International Energy Agency

A GLOBAL ENERGY STRATEGY TO MEET THE PARIS AGREEMENT GOALS

Meeting long-term climate objectives including the Paris Agreement means changing the way we produce and use energy. It will require a greater emphasis on energy efficiency and innovation, speeding up the deployment of low-carbon technologies, like solar photovoltaics (PV) and wind, accelerating the development of carbon capture, utilisation and storage (CCUS), and hydrogen.

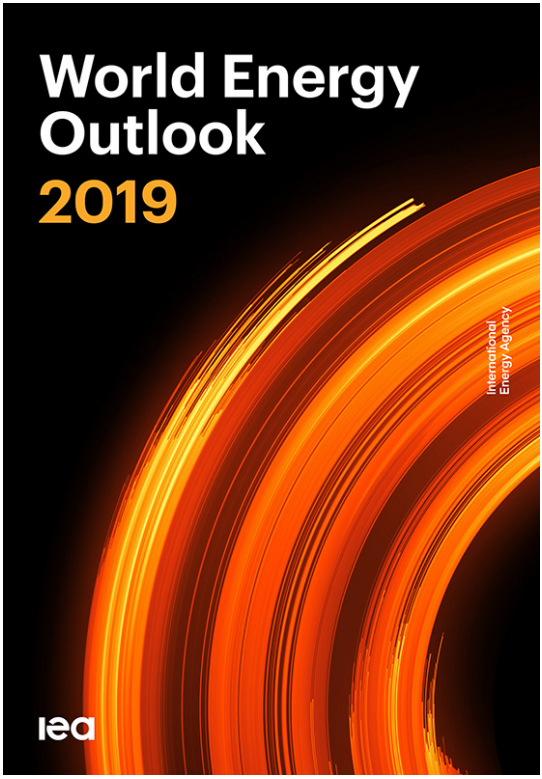
The International Energy Agency provides cutting-edge data, rigorous analysis and real-world solutions to support governments, industry and key stakeholders in meeting their sustainable goals. Our work spans the full spectrum of energy policies and technologies that will play a role in global clean energy transitions.

Defining a pathway to meet global climate and sustainability goals

With the Sustainable Development Scenario, the IEA describes a pathway that enables the world to meet climate, energy access and air quality goals, and which is fully compliant with the Paris Agreement, while maintaining a strong focus on the reliability and affordability of energy for a growing global population. That pathway would require rapid and widespread changes across all parts of the energy system. And, as ever, decisions made by governments remain critical.

"The world urgently needs to put a laser-like focus on bringing down global emissions. **This calls for a grand coalition encompassing governments, investors, companies and everyone else who is committed to tackling climate change.** Our Sustainable Development Scenario is tailor-made to help guide the members of such a coalition in their efforts to address the massive climate challenge that faces us all."

- Dr Fatih Birol, IEA Executive Director

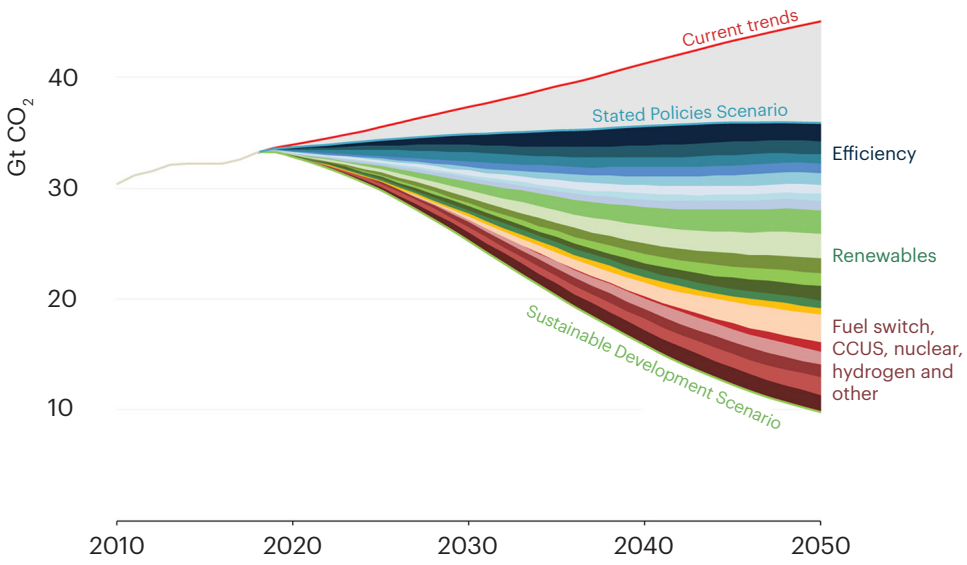


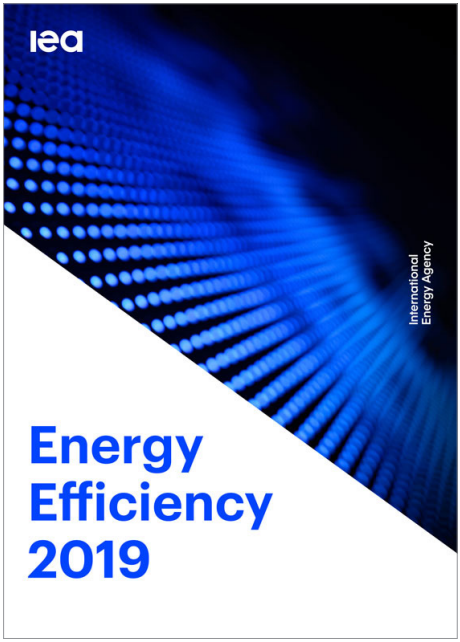
To achieve the Paris Agreement goals, energy-related CO_2 emissions need to decline steeply

Driven by higher energy demand, global energy-related CO_2 emissions rose 1.7% in 2018 to a historic high of 33.1 Gt. These emissions will continue rise unless governments change course.

The world's current trends point to growing CO_2 emissions. The IEA Stated Policies Scenario (STEPS), based on current policies and plans, including the first round of Nationally Determined Contributions, also shows that emissions grow to 2050. Our Sustainable Development Scenario (SDS) describes an integrated pathway for the global energy sector to meet the Paris Agreement goals, while also achieving universal energy access and substantially reducing air pollution. In the SDS, **there is no single or simple solution to transforming global energy systems:** while efficiency and renewables account for the bulk of abatement, a host of other technologies are also needed, including fuel switching, nuclear, CCUS and hydrogen.

Energy-related CO_2 emissions and reductions in the Sustainable Development Scenario by source.





Energy efficiency lowered emissions, but 2019 saw the lowest efficiency improvements in the past decade

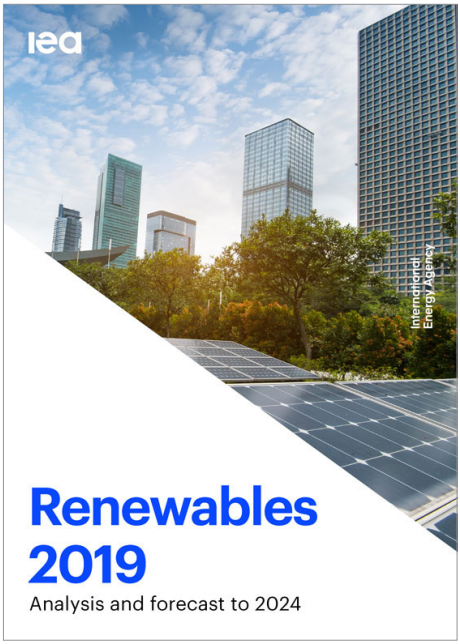
While efficiency accounts for the highest share of cumulative emissions reductions needed in the SDS, it is not currently on track to meet these objectives. Intensity improvement slowed down from nearly 3% in 2015 to **1.2% in 2018**. Reversing this trend and improving energy intensity is possible with cost-effective energy efficiency measures.

[See more in Energy Efficiency 2019]

Renewable power capacity additions — expected to increase in 2019 at their fastest pace in four years — but still not fast enough

After stalling in 2018 for the first time in almost two decades, additions are set to **rise by 12% in 2019.** This renewed growth is driven by solar PV. However, renewable electricity growth, which is not keeping up with increased demand, still needs to accelerate significantly to meet long-term sustainable energy goals.

[See more in Renewables 2019]



Offshore wind offers a vast untapped potential

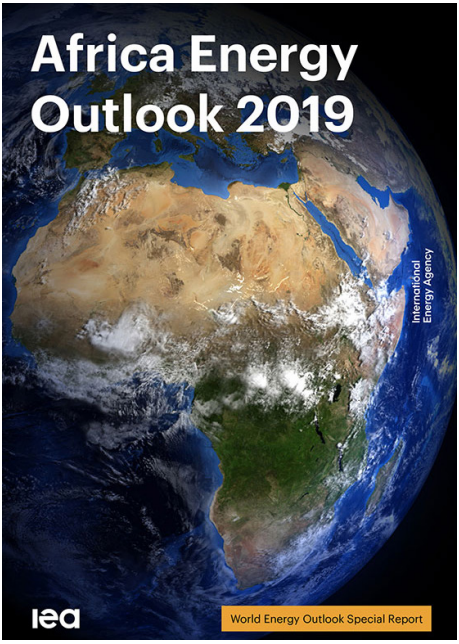
Offshore wind currently provides a small fraction of the globe's power, but our analysis shows that it has the potential to generate **more than 420 000 TWh** per year. This is more than the total amount of electricity consumed worldwide today. Steep cost reductions, supportive government policies and remarkable technological progress would make this possible.

[See Offshore Wind Outlook 2019]

Africa's energy demand can be driven by using renewables

How Africa meets its growing energy needs is crucial for the continent's economic and energy future. **Africa has the richest solar resources in the world**, but has installed only 5 gigawatts (GW) of solar PV today, less than 1% of the global installed capacity. The continent's vast renewables resources and falling technology costs can drive double-digit growth in deployment of utility-scale and distributed PVs, and other renewables. With 40% of global gas discoveries this decade, Africa is also poised to become the third-largest source of natural gas demand growth.

[See Africa Energy Outlook 2019]



Clean energy technologies must be deployed faster to reach the Paris Agreement goals

IEA's Tracking Clean Energy Progress (TCEP) assesses the status of 45 critical energy technologies and sectors each year, against whether they are "on track" to be deployed in-line with the Sustainable Development Scenario. Only seven clean energy technologies are on track with the SDS in 2019: solar PV, bioenergy, electric vehicles (EVs), rail, lighting, data centres and networks and energy storage.
[See Tracking Clean Energy Progress].

Which clean energy technologies are on track?

7
clean energy technologies are on track

...such as solar PV and EVs (or energy storage)

22
clean energy technologies need improvement

...such as nuclear power, chemicals and cooling (or hydrogen, trucks)

16
clean energy technologies are off track

...such as fuel economy and CCUS (or heating, transport biofuels)

Explore in detail: iea.org/tcep

We must tackle important innovation gaps for the full suite of clean energy technologies to be available

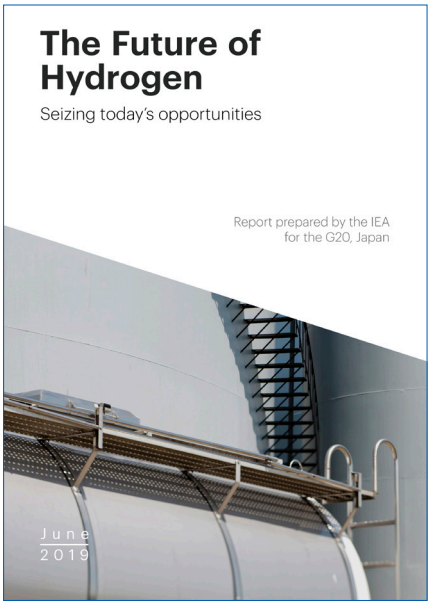
The IEA **Innovation Gaps framework** identifies key long-term technology challenges for research, development and demonstration that need to be filled in order to meet long-term clean energy transition goals. The framework highlights around 100 innovation gaps across key technologies and sectors.

CCUS is a critical clean energy technology that needs significant scaling up

In the SDS, carbon capture, utilisation and storage (CCUS) accounts for **over 8% of the cumulative emissions reductions** needed globally to 2050, and may be critical in hard-to-decarbonise industrial sectors. This implies a rapid scale-up of CCUS deployment, with a 20-fold increase in the annual rate of CO_2 capture from power and industrial facilities in the next decade.

Hydrogen is already an integral part of the modern refining and chemicals industry but can do much more

It is light, storable, energy-dense, and produces no direct emissions of pollutants or greenhouse gases. For hydrogen to make a significant contribution to clean energy transitions, however, it needs to be adopted in sectors where it is almost completely absent, such as transport, buildings and power generation. In a report prepared for the G20 meeting in Japan, the IEA provides an extensive and independent survey of where hydrogen stands now, and how it can help achieve a clean, secure and affordable energy future. [See The Future of Hydrogen]



CLIMATE CHANGE IS A GLOBAL CHALLENGE, AND A KEY PRIORITY FOR THE IEA

The IEA data, analysis and solutions provide support and guidance for countries on their energy transition pathways.

1. The IEA can help countries understand the global state-of-play, opportunities and challenges in the energy space, thanks to our multifaceted resources, including leading statistics, tracking indicators, energy investments, CO_2 status report, and methane tracker.

2. The IEA can help frame efforts in the context of sustainable energy pathways, through the World Energy Outlook, the Africa Energy Outlook, or the Southeast Asia Outlook.

3. The IEA can help guide and support countries to develop and implement policies for a sustainable energy pathway: including for decarbonising electricity, boosting innovation, tackling difficult sectors such as cooling and chemicals, developing integrated policies, or improving energy access without compromising energy security or climate goals.

THE IEA AT COP25

As an autonomous intergovernmental organisation, the IEA is an admitted observer to the UNFCCC negotiations at COP25. At the heart of global dialogue on energy, the IEA builds strong working relationships with its 30 member countries, 8 Association countries and beyond. The IEA contributes directly to the climate negotiations on the Paris Agreement rulebook and implementation guidelines, jointly with the OECD.

At COP25, the IEA will share its insights and expertise in support of countries' acting to implement their nationally determined contributions and working to meet the long-term objectives of the Paris Agreement.

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For more on what we have planned at COP25, please visit: **iea.org/cop25**