

# Opt In? Opt Out? Opt Green!

## KDE Eco's New Sustainability Initiative



 @be4foss@floss.social

Akademy – 8 September 2024



Slides available under "talks":

<https://invent.kde.org/teams/eco/opt-green/>





# Opt Green: KDE Eco's New Sustainable Software Project

Inspired by the successes of the "Blauer Engel Für FOSS" (BE4FOSS) project and KDE's ongoing [Sustainable Software](#) goal, KDE Eco has begun a new initiative: "Opt Green: Sustainable Software For Sustainable Hardware" (German: *Nachhaltige Software Für Nachhaltige Hardware*).

Screenshot from :[https://eco.kde.org/blog/2024-05-29\\_introducing-ns4nh/](https://eco.kde.org/blog/2024-05-29_introducing-ns4nh/)

# Today's Presentation

- Part I — This Is NOT Fine!
- Part II — What About BE4FOSS?
- Part III — Opt In? Opt Out? Opt Green!
- Part IV — How To Contribute?



## Part I — This Is NOT Fine

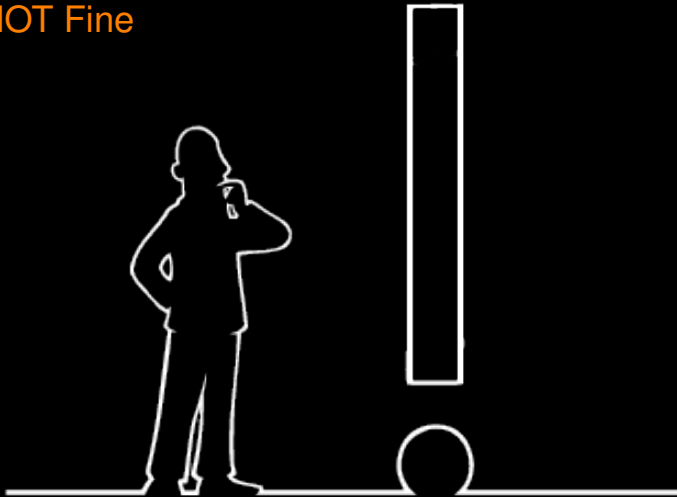


Image (modified) from Karanjot Singh published under a CC BY-SA 4.0 license:

<https://eco.kde.org/blog/2022-03-03-sok22-kde-eco/>

## This Is NOT Fine



The Observer  
Climate crisis

## 'Simply mind-boggling': world record temperature jump in **Antarctic** raises fears of catastrophe

An unprecedented leap of **38.5C** in the coldest place on Earth is a harbinger of a disaster for humans and the local ecosystem



**Robin McKie**  
Science editor

Sat 6 Apr 2024 16.00  
CEST



Screenshot (modified) from:

[theguardian.com/environment/2024/apr/06/simply-mind-boggling-world-record-temperature-jump-in-antarctic-raises-fears-of-catastrophe](https://theguardian.com/environment/2024/apr/06/simply-mind-boggling-world-record-temperature-jump-in-antarctic-raises-fears-of-catastrophe)



| A southern rockhopper penguin stands on a cliff on Marion Island, South Africa.

## Penguins are slow to evolve, making them vulnerable to climate change

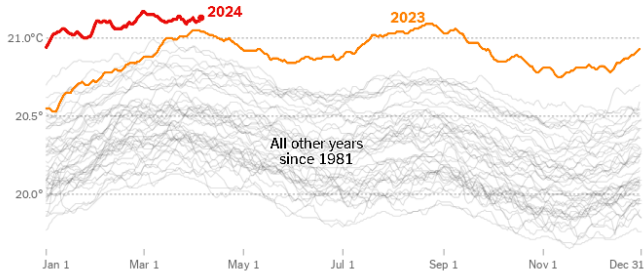
A sweeping study of extinct and living penguins shows the birds may not be able to keep up with the breakneck pace of modern warming.

By Rebecca Dzombak

July 19, 2022 • 6 min read

# *Ocean Heat Has Shattered Records for More Than a Year. What's Happening?*

Daily Global Sea Surface Temperatures



Screenshot (modified) from <https://www.nytimes.com/2024/04/10/climate/ocean-heat-records.html>

## *It's Been the Hottest Summer on Record, European Officials Say*

Sept. 5, 2024

The excessive heat worldwide suggests the full year will also be a record-breaker, according to Copernicus, the E.U. agency that tracks global warming.



Las Vegas has seen a particularly hot summer season. Wade Vandervort/Las Vegas Sun, via Associated Press



By Austyn Gaffney

WE'RE ALL MELTING —

# It's really f—ing hot, and it's really our fault

The hottest Northern Hemisphere summer on record follows climate-driven heat waves.

JOHN TIMMER · 9/7/2023, 8:08 PM



Mont Brucelle

Screenshot from :<https://arstechnica.com/science/2023/09/yes-this-year-is-as-hot-as-you-think-it-is/>

# "These Changes Are Not Natural"

**"Changes are emerging across  
the climate system.  
Everywhere we look, the climate  
is changing rapidly."**

Ed Hawkins, University of Reading, 18 Jan. 2023

[fediscience.org/@ed\\_hawkins/109710462146263953](https://fediscience.org/@ed_hawkins/109710462146263953)



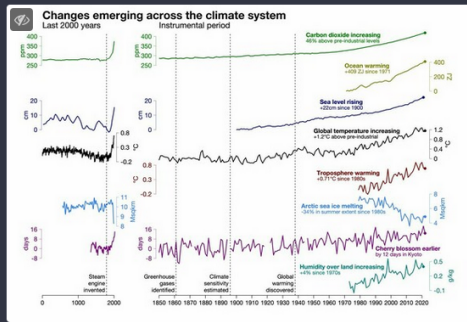
Ed Hawkins

@ed\_hawkins@fediscience.org

Changes are emerging across the climate system. Everywhere we look, the climate is changing rapidly.

Rate of recent changes is unprecedented in at least 2000 years for many climate metrics.

These changes are not natural; they are primarily caused by the burning of fossil fuels.





... To Let It Last This Long And Get This Bad

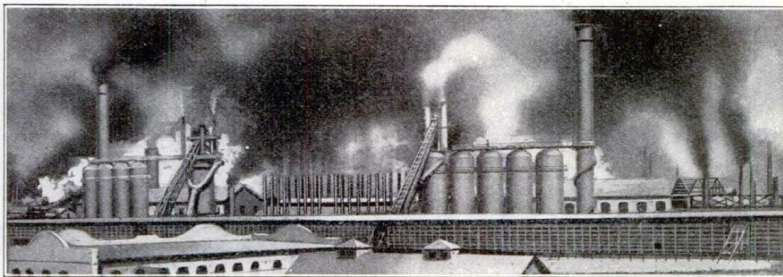


# 1912 – CO<sub>2</sub>: A “Blanket For The Earth”

March, 1912

POPULAR MECHANICS

341



The furnaces of the world are now burning about 2,000,000,000 tons of coal a year. When this is burned, uniting with oxygen, it adds about 7,000,000,000 tons of carbon dioxide to the atmosphere yearly. This tends to make the air a more effective blanket for the earth and to raise its temperature. The effect may be considerable in a few centuries.

***“[Adding CO<sub>2</sub>] tends to make the air a more **effective blanket** for the earth and to raise its temperature. This effect may be **considerable in a few centuries**.”*** – Popular Mechanics, 1912

[https://commons.wikimedia.org/wiki/File:191203\\_Furnaces\\_of\\_the\\_world\\_-\\_Popular\\_Mechanics\\_-\\_Global\\_warming.jpg](https://commons.wikimedia.org/wiki/File:191203_Furnaces_of_the_world_-_Popular_Mechanics_-_Global_warming.jpg)

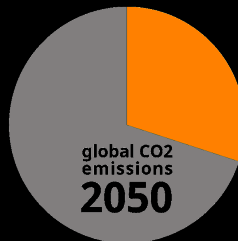
*“Computing can help mitigate climate change  
but must **first cease contributing** to it.”*



2,5 %



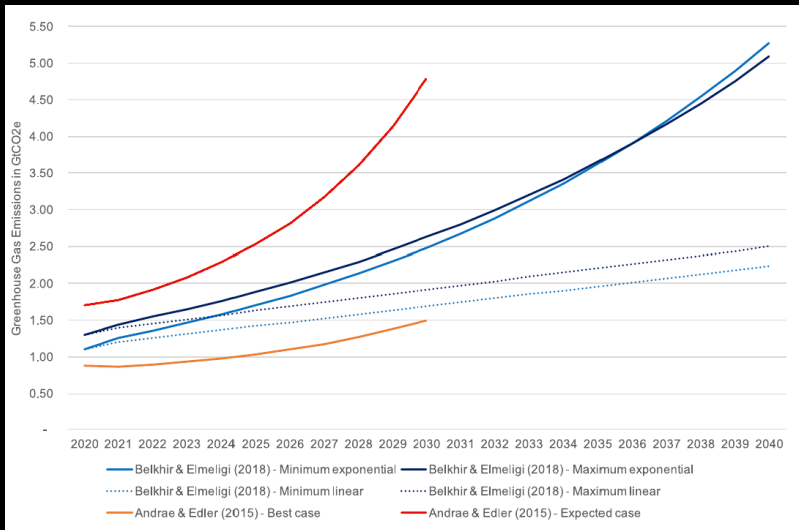
1,8 % - 3,9 %



30 %

ACM Tech Brief (2021): <https://dl.acm.org/doi/pdf/10.1145/3483410>

# All Estimates Go Up



Freitag et al. 2021: <https://www.sciencedirect.com/science/article/pii/S2666389921001884>

# Energy Consumption By ICT Sector

## WORLDWIDE ICT ELECTRICITY CONSUMPTION 8 TO 9% OF TOTAL

FIGURES FROM 2019 ~8.5%

WORLDWIDE ELECTRICITY CONSUMPTION ~23500 TWH

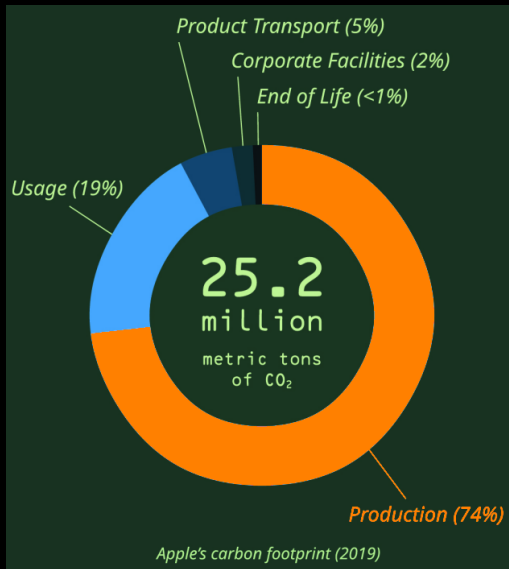
DATA CENTRES	~ 200	TWH
NETWORKS: INTERNET & RAN	~ 250	TWH
END USERS	~ 550	TWH
MANUFACTURING OF ICT	~1000	TWH
ICT ELECTRICITY CONSUMPTION	~ 2000	TWH

Table 1. Summary of the International Energy Agency's (IEA) estimates for the year 2019 of the electricity consumption (in terawatt-hours) worldwide by different sectors of ICT, namely data centers, networks including the radio access network and end users, and the manufacturing of ICT equipment, which represents roughly 50% of the total amount.

From: "Electricity Consumption by ICT: Facts, trends, and measurements" (2023, ACM):

<https://dl.acm.org/doi/pdf/10.1145/3613207>

# Apple's Carbon Footprint



# Carbon Footprint By Device

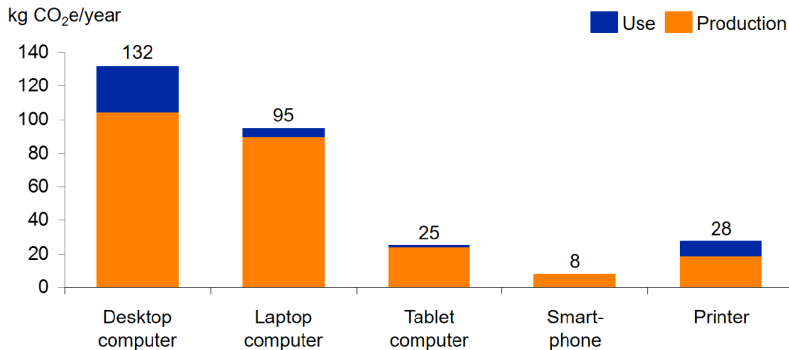


Figure 2: Average annual greenhouse gas emissions per end-user device during production and use by device type. The annual values of production emissions (grey) are based on current average useful lives of the devices.

From (modified): "Opportunities and Risks of Digitalization for Climate Protection in Switzerland" (2017):

[https://www.zora.uzh.ch/id/eprint/141128/10/Study\\_Digitalization\\_Climate\\_Protection\\_Summary\\_Oct2017.pdf](https://www.zora.uzh.ch/id/eprint/141128/10/Study_Digitalization_Climate_Protection_Summary_Oct2017.pdf)

# High Environmental Impact



Image by Muntaka Chasant: [https://en.wikipedia.org/wiki/File:Agbogbloshie,\\_Ghana\\_-\\_September\\_2019.jpg](https://en.wikipedia.org/wiki/File:Agbogbloshie,_Ghana_-_September_2019.jpg)



## And At Huge Social Costs, Including Human Rights Violations

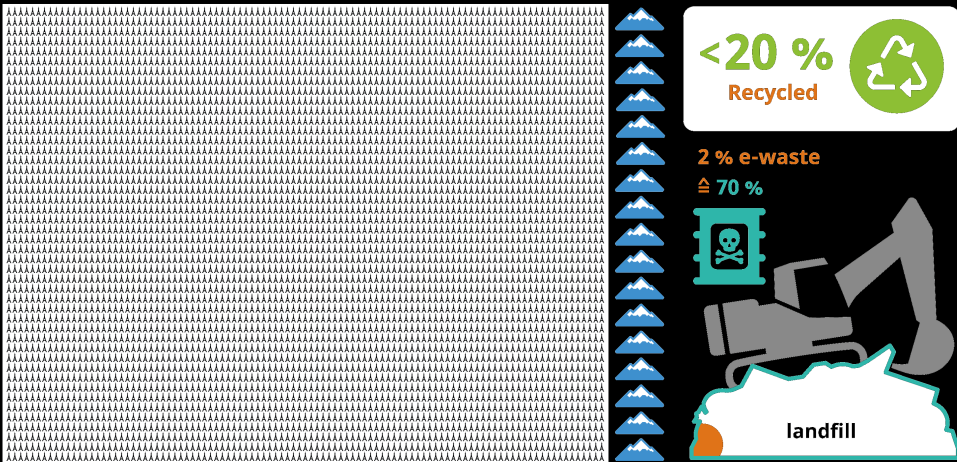


Photo of child labor in a cobalt mine in Congo from Thomas Coombes (CC BY-SA 3.0 DE)

Holding Companies Responsible (Supply Chain Due Diligence Act): <https://www.goethe.de/ins/id/en/kul/mag/22370005.html>

# “Tsunami Of E-Waste’, Achim Steiner, UNEP

**E-waste 2016 = 4500 Eiffel Towers = Height of 17 Mount Everests**



Based on report: <https://www.itu.int/en/ITU-D/Climate-Change/Documents/GEM%202017/Global-E-waste%20Monitor%202017%20.pdf>

## Part II — What About BE4FOSS



Image (modified) from Karanjot Singh published under a CC BY-SA 4.0 license:

<https://eco.kde.org/blog/2022-03-03-sok22-kde-eco/>

# Blauer Engel For Desktop Software (v. 4 2024)

FOSS For Sustainability

**Autonomy** and **Transparency** recognized  
as being crucial to sustainable software design!



## ABC of Certification Criteria



Resource &  
Energy Efficiency



Potential  
Hardware  
Operating Life



User  
Autonomy

## (A) Resource & Energy Efficiency

- Energy consumption (idle & standard usage)
- Minimum system requirements (CPU, working memory)
- Support for energy saving modes

## (B) Potential Hardware Operating Life

- Runs on hardware at least 5 years old

## (C) User Autonomy

- Uninstallability / Modularity (installing essential functions only)
- Continuity of support (security updates)
- Freedom from advertising / tracking
- Documentation (open standards, uninstallation how-to, privacy policy)
- Data formats / Transparency (open source/APIs open standards)

# The Environmental Problem Of Vendor Dependency

## Users Have Limited / No Choice

- **Proprietary Software**: Users have little influence over software they depend on
- **Bloatware / Feature Creep**: "Device doesn't meet minimum system requirements ..."
- **Abandonware / Planned Obsolescence**: "Device is no longer supported ..."

## Result

- **Use** – Increasing demands require **new, more powerful** devices
- **Dispose** – Functioning devices discarded as **e-waste**
- **Produce** – New devices **produced and shipped** unnecessarily

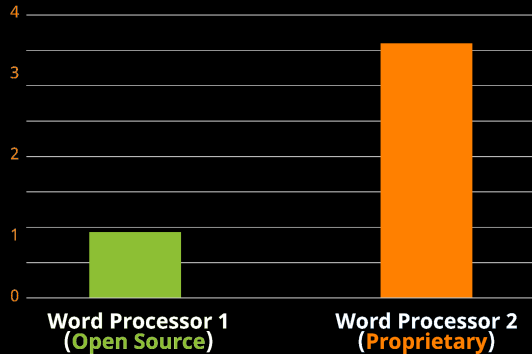
# Their Ads, Our Computing . . . Even When You Pay



Screenshot (modified) colors from: <https://www.pcworld.com/article/1668041/ads-in-the-windows-11-start-menu-are-definitely-coming.html>

# Increasing Demands & Energy Use

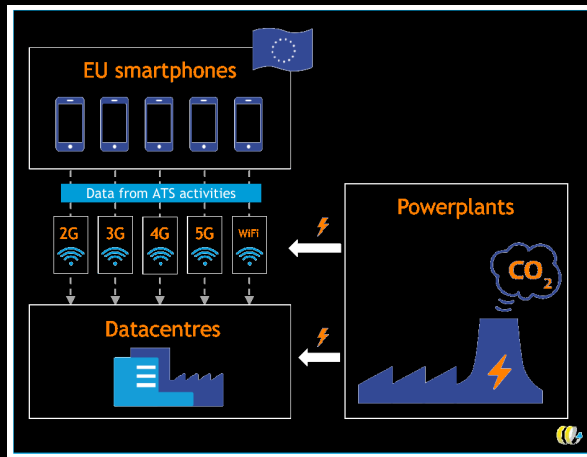
Watt-hours



Adapted from: <https://www.umweltbundesamt.de/publikationen/entwicklung-anwendung-von-bewertungsgrundlagen-fuer>



# No Opt Out For Ads/Tracking



Data from ATS = Ad / Tracking Services

Screenshot with modified colors from "Carbon footprint of unwanted data-use by smartphones: An analysis for the EU":  
[https://groenlinks.nl/sites/groenlinks/files/2021-09/CE\\_Delft\\_210166\\_Carbon\\_footprint\\_unwanted\\_data-use\\_smartphones.pdf](https://groenlinks.nl/sites/groenlinks/files/2021-09/CE_Delft_210166_Carbon_footprint_unwanted_data-use_smartphones.pdf)

# End Of Support Of Newer Hardware Is Driving E-Waste

## Windows 10 support ending means more e-waste

240 million PCs ineligible for Windows 11  
could become e-waste from October 2025



Incompatibility with Windows 11 prevents partners and ITAD firms from refurbishing and reselling still-viable PCs



Donating unsupported devices to disadvantaged communities globally presents challenges for digital equity



Microsoft will offer Extended Security Updates for Windows 10 from 2025 until 2028, but at an undisclosed annual cost

If all the PCs ineligible for Windows 11 were folded laptops stacked one on top of another, they would be 4,080km tall – 600km taller than the moon!



Source: Canalys estimates, PC Service and Sustainable Ecosystems Analysis, December 2023



From: <https://www.canalys.com/insights/end-of-windows-10-support-could-turn-240-million-pcs-into-e-waste>

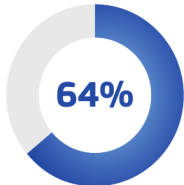
# And More E-Waste . . . And More CO2 And Toxic Pollution



From: <https://arstechnica.com/gadgets/2023/07/with-macos-sonoma-intel-macs-are-still-getting-fewer-updates-than-they-used-to/>

# Consumers May Be Aware Of The Problem, But Not A Solution!

Most respondents would like to keep using their current digital devices for at least 5 years



**37%**  
old device broke

Reason for purchasing a new device:



**30%**  
the performance  
of your old device had  
significantly deteriorated



**19%**  
certain applications  
or software stopped  
working on your old  
device

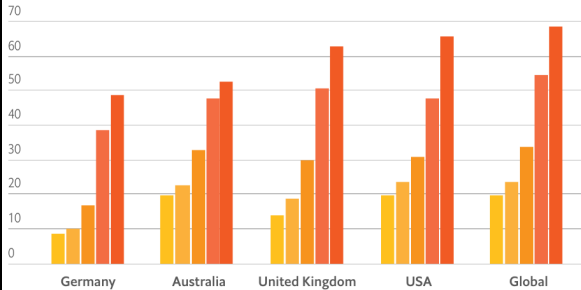
Screenshot (modified) from: <https://europa.eu/eurobarometer/surveys/detail/2228>

# Consumer Interest & Influence Is Up

## Shopping sustainably?

Google searches for sustainable products in the 'shopping' category. All countries. English. Index Value per Yearly average.

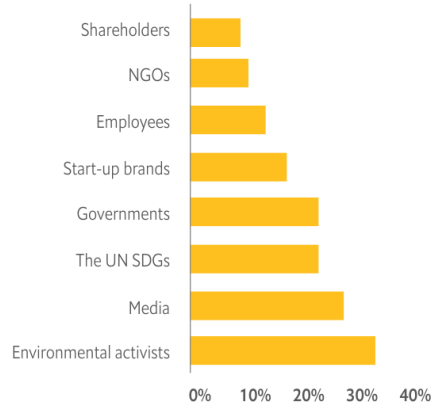
2016 2017 2018 2019 2020



Source: The EIU, Google Trends

## In the driver's seat: Consumers

What drives the focus on sustainability issues in the fashion and textile industry?



Source: EIU Survey, 2020.

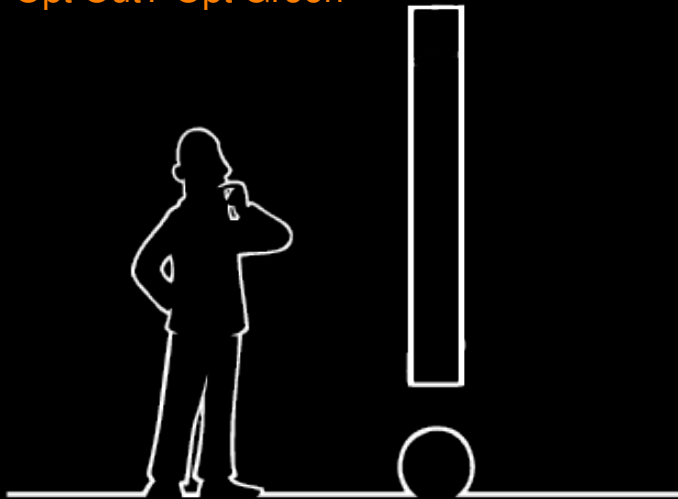
Screenshots from: <https://www.worldwildlife.org/publications/an-eco-wakening-measuring-awareness-engagement-and-action-for-nature>

# How Many Consumers Know About The Blue Angel For Software?

And the role **software** plays in hardware longevity!



## Part III — Opt In? Opt Out? Opt Green



# Focus On Eco-Consumers



Images from Karanjot Singh  
Images from Karanjot Singh

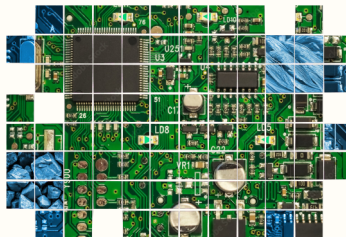


## Visuals: Imagery

Image selection emphasizes the physical world and human connection within the context of technology. Sample image types include hardware, nature, natural resources, people, and communities.

Images are framed in simple hand-drawn shapes to emphasize tactility and the human touch. They are sometimes colorized in dark versions brand's primary colors to unify disparate images and styles.

Images can be used in isolation or be composed into collages with other images and elements. A pixel-based structure, inspired by computer screens, can be used as a foundation for larger collages.



See : <https://invent.kde.org/teams/eco/opt-green/-/blob/master/organizational/brand/opt-green-branding-proposal.pdf>

# Revamped Website – eco.kde.org



## Be Green

Opt in to lower energy demands, extended hardware life, device independence, and user control for a healthier digital society.

[Learn More](#)



## Grow Green

Build communities and user support networks to bring the benefits of independent, sustainable software to your hometown.

[Learn More](#)

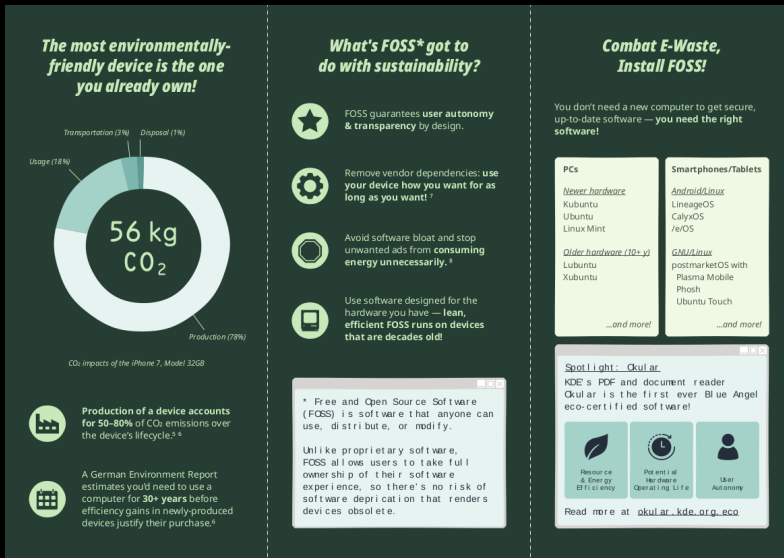


## Make Green

Develop applications and software features with a focus on efficiency and sustainability for this and future generations.

[Learn More](#)

# Campaigns & Advertisements – To Combat E-Waste With FOSS



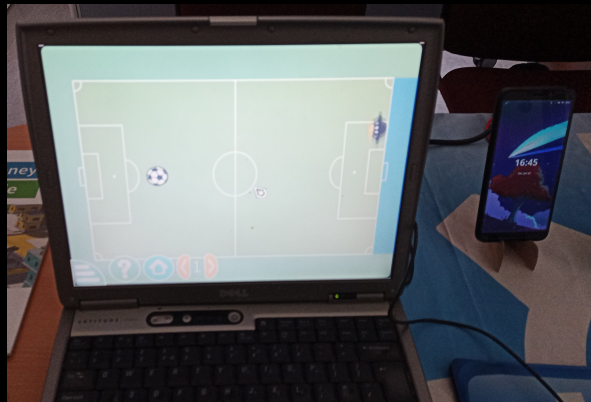
Leaflet (KDE CC BY-SA 4.0; design Anita Sengupta): <https://invent.kde.org/teams/eco/ns4nh/-/issues/1>

# Eco-Festivals, Open-Air Markets, Organic Shops



From: <https://www.umweltfestival.de/social-media-kits/>

# Eco-Festivals, Open-Air Markets, Organic Shops



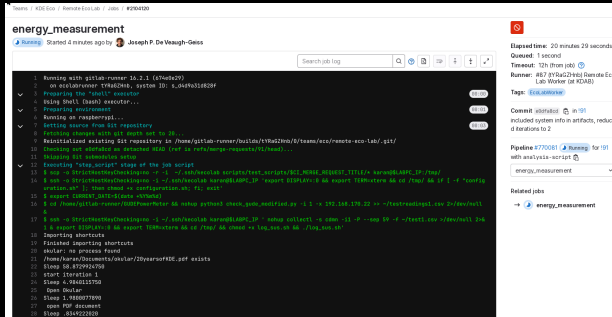
# Demo (Unsupported) Hardware Running Free Software

FOSS already **excels** in this space, by design . . . and it is a blue ocean!



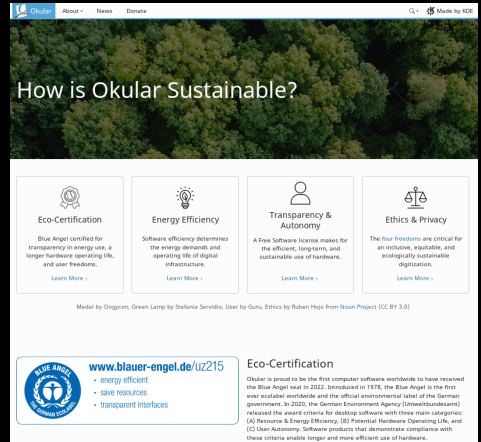
Image (CC BY-SA 4.0) from Raimond Spekking: [https://upload.wikimedia.org/wikipedia/commons/6/65/Apple\\_MacBook\\_Pro%2C\\_model\\_A1278-8109.jpg](https://upload.wikimedia.org/wikipedia/commons/6/65/Apple_MacBook_Pro%2C_model_A1278-8109.jpg)

# Visibility – Energy Measurements & Sustainability Documentation



```
1 Running with gitlab-runner 16.2.1 (6740dc29)
2 on ec2labrunner-tyR6d2H6, system ID: s.0469a316828f
3 Preparing the "shell" executor
4 Using Shell (bash) executor...
5 Preparing environment
6 Running on raspberrypi...
7 Getting source from Git repository
8 Fetching changes with git, using ref: to 28...
9 Reinitialized existing Git repository in /home/gitlab-runner/builds/tyR6d2H6/6/team/eco/remote-eco-lab/.git/
10 Checking out ab6f4d6c as detached HEAD (ref is refs/heads-requests/01/team)...
11 Relating Git submodules setup
12 Executing "setup_script" stage of the job script
13 $ cd -> $PWD=$(pwd)
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```


Screenshot KEcoLab



## How is Okular Sustainable?

- Eco-Certification**  
Blue Angel certified for transparency in energy use, a longer hardware operating life, and user freedoms.  
[Learn More >](#)
- Energy Efficiency**  
Software efficiency determines the energy demands and operating life of digital infrastructure.  
[Learn More >](#)
- Transparency & Autonomy**  
A Free Software license makes for the efficient, long-term, and sustainable use of hardware.  
[Learn More >](#)
- Ethics & Privacy**  
The four freedoms are critical for an inclusive, equitable, and ecologically sustainable digitization.  
[Learn More >](#)

Medial by Ongccro, Green Lamp by Stefania Servidio, User by Guru, Ethics by Ruben Hojo from Noun Project (CC BY 3.0)

 [www.blauer-engel.de/uz215](https://www.blauer-engel.de/uz215)

- energy efficient
- save resources
- transparent interfaces

### Eco-Certification

Okular is proud to be the first computer software worldwide to have received the Blue Angel seal in 2022. Introduced in 1978, the Blue Angel is the first ever ecolabel worldwide and the official environmental label of the German government. In 2020, the German Environment Agency (Umweltbundesamt) released the award criteria for desktop software with three main categories: (A) Resource & Energy Efficiency, (B) Potential Hardware Operating Life, and (C) User Autonomy. Software products that demonstrate compliance with these criteria enable longer and more efficient use of hardware.

Screenshot (design Anita Sengupta): <https://okular.kde.org/eco/>

# Upcycling Workshops – In Culture Centers

## Fincan

19 APR

**Familienchor im Körnerkiez**

🕒 2024-04-19 @ 16:30 - 2024-04-19 @ 18:00

📍 Fincan

19 APR

**Workshop zum Verkehrskonzept im...**

🕒 2024-04-19 @ 18:15 - 2024-04-19 @ 19:30

📍 -

19 APR

**Küfa – Küche für Alle**

🕒 2024-04-19 @ 19:30 - 2024-04-19 @ 21:00

📍 Fincan, Altenbraker Str. / Ecke Nogatstr.

20 APR

**Shag Jam Berlin April**

🕒 2024-04-20 @ 15:00 - 2024-04-20 @ 18:00

20 APR

**\*Sore Thumbs Speed Dating\***

🕒 2024-04-20 @ 20:00 - 2024-04-20 @ 23:45

21 APR

**Fluentbody Workshop**

🕒 2024-04-21 @ 11:00 - 2024-04-21 @ 13:00

Screenshot (modified) from: <https://fincan.eu/veranstaltungen/#events>



... And Schools



See: <https://engineering.upvest.co/posts/sponsoring-future-engineers/>

# Good For The Environment – Good For Penguins

And Gnus and Geckos ... and Dragons

ars TECHNICA

Linux market share passes 4% for first time;  
macOS dominance declines



Screenshot (modified) from <https://arstechnica.com/gadgets/2024/03/linux-continues-growing-market-share-reaches-4-of-desktops/>

## Part IV — How To Contribute



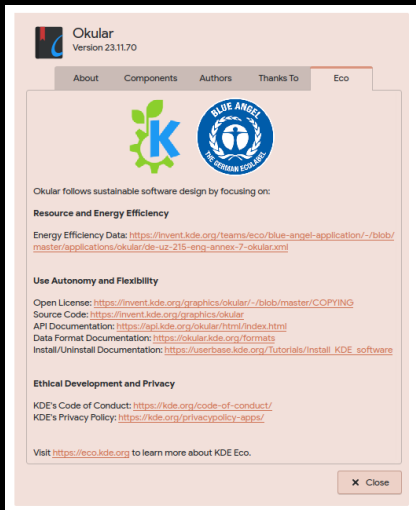
# Opt Green BoF!

## Monday, 10h, Room 2

### Topics

- **Design** – promotional materials, advertisements, website
- **Documentation** – Eco tab in About dialogue, minimal system requirements
- **Workshops/Campaigns** – organize in your home town, oldest hardware competition
- **Marketing** – measuring and comparing software products
- **Translation** – Opt Green infoflyers, pamphlets, etc.

# Contributor Invite – Visibility With Eco Tab



## Opt Green BoF

Monday, 10h, Room 2

<https://invent.kde.org/teams/eco/sustainable-software-goal/-/issues/2>

## Contributor Invite – Design

# Opt Green BoF

Monday, 10h, Room 2



Images from Karanjot Singh

# Measurement BoF!

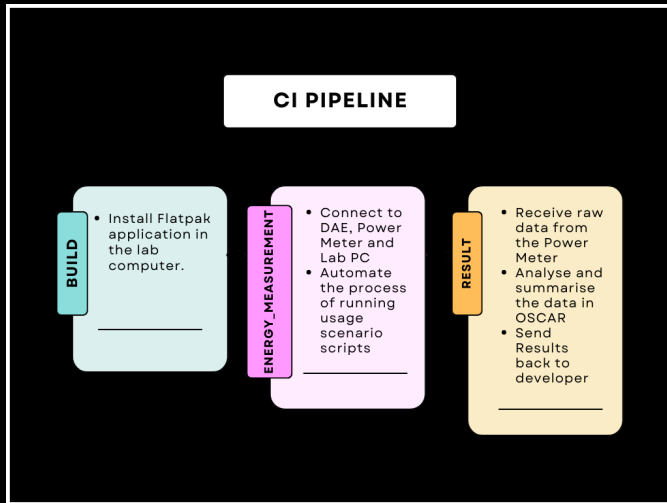
## Monday, 15h, Room 2

### Topics

- **KDE Tooling** – KEcoLab / KdeEcoTest
- **External Tooling**– Eco-CI from Green Coding Solutions
- **Automation** – usage scenario scripting with KdeEcoTest, Selenium

## Measurement BoF

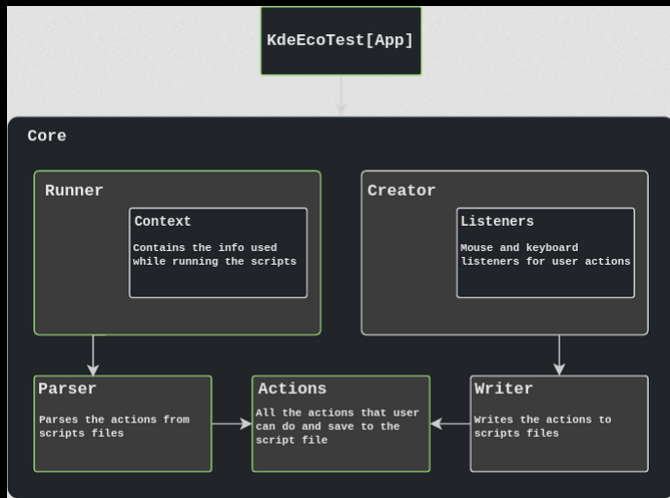
Monday, 15h, Room 2



Karanjot Singh <https://eco.kde.org/blog/2023-06-13-gsoc23-energy-measurement-lab/>



# Contributor Invite – KdeEcoTest Development



## Measurement BoF

Monday, 15h, Room 2

Mohamed Ibrahim <https://eco.kde.org/blog/2023-04-14-sok23-eco-tester/>

# Open Thoughts

- How low is **too low** for **minimum hardware requirements**?
- Can we **improve performance** on low spec hardware?
  - ▶ Document **what improves responsiveness, or resource usage**;
  - ▶ Have an automated system **identify your system's hardware bottlenecks**;
  - ▶ Connect these so when the biggest hardware bottleneck are identified, there's an **"optimize" button that eases the load** on the worst-performing system component.
- How do **LLMs**, etc. fit into this?
- **Which distro** with KDE Plasma is best for **new users**?
- Energy measurement **dashboard** for KDE developers?

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The publisher is responsible for the content of this publication.

Slides available under "talks":

<https://invent.kde.org/teams/eco/opt-green/>

