

CLIMATE ACTION PATHWAY

ENERGY

Executive Summary

November 2019

Vision statement

It is 2050 and energy systems worldwide have been decarbonized thanks to a range of innovative solutions and policy choices that set us on the pathway decades earlier. Institutional, legal and regulatory frameworks have been put in place to continue driving decarbonization of all energy sectors, including electricity, transport, heating and cooling.

The energy we use is primarily electric and at least 80 percent of our electricity is being generated from renewable energy sources. Energy intensity has been dramatically reduced. The energy infrastructure now in place is more resilient to the increasingly dramatic impacts of climate change than the heavily centralized fossil- and nuclear-fueled systems of the past. The global energy system has been democratized, with the participation of millions of people who produce, trade and consume energy in market structures that are fit for purpose.

There is also universal access to energy services, enabled by affordable, reliable, sustainable and modern energy sources. While the early phases of the transition were somewhat tumultuous, ultimately a fair and just transition was achieved. Societies are thriving as a result.

The future beyond 2050 looks bright, despite the challenges of our changing climate. The global energy system is low-carbon, resilient and efficient, providing the necessary services for further economic development in service to inclusive societies.



Milestones towards 2050



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|--|---|--|
| <ul style="list-style-type: none"> • Global emissions peak. • Long-term plans in place. • Stable policy for long-term investment in place. • Infrastructure investment shifts toward resilient systems. • Accelerated investment in innovation for end-use decarbonisation. | <ul style="list-style-type: none"> • Low-carbon infrastructure in place. • Markets adapted to new technologies and trends. • Achievement of SDG7: universal access to energy, increased renewable energy and energy efficiency. • Plans for 2050 compliant with 1.5C direction. | <ul style="list-style-type: none"> • Transition to low-carbon climate-resilient energy infrastructure is completed. • Energy system innovation continues to maintain resilience, security and efficiency of services |
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Facts & figures

Figure 1.

Renewable energy and total primary energy supply (TPES) in different scenarios in 2040 and 2050

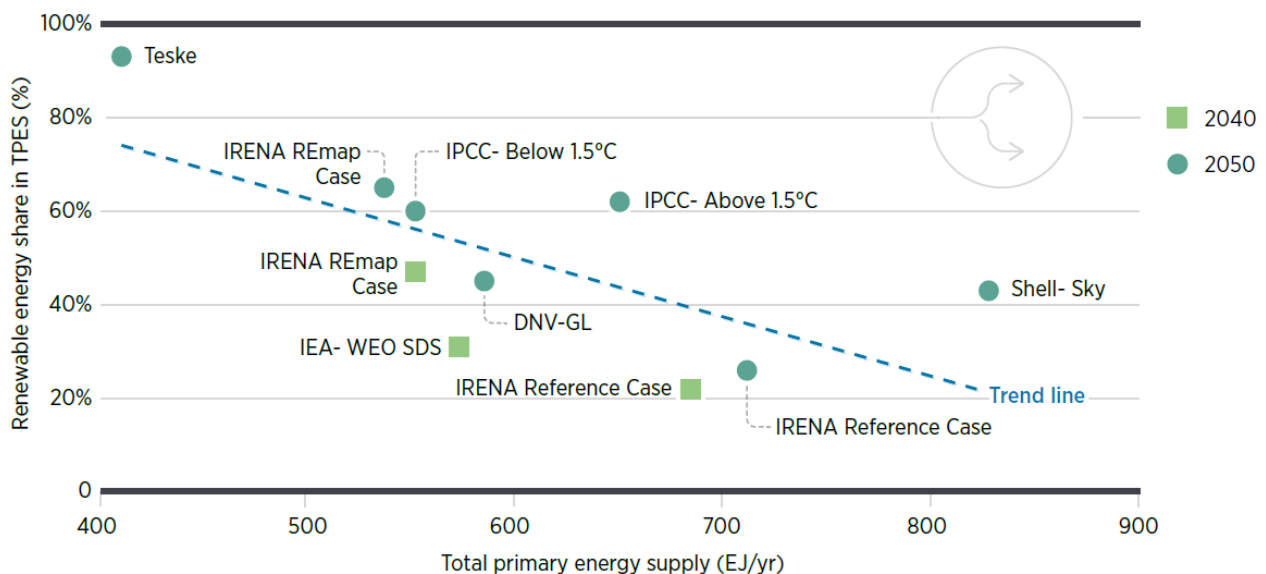




Figure 2.

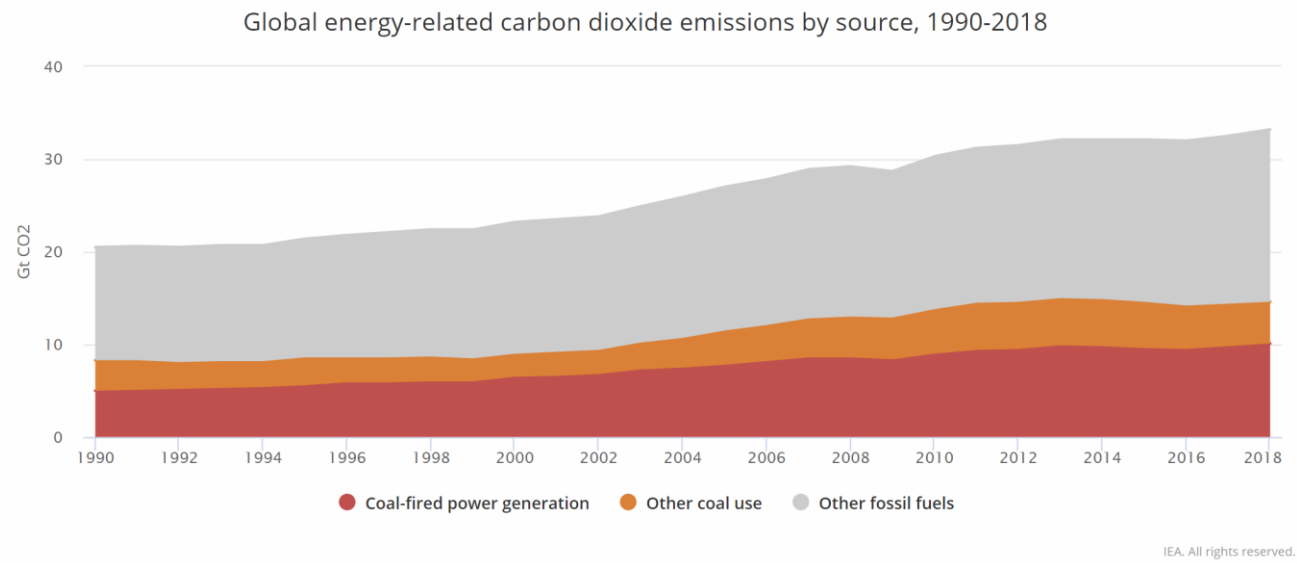
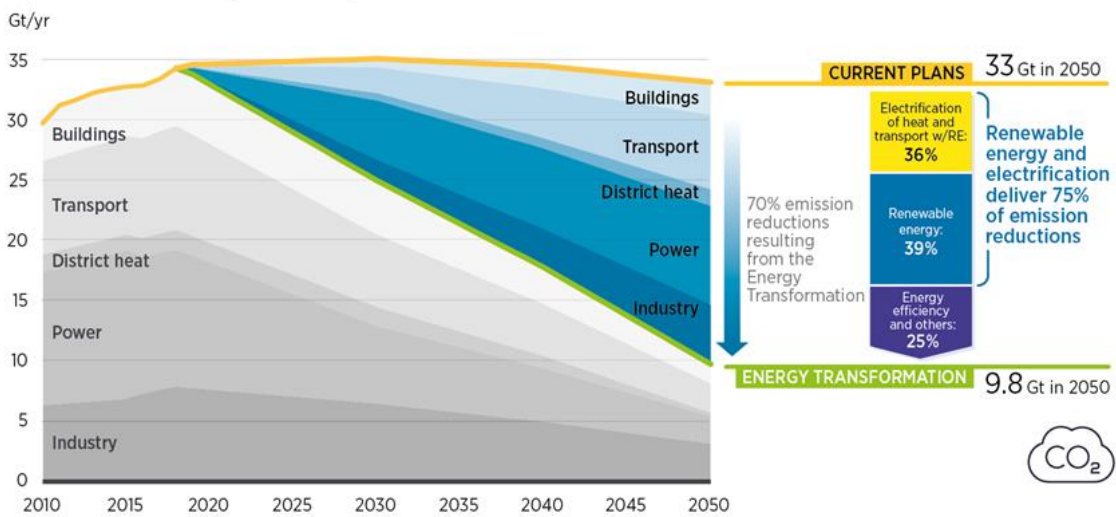


Figure 3.

Figure 1.1: Annual energy-related CO₂ emissions and reductions, 2010-2050



Globally, only about 42% of countries that have pledged to reduce emissions in Paris have carried out long-term low carbon transport emission modeling. These countries account for 85% of transport CO₂ emissions, and thus implementation of low carbon transport measures in these countries holds significant mitigation potential.

Progress

- The global population without access to electricity decreased from 1.2 billion in 2010 to about 840 million in 2017.¹
- The share of renewables in total generation capacity increased from 22 per cent in 2012 to 33 per cent in 2018.²
- By taking a range of cost-effective energy efficiency opportunities widely available today, energy intensity would improve by around 3 per cent per year between now and 2040.³
- Renewable energy, coupled with energy efficiency, can provide 90 per cent of the carbon emission reductions needed by 2050.⁴
- While significant financing gaps remain in achieving universal electricity access, there is a slightly positive trend, with finance for electricity increasing in 2017.⁵
- In 2018, renewable energy sector jobs reached 11 million compared to 10.3 million in 2017.⁶
- In 2019, through the [Annual Disclosure](#), states and regions reported over 100 targets for renewable energy and energy efficiency. 12 states and regions have targets of achieving 100% renewable electricity or energy by 2050 or earlier. Seven states and regions have reported that 100% of their electricity is generated from renewable sources region-wide.

¹ IEA, IRENA, UNSD, WB, WHO, Tracking SDG 7: The Energy Progress Report 2019, Washington DC 2019, <https://trackingsdg7.esmap.org/data/files/download-documents/2019-Tracking%20SDG7-Full%20Report.pdf>.

² International Renewable Energy Agency, *Renewable Energy Capacity Statistics 2019*, International Renewable Energy Agency, Abu Dhabi 2019, <https://www.irena.org/publications/2019/Mar/Renewable-Capacity-Statistics-2019>.

³ International Energy Agency, *Energy Efficiency*, <https://www.iea.org/topics/energyefficiency/>.

⁴ International Renewable Energy Agency, *Global energy transformation: A roadmap to 2050* (2019 edition), International Renewable Energy Agency, Abu Dhabi 2019, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Apr/IRENA_Global_Energy_Transformation_2019.pdf.

⁵ Sustainable Energy for All (SEforALL), *Energizing Finance Report 2019* (forthcoming).

⁶ International Renewable Energy Agency, *Renewable Energy and Jobs - Annual Review 2019*, International Renewable Energy Agency, Abu Dhabi 2019, <https://www.irena.org/publications/2019/Jun/Renewable-Energy-and-Jobs-Annual-Review-2019>.

⁷ The Climate Group's Global States and Regions Annual Disclosure report will be launched at the end of November ahead of COP25.



Climate action table

This summary should be read in combination with the corresponding Climate Action Table for this area that outlines concrete actions for 2020, 2030 and 2050 with respect to policies, finance and investment, technology and innovation, business and services and civil society towards fully implementing the Paris Agreement.

Contributions

Under the leadership of the High-Level Champions and through the Marrakech Partnership for Global Climate Action, the development of this Climate Action Pathway was led by the International Renewable Energy Agency (IRENA) in collaboration with the International Chamber of Commerce (ICC), International Energy Agency (IEA), REN21, Sustainable Energy for All (SEforAll), The Climate Group, UN Environment Programme (UNEP) and World Business Council For Sustainable Development (WBCSD).