

Energy crisis and climate catastrophe?

More and more people need more and more energy

Humanity's hunger for energy is growing even faster than the world's population. Cars need fuel, people want to live in warm homes, industry needs raw materials. Refrigerators, televisions, computers and mobile phones require electricity that is still produced mainly from coal, gas and uranium. All these substances are finite. Nevertheless, the consumption of resources is likely to increase rather than decrease. According to all predictions, world energy consumption will even rise by more than a third between 2010 and 2035. Approximately half of the increase will result from the energy requirements of China and India alone.

And what currently seems to be even worse than a possible shortage of raw materials: by burning fossil fuels in cars, heating systems, thermal power stations and industrial plants, greenhouse gases (especially CO₂) are produced, which damage our environment and change the climate. Even in Germany, 40% of electricity today is still produced from burning coal. Coal combustion is the most significant source of greenhouse gas emissions. The energy problem is therefore also a climate problem.

Numerous alarm signals are already visible today (rising global temperatures, melting polar ice caps, rising sea levels, etc.). The fact that these phenomena can be attributed to human behaviour has now been scientifically proven and can no longer be denied. Many scientists and politicians even call climate change a "question of fate" for humanity.

Graph 1:

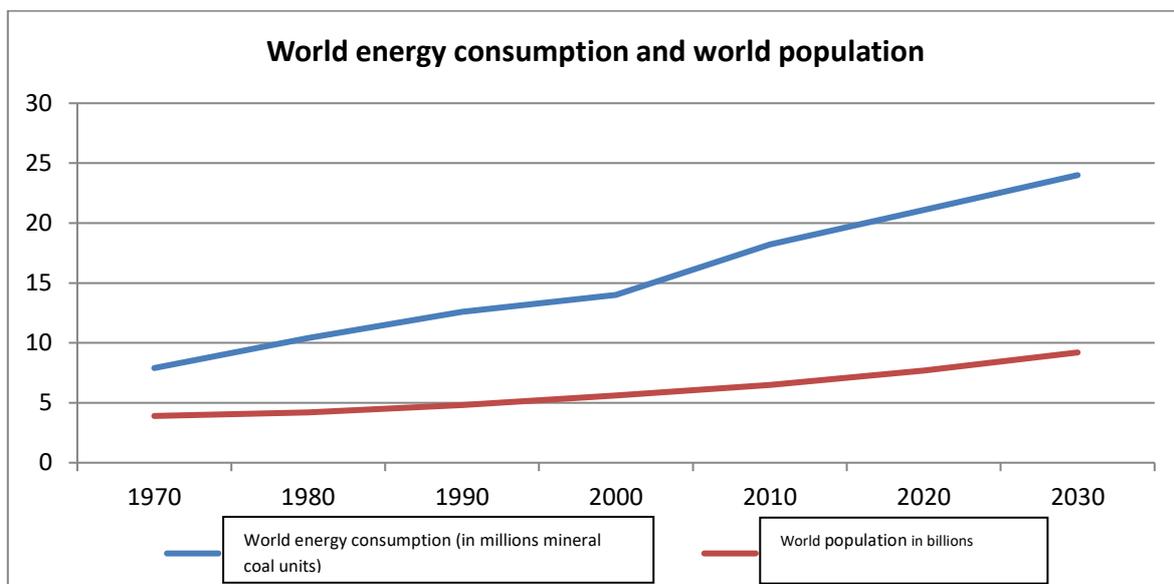


Photo credit: Dr Peter Kührt according to data from https://www.gvst.de/site/steinkohle/grafik_statistik.htm

Graph 2:

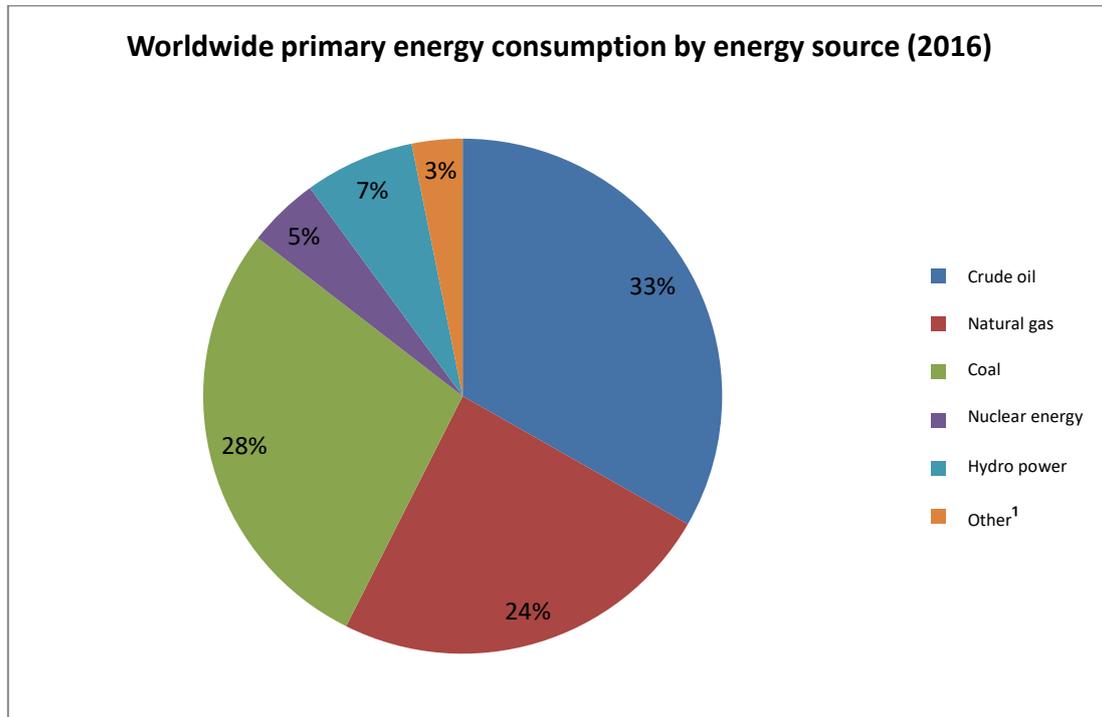


Photo credit: Dr Peter Kührt according to data from https://de.wikipedia.org/wiki/Liste_der_Staaten_mit_dem_h%C3%B6chsten_Energieverbrauch

¹ Bioenergy, geothermal energy, solar energy, wind energy

Graph 3:

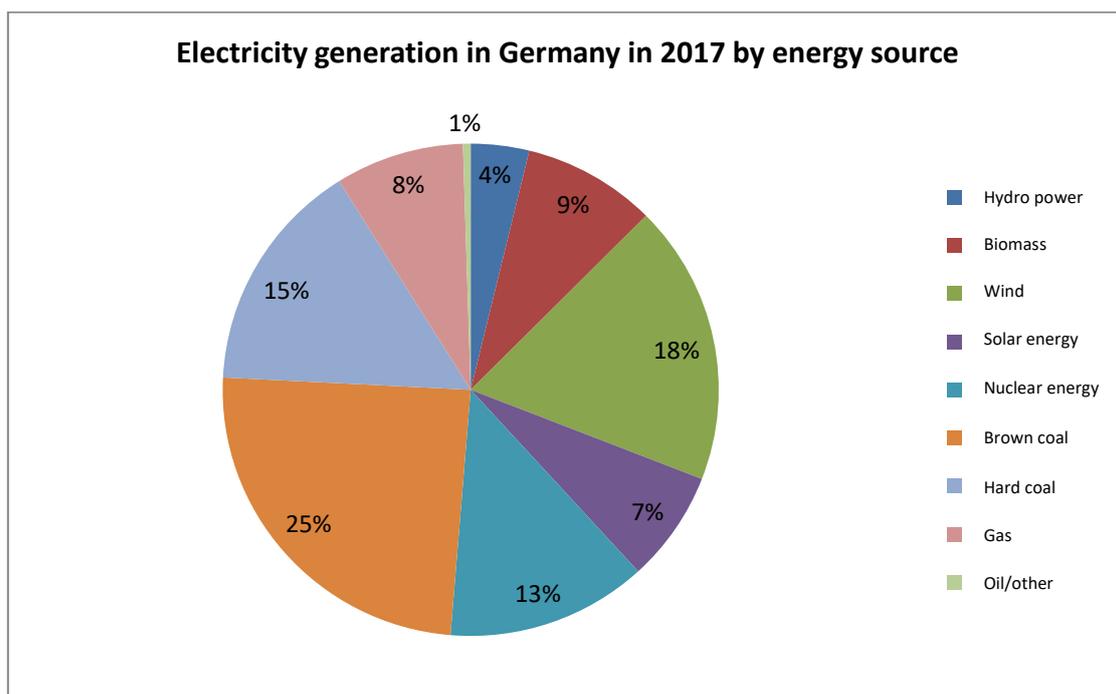


Photo credit: Dr Peter Kührt according to data from https://www.energy-charts.de/energy_pie_de.htm

Graph 4:

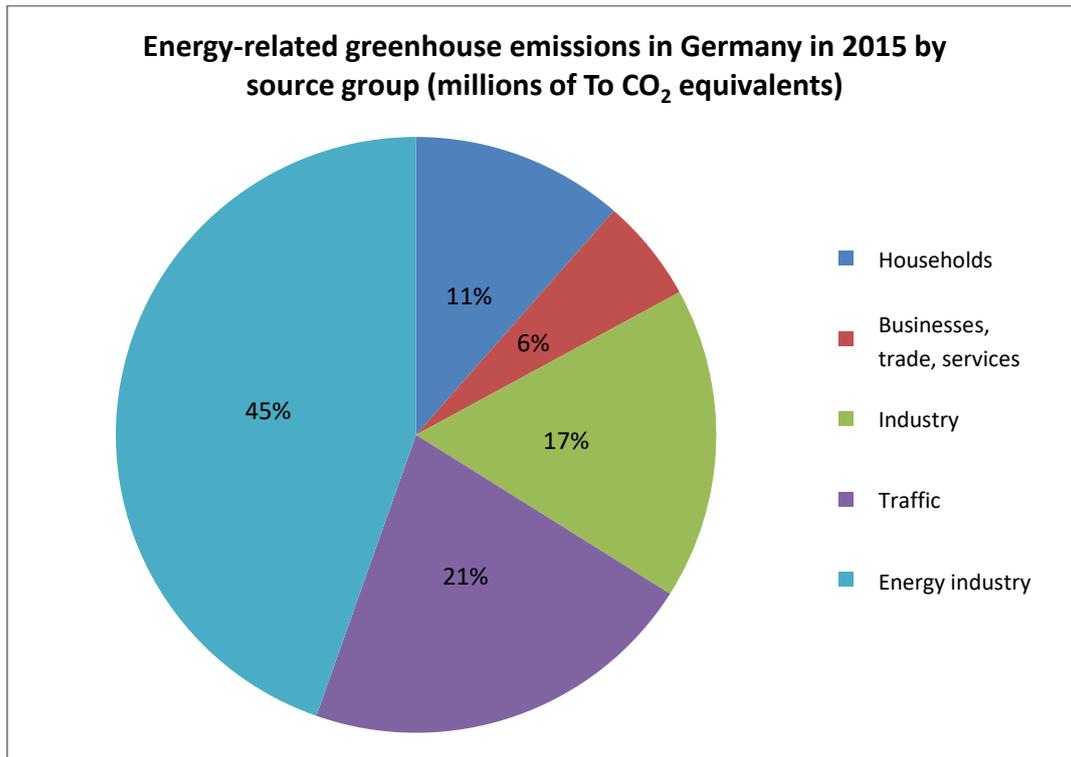


Photo credit: Dr Peter Kührt according to data from the Federal Environment Agency National trend tables for German reporting, status 1/2017

No future without raw materials!

The fact that not only oil deposits, but also many other raw materials on earth are becoming increasingly scarce, is undisputed. And it is not only German industry that fears dramatic raw material shortages and drastic price increases in the near future. This even applies notably to the technologies from which we expect many future-orientated solutions – but without cobalt, graphite, lithium and manganese there will be no future technologies! Just like smartphones, electric cars need batteries. The cobalt required for this comes mainly from the Congo, the graphite from China. Considerable procurement risks can be expected in the future for approx. 80% of the mineral raw materials that are so important today. Although there are still considerable reserves on Earth, only a few countries are still prepared to mine these raw materials or make them available to other countries. And the extraction of raw materials almost always takes place under extremely inhuman working conditions.

But what are the alternatives? In 2017, the German materials researcher and chemist Volker Strauss received the Deutscher Studienpreis (German Study Prize) in the natural and technical sciences category. He is attempting to produce electronic components, such as computer chips, solar cells and batteries, entirely from biodegradable materials. This will pave the way

for new kinds of organic nanomaterials (so-called “carbon nanoparticles”), which have interesting electronic and optical properties, and yet are easy and cost-effective to produce and can even be organically degraded.

No one knows yet whether the carbon nanoparticles will be able to contribute to solving our future problems. Scientific visions like this will be necessary to secure the future existence of mankind, even if they sometimes remind us of science fiction.

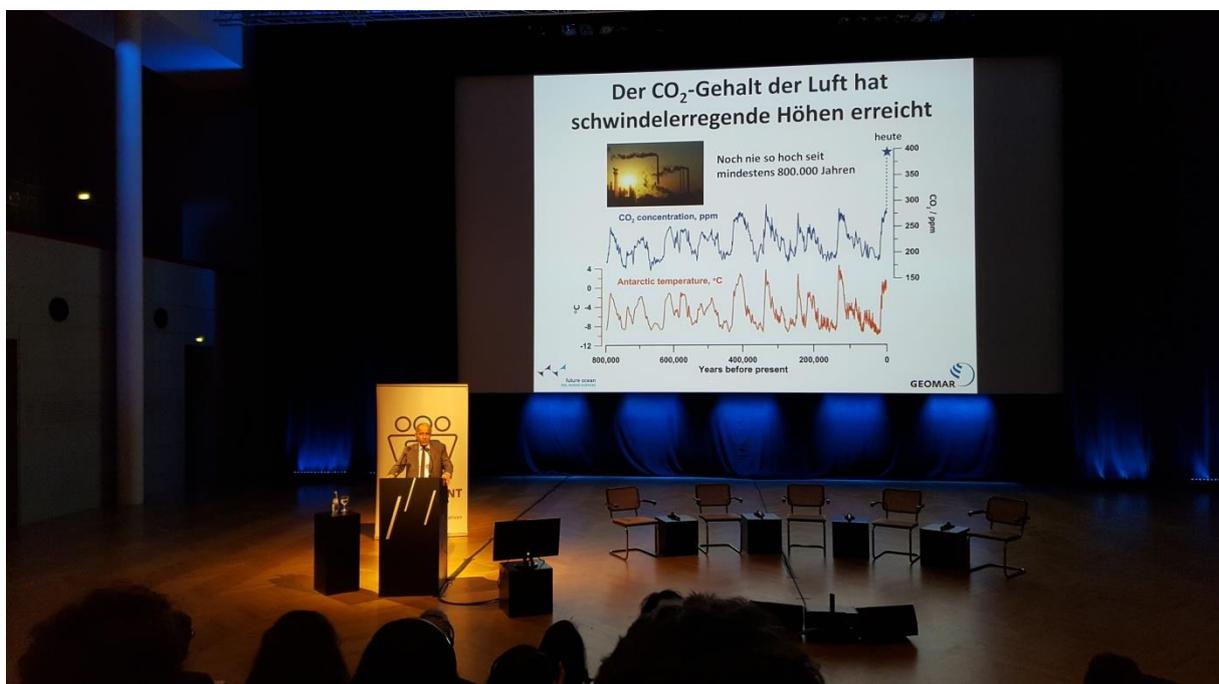


Photo credit: Dr Peter Kührt

*Lecture by Professor Mojib Latif at the 2017 World Climate Conference in Bonn,
Symposium by Engagement Global on 14 November 2017 at the Bundeskunsthalle Bonn*

Link tip:

Intergovernmental Panel on Climate Change: Summary for policy makers
http://ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_SPM_FINAL.pdf



Photo credit: Dr Peter Kührt

You are a team of young, critical scientists. You are now expected to form an opinion about issues facing humanity in the future.

Watch the video clip “The future (2014)” and answer the following questions in working groups. Write down the answers in keywords. Visualisation is not necessary. The results of the working groups will then be presented orally in turn and put up for discussion.

Video clip: <http://www.mediatheque.lindau-nobel.org/videos/34259/the-future>

Exercises:

1. Nobel laureate Christian de Duve says: “If we let things go, we are doomed!” What does he mean by that?
2. How does Nobel laureate Hartmut Michel intend to solve people’s energy problems – and why does Nobel laureate Robert Laughlin consider this idea unrealistic?
3. The energy problem is also a climate problem. It is not only Nobel laureate Steven Chu who says this; now almost all climate experts say it. Which arguments do both US President Donald Trump and Nobel laureate Ivar Giaver use to contradict this assumption?
4. What is your personal view on climate change?