



# Combat Climate Change with Green Code

Janne Kalliola

Photo by Niilo Isotalo on Unsplash

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# Contents

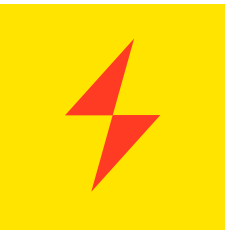
- 1 About me and my book
- 2 The exploding IT carbon footprint
- 3 How software consumes energy
- 4 What is “green code”
- 5 What you can do about it?
- 6 Final words



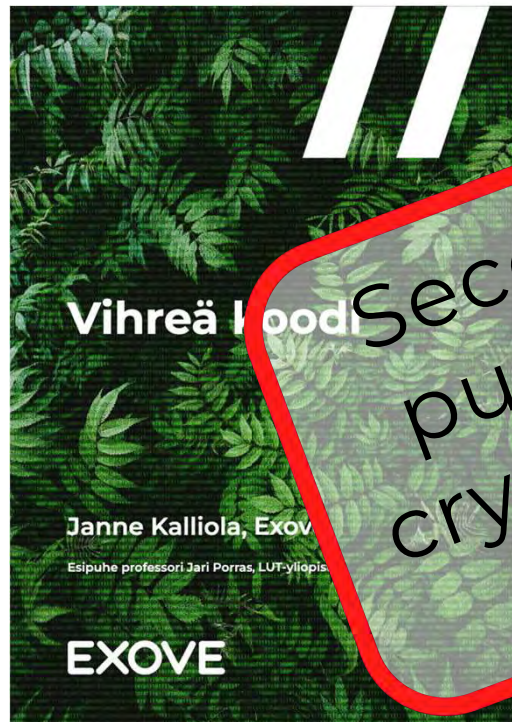
## About Myself

- Janne Kalliola, Chief Growth Officer and founder of Exove
- Have been coding since 1983 – Basic, Pascal, Lisp, Fortran, C/C++/Obj-C, Java, PHP, JavaScript
- Now focusing on growth of Exove, a leading open web technology company delivering digital growth
- Working with green coding and carbon neutrality for a few years now



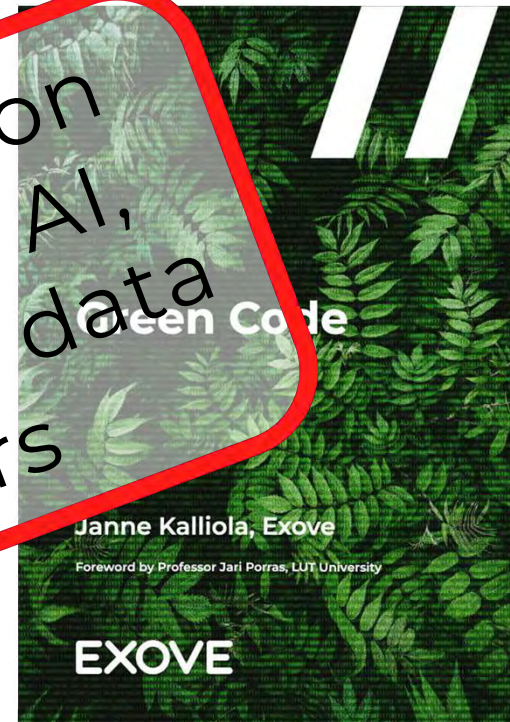


# My Book



[exove.com/fi/vihrea-koodi](https://exove.com/fi/vihrea-koodi)

Second edition  
published – AI,  
cryptos, IoT, data  
+ others



[exove.com/green-code](https://exove.com/green-code)

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# The Exploding IT Carbon Footprint

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The ICT sector accounts for 4–10% of the world's energy consumption<sup>1)</sup> and 2.1–3.9% of greenhouse emissions<sup>2)</sup>.

**The numbers are growing.**

<sup>1)</sup> Ministry of Transport and Communications: Climate and environmental strategy for the ICT sector.

<sup>2)</sup> The real climate and transformative impact of ICT: A critique of estimates, trends, and regulations



3.0% of global  
carbon emissions<sup>1)</sup> =  
1 580 000 000 tons  
Every year.

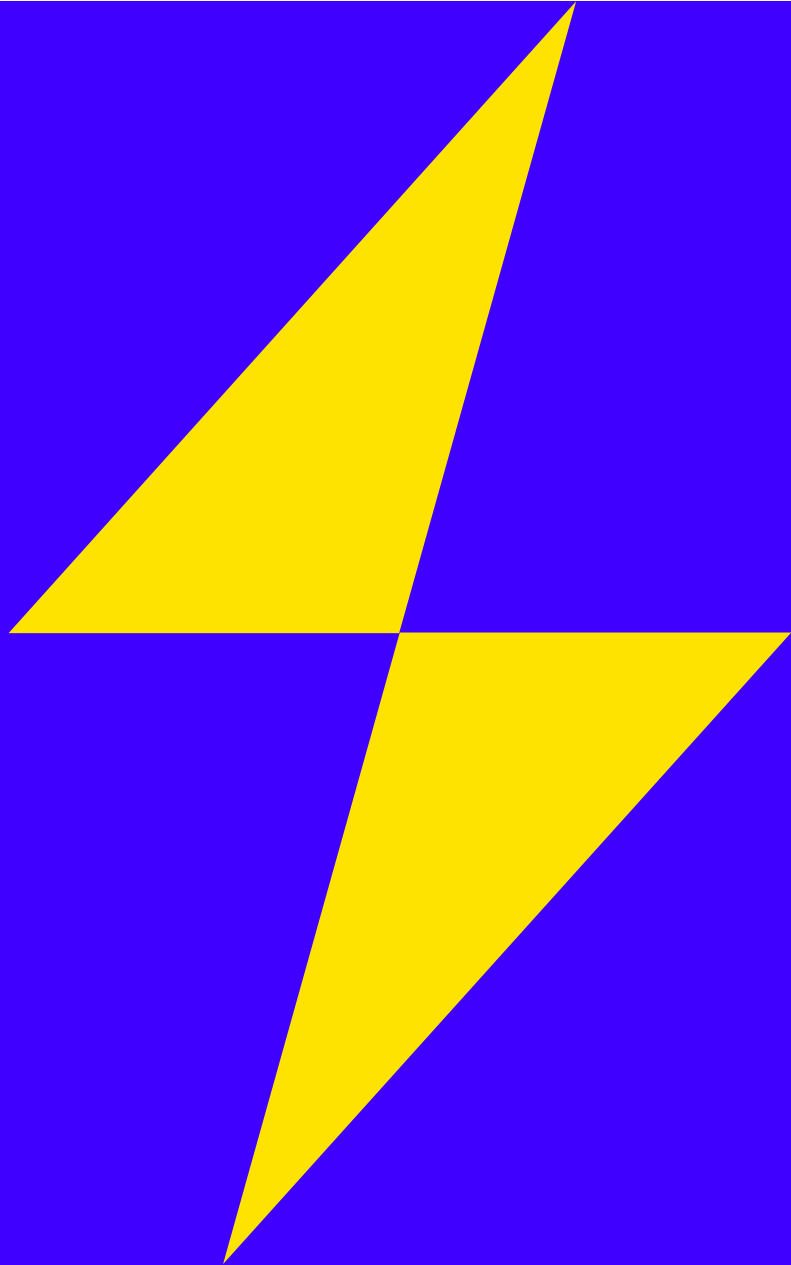
<sup>1)</sup> Global emissions 58.2Gt from UN Emissions Gap Report 2022



For the sake of perspective, this is about the mass of all land mammals and people.<sup>1)</sup>

<sup>1)</sup> <https://energyeducation.ca/encyclopedia/Gigatonne>



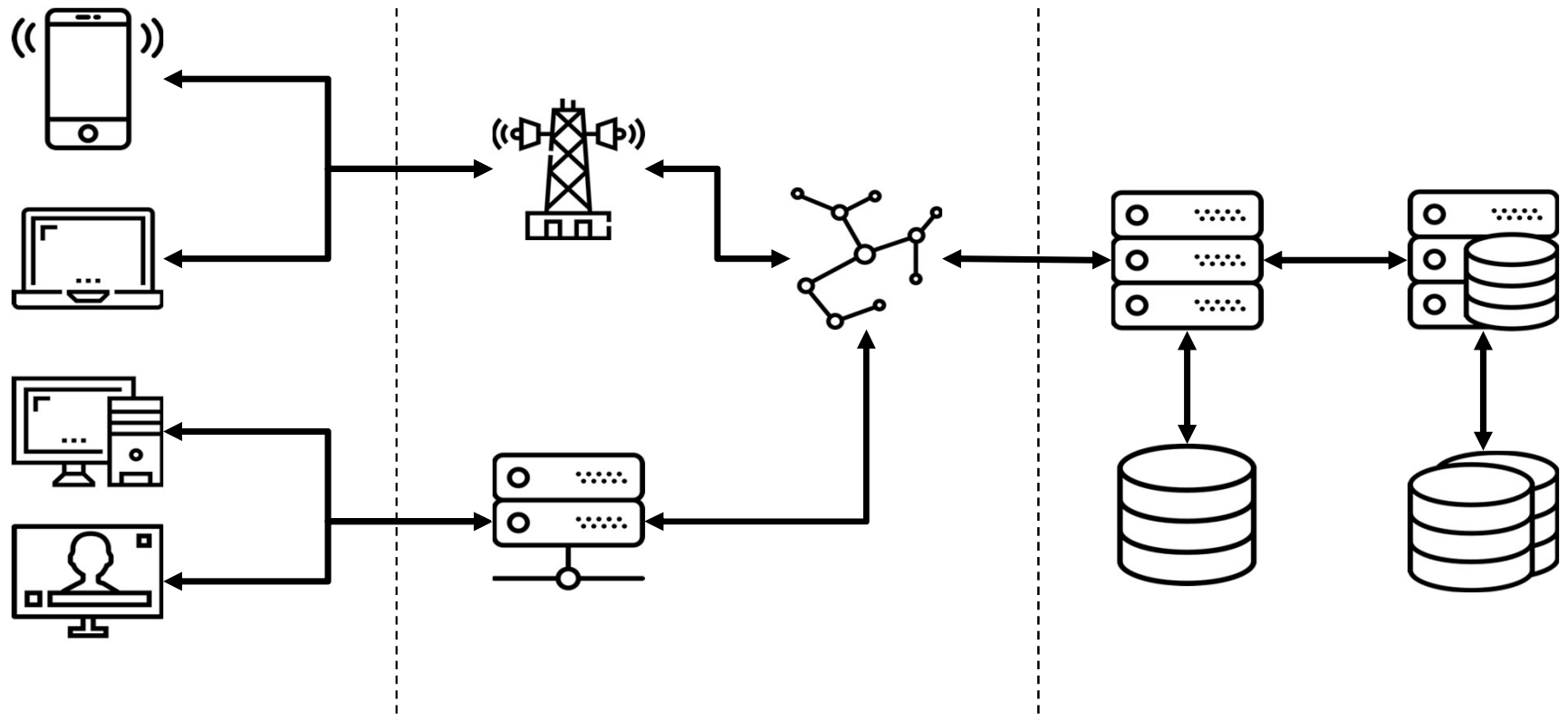


# How Software Consumes Energy

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# Generic Architecture of Modern Software



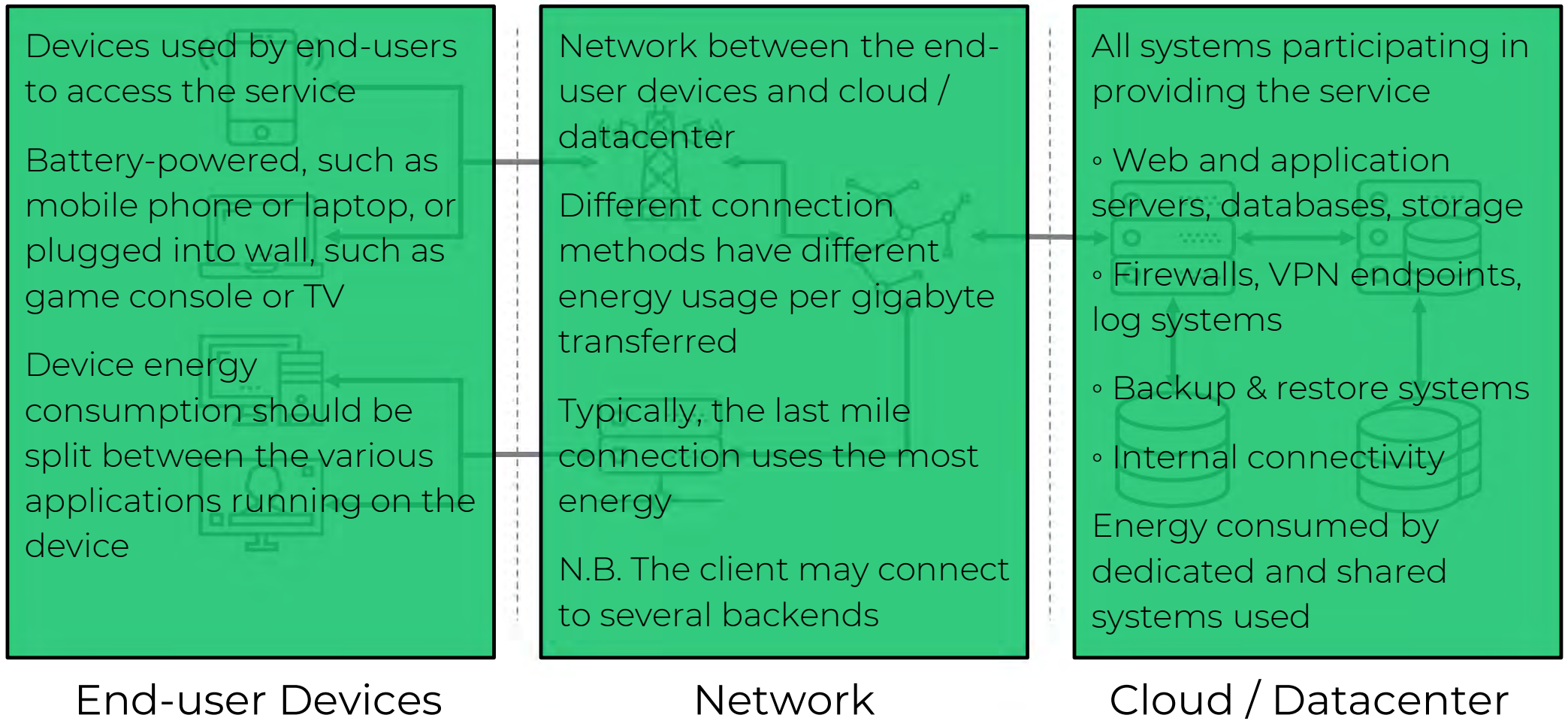
End-user Devices

Network

Cloud / Datacenter



# Generic Architecture of Modern Software





# Energy Consumption

Electricity consumption of the CPU, GPU, display, network connection, GPS, etc.

Typically very optimised hardware when devices are battery-powered

Not so when the device is plugged to a wall socket

The screen is the biggest hog of energy in mobile devices

End-user Devices

Electricity consumption of data transferred

Typically calculated on energy used per gigabyte

Varies a lot between the various types of networks – 10,000 times efficiency differences (mobile vs. optic fibre)

Network

Electricity consumption of servers, storage, and internal network

Optimised hardware, designed to be run with a full throttle all the time



Cloud / Datacenter





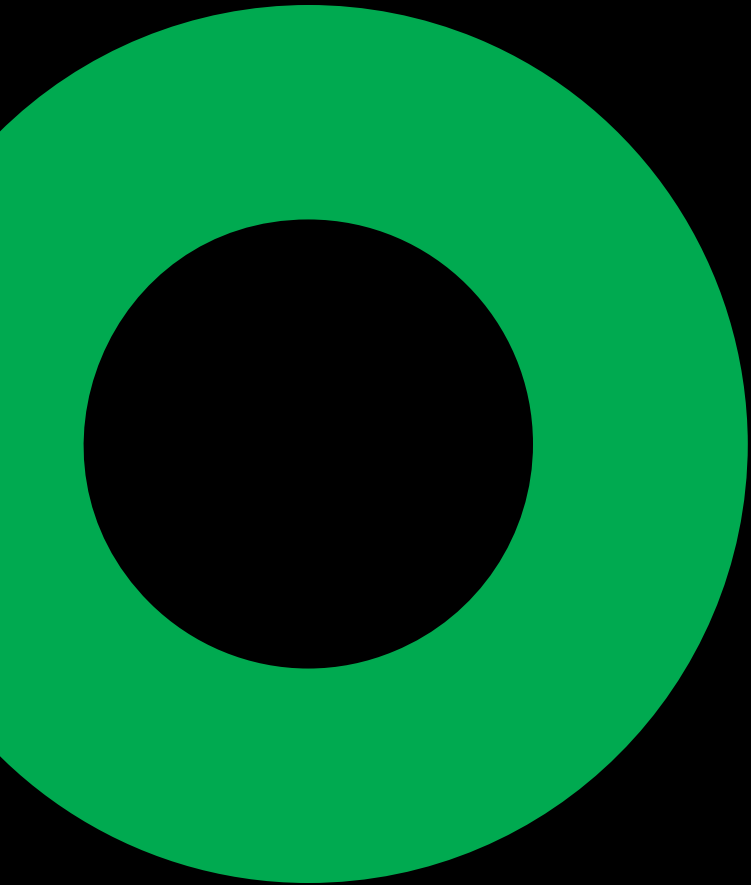
Software needs hardware to run.

Hardware causes emissions during its lifecycle.

Hardware needs electricity, and the emissions depend on the type of energy.

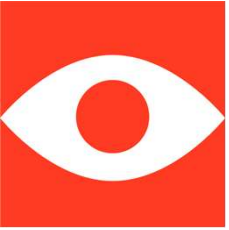
Energy production causes emissions, including also renewables.

Thus, it is paramount to save energy.



# What Is Green Code

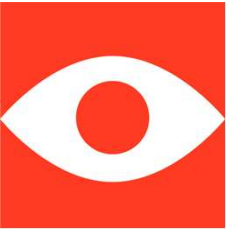
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# Green Code

Green code is like any other code, but it takes also the environmental aspects into consideration.

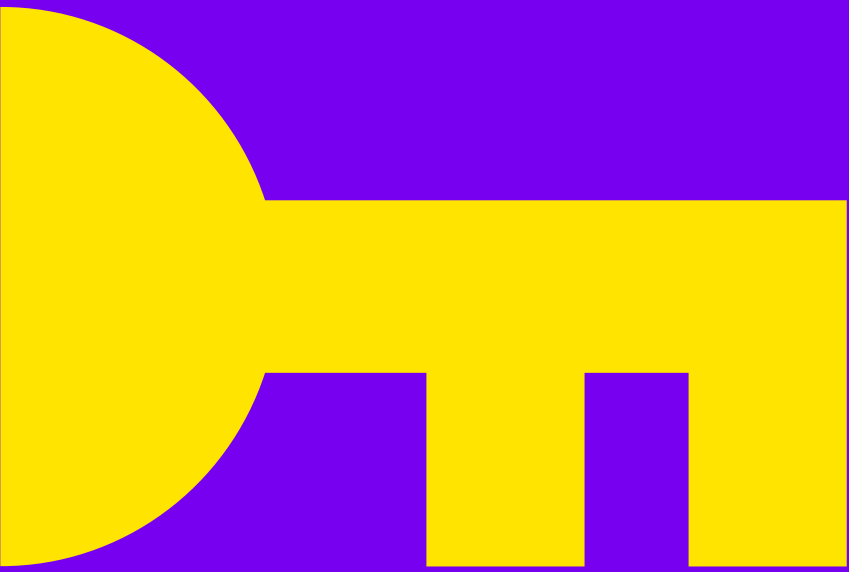
- Efficient and optimised
- Focused on valuable actions
- Does not waste energy to something invaluable
- Hosted in green datacenters
- Could also alter its functionality based on electricity price



- The less execution time is spent, the less energy is consumed.<sup>1)</sup>
- The less data is transferred, the less energy the network uses.
- The less hardware is used, the less emissions are caused.

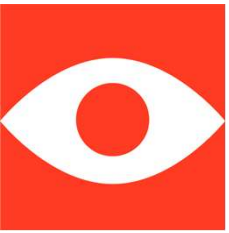
<sup>1)</sup> Ranking Programming Languages by Energy Efficiency



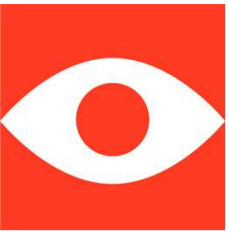


What You  
Can Do  
About It?

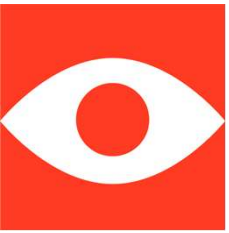
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Impact above all.

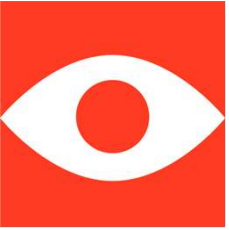


The **more popular**  
your software is,  
the **more impact** your  
changes have.



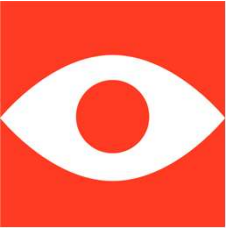
The **more popular**  
your software is,  
the **more responsibility**  
you have.





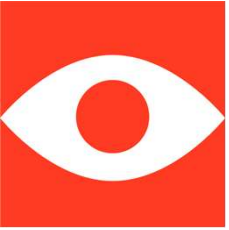
# Developers

- Take the matter seriously and take action accordingly.
- Find out how your application consumes energy and identify the best locations to implement energy-saving changes.
- Minimise data transmission and storage needs.
- Challenge product owners and designers when they propose new features.
- If you are a senior level developer, provide guidance to less experienced developers and help them understand problems and appropriate solutions.



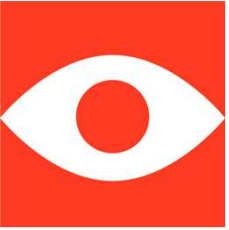
# Designers

- Understand both the business needs and the user's wishes. Try to solve these potentially conflicting requirements efficiently.
- Minimise the user's chances of making mistakes.
- Think about what the most minimal solution would be.
- Actively discuss the energy consumption of your designs with software developers.
- Try to eliminate problems that require new code entirely rather than finding solutions to them.



# Procurement

- Get carbon-wise digital partners. Demand implementations that respect the environment from them.
- Investigate how your digital solutions impact the environment and adjust them as needed.
- Look at the entire value chain, don't sub-optimize.
- Don't greedily try to do everything at once.
- Establish procurement criteria suitable for your organisation to evaluate sustainability in general and carbon neutrality and green coding in particular.



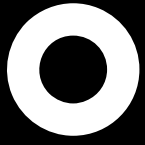
# Users

- Identify the time you spend with applications. Reduce application use if possible.
- Reduce watching videos.
- Decrease the frequency of updating your devices and take good care of them.
- Don't use bitcoin and similar energy-wasting solutions. Remember that not all digital solutions are automatically better than analog or previously used ones.
- Use small idle moments for dreaming. Tolerate boredom.



# Final Words

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# This Is a Journey

- Do not expect that all changes can be done at once.
- Instead, we need to keep the client – internal or external – needs in primary focus, and operate within agreed budgets.
- Satisfied clients allow us to make more changes to the systems, including also making it more energy efficient, than dissatisfied clients.
- Do not set too ambitious goals or try to gobble everything up at once.

Photo by Todd Trapani on Unsplash

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A photograph of a dense forest with many thin trees and lush green foliage. In the center, there is a wooden signpost with a flat top. The text is overlaid on the left side of the image.

The most important  
thing in starting a  
journey is to take  
the first step.





[exove.com/fi/vihrea-koodi](https://exove.com/fi/vihrea-koodi)



[exove.com/green-code](https://exove.com/green-code)

Let's discuss  
during the  
next break.

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