

KEY MESSAGES FOR DECISION MAKERS



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Alliance for Rural Electrification (ARE)
American Council on Renewable Energy (ACORE)
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Association for Renewable Energy of Lusophone Countries (ALER)
Chinese Renewable Energy Industries Association (CREIA)
Clean Energy Council (CEC)
European Renewable Energies Federation (EREF)
Global Off-Grid Lighting Association (GOGLA)
Global Solar Council (GSC)
Global Wind Energy Council (GWEC)
Indian Renewable Energy Federation (IREF)
International Geothermal Association (IGA)
International Hydropower Association (IHA)
Renewable Energy Solutions for Africa (RES4Africa) Foundation
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World Bioenergy Association (WBA)
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INTER-GOVERNMENTAL ORGANISATIONS

Asia Pacific Energy Research Centre (APERC)
Asian Development Bank (ADB)
ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)
European Commission (EC)
Global Environment Facility (GEF)
International Energy Agency (IEA)
International Renewable Energy Agency (IRENA)
Islamic Development Bank (IsDB)
Regional Center for Renewable Energy and Energy Efficiency (RCREEE)
United Nations Development Programme (UNDP)
United Nations Environment Programme (UNEP)
United Nations Industrial Development Organization (UNIDO)
World Bank (WB)

NGOS

Association Africaine pour l'Electrification Rurale (Club-ER)
CLASP
Clean Cooking Alliance (CCA)
Climate Action Network International (CAN-I)
Coalition de Ciudades Capitales de las Americas (CC35)
Energy Cities
Euroheat & Power (EHP)
Fundación Energías Renovables (FER)
Global 100% Renewable Energy
Global Forum on Sustainable Energy (GFSE)
Global Women's Network for the Energy Transition (GWNET)
Greenpeace International
ICLEI – Local Governments for Sustainability
Institute for Sustainable Energy Policies (ISEP)
International Electrotechnical Commission (IEC)
Jeunes Volontaires pour l'Environnement (JVE)
Mali Folkecenter (MFC)
Power for All
Renewable Energy and Energy Efficiency Partnership (REEEP)
Renewable Energy Institute (REI)
Renewables Grid Initiative (RGI)
SLOCAT Partnership for Sustainable Low Carbon Transport
Solar Cookers International (SCI)
Sustainable Energy for All (SEforALL)
World Council for Renewable Energy (WCREE)
World Future Council (WFC)
World Resources Institute (WRI)
World Wildlife Fund (WWF)

SCIENCE AND ACADEMIA

AEE – Institute for Sustainable Technologies (AEE INTEC)
Council on Energy, Environment and Water (CEEW)
Fundación Bariloche (FB)
International Institute for Applied Systems Analysis (IIASA)
International Solar Energy Society (ISES)
National Renewable Energy Laboratory (NREL)
National Research University Higher School of Economics, Russia (HSE)
South African National Energy Development Institute (SANEDI)
The Energy and Resources Institute (TERI)

GOVERNMENTS

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RENEWABLE ENERGY POLICY NETWORK FOR THE 21st CENTURY



REN21 is the only **global renewable energy community** of actors from science, governments, NGOs and industry. We provide up-to-date and peer-reviewed facts, figures and analysis of global developments in technology, policies and markets. Our goal: enable decision-makers to make the shift to renewable energy happen – now.



The most successful organisms, such as an octopus, have a **decentralised intelligence** and "sensing" function. This increases responsiveness to a changing environment. REN21 incarnates this approach.



Our more than **2,000 community members** guide our co-operative work. They reflect the vast array of backgrounds and perspectives in society. As REN21's eyes and ears, they collect information and share intelligence, by sending input and feedback. REN21 takes all this information to better understand the current thinking around renewables and change norms. We also use this information to connect and grow the energy debate with non-energy players.



Our annual publications, the *Renewables Global Status Report* and the *Renewables in Cities Global Status Report*, are probably the world's most comprehensive crowdsourced reports on renewables. It is a truly collaborative process of co-authoring, data collection and peer reviewing.

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This document presents the overarching renewable energy trends and perspectives from 2021 so that policy makers and other decision makers can more easily understand the significance of the latest developments. It outlines what is happening to drive the energy transition and details why it is not happening fast enough or as fast as possible. It draws on the meticulously documented data found in **REN21's *Renewables 2021 Global Status Report***. See the endnotes and methodological notes in the full report for further details, at www.ren21.net/gsr.

MAKING RENEWABLE ENERGY A KEY PERFORMANCE INDICATOR

2020 – a year of new norms

The year 2020 was one of new norms.

As the world witnessed the tragic impacts of a pandemic, communities also experienced the health and well-being benefits stemming from the sudden decline in the use of fossil fuels, such as higher air quality and bluer skies. People also understood, collectively, the importance of governments mobilising quickly in the face of a crisis – in response not only to the immediate public health challenge and the economic recession that followed, but also to longer-term crises related to air pollution, climate change and biodiversity loss.



As a result, 2020 was also a year of accelerating ambition. The total number of national targets for achieving net zero emissions (including targets already in law, proposed and drafted) covered countries responsible for more than 80% of global carbon dioxide (CO₂) emissions. The public consensus increasingly reflects the emerging vision to move beyond fossil fuels, which are responsible for nearly 90% of CO₂ emissions. Under pressure from citizens, civil society and the courts, countries are being forced to strengthen their own climate plans, while fossil fuel companies are losing legal and shareholder battles. At the same time, businesses are buying ever larger amounts of renewable energy.

Rising ambition and recovery packages are an opportunity to channel needed funding to renewable energy and further accelerate the transition.

Renewable energy is central to the solution, both to continue to fight climate change at scale and to overcome the post-pandemic economic recession. Growing commitments towards net zero emissions highlight a rising tide of awareness of the urgent action needed to address climate change and air pollution and to accelerate sustainable development. Rising ambition and economic recovery packages also provide an opportunity to channel needed funding to renewable energy and further accelerate the transition.

Persistent Challenges for Renewables

However, **a heightened profile does not automatically translate into action** and implementation. Obstacles that have prevented the growth of renewable energy in past years continued during 2020. They include the lack of integrated, cross-sectoral strategies to drive the transition; the lack of sufficient policy support and enforcement; persistent support for fossil fuels; the need for infrastructure development and increased affordability in some markets; and the need for more innovation in some sectors. Together, they have led to only a **slow increase in the share of renewable energy** in final energy demand.

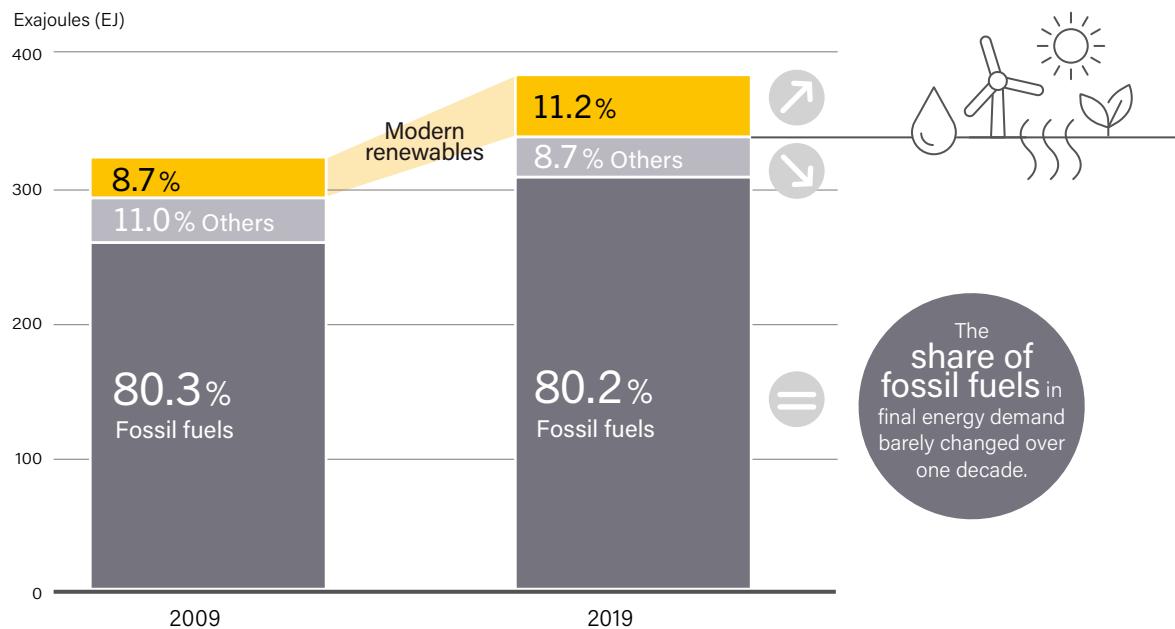
At the same time, the world is burning more fossil fuels than ever. Since 2009, the share of fossil fuels in final energy consumption has remained the same, and global energy demand has expanded around 20%. Renewable energy meets just over 11% of global final energy demand – only a slight increase from around 9% a decade ago.



Renewable energy meets just over 11% of global final energy demand – **only a slight increase** from around 9% a decade ago.



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 share of renewables has increased only moderately each year despite tremendous growth in some renewable energy sectors. Renewables grew almost 5% per year between 2009 and 2019, outpacing growth in fossil fuels (1.7%). However, energy demand also grew significantly over the period. As a result, renewables accounted for only one-quarter of the total growth in the world's use of energy.

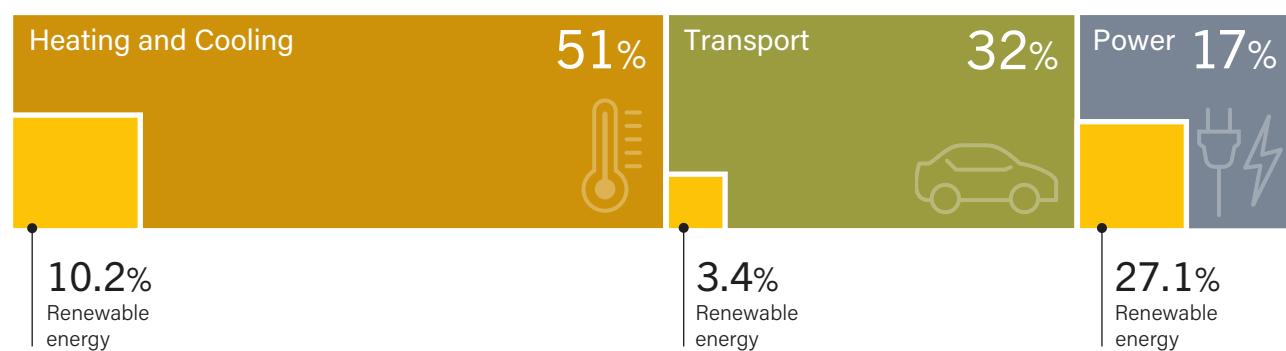
Energy efficiency also faced challenges in 2020. The rate of improvement in energy intensity (a common indicator of energy efficiency) has been declining since 2015, and in 2020 the rate was half that of the previous two years.

The persistent share of fossil fuels, as well as increasing energy demand, underscore the **complementary and fundamental roles of energy conservation and efficiency alongside renewables** to increase the renewable share while meeting global energy needs. However, energy conservation, energy efficiency and renewable energy are not enough by themselves; it also is necessary to **leave fossil fuels in the ground and to phase out existing fossil fuel capacity.**

Progress that has been made has occurred primarily in the power sector, where the share of renewables is highest. However, overall energy use in the power sector is much lower than energy consumed in other sectors, such as heating, cooling and transport. Together, these other sectors account for more than 80% of final energy demand, yet their renewable energy shares are much lower than for the power sector.

These sectors also saw more difficulty in 2020 than in past years. The uptake of **modern renewables for heating and cooling progressed slowly**, and consumption of renewable heat fell during the pandemic. Similarly, in contrast to previous years when the share of renewables showed some growth, albeit limited, **the transport sector's renewable energy share did not increase** in 2020. The uptake of renewables in heating and transport is constrained by these sectors' high dependence on fossil fuels, which is exacerbated by persistent fossil fuel subsidies, insufficient renewable energy policy support and enforcement, and slow developments in new technologies (such as advanced biofuels).

Renewable Share of 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.



At the same time, **2020 offered some bright spots**. Although the early phase of the pandemic was a difficult period for renewables, new renewable power capacity hit a record increase globally. Renewables were the only source of electricity generation to experience a net increase. Investment in renewable power grew for the third consecutive year, and corporations continued to break records for sourcing renewable electricity. More countries are turning to electrification of heat with renewable energy, and although production of transport biofuels decreased, electric vehicle sales expanded, as did the linking of these vehicles to renewable electricity.

The status of renewable energy in 2020 shows that a **structural shift from fossil fuels to renewables is required**. A structural shift does not mean moderately increasing the share of renewable energy from one year to another. It does not mean gradually lowering the contribution of fossil fuels. It means transitioning from fossil fuels to a renewable energy-based system in all societal and economic activities. Targets, policies and investment are the tools on our workbench – and reaching significantly higher shares of renewable energy is the blueprint we must follow.

Reaching significantly
higher shares
of renewable
energy is the
blueprint we must follow.



Renewable Energy Targets

Most of the world's largest countries and greatest emitters of greenhouse gases lack clear, economy-wide objectives to shift to renewables in all sectors. Only five members of the G20 – the European Union (EU-27), France, Germany, Italy and the United Kingdom – had set 2020 targets to achieve a specific share of renewables in final energy use, and some were clearly not on track to achieve their own targets by year's end.

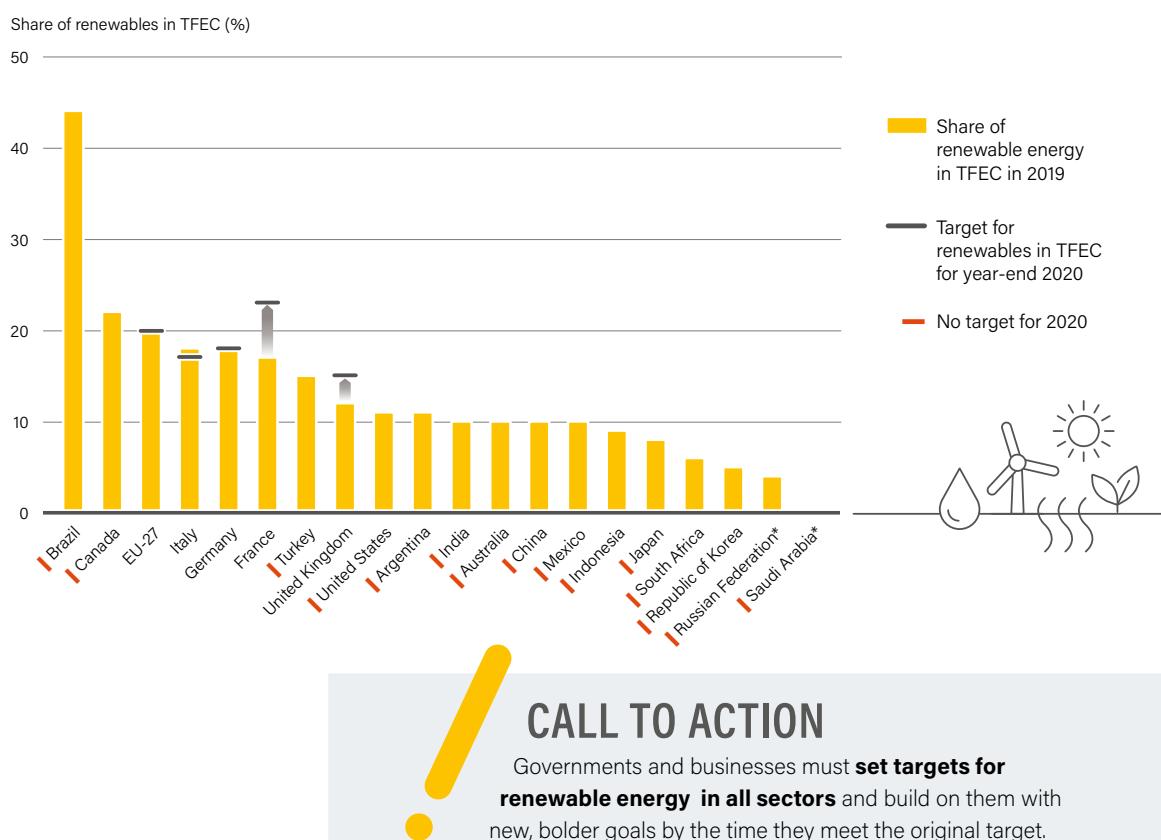
Overall, 165 countries had targets in place to achieve certain levels of renewable energy by 2020. However, most of the targets were only for the power sector. In addition, these target-setters were

not always on track leading up to 2021. Overall, some 80 targets for 2020 had already been met, while the majority (134) had not yet been achieved, according to the latest data available.

Even when countries meet their commitments, they do not always set new ones to chart the path towards higher ambition. Only half of the countries with 2020 targets had set later more ambitious targets by year's end. Worse still, most of the countries that have not set new targets had not yet even achieved their first. In short, **countries are missing the mark and are failing to plan ahead to increase their ambition.**



Renewable Energy Shares and Targets
G20 Countries, 2019 and 2020



Policies to Support Renewable Energy and Phase Out Fossil Fuels



Countries do not achieve their targets in large part because they lack a supportive policy framework, or because the policy frameworks they have are ineffective or not enforced. This year of new norms – 2020 – highlighted inaction among the world's policy makers and the lack of concrete measures to decarbonise their economies. **It was the first year in which the number of countries with renewable energy support policies did not increase.**

In addition, the heating and cooling and transport sectors lag far behind the power sector. While the number of countries with policies for renewable energy in transport plateaued in 2017, the number of countries with policies for heating and cooling peaked that year and has been declining ever since.

Supportive policy frameworks are critical to build renewables-based energy systems around the world.

The successful uptake of renewable energy has been driven by bold policy making. However, unconditional support for propping up fossil fuels continues, while renewables receive far less support. The world will not reach its climate and development goals until renewable energy is prioritised.

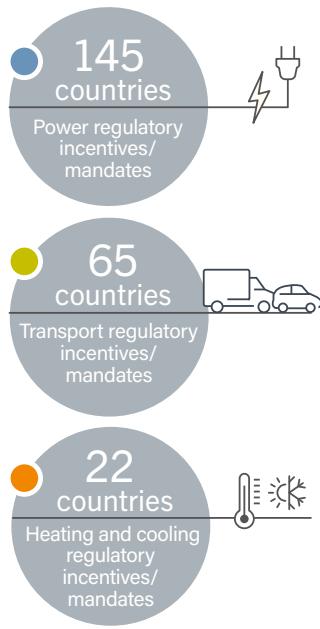
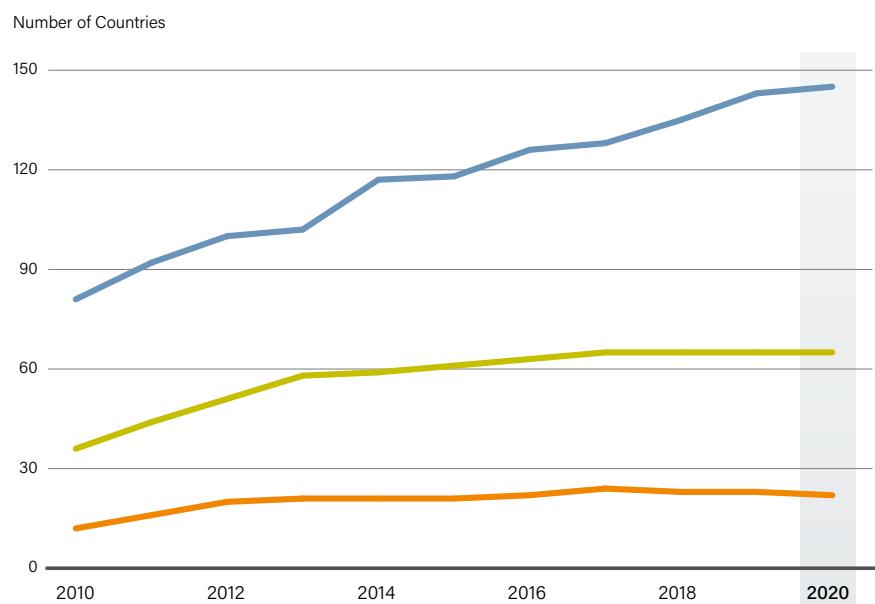
In addition, stable policies are crucial to ensure that targets for renewables and net zero emissions are achieved. Today's stop-and-go policy making poses a grave threat to the future development of renewables.

CALL TO ACTION

Targets have to be backed up by policies that **support the uptake of renewables** by incentivising and/or mandating their use. But this is not enough – governments also need to **actively phase out the use of fossil fuels** and fossil fuel subsidies.



Number of Countries with Renewable Energy Regulatory Policies
2010–2020



Note: Figure does not show all policy types in use. In many cases countries have enacted additional fiscal incentives or public finance mechanisms to support renewable energy. A country is considered to have a policy (and is counted a single time) when it has at least one national or state/provincial-level policy in place. Power policies include feed-in tariffs (FiTs) / feed-in premiums, tendering, net metering and renewable portfolio standards. Heating and cooling policies include solar heat obligations, technology-neutral renewable heat obligations and renewable heat FiTs. Transport policies include biodiesel obligations/mandates, ethanol obligations/mandates and non-blend mandates.

Renewable Energy Investment



Global investment in renewable power capacity withstood the economic crisis triggered by the COVID-19 pandemic, totalling USD 303.5 billion in 2020. This 2% increase over 2019 marks a significant rebound, particularly given conditions at the start of the year.

However, this annual increase of 2% is well below necessary levels. At this rate, total growth in renewable energy investment will be only 22% by 2030. **To reach global climate and sustainable development goals, annual investment in renewables must at least triple by 2030**, for a total increase of 200%.

Economic recovery packages provide an opportunity to reorient investment. However, despite international calls to "build back better" during the COVID-19 crisis, **investment in fossil fuels in COVID-19 recovery packages was six times higher than for renewable energy**.

Beyond recovery funds, fossil fuel subsidies remain in the hundreds of billions of dollars, far above the support for renewables. In addition, investment in new fossil fuel production and related infrastructure continued in many countries. In 2020, the world saw the first annual increase in global coal capacity since 2015.

CALL TO ACTION

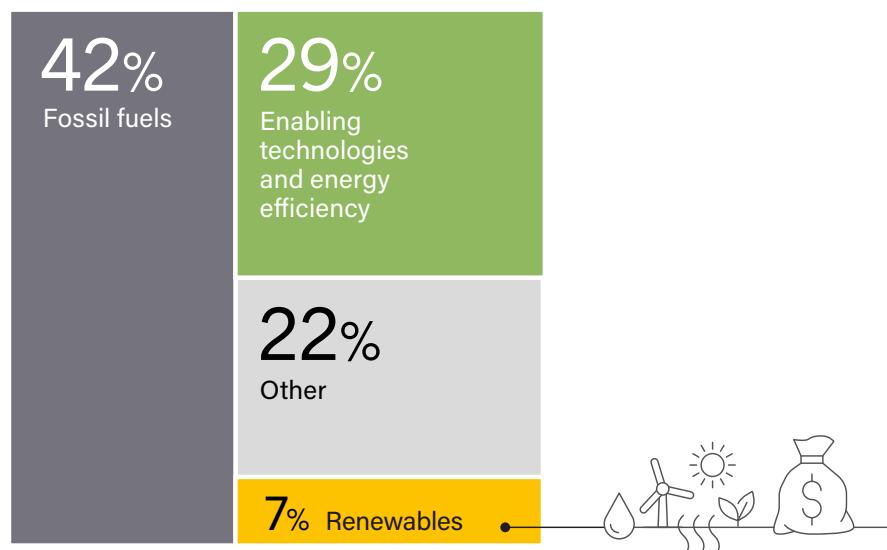
A structural shift means **channelling funding from fossil fuels to energy conservation, energy efficiency and renewable energy**. At the same time, the overall level of renewable energy investment must be increased dramatically.

i See IEA, *Net Zero by 2050* and IRENA, *World Energy Transition Outlook (Preview)*.



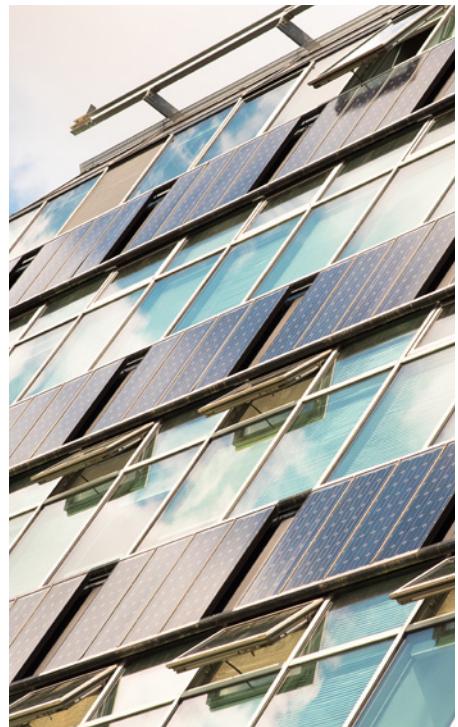
Energy Investments in COVID-19 Recovery Packages of 31 Countries

January 2020 to April 2021



Source: EnergyPolicyTracker.org.

Note: Although the energy produced from solid waste combustion is efficient, it cannot be considered entirely renewable as solid waste also contains inorganic material. Generally, about 50% of energy from municipal solid waste is classified as renewable. Multiple renewables include geothermal and ocean power. Enabling technologies include e-mobility and renewable hydrogen. The "Other" category refers to other types of energy-related policies including, among others, nuclear energy, incineration, hydrogen from unspecified sources, and multiple energy types (for example intertwined fossil fuels and clean energy). Where totals do not add up, the difference is due to rounding.



Renewable Energy as a Key Performance Indicator in All Economic Activities

Nothing will happen unless we measure the right indicator. Considering the urgency of accelerating the structural shift from fossil fuels to renewables in all societal and economic activities, it is not enough anymore to track renewable energy targets, policies and investment.

The world's progress towards global climate and sustainable development goals can be measured by a simple key performance indicator: the share of renewable energy.

The share of renewable energy reflects developments in energy demand, energy conservation, energy efficiency and emissions in addition to renewable energy uptake and the reduction of fossil fuel use. Reaching a high renewable energy share can be used as the blueprint for a structural shift towards a transformed energy world.

Therefore, this indicator should be integrated at every level of decision making. Because energy is everywhere, the energy transition needs to happen everywhere. This particular key performance indicator lets people measure progress and ensure engagement globally, nationally, in regions, in cities, in any economic sector and even in businesses.

The share of renewable energy must be integrated at every level of decision making.



CALL TO ACTION

Make progress in renewables a key performance indicator in all economic activities, and use the renewable energy share to monitor advancement.


 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
POLICIES⁷			
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

1 Data are from BloombergNEF and include investment in new capacity of all biomass, geothermal and wind power projects of more than 1 MW; all hydropower projects of between 1 and 50 MW; all solar power projects, with those less than 1 MW estimated separately; all ocean power projects; and all biofuel projects with an annual production capacity of 1 million litres or more. Total investment values include estimates for undisclosed deals as well as company investment (venture capital, corporate and government research and development, private equity and public market new equity).

2 The GSR strives to exclude pure pumped storage capacity from hydropower capacity data.

3 Solar PV data are provided in direct current (DC).

4 Includes bio-heat supplied by district energy networks and excludes the traditional use of biomass. See Reference Table R1 in the GSR 2021 Data Pack and related endnote for more information.

5 Includes glazed (flat-plate and vacuum tube) and unglazed collectors only. The number for 2020 is a preliminary estimate.

6 The estimate of annual growth in output is based on a survey report published in early 2020. The annual growth estimate for 2020 is based on the annualised growth rate in the five-year period since 2014.

7 A country is counted a single time if it has at least one national or state/provincial target or policy.

8 Biofuel policies include policies listed both under the biofuel obligation/mandate column in Table 6 and in Reference Table R8 in the GSR 2021 Data Pack.

9 Data reflect all countries where the policy has been used at any time up through the year of focus at the national or state/provincial level.

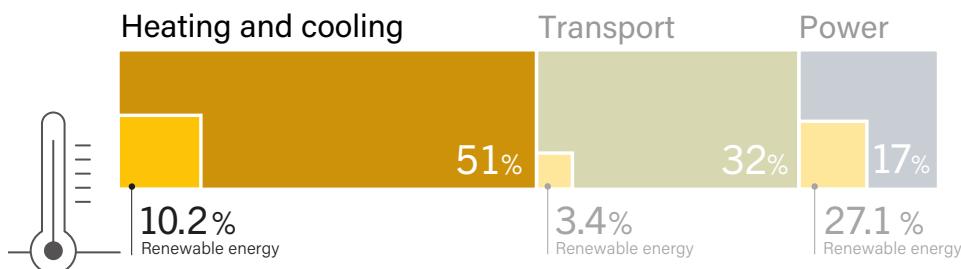
Note: All values are rounded to whole numbers except for numbers <15, biofuels and investment, which are rounded to one decimal point.

FAME = fatty acid methyl esters; HVO = hydrotreated vegetable oil.



RENEWABLE ENERGY SHARES AND POLICIES HEATING & COOLING

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



Policies subsidising fossil fuels still clash with those that encourage the uptake of renewable heating and cooling.

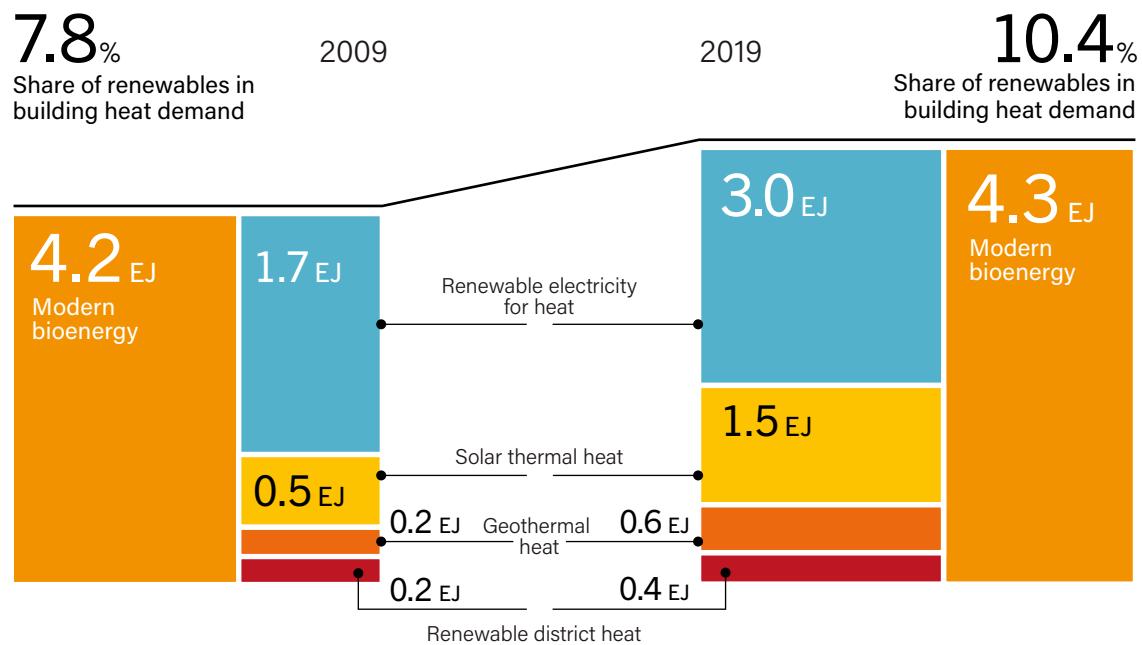


What is the story?

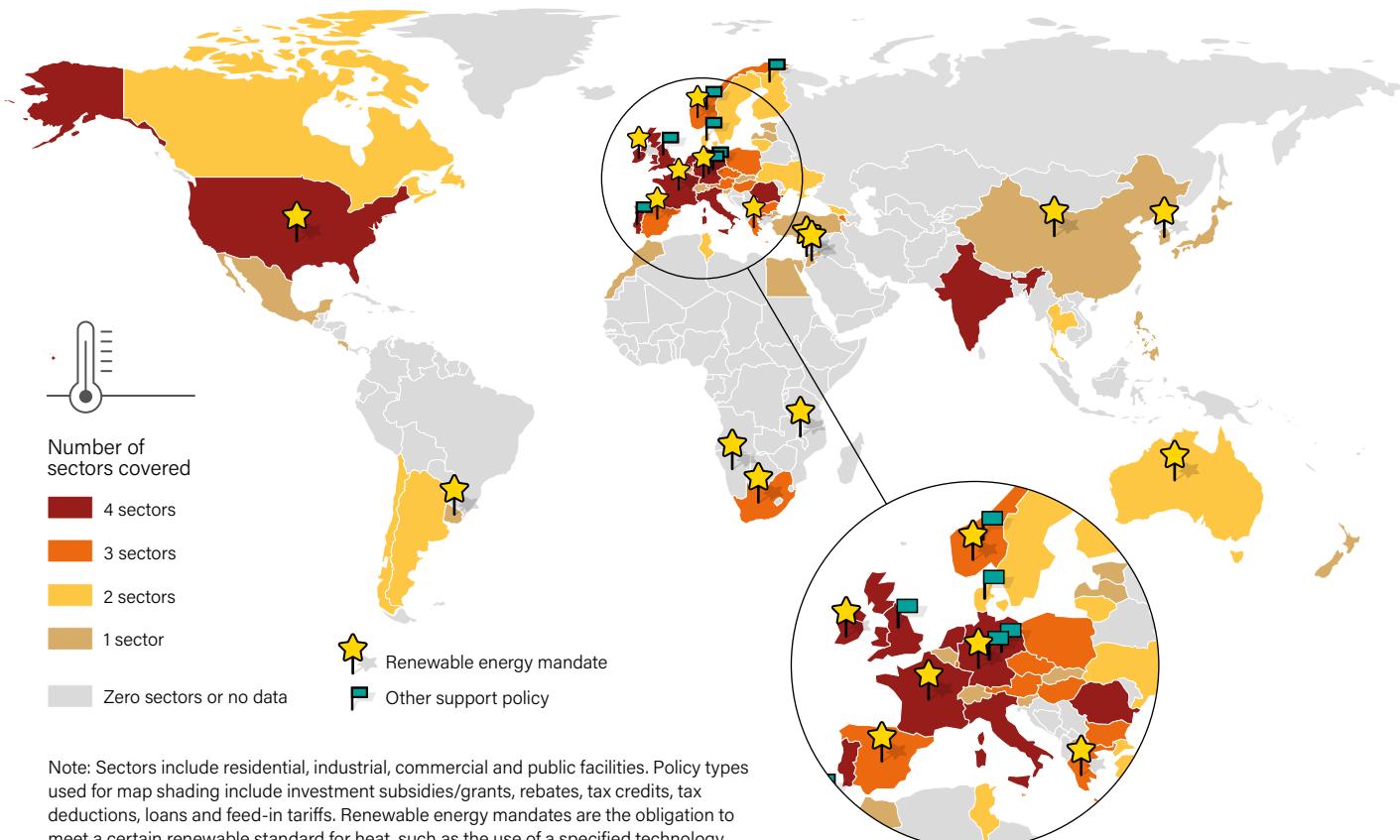
The share of renewable energy in meeting heating and cooling needs is still low. It is increasing only slowly, despite large growth in some technologies, as shown below. In order to increase the use of renewable heating and cooling, policies are needed that improve the affordability of these technologies and level the playing field compared to fossil fuels.



Renewable Energy Contribution to Heating in Buildings
by Technology, 2009 and 2019

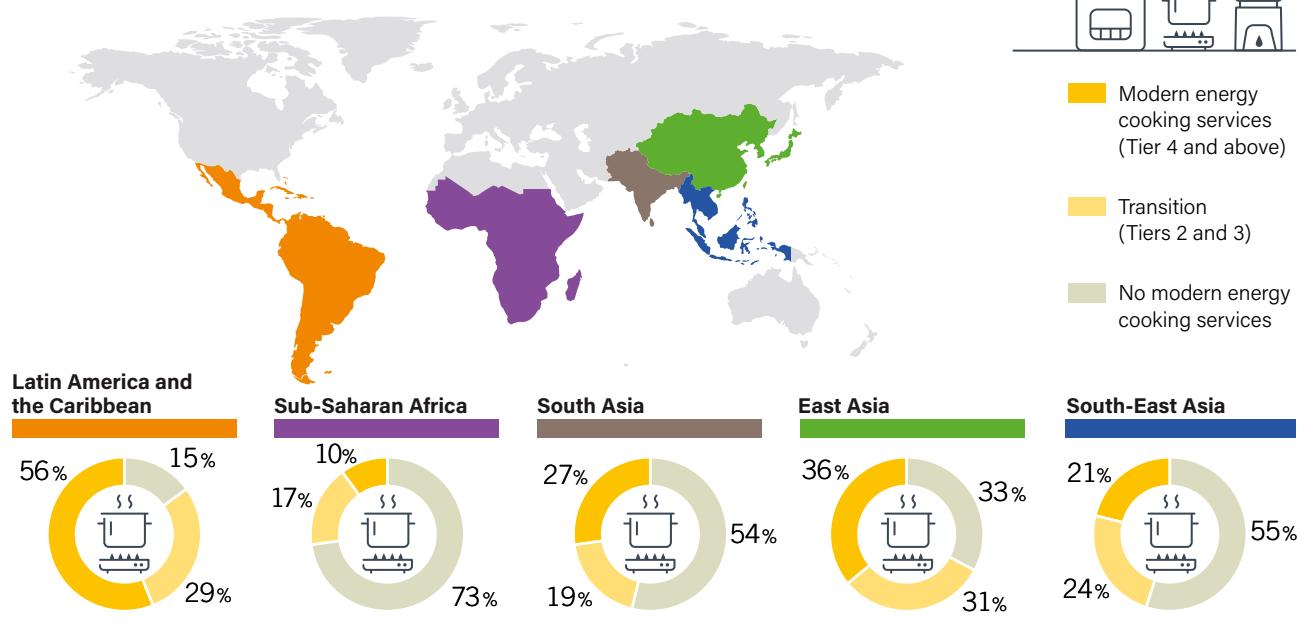


Sectoral Coverage of National Renewable Heating and Cooling Financial and Regulatory Policies as of End-2020



Source: REN21 Policy Database.

Population with Access to Modern Energy Cooking Services by Region, 2020

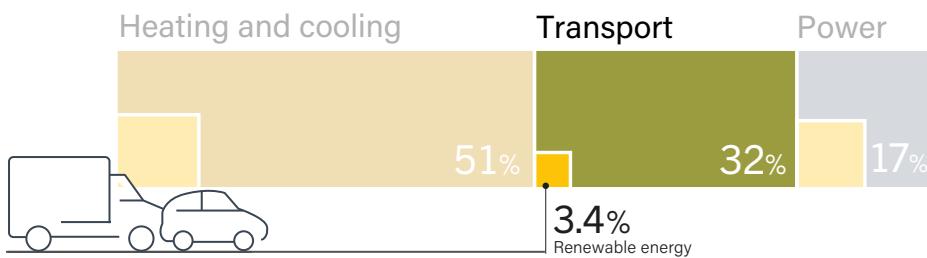


Source: ESMAP.



RENEWABLE ENERGY SHARES AND POLICIES TRANSPORT

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



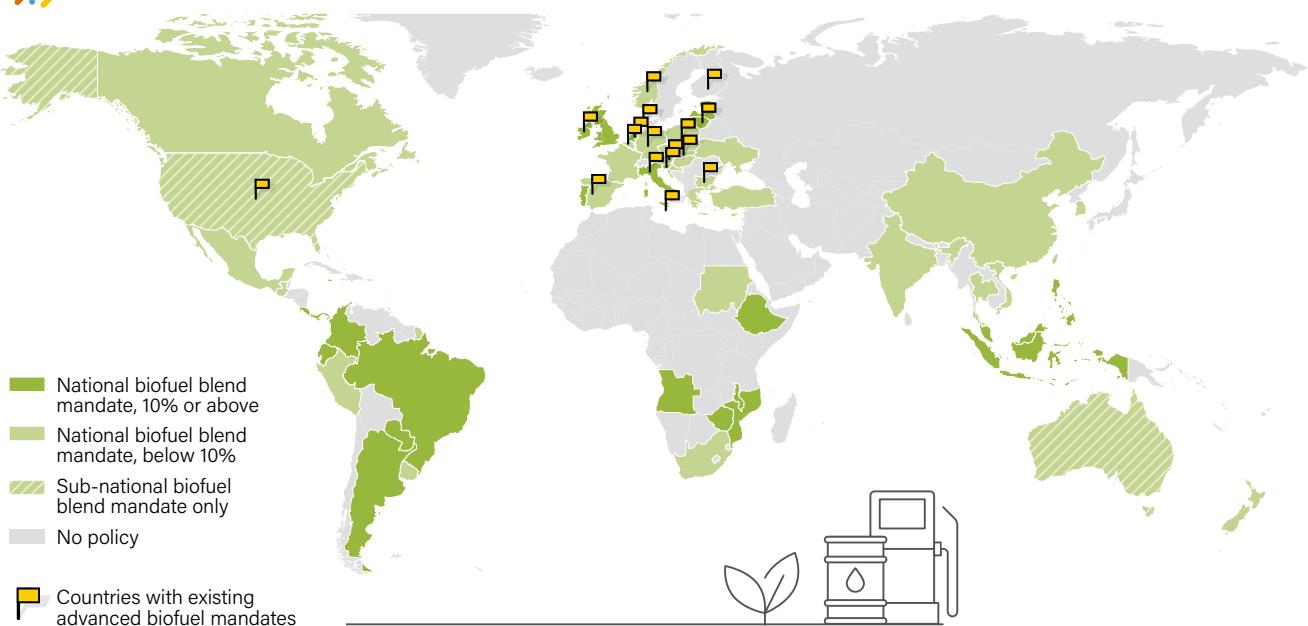
Overall, the transport sector is **not on track** to meet global climate targets for 2030 and 2050.

What is the story?

Transport is the sector with the lowest share of renewable energy. It is also a heavy energy-consuming sector, accounting for 32% of global final energy demand. Biofuels are the dominant source of renewable energy for transport, and the contribution of (renewable) electricity remains low. Policy attention is urgently needed to electrify transport with renewable energy and increase the use of renewable fuels.



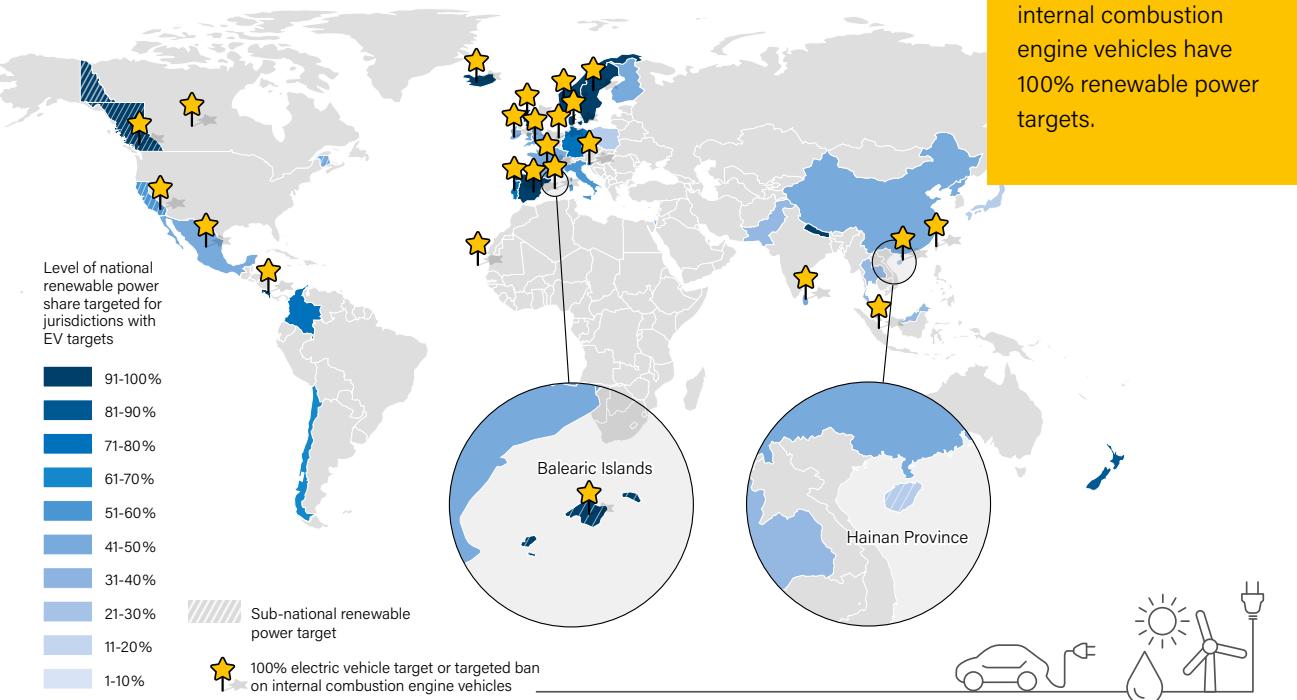
National and Sub-National Renewable Transport Mandates End-2020



Note: Shading shows countries and states/provinces with mandates for either biodiesel, ethanol or both.

Source: REN21 Policy Database.

Targets for Renewable Power and Electric Vehicles as of End-2020



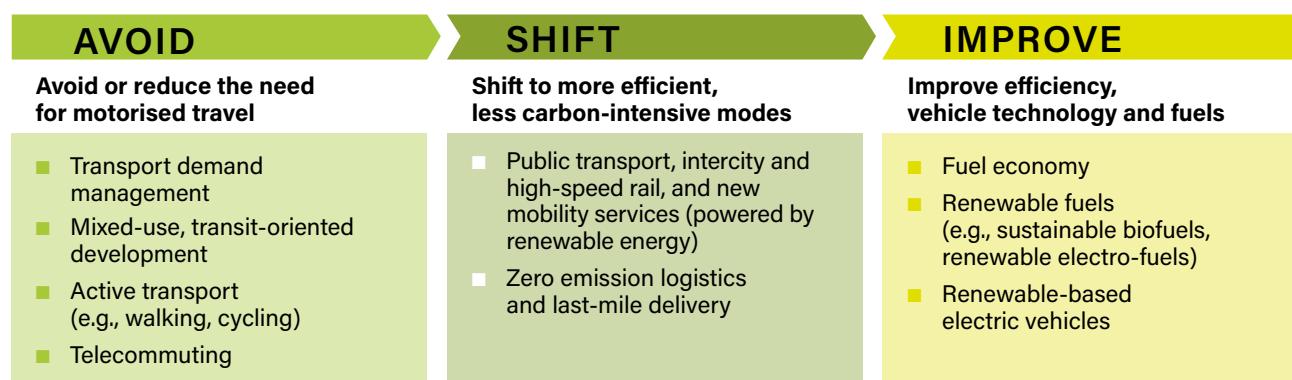
Only
8 countries
with targeted bans on
internal combustion
engine vehicles have
100% renewable power
targets.

Note: Renewable power targets include only targets for a specific share of electricity generation by a future year. Where a jurisdiction has multiple targets, the highest target is shown. Nepal and Quebec show actual renewable power shares; both jurisdictions along with Iceland and Norway have already achieved nearly 100% renewable power. Electric vehicle targets vary; for details, see Reference Tables R6 and R8 in the GSR 2021 Data Pack.

Source: REN21 Policy Database.



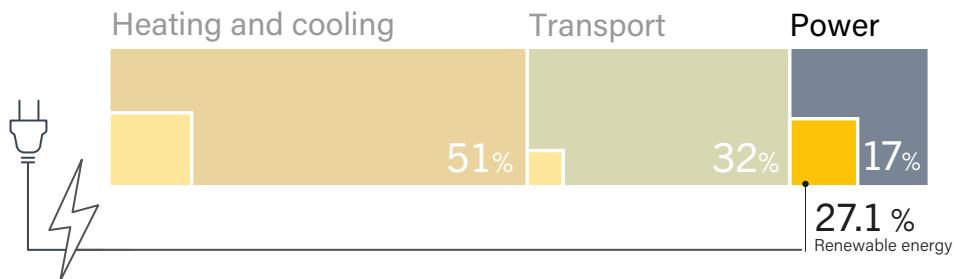
Avoid-Shift-Improve Framework in the Transport Sector





RENEWABLE ENERGY SHARES AND POLICIES POWER

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



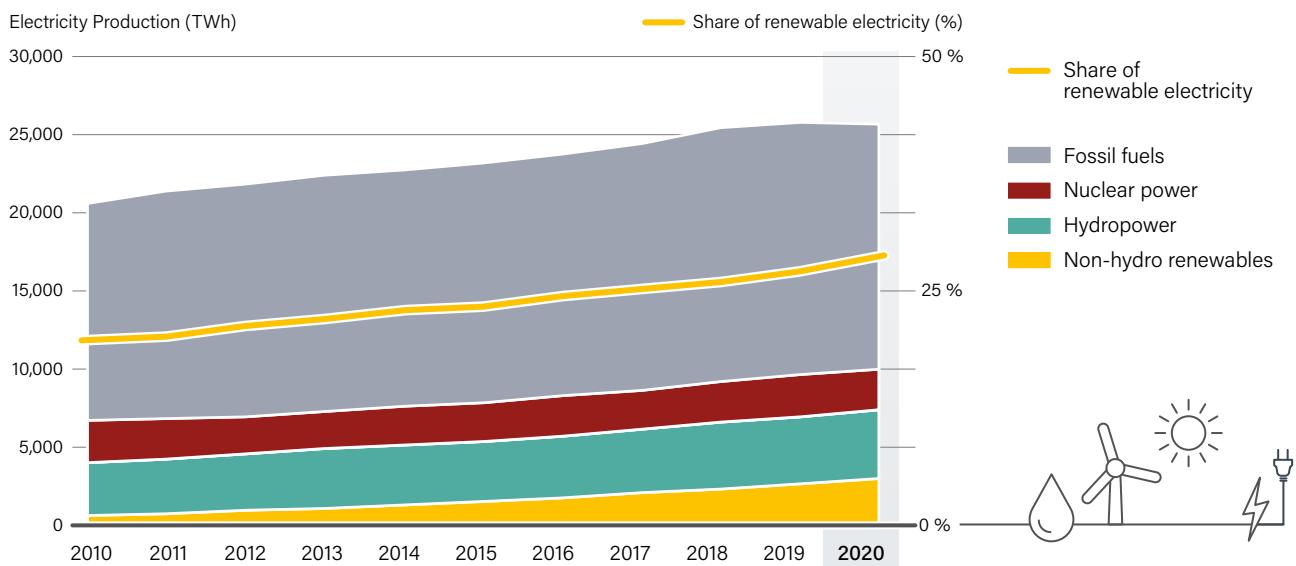
In 2020, wind power and solar PV generated more than 20% of electricity in nine countries.

What is the story?

Renewables make their greatest contribution to the power sector. The share has risen quickly in recent years and reached 29% in 2020, up from 27% in 2018. The power sector continued to receive the bulk of renewable energy policy attention in 2020, as in previous years. Although feed-in policies remain a widely used mechanism, in 2020 the shift continued from feed-in policies to tenders and auctions..



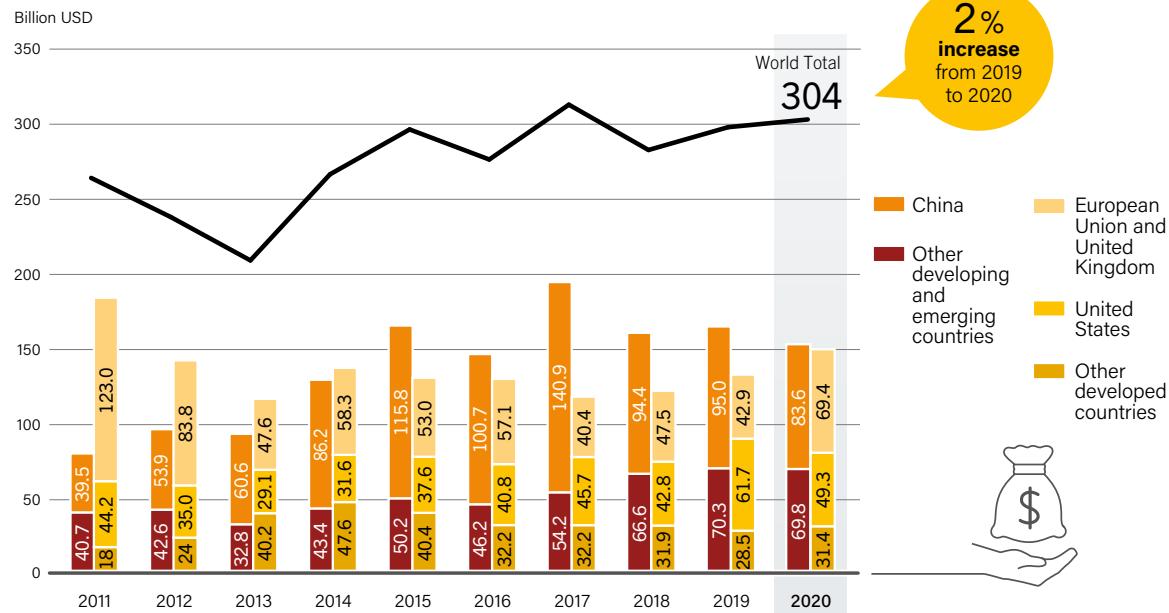
Global Electricity Production by Source, and Share of Renewables 2010-2020



Source: Ember.

Global Investment in Renewable Power Capacity

Developed, Emerging and Developing Countries, 2010-2020



Note: Figure includes utility-scale renewable energy and small-scale solar projects and excludes large hydropower projects of more than 50 MW.

Source: BloombergNEF.

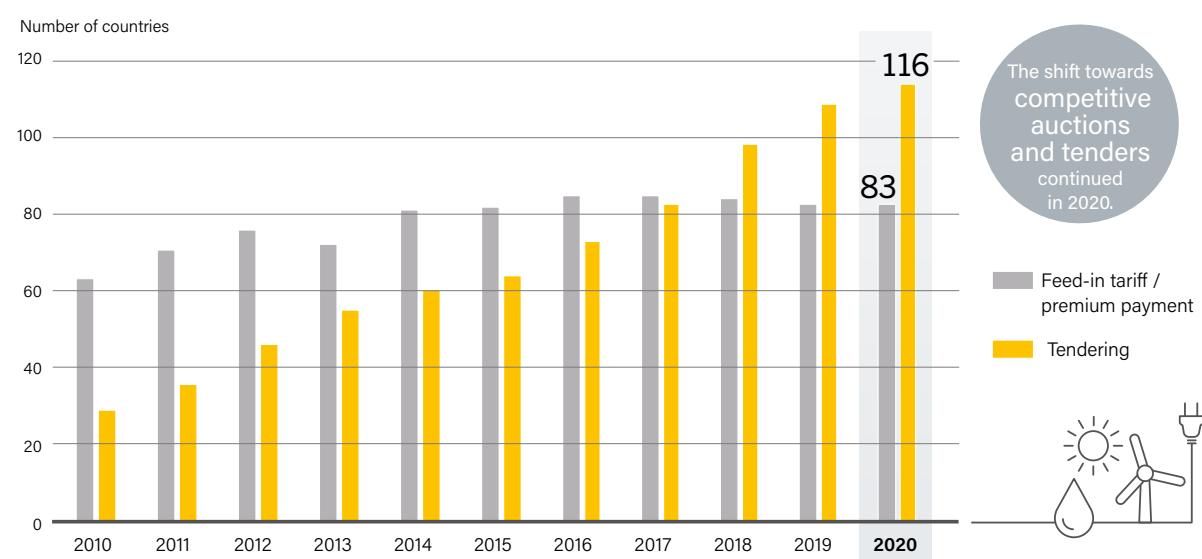


Solar PV mini-grids

are increasingly the preferred technology for providing electricity access across Africa and Asia.

Renewable Energy Feed-in Tariffs and Tenders

2010-2020



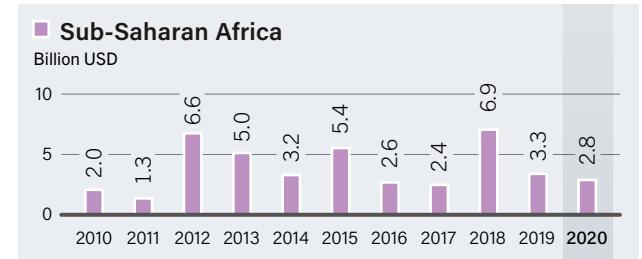
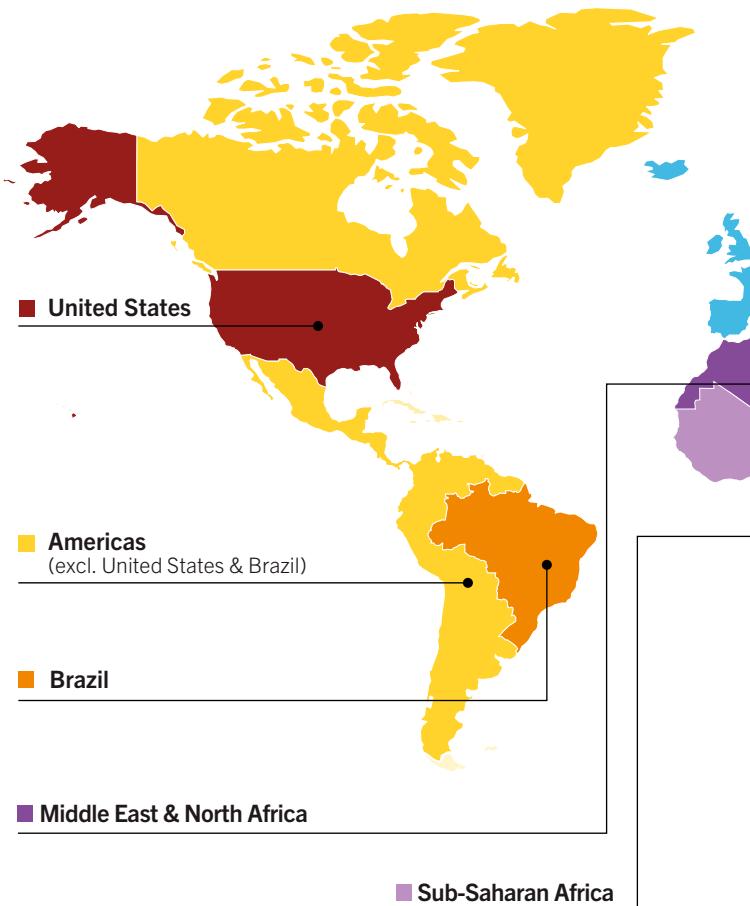
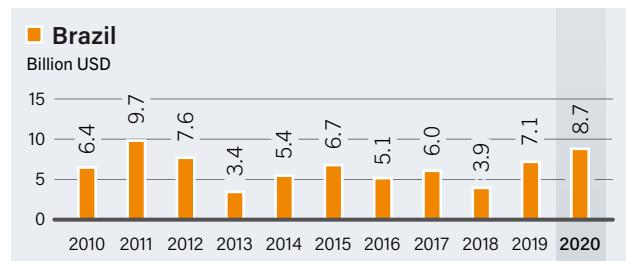
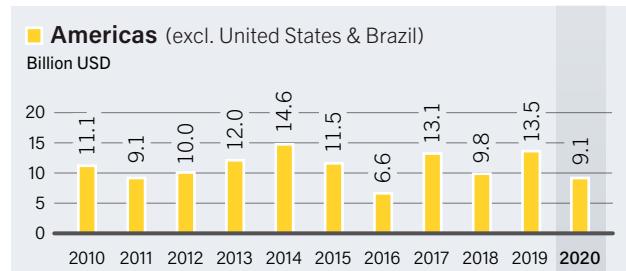
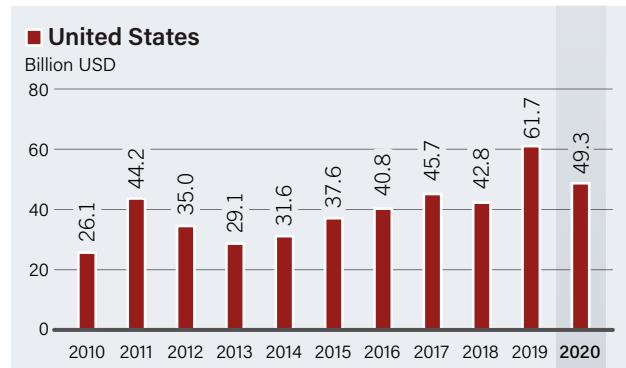
Source: REN21 Policy Database.



GLOBAL INVESTMENT 2020



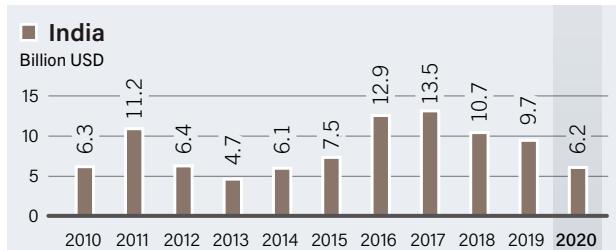
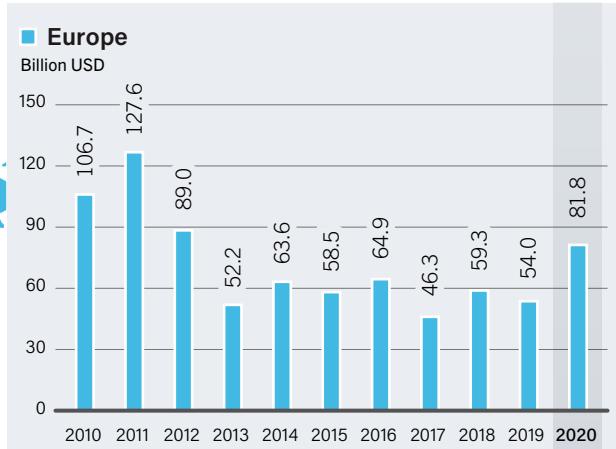
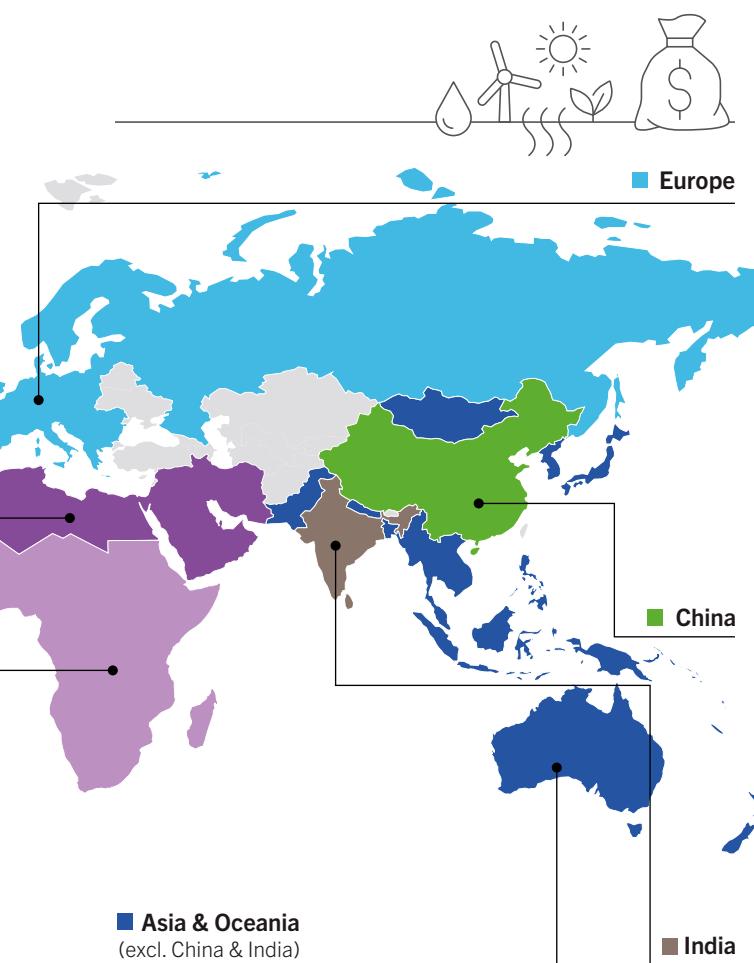
Global Investment in Renewable Energy Capacity
by Country and Region, 2010-2020



Note: Figures include utility-scale renewable energy and small-scale solar projects and exclude large hydropower projects of more than 50 MW. The regions in this figure follow those presented in the BNEF *Energy Transition Investment 2021* report and differ from the regional definitions included elsewhere in the GSR.
Source: BloombergNEF.



In 2020,
solar power
was the only renewable
energy technology to
experience an increase
in investments.





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



More than
256 GW of
renewable power capacity
was added globally
in 2020 – beating the
previous record by
nearly 30%.





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

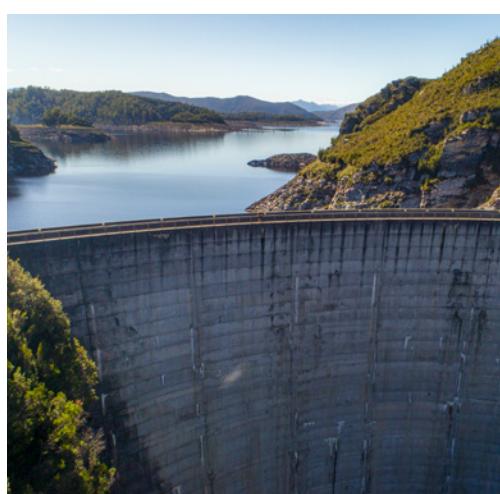
	1	2	3	4	5
POWER					
Renewable power capacity (including hydropower)	China	United States	Brazil	India	Germany
Renewable power capacity (not including hydropower)	China	United States	Germany	India	Japan
Renewable power capacity <i>per capita</i> (not including hydropower) ¹	Iceland	Denmark	Sweden	Germany	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

1 Per capita renewable power capacity (not including hydropower) ranking based on data gathered from various sources for more than 70 countries and on 2019 population data from the World Bank.

2 Solar water heating collector ranking for total capacity is for year-end 2020 and is based on capacity of water (glazed and unglazed) collectors only. Data from International Energy Agency Solar Heating and Cooling Programme.

3 Not including heat pumps.

Note: Most rankings are based on absolute amounts of investment, power generation capacity or output, or biofuels production; if done on a basis of per capita, national GDP or other, the rankings would be different for many categories (as seen with per capita rankings for renewable power not including hydropower and solar water heating collector capacity).





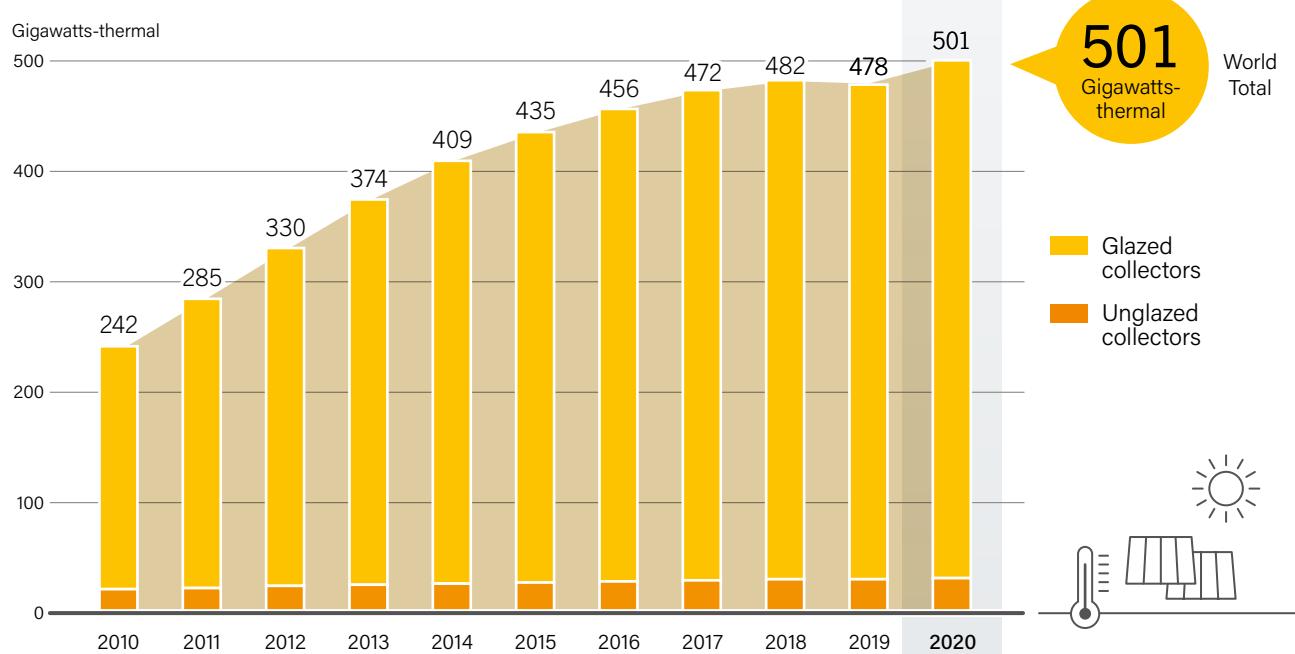
TECHNOLOGIES FOR A RENEWABLES REVOLUTION HEATING & COOLING

What are the technology options?

Technologies that help increase the share of renewables in heating and cooling include solar thermal heating, geothermal heat, bioenergy and renewable electricity (e.g., heat pumps). Markets for solar thermal heating and heat pumps grew in 2020, and geothermal heat use is rising, while bioenergy use has been mainly flat in recent years.



Solar Water Heating Collectors Global Capacity
2010-2020



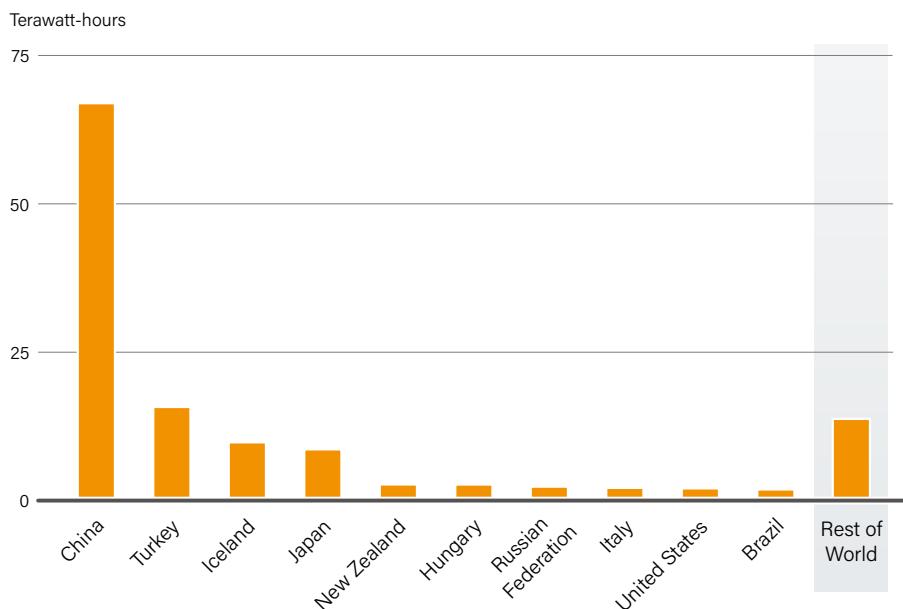
Note: Data are for glazed and unglazed solar water collectors and do not include concentrating, air or hybrid collectors. The drop in 2019 was caused by revised annual additions for China in 2019 and new assumptions for projecting total capacity in operation for 2019 and 2020.

Source: IEA SHC.



Geothermal Direct Use

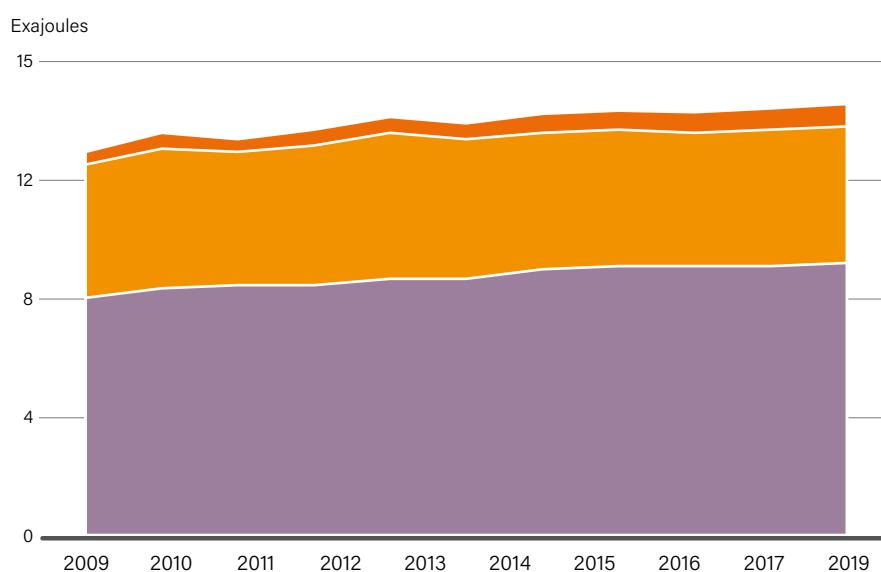
Estimates for Top 10 Countries and Rest of World, 2020



Geothermal direct use capacity increased by around 8% in 2020.



Global Bioenergy Use for Heating by End-Use, 2009-2019



Total average annual change:

+1.2%

+5.9%

+1.4%

+0.3%

District heating
Industry
Buildings,
modern bioenergy

Source: Based on IEA.



TECHNOLOGIES FOR A RENEWABLES REVOLUTION TRANSPORT

What are the technology options?

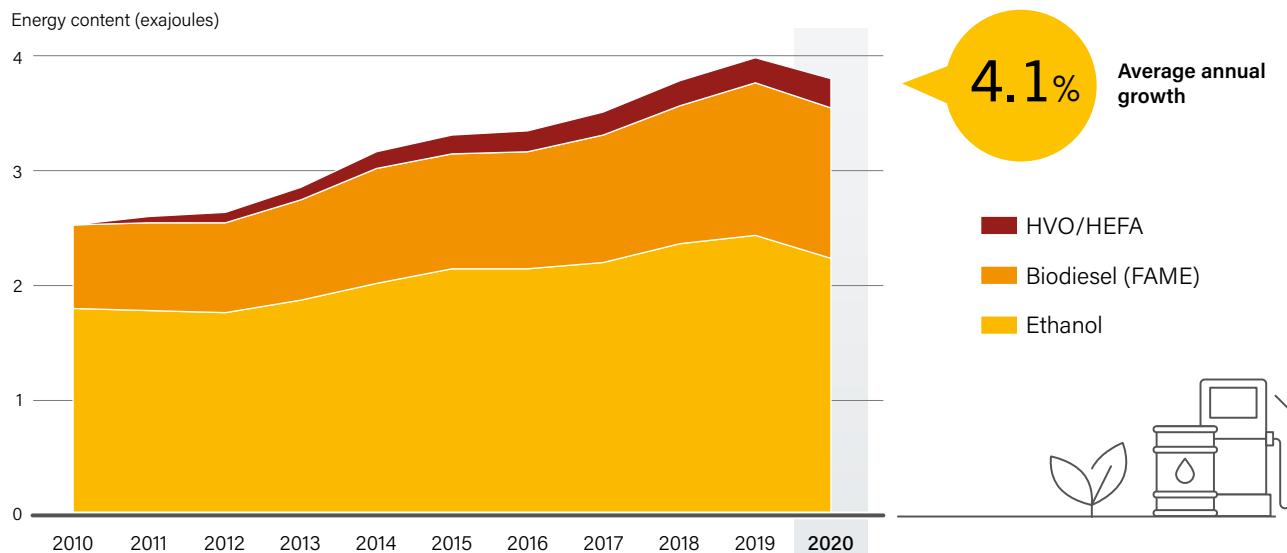
Biofuels, including ethanol and biodiesel, make up most of the renewable energy contribution to the transport sector. Electric vehicles provide an opportunity to increase the renewable share with electricity. Biofuels production fell in 2020 in the wake of the COVID-19 crisis, but the overall share of biofuels in the sector remained stable. On the contrary, sales of electric cars exploded, and some markets saw significant growth in the market share of electric cars.

The United States and Brazil, the two leading producers of biofuels, account for around

80% of global production.



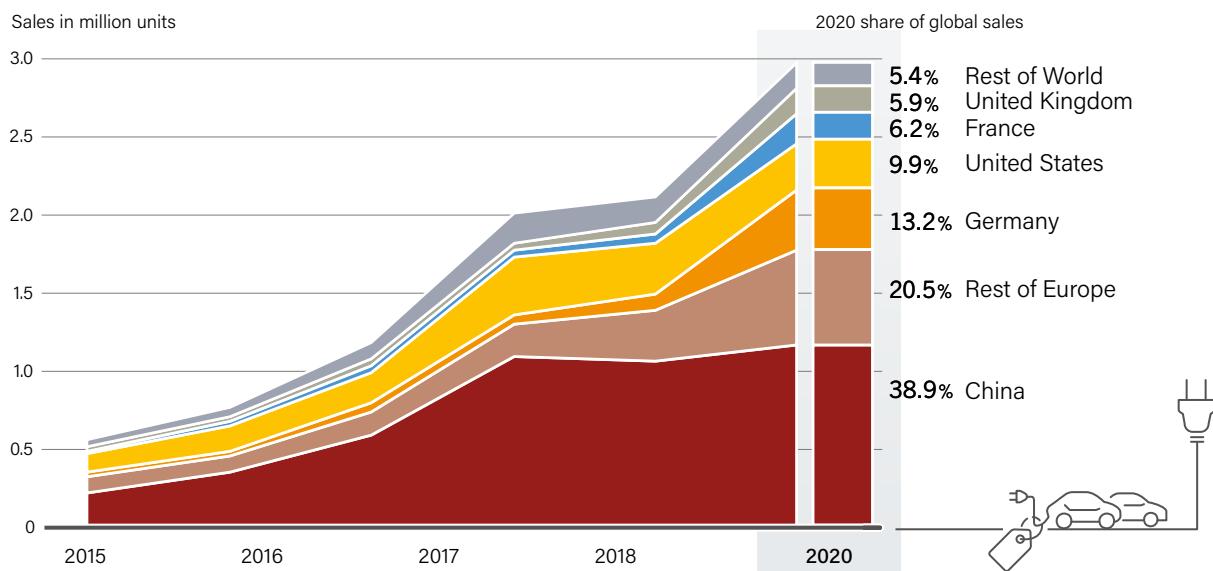
Global Production of Ethanol, Biodiesel and HVO/HEFA Fuel
by Energy Content, 2010-2020



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

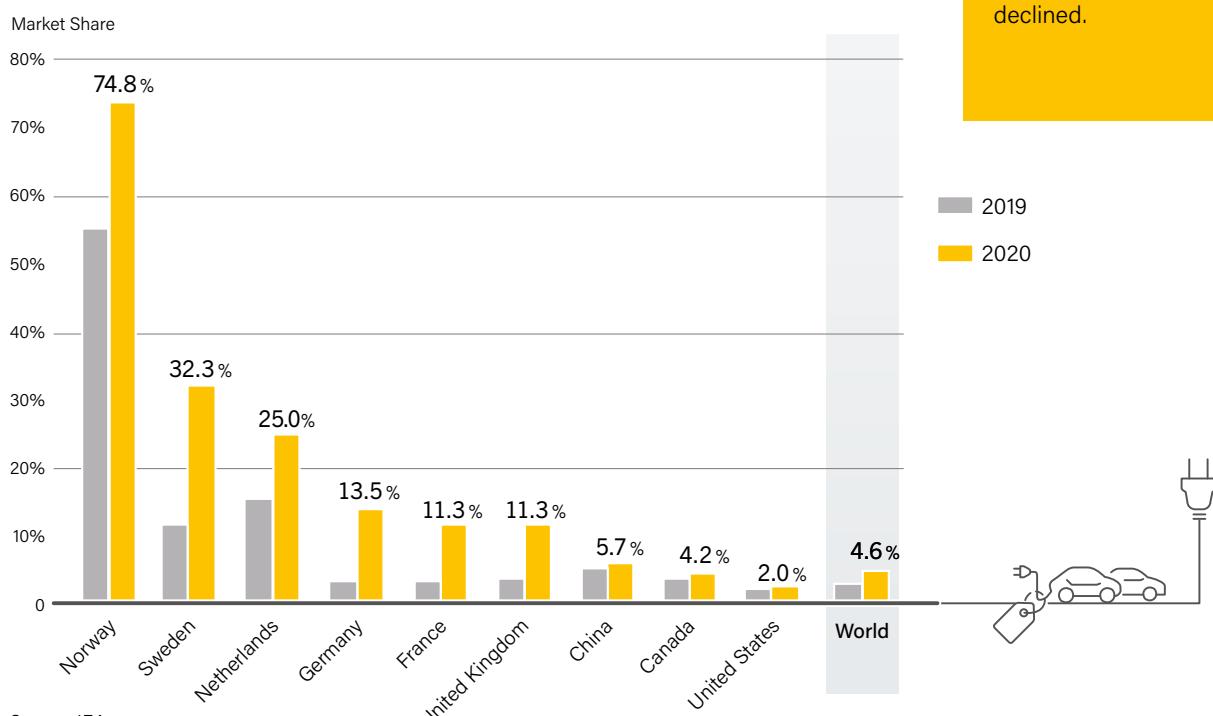
Electric Car Global Sales

Top Countries and Rest of World, 2015-2020



Market Share of Electric Cars in Annual Sales

Top Large Markets and World, 2020





TECHNOLOGIES FOR A RENEWABLES REVOLUTION POWER

What are the technology options?

Installed renewable power capacity grew by more than 256 GW during the pandemic year 2020, the largest increase ever. Solar PV and wind power made up more than 90% of this increase and are the main drivers towards higher shares of renewables in the power sector. By the end of 2020, 34 countries had more than 10 GW of renewable power capacity in operation, up from 20 countries in 2010.



Annual Additions of Renewable Power Capacity by Technology and Total, 2014-2020

Additions by technology (Gigawatts)

150

120

90

60

30

0

2014

2015

2016

2017

2018

2019

2020

More than
256
gigawatts added
in 2020

- Solar PV
- Wind power
- Hydropower
- Bio-power,
geothermal,
ocean power,
CSP

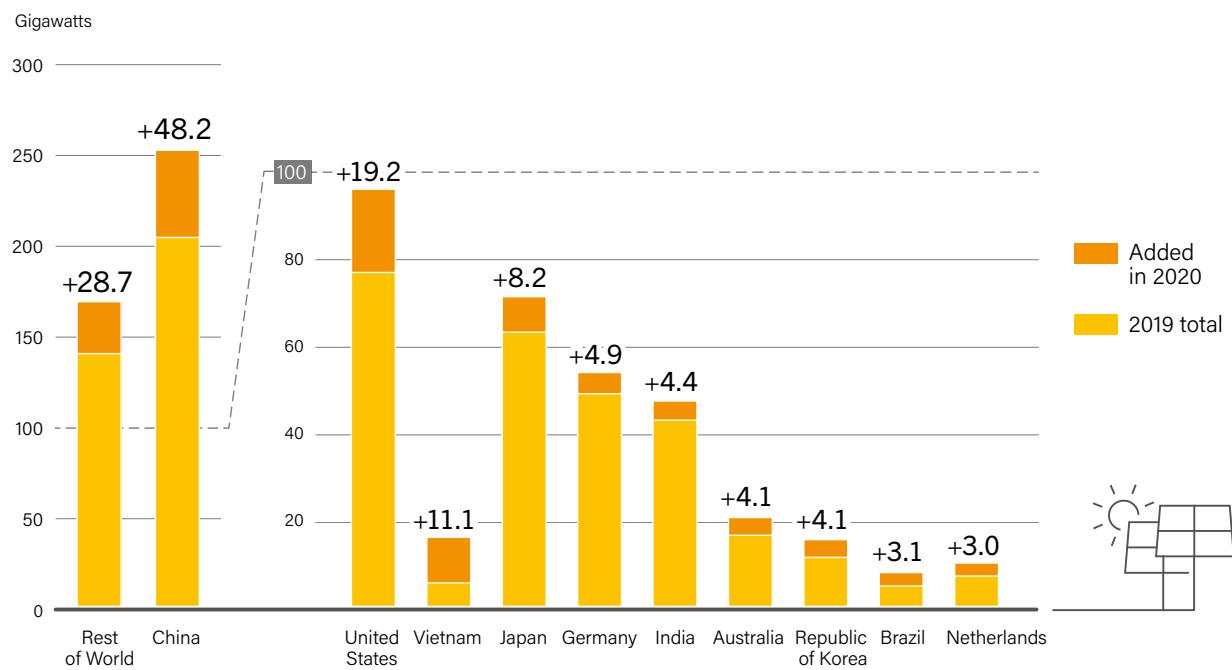


Note: Solar PV capacity data are provided in direct current (DC). Data are not comparable against technology contributions to electricity generation.
Source: REN21 analysis.



Solar PV Capacity and Additions

Top 10 Countries for Capacity Added, 2020



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

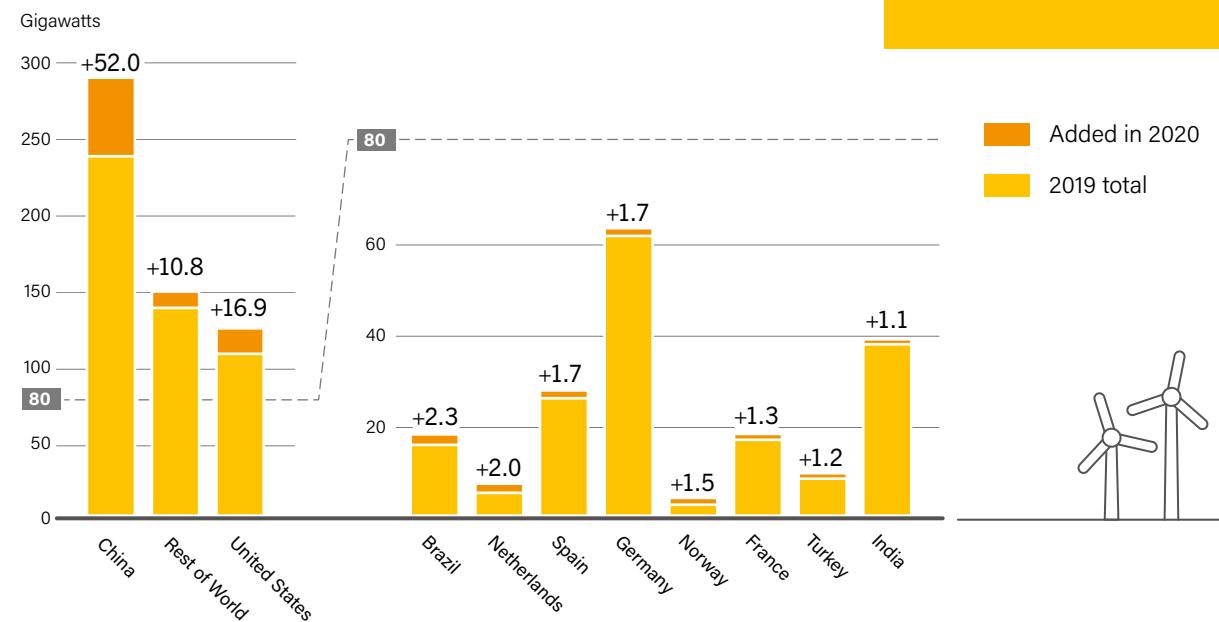
Source: REN21 analysis.

Continuing a trend going back to 2012, most of the newly installed power capacity in 2020 was renewable.



Wind Power Capacity and Additions

Top 10 Countries for Capacity Added, 2020

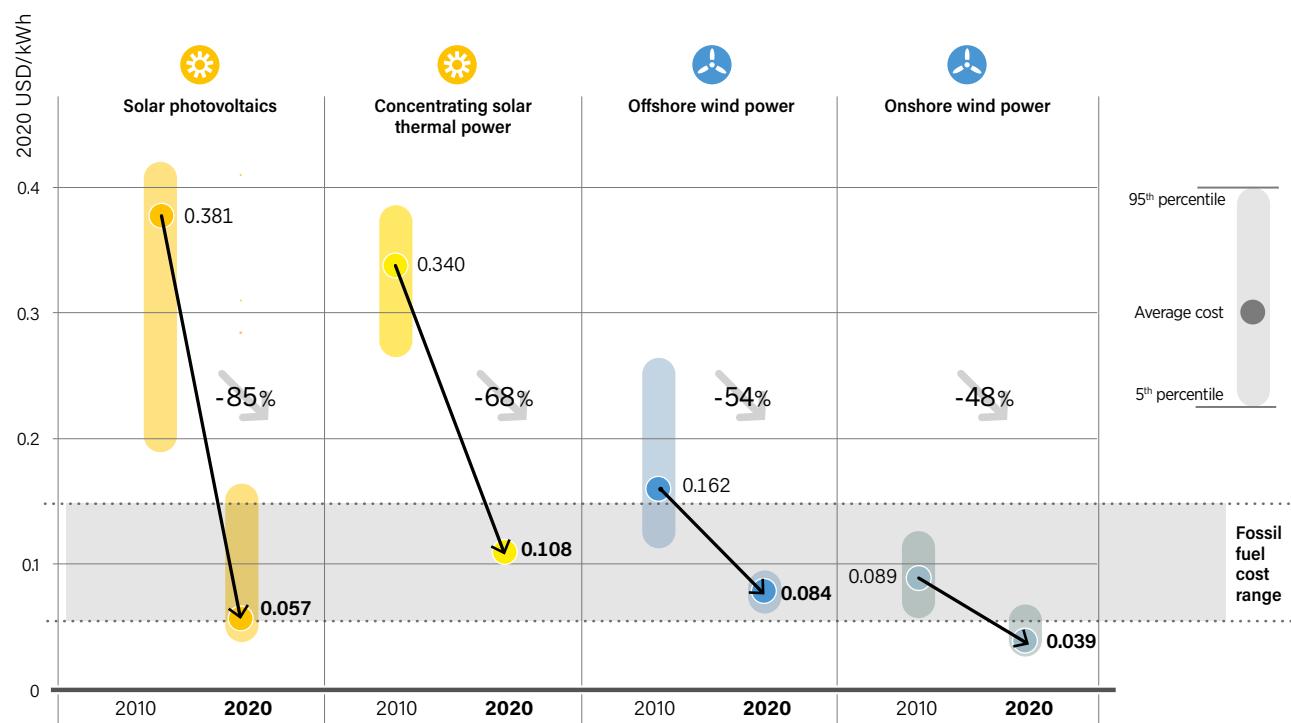


Note: Numbers above bars are gross additions, but bar heights reflect year-end totals. Germany's net additions were slightly below those of Norway.

Source: REN21 analysis.



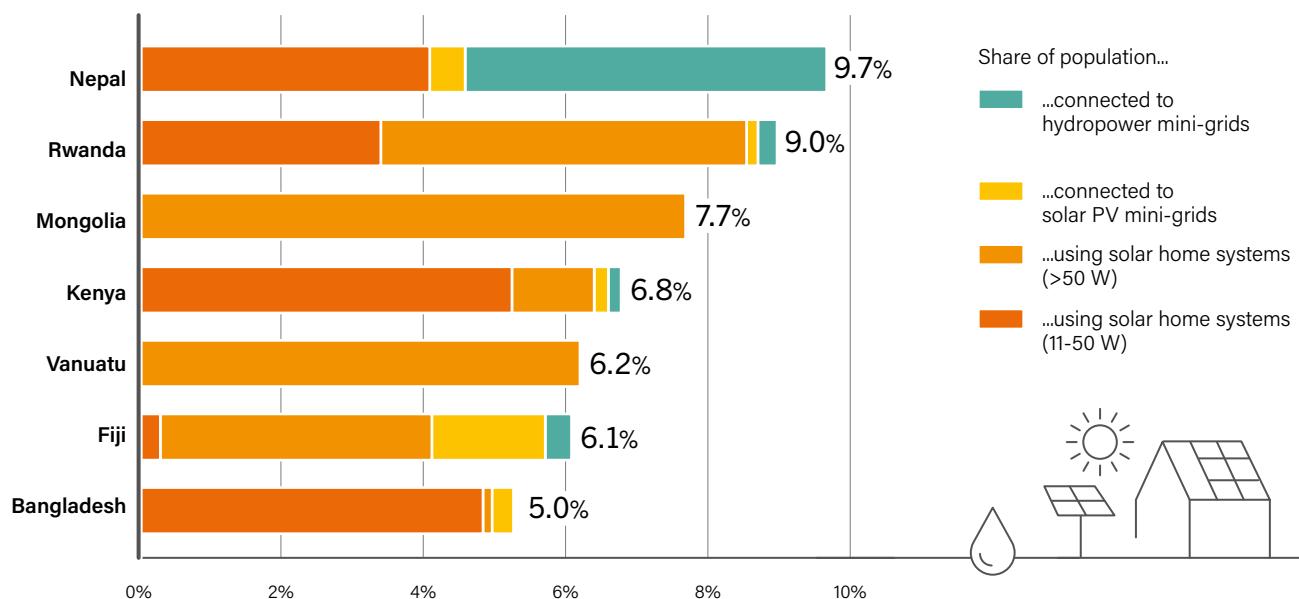
Global Levelised Costs of Electricity from Newly Commissioned Utility-scale Renewable Power Generation Technologies, 2010 and 2020



Source: IRENA.



Top 7 Countries with the Highest Electricity Access Rate from Distributed Renewable Energy Solutions 2019



Note: Data in figure include solar home systems (SHS) and mini-grids but exclude solar lights.

Source: REN21 analysis.

The REN21 Secretariat has produced this document to highlight important trends in renewable energy that occurred in 2020 and to put them in perspective of the global energy transition. It draws on elements from REN21's *Renewables 2021 Global Status Report*.

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RENEWABLES 2021 GLOBAL STATUS REPORT

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See Endnotes and Methodological Notes
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