

The background is a clear, light blue sky. On the left, there are several dandelion seed heads, some in sharp focus and others blurred. On the right, there are several colorful geometric shapes: a teal circle, a blue circle, a yellow circle, a teal rounded rectangle, an orange rounded rectangle, a blue rounded rectangle, and a yellow rounded rectangle. The text "RENEWABLES NOW" is centered in the middle of the image.

RENEWABLES NOW



LAUNCH OF THE RENEWABLES GLOBAL STATUS REPORT 2023 COLLECTION (GSR)

RENEWABLES IN **ENERGY SUPPLY**

REN21 Secretariat
secretariat@ren21.net



DRIVING THE SHIFT TO RENEWABLES – NOW!

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

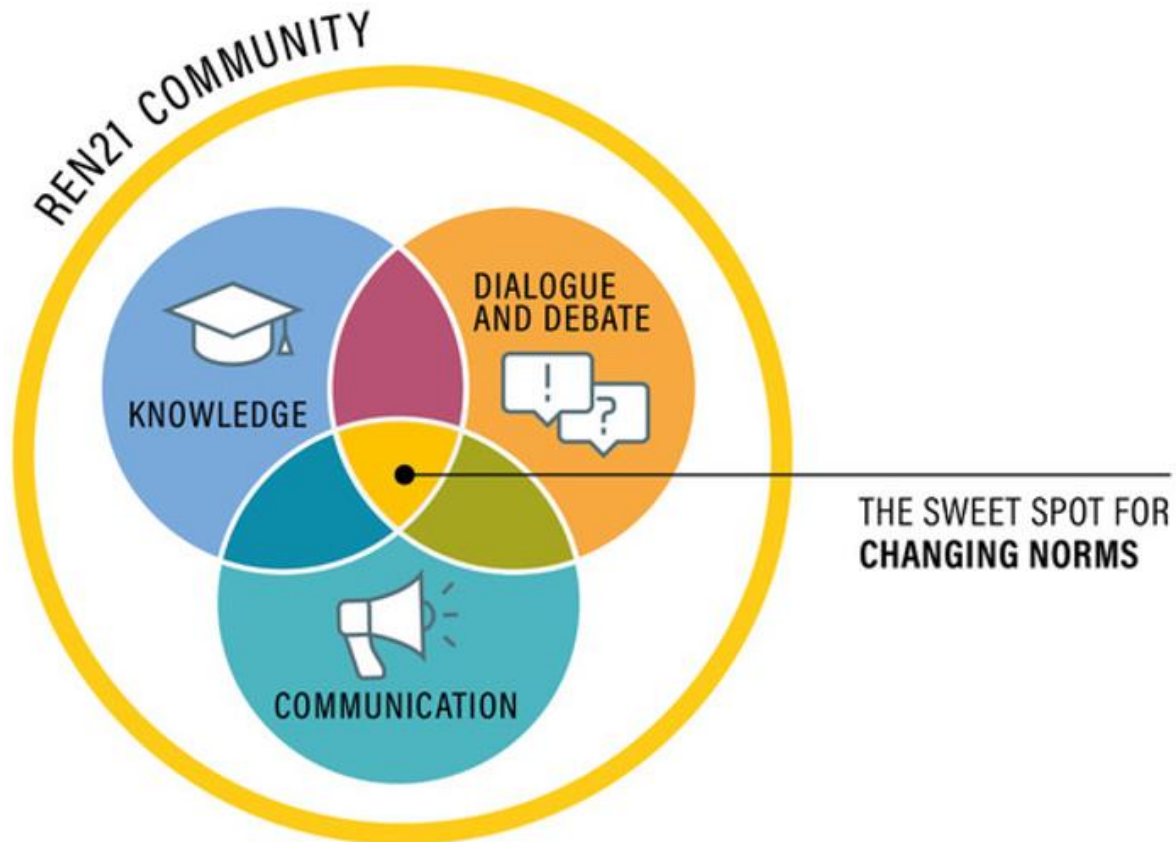
Our more than **4,000 community members** co-operate collecting information, changing norms and debating.



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

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

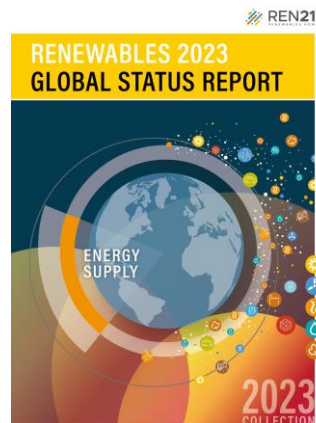
OUR APPROACH TO DRIVE CHANGE



Position knowledge strategically, build on the REN21 community and their roles, **engage** with usual and unusual suspects **to change norms.**

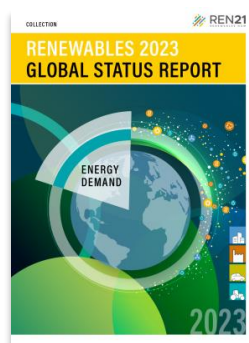
THE ANNUAL GSR COLLECTION

REPORTING ABOUT THE BUILDING BLOCKS OF THE RENEWABLES SYSTEMS



Renewables in Energy Supply (Heat, Fuel and Electricity)

- Policy
- Investment
- Market and Industry Trends



Upcoming Modules:

- Energy Systems and Infrastructure for Renewables
- Economic and Social Value Creation with Renewables
- Global Overview

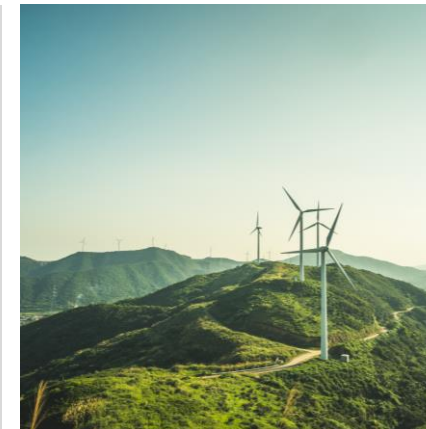
RENEWABLES IN ENERGY SUPPLY

KEY DRIVERS AND TRENDS

Energy prices and security of energy supply among key drivers in 2022

Record growth in installed capacity of Renewable Power Additions: **348 GW** in 2022

Solar PV leads all technologies: 1 TW milestone reached of total installed capacity



Record growth in Investment in Renewable Power: more than **USD 500 billion** in 2022



Wind Power slows amid supply chain disruption and increase material cost



Deployment uneven across energy carrier, technology and regions

700 million people lack access to electricity

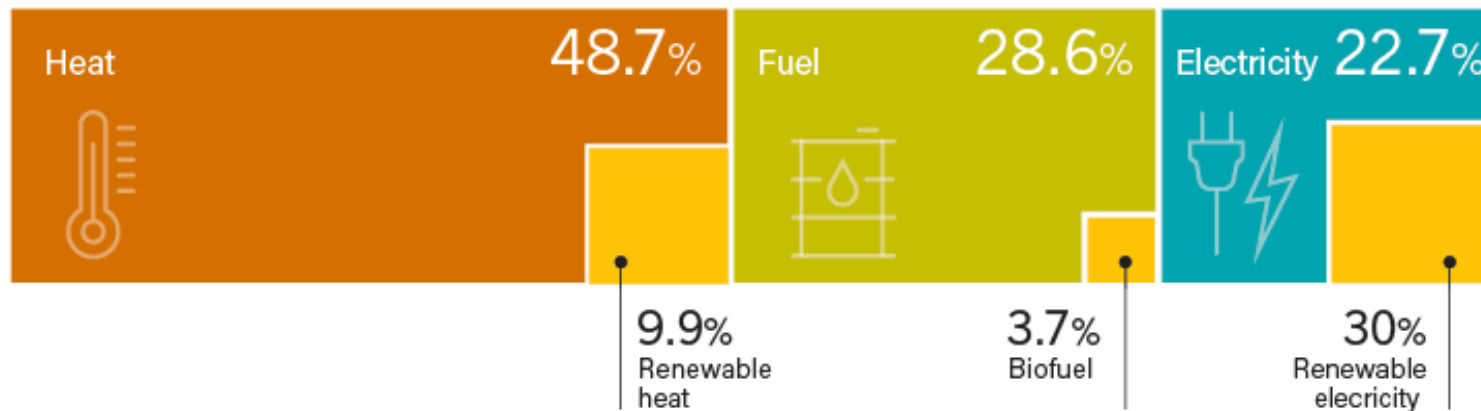


ARE RENEWABLES FUELING ALL OF THE WORLD'S ENERGY NEEDS?

ENERGY, MORE THAN ELECTRICITY

RENEWABLES UPTAKE UNEVEN ACROSS ENERGY CARRIERS

 Total Final Energy and Total Modern Renewable Energy Share, by Energy Carrier, 2020

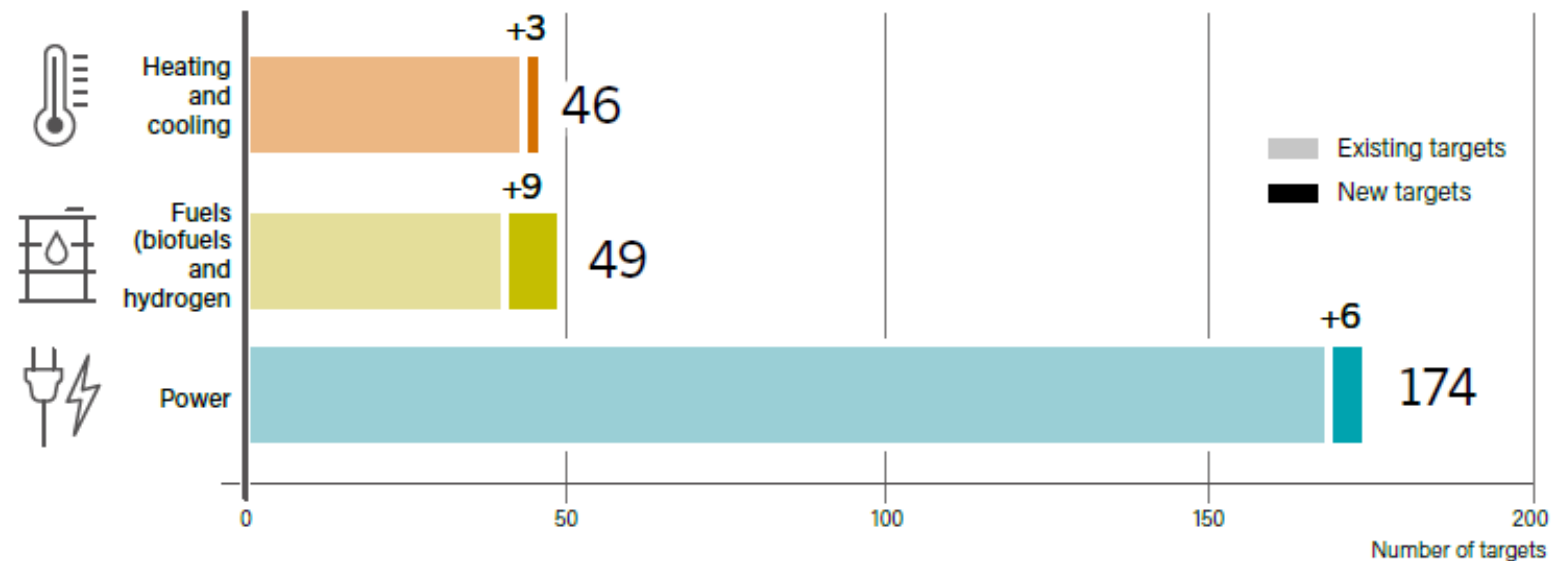


Largest focus is on the power sector, but **renewable heat** and **renewables-based fuels** seriously lag behind

FROM A POWER TRANSITION TO AN ENERGY TRANSITION

REPRODUCING THE SUCCESS STORY OF POWER


Renewable Power and Heating and Cooling Targets, 2022

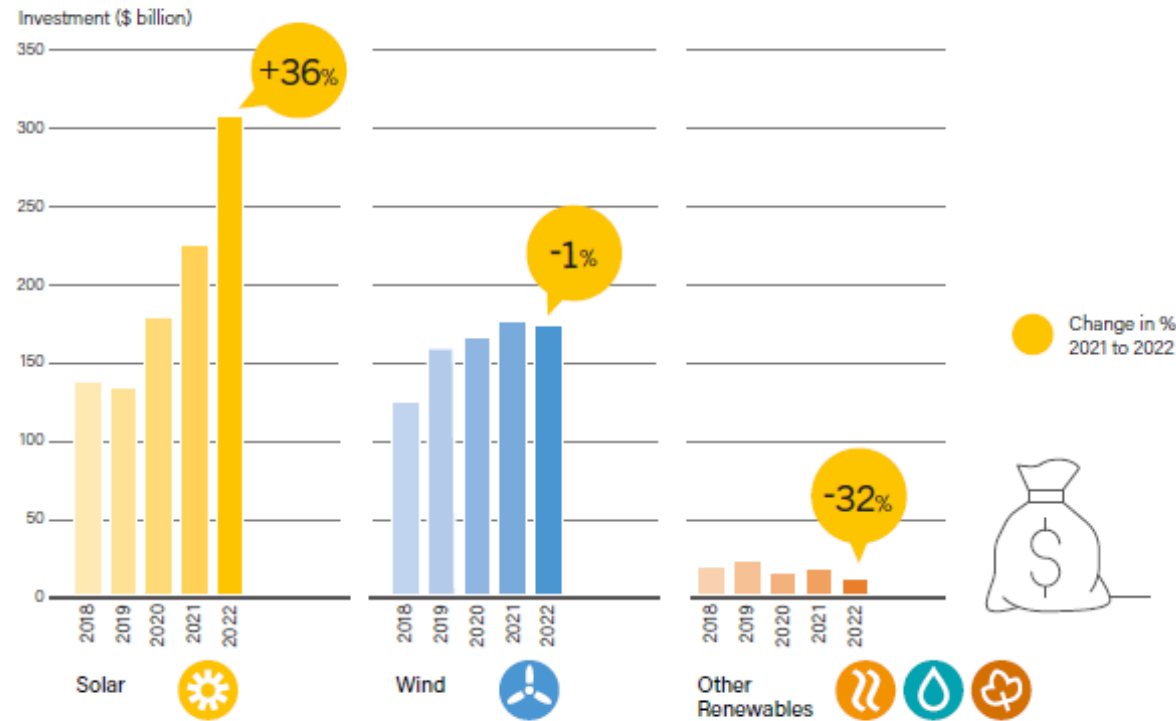


Targets, policies and regulations, strategic planning are key for technology innovation, market development and bringing down cost

RENEWABLES INVESTMENT UNEVEN ACROSS TECHNOLOGIES

REAL NEED FOR GROWTH IN RENEWABLE HEAT AND FUEL


 **Global Investment in Renewable Power and Fuels by Technology, 2018-2022**

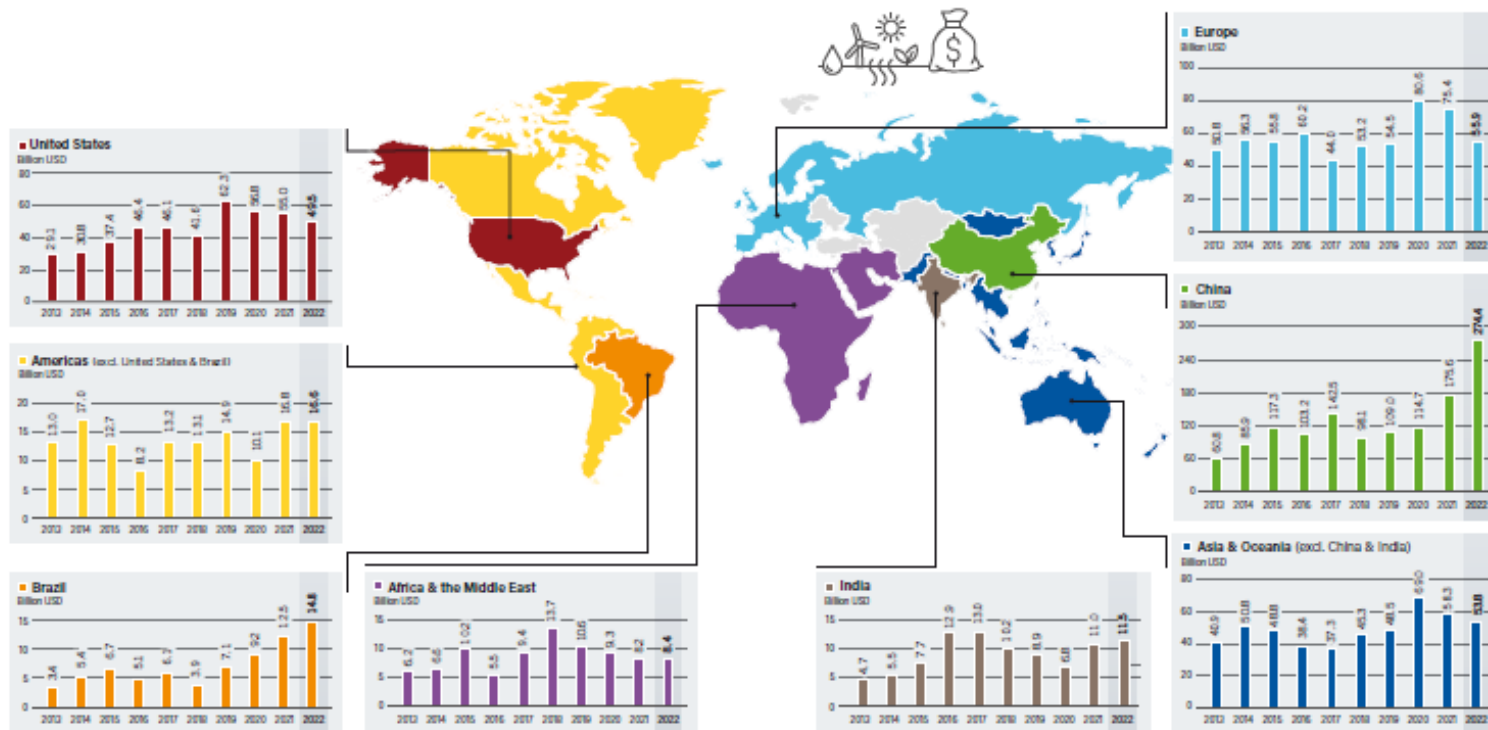


Record growth in Solar PV, investment contracting in all other renewable energy technologies.

RENEWABLES INVESTMENT UNEVEN ACROSS GEOGRAPHIES

REAL NEED TO DIVERSIFY INVESTMENT

 **Global Investment in Renewable Power and Fuels, by Country and Region, 2012-2022**



China accounted for **55%** of global investment in 2022.

The **US and EU** at **11%** and **10%** respectively.

The **Middle East & Africa** accounted for **1.6%** of global investment in 2022.




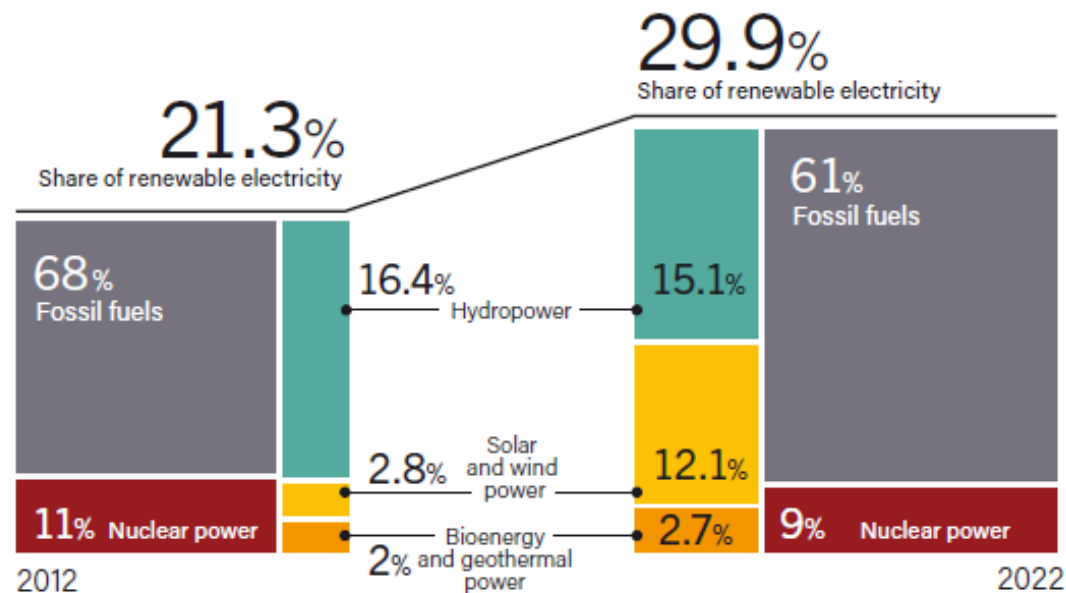
POWER SECTOR LEADING RENEWABLES UPTAKE

UNEVEN UPTAKE ACROSS TECHNOLOGIES AND GEOGRAPHIES

RENEWABLE ELECTRICITY IS LEADING THE SHIFT IN ENERGY SUPPLY

SOLAR AND WIND DOMINATE NEW POWER DEPLOYMENT


 Share of Renewable Electricity Production, by Energy Source, 2012-2022



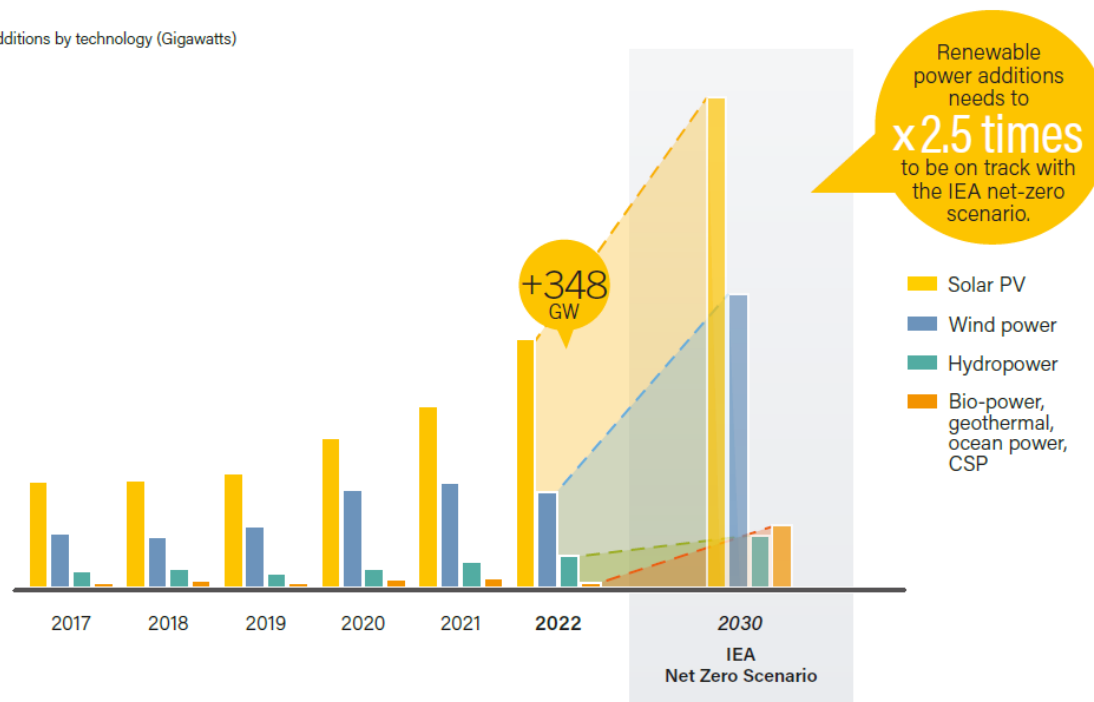
Renewable energy represented **29.9%** of the global electricity mix in 2022, with solar and wind power providing more than **12%** of the world's electricity for the first time ever.

RECORD INCREASE IN RENEWABLE POWER CAPACITY

ANNUAL ADDITIONS STILL NEED TO RAMP UP TO MEET CLIMATE SCENARIOS

 **Renewable Power Capacity Annual Additions by Technology, 2017-2022, and Increases Required by 2030 to Achieve the IEA's Net Zero Scenario**

Additions by technology (Gigawatts)



Total installed capacity:
3481 GW

Needed increase in annual capacity

Solar PV : **x2**


Wind : **x3.7**

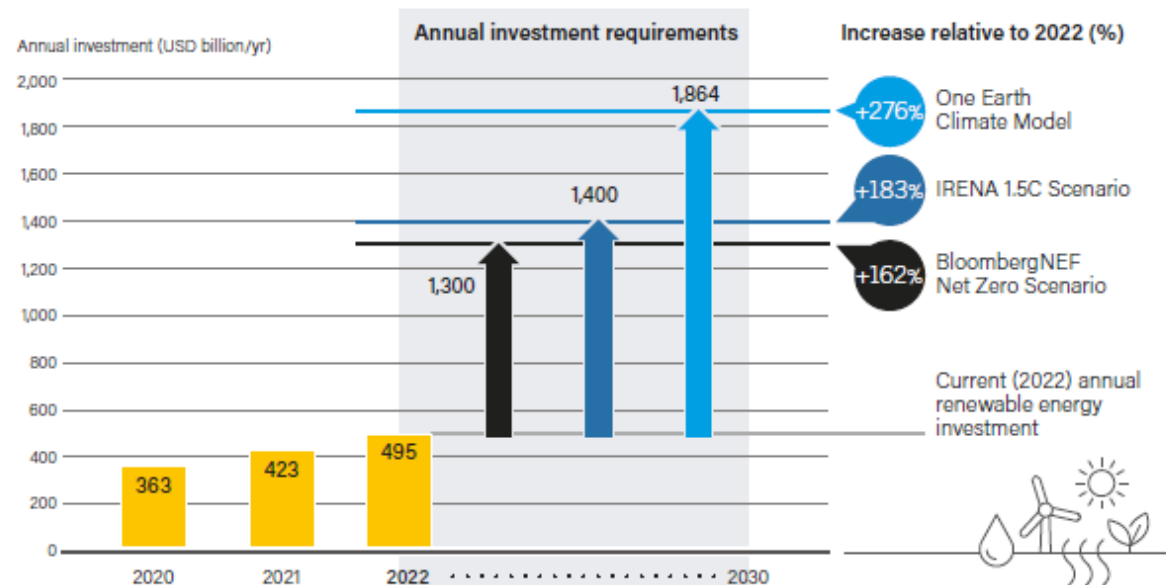
Hydropower: **x2.3**

Other technologies: **x9.7**

RECORD INCREASE IN RENEWABLE POWER CAPACITY

ANNUAL INVESTMENTS STILL NEED INCREASE TO MEET CLIMATE SCENARIOS


 **Range of Annual Renewable Energy Investment Needed in Climate Change Mitigation Scenarios, Compared to Recent Investments**

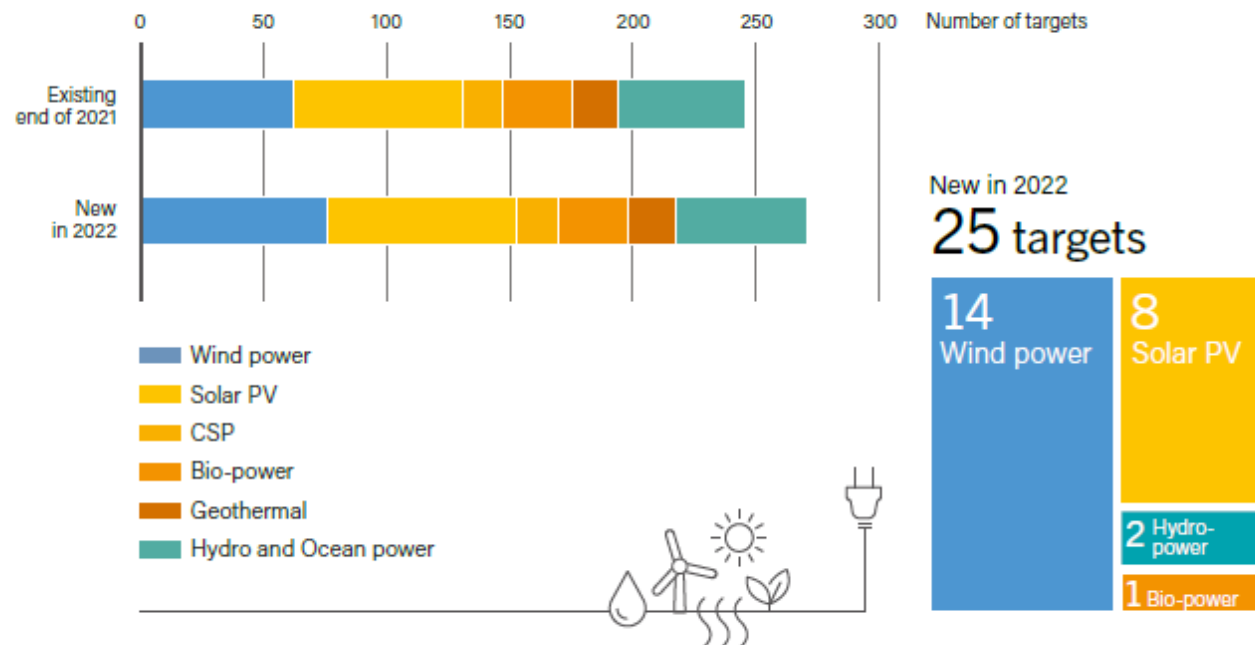


According to climate scenarios, annual investment **must at least double** from now until 2030.

POWER TARGETS CONTINUE TO INCREASE

HIGHER ATTENTION TO WIND AND OFF-SHORE WIND

 **Technology-Specific Targets for Installed Renewable Power Capacity, 2022**

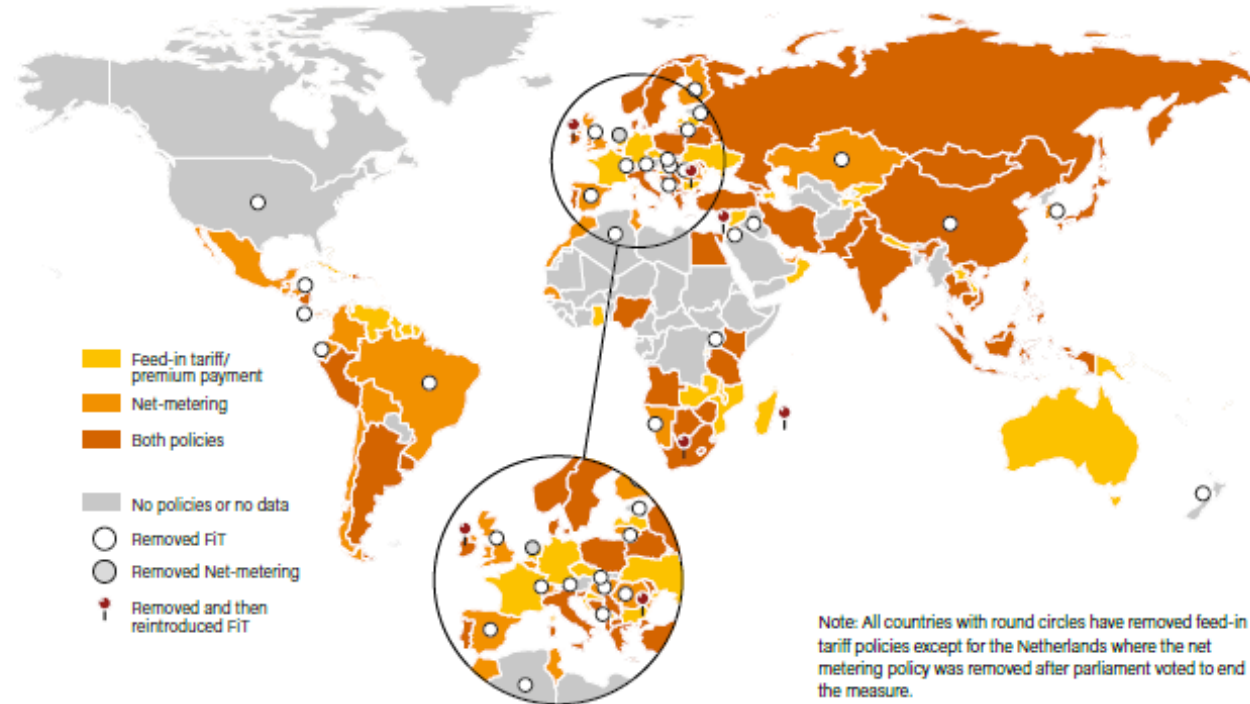


In total, more than **250 technology-specific power capacity targets** were in place in 126 national and sub-national jurisdictions by year's end.

FEED IN TARIFFS AND NET-METERING

MORE THAN 20 COUNTRIES REMOVED FEED-IN TARIFFS IN RECENT YEARS

 **Renewable Energy Feed-in Tariffs and Net Metering Policies, 2022**

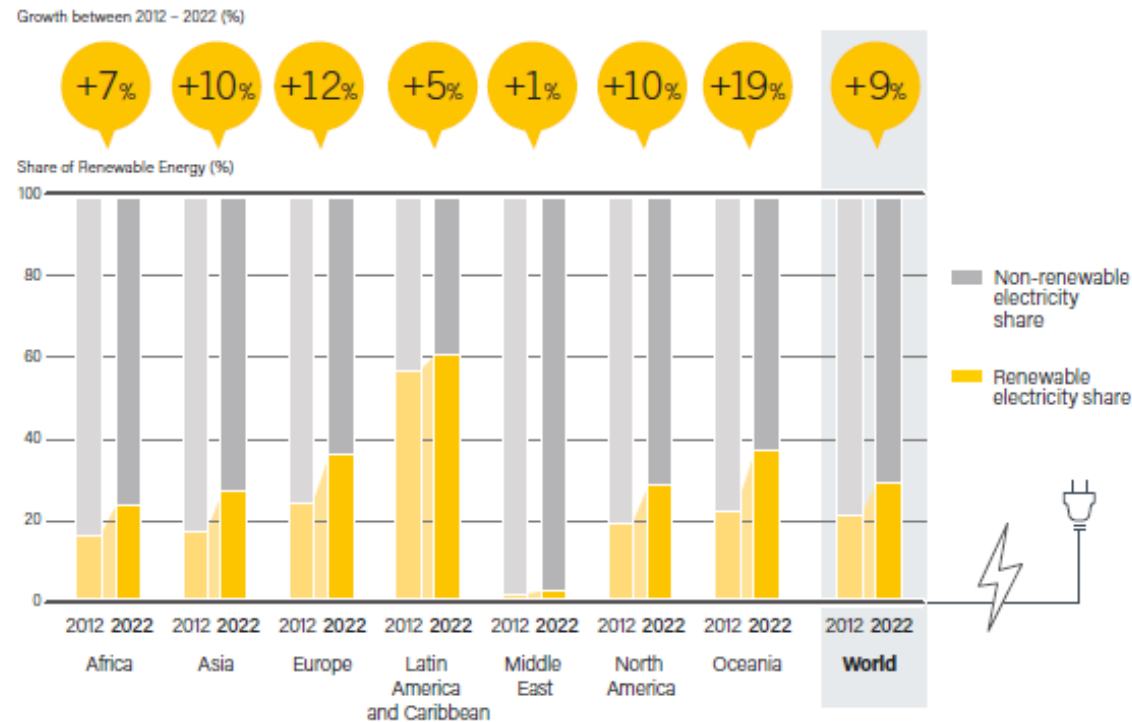


By the end of 2022, **83 countries** had in place feed-in tariffs or a premium payment policy, **92 countries** had a net-metering policy and **56 countries** had both.

RENEWABLE ELECTRICITY GENERATION

UNEVEN ACROSS GEOGRAPHIES, BUT EMERGING ECONOMIES SHOWING PROGRESS

 **Renewable Share of Electricity Generation, by Region, 2012 and 2022**



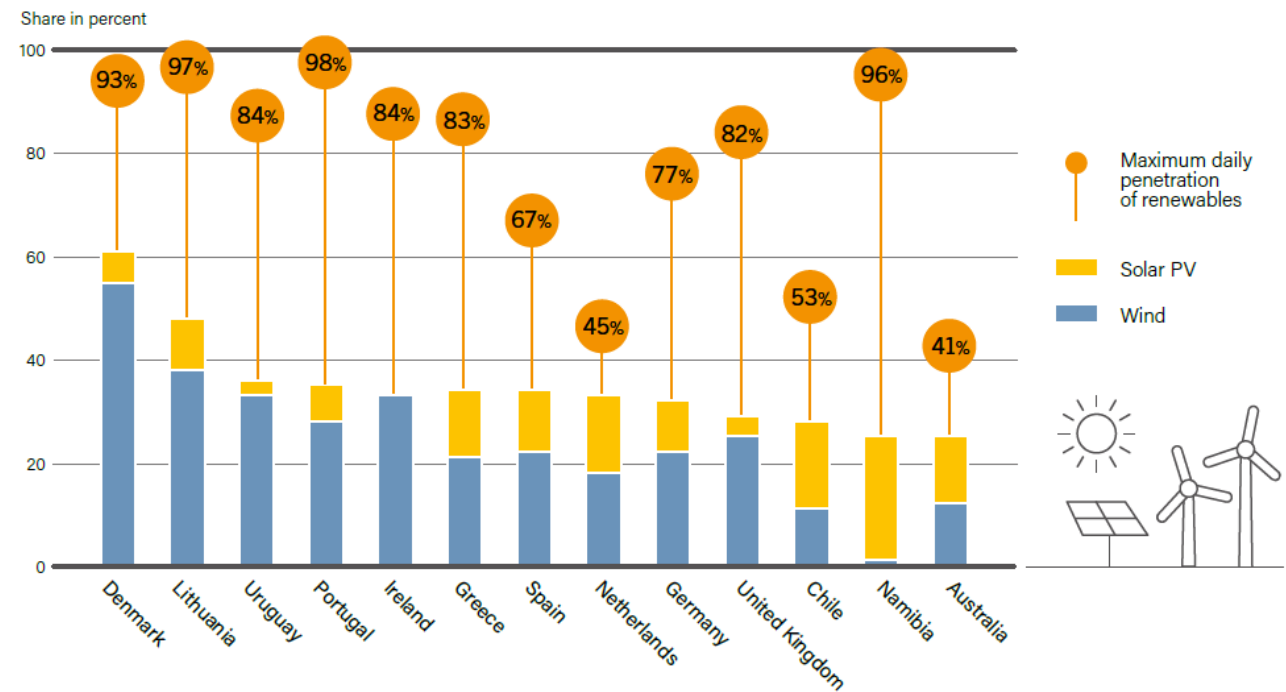
Only three regions have renewable electricity shares higher than 35%

In 2022, Oceania had the highest y-y growth with 13%, followed by Asia and Africa with 11% y-y growth each.

KEY CHALLENGES FOR RENEWABLES POWER UPTAKE

- **More than 1 TW** of renewables power waiting to be constructed or connected to the grid
- Delays linked to **permitting** processes and local acceptance delay
- Global investment in **electricity grid infrastructure** totalled estimated USD 274 billion in 2022, an 8% increase from 2021.

FIGURE 1. Top Countries for Share of Variable Renewable Electricity Generation, and Maximum Daily Penetration, 2022




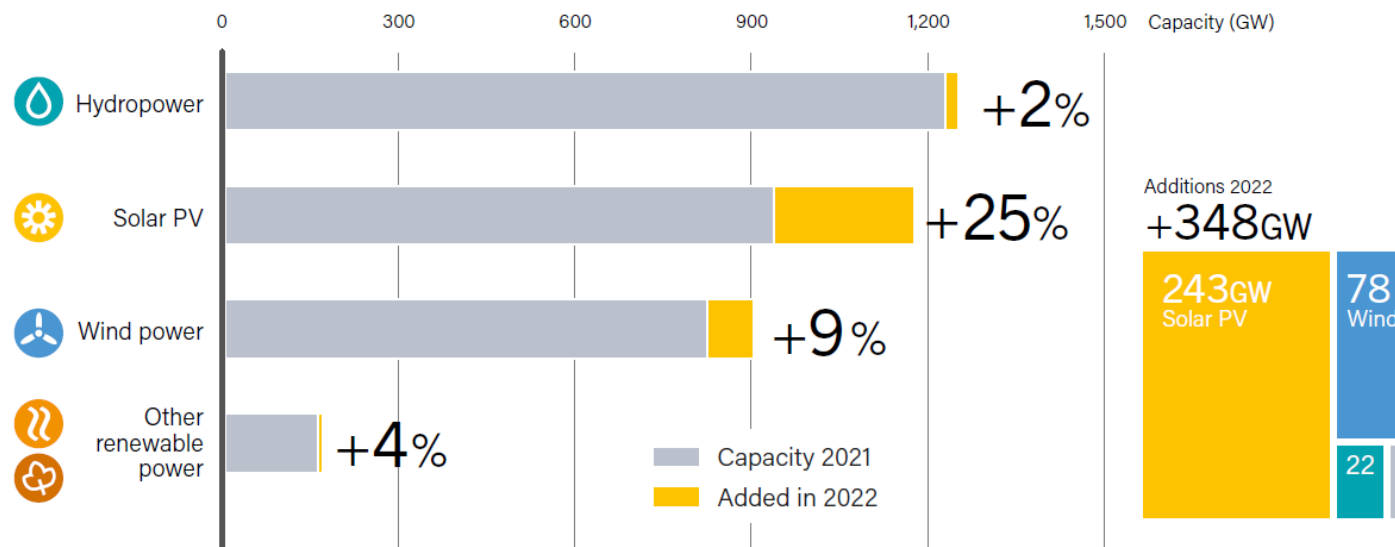


LEADING TECHNOLOGIES IN RENEWABLE POWER

RECORD INCREASE IN RENEWABLE POWER CAPACITY

DESPITE SUPPLY CHAINS DISRUPTIONS AND GLOBAL RISE IN COMMODITY PRICES


 Renewable Power Total Installed Capacity and Annual Additions, by Technology, 2022

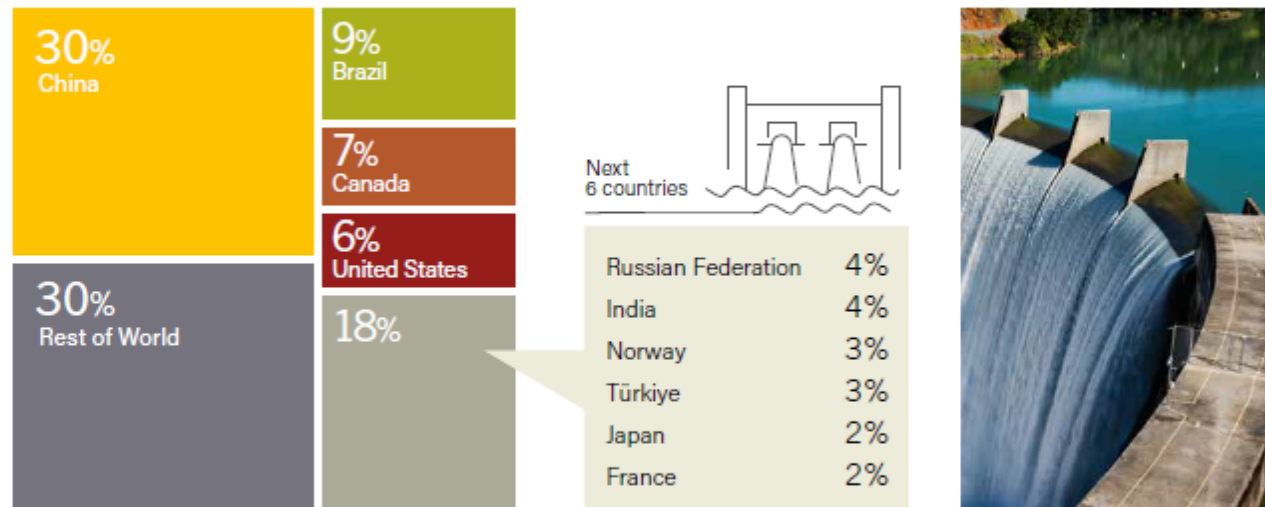


Renewable power capacity additions grew by **13% (348 GW)** in 2022, largely led by solar PV and wind power with **92%** of total. Total Installed Capacity reached **3,481 GW** in 2022.

HYDROPOWER IN ENERGY SUPPLY

STILL DOMINATES THE SHARE OF RENEWABLE ENERGY IN POWER

 Hydropower Global Capacity, Shares of Top 10 Countries and Rest of World, 2022


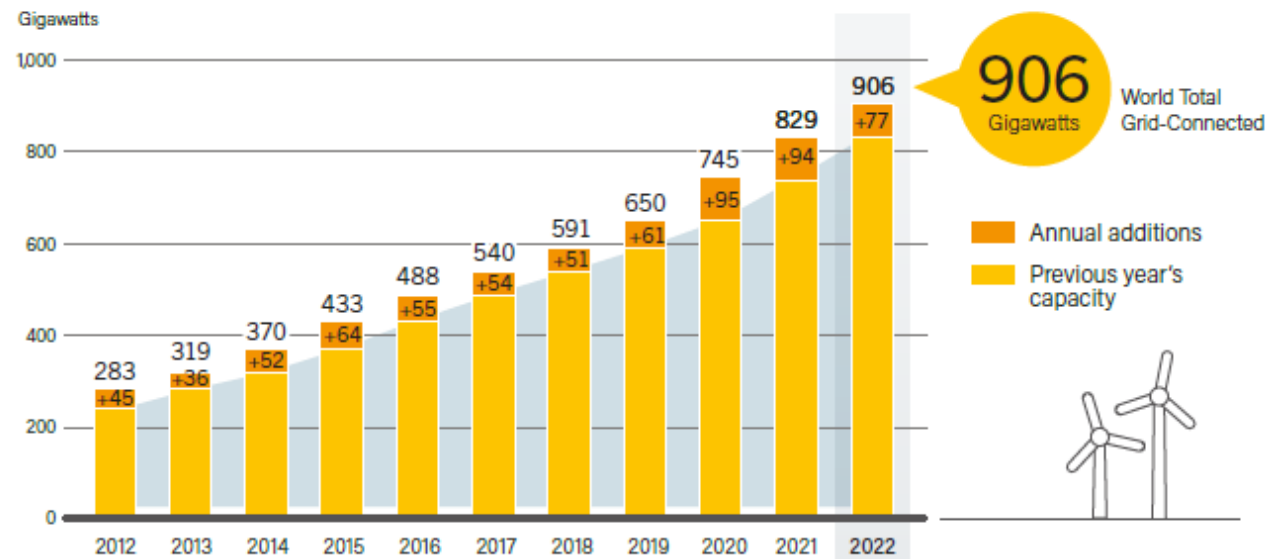


Hydropower capacity reached **1,220 GW** in 2022, accounting for **50%** of total renewable power and **15%** of renewable electricity generation.

In Europe, hydropower production dropped **19%** in 2022 due to **extreme drought**.

WIND POWER IN ENERGY SUPPLY

GLOBAL INSTALLED CAPACITY SLOWED DOWN IN 2022


Wind Power Global Capacity and Annual Additions, 2012-2022



Note: Totals may not add up due to rounding. Additions in 2022 are gross.

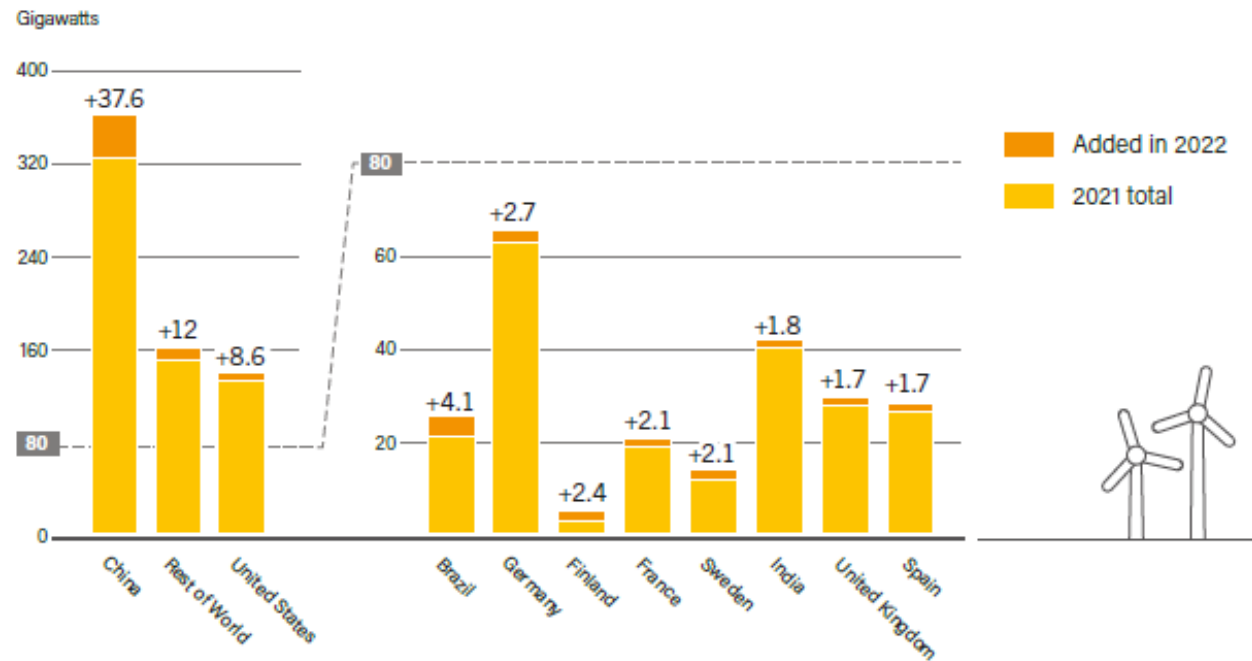
Wind new installed capacity decreased by 17% in 2022 due mainly to **increase material cost** and **supply chain disruptions**.

Wind power generation reached 7.6% of total electricity generation.

WIND POWER IN ENERGY SUPPLY

REGIONALLY

 **Wind Power Capacity and Additions, Top 10 Countries, 2022**




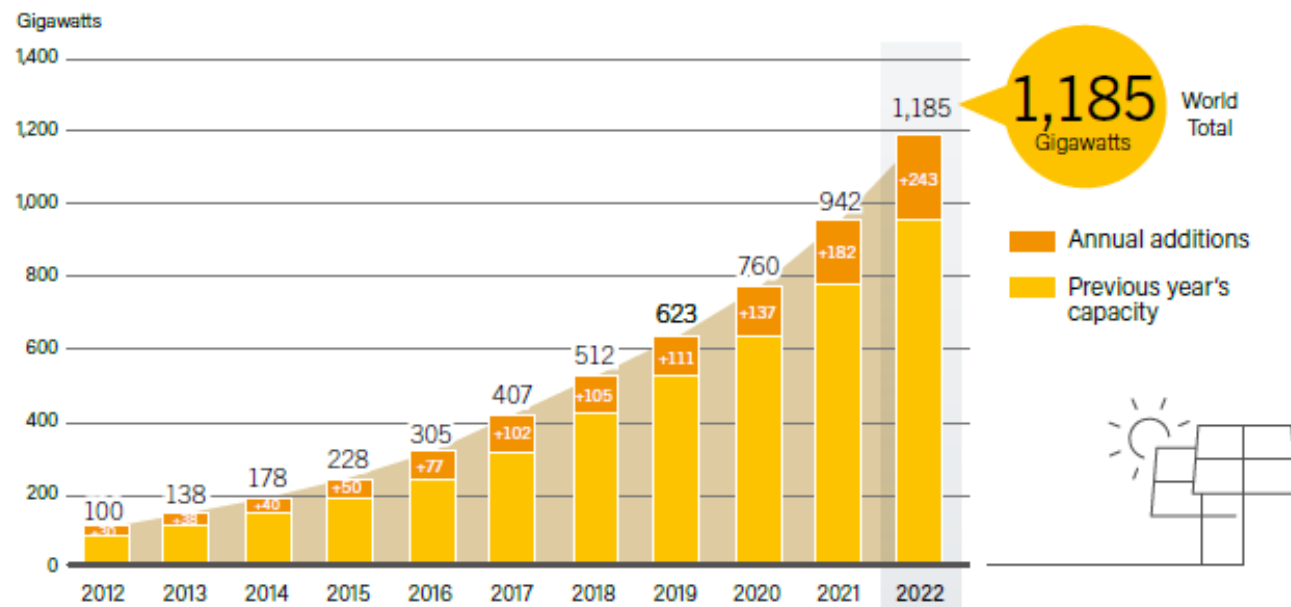
Note: Numbers above bars are gross additions, but bar heights reflect year-end totals. Net additions were lower for China (36.5 GW), the United States (8.3 GW) and Germany (2.5 GW) due to decommissioning. Totals may not add up due to rounding.

For the 15th consecutive year **Asia** was the largest market with **55%** share of global market in **2022** down from **58%** in **2021**.

SOLAR PV IN ENERGY SUPPLY

GLOBAL INSTALLED CAPACITY SURPASSED 1 TW

 Solar PV Global Capacity and Annual Additions, 2012-2022



Solar PV installed capacity grew **37%** in 2022.


Utility-scale solar PV market grew **25%** in 2022 adding **124.2 GW**.

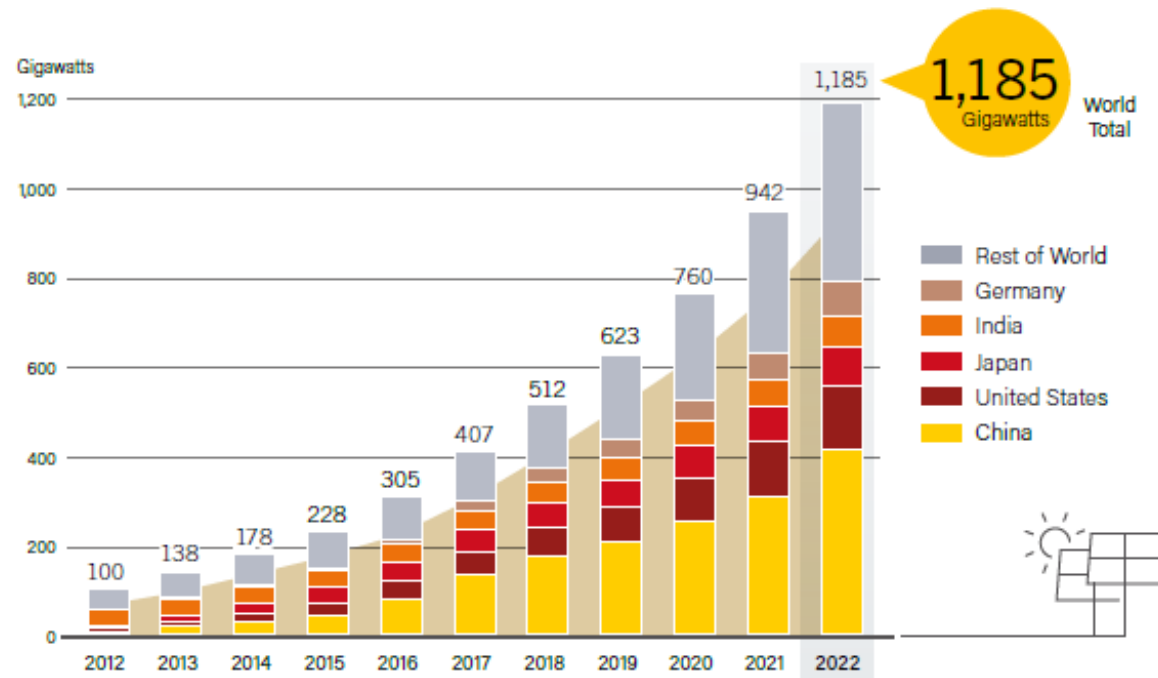
Solar PV rooftop market grew **54%** in 2022 adding **115.2 GW**.

Solar PV **generation** reached **4.5%** of total

SOLAR PV IN ENERGY SUPPLY

REGIONALLY, ASIA DOMINATES

 Solar PV Global Capacity, by Country and Region, 2012-2022




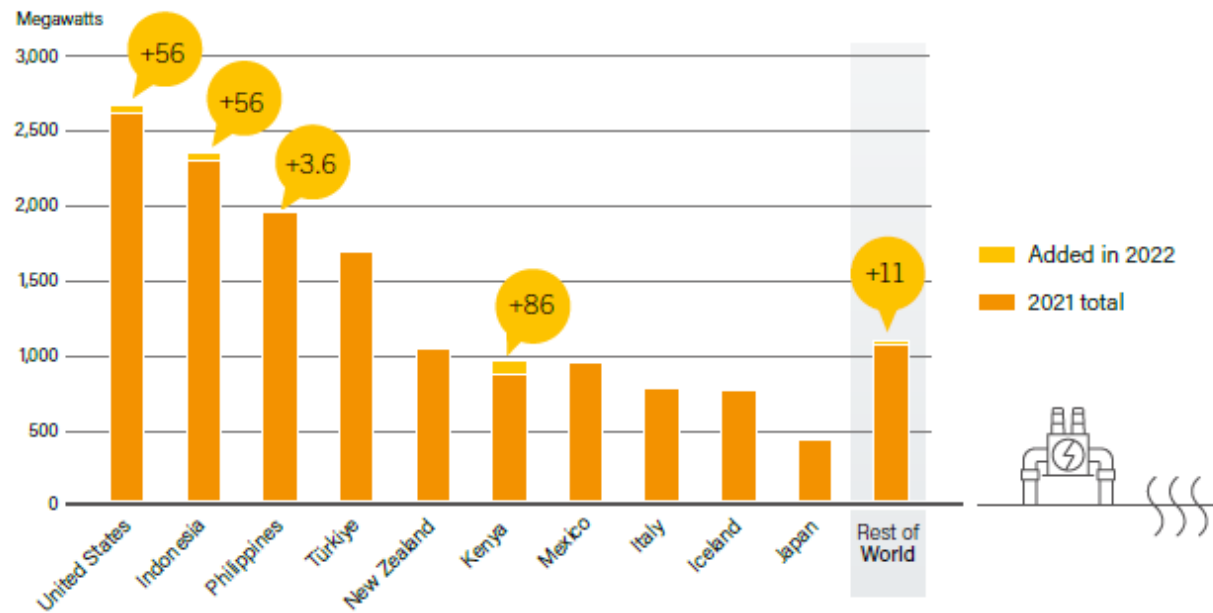
For the 10th consecutive year, **Asia dominated with 64%** of all capacity additions.

Solar PV manufacturing is concentrated in **China** with more than **80%** in all stages of supply chain.

GEOTHERMAL POWER IN ENERGY SUPPLY

SLOW YEAR FOR GEOTHERMAL POWER CAPACITY ADDITIONS, 30% LOWER THAN 2021

 Geothermal Power Capacity and Additions, Top 10 Countries and Rest of World, 2022




New geothermal power generating capacity of **0.2 GW** came online in 2022, bringing the cumulative global total to around **14.6 GW**.

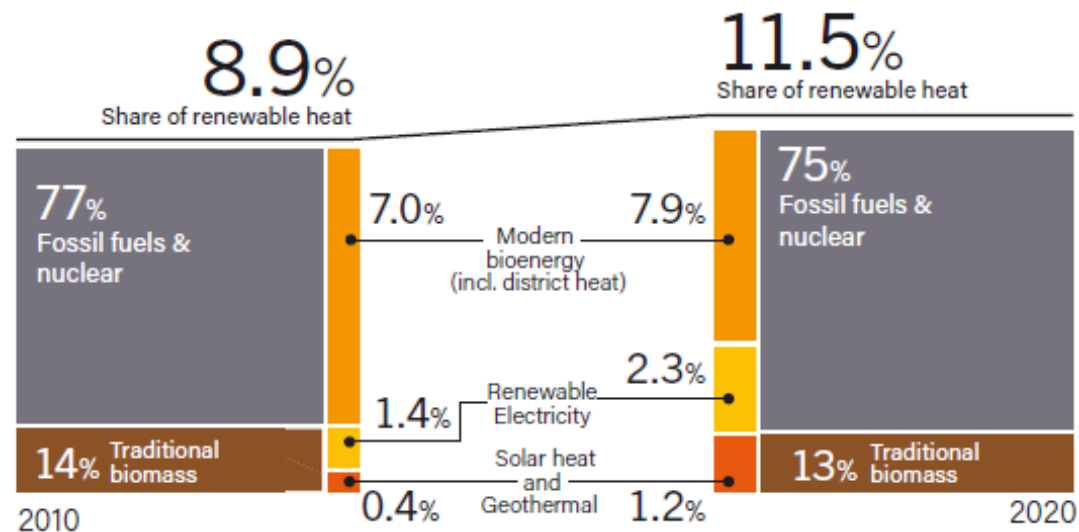


STRUCTURAL CHANGES TO DRIVE RENEWABLES HEAT

DEEP STRUCTURAL CHANGES ARE NEEDED

MOST ENERGY NEEDS ARE FOR HEATING

 **Share of Renewable Heat Production, by Energy Source, 2010 and 2020**




Renewable share of heat generation increased by almost 2.6 percentage points in the past decade.

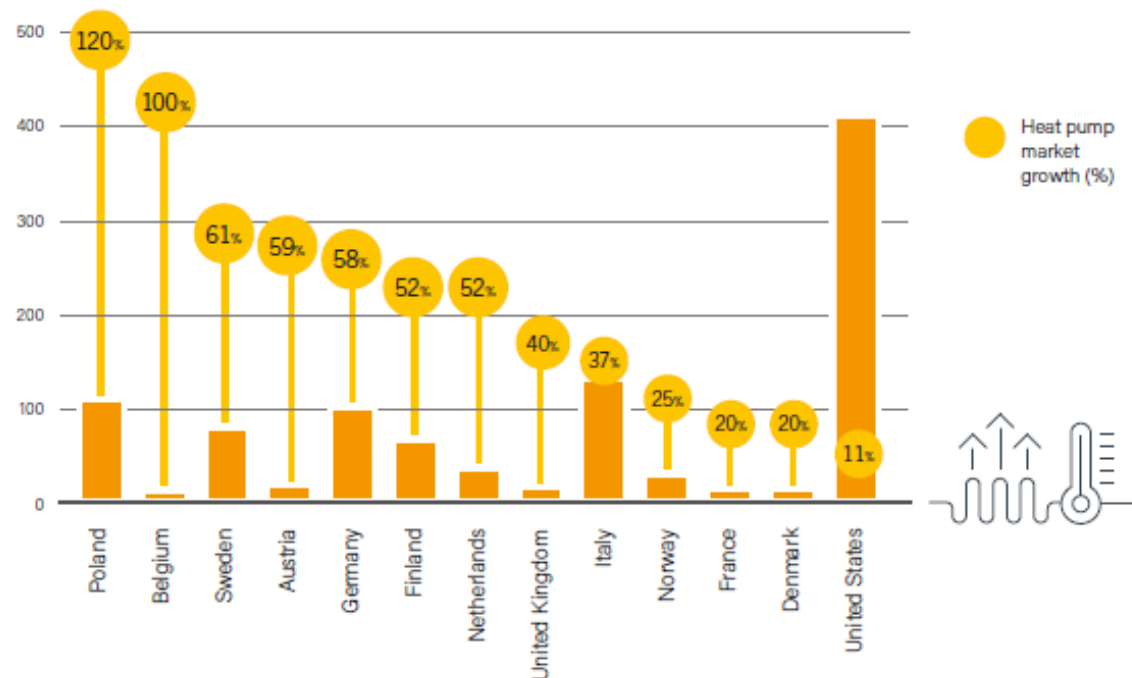
Bioenergy dominates the renewable share of heat supply.

HEAT PUMPS ARE AN ESSENTIAL SOLUTION FOR RENEWABLE HEAT

THE SHARE OF RENEWABLE ELECTRICITY FOR HEATING IS ACCELERATING

 National Heat Pump Markets with the Largest Growth in 2022

Annual growth in heat pump sales (additional units sold in thousands)




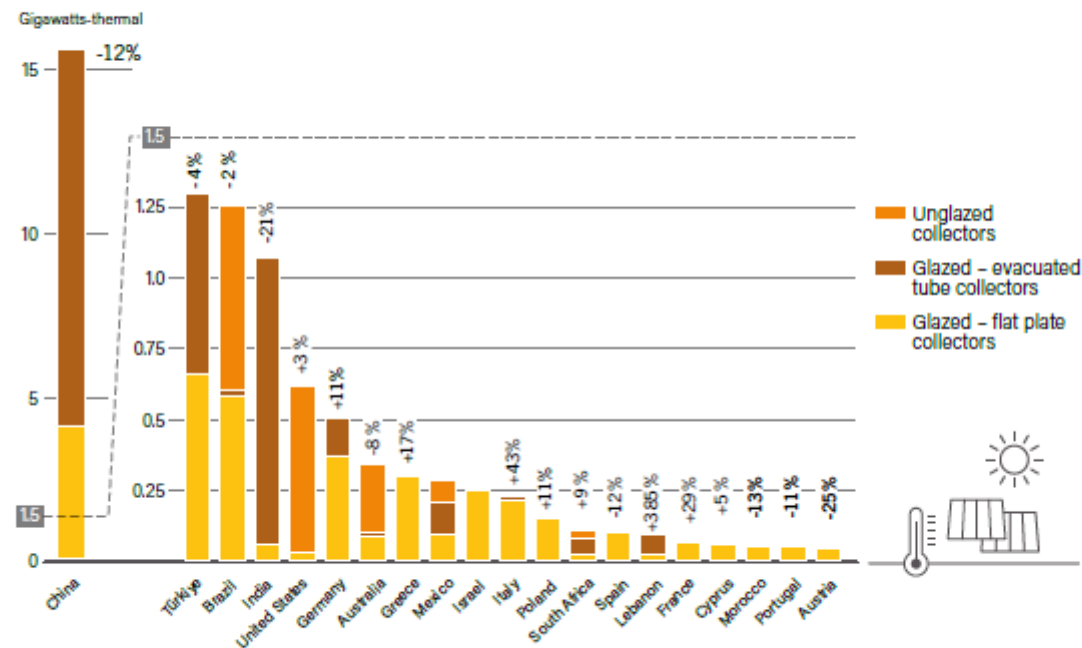
The **United States** leads the heat pump market, but record **growth across Europe** in response to the energy crisis.

Annual growth was of **+10%** globally and **+37%** in EU

SOLAR WATER HEATERS

DEMAND FOR SMALL-SCALE SYSTEMS IS DECREASING, WHILE INCREASING FOR LARGER SYSTEMS

 Solar Water Heating Collector Additions, Top 20 Countries for Capacity Added, 2022




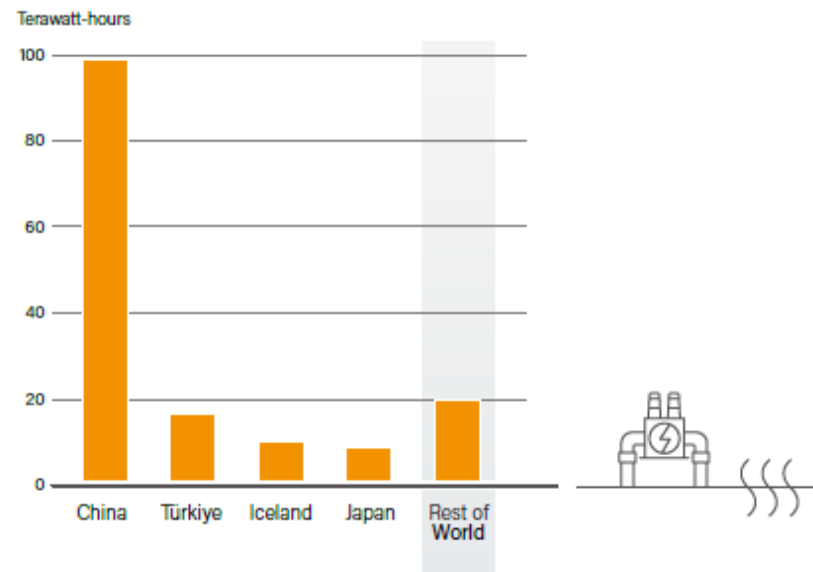
Note: Additions represent gross capacity added and are rounded to nearest whole number. The additions for Mexico and Israel refer to 2021 (latest data available). For Morocco, the share of collector types was not available.

The **global** solar thermal market **contracted -9.3%** in 2022, due to **-12% drop in China**.

GEOTHERMAL HEAT IN RENEWABLE ENERGY SUPPLY

GROWTH IN 2022, THOUGH HIGHLY CONCENTRATED IN A FEW COUNTRIES

 Geothermal Direct Use, Estimates for Top 4 Countries and Rest of World, 2022



The top four countries (China, Türkiye, Iceland and Japan) are estimated to account for nearly **90%** of global geothermal direct use in 2022.



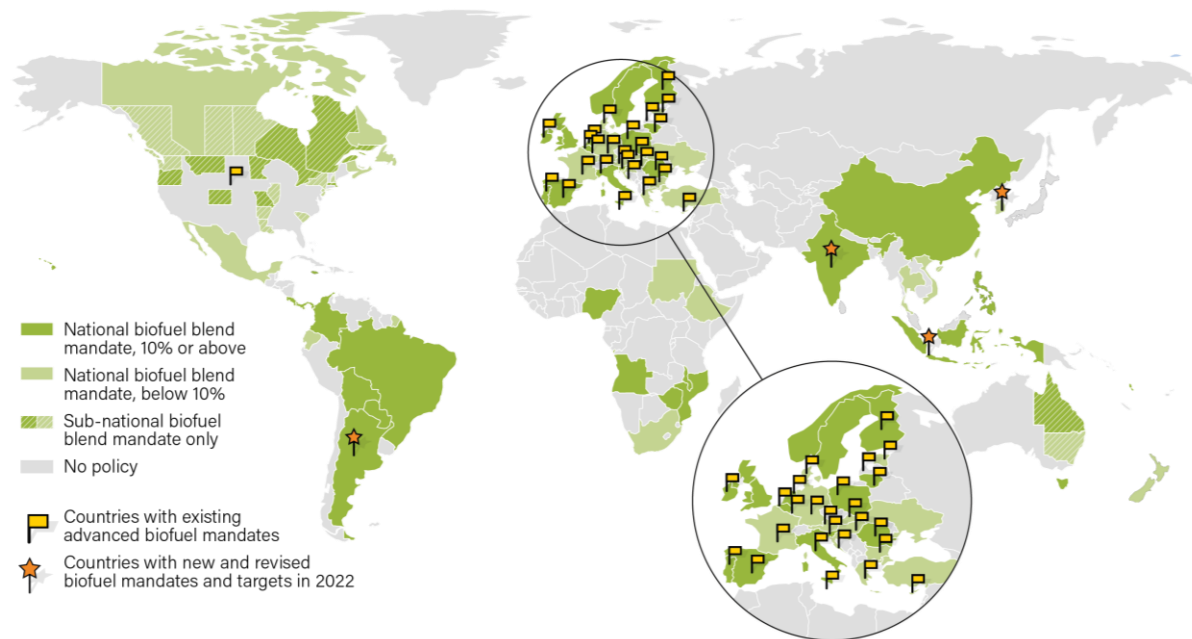
RENEWABLE FUELS

EMERGING TECHNOLOGIES AND REGIONAL SOLUTIONS

BIOFUELS IN RENEWABLE ENERGY SUPPLY

FOSSIL FUELS PRICES AND SUBSIDIES AFFECTED POLICIES FOR BIOFUEL

 **National and Sub-National Renewable Biofuel Mandates and Targets, as of End-2022**




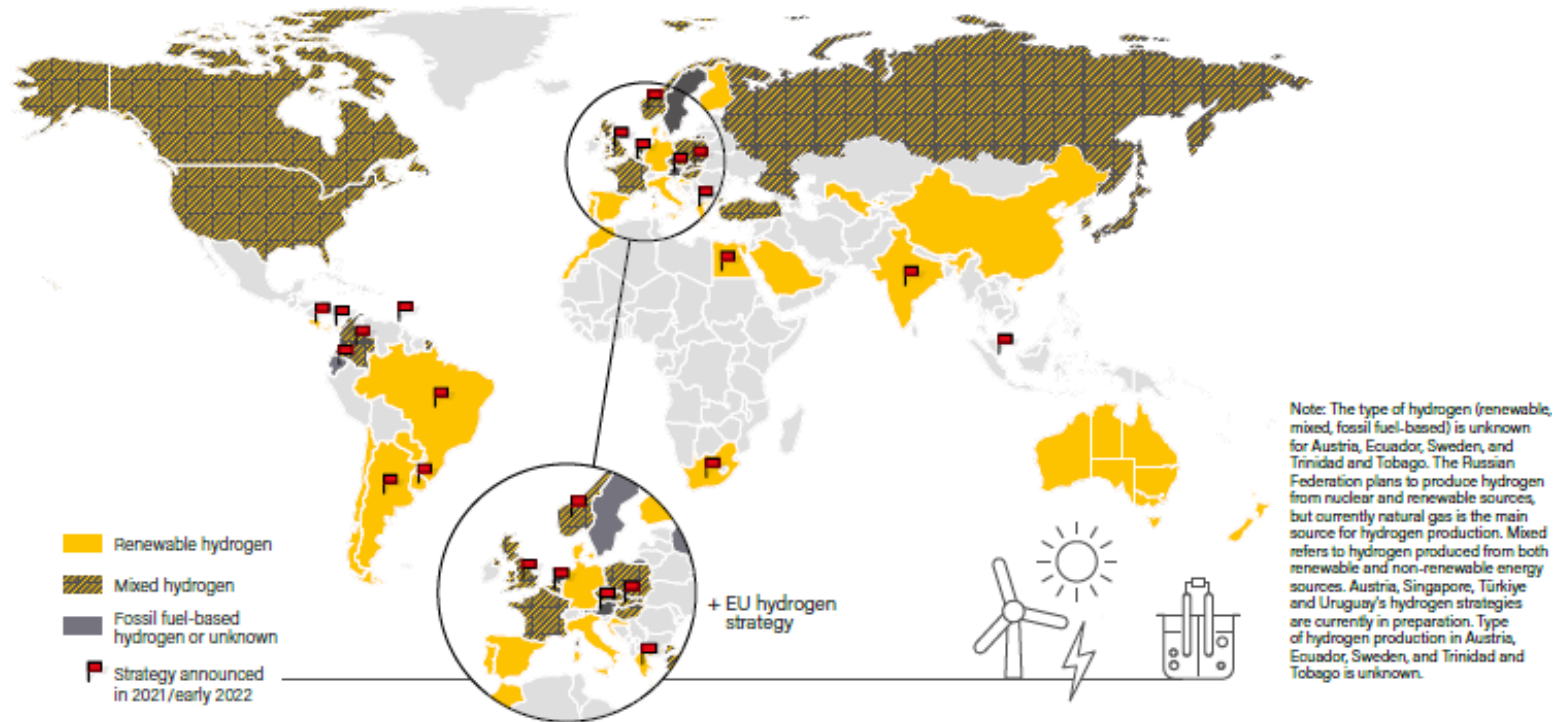
Global production of liquid biofuels totalled **162 billion litres**, providing **3.6%** of the overall energy use in the transport sector.

10 countries reduced or suspended biofuel mandates in 2022.

RENEWABLE HYDROGEN

SEVERAL COUNTRIES ARE POSITIONING THEMSELVES AS RENEWABLE HYDROGEN HUBS

 Hydrogen Strategies and Roadmaps in Selected Countries, as of End-2022



95% of global hydrogen demand is met with hydrogen produced from fossil fuels.

Australia, Chile, Morocco and South Africa are set to become renewable hydrogen hubs.



CHALLENGES & OPPORTUNITIES

DESPITE MULTIPLE CHALLENGES, RENEWABLES CONTINUE TO GROW

THE WAY FORWARD

ACCELERATION, BROADENING THE STRATEGIES AND STRUCTURAL SHIFT AWAY FOR FOSSIL FUELS

RENEWABLE POWER

- Accelerate deployment and investment
- Develop infrastructure now
- Speed up permitting and increase societal acceptances
- Phase out existing fossil fuel power in the grids

RENEWABLE HEAT AND FUELS

- Replicate the success story of power: targets, policies, technology development, investment leading to cost reductions
- Remove fossil fuel subsidies
- Accelerate the electrification of transport, buildings and industry

RE:NEW THE EQUITY

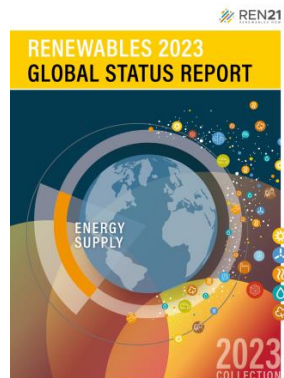
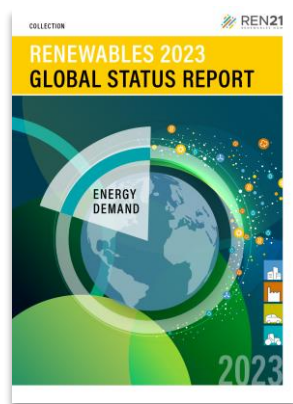
- Address Energy access
- Ensure access to technologies, finance and skilling everywhere
- Strategically build on the decentralised nature of renewables:
 - Regions, countries, subnational territories, cities
 - Corporation
 - Citizens

Systemic attention is needed!!

The shift to renewables is a shift of the energy system, the economy and the society
Pillars: end fossil fuel, energy efficiency, renewable capacities, infrastructure, shifting energy demand

THANK YOU!

STAY TUNED FOR THE **UPCOMING MODULES**



REN21 Secretariat
www.ren21.net



The background is a clear, light blue sky. On the left, there are several dandelion seed heads, some in sharp focus and others blurred. On the right, there are several colorful geometric shapes: a teal circle, a blue circle, a yellow circle, a teal rounded rectangle, an orange rounded rectangle, a blue rounded rectangle, and a yellow rounded rectangle. The text "RENEWABLES NOW" is centered in the middle of the image.

RENEWABLES NOW

