

Renewable Energy

EES 3310/5310

Global Climate Change

Jonathan Gilligan

Class #34: Wednesday, April 13 2022

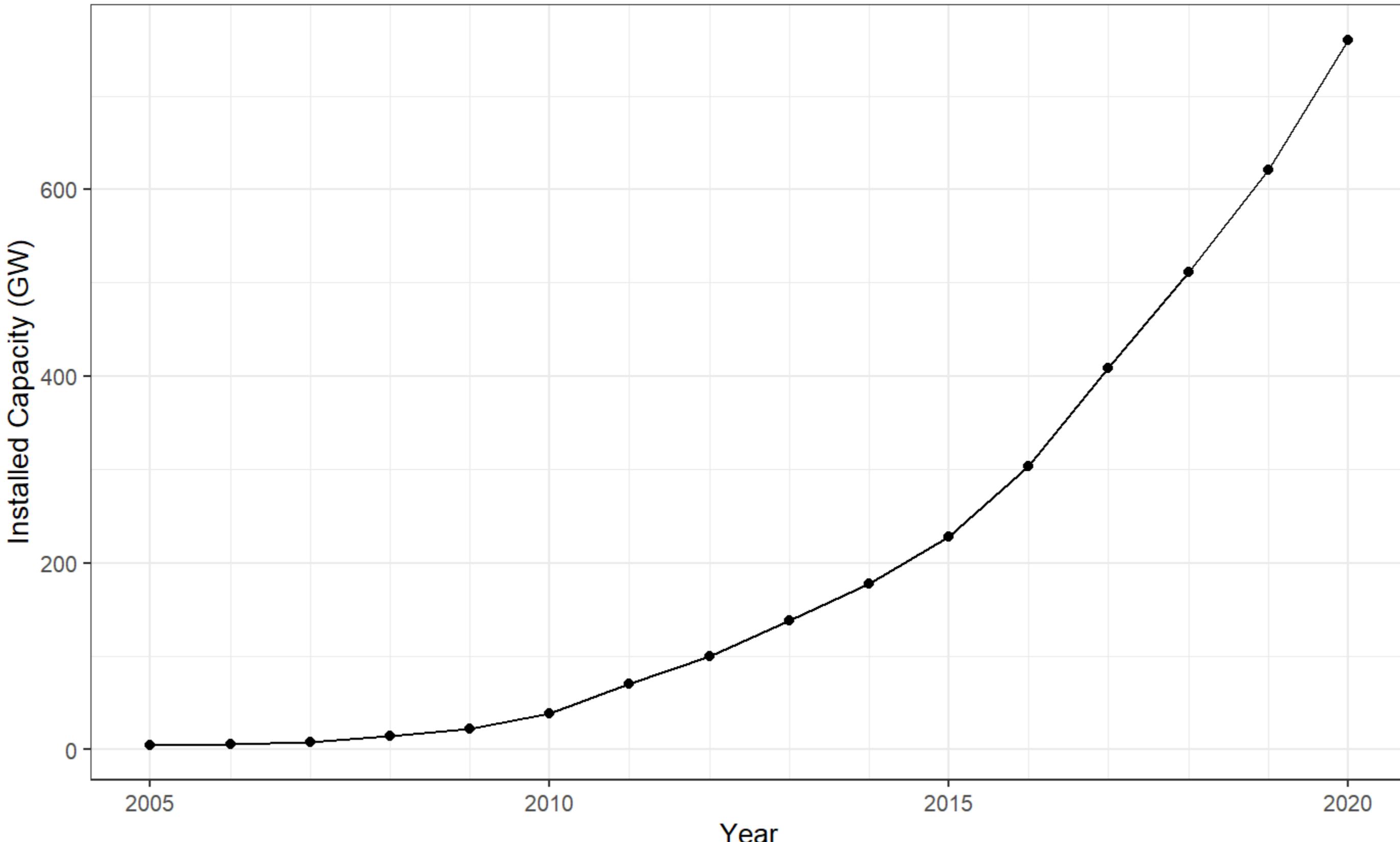
Prospects for Clean Energy

Solar Power

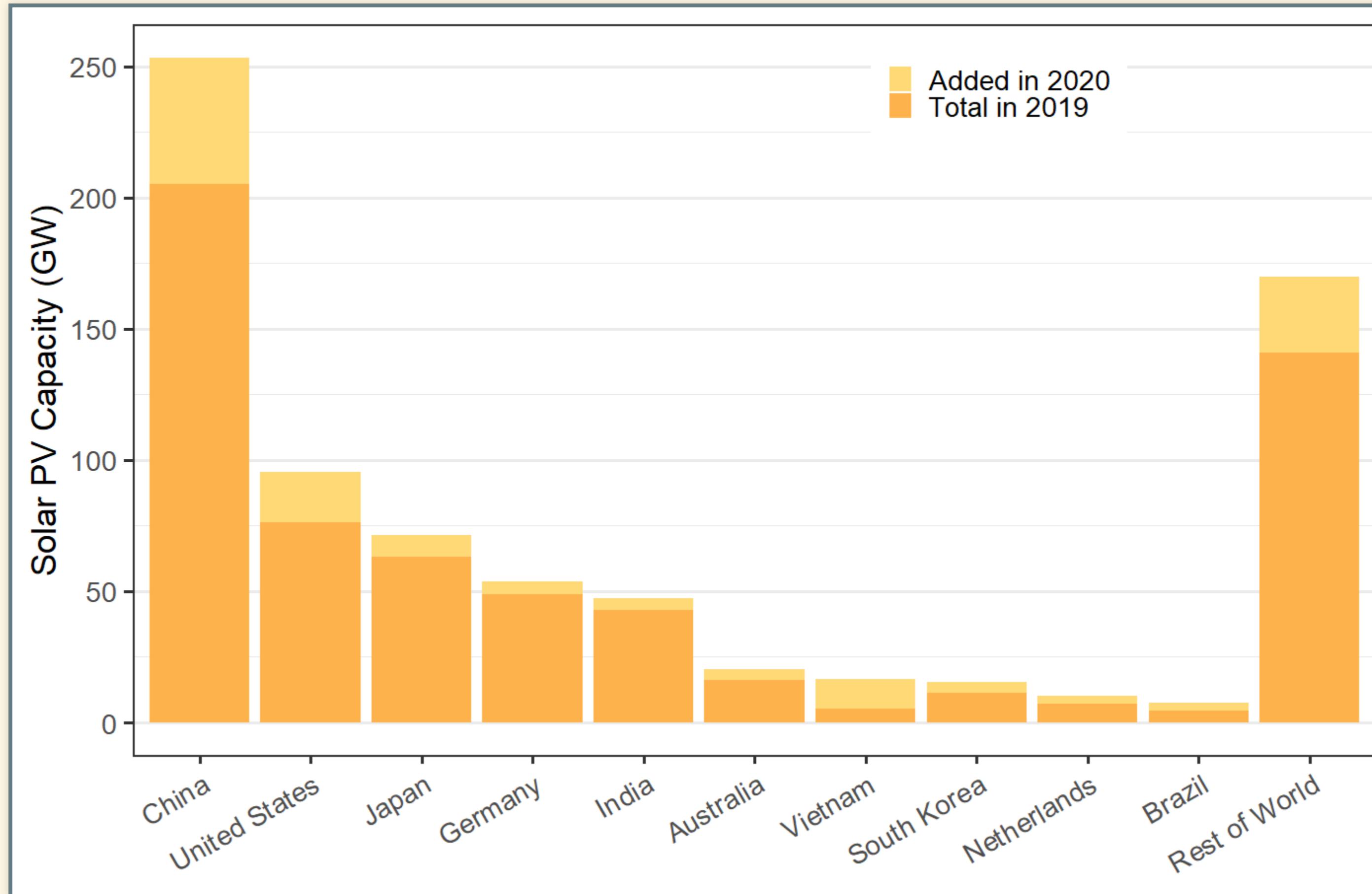


Solar Energy over Time

Installed Solar Photovoltaic Capacity



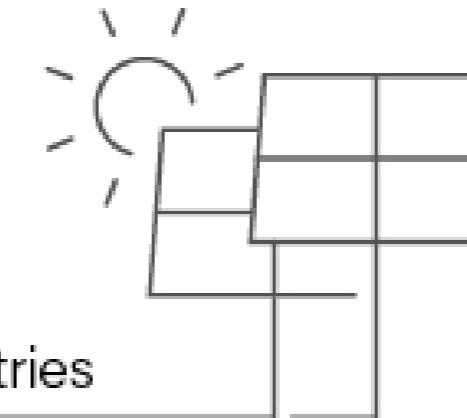
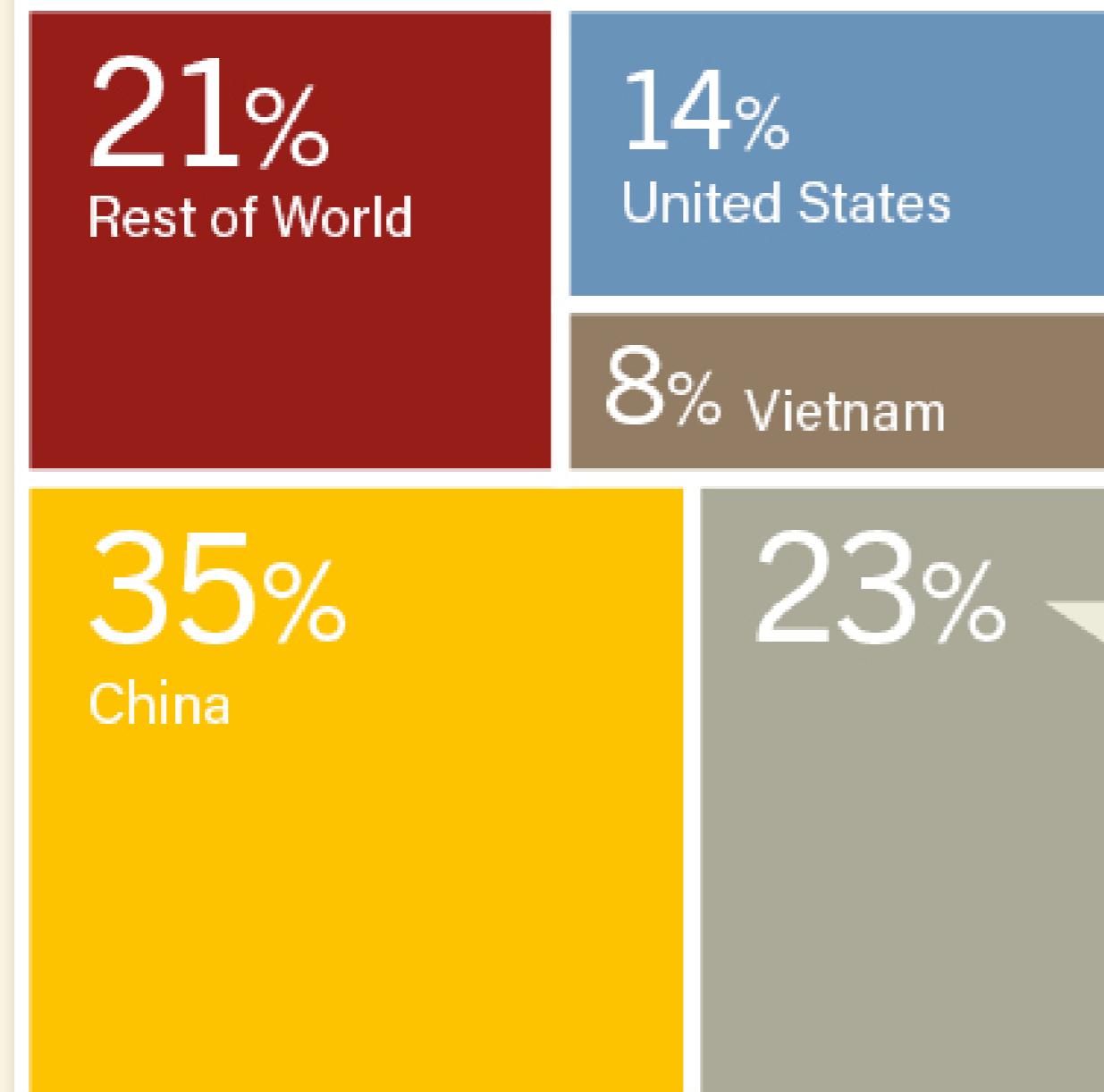
Top-10 Nations for Solar PV



Another View



Solar PV Global Capacity Additions Shares of Top 10 Countries and Rest of World, 2020



Next 7 countries

Japan	6%
Germany	4%
India	3%
Australia	3%
Republic of Korea	3%
Brazil	2%
Netherlands	2%

Note: Totals may not add up due to rounding.



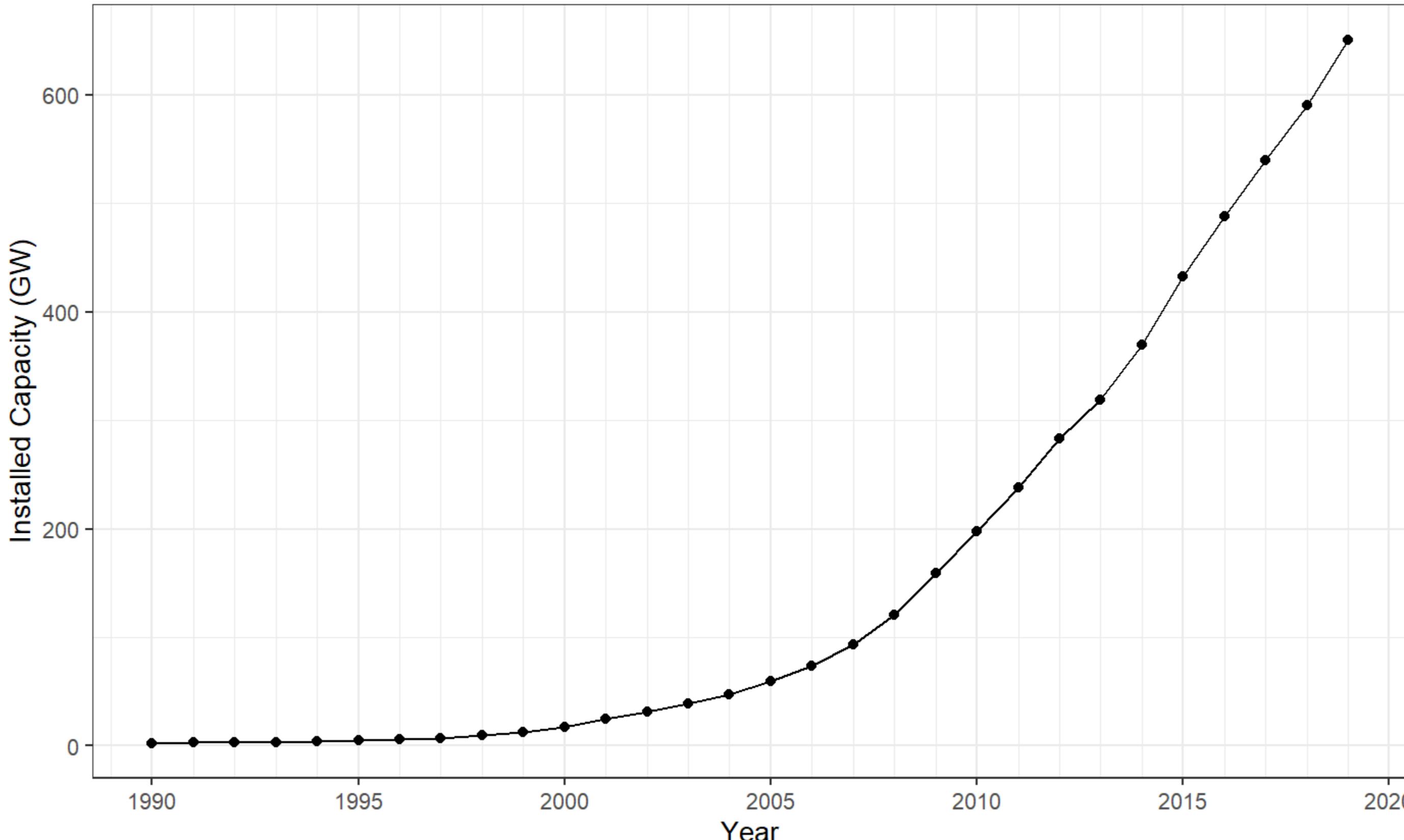
RENEWABLES 2021 GLOBAL STATUS REPORT

Wind Power

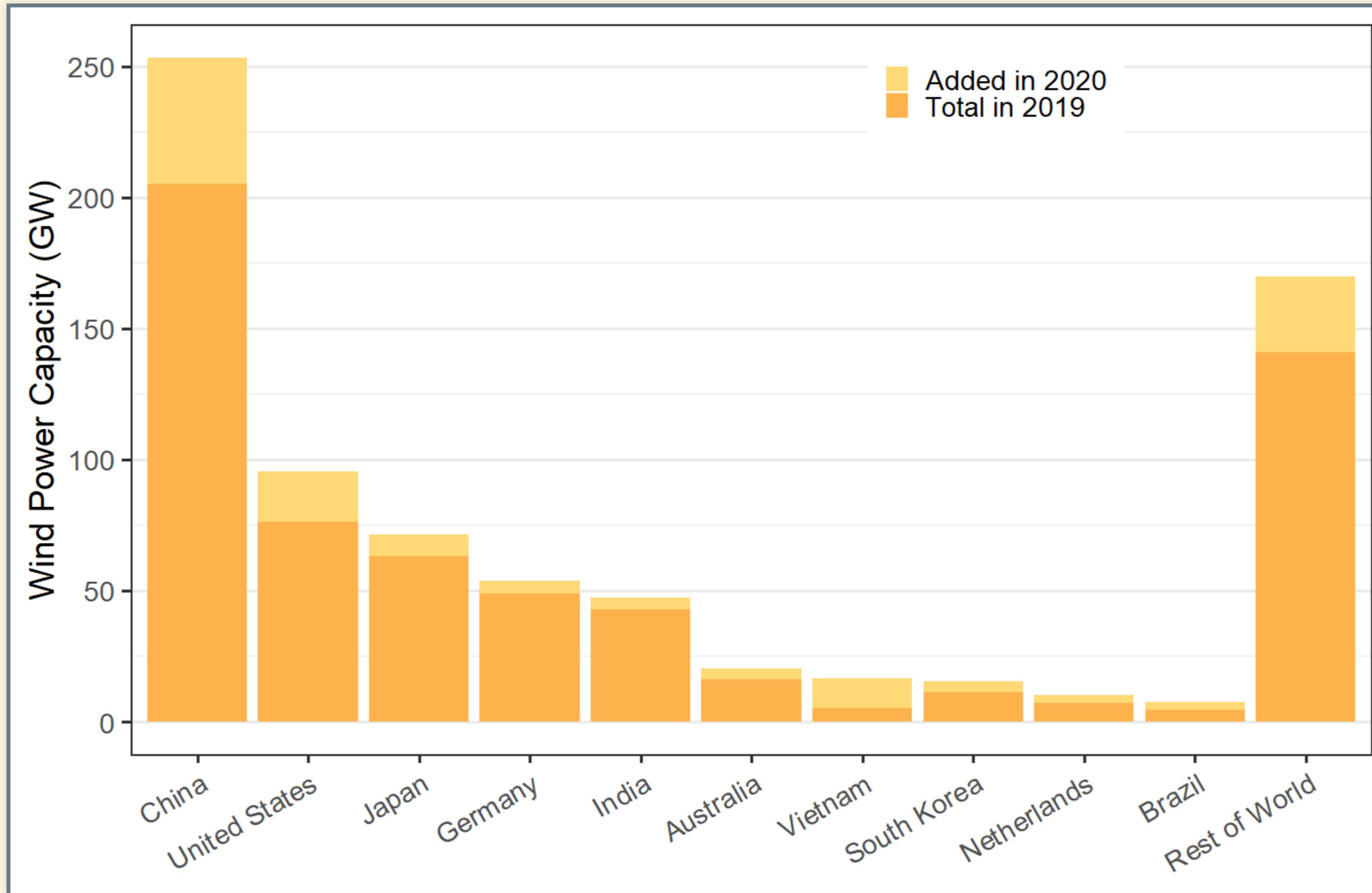


Wind Energy over Time

Installed Wind Capacity



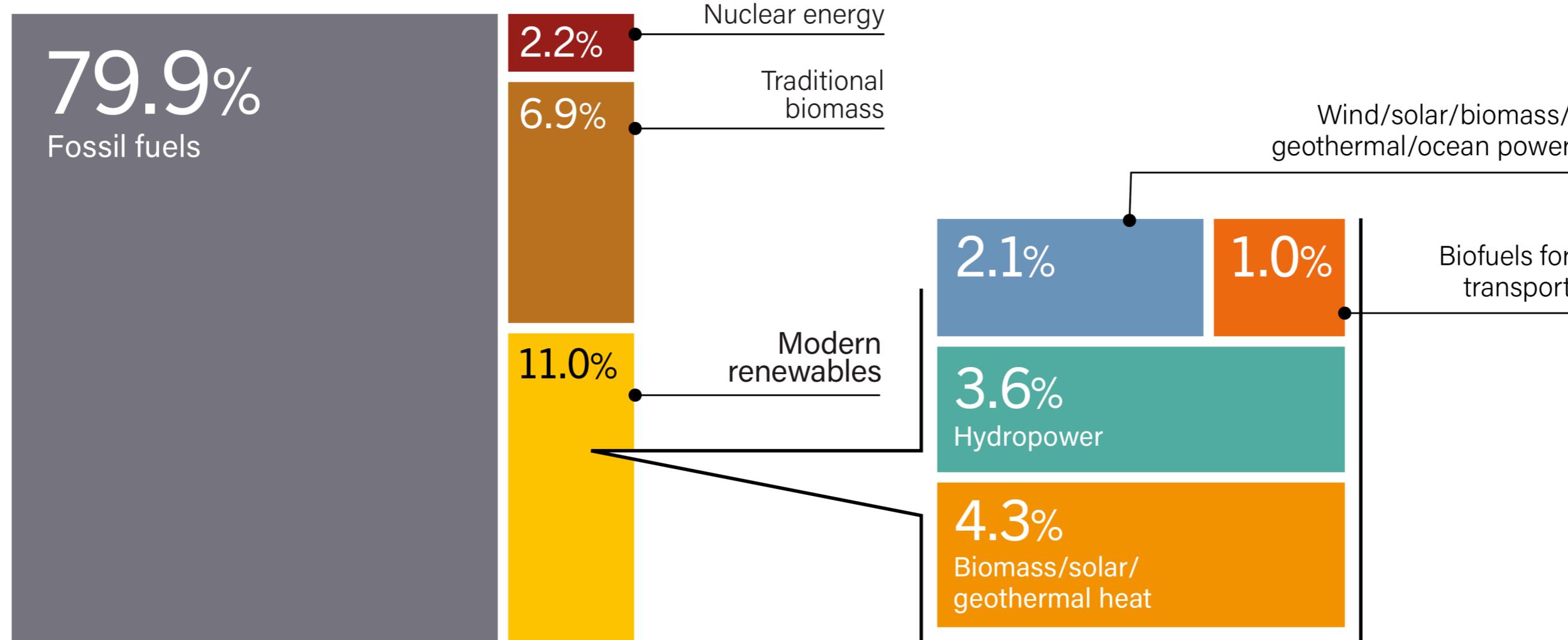
Top-10 Nations for Wind



Challenges

Current World Mix of Energy

Estimated Renewable Share of Total Final Energy Consumption, 2018



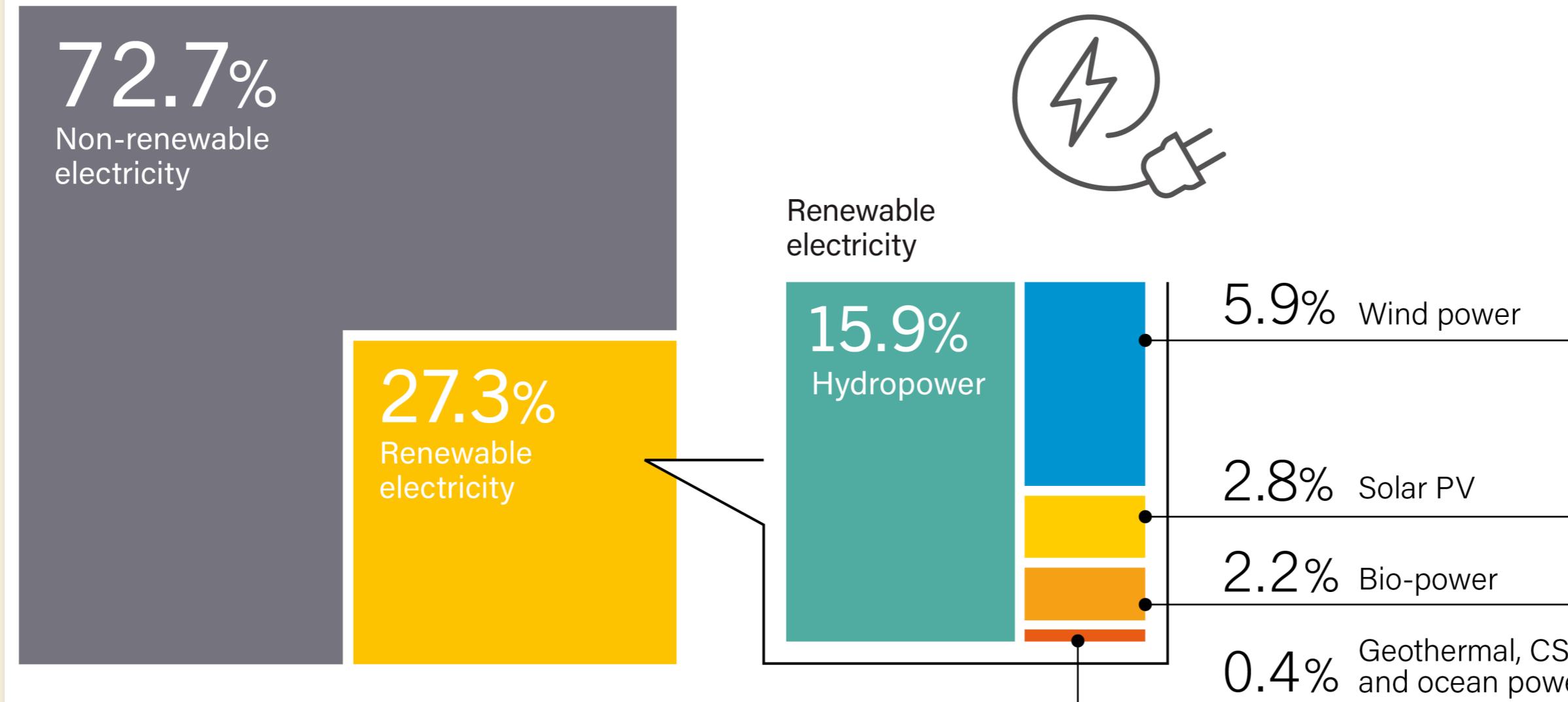
Note: Data should not be compared with previous years because of revisions due to improved or adjusted data or methodology. Totals may not add up due to rounding.

Source: Based on IEA data.

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World Electricity Generation

Estimated Renewable Energy Share of Global Electricity Production, End-2019



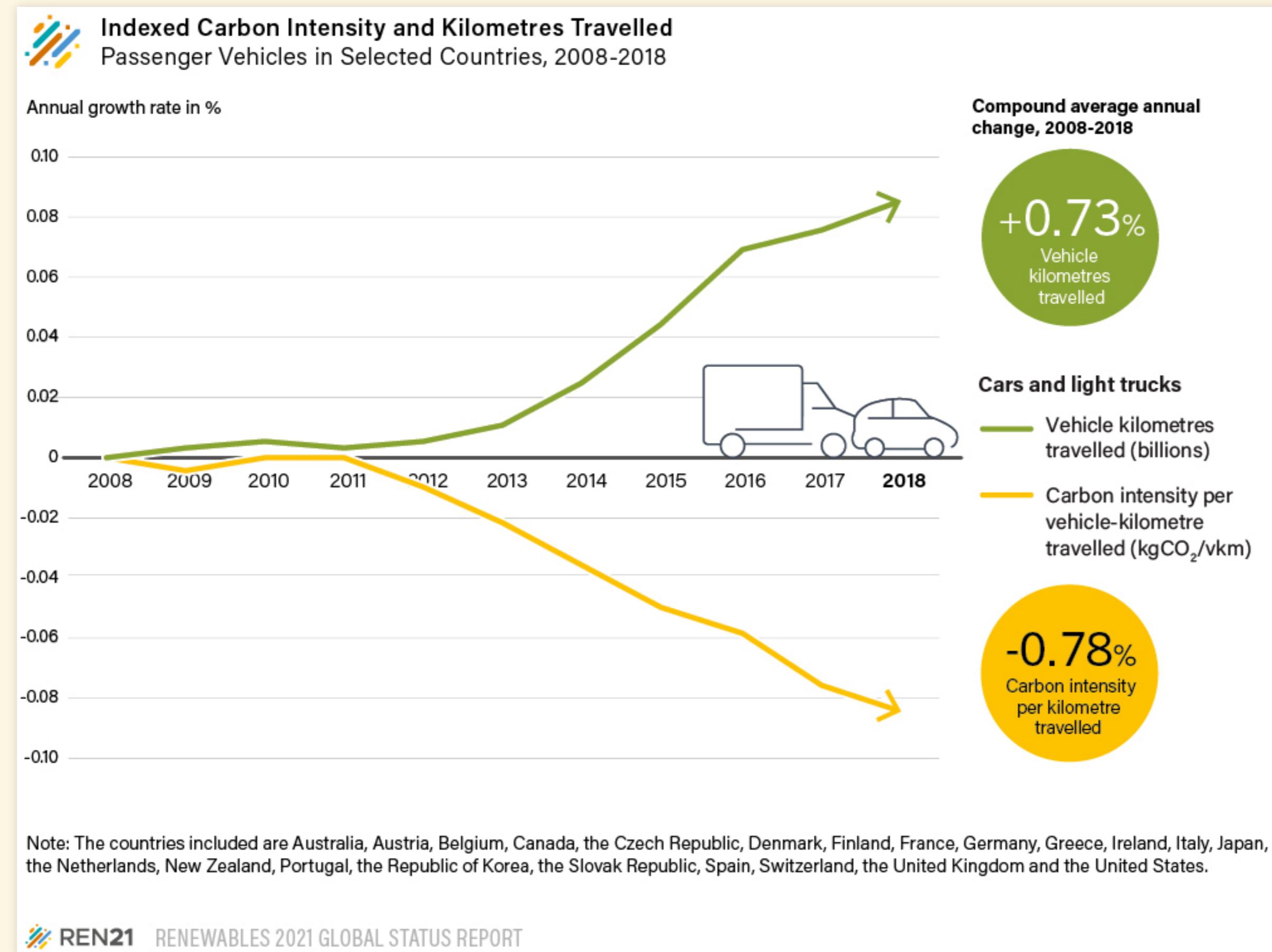
Note: Data should not be compared with previous versions of this figure due to revisions in data and methodology.



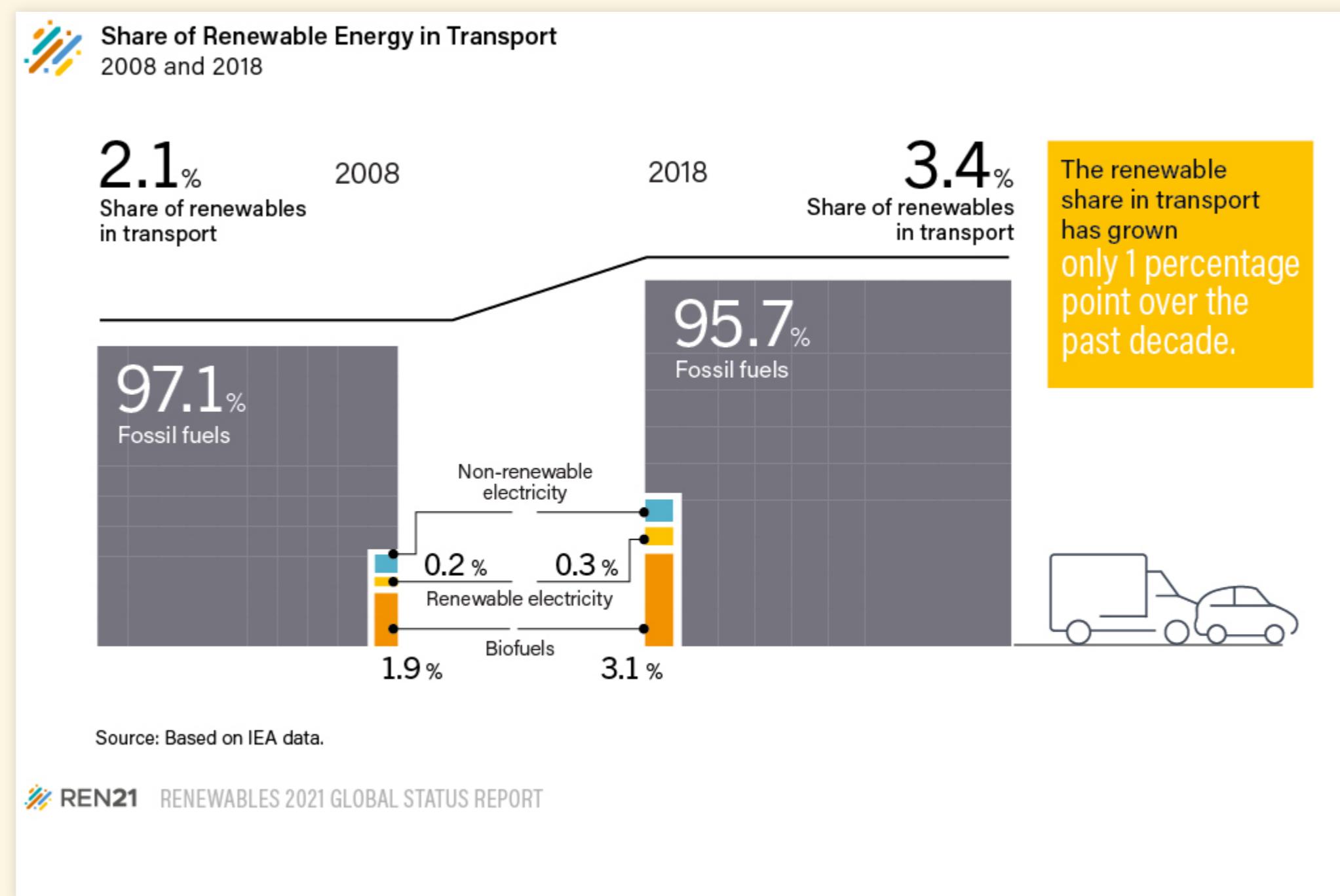
RENEWABLES 2020 GLOBAL STATUS REPORT

Renewable Energy Policy Network for the 21st Century, *Global Status Report 2021*, <http://www.ren21.net/status-of-renewables/global-status-report/>

Transportation

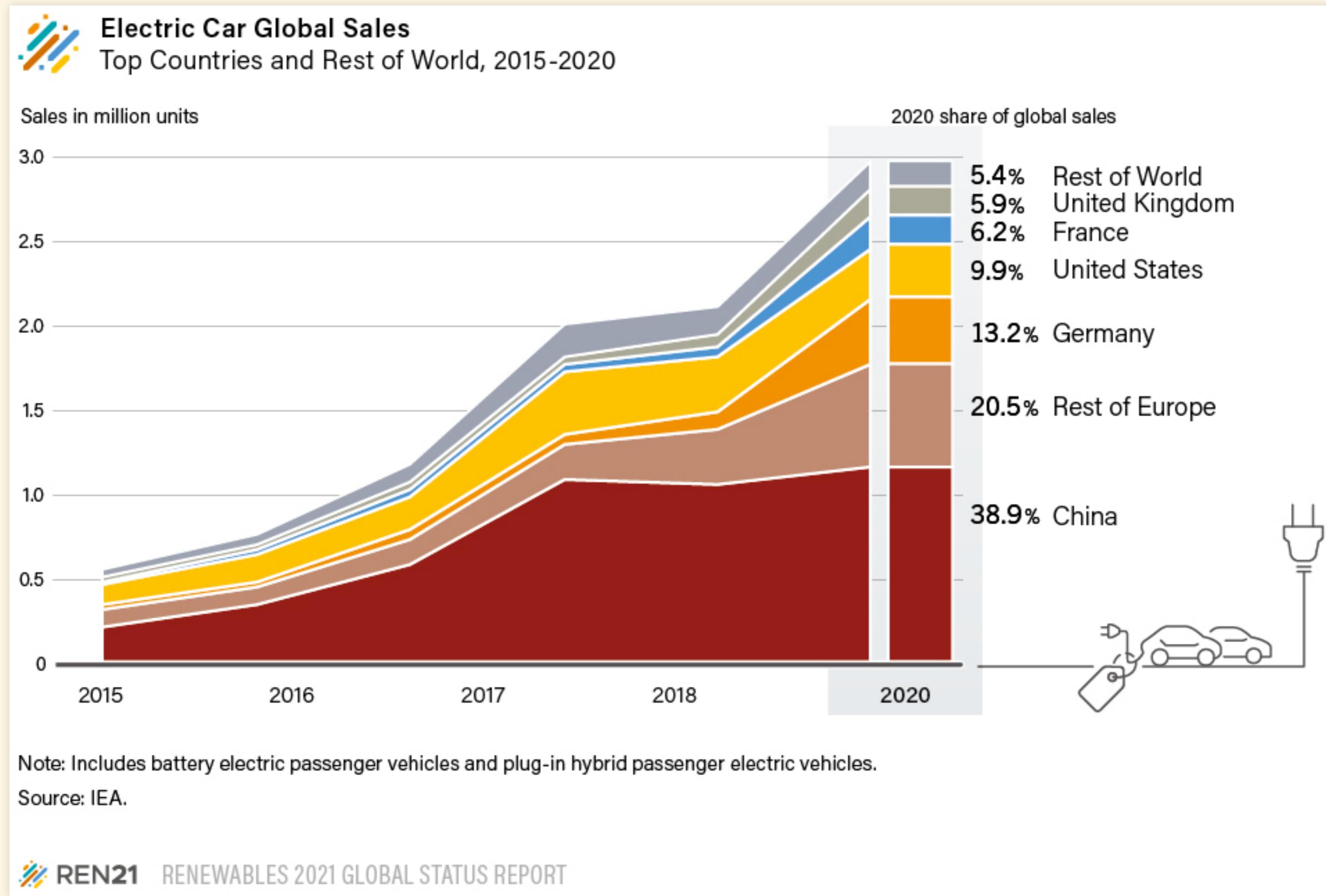


Transportation



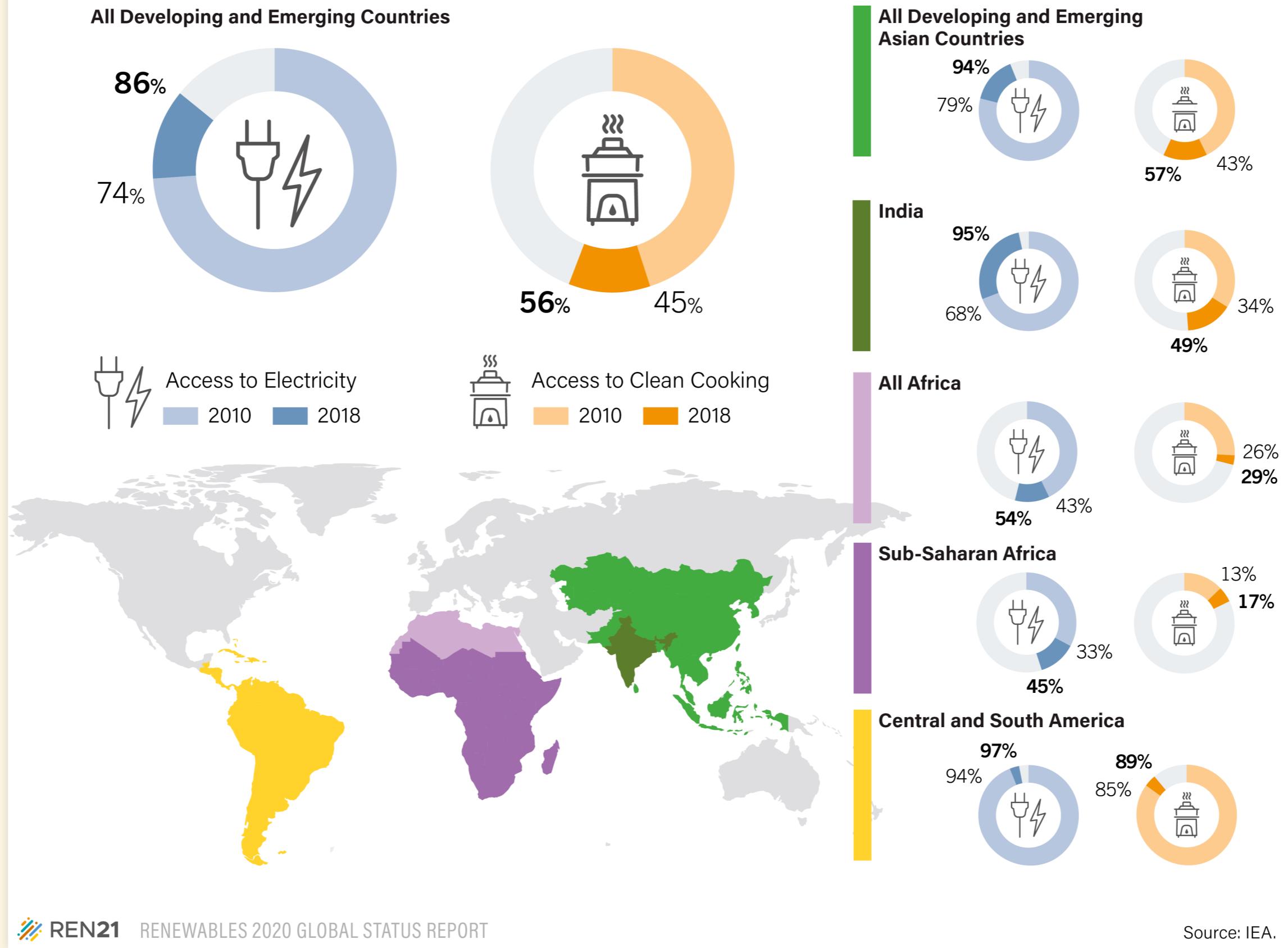
Renewable Energy Parity Network for the 21st Century, *Global Status Report 2021*, <http://www.ren21.net/status-of-renewables/global-status-report/>

Transportation



Energy Poverty

Access to Electricity and Clean Cooking by Region, 2010 and 2018



Prospects for Future Renewable Energy

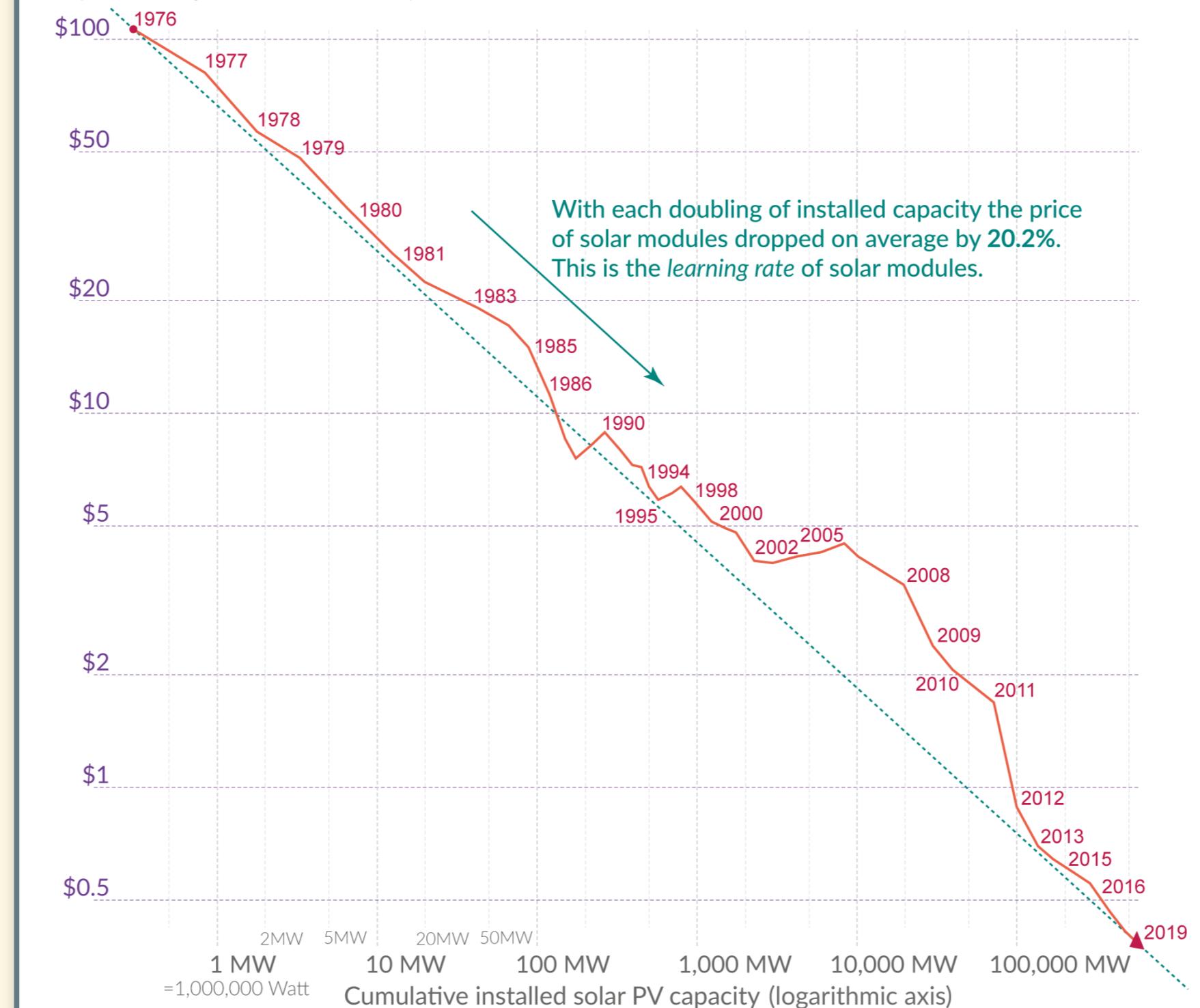
Solar PV

The price of solar modules declined by 99.6% since 1976

Our World
in Data

Price per Watt of solar photovoltaics (PV) modules (logarithmic axis)

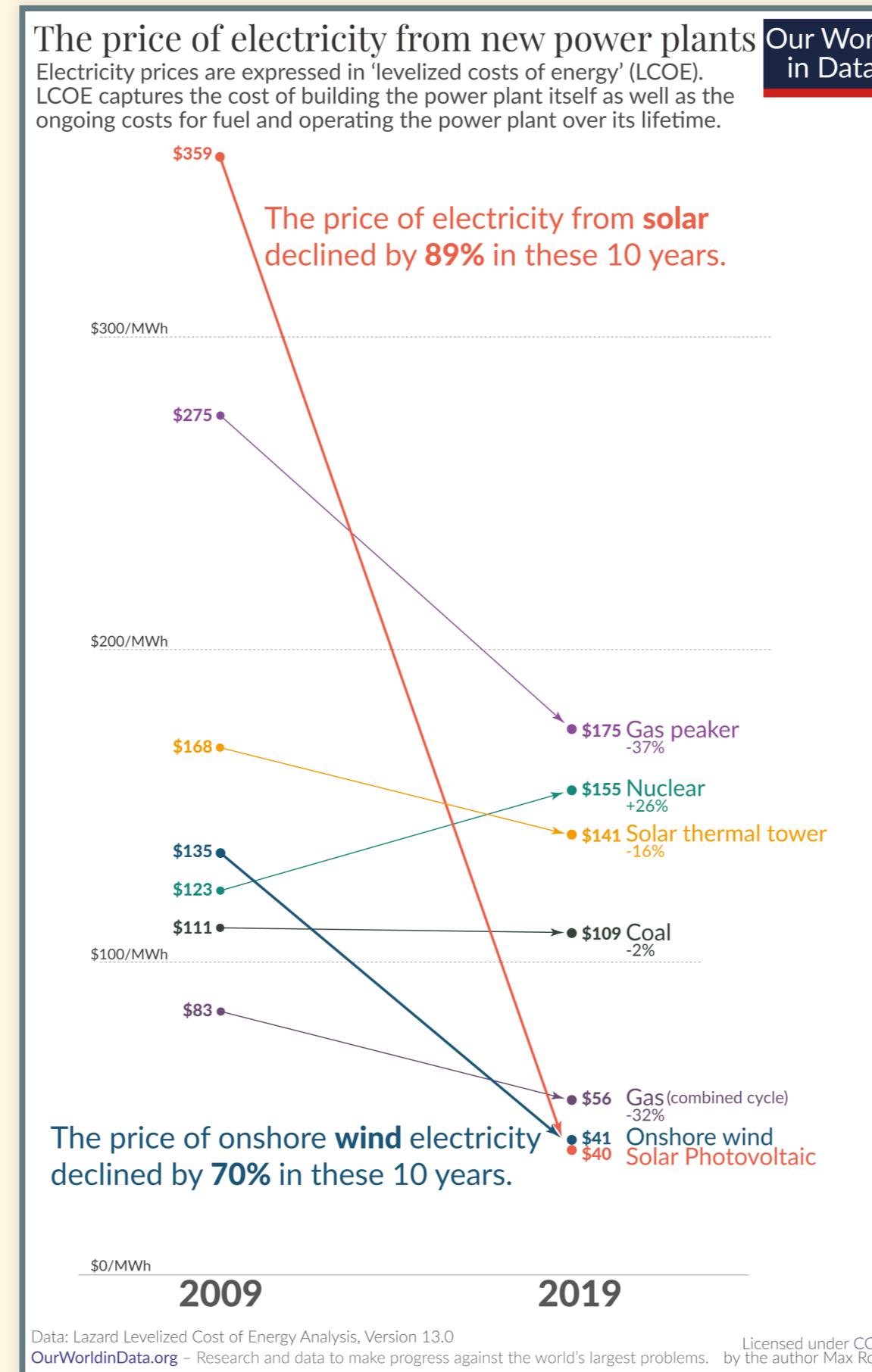
The prices are adjusted for inflation and presented in 2019 US-\$.



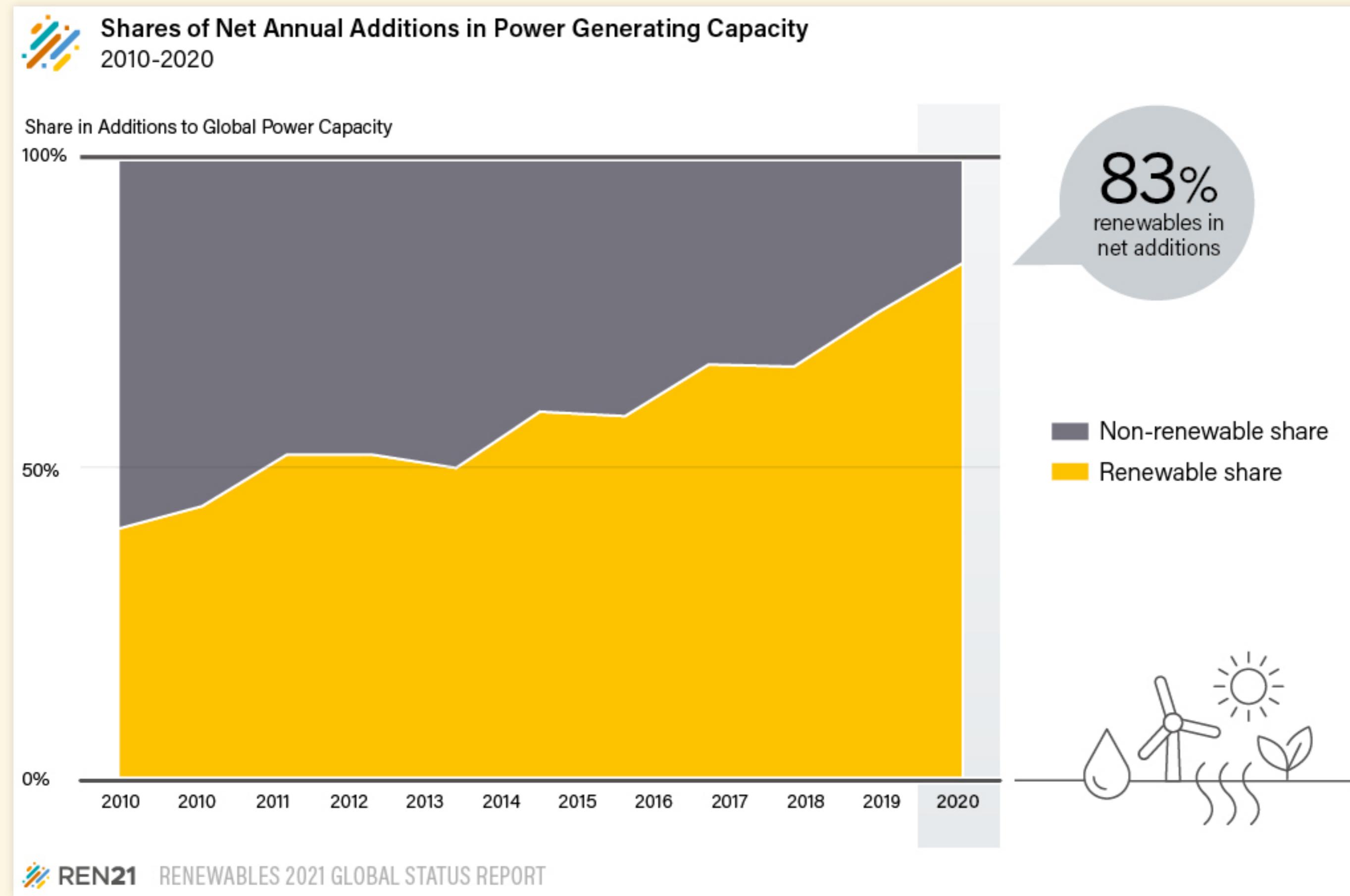
Data: Lafond et al. (2017) and IRENA Database; the reported learning rate is an average over several studies reported by de La Tour et al (2013) in Energy. The rate has remained very similar since then.
OurWorldInData.org – Research and data to make progress against the world's largest problems.

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Cost of Renewable Energy vs. Fossil Fuels

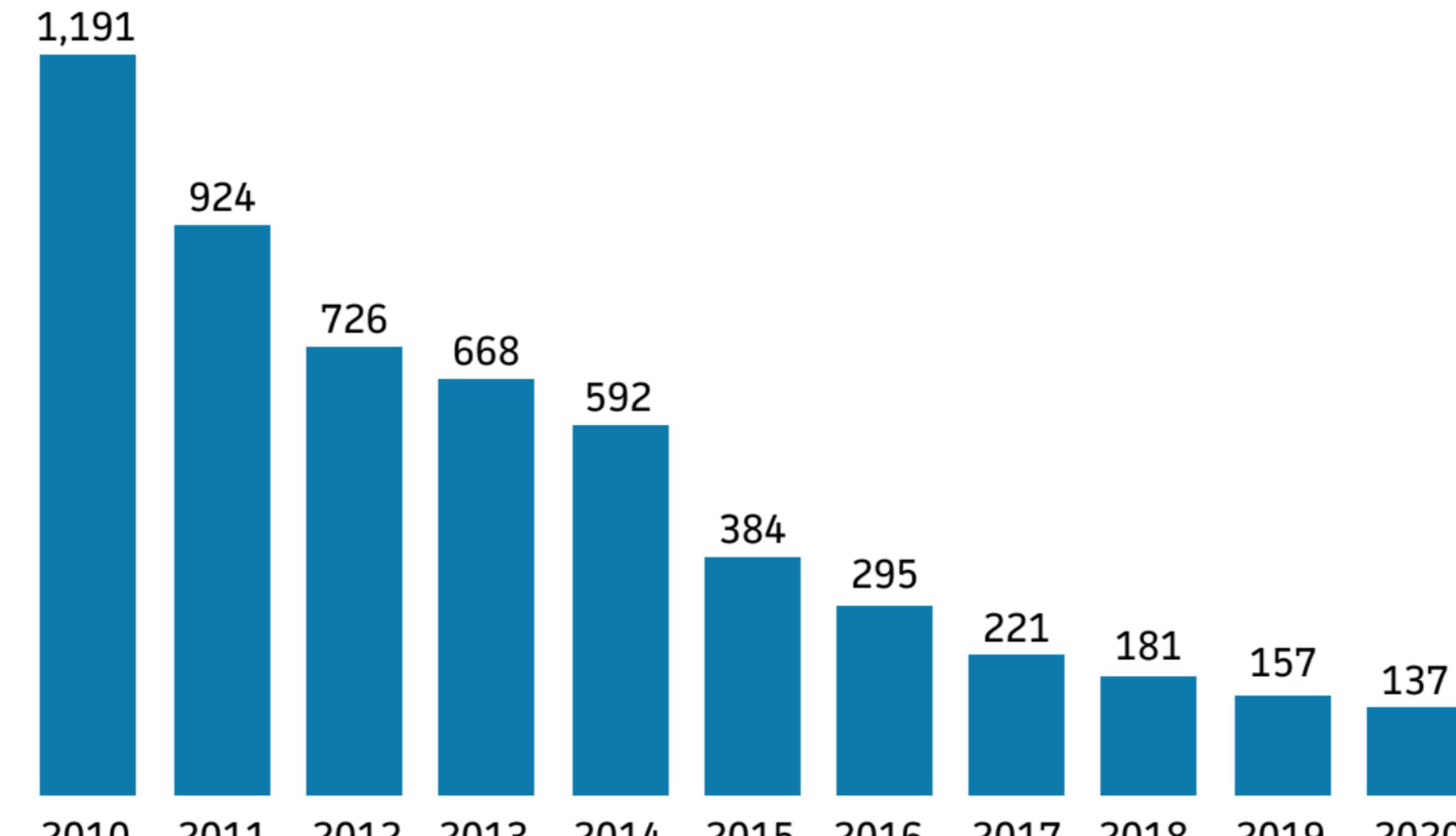


Renewables Are the Fastest-Growing Source of Electricity



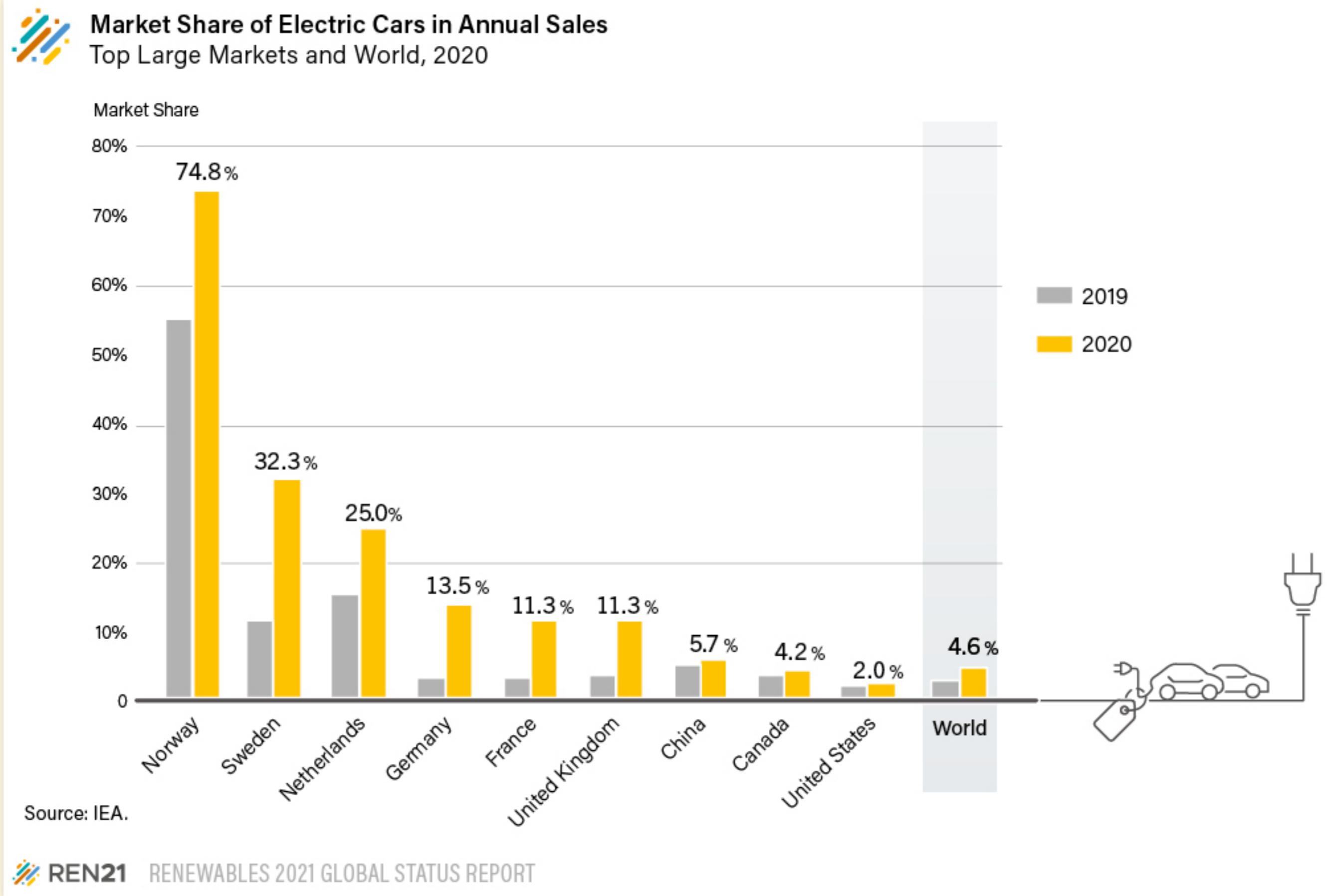
Battery Storage

Volume-weighted average of lithium-ion battery price from all sectors (in USD)



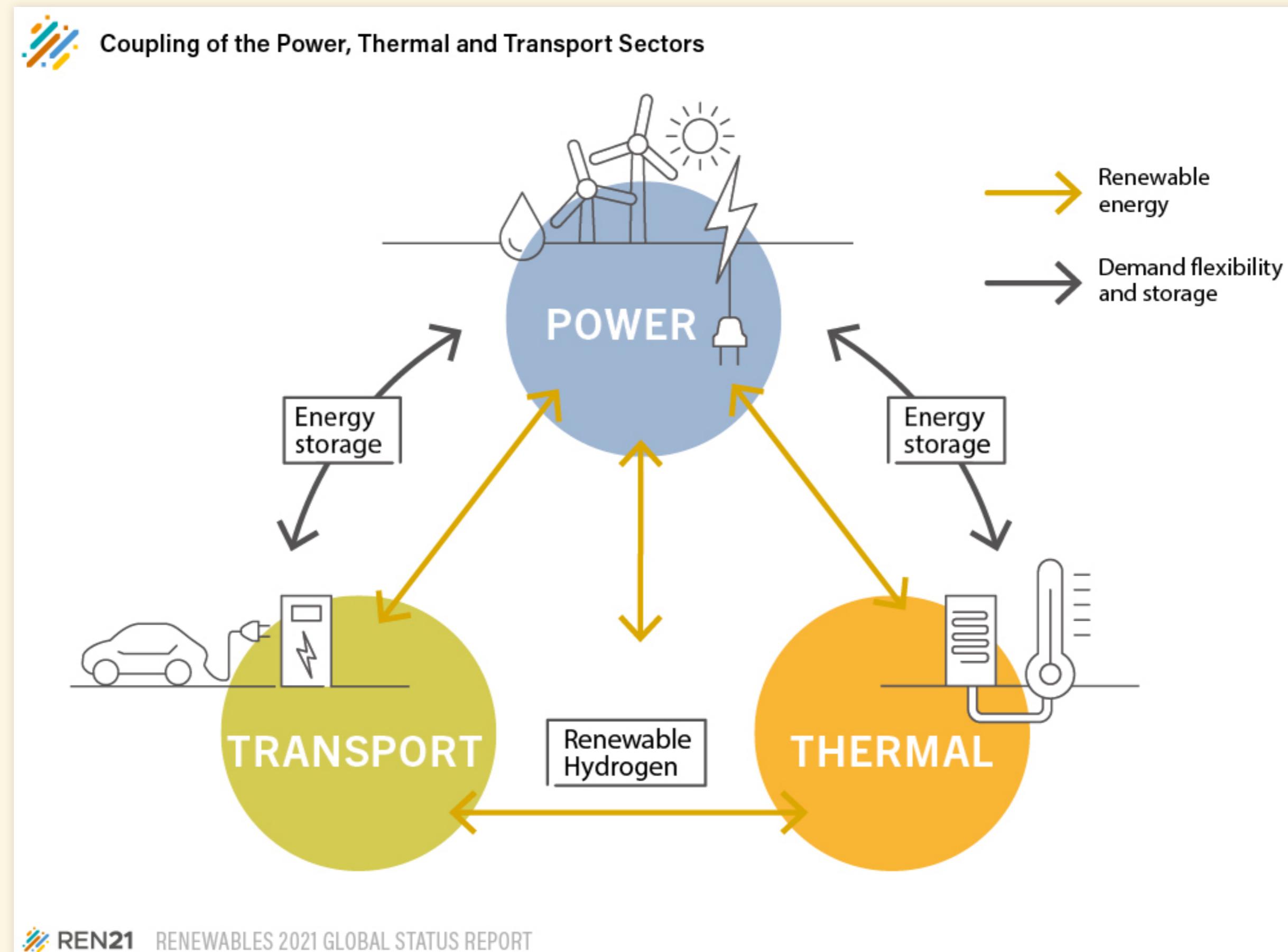
Source: Bloomberg

Electric Cars



Other Considerations

Holistic View of Energy



Prospects for Future Renewable Energy

Cost of Renewable Power

- Cost of solar energy is 90% less than in 2009
- Cost of wind energy is 70% less than in 2009
- Cost of wind and solar is now one third the cost of coal power
- Cost of battery storage is down 87% since 2010.
- Most car companies say the future of cars is electric
- Politics and government regulations are **preventing** the rapid expansion of renewable electricity
- Many tech companies like Amazon, Facebook, Google, Microsoft, and Apple want to install more renewable electricity
- Vanderbilt is building 70 million Watts of solar power to supply 100% of campus electricity.