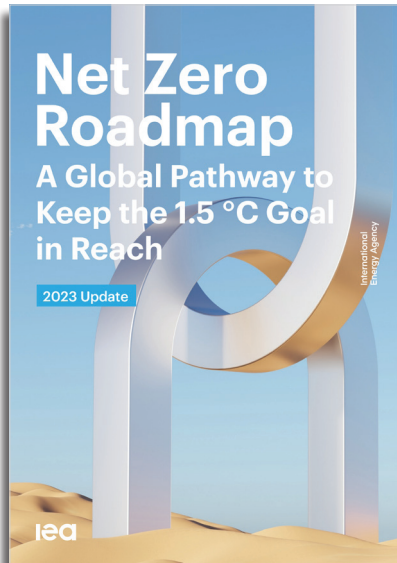




# IICEC Energy & Climate Research Review

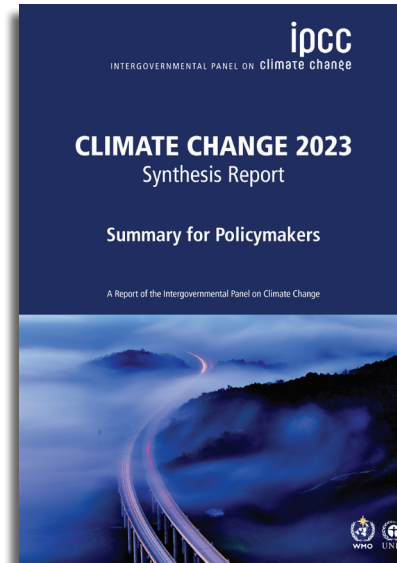
October 23, 2023 Issue 1



## Net Zero Roadmap: A Global Pathway to Keep the 1.5°C Goal in Reach, 2023 Update, International Energy Agency

The report provides a comprehensive update of the first Net Zero Emissions Scenario (NZE) by 2050, which was first launched in 2021.

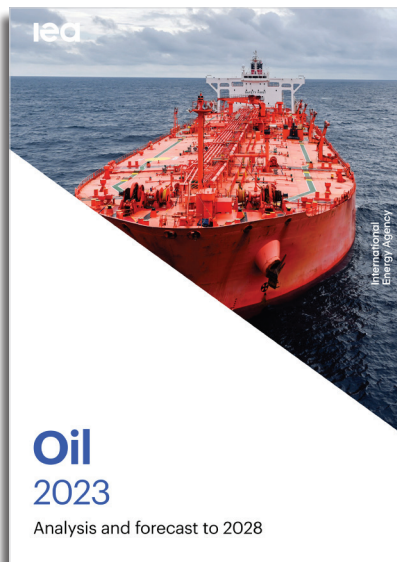
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## Climate Change 2023: Synthesis Report, Summary for Policy Makers, Intergovernmental Panel on Climate Change (IPCC)

This science-based analysis highlights the relevant impacts and risks of current climate mitigation and adaptation initiatives and examines the interrelations among ecosystems, climate and biodiversity.

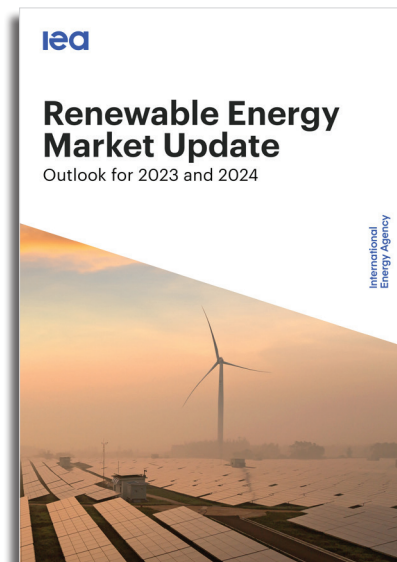
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## Oil 2023: Analysis and Forecast to 2028, International Energy Agency

The International Energy Agency's (IEA) medium-term outlook, Oil 2023, presents a comprehensive assessment of the evolving dynamics of oil supply and demand to 2028.

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## Renewable Energy Market Update: Outlook for 2023 and 2024, International Energy Agency

The IEA's Renewable Energy Market Update Outlook for 2023 and 2024 analyzes the most up-to-date information and data regarding the expansion of renewable power capacity worldwide and in major markets during 2022, with detailed forecasts for 2023 and 2024.

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## FOREWORD

Dear Esteemed Readers,

In the fast-paced world of business, we understand that your time is invaluable. The pursuit of staying at the forefront of energy and climate policy and industry trends and advancements, you may often find yourselves grappling with the challenge of consuming extensive research materials. This is precisely why we are excited to introduce to you the IICEC Energy & Climate Research Review (IICEC ECRR), a new and unique product meticulously curated to reflect highlights from different recent energy studies in the ever-evolving policy, industry, and business landscapes in energy and climate.

The reports in this series are selected considering their worldwide recognition, relevance, originality, diversity, and the impact of contribution to the current and future energy and climate agenda. More than just a research summary, IICEC ECRR intends to provide a profound distillation of the most significant findings of selected research in various aspects of global and regional energy and climate matters. The "Key Takeaways" not only distill the core findings but also spotlight insights for a more sustainable energy future. Through the ECRR, we hope you can extract the essence of comprehensive research in mere minutes, instead of investing hours in exhaustive reading.

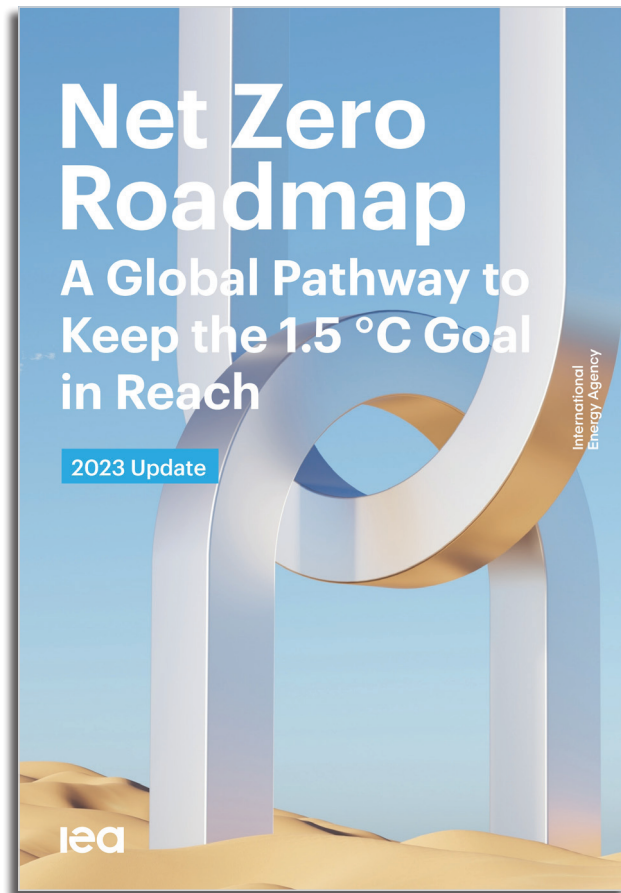
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Bora Şekip GÜRAY  
IICEC Director



Dr. Mehmet Doğan ÜÇÖK  
IICEC Coordinator



## Net Zero Roadmap: A Global Pathway to Keep the 1.5°C Goal in Reach, 2023 Update, International Energy Agency

The report provides a comprehensive update of the first Net Zero Emissions Scenario (NZE) by 2050, which was first launched in 2021. Reflecting on recent global and regional dynamics that are shaping energy supply, demand, and technologies, the NZE report shows a pathway for the global energy sector towards net-zero CO<sub>2</sub> emissions by 2050 in accordance with the 1.5°C goal, presenting critical recommendations to secure clean energy transitions with multiple energy, climate, and economic benefits.

### Key Takeaways:

#### Towards 2030: four areas can reduce more than 80% of emissions by 2030

The report emphasizes many recent achievements in scaling-up of clean energy technologies, notably solar photovoltaic (PV) power sources and electric vehicles (EVs), which are among the many progress areas since the 2021 report. It highlights that these two technologies are on track to help meet NZE objectives. In addition, the report focuses on four specific areas that can provide four-fifth of the emissions reductions required by 2030: growing renewables, enhancing energy efficiency, cutting methane emissions, and speeding up electrification. The key measures identified in the report are largely cost-effective and supported by technological progress and market uptake.

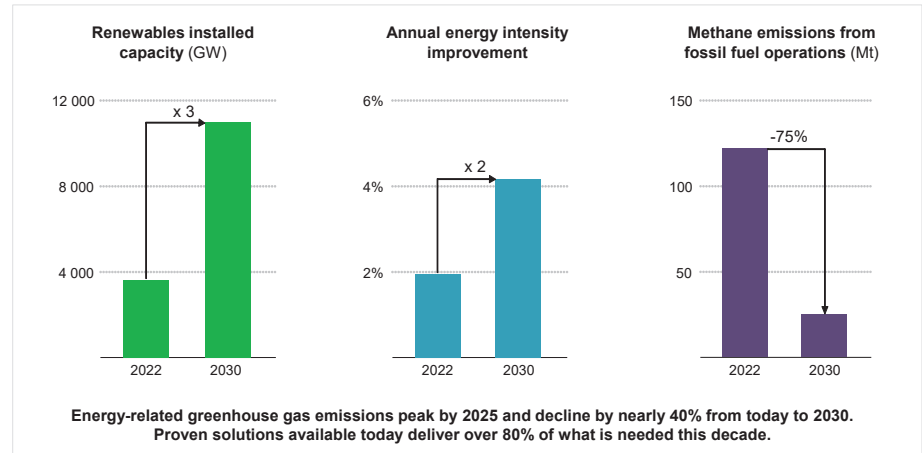
Tripling global installed renewables capacity provides the largest emissions reductions by 2030 in NZE. According to the report, wind power and solar PV will continue to play major roles due to their several advantages of having significant resource bases and unutilized potential, while improving cost-competitiveness can also enable faster and wider deployment of these two technologies. The report also sets forth a set of recommendations to accelerate capacity uptake, such as speeding up the permitting processes, expanding, modernizing, and increasing the flexibility of power grids, and addressing supply chain bottlenecks to enforce security.

Energy efficiency is the second largest contributor to emission reductions throughout 2030 in NZE. Doubling the energy intensity performance by 2030 to mitigate emissions, the report finds, can provide significant fuel saving and energy security benefits, which are equivalent to the current level of total oil demand in the global road transport. Three focus areas can realize these energy efficiency improvements: enhanced technical efficiency of the energy equipment base; fuel switching, especially to electricity where applicable; and efficient use of both energy and materials along the value chain.

Electrification trends are robust in the energy system due to the adaptation of conventional electricity applications and the growth in electric vehicles and heat pumps. EV sales are forecast to represent two-thirds of new car sales by 2030, while the growth in heat pump deployment is expected to accelerate, with an 11% increase in sales in 2022. Electrification provides a nearly 20% reduction in greenhouse gas (GHG) emissions by 2030, with a 75% reduction in methane emissions from fossil fuel operations.



We have the tools to go much faster



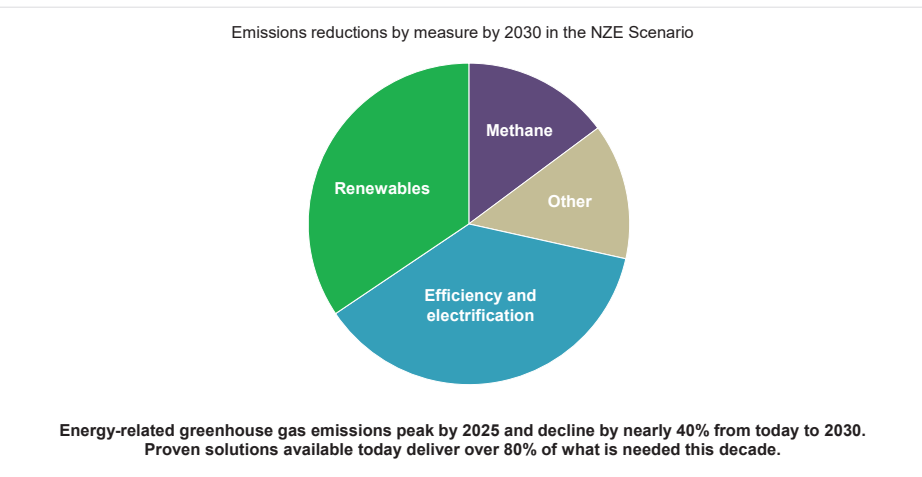
Peak of fossil fuel demand and energy-related GHG emissions before 2030

CO<sub>2</sub> emissions from the global energy sector reached a record high in 2022 at roughly 1% above the pre-Covid-19 levels. However, they are set to peak within this decade thanks mainly to a rapid expansion in the deployment of some clean energy technologies. The report shows that coal, oil, and natural gas demand will all peak before 2030 – even in the case in which no new climate policies are put forward – while energy-related GHG emissions will peak by 2025. However, it is importance to note that this trend alone is insufficient to bring the energy system on track with overall NZE objectives. Further progress is needed in new clean energy technologies, electrification, infrastructure, energy markets, and investments.

Beyond 2030: acceleration in new clean energy technologies

The report notes that about two-thirds of emission reductions by 2050 can be achieved with technologies that are presently on the market, a figure that is up from 56% in the 2021 report and that reveals major progress in technology development and commercialization over the past two years. Key in this regard is the recent momentum in clean energy innovation, and the report argues that research, development, and demonstration should be strengthened to realize the potential of next generation low-emissions technologies and their attendant infrastructure. In addition to many clean energy technologies on the market such as solar PV, EVs, and batteries, large amounts of low-emission fuels, carbon capture-related technologies, smarter energy networks, and upgraded infrastructure are also required.

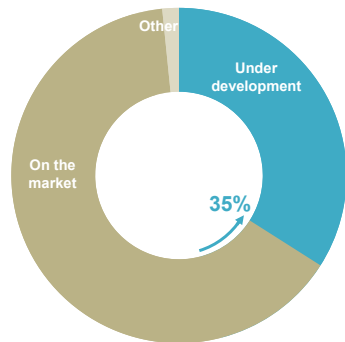
We have the tools to go much faster





### Innovation is already delivering new tools and lowering their costs iea

CO<sub>2</sub> emission reductions by technology maturity in 2050 in the NZE Scenario of 2023



Clean energy innovation has been accelerating in the last few years, yet more RD&D is needed to unlock the next generation of low-emissions technologies.

### Energy investment challenges and opportunities

Global clean energy investments are set to break a new record at USD 1.8 trillion in 2023, and clean energy investments will reach roughly USD 4.5 trillion annually by the early 2030s in NZE. Although this would pose certain challenges, clean energy investments prove economic over time by reducing fuel bills and supporting economic growth. The report demonstrates that both total energy sector investment and fuel bills are lower in NZE than at present in terms of their share of global GDP by 2050. However, emerging market and developing economies other than China require a seven-fold increase from now through the early 2030s in clean energy investment.

### “Electricity becomes the new oil”

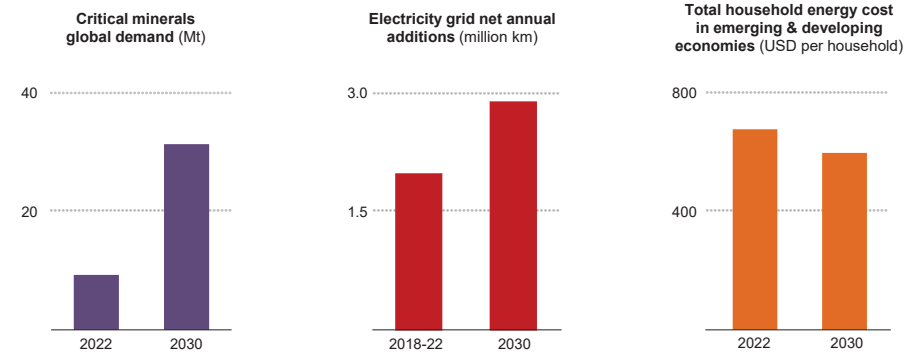
NZE shows a rapid electrification of the energy system through 2050, with electricity representing over 50% of global final energy consumption by 2050, up from around 20% at present. In this pathway, electricity-supply security will be among the key aims necessitating larger electricity system flexibility. Battery energy storage, demand response, and modernized and digitalized power grids support strong and secure electrification. The future energy system will also require more low-emissions and dispatchable power generation capacity, with power transmission and distribution grids needing to grow by roughly 2 million km per annum until 2030 to meet the objectives in NZE.

### Well-designed energy transitions: risk and opportunity management

The report presents how and why the NZE pathway transition must be both secure and affordable. Among the major challenges going forward is ensuring supply and demand balances for critical minerals. For example, the current level of announced projects for nickel and cobalt mining fell short of what is needed in NZE by 2030. New projects, more innovative mining solutions, and other measures such as more recycling and material-efficient designs are thus essential. There is also a high degree of geographical concentration in the mining and processing of critical minerals, which carries risks of supply disruptions due to geopolitics, extreme weather events, or industrial accidents. In this context, the report urges greater diversity, resilience, and openness in critical minerals supply chains.

Total household energy expenditure in emerging market and developing economies decreases by more than 10% by 2030 in NZE compared to current levels, which results from important energy and cost savings through higher electrification and energy efficiency. The report notes that policy measures should support low-income households due to the higher initial costs of clean energy technologies.

### Managing the risks and opportunities that arise in energy transitions iea



The pace of change required in the NZE Scenario represents an enormous undertaking in terms of ensuring energy security, ramping up infrastructure, and safeguarding energy affordability.



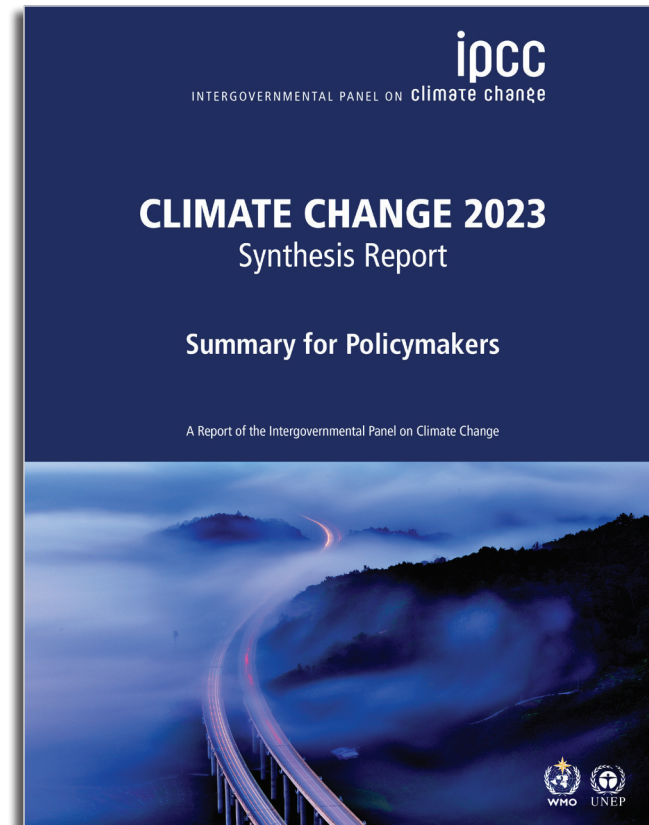


### A global, equitable, and differentiated pathway, with urgent, unified actions

The report shows that there is no “low international co-operation route” for limiting global warming at 1.5°C, underlining the importance of an equitable pathway that differentiates between advanced and developing economies. Advanced economies reach net-zero emissions by around 2045 in NZE, with China achieves net-zero emissions around 2050. Other emerging market and developing economies reach their targets well after 2050, as countries follow their own courses based on resources and circumstances.

Overall, the report details an energy sector that is changing quickly but that demands additional efforts, as there is little time to get the energy system on track to meet the net-zero pathway and 1.5°C objectives. If taken, a cleaner energy economy can offer improving economies, energy-security benefits, and industrial opportunities that are only possible with unified international efforts and collaboration to meet climate objectives.

Link to report: <https://www.iea.org/reports/net-zero-roadmap-a-global-pathway-to-keep-the-15-0c-goal-in-reach>



### Climate Change 2023: Synthesis Report, Summary for Policy Makers, Intergovernmental Panel on Climate Change (IPCC)

This science-based analysis highlights the relevant impacts and risks of current climate mitigation and adaptation initiatives and examines the interrelations among ecosystems, climate and biodiversity. Benefitting from a diverse set of knowledge that links climate science, climate change mitigation and adaptation matters, and sustainable development, the report once more confirms that GHG emissions from human activities have unequivocally caused global warming and argues that urgent action and a climate resilient development perspective is needed to address the widespread risks and secure a sustainable future for all.



### Key Takeaways:

#### Intensifying adverse impacts of climate change with multiple risks

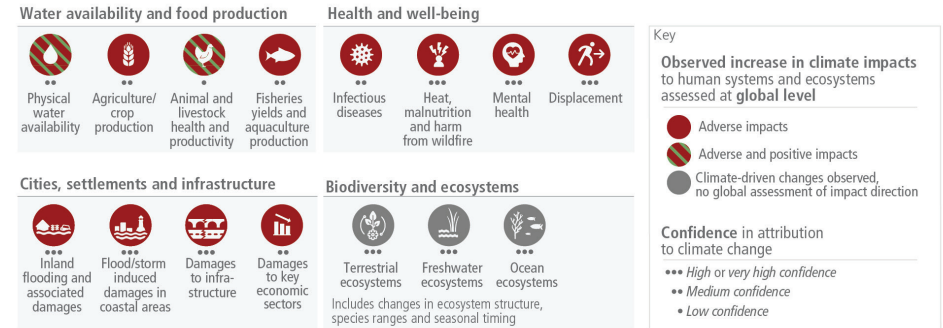
Human-induced activities have led to global warming of 1.1°C above global average temperatures from pre-industrial levels (1850–1900). The report illustrates that this change has increased both the intensity and frequency of extreme weather events, which poses a danger for human life and the planet and is widely observable across all regions in the world. This has already caused numerous, adverse impacts and losses and damage to nature and people (a high confidence conclusion of the report), as 3.3–3.6 billion people remain highly vulnerable to climate change impacts. Vulnerable regions and communities with the least historical contribution to the present current climate are disproportionately affected (high confidence), according to the report.

Each increment of global warming yields rapidly increasing hazards. For example, extreme events such as intense heatwaves, increased rainfall, and drought heighten human health risks. Climate-driven security risks in food and water are likewise anticipated to expand with increased warming. In addition to threatening water availability and food production, the damage to infrastructure and wider economic pain is clear, with urban settlements and biodiversity widely exposed to the escalating impacts of climate change.

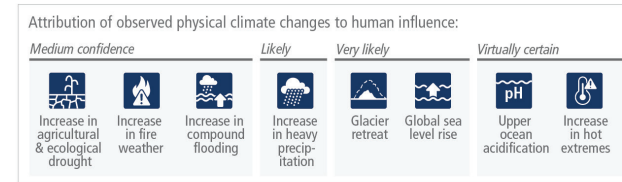
Heatwaves and droughts are also set to become more frequent (high confidence). The report also finds that current 1-in-100-year extreme sea level events are anticipated to take place at least annually in several regions by 2100 across all explored scenarios (high confidence). Increases in aridity and fire weather are also among the major risks (medium to high confidence). In addition, near and long-term exposure to climate hazards are increasing globally and linked to many socio-economic development trends such as migration, urbanization, and growing inequality.

### Adverse impacts from human-caused climate change will continue to intensify

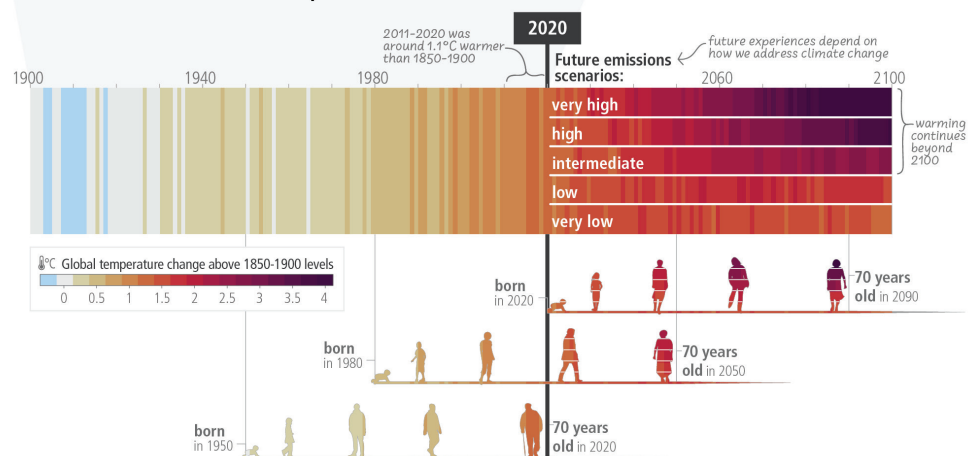
#### a) Observed widespread and substantial impacts and related losses and damages attributed to climate change



#### b) Impacts are driven by changes in multiple physical climate conditions, which are increasingly attributed to human influence

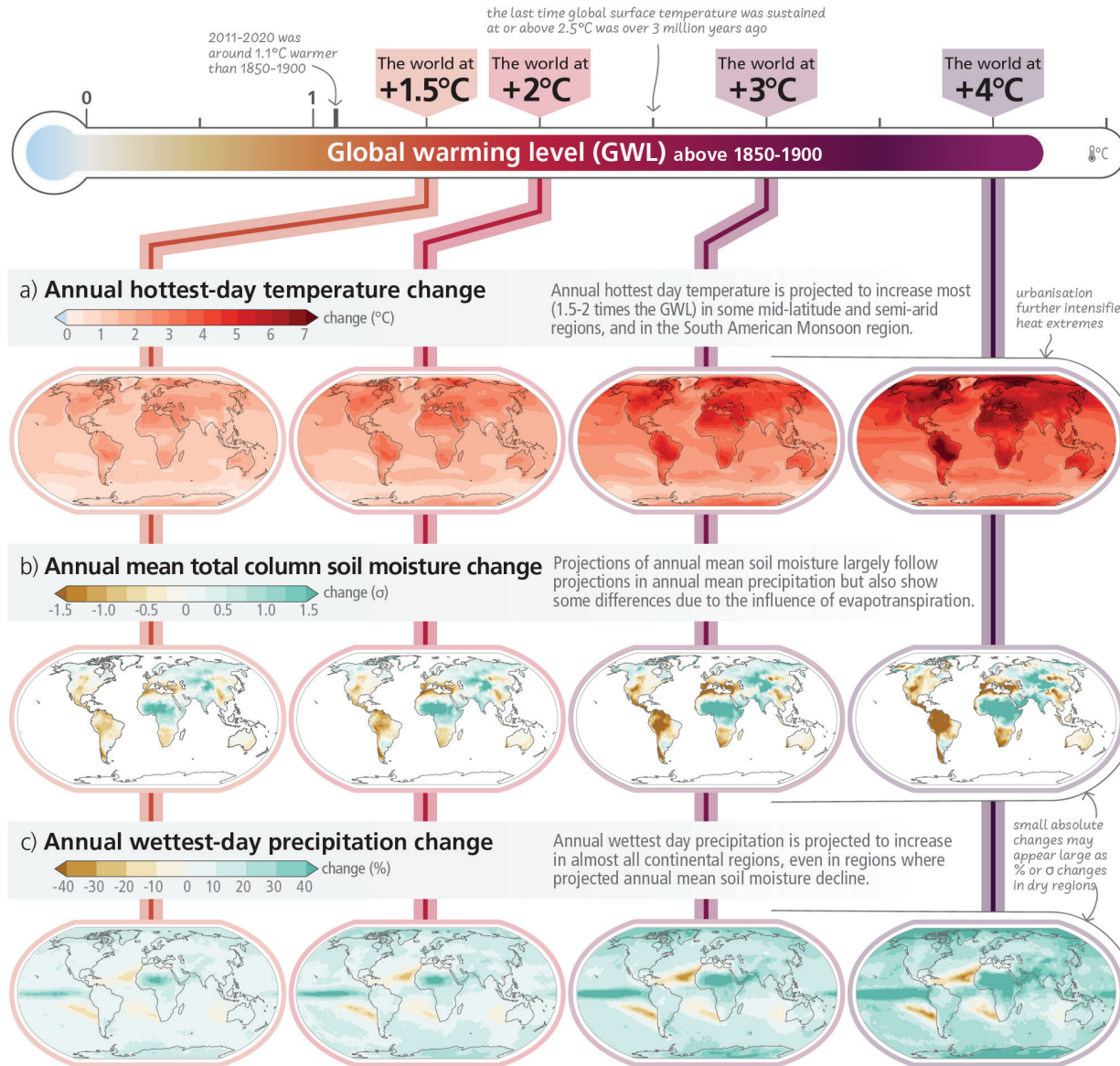


#### c) The extent to which current and future generations will experience a hotter and different world depends on choices now and in the near-term





### With every increment of global warming, regional changes in mean climate and extremes become more widespread and pronounced



### Today's choices will determine outcomes for current and future generations

The future will be driven by the decisions and actions taken today to address climate change, and the report provides future emission scenarios and their resulting increases in global warming, which vary depending on the pace and success of the measures to mitigate climate change. The modelled pathways that limit warming to 1.5°C (>50%) without or only a limited overshoot of this target and those that limit warming to 2°C (>67%) both require rapid, deep GHG emissions reductions across all sectors through 2030.

The report shows that global net-zero CO<sub>2</sub> emissions are in reach for these pathways, in the early 2050s for 1.5°C (>50%) and around the early 2070s for 2°C (>67%) (high confidence). Limiting global warming to 1.5°C necessitates a more rapid decline in GHG emissions across all sectors, but there are multiple options to limit GHG emissions, which are both available and feasible. However, accelerated action is needed to bridge the gaps between existing mitigation and adaptation and what is required.

### Climate resilient pathway with systems transition perspective needed

Climate resilient development is critical, which the report shows can be achieved by integration of mitigation and adaptation measures, along with many other benefits including health and air quality improvements and new job opportunities via wider and larger use of clean energy solutions and technologies. Increasing climate finance and investments, developing technologies, and fostering cooperation are ultimately essential to secure a more sustainable future.





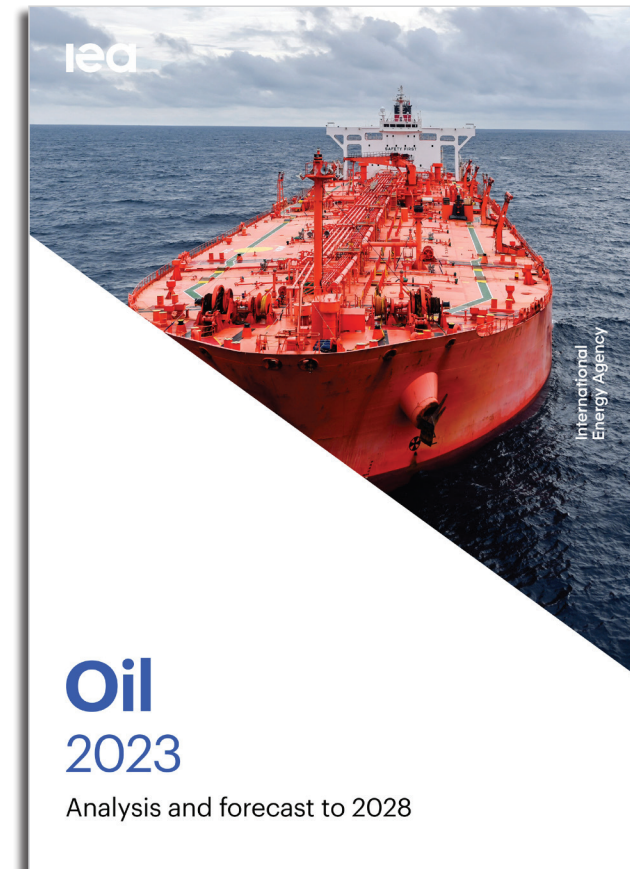
The report also details mitigation and adaptation options across different sectors. The systems transitions perspective includes development and deployment of low or zero-emission technologies, demand-related measures including infrastructure, and socio-cultural and behavioral changes. Technological efficiency simply must be enhanced and widely adopted, while climate-related services need to be enhanced and ecosystems should be protected and restored ecosystems (high confidence). Overall, the pace of the transformation should be enforced.

### Equity and climate justice enhance mitigation and climate resilience

Tackling climate change requires embracing a holistic perspective, and the report underlines that adaptation and mitigation efforts should prioritize equity, climate justice, inclusivity, and other relevant social dimensions. This approach can lead to a more sustainable future by supporting the required transformation and advancing climate-resilient development.

There are many options for reducing emissions-intensive consumption that do not hinder societal well-being, but these require technology, knowledge-sharing, capacity building, and cooperation. A critical conclusion from the report is that climate-resilient development can only advance if relevant actors work together in an equitable, just, and inclusive fashion towards equitable and just outcomes, and for a sustainable future for all (high confidence).

Link to report: <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>



## Oil 2023: Analysis and Forecast to 2028, International Energy Agency

The global energy crisis has once again elevated energy security to a prominent position on the international policy agenda and bolstered the momentum behind the adoption of clean energy technologies. Investments in clean energy are outpacing those in fossil fuels, playing a crucial role in bringing peak oil demand into sight. The International Energy Agency's (IEA) medium-term outlook, Oil 2023, presents a comprehensive assessment of the evolving dynamics of oil supply and demand to 2028. This report delves into the impact of governments' stronger commitment to a low-emissions future and of shifts in consumer behavior on the fundamental aspects



of the oil market in the coming years. Oil 2023 also enumerates several challenges and uncertainties that lie ahead, including investments in upstream activities, sources of new supply growth, available production capacity, and changing patterns of oil demand. Furthermore, it provides valuable insights into how these shifting dynamics will influence refining operations and trade flows.

### **Key Takeaways:**

#### **Global oil markets have undergone significant reset**

Global oil markets are readjusting gradually, following three tumultuous years that were marked by the disruptive effects of the Covid-19 pandemic and Russia's invasion of Ukraine. The report notes that the benchmark crude oil prices have returned to levels below those seen before the conflict and the previously record-breaking levels for refined product cracks have now subsided. This shift can be attributed to growing supplies aligning with a notable deceleration in oil-demand growth across advanced economies.

The report also outlines how, although the market may experience notable tightening in the coming months due to OPEC+ production cuts mitigating the increase in global oil supplies, the outlook becomes more favorable throughout the forecast period to 2028. Russia's invasion of Ukraine triggered a surge in oil prices and highlighted concerns regarding the security of supply, thereby speeding up the adoption of clean energy technologies. Simultaneously, investments in upstream activities are projected to reach their highest levels since 2015 in 2023.

In the medium term, the balancing of crude oil and product markets will be significantly influenced by several factors presented in the report, which include uncertain global economic conditions, the decisions made by OPEC+, and the policy for industrial refining in China. These factors hold substantial importance in determining the stability and equilibrium of oil markets.

#### **Energy crisis has expedited shift away from oil**

Based on current policy frameworks, the forecast for global oil demand growth indicates a significant slowdown during the period from 2022 to 2028, driven by the progress of the energy transition. Although an eventual peak in oil demand is anticipated, continued expansion in petrochemical feedstock and air travel sustains

overall consumption throughout the period. Projections estimate that global oil demand will reach 105.7 million barrels per day (mb/d) by 2028, representing an increase of 5.9 mb/d compared to 2022 levels.

A crucial finding of the report is that the demand for oil from combustible fossil fuels (excluding biofuels, petrochemical feedstocks, and non-energy use) is projected to peak at 81.6 mb/d in 2028, the final year of the report's forecast. This milestone signifies a momentous shift towards lower-emission energy sources. The deceleration in demand has been accelerated by Russia's invasion of Ukraine, which raised concerns about energy security. Additionally, governments' post-Covid recovery strategies, which involve allocating over USD 2 trillion towards clean energy investments by 2030, play a key role in expediting this transition.

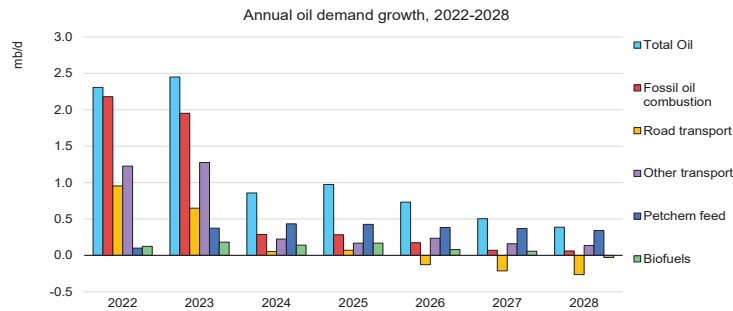
Meanwhile, the growth trajectory for gasoline is expected to reverse after 2023, while the same reversal is forecasted for transport fuels overall after 2026. These trends are attributed to a switch towards lower-emission energy sources triggered by the global energy crisis. Moreover, policies emphasizing improvements in energy efficiency and the rapid surge in EV sales contribute to this transformative shift in oil-consumption patterns. The reports underlines that the implementation of supplementary policy measures and behavioral shifts would be necessary to achieve an earlier decline in total oil demand in alignment with the IEA's Net Zero Emissions by 2050 Scenario (NZE).

#### **Global oil reaching significant peak milestones**

The momentum of global oil demand is projected to fall during the forecast period from 2022 to 2028, reflecting the accelerating pace of the energy transition and the imminent approach of an overall peak. Annual growth in oil demand will slow from 2.4 mb/d in 2023 to 400 kb/d in 2028.



### Global energy crisis accelerates transition away from oil



Growth in oil demand will slow from 2.4 mb/d in 2023 to 400 kb/d in 2028. Fossil fuel combustion peaks in 2028 on rising efficiencies and EV sales. Petrochemical feedstocks continue to increase.



Source: IEA, Oil 2023, Note: Fossil oil combustion is total demand minus feedstock use, other non-energy uses and biofuels consumed.

The forecasted peak of oil demand for combustible fossil fuels signals the peak of post-pandemic gasoline consumption by 2023, of road transport by 2025, and of total transport by 2026. Notably, economies such as China and India are anticipated to sustain growth throughout the forecast period. Conversely, the OECD in aggregate may reach its peak this year, exemplifying the significant impact of advancing vehicle efficiencies and the shift towards electrification.

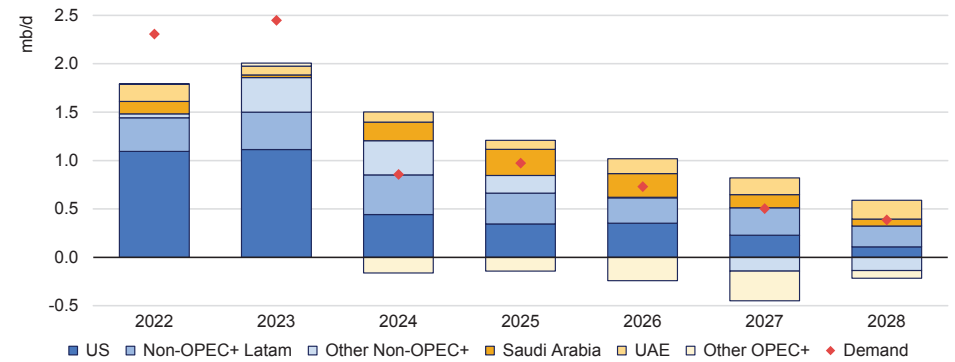
### The supply side: energy transition leads to gradual easing of global oil production capacity building

Over the medium term, the expansion of global oil production capacity, primarily led by the United States and other producers in the Western Hemisphere, is expected to gradually moderate. However, the increase in capacity still aligns with the slower pace of projected demand growth throughout the forecast period from 2023 to 2028. The world's total supply capacity is forecasted to rise by 5.9 mb/d to reach 111 mb/d by 2028.

Nevertheless, a noticeable slowdown in capacity additions in the United States contributes to an overall easing of global capacity growth, with an average annual increase of 1.9 mb/d in 2022-2023 declining to just 300 kb/d by the end of the forecast period.

The widespread deceleration in production-capacity expansion primarily reflects the global shift towards cleaner energy sources and a corresponding weaker outlook for oil demand.

### Global oil supply capacity and demand forecast, year-on-year change, 2022-2028

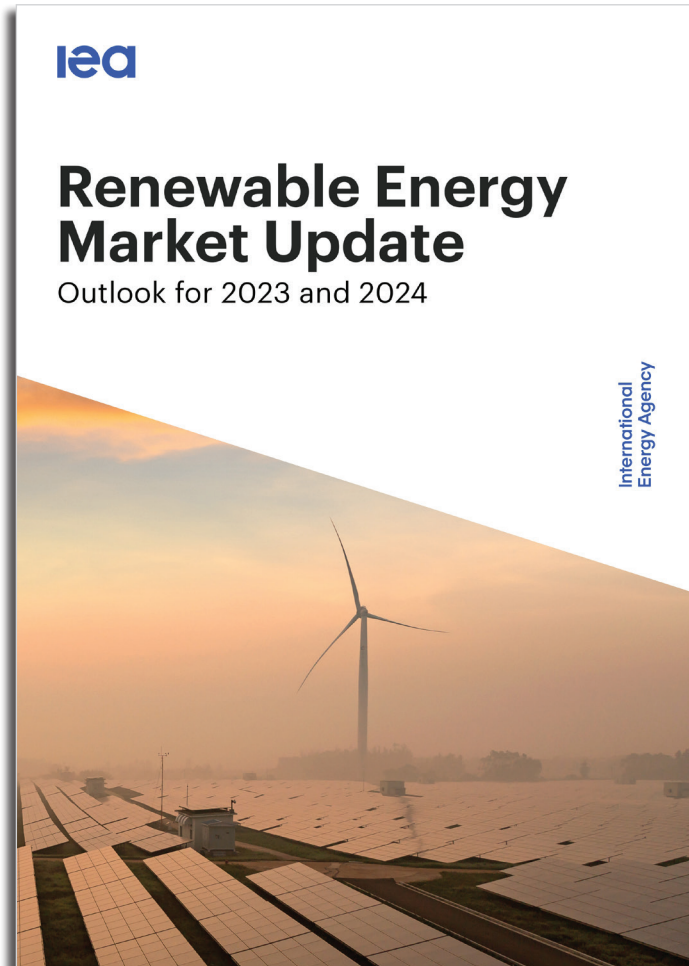


Source: IEA, Oil 2023, Note: Assumes Iran and Russia remain under sanctions.

Medium-term capacity-expansion plans are primarily driven by non-OPEC+ producers, accounting for a substantial 86% of the total increase, equivalent to a net supply boost of 5.1 mb/d. The United States plays a significant role, contributing to half of the non-OPEC+ growth, while Latin American countries such as Brazil and Guyana add an additional 1.9 mb/d to the region's capacity. Saudi Arabia and the UAE lead capacity building in OPEC+.

The report notes that the prospects for Russia's oil capacity growth face uncertainties due to the prevailing geopolitical situation. Sanctions imposed on Russia may restrict its export capabilities, leading to a decline in capacity as some production is forced to be shut in. Additionally, in the long run, the departure of Western companies following Russia's invasion of Ukraine could impede capacity growth due to project delays caused by a shortage of technology and equipment.

Link to report: <https://www.iea.org/reports/oil-2023>



## Renewable Energy Market Update: Outlook for 2023 and 2024, International Energy Agency

The IEA's Renewable Energy Market Update Outlook for 2023 and 2024 analyzes the most up-to-date information and data regarding the expansion of renewable power capacity worldwide and in major markets during 2022, with detailed forecasts for 2023 and 2024.

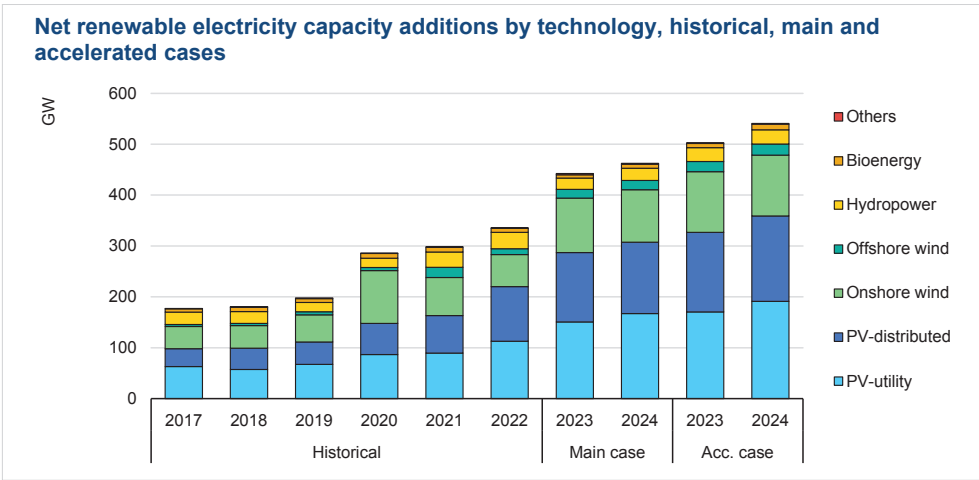
The update examines crucial topics, such as the impact of the energy crisis on renewable energy deployment in the EU, its influence on energy affordability, and the latest trends in the major economies such as the United States, China, and India. Additionally, the report investigates the implications of significant developments in solar, wind, and biofuel technologies, encompassing market dynamics, financing, energy security priorities, manufacturing, and power system integration. The report offers the most recent evaluation by the IEA regarding the status of renewable energy markets, following the release of its Renewables 2022 report, providing forecasts for new global renewable power capacity additions and biofuel demand in 2023 and 2024 and examining key uncertainties and policy-related implications that could influence projections for 2024 and beyond.

### Key Takeaways:

#### **Renewable power capacity led by solar PV experiencing rapid growth, propelled by the global energy crisis and strong policy support**

According to the report, global renewable capacity is projected to increase by 107 GW in 2023, reaching a total of over 440 GW ("Main Case" shown in the chart below). This represents the largest absolute increase ever recorded and is more than the combined power capacity of Germany and Spain. The growth in renewable capacity is driven by several factors, including expanding policy support, growing concerns about energy security, and improved competitiveness with fossil fuel alternatives. In the "Accelerated Case," there is a potential for renewable capacity additions to exceed 500 GW, representing a nearly 15% increase compared to the Main Case. Notably, the largest contributing factor to this growth is the significant uptake of the distributed solar PV.





Source: IEA Renewable Energy Market Update Outlook for 2023 and 2024

### Solar PV capacity accounts for two-thirds of projected increase in global renewable capacity in 2023

Many countries, particularly in Europe, are actively seeking alternatives to imported fossil fuels to improve energy security because of the global energy crisis and higher electricity prices. This shift has created a favorable environment for solar PV installations, especially in residential and commercial systems. The reports shows that these smaller distributed PV applications are expected to make up half of overall deployment in 2023. In fact, their deployment alone worldwide is higher than the total deployment of onshore wind over the same period.

### Onshore wind capacity set to rebound in 2023

After two years of decline, the report foresees onshore wind capacity additions to rebound by 70% in 2023, reaching a record amount of 107 GW. This increase is mainly attributed to the commissioning of delayed projects in China following the Covid-19 restrictions implemented in 2022. Additionally, supply chain challenges that have pushed project commissioning from 2022 to 2023 in Europe and the United States result in faster expansion within 2023. However, offshore wind growth is expected to be more limited compared to solar PV due to the lack of active projects outside of China.

### Overall growth in renewables-based power capacity in 2023 and 2024

Overall, the renewable energy sector is experiencing significant growth in 2023, with solar PV and onshore wind leading the way. This growth is attributed to various factors, such as policy support, energy security concerns, and improved competitiveness. At the end of 2024, cumulative world renewable capacity is forecast to reach over 4500 GW, supported by global renewable capacity additions in 2024, which are expected to reach 550 GW. This increase is primarily attributed to the accelerated deployment of residential and commercial PV installations, with faster deployment being driven by more favorable policies and incentives, which encourage the implementation of renewable energy projects.

### Europe places renewables at forefront of strategy to tackle energy crisis

The energy crisis in Europe caused by Russia's invasion of Ukraine has prompted the EU to take urgent action to reduce its dependence on Russian natural gas imports. As a response, the EU has significantly increased its forecast for renewable capacity additions in 2023 and 2024 to 40%. The report highlights that the rapid growth in distributed solar PV is the main reason for this increase, accounting for nearly three-quarters of the forecast revisions. High electricity prices and increasing policy support in key EU markets such as Germany, Italy, and the Netherlands are driving the growth.

### China set to outstrip world in renewable capacity installations in 2023 and 2024, solidifying position as frontrunner in global renewable energy expansion

China is projected to lead the world in renewable capacity additions in both 2023 and 2024. The country already accounted for nearly half of all new renewable power capacity worldwide in 2022. By 2024, China's share is expected to expand to a record-breaking 55% of global annual renewable capacity deployment, which translated into almost 70% of all new global additions of offshore wind, 60% of onshore wind, and 50% of solar PV.

In contrast, the United States is predicted to rebound from a challenging year in 2022, with wind and solar capacity additions increasing by approximately 40% in 2023. This growth is supported by existing tax incentives and anticipated benefits from the Inflation Reduction Act, which will provide long-term certainty for renewable energy projects until 2032. India's renewable capacity additions are also expected to rise in 2023 and 2024, primarily due to the accelerated deployment of onshore wind, hydropower, and distributed solar PV.



### Wind and solar PV increasingly competitive, but policies must adapt to evolving market conditions

The competitiveness of wind and solar PV has improved, making them the most cost-effective options for new electricity generation in most countries. It is projected that the costs of generating electricity from onshore wind and solar PV will decline by 2024, although they will likely remain 10-15% higher than pre-Covid levels in most markets outside of China. Additionally, future power contracts indicate wholesale power prices that are two to three times higher than 2020 averages. In comparison, wind and solar PV plants can offer electricity at prices 30-50% lower than those of future power contracts in most key markets, further increasing the attractiveness of renewables for investors.

Despite the positive outlook for renewable energy, policy uncertainties and volatile prices left a portion of renewable energy auction volumes unallocated in 2022. The report emphasizes the need for government auction designs that consider factors such as inflation, interest rate increases, and turbulence in commodity prices.

The report also notes that the financial health of the renewable energy value chain is critical for the industry's sustainable growth. While the industry has shown overall financial resilience, challenges from volatile commodity prices, higher interest rates, supply chain constraints, and trade measures remain. Overall, there is significant variation across sectors and countries.

### Global solar PV manufacturing capacity expected to reach approximately 1,000 GW by 2024, a significant milestone to meet the annual demand outlined in IEA Net Zero Emissions by 2050 Scenario

The global manufacturing capacity of solar PV is expected to reach nearly 1,000 GW in 2024, which is sufficient to meet the annual demand in the International Energy Agency's Net Zero Emissions (NZE) by 2050 Scenario. However, wind equipment manufacturing is expanding more slowly and may struggle to keep up with the growth in demand by 2030. While China will maintain its dominance in global PV manufacturing capacity, announcements of solar PV manufacturing projects in the United States and India signal the diversification of relevant supply chains in the medium term.

Link to report: <https://www.iea.org/reports/renewable-energy-market-update-june-2023>

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