Energy Data for Dummies

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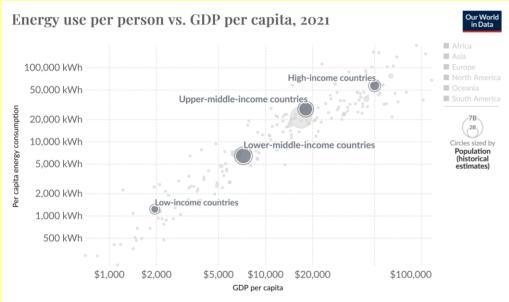
Energy Data for Dummies

Independent Commentator on Climate and Energy



https://youtu.be/sYOm0ZE mJ8o

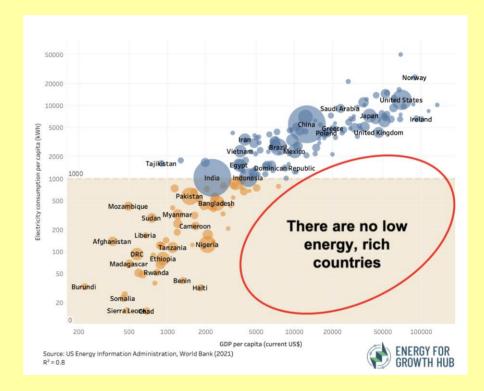
Energy and Prosperity



Data source: U.S. Energy Information Administration (EIA); Energy Institute Statistical Review of World Energy (2023); Data compiled from multiple sources by World Bank

Note: Energy refers to primary energy – the energy input before the transformation to forms of energy for end-use (such as electricity or petrol for transport).

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Energy and Prosperity (2)







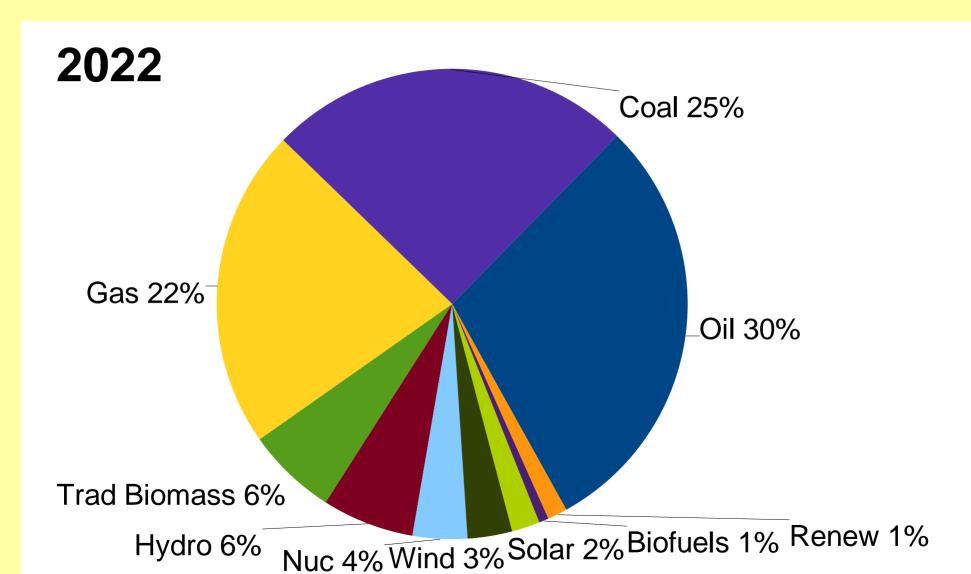
Thermodynamics



'There is no such thing as a Free Lunch'

Where Does Our Energy Come From? Our World in Data Global primary energy consumption by source Primary energy is based on the substitution method and measured in terawatt-hours. Other renewables Modern biofuels 160,000 TWh Solar Wind Hydropower 140.000 TWh Nuclear Natural gas 120.000 TWh 100.000 TWh Oil 80.000 TWh 60.000 TWh 40,000 TWh Coal 20.000 TWh Traditional biomass 0 TWh 2005 2010 2015 1997 2000 2022

Data source: Energy Institute - Statistical Review of World Energy (2023); Smil (2017) **Note:** In the absence of more recent data, traditional biomass is assumed constant since 2015. <u>OurWorldInData.org/energy</u> | <u>CC BY</u>



Oil



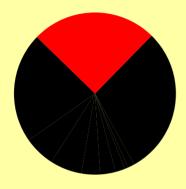
~50 years remaining Versatile, storable, controllable, reliable







Coal



~400 years remaining

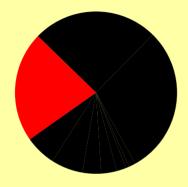
Storable, controllable, reliable

40% of electricity









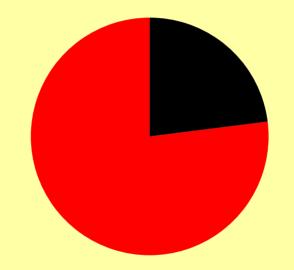
~50 years remaining Storable controllable reliable



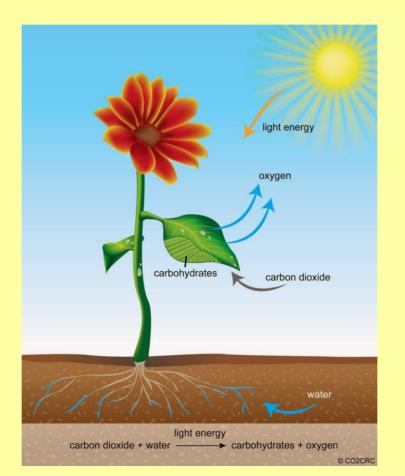
Fracking



Fossil Fuels Today – 77%



Photosynthesis



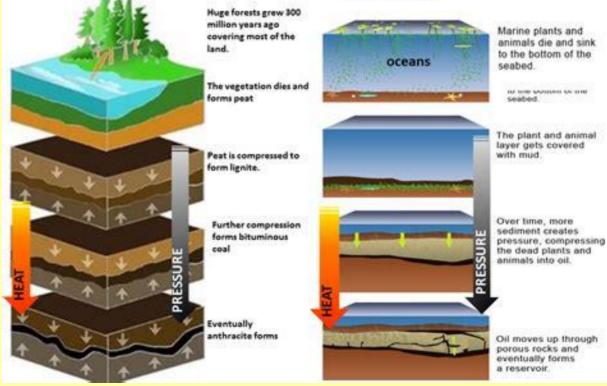
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Making Fossil Fuels

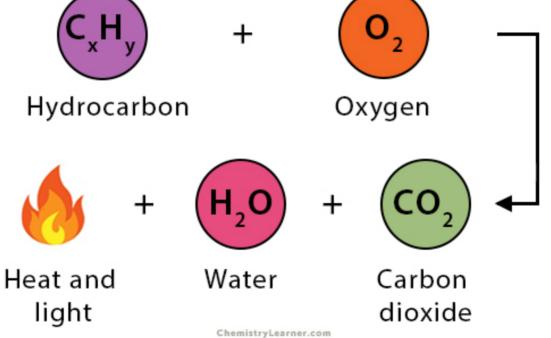
COAL FOSSIL FUEL FORMATION OIL & GAS

It took at least millions of years for coal to form-from land plants -huge ancient fern forests that existed over 300 millions years ago

It took at least a million years for oil and gas to form from ocean plants, like phytoplankton and algae, hundreds of millions of years ago.



Burning Fossil Fuels Combustion Reaction $(C_xH_y) + (O_2)$

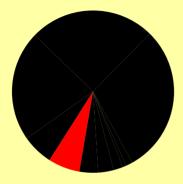


Biomass





Hydro





Nuclear





Wind

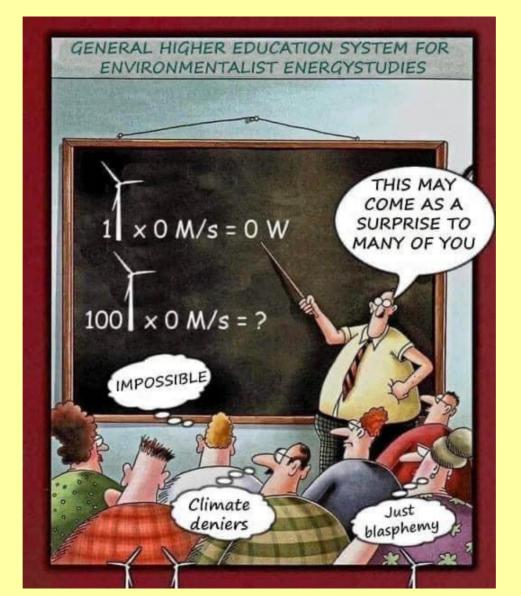




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Energy Storage

Hope and Hype

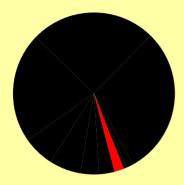
==> But no delivery



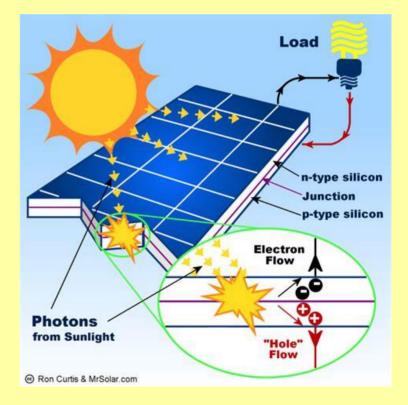




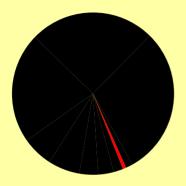
Solar



Excellent at midday in the summer

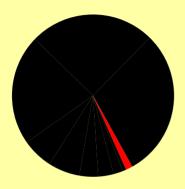


Biofuels





Other Renewables





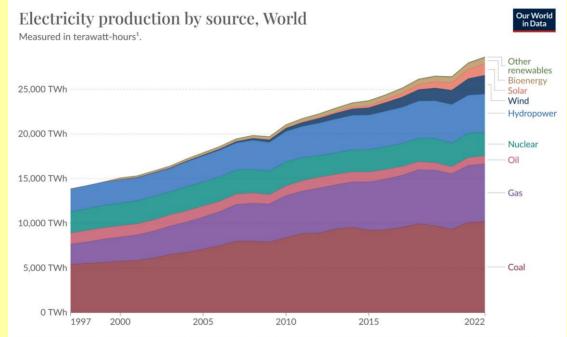


Energy and Electricity Worldwide

Electricity 16%

Other 84%

Renewables Revolution?



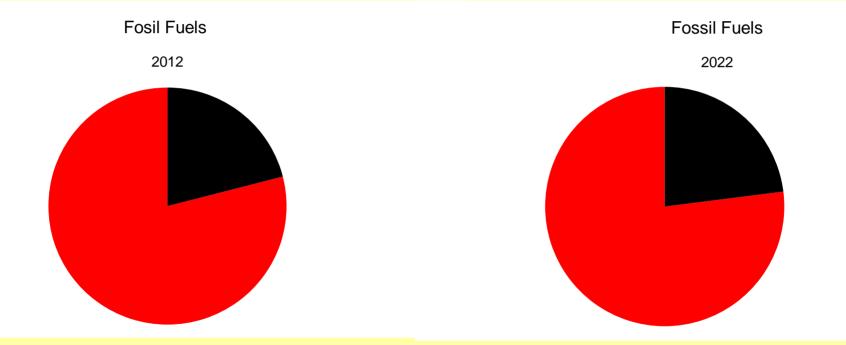
Data source: Ember - Yearly Electricity Data (2023); Ember - European Electricity Review (2022); Energy Institute - Statistical Review of World Energy (2023)

Note: Other renewables include waste, geothermal, wave and tidal.

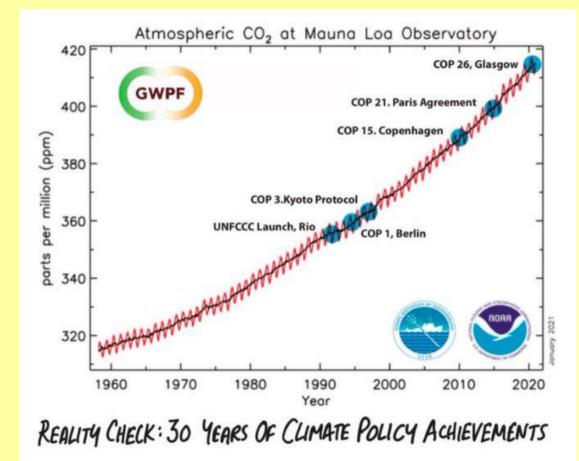
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1. Watt-hour: A watt-hour is the energy delivered by one watt of power for one hour. Since one watt is equivalent to one Joule per second, a watt-hour is equivalent to 3600 Joules of energy. Metric prefixes are used for multiples of the unit, usually: - kilowatt-hours (kWh), or a thousand watt-hours. - Megawatt-hours (MWh), or a million watt-hours. - Gigawatt-hours (GWh), or a billion watt-hours. - Terawatt-hours (TWh), or a trillion watt-hours.

Conclusion 1 : Fossil Fuels Still Rule OK!



Conclusion 2: Net Zero is a Flop



Conclusion 3:

==>Spend money on adapting to climate change, not fighting it

Summary

- Don't believe the hype believe the data
- There is no such thing as a free lunch!