Kubernetes Emissions Insights: Turning Cloud-Native Green

And what can you do

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Flavia Paganelli

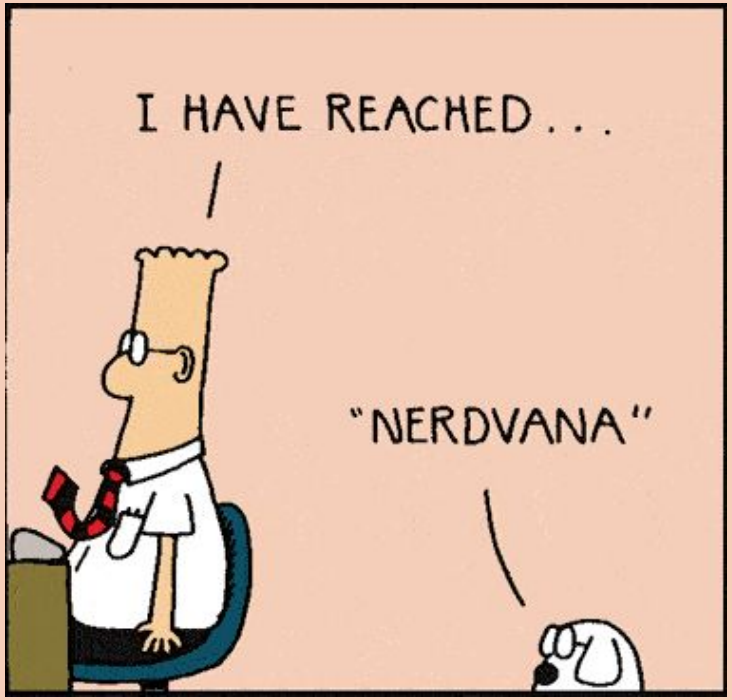
FOSDEM

Aknostic

One computer, one program... life was good!

Photo: wikipedia

A wake-up call



The bigger picture

Photo: The Guardian

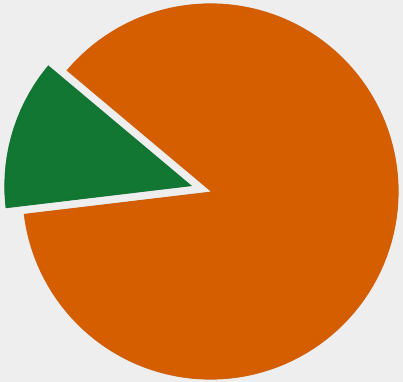
Photo: The Atlantic

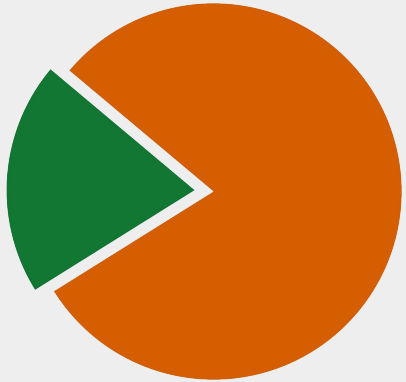
Photo: rnz.co.nz


Do we need all that?

Overprovisioning in Kubernetes clusters

only 13% CPU utilised





only 20% memory utilised

Source: study by cast.ai in 2024

Using the right tools you can reduce your waste

KEIT

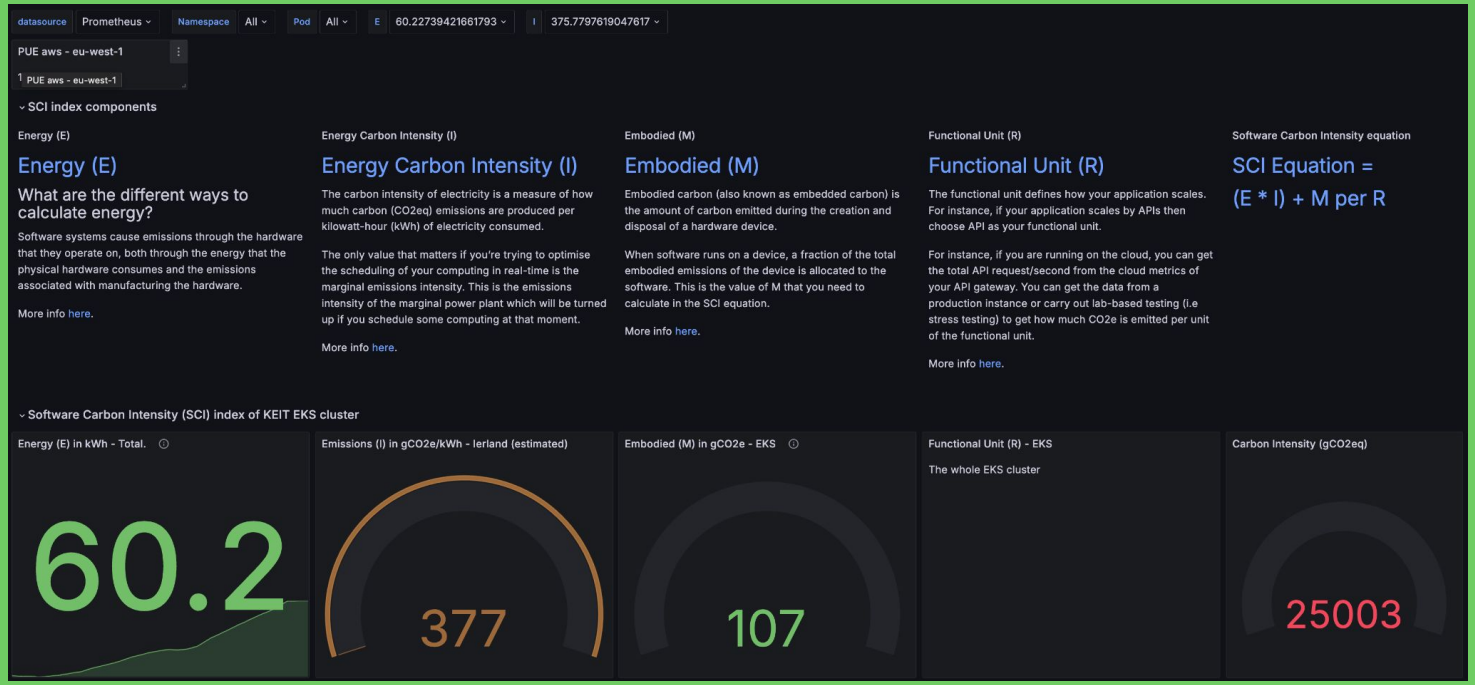
Green Reviews

Autoscaling

Right-sizing,

Time shifting

Insights from KEIT - the dashboard



https://github.com/aknostic/keit

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KEIT dashboard

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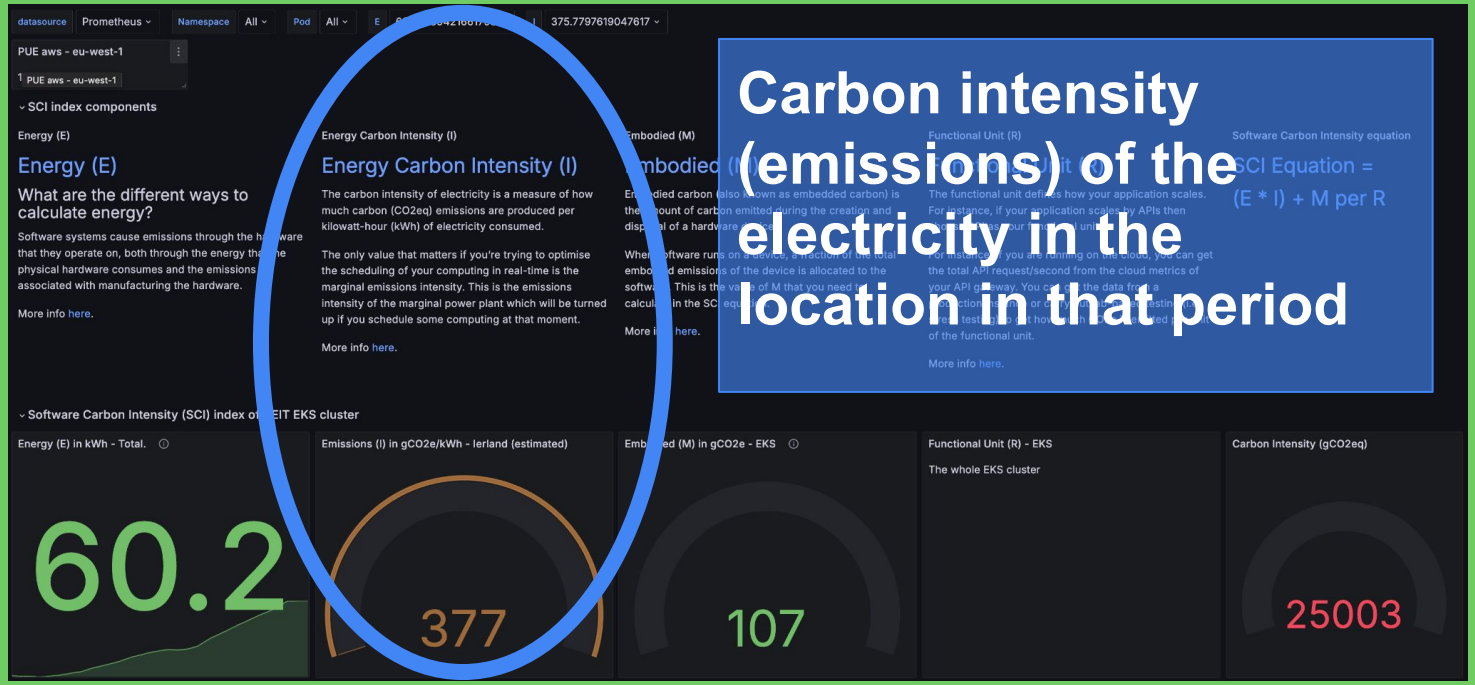
KEIT dashboard



https://github.com/aknostic/keit

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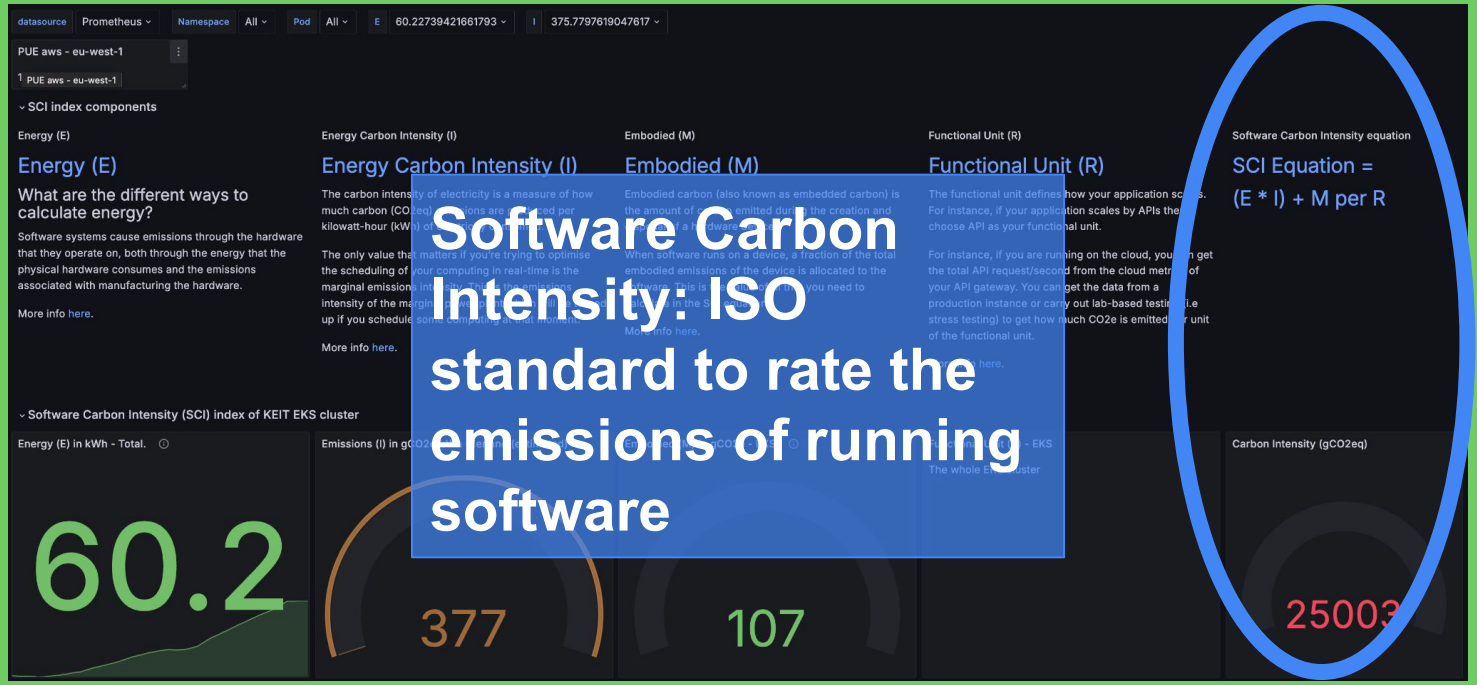
KEIT dashboard

Embodied emissions: generated during production, transportation and discarding of the servers

https://github.com/aknostic/keit

FOSDEM

KEIT dashboard



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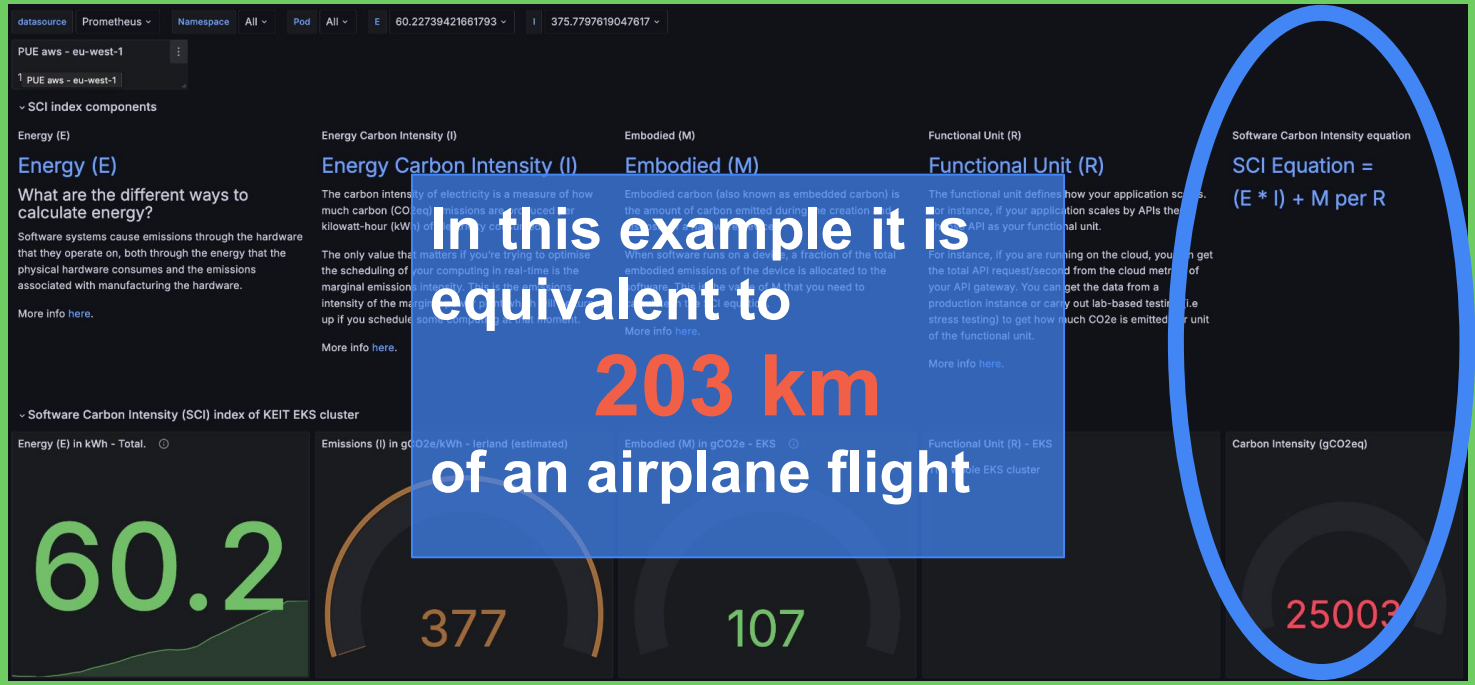
KEIT dashboard



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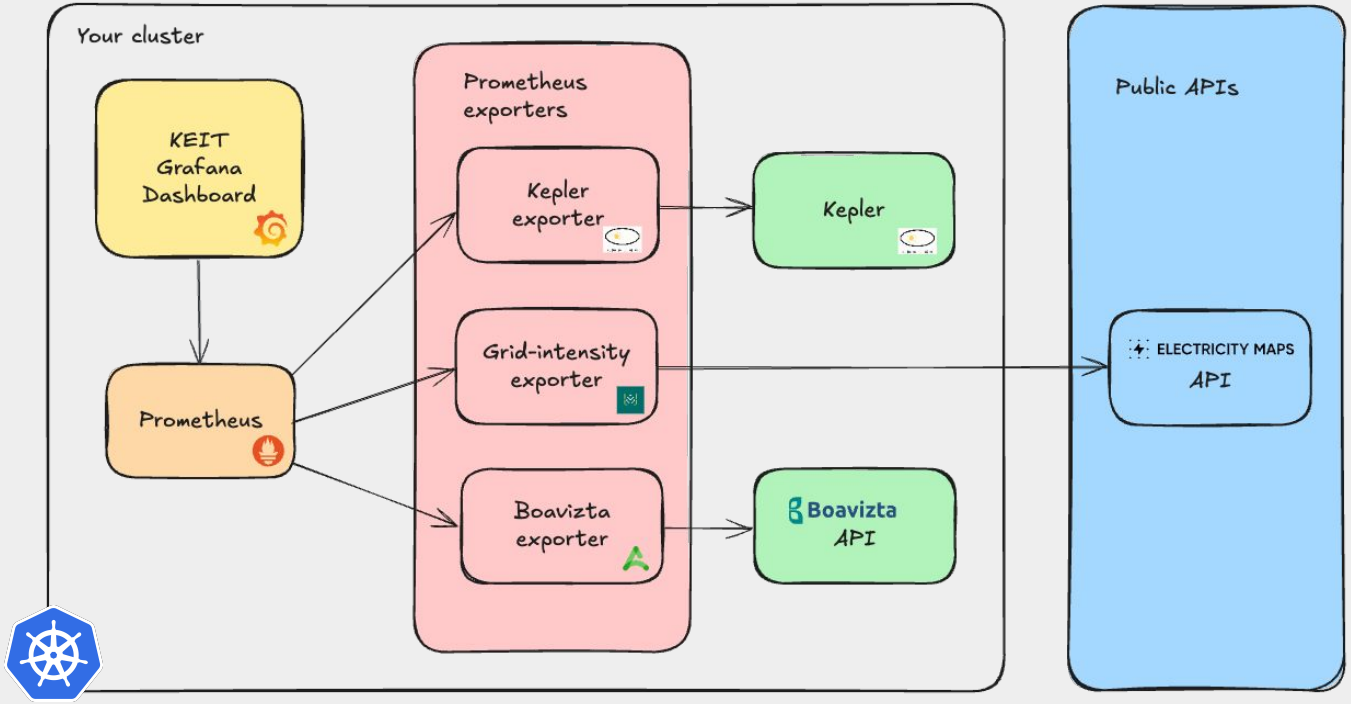
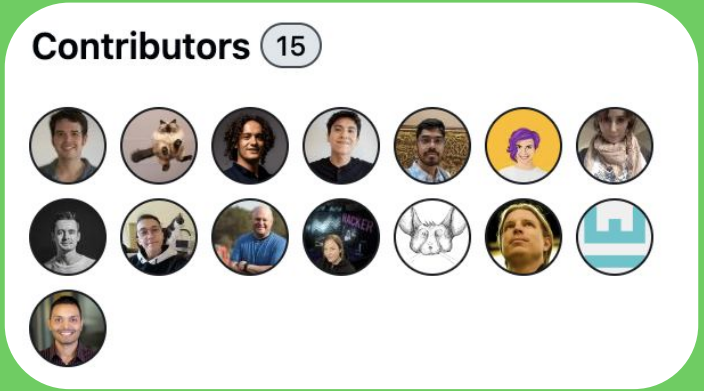
KEIT components



Opportunity: CNCF's Green Reviews working group

Volunteer-run group of open-source contributors 💚

138 members in Slack channel



Niki Manoledaki
Co-Chair

Antonio di Turi
Co-Chair

Ross Fairbanks
Tech Lead

Flavia Paganelli
Tech Lead

FOSDEM

Join us at Slack CNCF #tag-env-wg-green-reviews

What can you do?

You are doing something by being here

Make it part of your system

Start improving by measuring and optimizing

Become an ambassador at your community

And contribute!

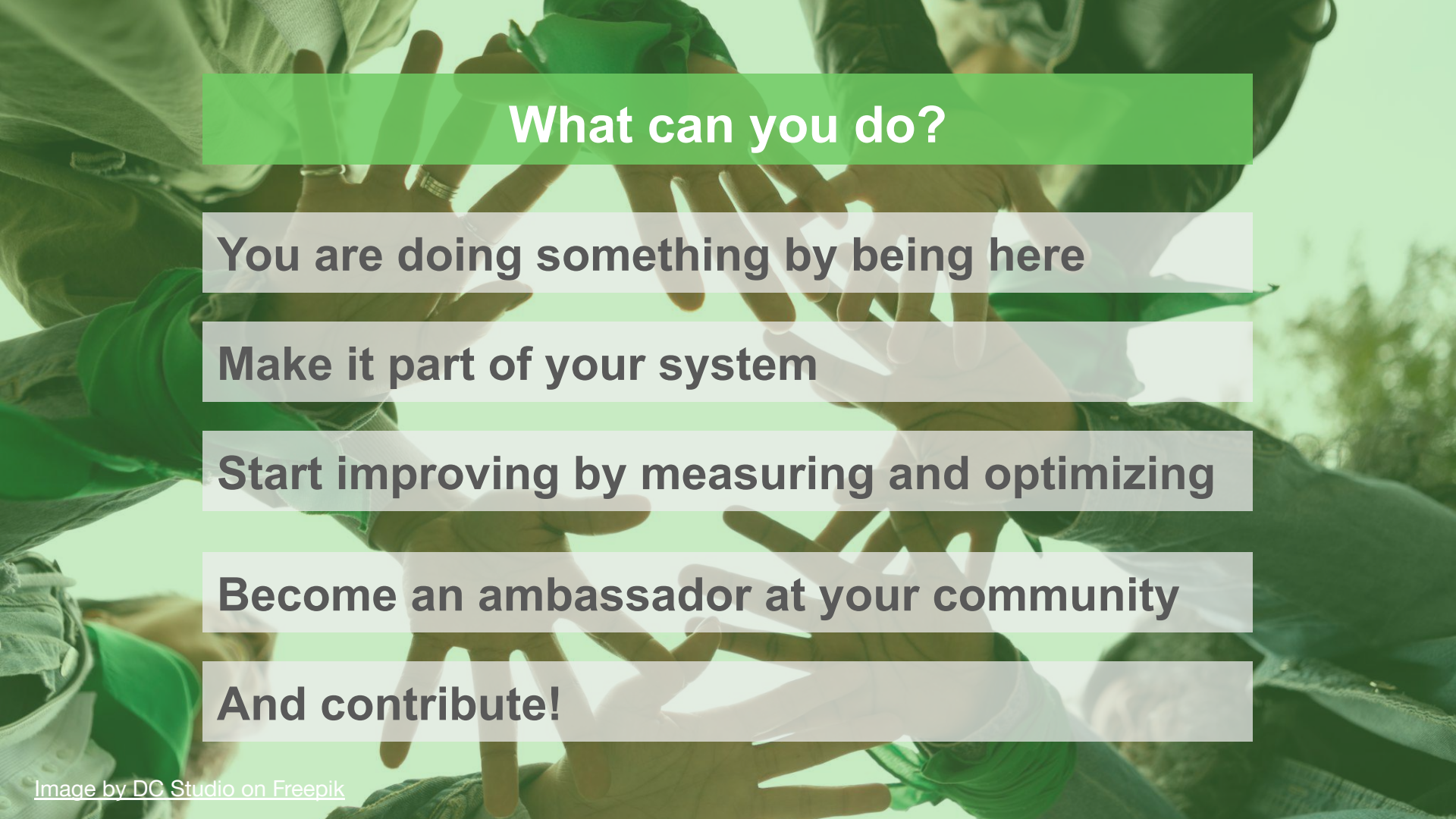


Image by DC Studio on Freepik

We can make a positive change

Useful links: Community

- CNCF TAG Environmental Sustainability:
  - Zoom calls every 1st and 3rd Wednesday of each month at 16:00 UTC
  - Slack channel #tag-environmental-sustainability
- Green Reviews working group:
  - Zoom calls every 2nd and 4th Wednesday of each month at 16.00 UTC
  - Slack channel #tag-env-wg-green-reviews
- Meetups in NL
  - Sustainable IT Netherlands
  - Green Software - The Netherlands
- Podcasts
  - Green IO
  - Environmental Variables (Green Software Foundation)
- Green Software foundation

Useful links: open source tools

Measuring and estimating:

- Green Reviews repo
- Kepler: tracking energy consumption
- ElectricityMaps for carbon intensity
- Boavizta for embodied carbon
- Green Metrics Tool
- KEIT & About KEIT
- Cloud carbon footprint
- Carbon footprint estimator for AWS instances
- Carbon Costs

Optimising:

- Goldilocks for setting your resource requests and limits
- PerfectScale for optimising your resource requests and limits
- Kube-green to switch off what you don't use
- Carbon aware sdk for running software which is less carbon intensive

Thank you! Questions?

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