
RENEWABLES NOW

RENEWABLES 2021 GLOBAL STATUS REPORT

MASTER SLIDE DECK

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REN21

THE ONLY GLOBAL RENEWABLE ENERGY MULTI-STAKEHOLDER COMMUNITY

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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.

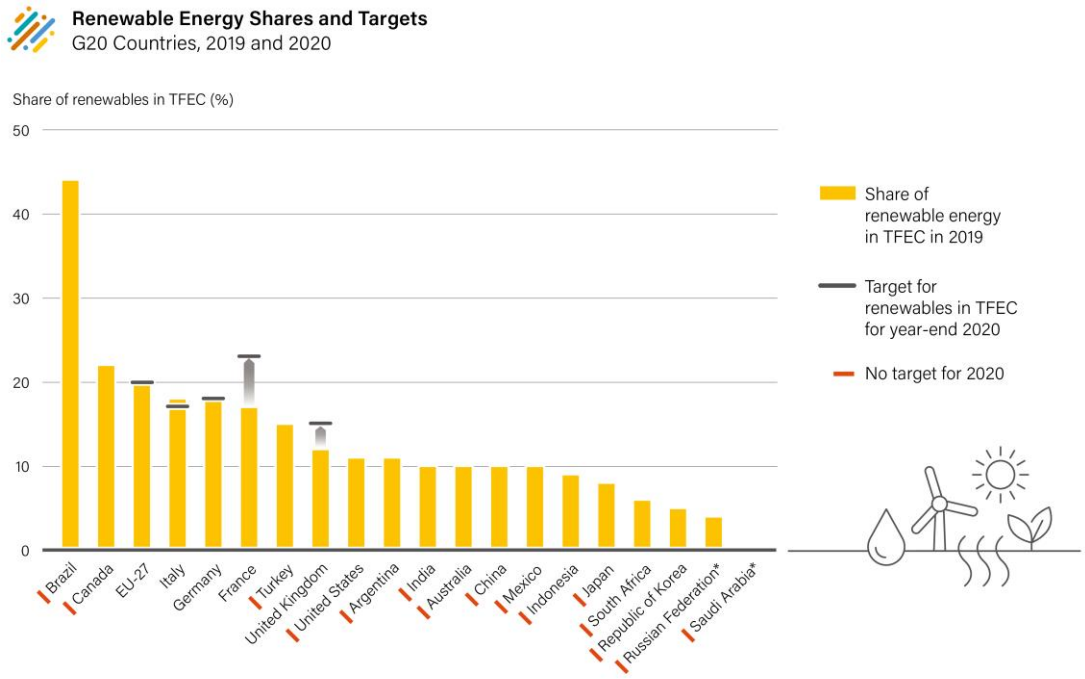
RENEWABLES 2021 GLOBAL STATUS REPORT

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, Renewables and Decarbonisation
- Feature: Business Demand for Renewables

G20 COUNTRIES LACK TARGETS FOR RENEWABLES



Ambition lacking on **key performance indicator** of renewable energy share.

RENEWABLE ENERGY CONTINUED TO GROW IN 2020

- **Total power capacity rose almost 10%**
  - 2,839 GW including hydropower
  - Non-hydropower: 16.6% increase
- **256 GW of renewable power additions**
  - Solar PV: 139 GW; Wind: 93 GW; Hydro: 20 GW
- **Renewable heat demand increased marginally**
- **Biofuel production fell 5% in 2020**

Renewable Energy Indicators 2020

		2019	2020
INVESTMENT			
New investment (annual) in renewable power and fuels[1]	billion USD	298.4	**303.5**
POWER			
Renewable power capacity (including hydropower)	GW	2,581	**2,838**
Renewable power capacity (not including hydropower)	GW	1,430	**1,668**
Hydropower capacity[2]	GW	1,150	**1,170**
Solar PV capacity[3]	GW	621	**760**
Wind power capacity	GW	650	**743**
Bio-power capacity	GW	137	**145**
Geothermal power capacity	GW	14.0	**14.1**
Concentrating solar thermal power (CSP) capacity	GW	6.1	**6.2**
Ocean power capacity	GW	0.5	**0.5**
HEAT			
Modern bio-heat demand (estimated)[4]	EJ	13.7	**13.9**
Solar hot water demand (estimated)[5]	EJ	1.5	**1.5**
Geothermal direct-use heat demand (estimated)[6]	PJ	421	**462**
TRANSPORT			
Ethanol production (annual)	billion litres	115	**105**
FAME biodiesel production (annual)	billion litres	41	**39**
HVO biodiesel production (annual)	billion litres	6.5	**7.5**
POLICIES[7]			
Countries with renewable energy targets	#	172	**165**
Countries with renewable energy policies	#	161	**161**
Countries with renewable heating and cooling targets	#	49	**19**
Countries with renewable transport targets	#	46	**35**
Countries with renewable electricity targets	#	166	**137**
Countries with heat regulatory policies	#	22	**22**
Countries with biofuel blend mandates[8]	#	65	**65**
Countries with feed-in policies (existing)	#	83	**83**
Countries with feed-in policies (cumulative)[9]	#	113	**113**
Countries with tendering (held during the year)	#	41	**33**
Countries with tendering (cumulative)[9]	#	111	**116**

WHICH COUNTRIES LED THE WAY IN 2020?

Top Five Countries 2020

Annual Investment / Net Capacity Additions / Production in 2020
Technologies ordered based on total capacity additions in 2020.

	1	2	3	4	5
Solar PV capacity	China	United States	Vietnam	Japan	Germany
Wind power capacity	China	United States	Brazil	Netherlands	Spain or Germany
Hydropower capacity	China	Turkey	Mexico	India	Angola
Geothermal power capacity	Turkey	United States	Japan	–	–
Concentrating solar thermal power (CSP) capacity	China	–	–	–	–
Solar water heating capacity	China	Turkey	India	Brazil	United States
Ethanol production	United States	Brazil	China	Canada	India
Biodiesel production	Indonesia	Brazil	United States	Germany	France

As in past years, **China** led many key annual categories for renewable energy in 2020.

RENEWABLE ENERGY LEADERS AT THE END OF 2020

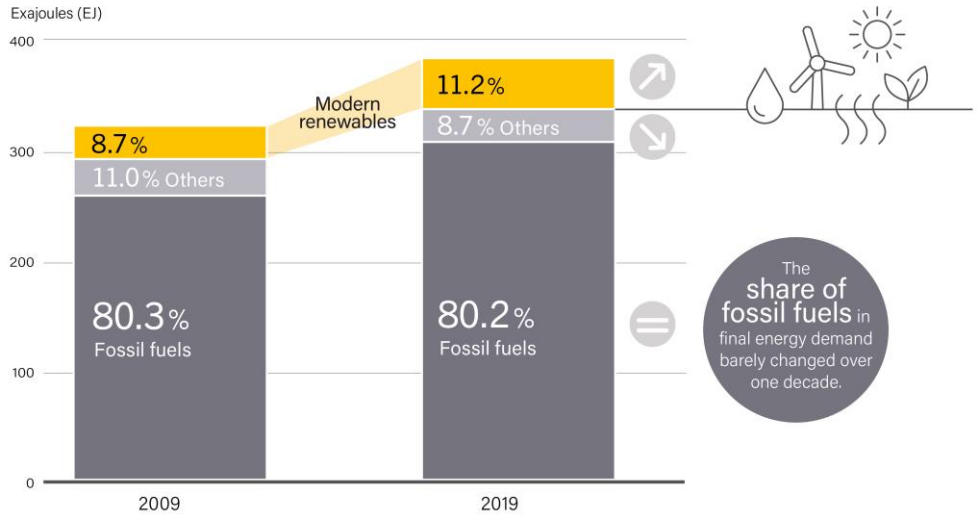
Total Power Capacity or Demand / Output as of End-2020

	1	2	3	4	5
POWER					
Renewable power capacity (including hydropower)	China	United States	Brazil	India	Germany
Renewable power capacity (not including hydropower)	China	United States	Germany	India	Japan
Renewable power capacity *per capita* (not including hydropower)[1]	Iceland	Denmark	Sweden	Germany	Australia
Bio-power capacity	China	Brazil	United States	Germany	India
Geothermal power capacity	United States	Indonesia	Philippines	Turkey	New Zealand
Hydropower capacity[2]	China	Brazil	Canada	United States	Russian Federation
Solar PV capacity	China	United States	Japan	Germany	India
Concentrating solar thermal power (CSP) capacity	Spain	United States	China	Morocco	South Africa
Wind power capacity	China	United States	Germany	India	Spain
HEAT					
Modern bio-heat demand in buildings	United States	Germany	France	Italy	Sweden
Modern bio-heat demand in industry	Brazil	India	United States	Finland	Sweden
Solar water heating collector capacity[2]	China	Turkey	India	Brazil	United States
Geothermal heat output[3]	China	Turkey	Iceland	Japan	New Zealand

Some countries changed places during the year, though in many cases **the leaders for total capacity and generation are well-established.**

INCREASING ENERGY DEMAND AND FOSSIL FUEL USE

Estimated Renewable Share of Total Final Energy Consumption
2009 and 2019



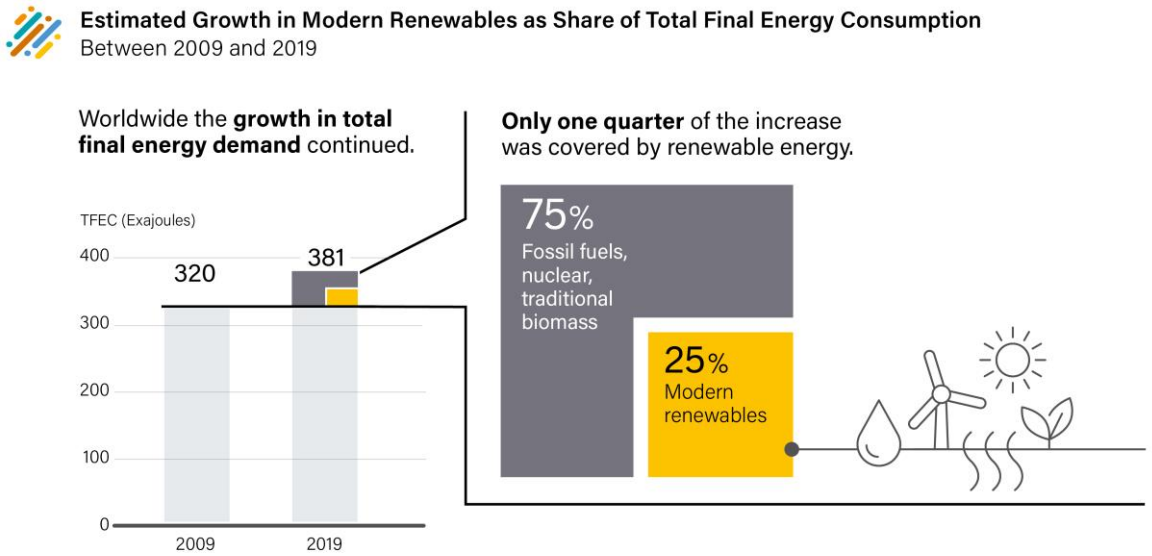
Note: Totals may not add up due to rounding. This figure shows a comparison between two years across a 10-year span. The result of the economic recession in 2008 may have temporarily lowered the share of fossil fuels in total final energy consumption in 2009. The share in 2008 was 80.7%.

Source: Based on IEA data.

The world is **burning more fossil fuels** than ever.

RENEWABLES ARE GROWING FAST... BUT NOT FAST ENOUGH

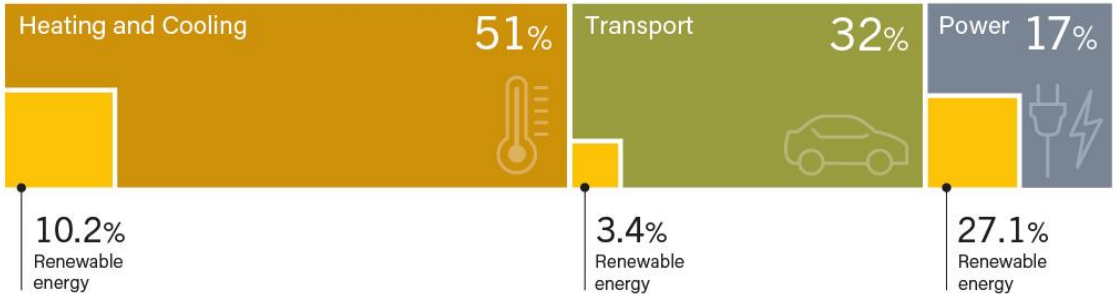
- Renewables grew two times faster than fossil fuels
- Renewable energy only accounted for 25% of demand growth
- Energy efficiency and renewables are complementary



Source: Based on IEA data.

MORE THAN 80% OF ENERGY FOR HEATING & TRANSPORT

Renewable Energy in Total Final Energy Consumption
by Final Energy Use, 2018



Note: Data should not be compared with previous years because of revisions due to improved or adjusted methodology.

Source: Based on IEA data.

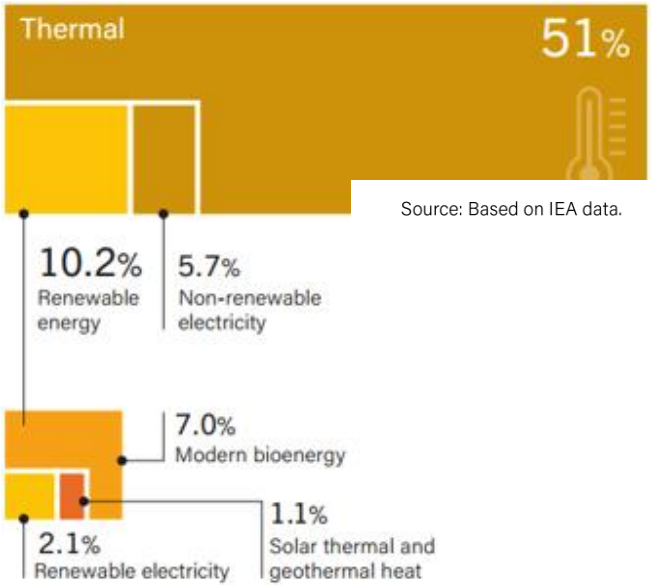
Most focus is on the power sector, but the **greatest urgency** is in heating and transport.

SLOW GROWTH IN RENEWABLE HEATING AND COOLING

KEY BARRIERS

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

Renewable Energy in Total Final Energy Consumption, by Final Energy Use, 2018

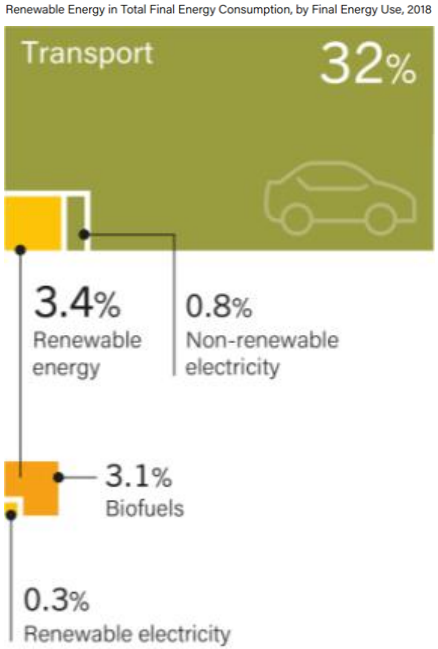


Source: Based on IEA data.

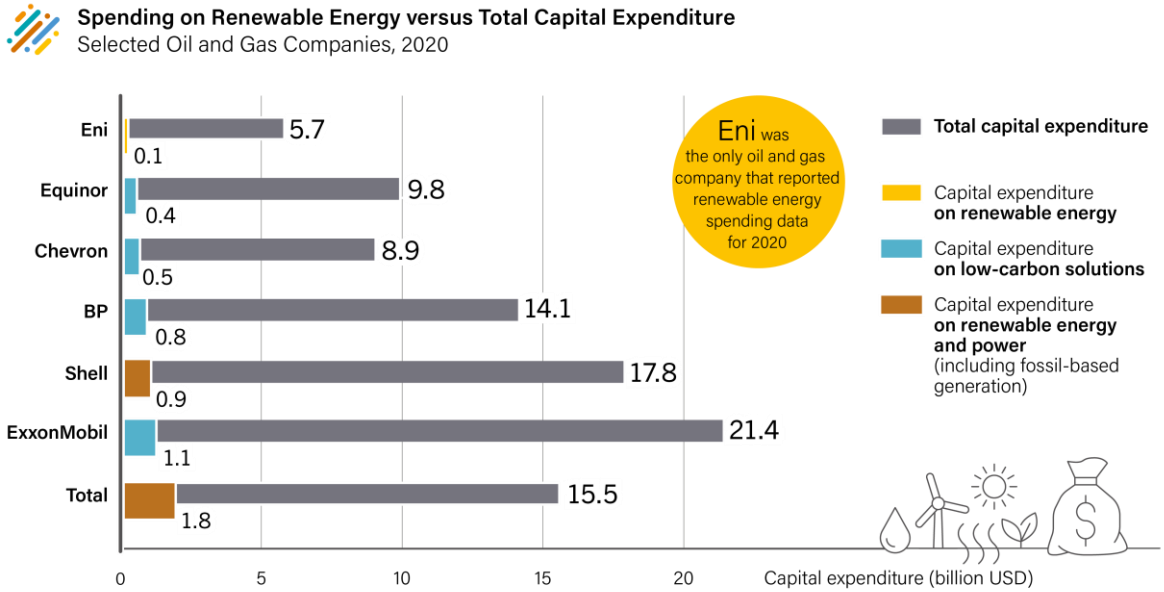
SLOW GROWTH IN RENEWABLE TRANSPORT

KEY BARRIERS

- Sector heavily relying on fossil fuel
  - Fossil fuel subsidies – no level playing field
- Demand increasing fasting than other sectors
- Lack of policy support frameworks
  - Holistic strategies missing
  - Direct linking between EVs and renewables is limited
  - Avoid-Shift-Improve often missing renewable energy
- Investment in supporting infrastructure needed (e.g., EV charging)
- Technological advances needed for renewables in advanced biofuels, maritime and aviation sectors

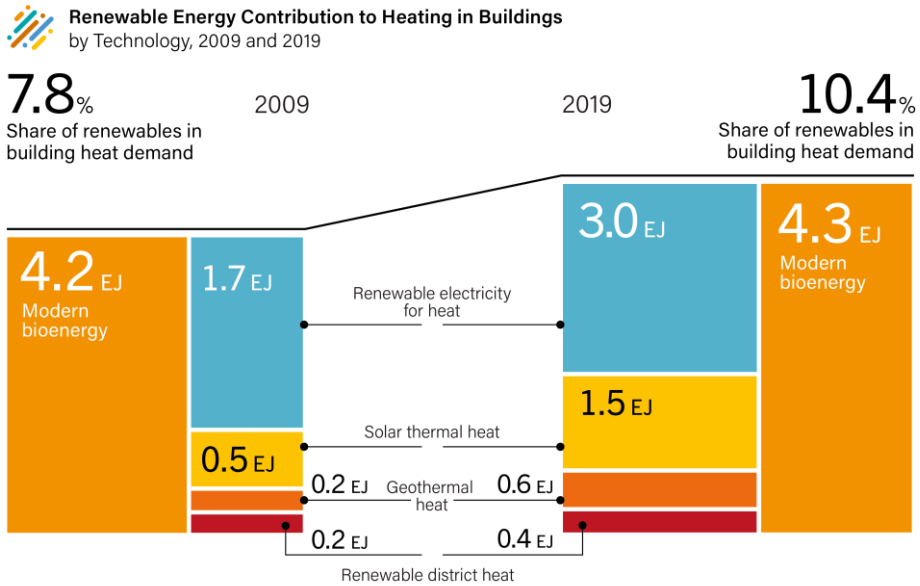


OIL AND GAS SPENDING ON RENEWABLES REMAINS LOW



Oil and gas companies **do not explicitly report on renewable energy spending** in their financial statements.

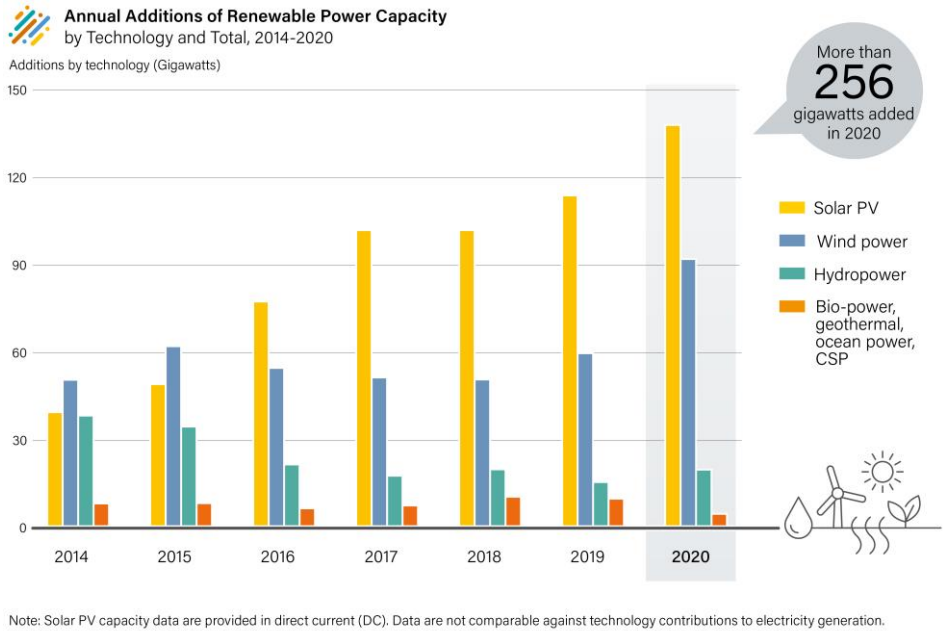
RENEWABLE HEAT IS GRADUALLY GROWING IN BUILDINGS



Source: Based on IEA data.

The share of renewable heating and cooling in buildings grew from 7.8% in 2009 to **more than 10% in 2019.**

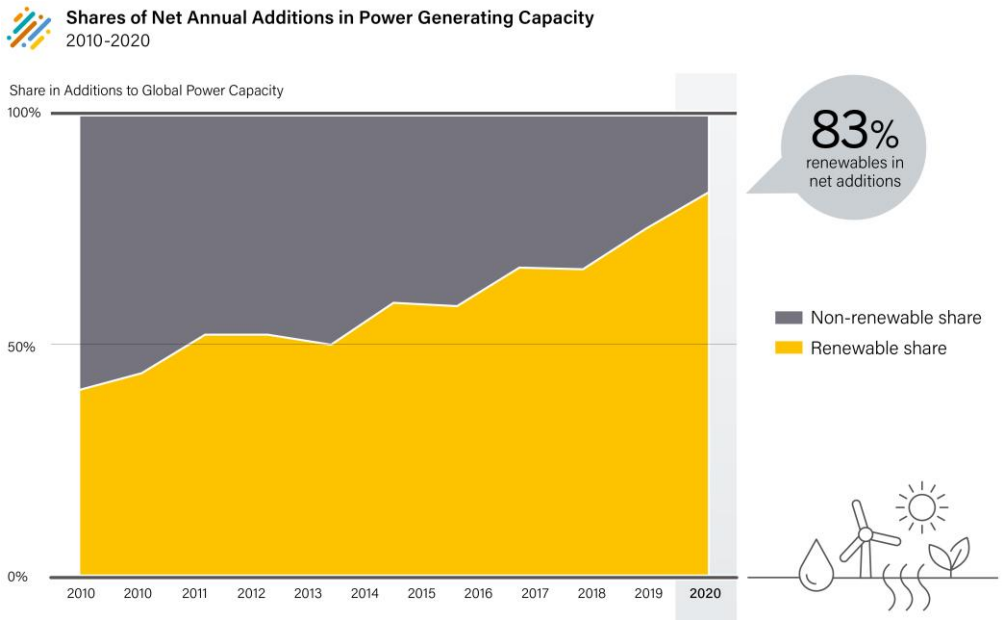
MORE THAN 250 GW OF RENEWABLE POWER ADDED



Note: Solar PV capacity data are provided in direct current (DC). Data are not comparable against technology contributions to electricity generation.

New renewable power capacity hit a **record increase** globally.

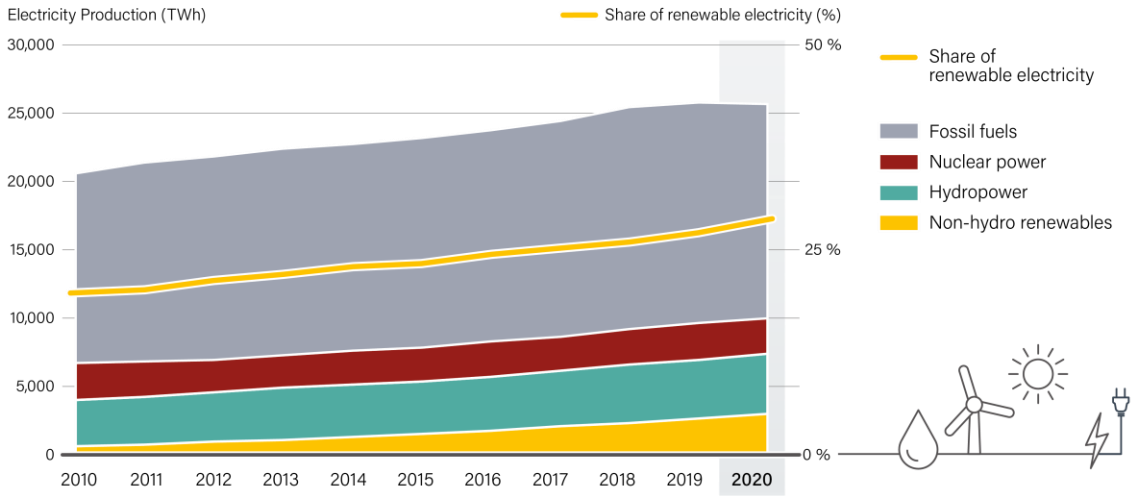
MORE RENEWABLE POWER ADDED THAN FOSSIL FUEL & NUCLEAR



Renewable power generation capacity additions remain ahead for **the sixth year in a row**.

ALMOST 30% OF GLOBAL ELECTRICITY IS NOW RENEWABLE

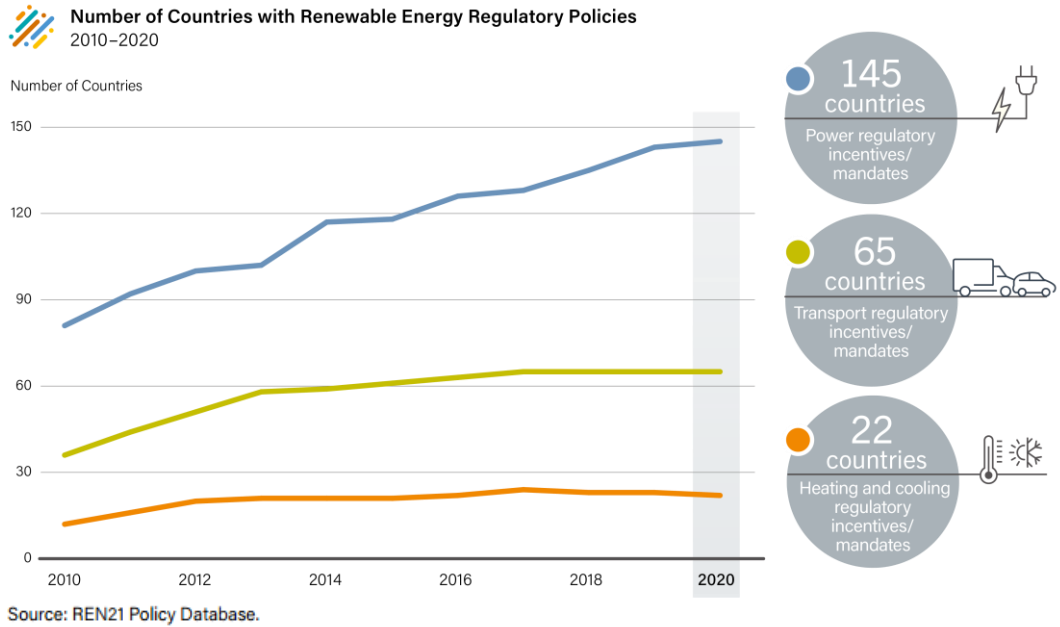
Global Electricity Production by Source, and Share of Renewables
2010-2020



Source: Ember.

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

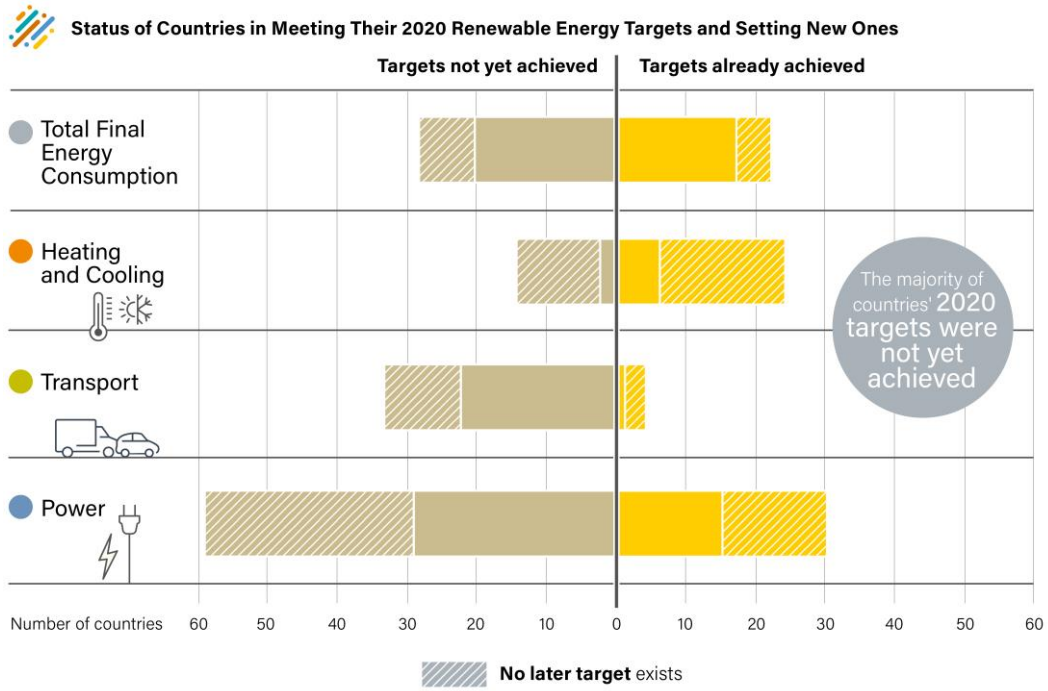
POWER SECTOR RECEIVES MOST POLICY ATTENTION



Source: REN21 Policy Database.

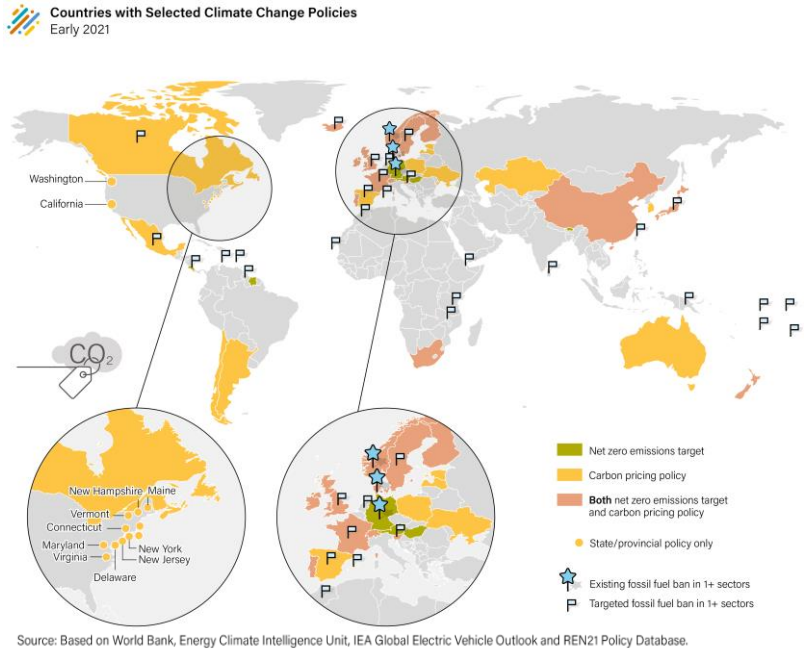
Policies and targets for **renewables in power** remain more ambitious and more numerous than those for other sectors.

TARGETS NOT ACHIEVED OR FOLLOWED UP



The number of countries with **targets fell across all sectors**.

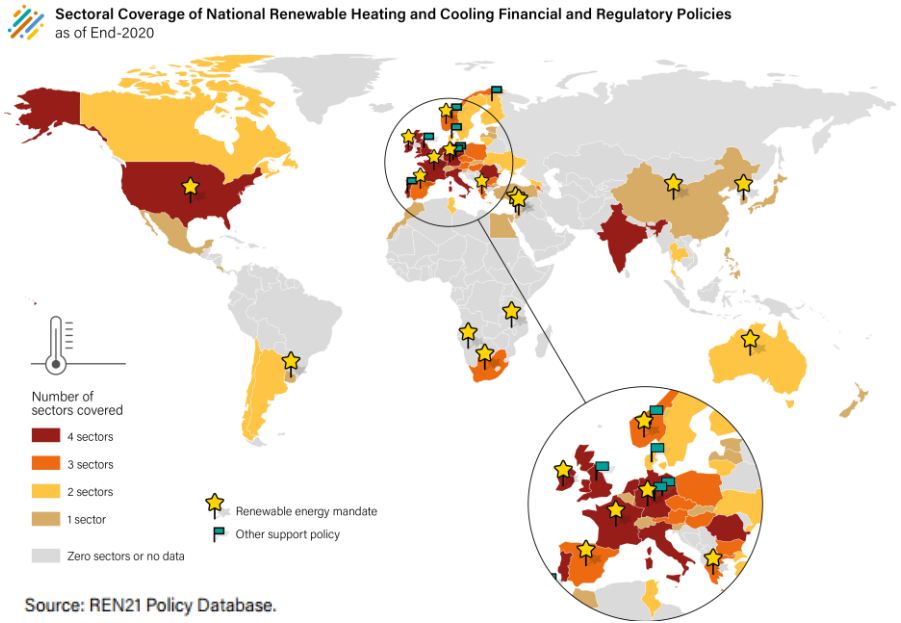
CLIMATE POLICIES AROUND THE WORLD



Source: Based on World Bank, Energy Climate Intelligence Unit, IEA Global Electric Vehicle Outlook and REN21 Policy Database.

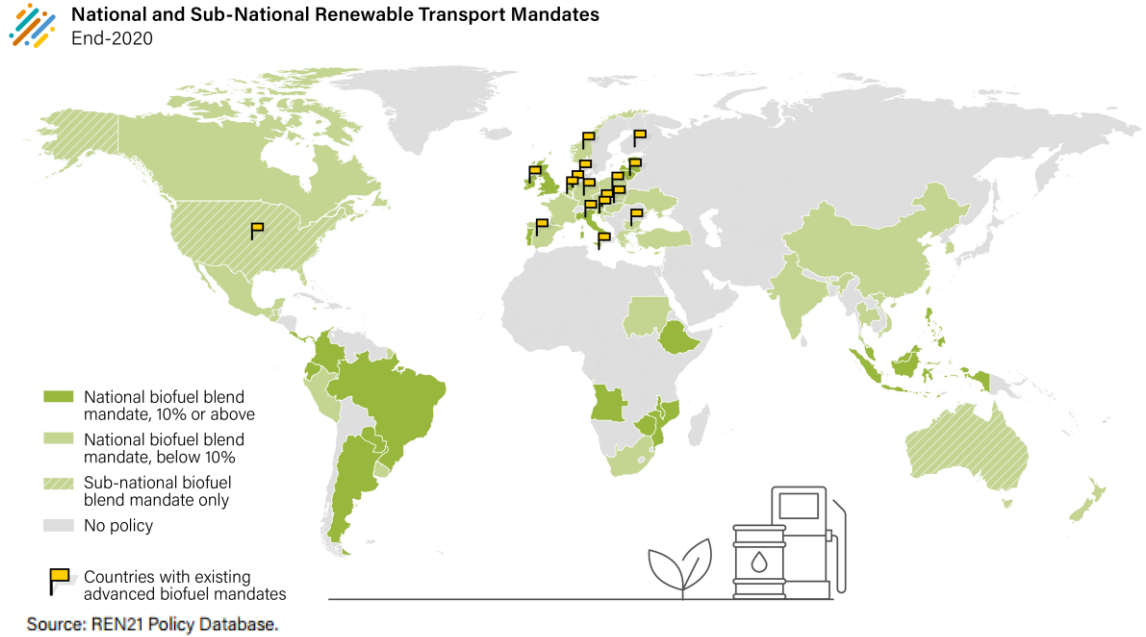
Carbon pricing initiatives covered only around **22% of global greenhouse gas emissions** by early 2021.

POLICY SUPPORT LOW IN HEATING AND COOLING SECTOR



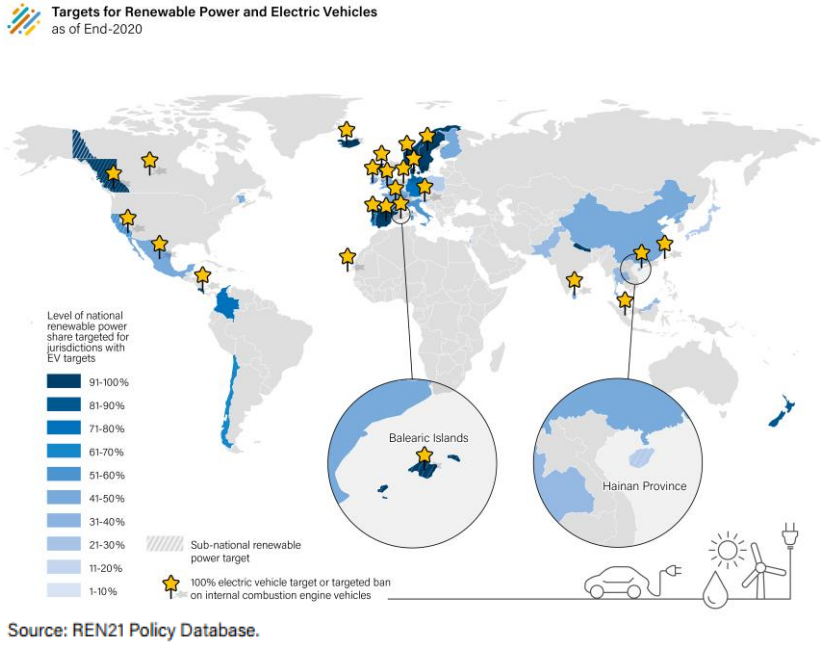
Only 10 countries had renewable heat support policies covering all sectors as of end-2020.

POLICY SUPPORT REMAINS STATIC FOR TRANSPORT



Biofuel blending mandates remain the most widely adopted renewable energy support policy in the transport sector.

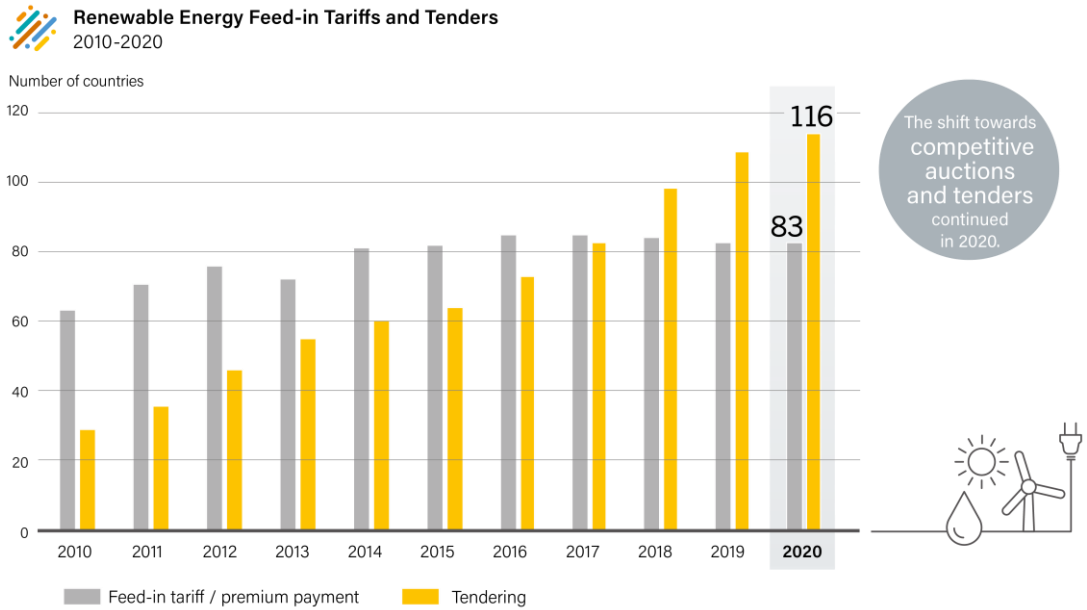
ONLY SEVERAL COUNTRIES HAVE TARGETS FOR EVS AND RENEWABLES



Source: REN21 Policy Database.

Only 8 countries with targeted bans on internal combustion engine vehicles have 100% renewable power targets

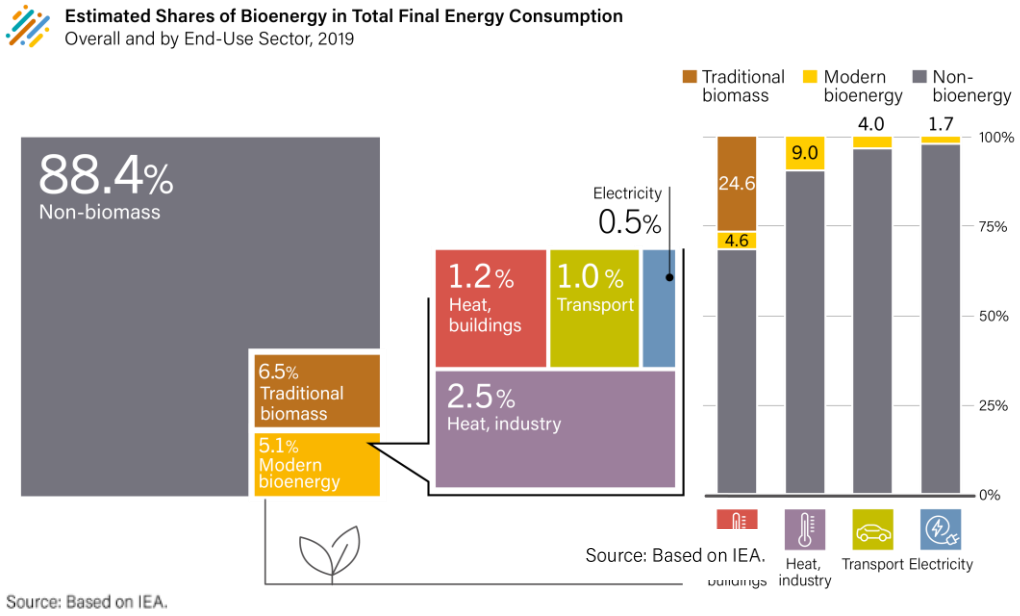
THE RISE OF RENEWABLE POWER AUCTIONS CONTINUED



Source: REN21 Policy Database.

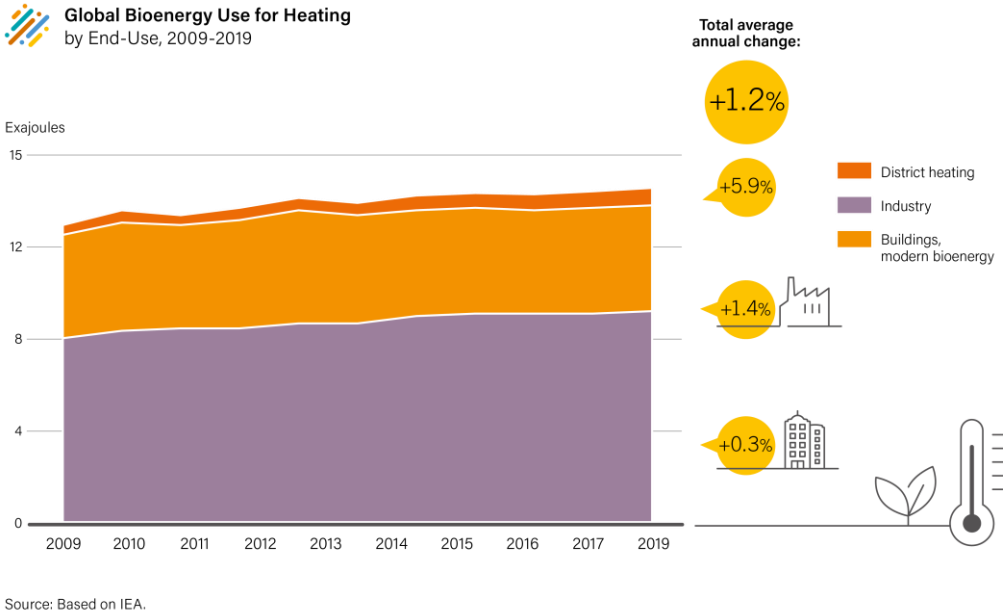
116 countries had used auctions or tendering as of end-2020, up from 111 total countries in 2019.

BIOENERGY CONTRIBUTES MOST TO RENEWABLE SUPPLY



Modern bioenergy supplies energy for heating, transport and electricity end-uses.

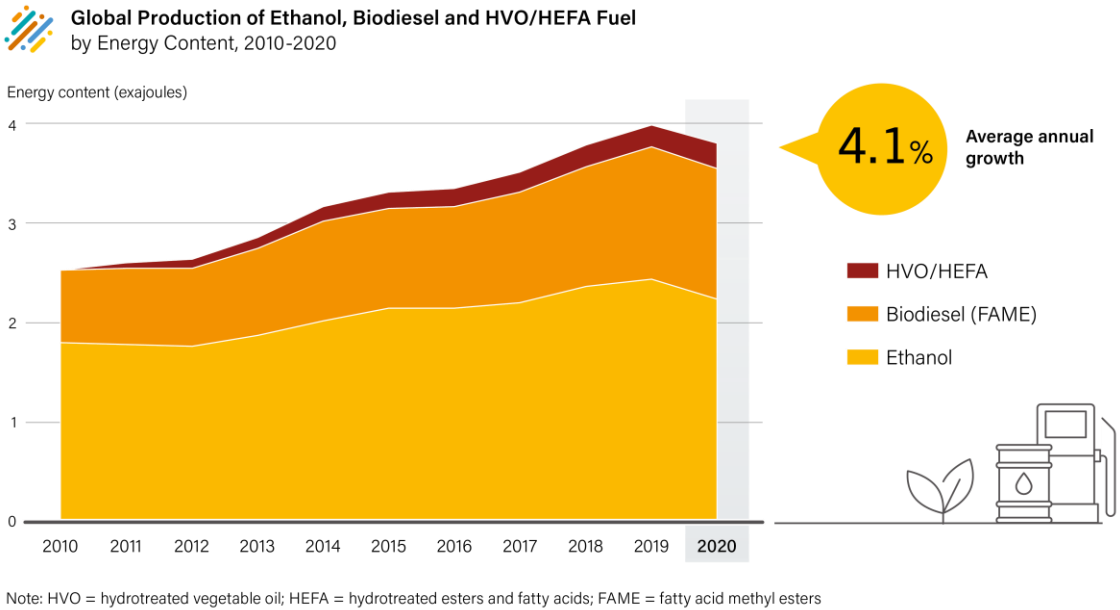
USE OF MODERN BIOENERGY IS INCREASING SLOWLY



Source: Based on IEA.

Bio-heat is used in **buildings and industry**, and often supplied by district energy networks.

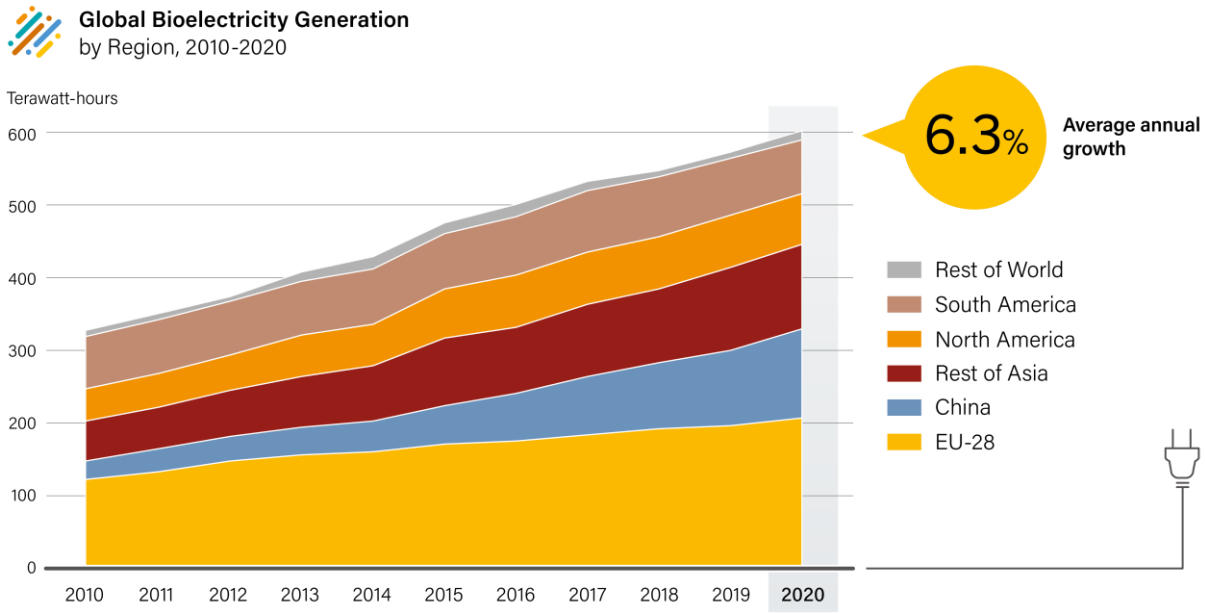
BIOFUELS PRODUCTION DECREASED IN 2020



Note: HVO = hydrotreated vegetable oil; HEFA = hydrotreated esters and fatty acids; FAME = fatty acid methyl esters

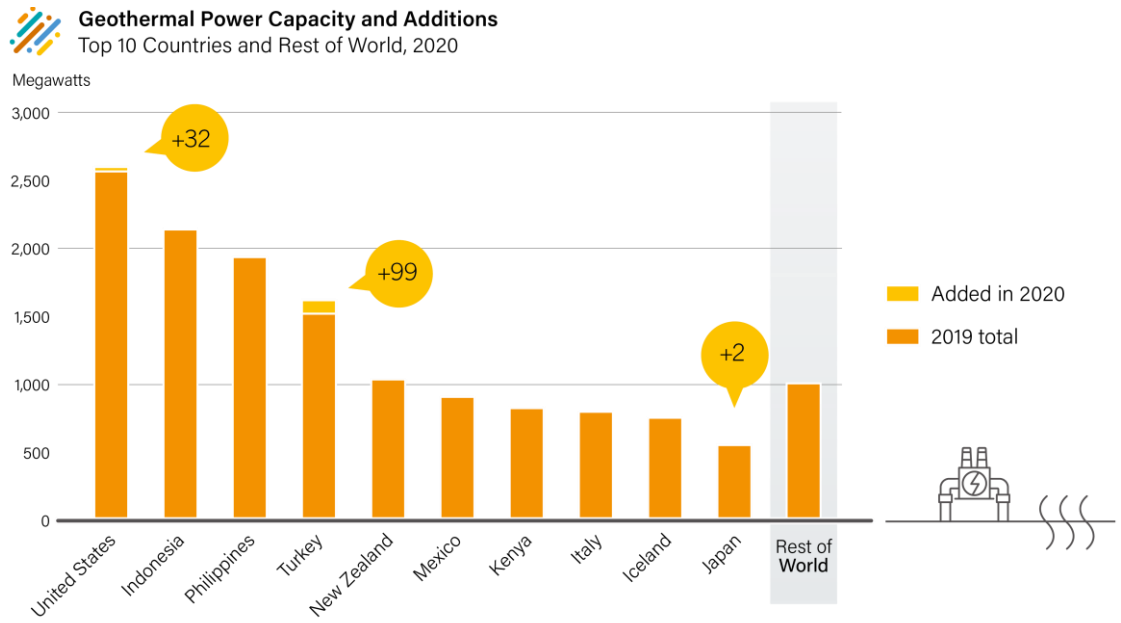
The **United States** remained the leading biofuels producer, with a 51% share, despite declines in US production of both ethanol and biodiesel.

BIOELECTRICITY PRODUCTION HAS GROWN RAPIDLY



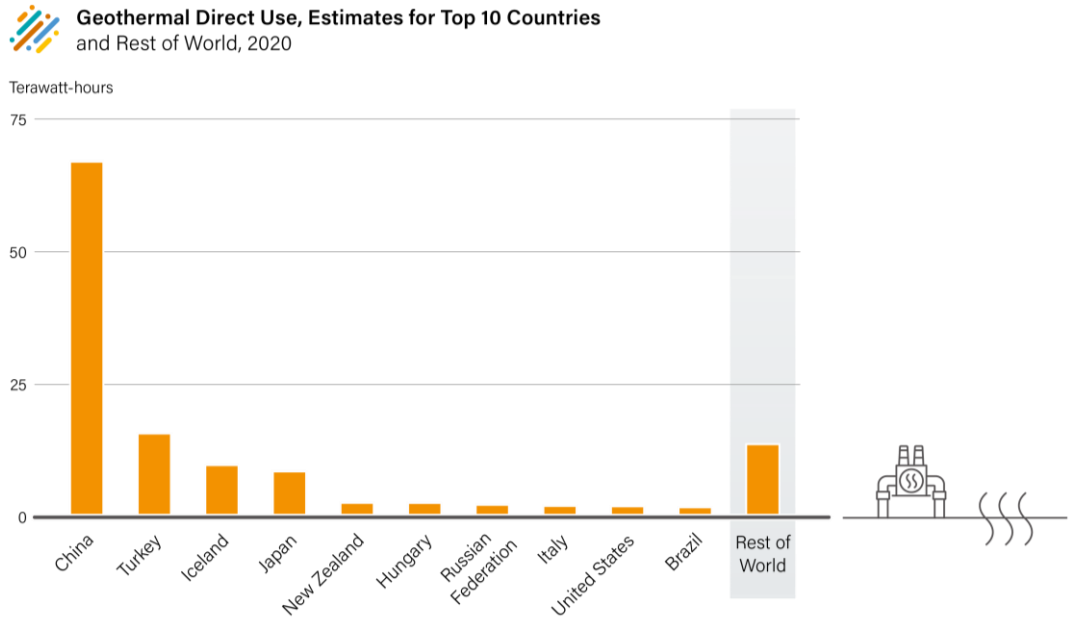
Bioelectricity generation increased **6.4% from 2019**, with the majority of gains in China.

NEW GEOTHERMAL POWER INSTALLATIONS IN 2020



USA and Indonesia have been the most active geothermal power markets in recent years.

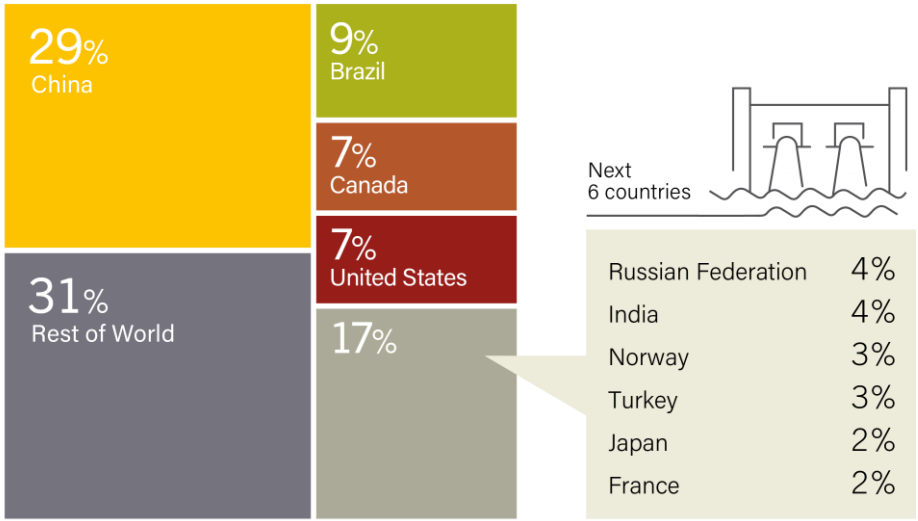
CHINA LED GEOTHERMAL DIRECT USE IN 2020



China, Turkey, Iceland and Japan together represented roughly **75% of the global total** geothermal direct use in 2020.

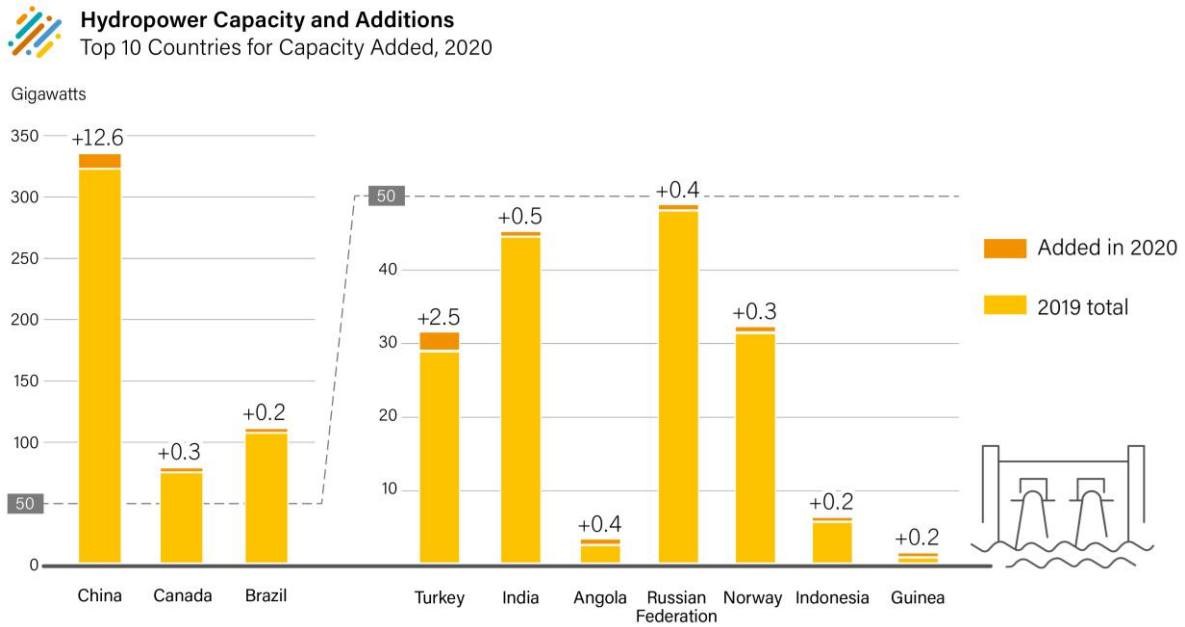
HYDROPOWER CAPACITY INCREASED 24% IN 2020

Hydropower Global Capacity, Shares of Top 10 Countries
and Rest of World, 2020



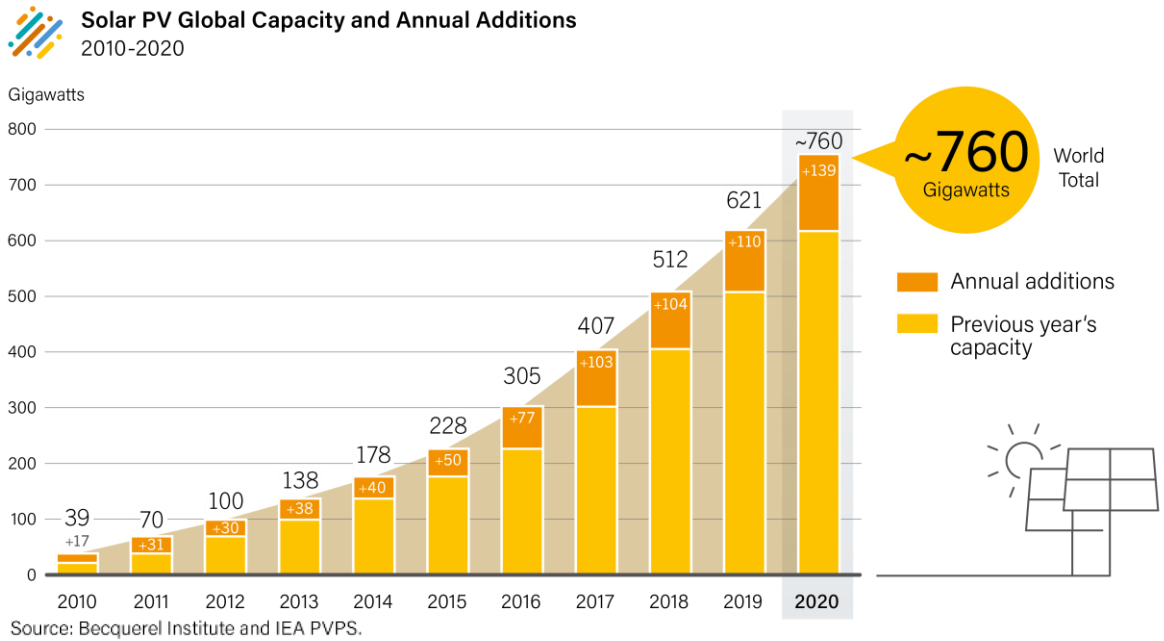
An estimated **19.4 GW was added in 2020**, representing a 24% increase in capacity additions from 2019.

HYDROPOWER CAPACITY ADDITIONS DRIVEN BY CHINA



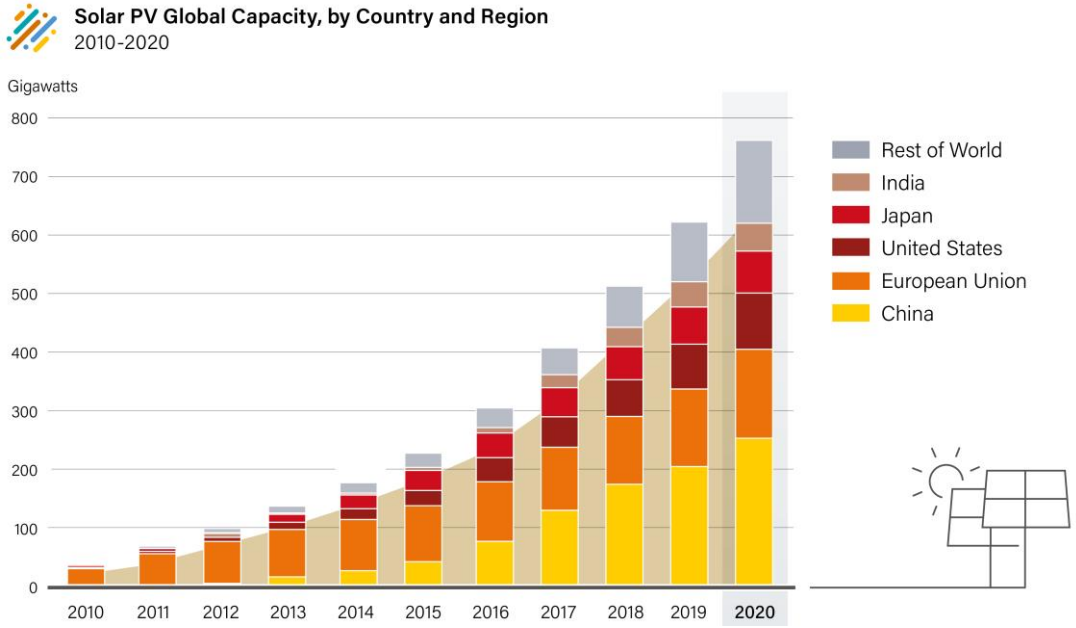
China installed the most new capacity in 2020, followed by Turkey, India, Angola and the Russian Federation.

SOLAR PV CAPACITY ADDITIONS REACHED 139 GW



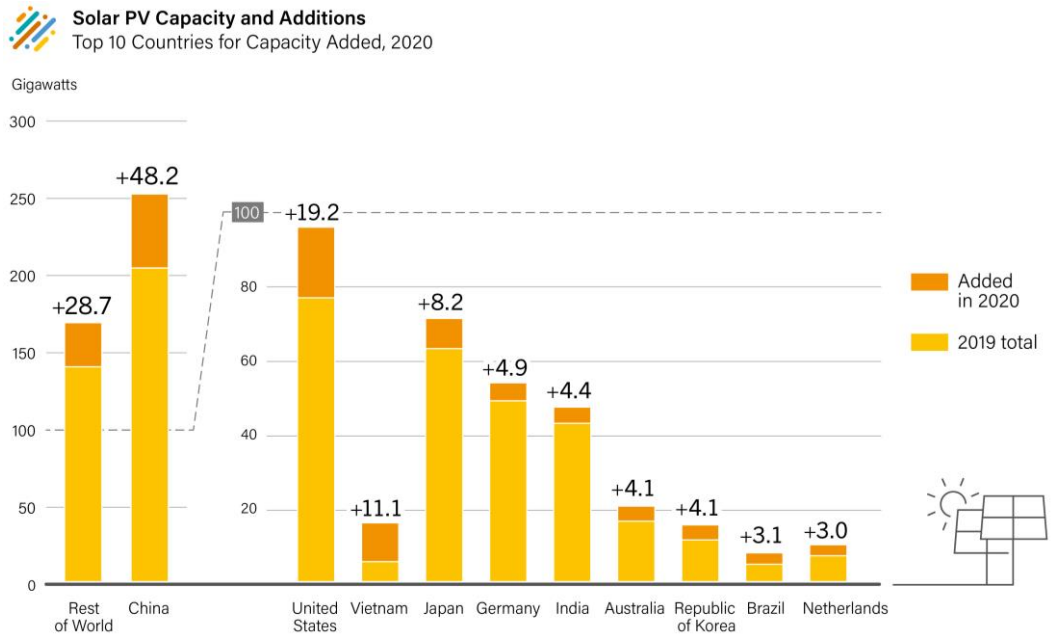
By the end of 2020, at least **15 countries** had enough capacity in operation to meet **at least 5% of their** electricity demand with solar PV.

SOLAR PV SPREADING TO NEW PARTS OF THE WORLD



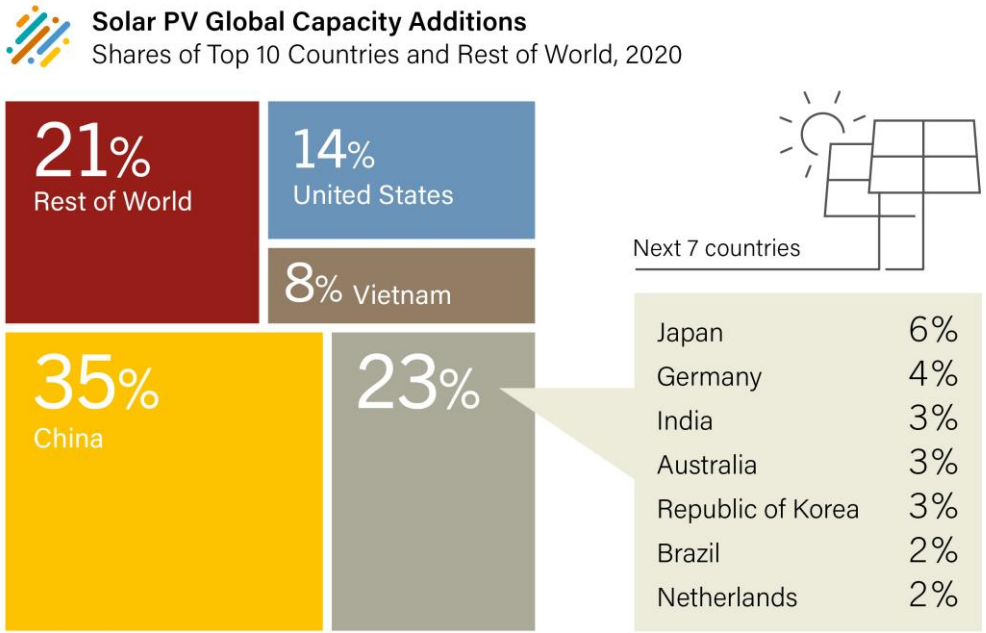
For the eighth consecutive year, Asia eclipsed all other regions for new installations, **accounting for almost 60% of global additions.**

CHINA REMAINS LEADER IN SOLAR PV



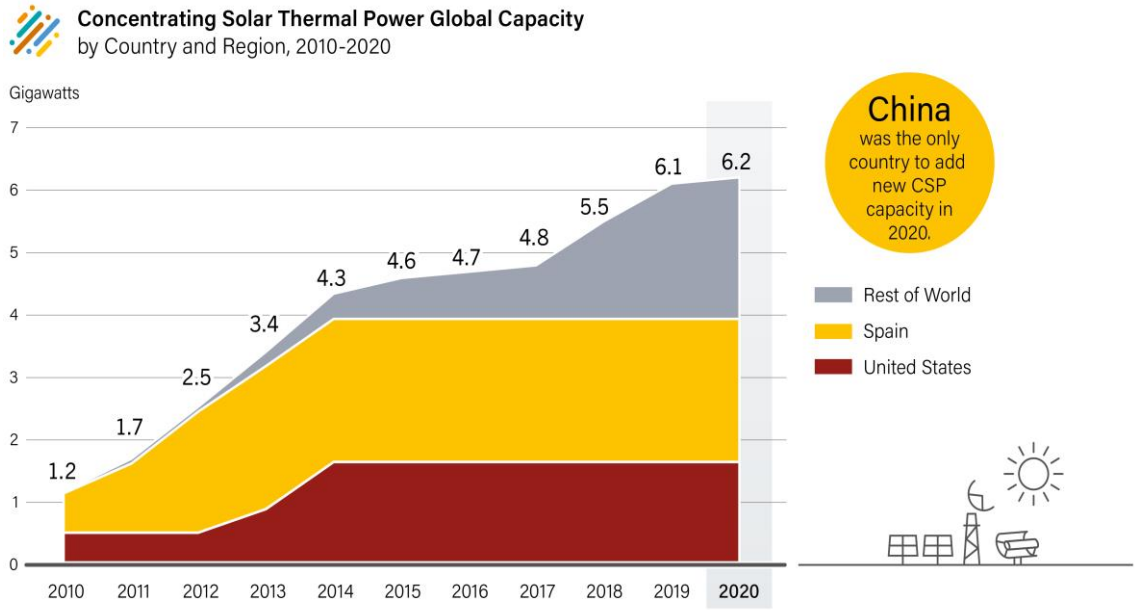
Following two years of decline, **China's market increased 60%** – driven largely by pending changes to the country's FIT structure

ASIA LEADS SOLAR PV MARKETS YET AGAIN



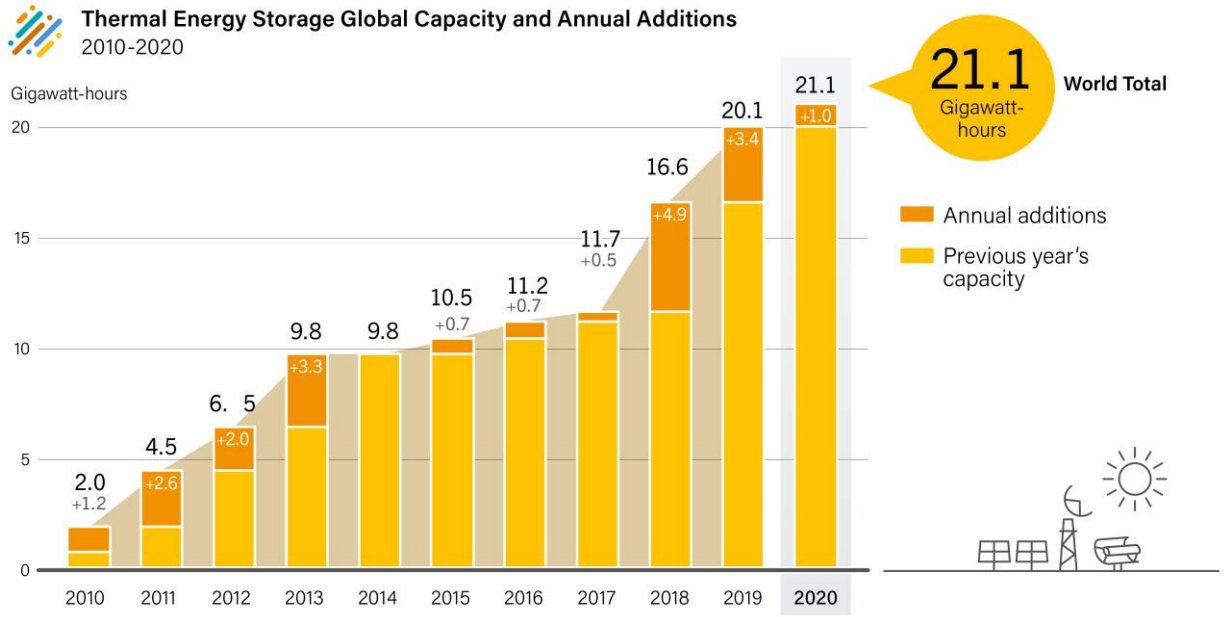
Asia accounted for almost 60% of global additions, despite declines in the region's top three markets (China, India and Japan).

NEW CSP ADDITIONS EXCLUSIVELY IN CHINA



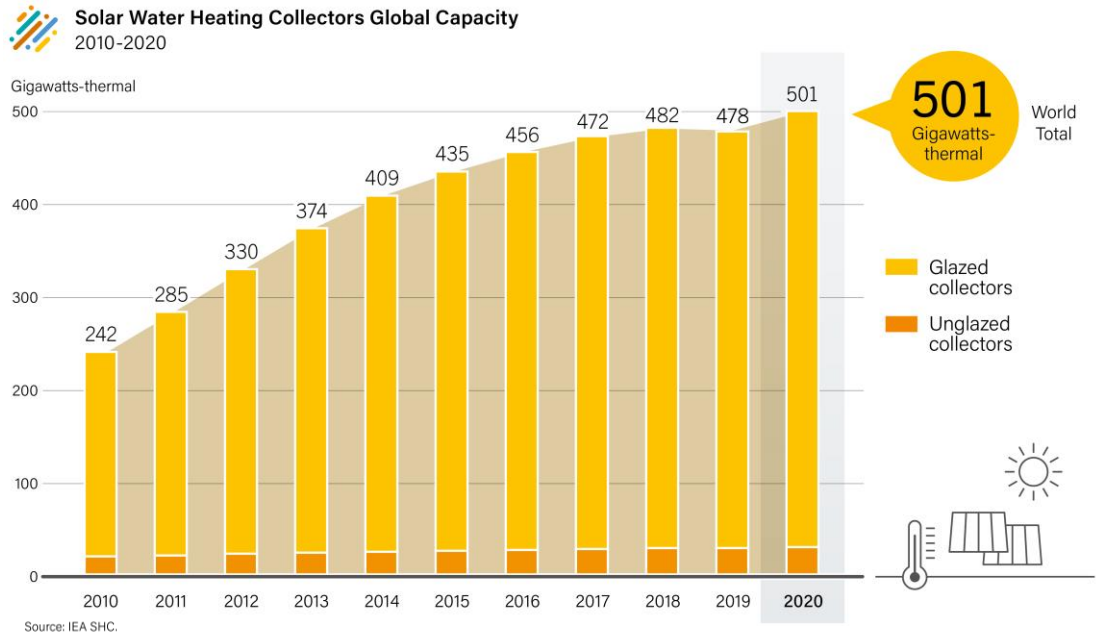
Global CSP capacity **grew 1.6% in 2020**, with a single 100 MW project coming online in China.

NEARLY ALL CSP PLANTS USE THERMAL ENERGY STORAGE



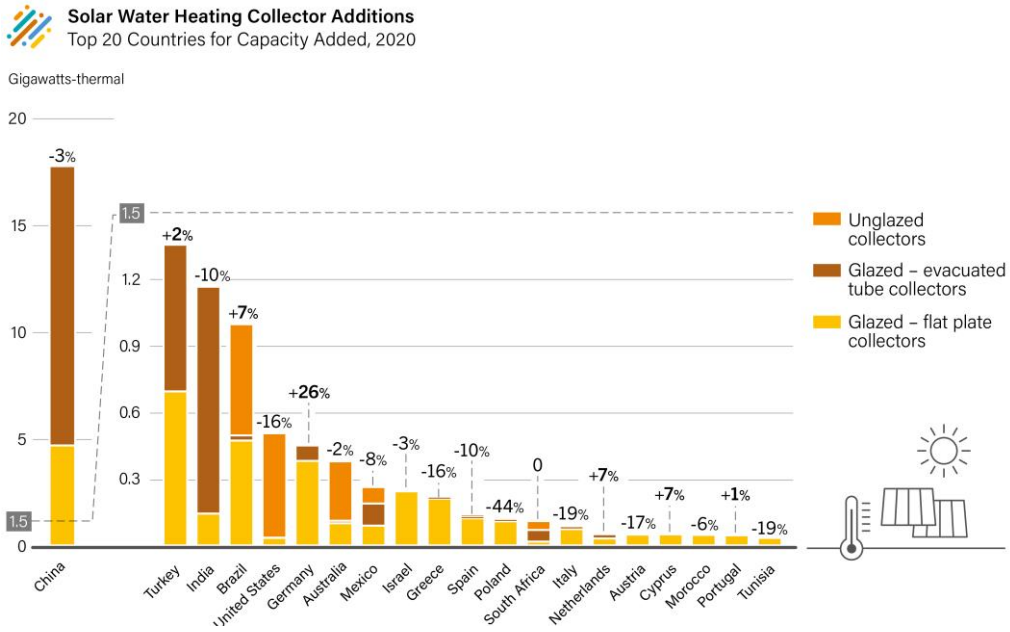
22 of the 24 CSP plants completed globally since the end of 2014 have incorporated thermal energy storage.

INSTALLED SOLAR WATER HEATING CAPACITY INCREASED



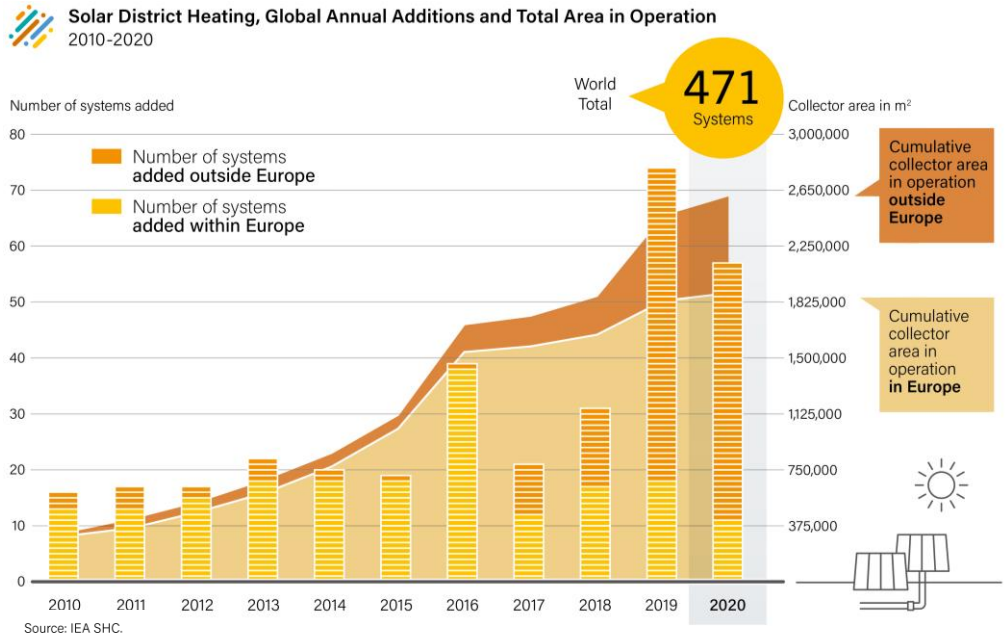
Global operating solar thermal capacity **increased 5%** from 2019.

CHINA DOMINATED SOLAR WATER HEATING COLLECTOR SALES



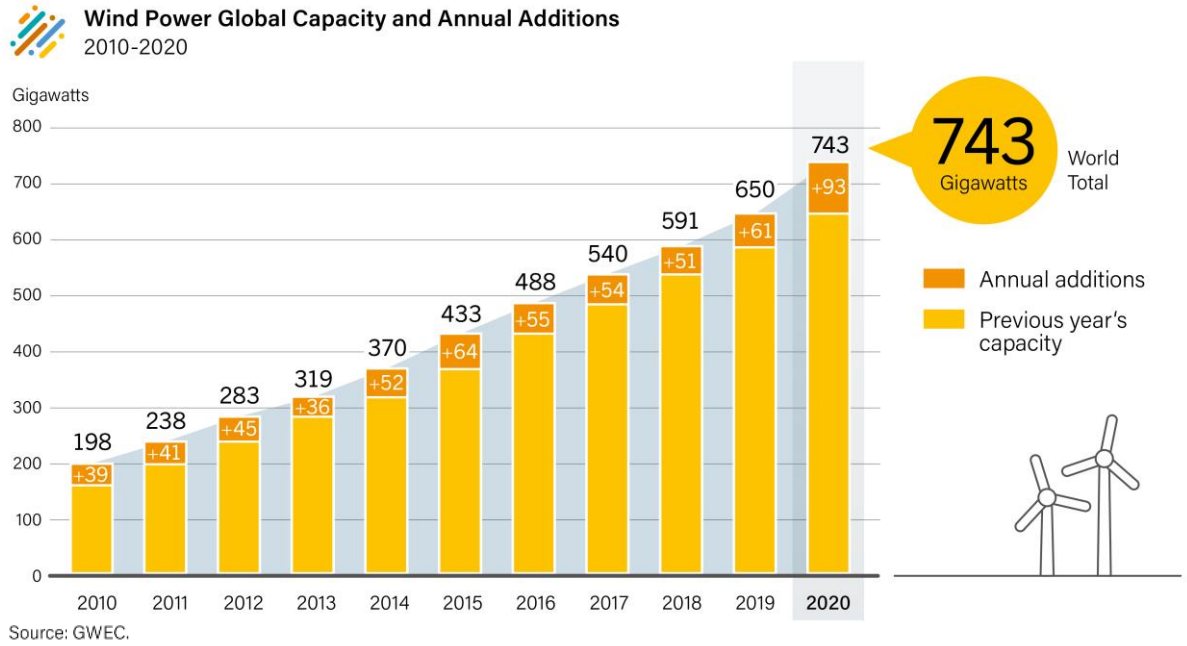
China accounted for 71% of new global sales in solar water heating collectors, followed by Turkey and India.

LARGE INCREASE IN SOLAR DISTRICT HEATING SYSTEMS



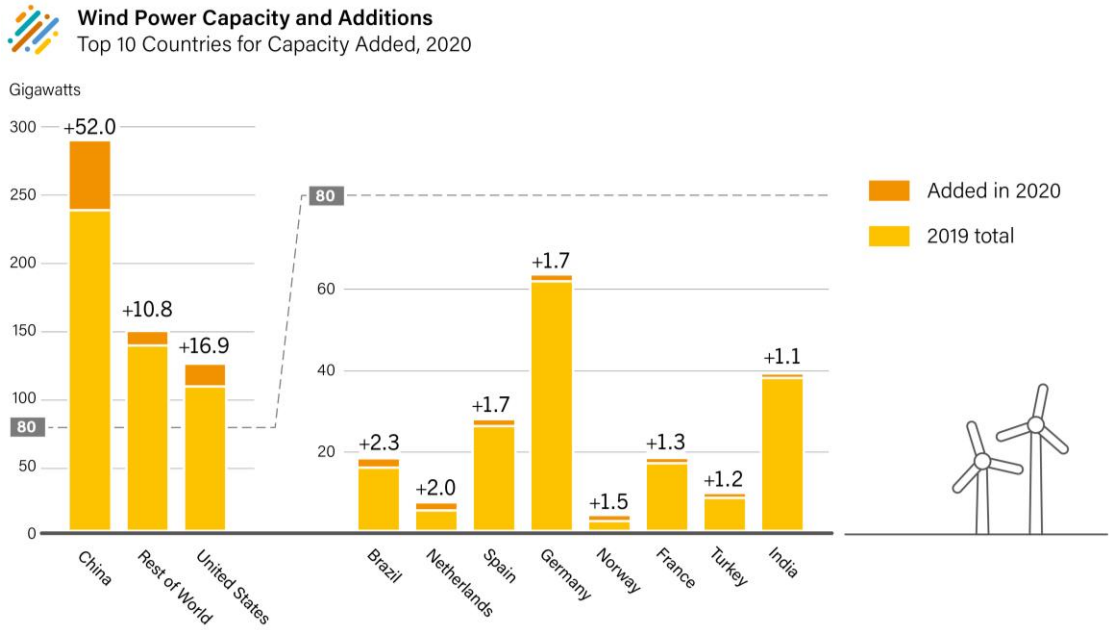
Leading markets for solar district heating were **Brazil, China and Turkey.**

RECORD-BREAKING WIND POWER CAPACITY ADDED



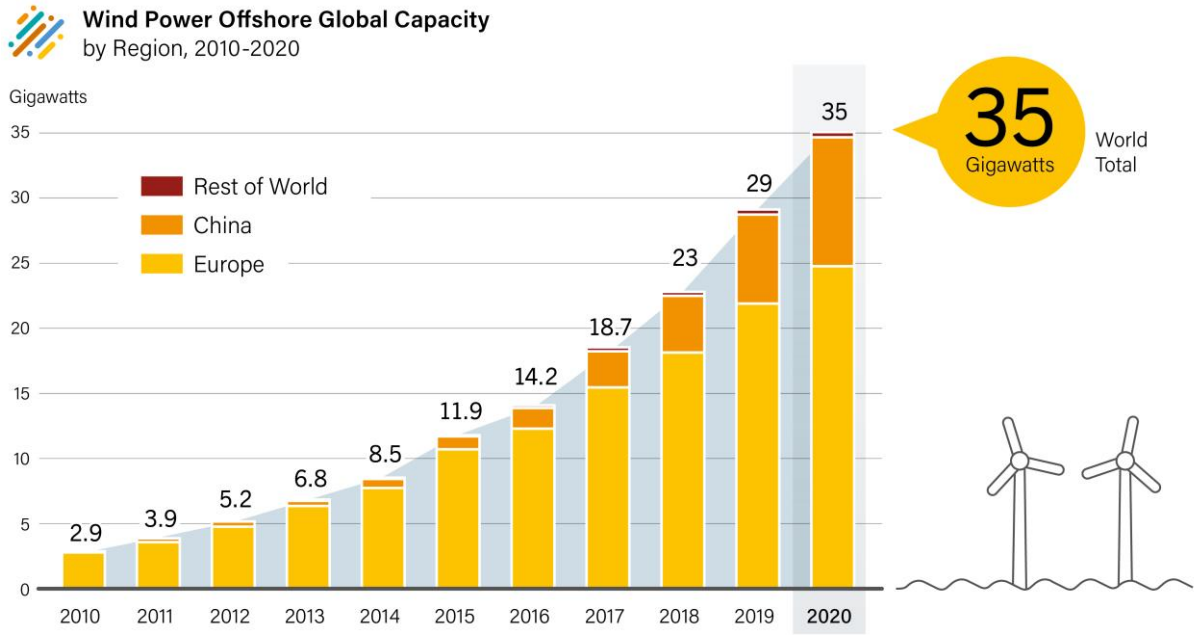
At 93 GW added, the global wind power market was **45% higher** than its previous high in 2015.

MORE THAN HALF OF NEW WIND POWER CAPACITY IN ASIA



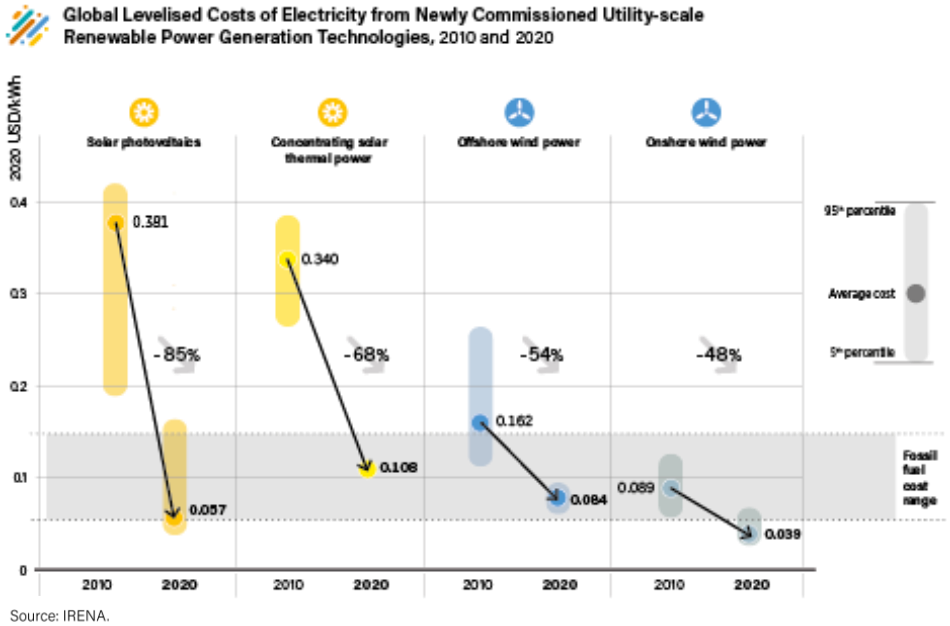
China had its **biggest year yet for new installations at 52 GW**, doubling its capacity added in 2019.

OFFSHORE WIND MARKET KEPT GROWING



Offshore wind power accounted for a record **6.5% of wind power additions** in 2020, down from 10% in 2019.

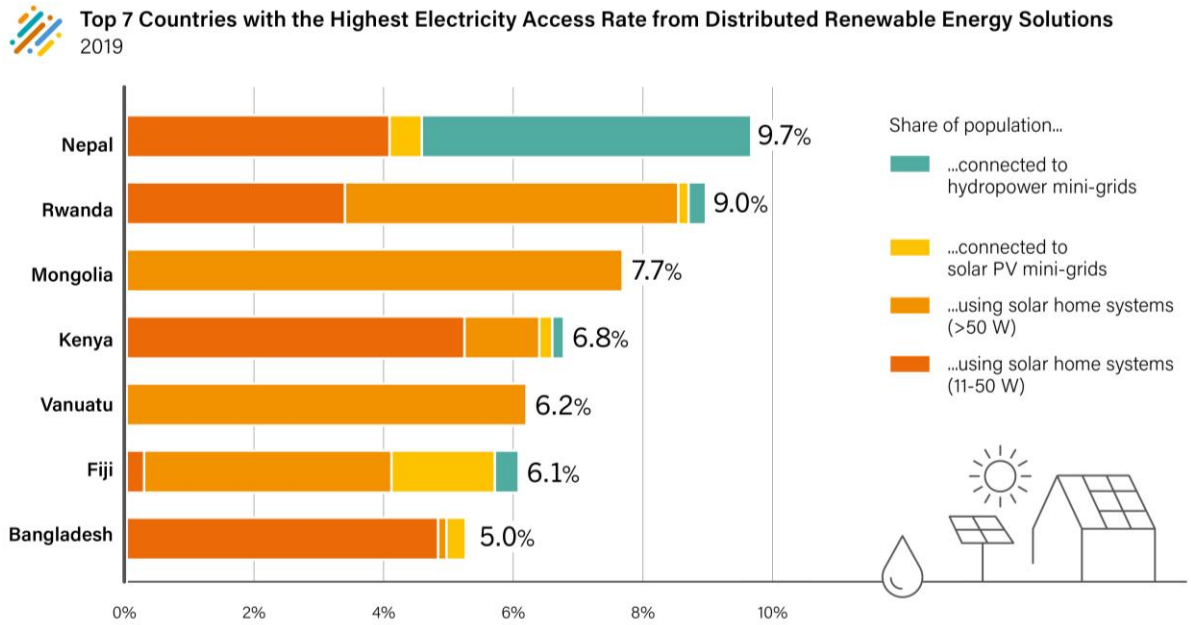
RENEWABLE POWER COSTS KEEP FALLING



Source: IRENA.

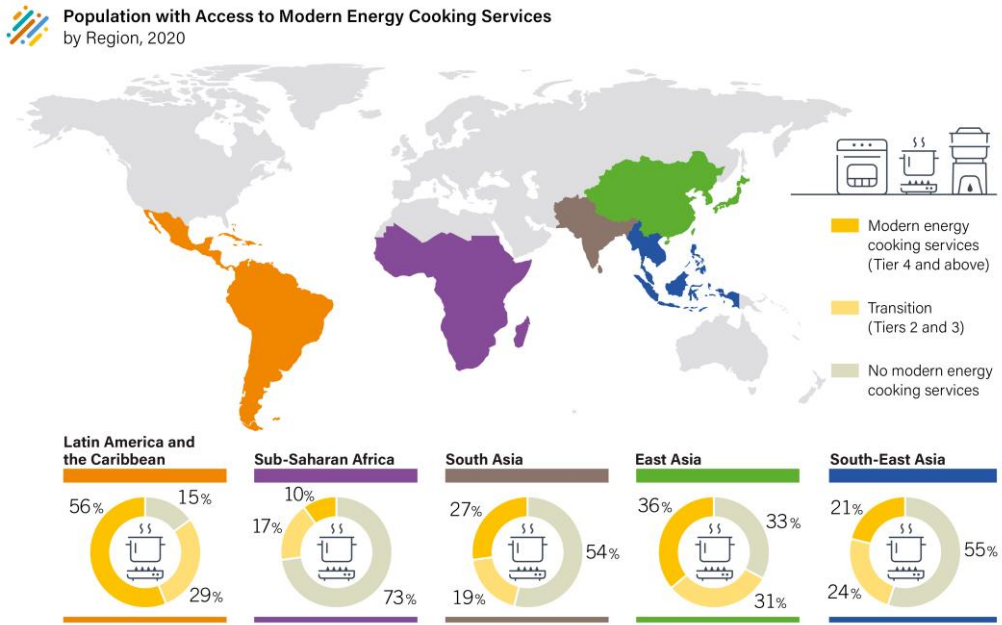
Costs for solar PV and CSP as well as onshore and offshore wind have **fallen sharply over the past decade.**

DISTRIBUTED RENEWABLES: KEY SOLUTIONS TO PROVIDE ENERGY ACCESS



Distributed renewables for energy access **provide electricity to between 5% and 10% of the population** in several developing countries.

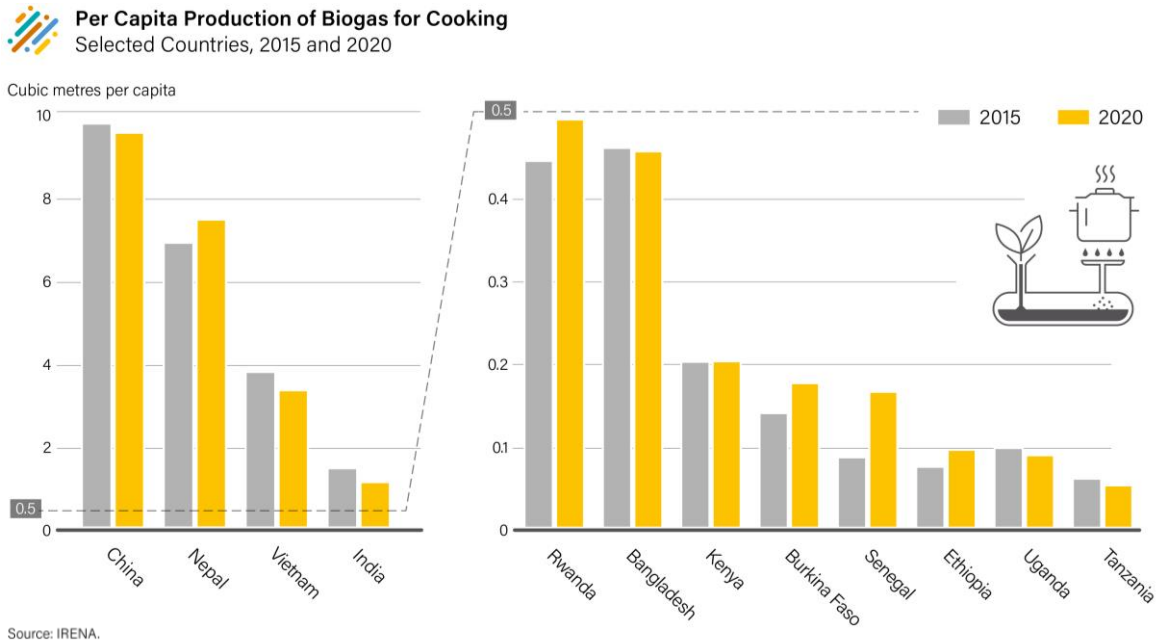
PROGRESS IN CLEAN COOKING REMAINS SLOW



Source: ESMAP.

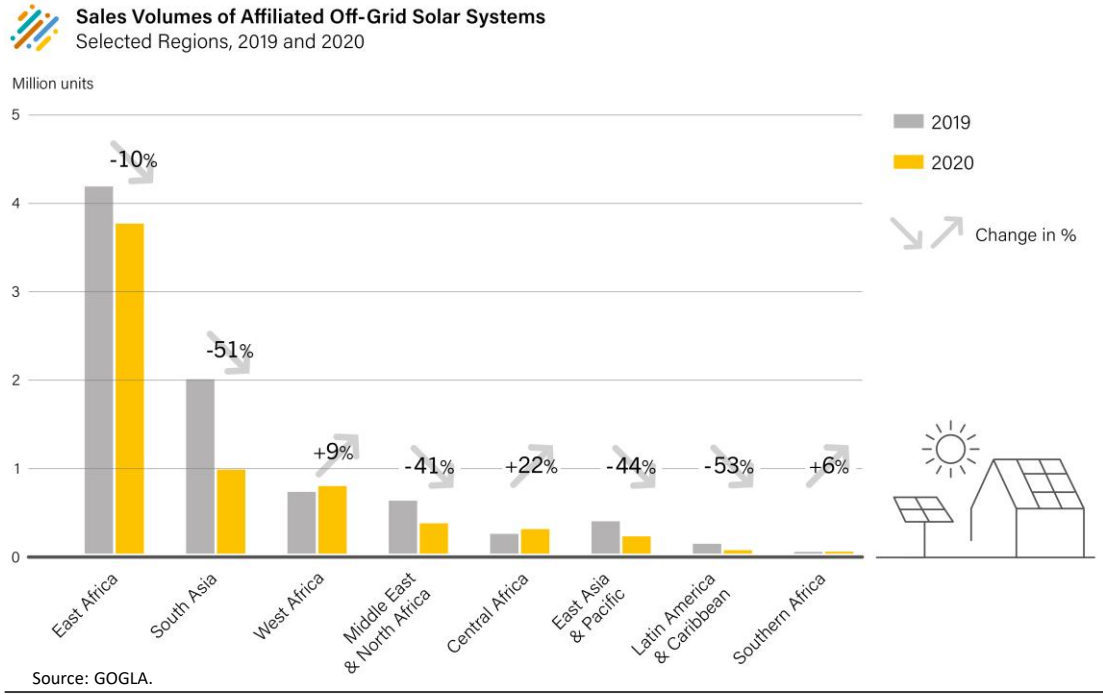
Despite recent progress, China and India **still account for nearly half of the global population without access**.

BIOGAS FOR COOKING EXPANDS IN NEW MARKETS



The bulk of the biogas production per capita **(99.7%) occurs in Asia**.

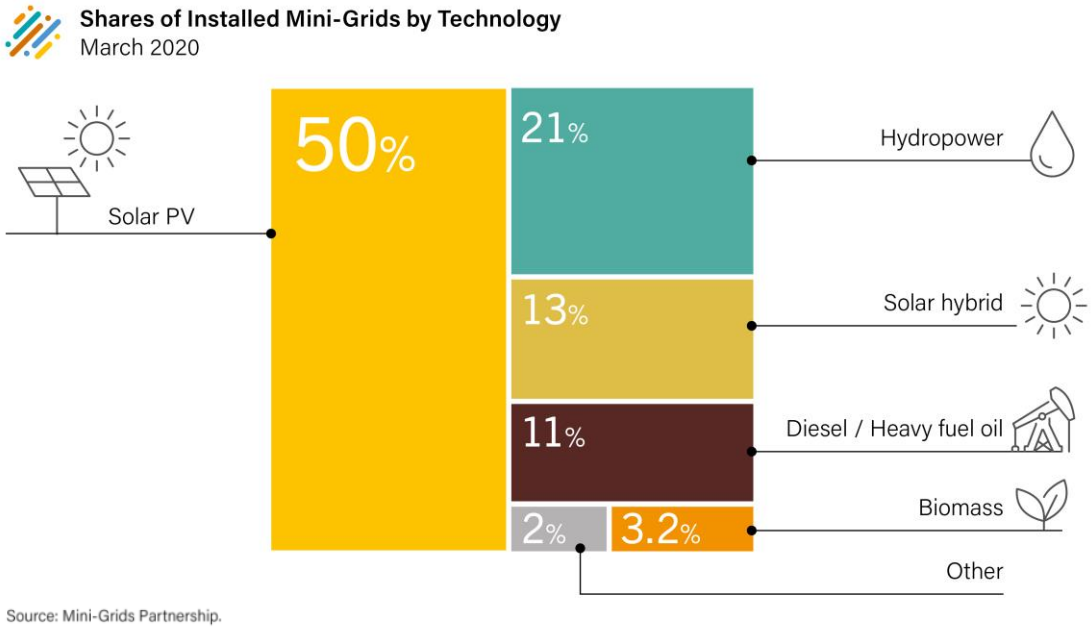
OFF-GRID SALES DISRUPTED DUE TO COVID-19



Source: GOGLA.

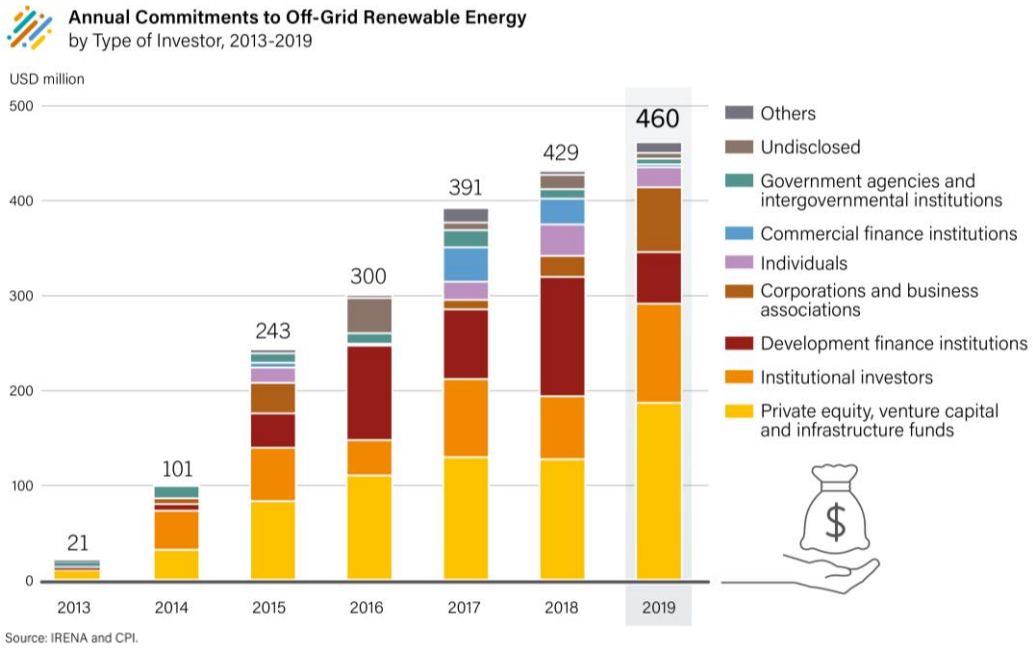
Sales of off-grid solar systems **fell 22%** compared to 2019, largely due to lockdown-related disruptions.

RENEWABLES-BASED MINI-GRIDS EXPANDING IN ENERGY ACCESS



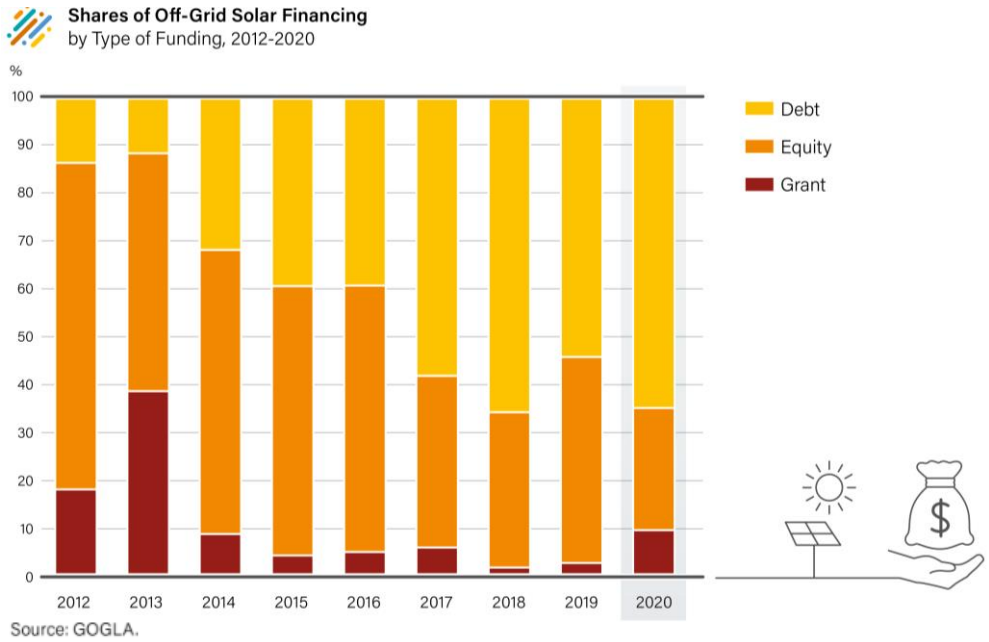
Solar PV has been the fastest growing mini-grid technology, incorporated **into 55% of mini-grids** in 2019 compared to only 10% in 2009.

TYPE OF INVESTORS IN DREA MARKETS CONTINUED TO SHIFT



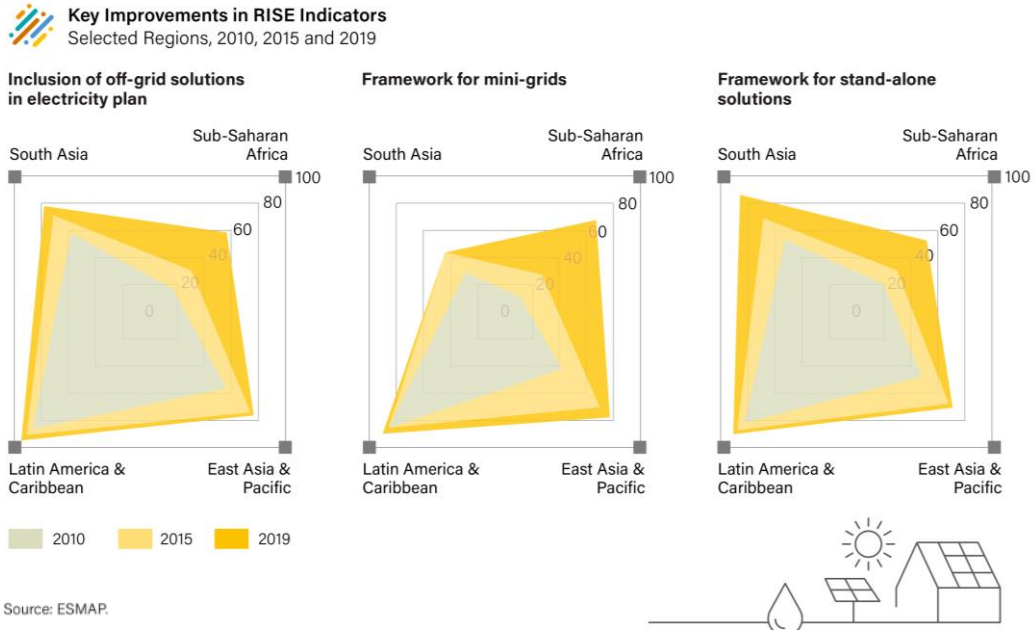
Corporations **more than tripled** their investment during this period, from USD 22 million in 2018 to USD 68 million in 2019.

EQUITY FINANCING FELL IN OFF-GRID SOLAR SECTOR



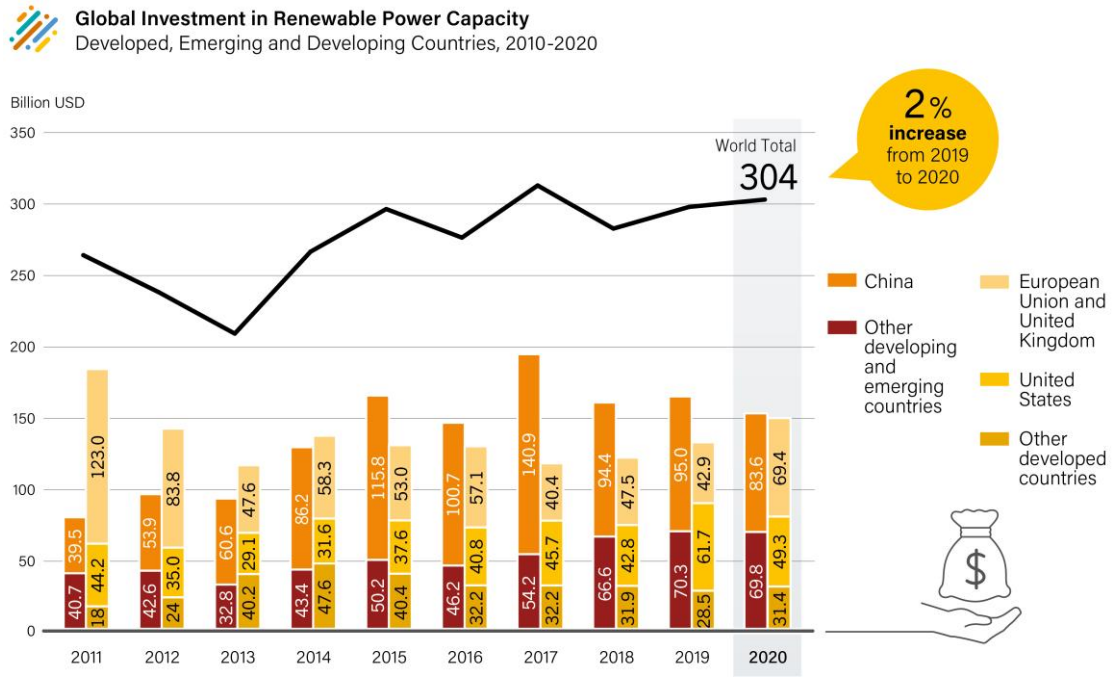
Equity funding fell 46%, but this was **compensated by an increase in both debt and grant funding**.

MORE POLICIES FOR RENEWABLES-BASED ELECTRICITY ACCESS



By 2019, policies to promote mini-grids and stand-alone renewables **had been implemented in many countries**.

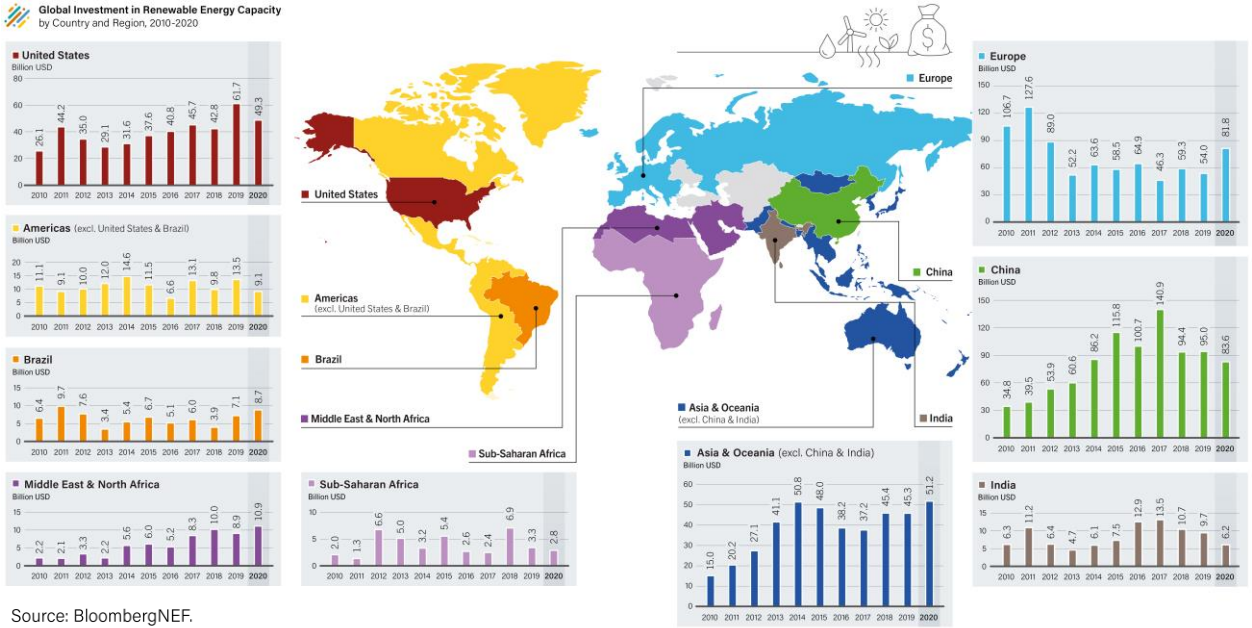
INVESTMENT IN RENEWABLES INCREASED SLIGHTLY



Source: BloombergNEF.

To reach global climate and sustainable development goals, annual **investment in renewables must at least triple** by 2030.

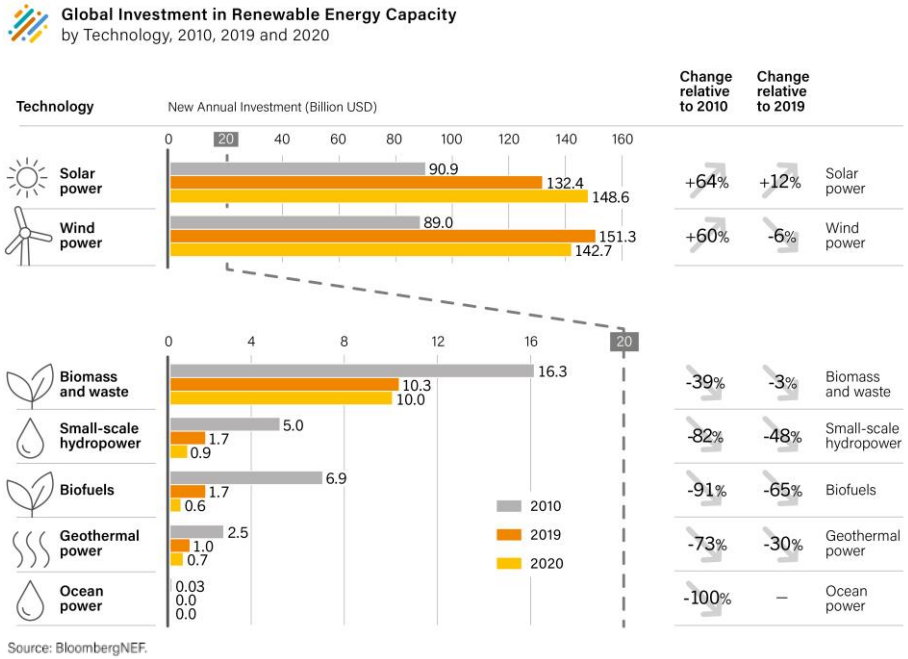
DEVELOPING COUNTRIES INVESTED MORE THAN DEVELOPED ONES



Source: BloombergNEF.

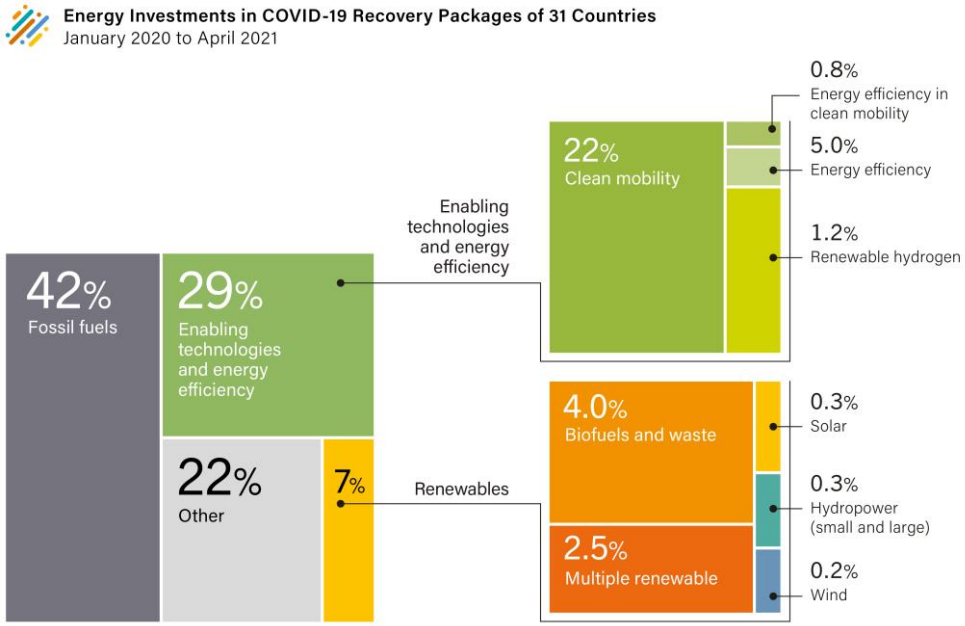
Investments for the year **rose 13% in developed countries** and fell 7% in developing and emerging countries.

INVESTMENT GREW ONLY IN SOLAR PV TECHNOLOGY IN 2020



Solar power represented **nearly half of global renewable energy capacity investment in 2020 -** up 12% from 2019.

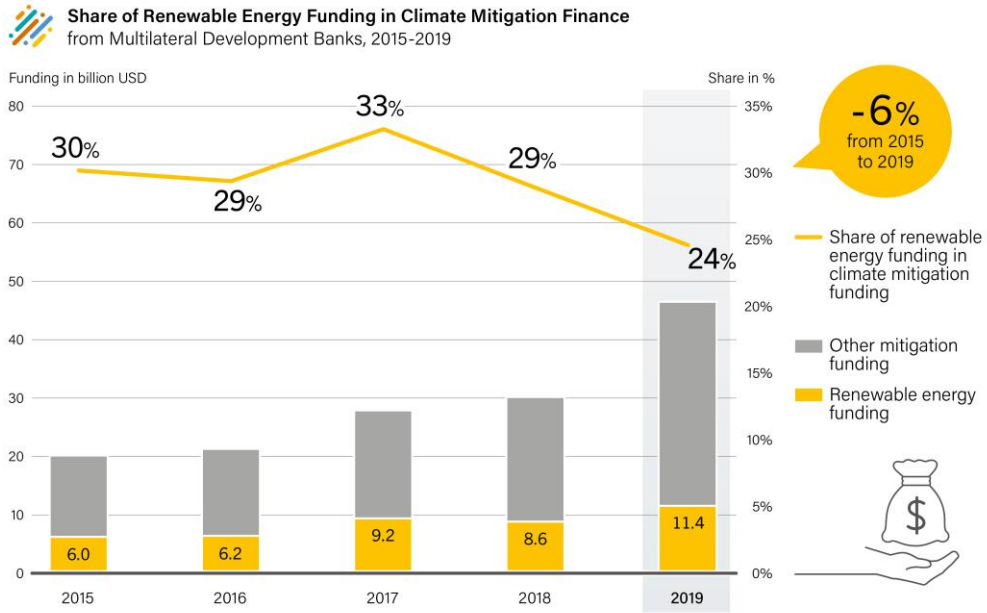
6X MORE RECOVERY FUNDING FOR FOSSIL FUELS



Source: EnergyPolicyTracker.org.

As of early 2021, **only 7%** of COVID recovery spending was allocated to renewables.

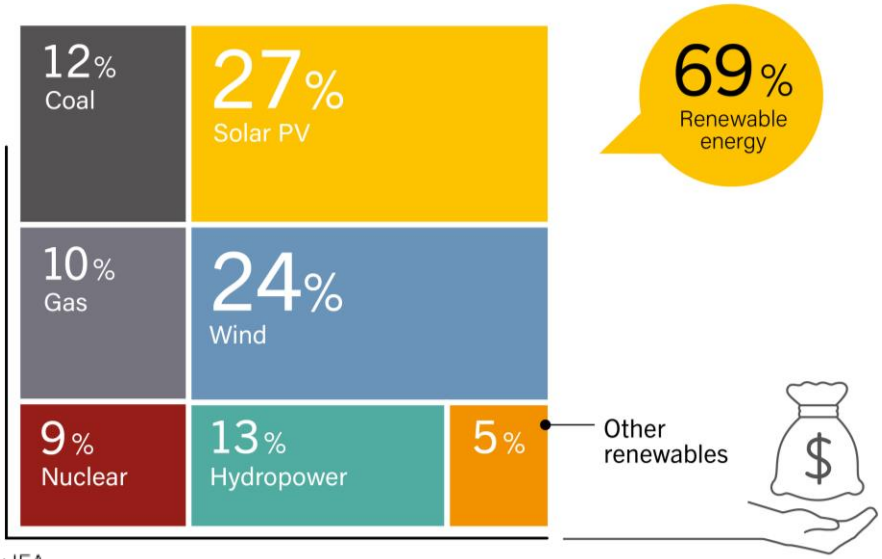
INCREASING MDB INVESTMENTS IN RENEWABLES



Multilateral development bank investments in renewable energy projects **increased 89%** between 2015 and 2019.

2X MORE INVESTMENT IN NEW RENEWABLE POWER CAPACITY THAN FOSSIL FUEL

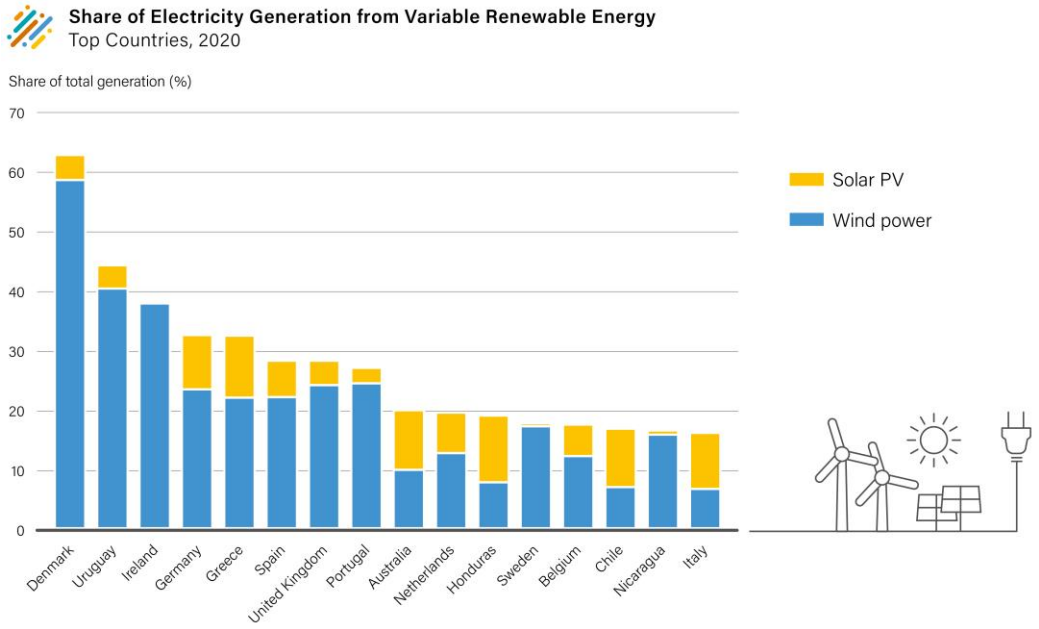
Estimated Global Investment in New Power Capacity
by Type, 2020



Source: IEA.

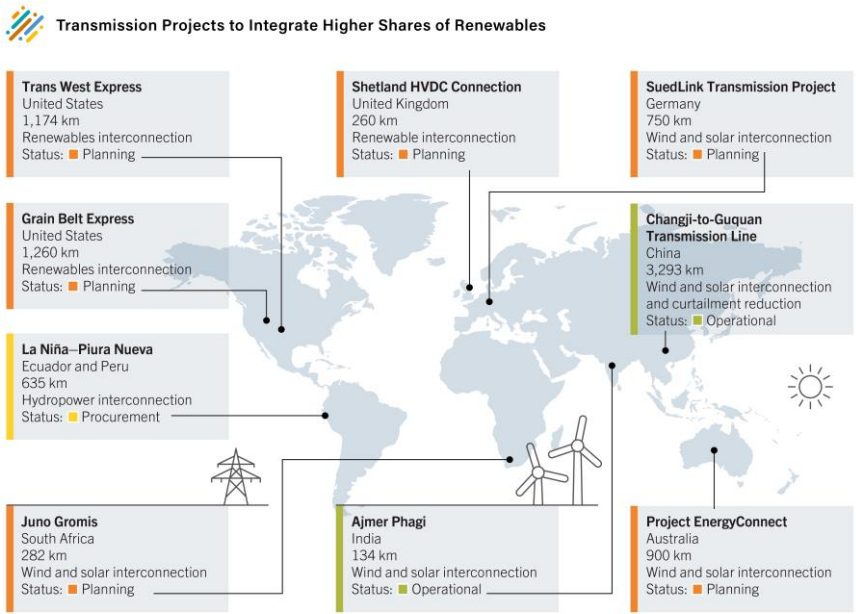
Almost **70% of the global investment in new renewable power and fuel capacity went to renewable power** plants, while only 31% went to coal, gas and nuclear plants.

VARIABLE RENEWABLE ELECTRICITY CONTINUED TO RISE



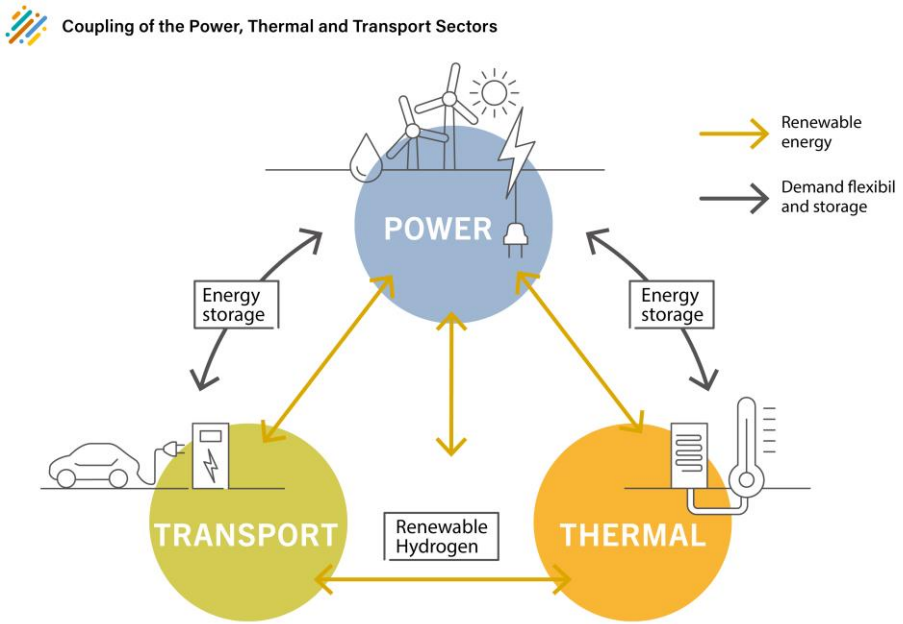
At least **nine countries produced more than 20% of their electricity generation from VRE** in 2020

MAJOR TRANSMISSION PROJECTS ADVANCED IN 2020



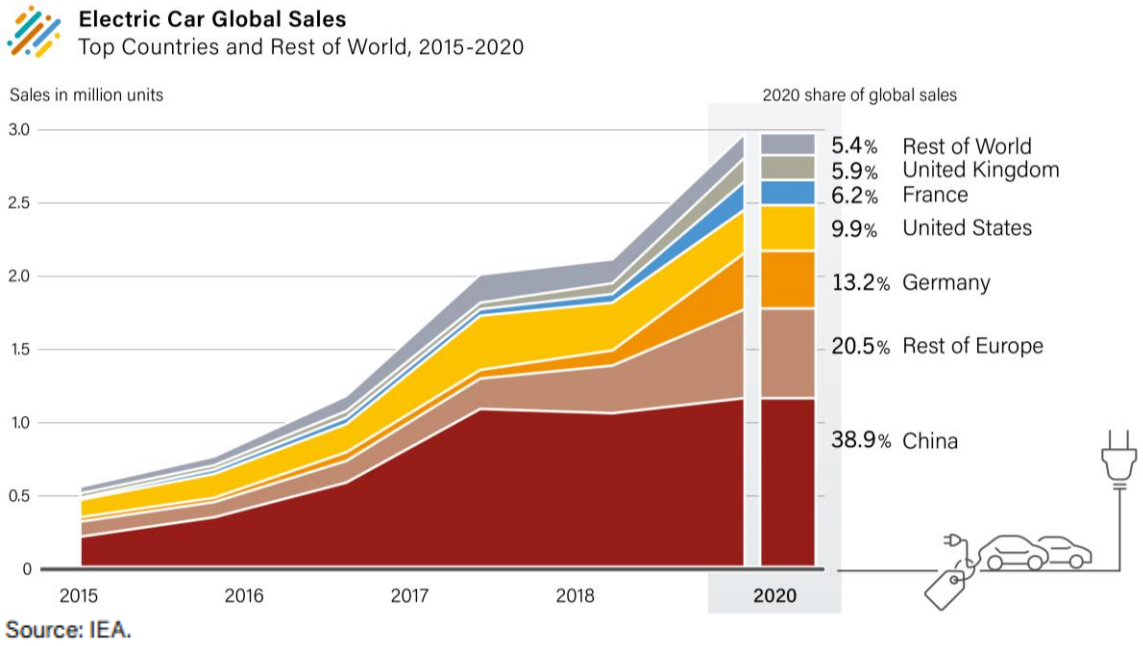
Digital technologies are increasing the usable capacity of existing transmission infrastructure, often a barrier to wider VRE deployment.

SECTOR COUPLING SUPPORTS RENEWABLES INTEGRATION



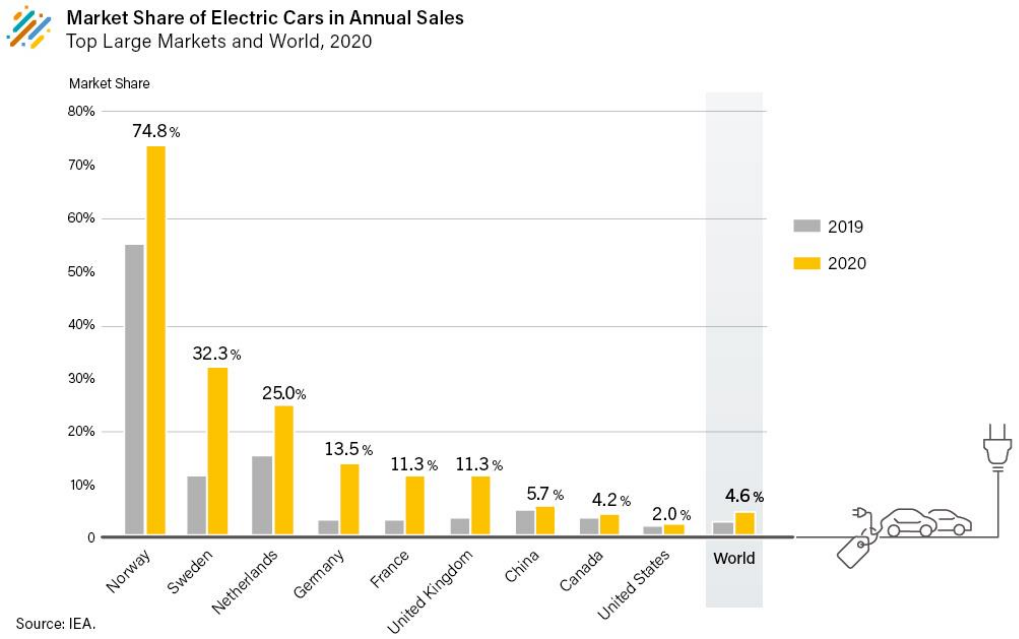
End-use technologies supporting the integration of renewables in power systems **experienced increased sales** in 2020 despite the onset of the COVID-19 pandemic.

ELECTRIC CAR SALES INCREASED 41% IN 2020



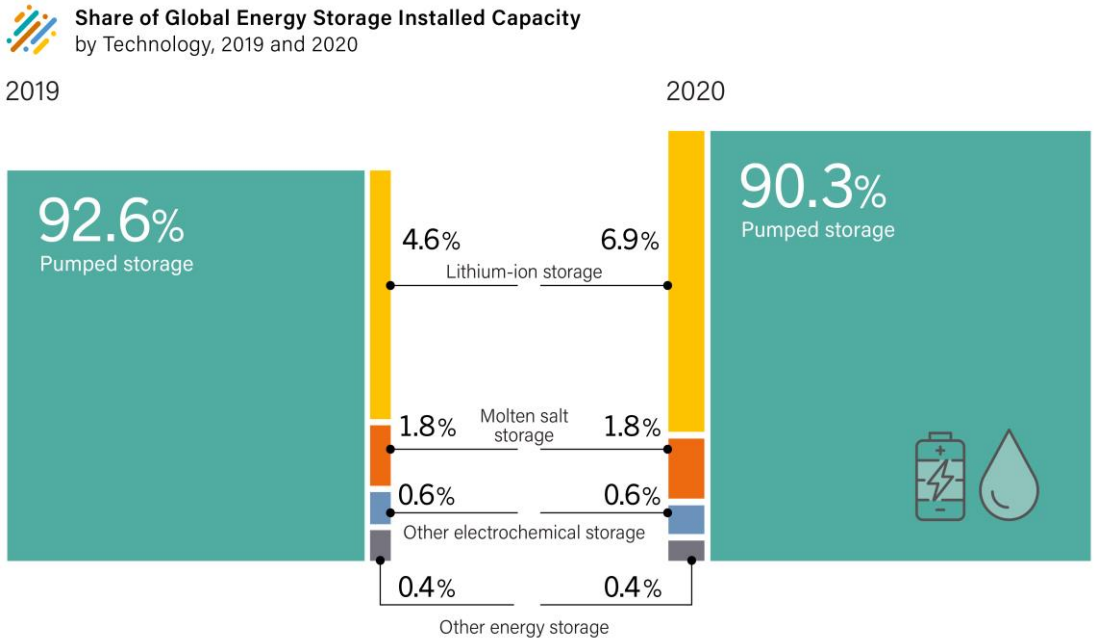
Share of electric cars in new car sales reached 4.6%, **a record high.**

MARKET SHARE OF ELECTRIC CARS IN NEW CAR SALES REACHED 4.6% IN 2020



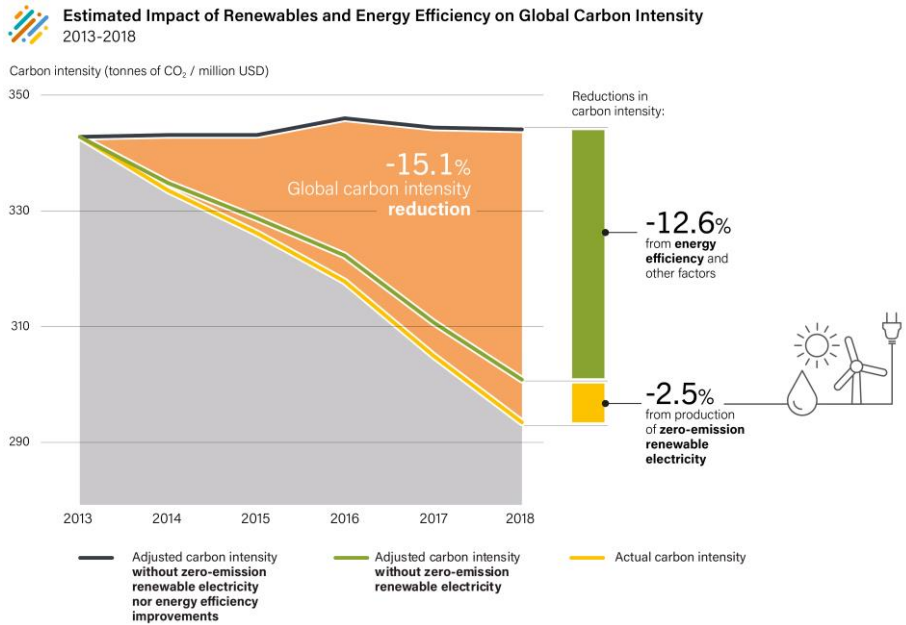
Norway remained the **leader in the share of electric cars in overall car sales, at 75%**, followed by Iceland (52%), and Sweden (32%).

ENERGY STORAGE MARKET BENEFITED FROM COVID STIMULUS



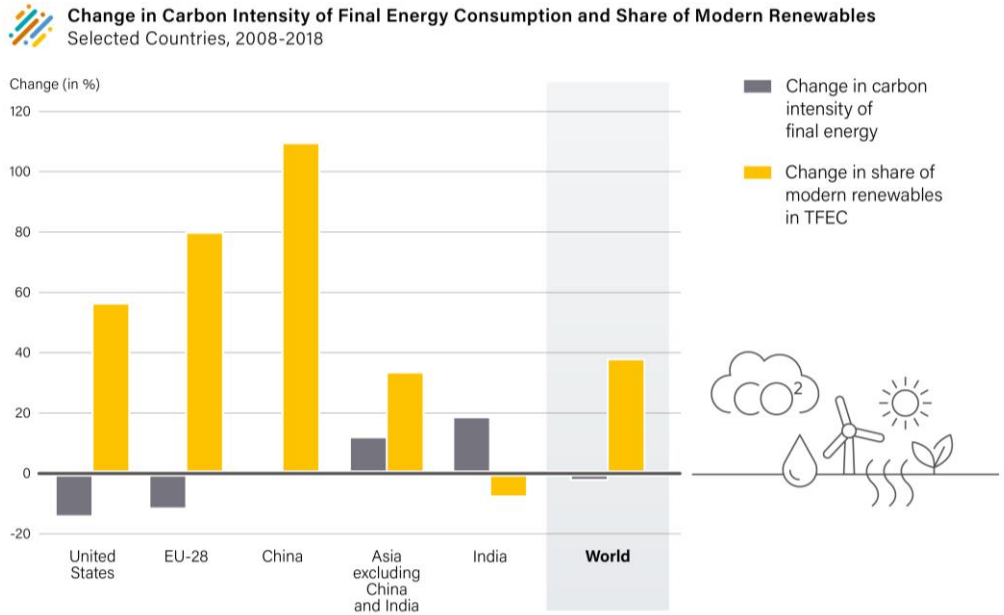
The global operational energy storage capacity reached **191.1 GW in 2020, reflecting 3.4% growth** year-on-year.

ENERGY EFFICIENCY SLOWS CARBON INTENSITY GROWTH



Despite a decline in energy efficiency improvements, there was an **overall decoupling of global economic growth and CO2 emissions** between 2013 and 2018.

CARBON INTENSITY OF FINAL ENERGY CONSUMPTION IMPROVING

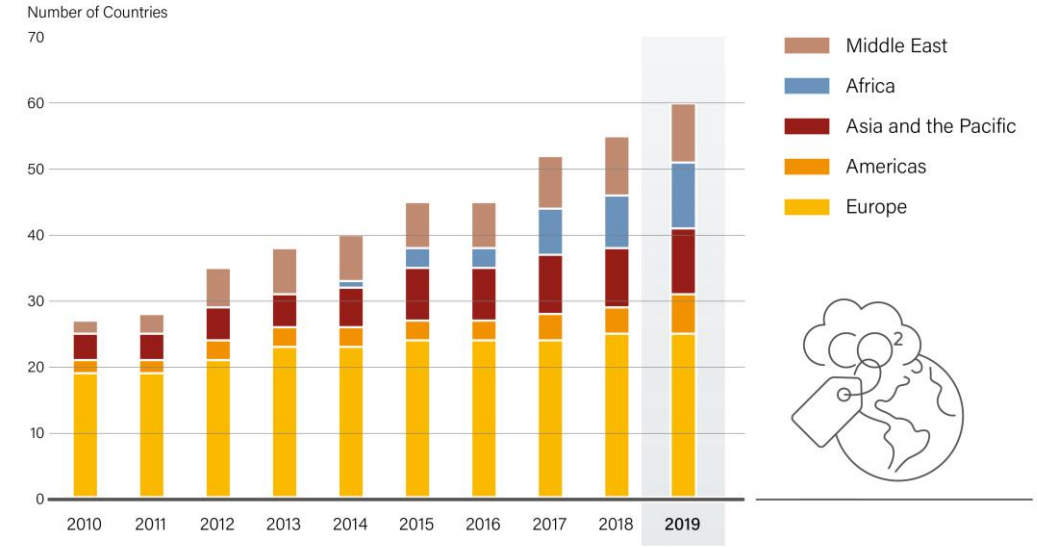


Source: Based on IEA.

Between 2008 and 2018, **the global carbon intensity of final energy decreased 2%.**

COUNTRIES ARE INCREASINGLY MONITORING EMISSIONS

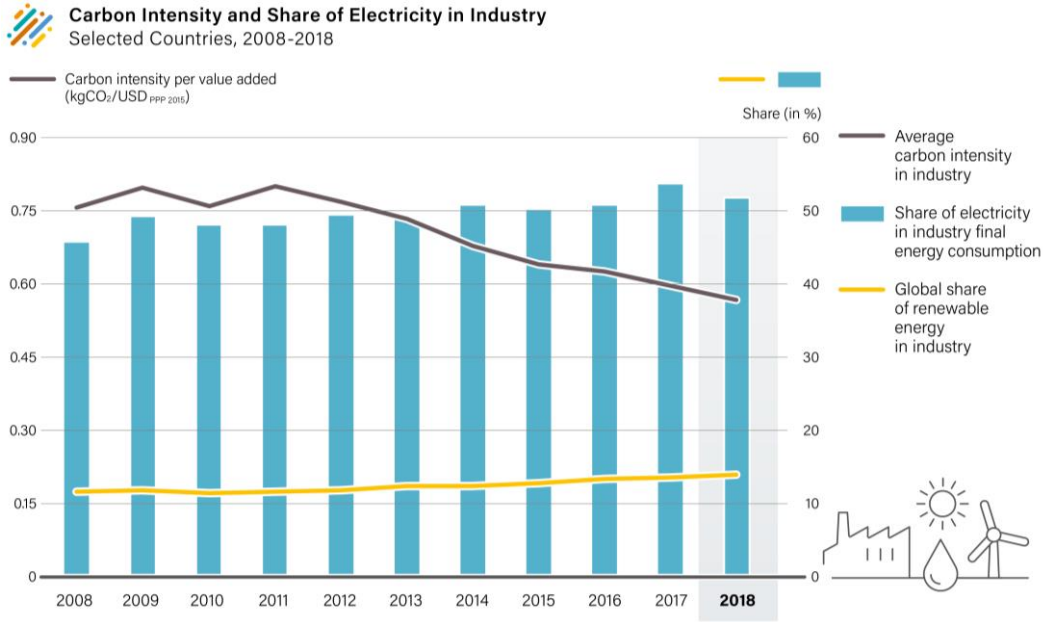
Number of Countries with Carbon Emission Monitoring, Reporting and Verification Policies
by Region, 2010-2019



Source: World Bank Group.

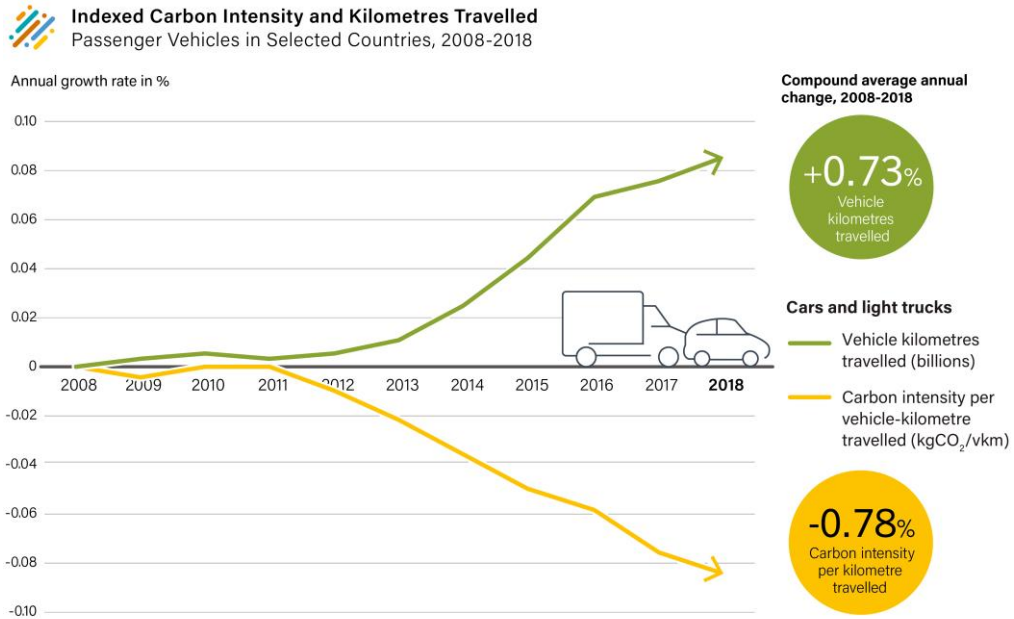
Uptake of **monitoring, reporting and verification** has **nearly doubled** over the decade, from 27 countries in 2010 to 60 countries in 2020.

INDUSTRIAL CARBON INTENSITY IMPROVES



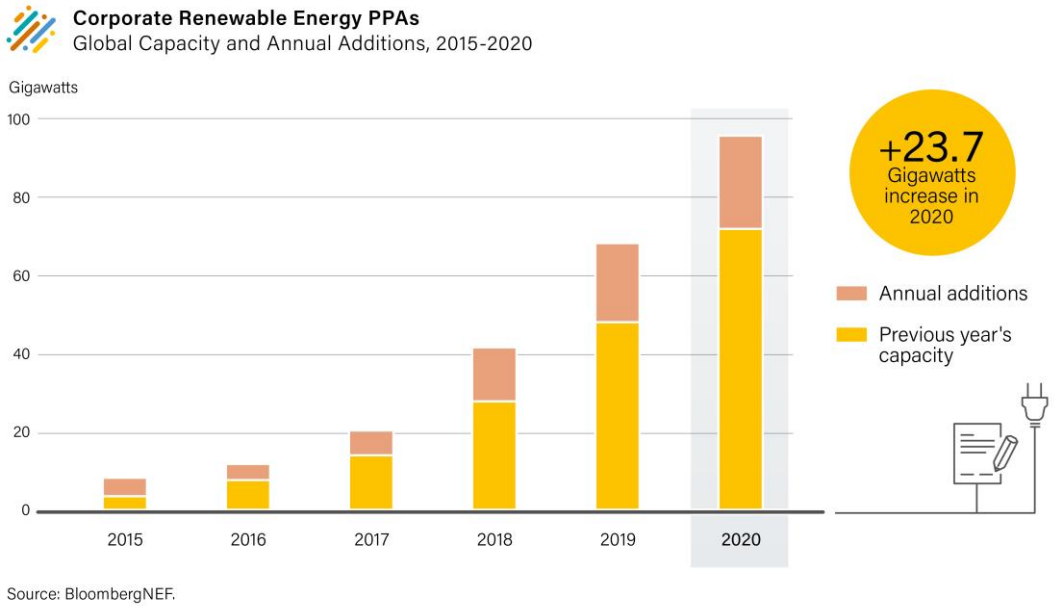
In a selection of OECD countries, **carbon intensity in industry improved 25% between 2008 and 2018**, as the share of electrification increased to 13%

TRANSPORT CARBON INTENSITY IMPROVING SLOWLY



In OECD countries, the **carbon intensity of transport improved at an annual rate of 0.64%** between 2008 and 2017.

CORPORATE RENEWABLE PPAS INCREASED



Source: BloombergNEF.

New renewable corporate power purchasing agreements **increased 18%** in 2020.

MANY NET ZERO TARGETS ANNOUNCED IN 2020

New Net Zero Emission and Carbon-Neutral Targets Set
by Countries/Regions in 2020

Net zero emission targets

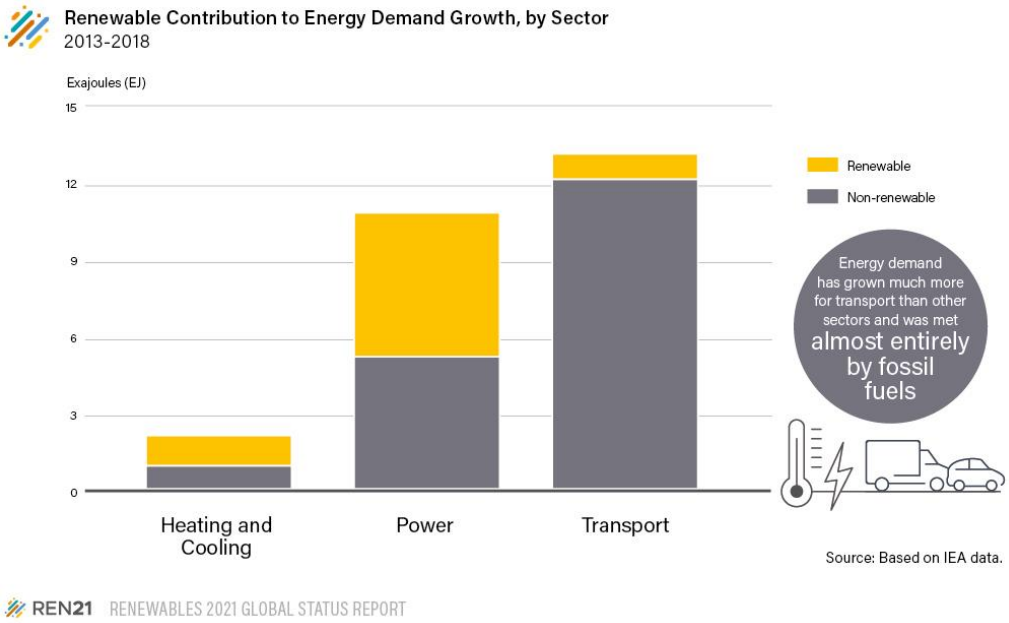
Country/region	2019 CO_2 emissions (kilotonnes)	2019 CO_2 emissions (% of world total)	Target year	Legal status
EU-27	**2,939,069**	7.73%	2050	Proposed
Austria	72,363	0.19%	2040[1]	In law/policy document
Canada	584,846	1.54%	2050	Proposed
Hungary	53,183	0.14%	2050	In law/policy document
Jamaica	7,442	0.02%	2050	Pledge
Lao PDR	6,783	0.02%	2050	Pledge
Maldives	913	<0.001%	2030[2]	Pledge
Mauritius	4,332	0.01%	2070	Pledge
Nepal	15,019	0.04%	2050	NDC
United Kingdom	364,906	0.96%	2050[3]	In law/policy document
The Vatican	N/A	N/A	2050	Pledge

Carbon-neutral targets

Country/region	2019 CO_2 emissions (kilotonnes)	2019 CO_2 emissions (% of world total)	Target year	Legal status
Argentina	199,414	0.52%	2050	NDC
Barbados	3,827	0.01%	2030	In law/policy document[4]
China	11,535,200	30.34%	2060	Pledge
Japan	1,153,717	3.03%	2050	Pledge
Kazakhstan	277,365	0.73%	2060[5]	Pledge
Korea, Republic of	651,870	1.71%	2050	NDC
Malawi	1,616	<0.001%	2050	Pledge
Nauru	N/A	N/A	2050	Pledge
Slovenia	15,365	0.04%	2050	National plan/strategy
South Africa	494,862	1.30%	2050[6]	National plan/strategy

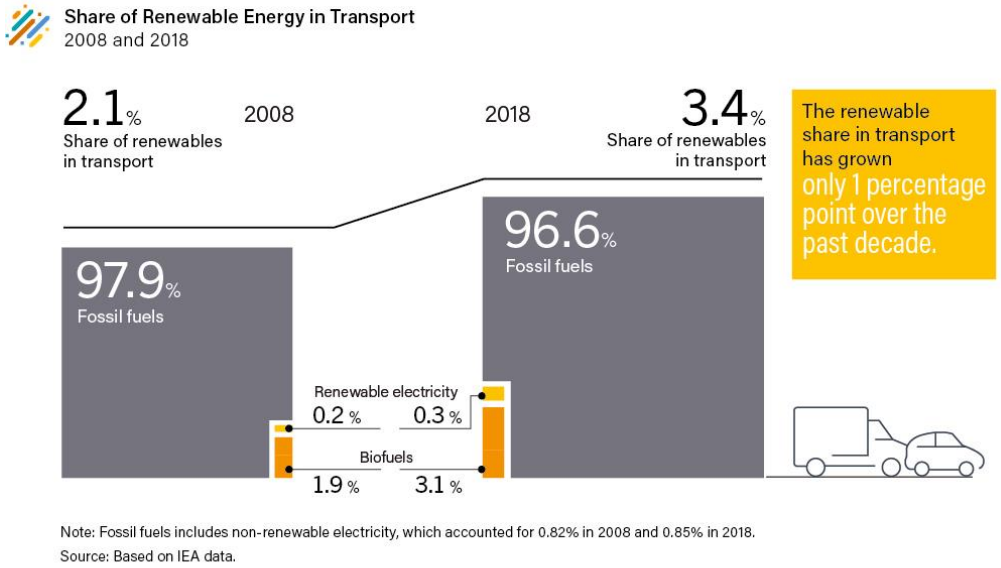
Only about one-fifth of all announced national net zero targets are actually **in law** or have been achieved.

RENEWABLES SHARES IN ENERGY DEMAND GROWTH



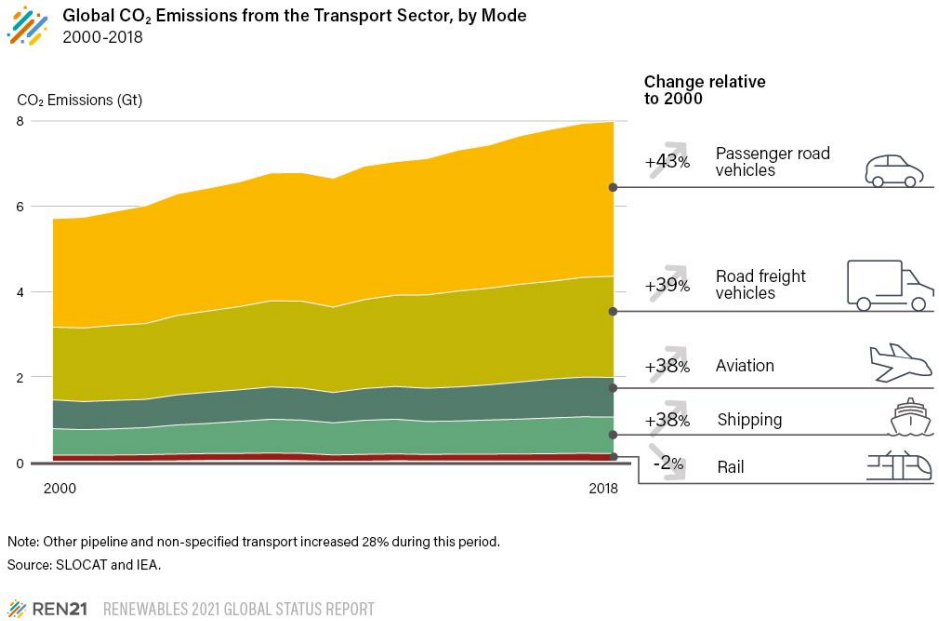
Renewables represented the largest share of energy demand growth in the **power sector**.

RENEWABLES IN TRANSPORT GREW SLOWLY



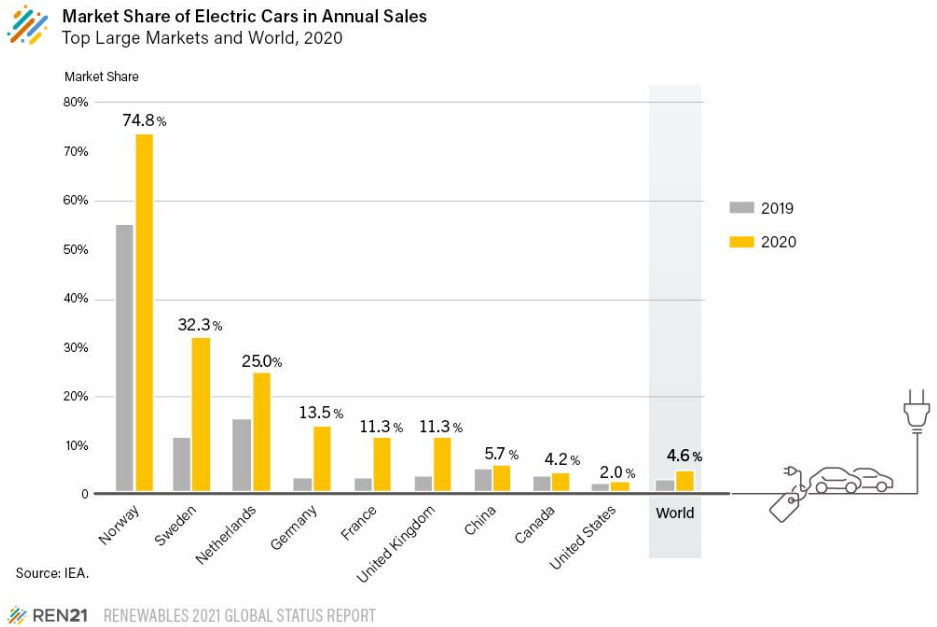
The share of renewable energy in transport grew slowly **from 2.1% in 2008 to 3.4% in 2018.**

TRANSPORT RELATED EMISSIONS ON THE RISE



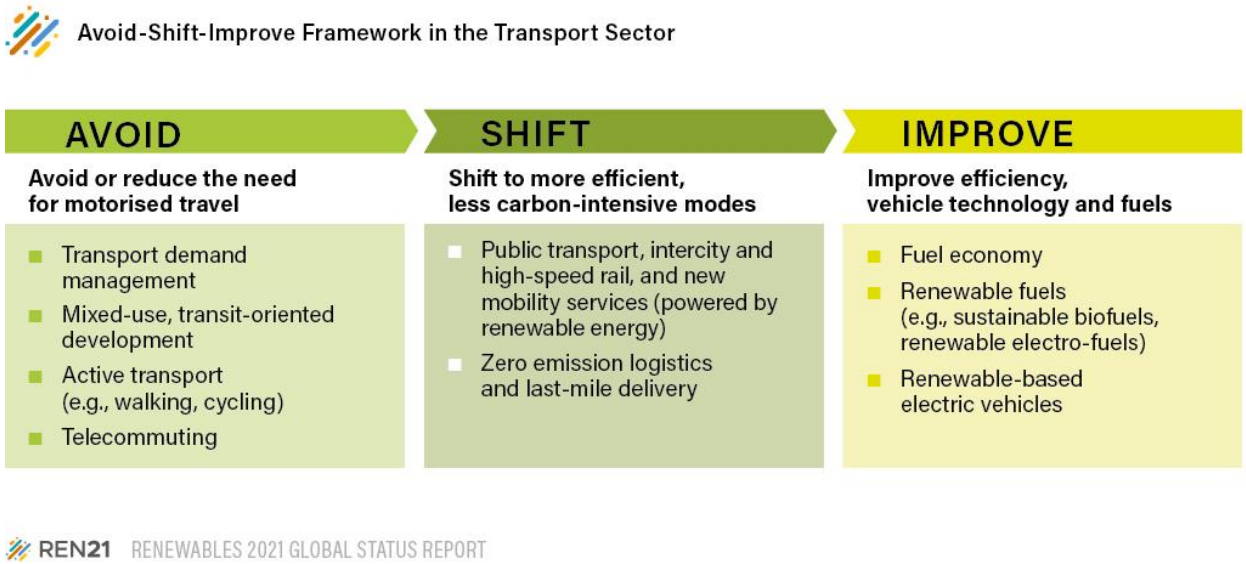
Global CO2 emissions **rose over the decade** in all transport sectors **except rail**, where it dropped by 2%.

MARKET SHARE OF ELECTRIC CARS INCREASED



Norway remains the largest market for electric cars in the world.

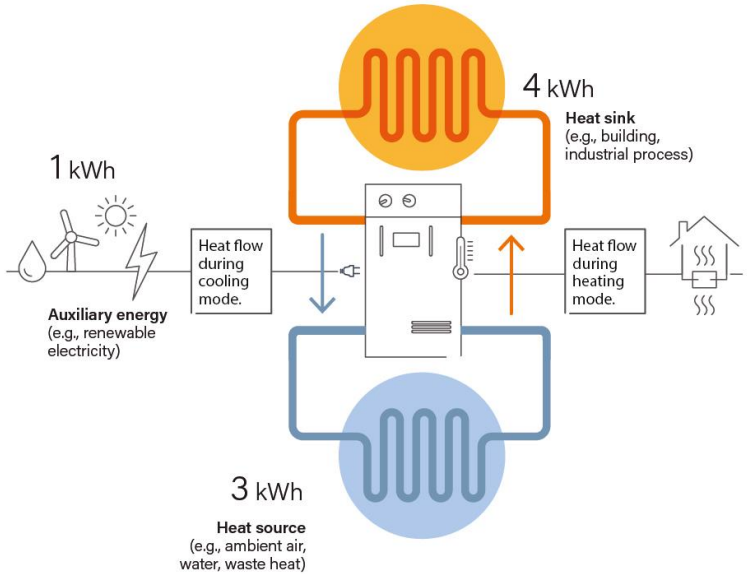
THE AVOID-SHIFT-IMPROVE FRAMEWORK



Such a framework can **greatly decrease energy demand and associated greenhouse gas emissions** in the transport sector.

SCHEMATIC OF A HEATING AND COOLING SYSTEM

Schematic of a Heating and Cooling System with an Electric Heat Pump



When the energy used to drive a heat pump is renewable, so is 100% of its output.

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