100 XP

Principle: Carbon efficiency

2 minutes

https://www.microsoft.com/en-us/videoplayer/embed/RWwJFI?postJsllMsg=true

This video's content is still valid, but the principle numbers might differ due to the Green Software Foundation's principle renumbering.

Working with sustainability means different things to different people, which presents a challenge when it comes to communication and deciding what to optimize. For Sustainable Software Engineering, our focus is carbon, and that's why we start with the principle to build applications that are *carbon efficient*.

What's carbon?

Greenhouse gases (GHG) act as a blanket that increases the Earth's temperature, which is a natural phenomenon. However, human activities change the global climate considerably faster than animals and plants can adapt. How human society will adapt is still an open question.

There are many different GHGs. The most common GHG emitted through human activity is carbon dioxide (CO_2). To make calculations more manageable, we normalize all GHG numbers to *carbon dioxide equivalent* (CO_2eq). For example, one ton of methane has the same warming effect as about 25 tons of CO_2, so we normalize it to 25 tons CO_2eq. We might shorten it to just **carbon**, which often refers to all GHGs.

Net-zero carbon targets

The UN IPCC set a goal that 195 states in the Paris Climate Agreement agreed to and ratified. The agreed target is to reduce carbon pollution so that the temperature increase stabilizes to a 1.5°C increase by 2100 when compared to preindustrial levels.

The Earth's temperature increase depends on the total amount of carbon we have in the atmosphere, not the rate at which we're emitting. To completely halt the rate of temperature increase, we need to stop adding carbon to the atmosphere or achieve net-zero emissions.

Net-zero means that for each gram of carbon we emit, we also extract one gram so the overall mass of carbon in the atmosphere remains fixed.

To achieve this goal, we need to start immediately reducing our carbon emissions to a 45% reduction by 2030 and reach net-zero by 2050.

Don't waste carbon

We always emit carbon through our activities; our goal is that for each gram of carbon we emit into the atmosphere, we make sure we extract the most value from it as possible.

Being *carbon-efficient* means to minimize the amount of carbon emitted per unit of work.

As engineers, our part in the climate solution is building carbon-efficient applications. Being carbon-efficient is about building applications that add the same value for you or your users but emit less carbon.

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