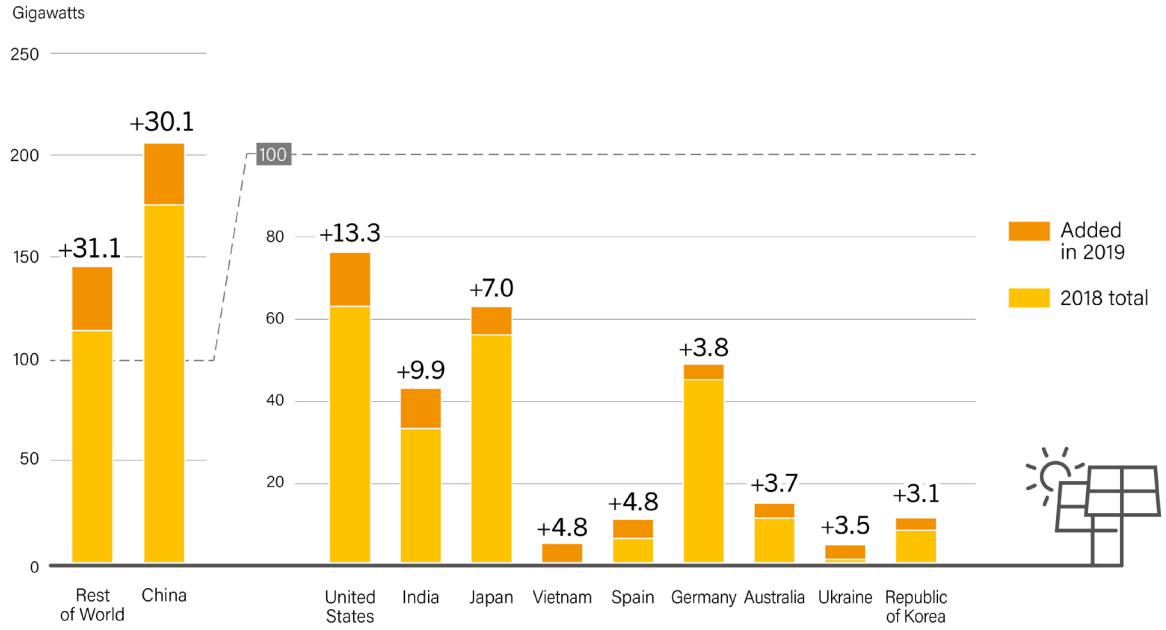
Solar PV Global Capacity and Annual Additions, 2009-2019

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

Source: Becquerel Institute and IEA PVPS.

By the end of 2019, **22 countries** had enough capacity in operation to meet **at least 3% of their** electricity demand with solar PV.

CHINA REMAINS LEADER IN SOLAR PV DESPITE DECLINE IN MARKET

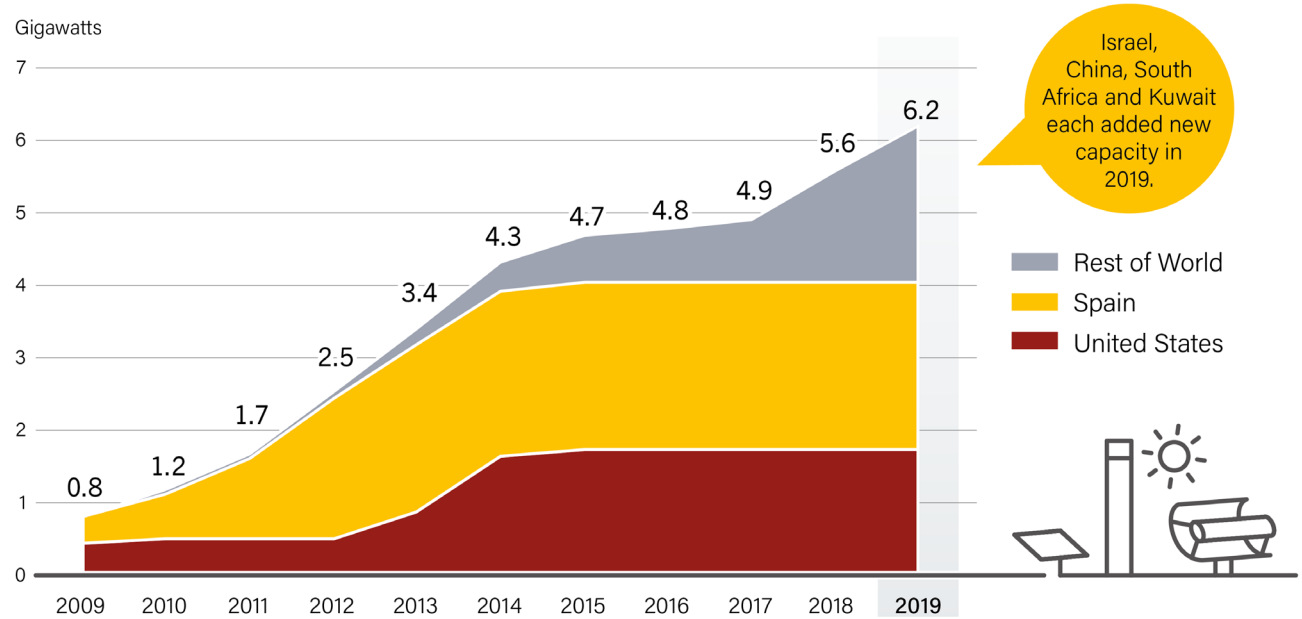


Note: Data are provided in direct current (DC).

Solar PV Capacity and Additions, Top 10 Countries for Capacity Added, 2019

China's market decline attributed to **policy uncertainty** following the removal of a feed-in tariff law in 2018.

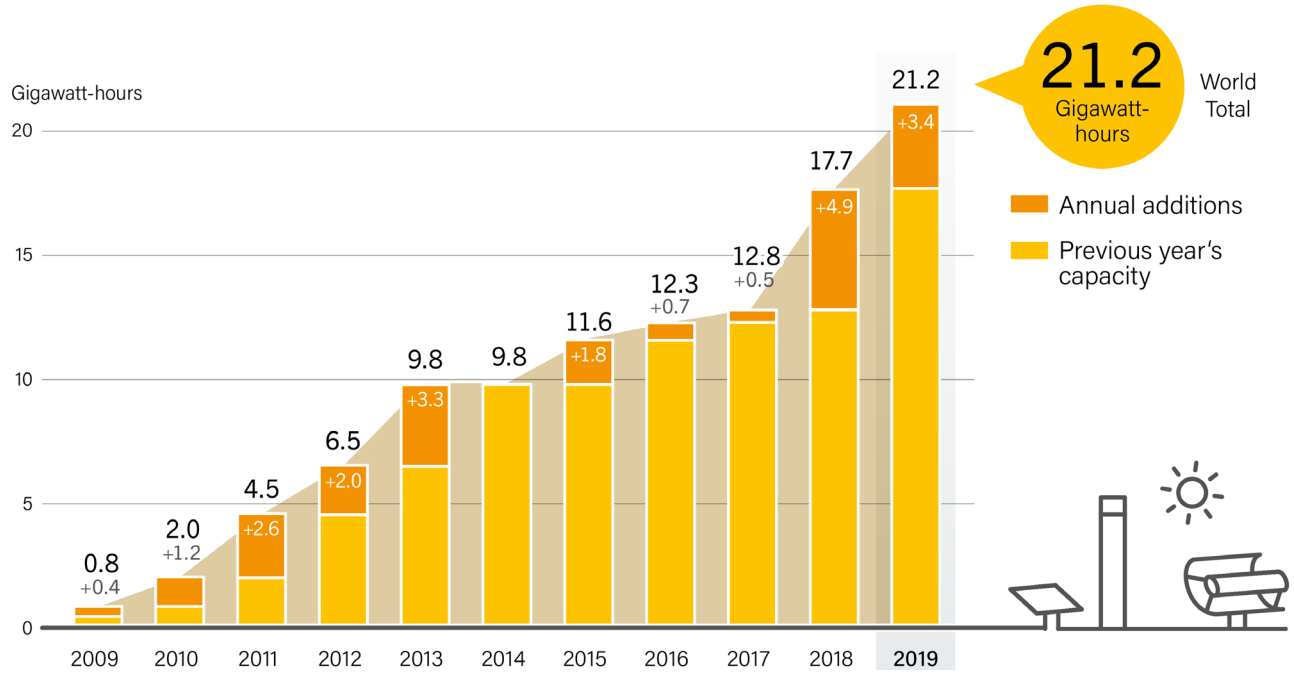
NEW CSP ADDITIONS EXCLUSIVELY IN EMERGING MARKETS



Concentrating Solar Thermal Power Global Capacity, by Country and Region, 2009-2019

Global CSP capacity **grew 11% in 2019**, with around 600 MW of capacity coming online.

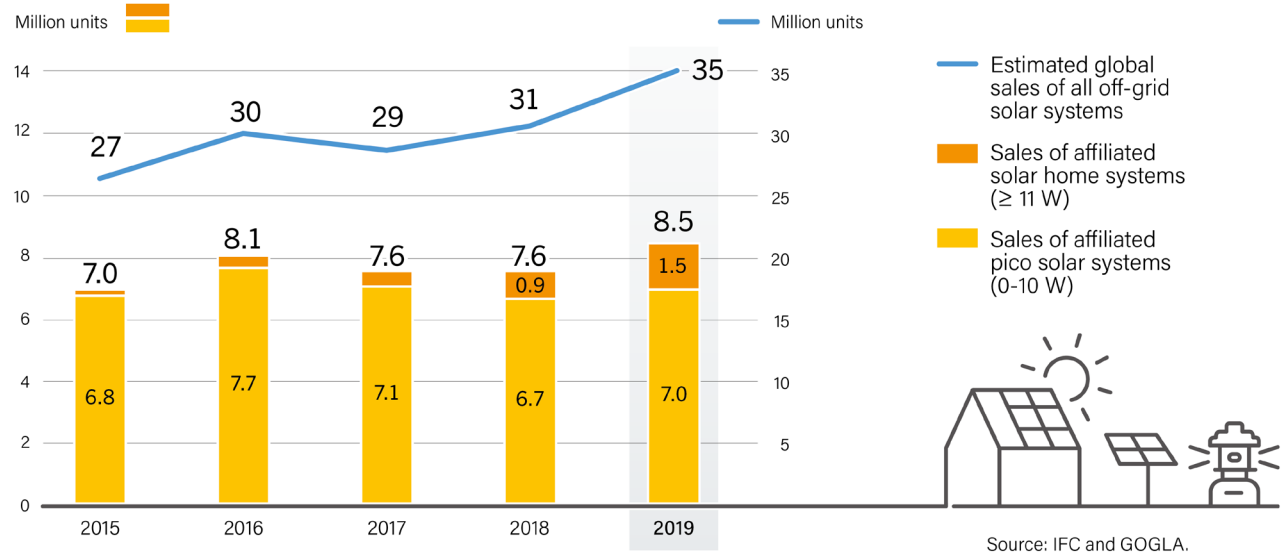
NEARLY ALL CSP PLANTS USE THERMAL ENERGY STORAGE



CSP Thermal Energy Storage Global Capacity and Annual Additions, 2009-2019

21 of the 23 CSP plants completed globally since the end of 2014 have incorporated thermal energy storage.

GLOBAL SALES OF OFF-GRID SOLAR SYSTEMS SEES STRONG GROWTH

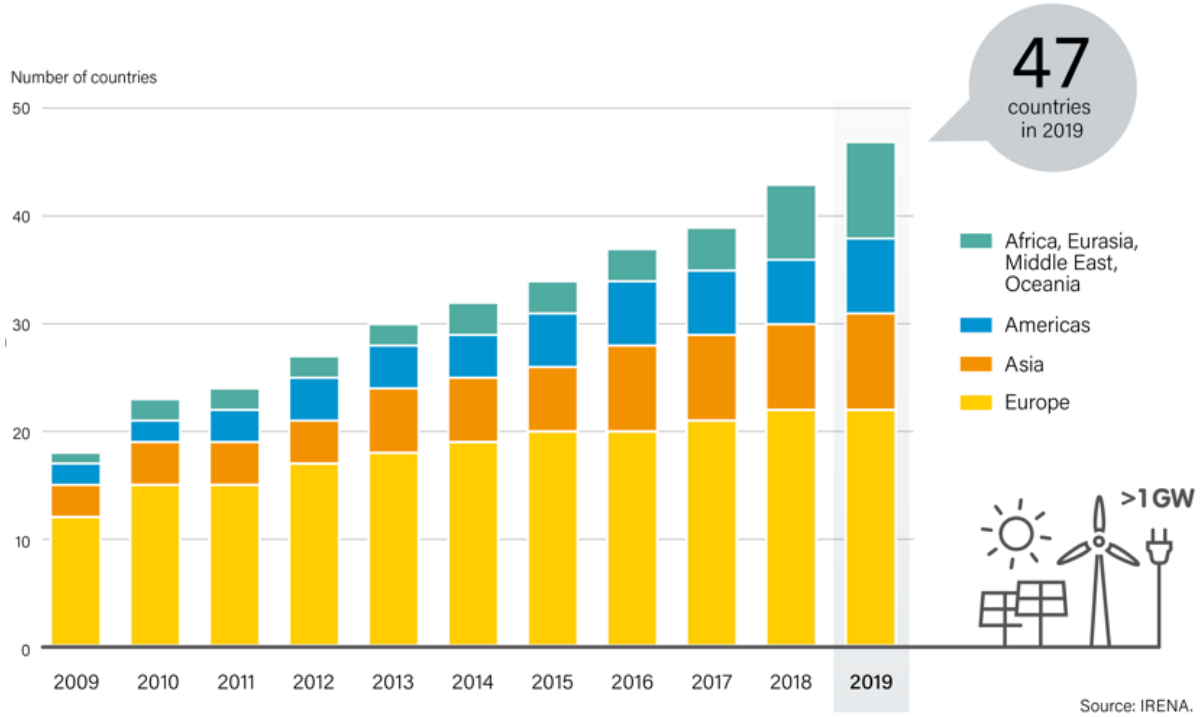


Source: IFC and GOGLA.

Global Sales Volumes of Off-Grid Solar Systems, 2015-2019

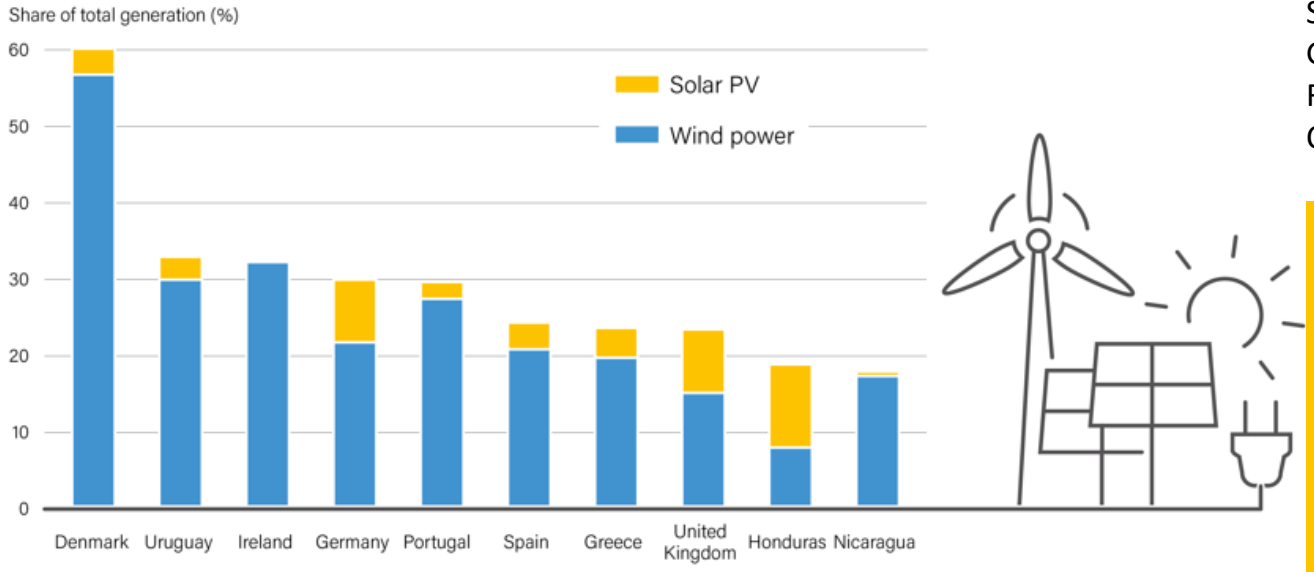
The market for solar lighting systems and solar home systems **grew 13%** in 2019 – the highest growth of the past five years.

SOLAR PV AND WIND POWER ARE SPREADING AROUND THE WORLD



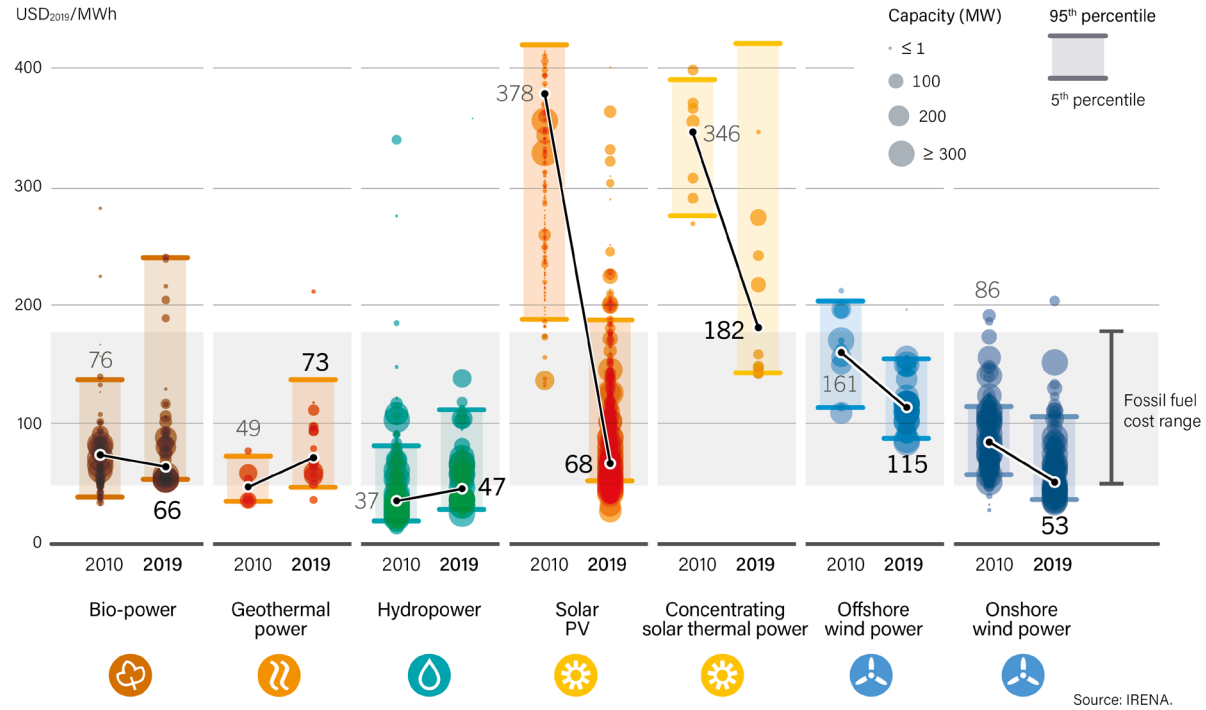
Number of Countries with More Than 1 GW of Solar PV and Wind Power, by Region, 2009-2019

VARIABLE RENEWABLES REACHING HIGH SHARES IN MANY COUNTRIES



Share of Electricity Generation from Variable Renewable Energy, Top Countries, 2019

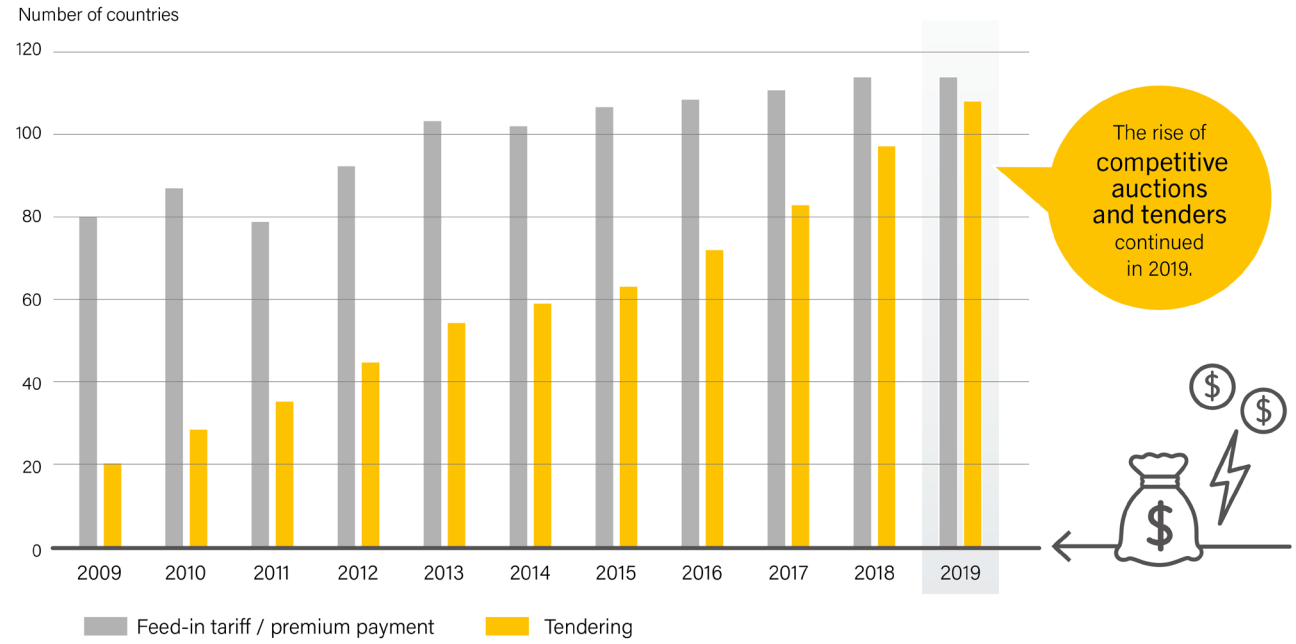
RENEWABLE POWER COSTS KEEP FALLING



Global Levelised Cost of Electricity from Newly Commissioned, Utility-scale Renewable Power Generation Technologies, 2010-2019

Costs for solar PV and CSP as well as onshore and offshore wind have **fallen sharply over the past decade.**

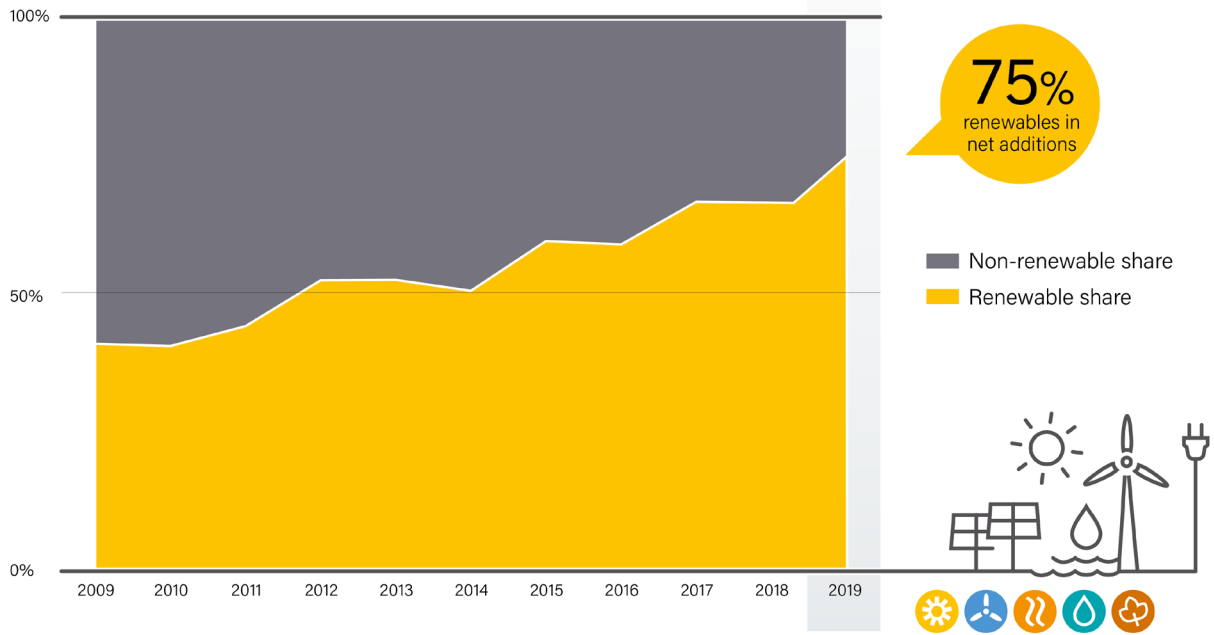
THE RISE OF RENEWABLE POWER AUCTIONS CONTINUED



Cumulative Number of Countries with Feed-in or Tendering Policies, 2009-2019

109 countries had used auctions or tendering as of end-2019, up from 98 total countries in 2018.

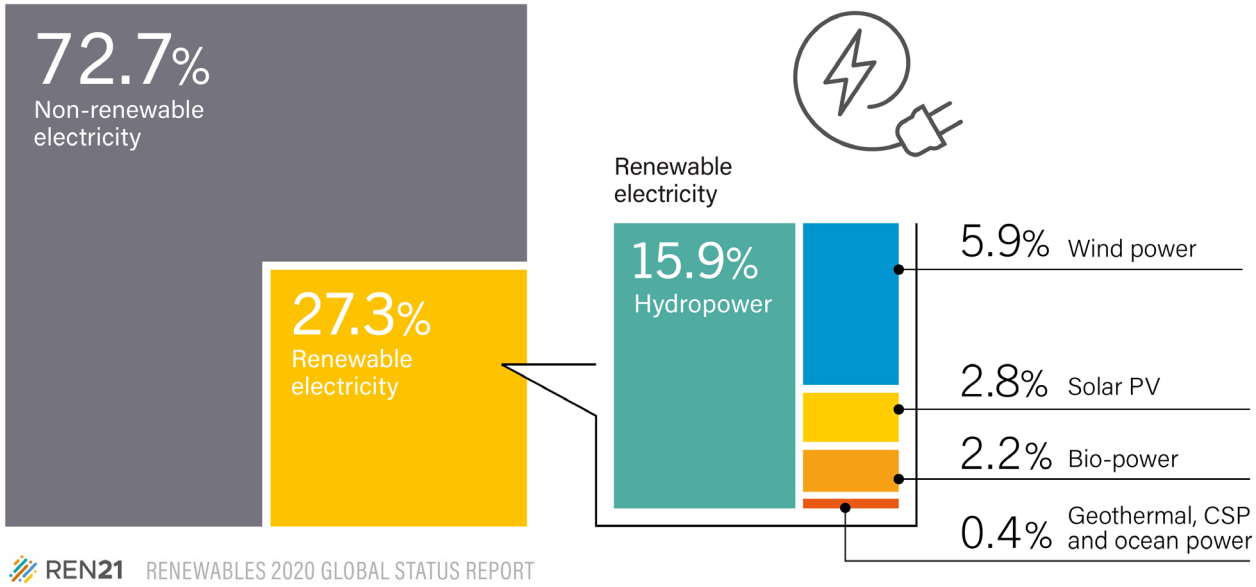
MORE RENEWABLE POWER ADDED THAN FOSSIL FUEL AND NUCLEAR



Renewable and Non-renewable Shares of Net Annual Additions in Power Generating Capacity, 2009-2019

For **the fifth year in a row**, net additions of renewable power generation capacity were higher than net installations of both fossil fuel and nuclear power capacity combined.

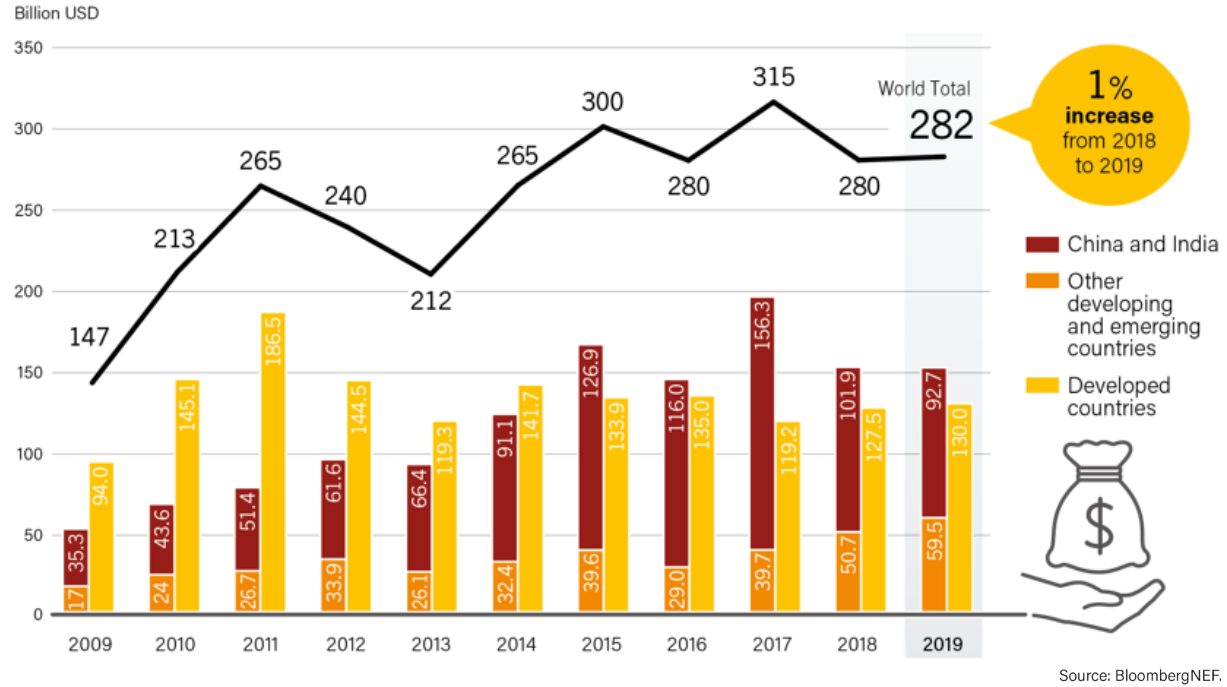
MORE THAN 27% OF GLOBAL ELECTRICITY IS NOW RENEWABLE



Estimated Renewable Energy Share of Global Electricity Production, End-2019

The share of renewables in electricity generation is **rising in many countries around the world.**

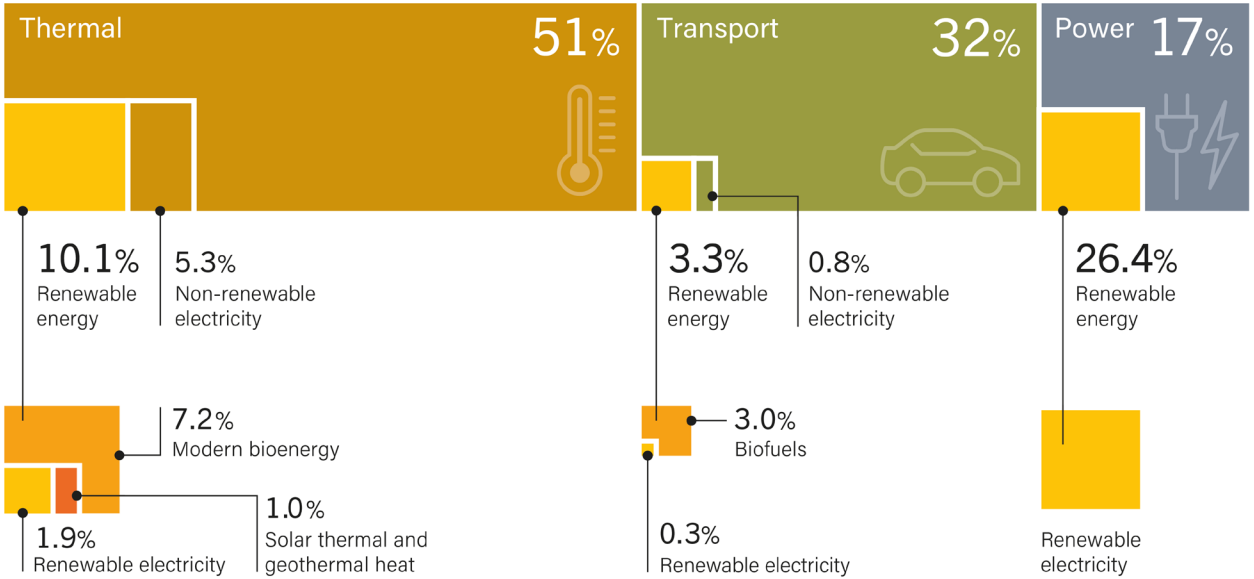
INVESTMENT IN RENEWABLES HAS BARELY GROWN



Source: BloombergNEF.

Global Investment in Renewable Power and Fuel Capactiy in Developed, Emerging and Developing Countries, 2009-2019

MORE THAN 80% OF OUR ENERGY FOR HEATING, COOLING, TRANSPORT



Renewable Share of Total Final Energy Consumption, by Final Energy Use, 2017

Most focus is on the power sector.

But the **greatest urgency** is in heating, cooling and transport.

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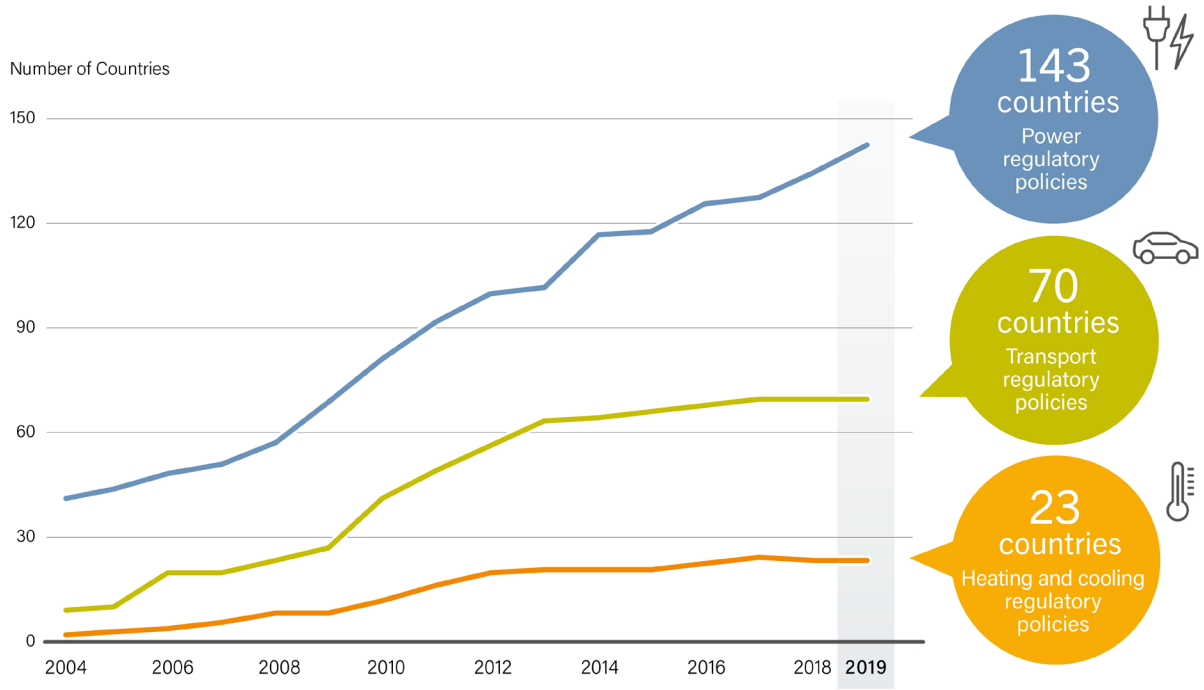
Source: Based on IEA data.

POWER SECTOR CONTINUES TO RECEIVE MOST POLICY ATTENTION



Number of Countries with Renewable Energy Policies, 2004-2019

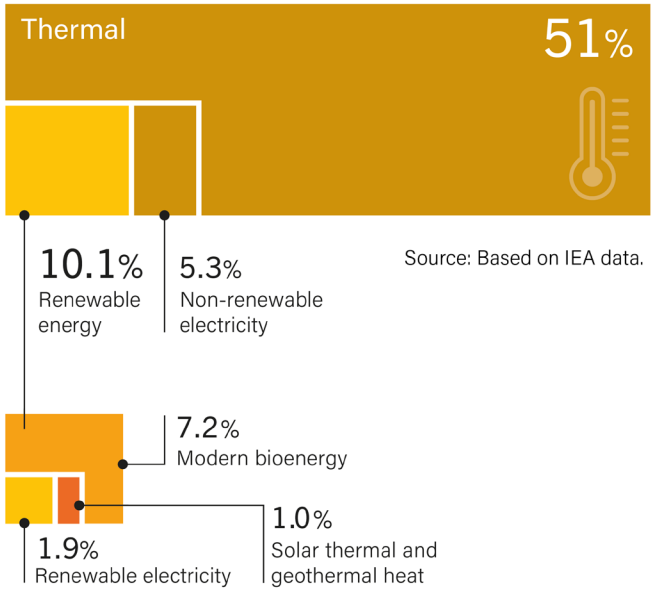
Policies and targets **renewables in power** remain more ambitious and more numerous than those for other sectors.

RENEWABLES STILL MEET LOW SHARE OF THERMAL ENERGY NEEDS

KEY BARRIERS

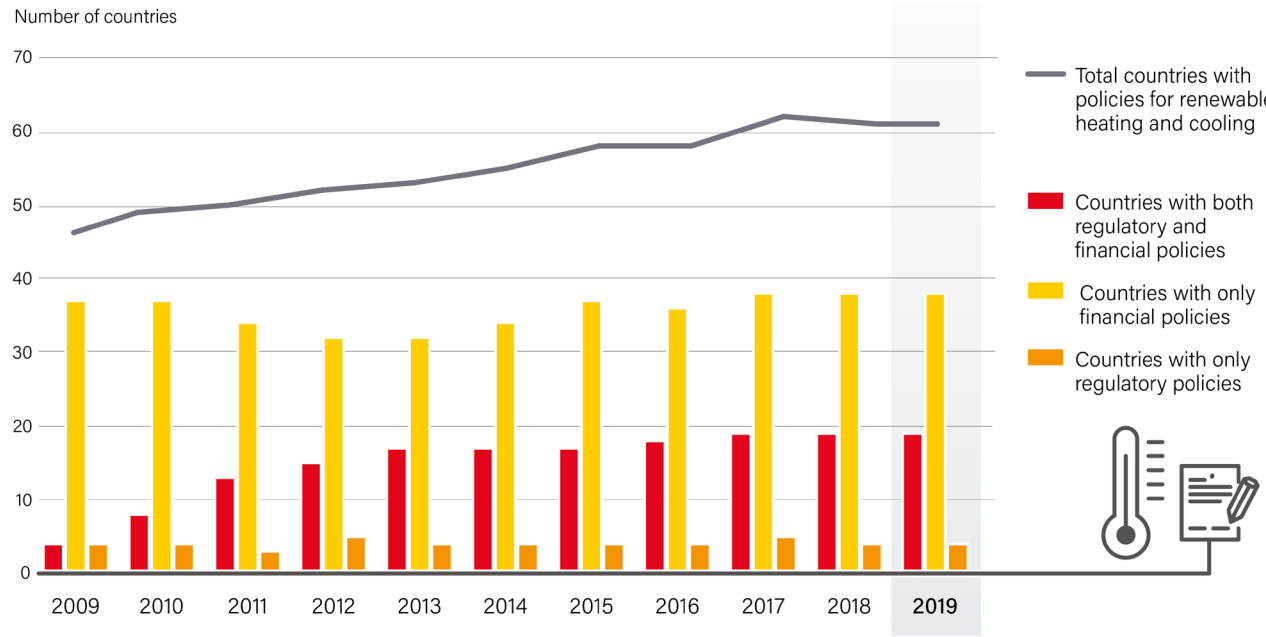
- Sector heavily relying on fossil fuel
  - Fossil fuel subsidies – no level playing field
  - Upfront capital cost of renewables
- Lack of supportive regulatory framework
  - No new H&C policies since 2017
  - Little support for electrification
- Resource availability
- Investments in supporting infrastructure needed (e.g., district heating and cooling)
- Technological advances needed for high-temperature industrial processes

Renewable Share of Total Final Energy Consumption, by Final Energy Use, 2017



Source: Based on IEA data.

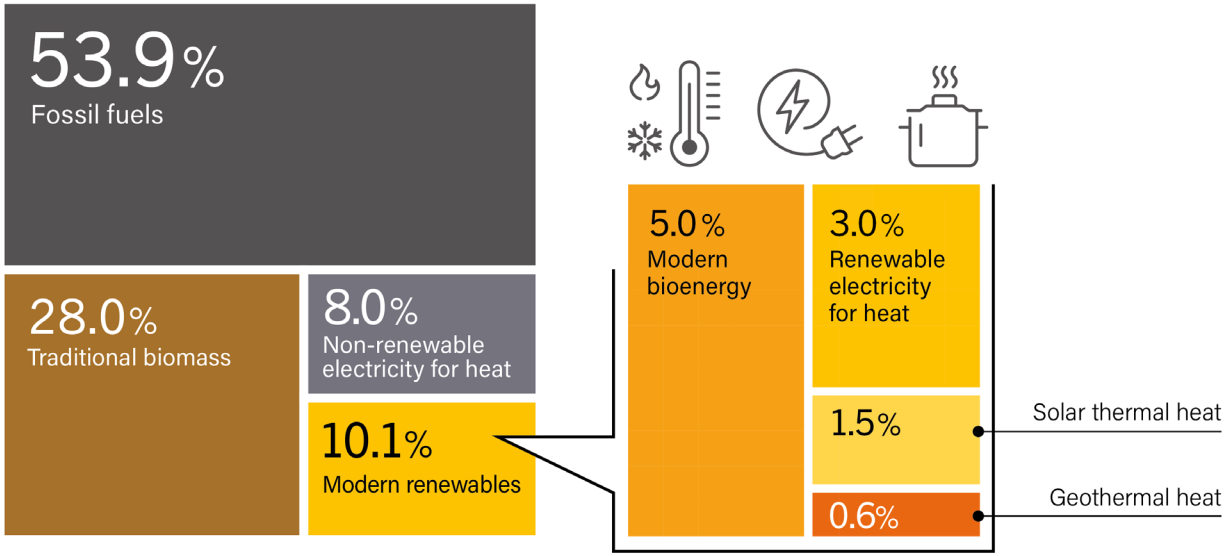
POLICY SUPPORT STAGNATING IN HEATING AND COOLING SECTOR



Countries with Policies for Renewable Heating and Cooling, 2009-2019

No new countries have adopted renewable energy financial support policies for heating and cooling since 2017.

RENEWABLE HEAT IS GRADUALLY GROWING IN BUILDINGS



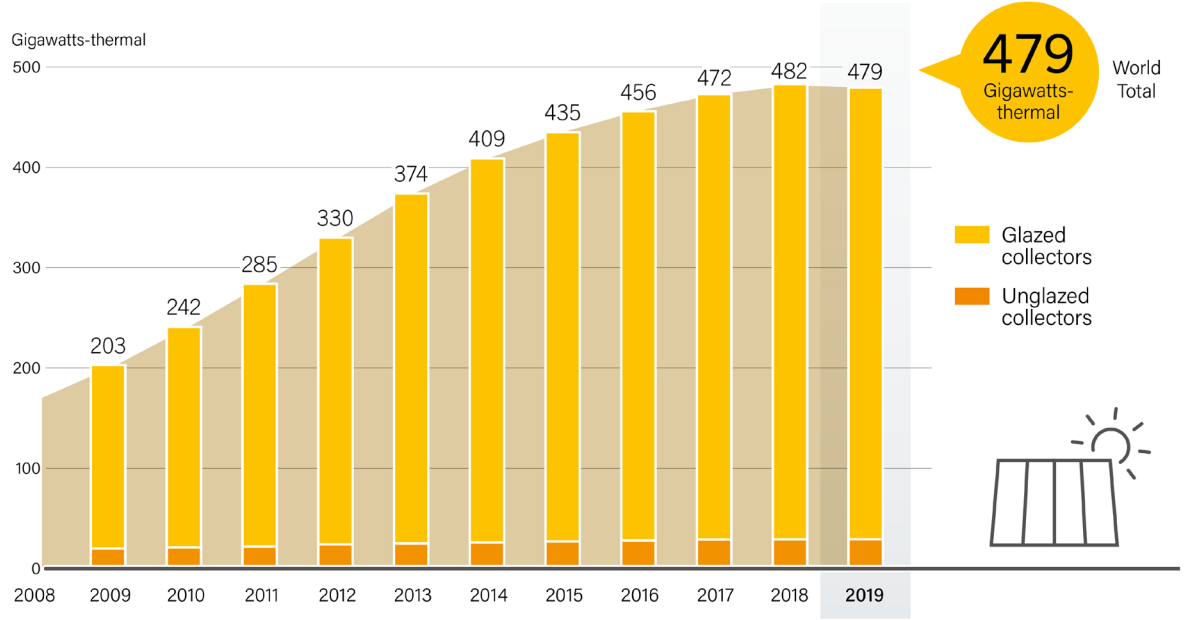
Note: Includes space heating, space cooling, water heating and cooking.
Modern bioenergy includes heat supplied by district energy networks.

Source: Based on IEA data.

Estimated Renewable Share of Heating and Cooling in Buildings, 2018

The share of renewable heating and cooling in buildings grew from **8% in 2010** to more than 10% in 2018.

INSTALLED SOLAR WATER HEATING CAPACITY DECLINED



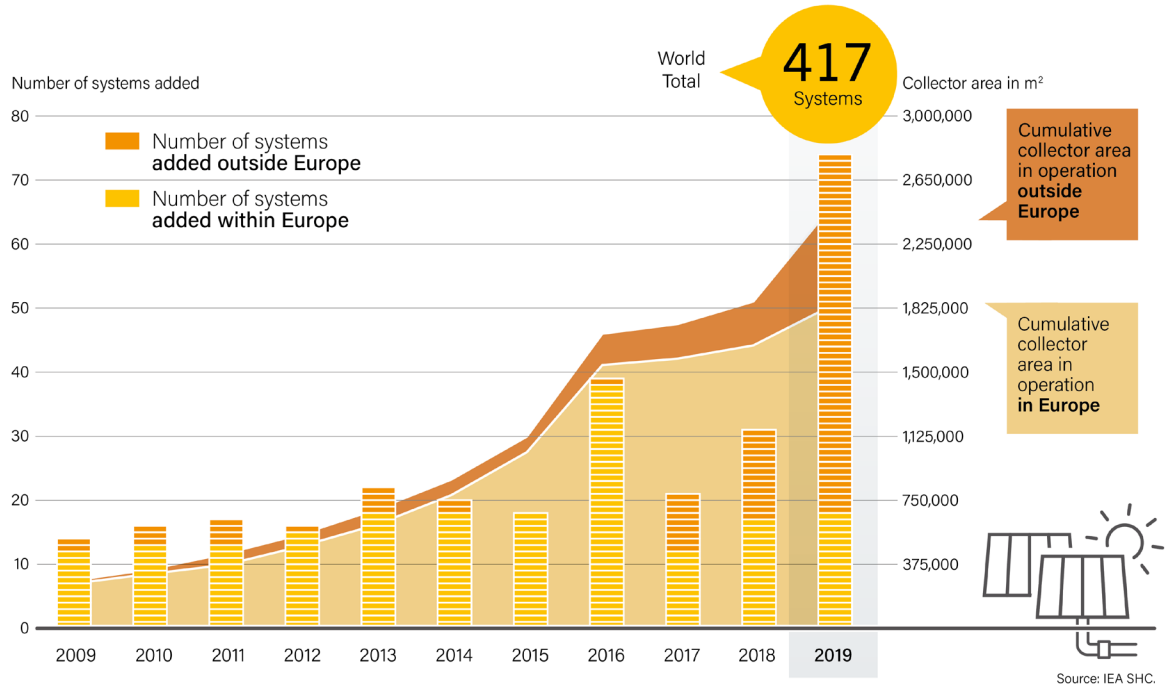
Note: Data are for glazed and unglazed solar water collectors and do not include concentrating, air or hybrid collectors. New additions in China were based on produced collector area, and included export volumes in the national statistics for 2019 and earlier years.

Source: IEA SHC.

Solar Water Heating Collectors Global Capacity, 2009-2019

Source: IEA SHC.

LARGE INCREASE IN SOLAR DISTRICT HEATING SYSTEMS



Solar District Heating Systems, Global Annual Additions and Total Area in Operation, 2009-2019

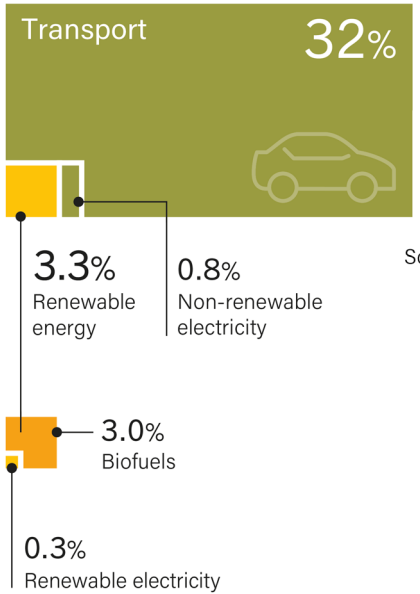
Leading markets for solar district heating were **Denmark, China and Germany.**

THE SHARE OF RENEWABLES IN TRANSPORT HAS NOT CHANGED

KEY BARRIERS

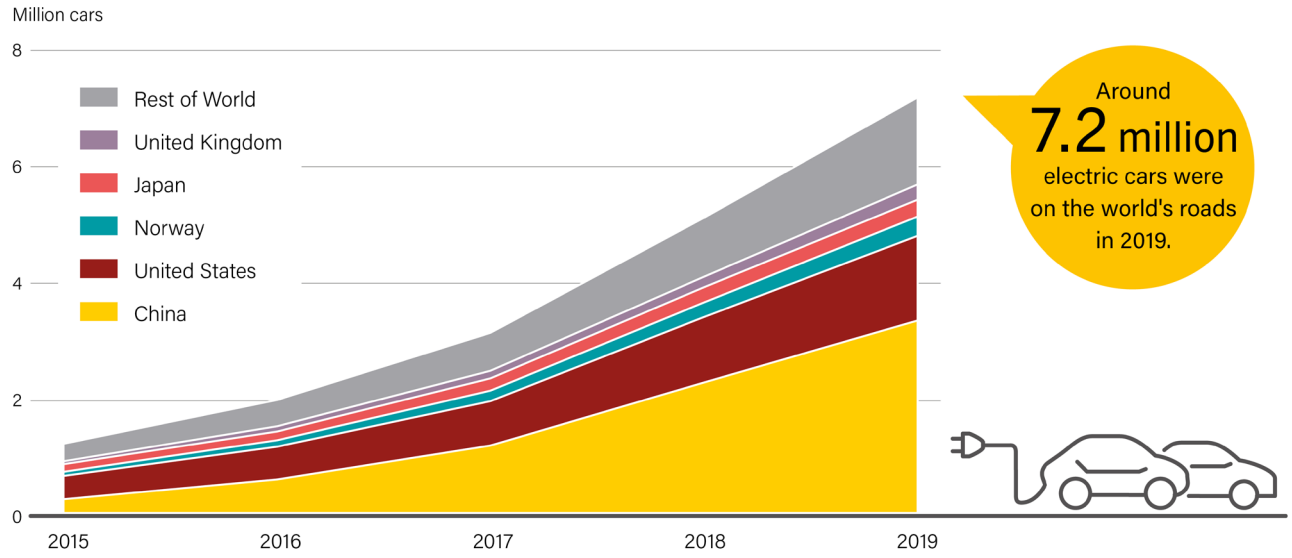
- Sector heavily relying on fossil fuel
  - Fossil fuel "centered" market structures
  - Fossil fuel subsidies – no level playing field
- Exploding demand growth (+4% per year)
- Lack of strong policy support
  - no new countries with biofuel blend mandates since 2017
  - Only nine countries with advanced mandates
  - Only five countries with fuel economy standards
- Limited options in aviation and shipping

Renewable Share of Total Final Energy Consumption, by Final Energy Use, 2017



Source: Based on IEA data.

ELECTRIC CAR STOCK INCREASED 40% IN 2019



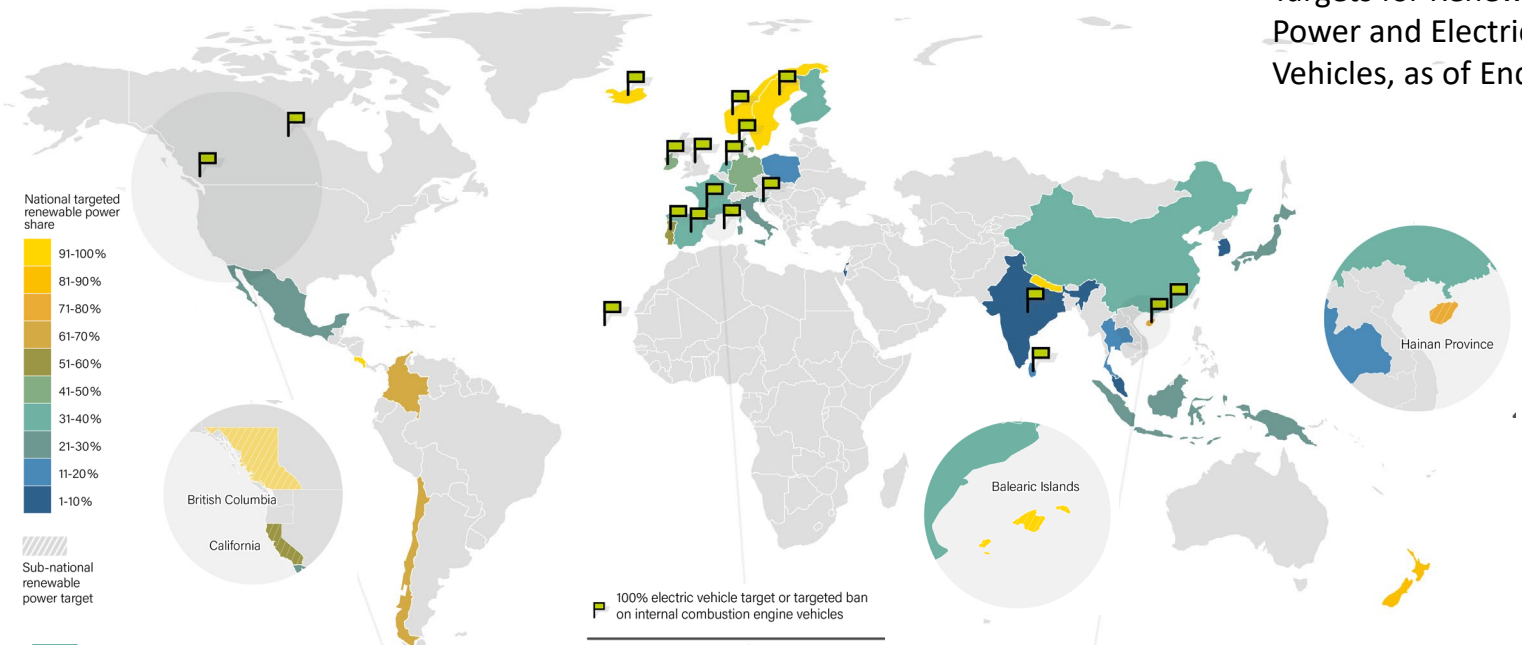
Source: IEA.

Electric Car Global Stock, Top Countries and Rest of World, 2015-2019

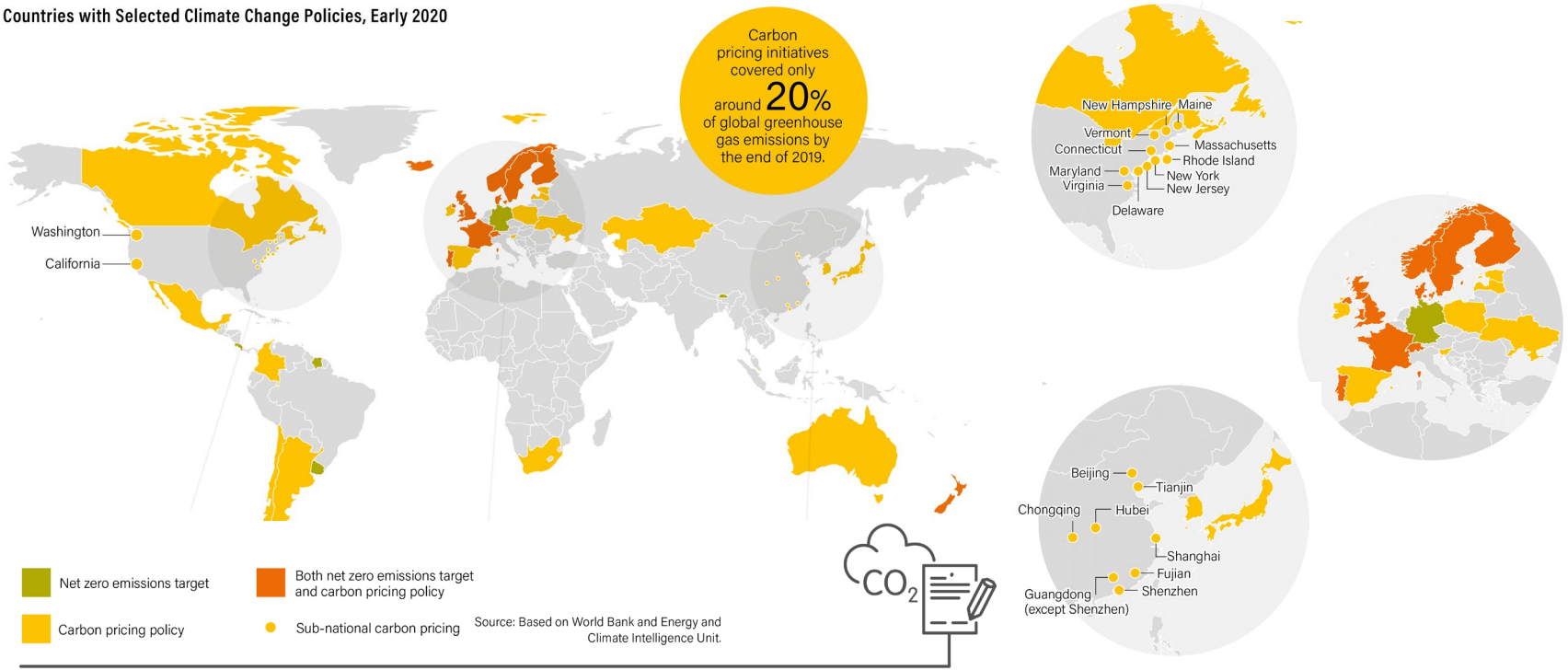
Share of electric cars in new car sales reached 2.5%, **a record high.**

ONLY SEVERAL COUNTRIES HAVE TARGETS FOR EVS AND RENEWABLES

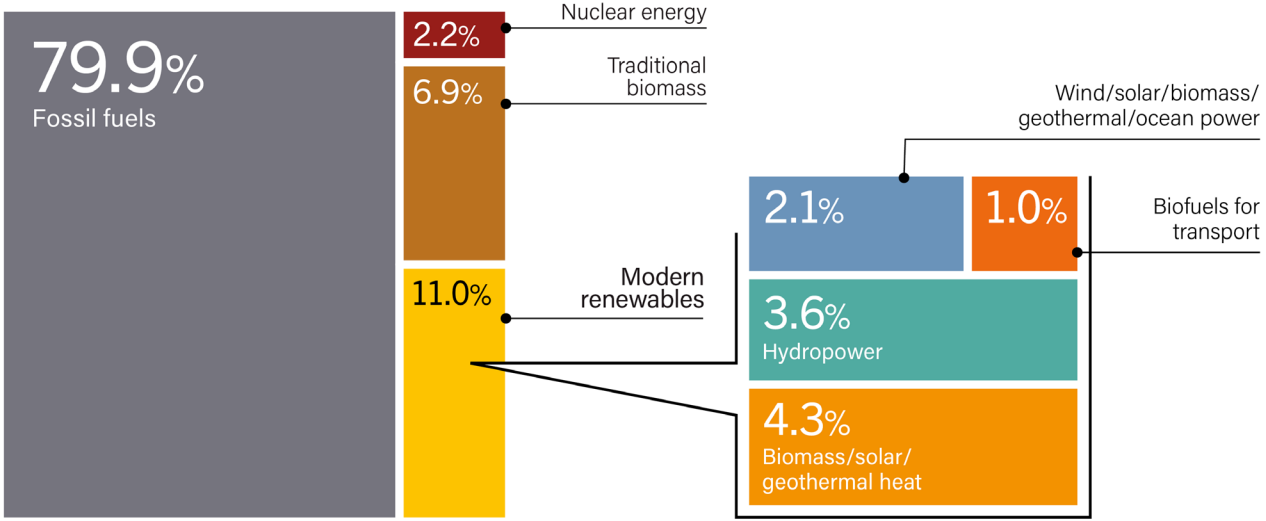
Targets for Renewable Power and Electric Vehicles, as of End-2019



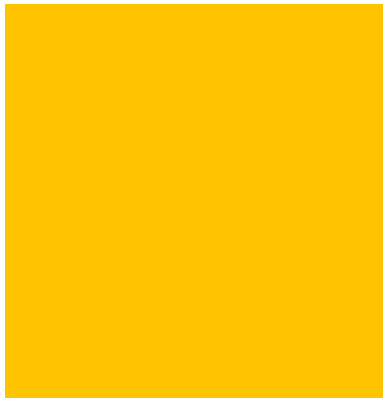
CARBON PRICING SLOWLY EXPANDING



ONLY MODERATE CHANGE IN RENEWABLE SHARE OF ENERGY DEMAND



Estimated Renewable Share of Total Final Energy Consumption, 2018



Note: Data should not be compared with previous years because of revisions due to improved or adjusted data or methodology. Totals may not add up due to rounding.

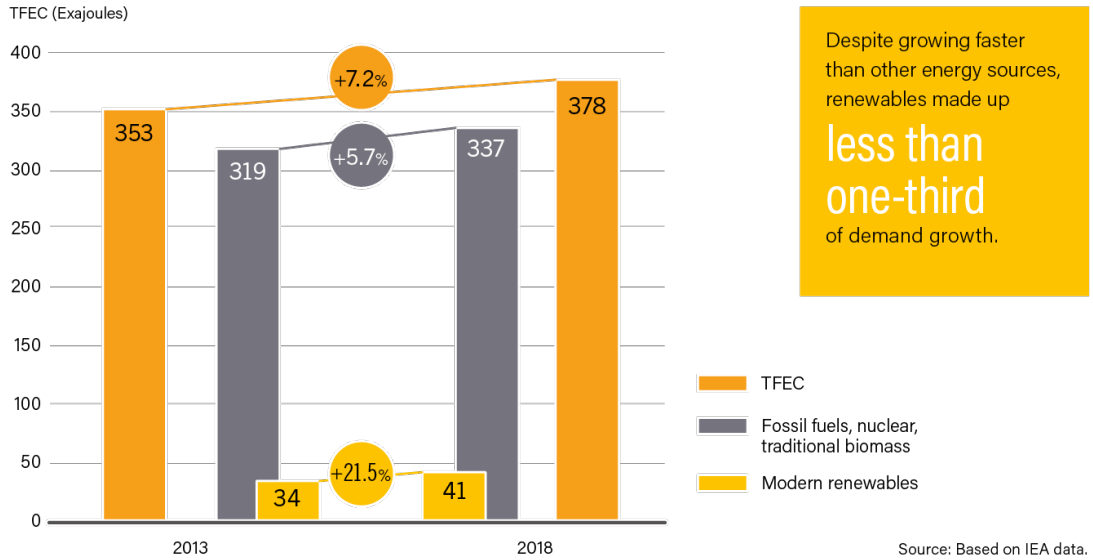
Source: Based on IEA data.

RENEWABLES ARE GROWING FAST... BUT NOT FAST ENOUGH

RISING ENERGY DEMAND KEEPS RENEWABLE SHARE LOW

- Renewables grew three times faster than fossil fuels
- Renewable energy only accounted for **29%** of demand growth
- Energy efficiency and renewables both needed to reduce fossil fuel use

Estimated Global Growth in Renewable Energy Compared to Total Final Energy Consumption, 2013-2018



Despite growing faster than other energy sources, renewables made up

less than one-third

of demand growth.

Source: Based on IEA data.

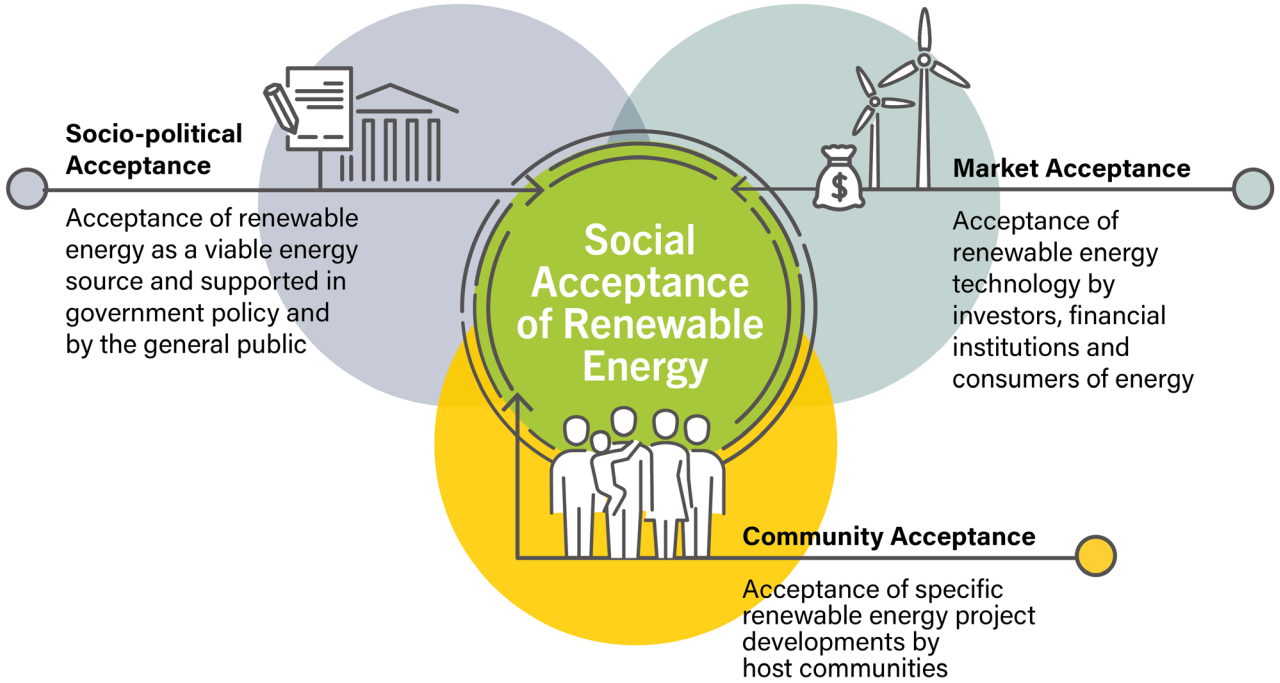
MANY EXISTING SOLUTIONS SHOULD BE URGENTLY IMPLEMENTED

ACTIONS TO BE TAKEN IN PARALLEL

- **Use policies to actively support renewables across all end-use sectors:**
  - Examples include mandates for renewable heat technologies and incentives to use EVs with RE
  - Create accessible market conditions
- **Make energy efficiency mandatory to decrease energy demand:**
  - Building retrofits and net zero energy codes
  - Promote walking/cycling and public transport
  - Fuel efficiency standards
- **Accelerate the phase-out of fossil fuels**
  - Remove fossil fuel subsidies
  - Divest from fossil fuels
  - Fossil fuel bans, in particular heating/transport
- **Accompany sectors to change:**
  - Integrate planning among all energy sectors
  - Reskilling
  - Public procurement of renewables

A **systemic problem** requires a **systemic solution**.

PUBLIC SUPPORT FOR RENEWABLES



Dimensions of Social Acceptance of Renewable Energy

Opinion polls suggest a widespread societal support for renewables but some people are still against local projects.

LEVERS TO BUILD PUBLIC SUPPORT AND ENCOURAGE ACTION

Governments have a wide range of measures at their disposal. Such as...

Awareness campaigns.

Policies encouraging public engagement with renewables.

Public participation, control and ownership.

All of these mechanisms are actively used to build public support.

SHIFTING TO RENEWABLES IN ALL SECTORS

- **Renewables are growingly strong in the power sector, but slowly in heating, cooling and transport.**
- **Energy efficiency and renewables are both needed to reduce fossil fuel use.**
- **Policy and technology solutions already exist to shift to renewables in all sectors but political will is missing.**
- **Public support is important to spur renewable energy uptake to meet climate and development goals.**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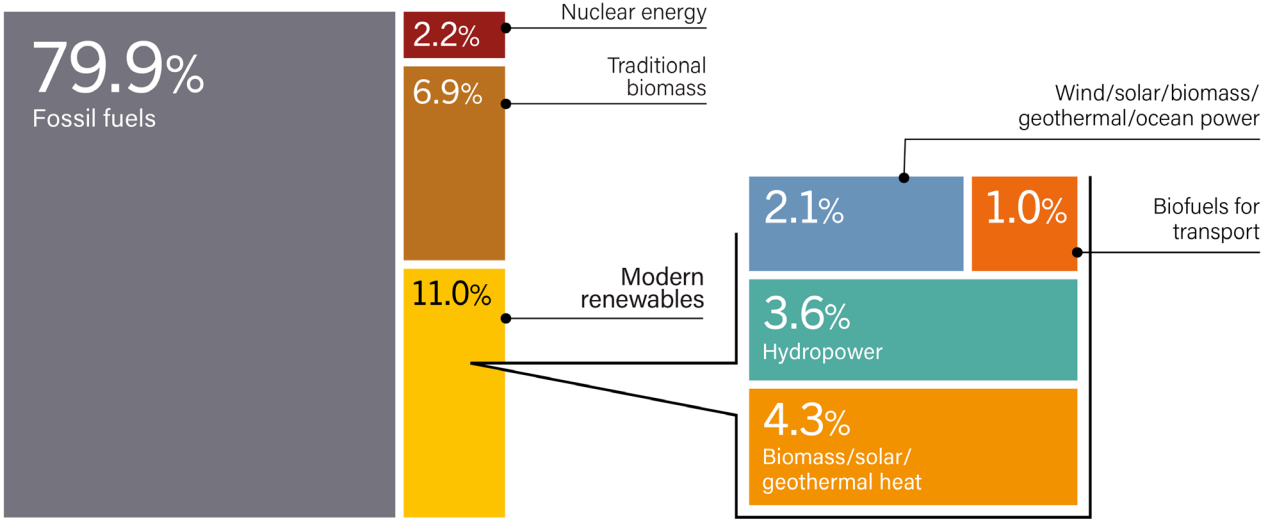
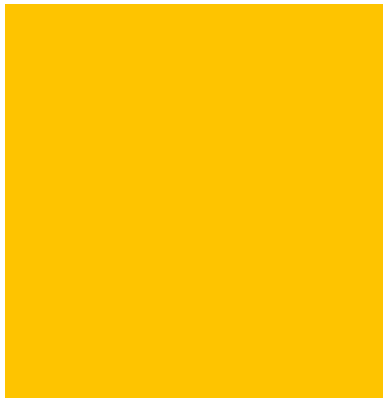
EXTRA SLIDES

ONLY MODERATE CHANGE IN RENEWABLE SHARE OF ENERGY DEMAND



Estimated Renewable Share of Total Final Energy Consumption, 2017



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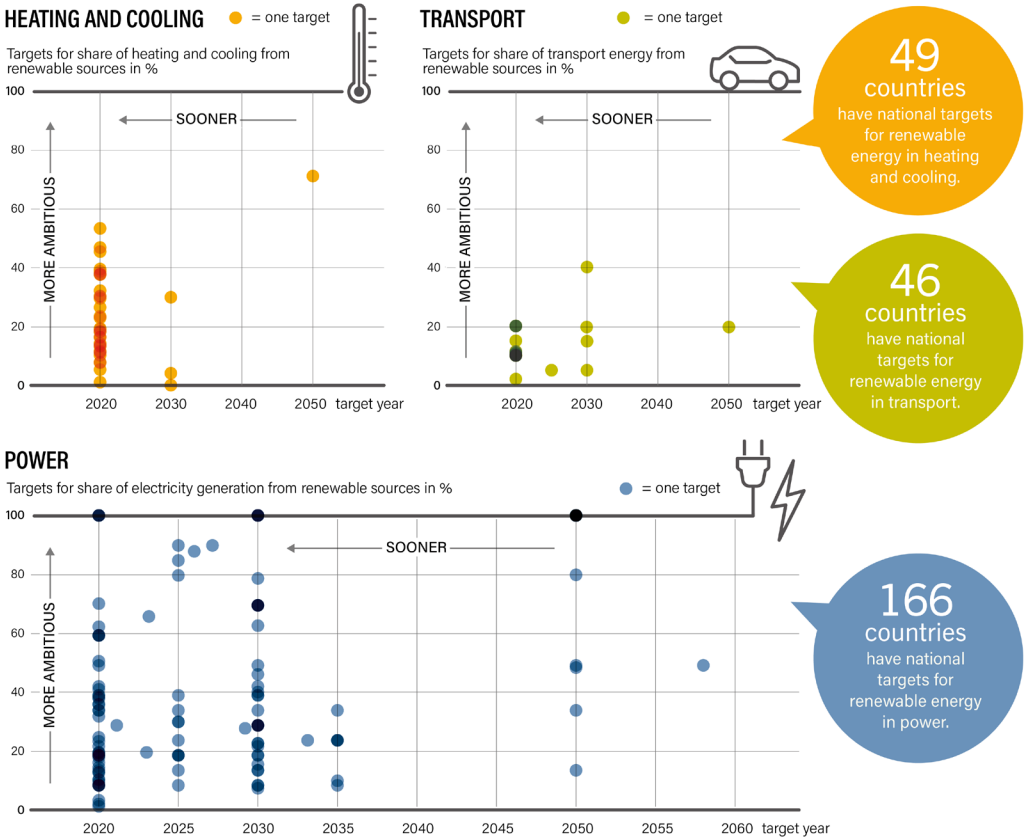
Source: Based on IEA data.

TARGET IMBALANCE

National Sector-Specific Targets for Share of Renewable Energy by a Specific Year, in Place at End-2019

Globally, most renewable energy targets are aimed exclusively at the **power sector**.



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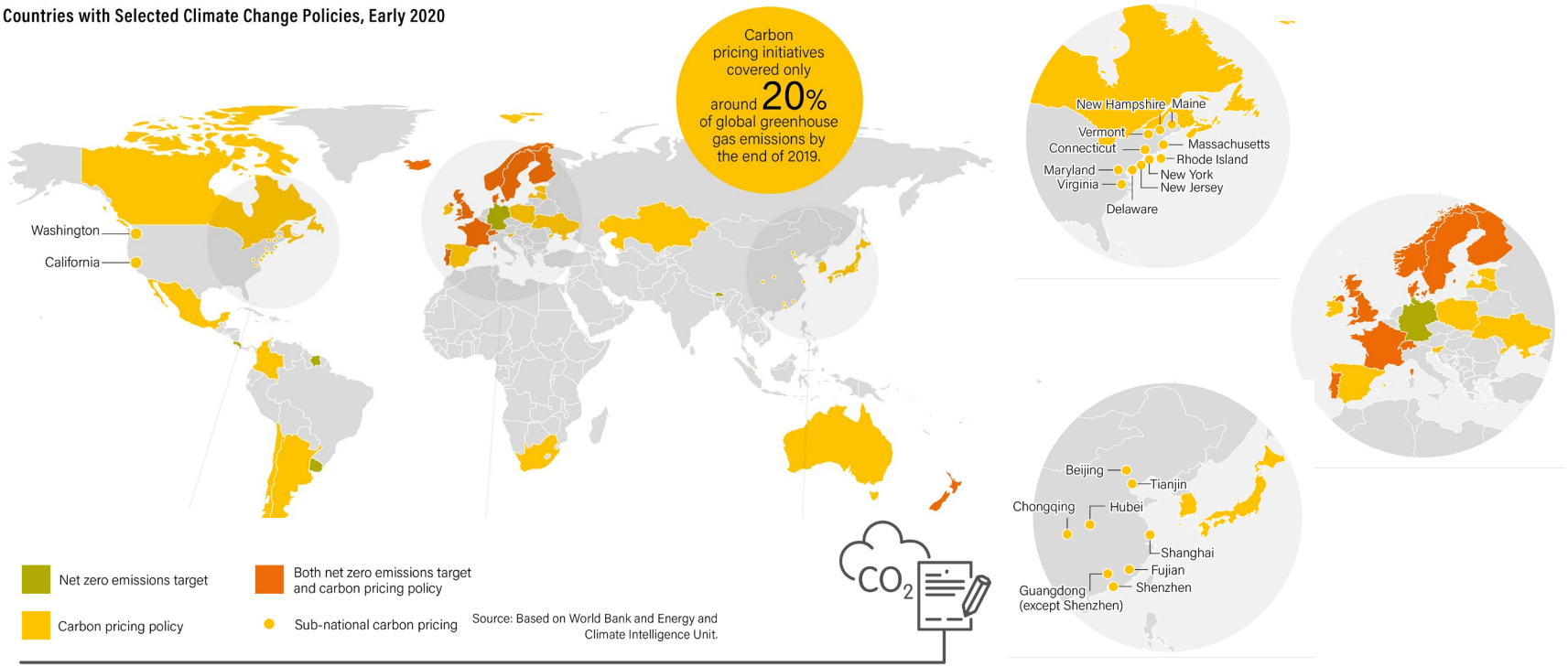
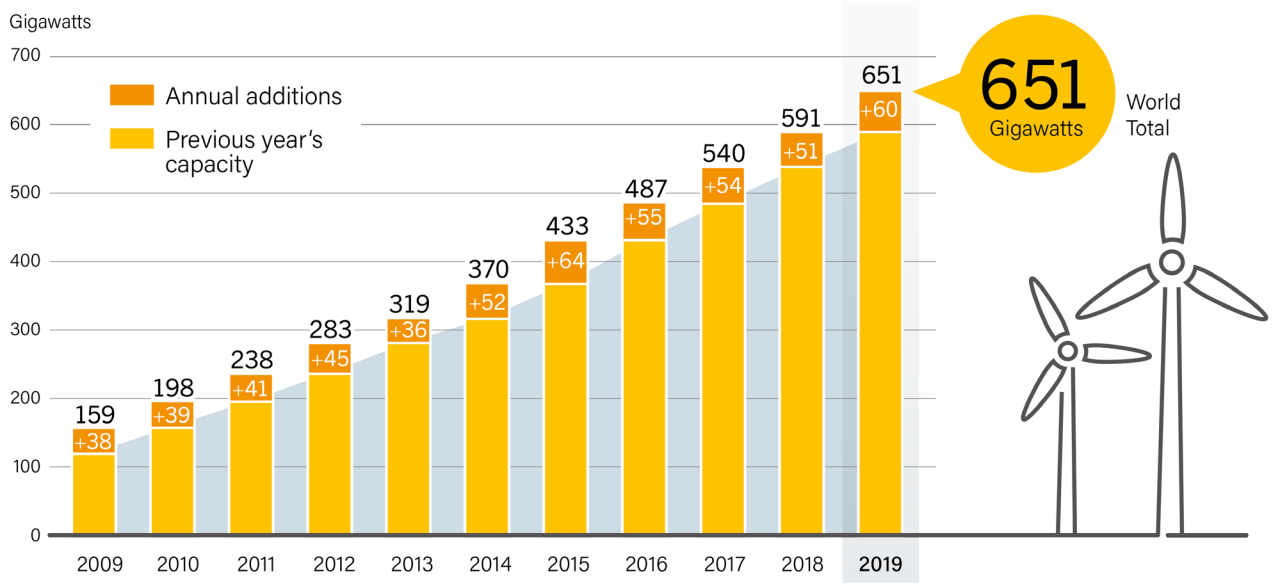


WIND POWER CAPACITY CONTINUES INCREASE STEADILY YEAR-ON-YEAR



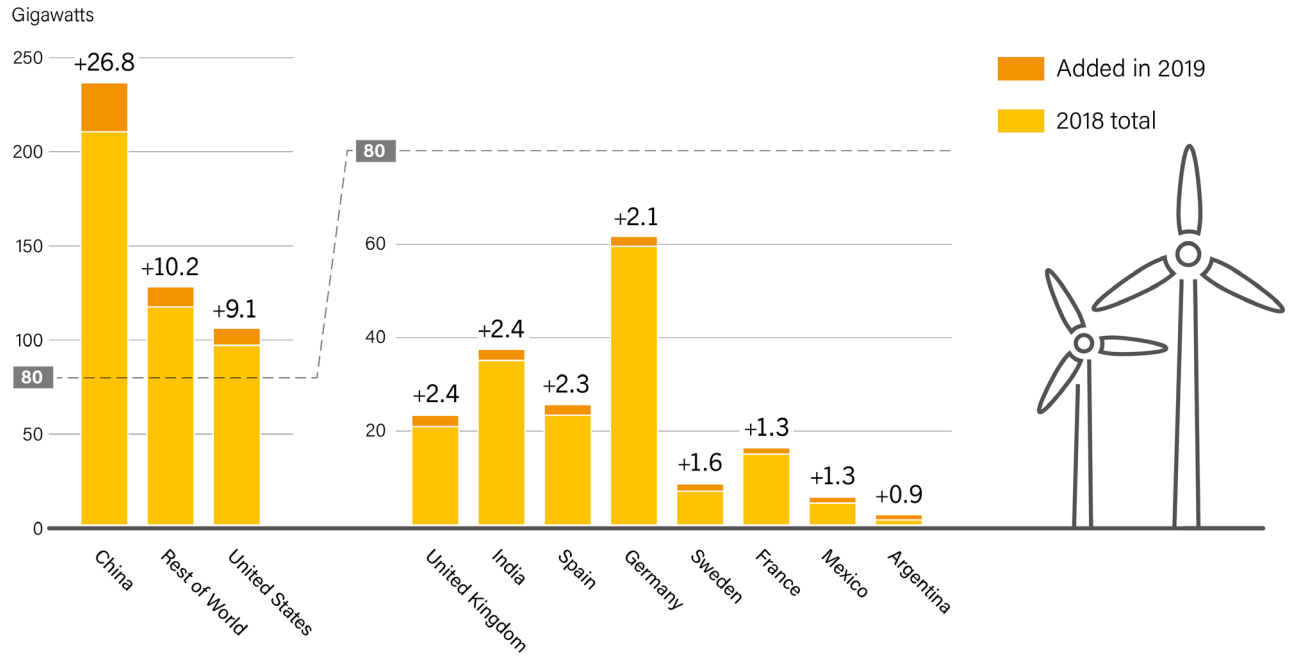
Note: Totals may not add up due to rounding.

Source: GWEC.

Wind Power Global Capacity and Annual Additions, 2009-2019

The global wind power market saw its **second largest** annual increase in 2019.

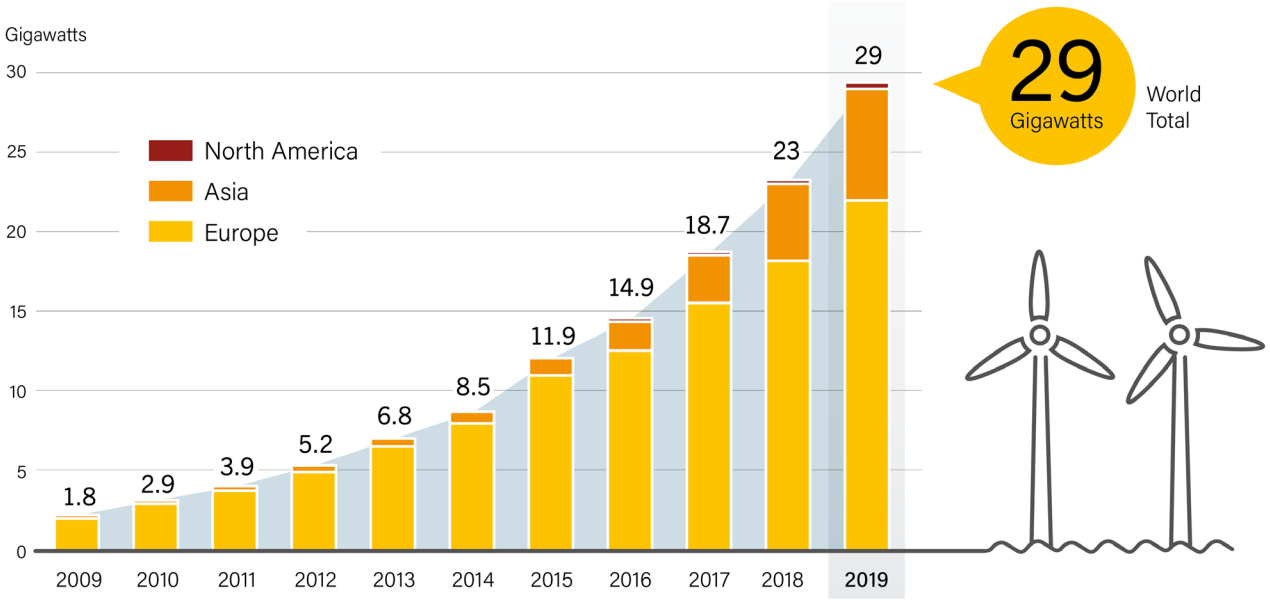
MORE THAN HALF OF NEW WIND POWER CAPACITY IN ASIA



Wind Power Capacity and Additions, Top 10 Countries, 2019

China again saw an increase in new installations (**up 22%**) during 2019, adding around 26.8 GW.

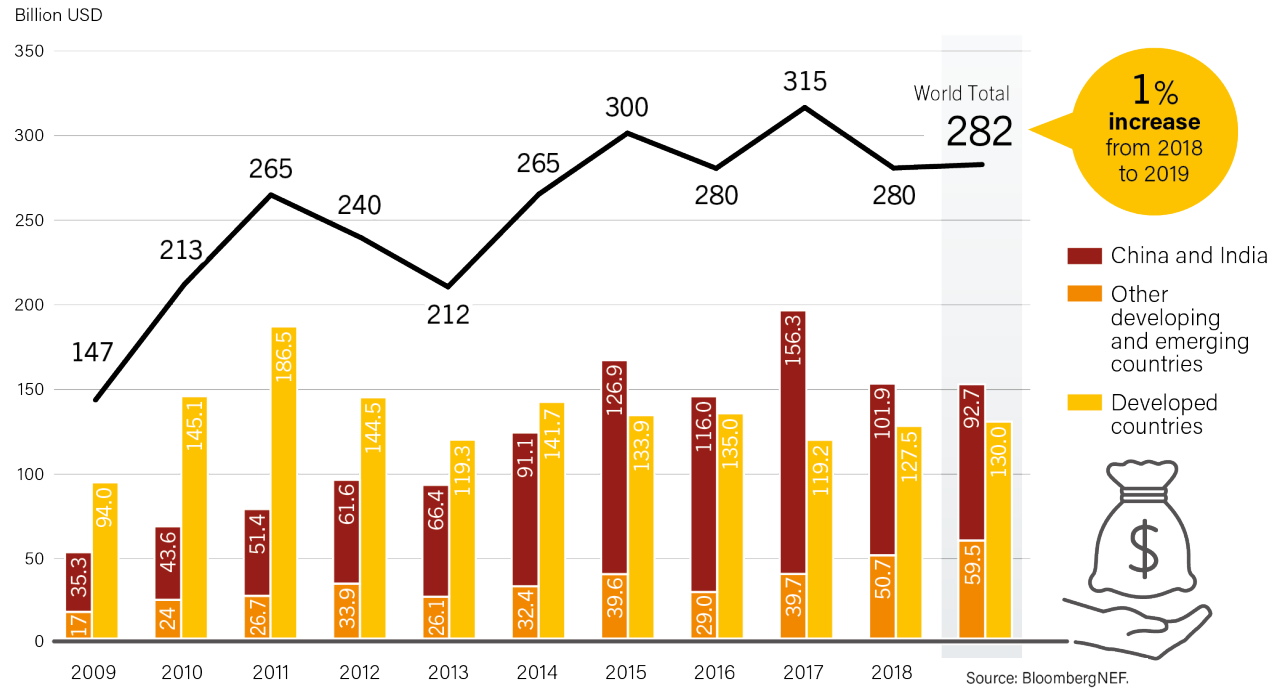
SUCCESS OF OFFSHORE WIND IN EUROPE SPARKED INTEREST ELSEWHERE



Wind Power Offshore Global Capacity by Region, 2009-2019

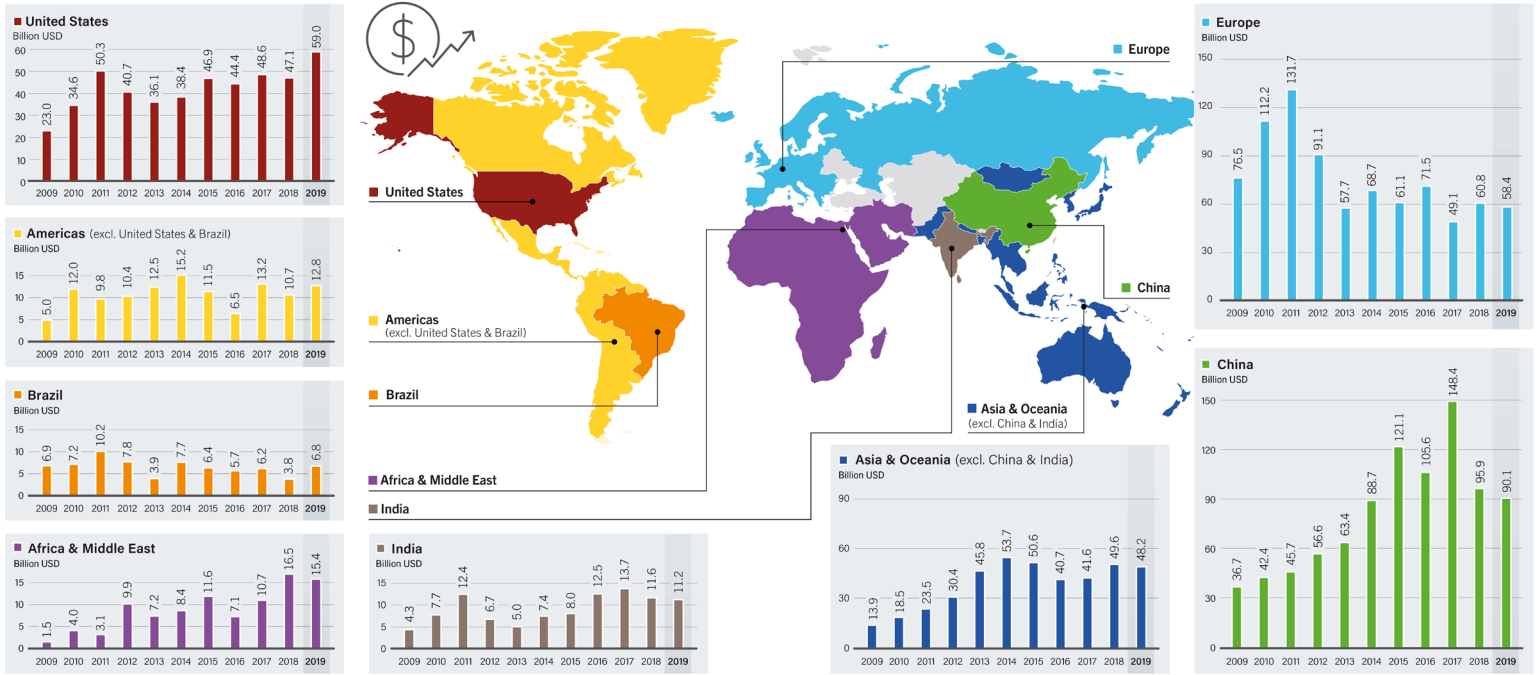
Offshore wind power accounted for a record **10% of wind power additions** in 2019.

INVESTMENT IN RENEWABLES HAS BARELY GROWN



Global New Investment in Renewable Power and Fuel Capacity in Developed, Emerging and Developing Countries, 2009-2019

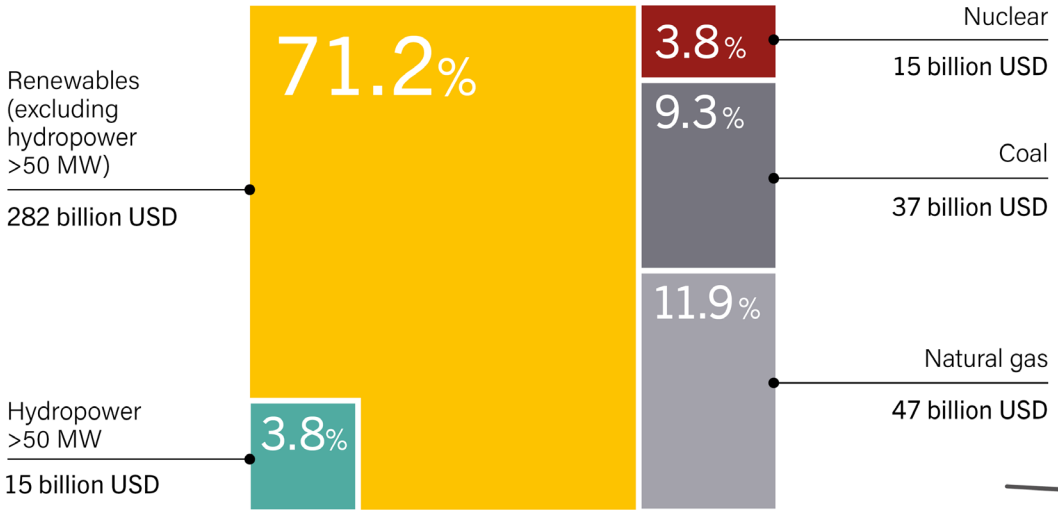
INVESTMENT GREW IN THE AMERICAS, BUT DECREASED ELSEWHERE



Global New Investment in Renewable Power and Fuels, by Country and Region, 2009-2019

Source: BloombergNEF.

3X MORE INVESTMENT IN RENEWABLES THAN IN COAL, GAS AND NUCLEAR



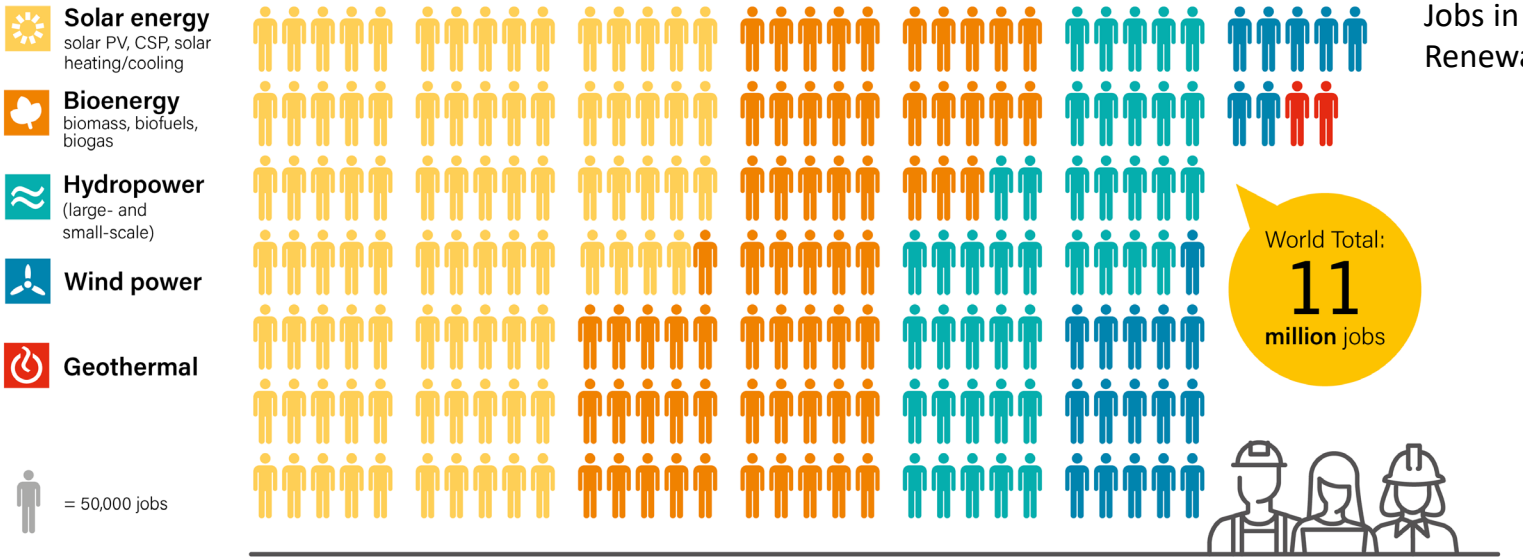
Global Investment in New Power Capacity by Type (Renewables, Coal, Gas and Nuclear Power), 2019

In 2019, **renewable power technologies continued to attract far more investment dollars** than did coal, natural gas or nuclear power generating plants.

Note: Renewable investment data in figure exclude biofuels and some types of non-capacity investment.

Source: BloombergNEF.

JOBS IN RENEWABLE ENERGY KEEP GROWING



Jobs in Renewable Energy, 2018

Source: IRENA.