



KubeCon



CloudNativeCon

Europe 2023

Scale Down Your Environmental Impact



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Meet Your Speakers



Mary Karroqe



Zinnia Gibson

Which is the biggest contributor to carbon emissions globally, per capita?



Manufacturing



Electricity



Transportation



Forestry

Which is the biggest contributor to carbon emissions globally, per capita?



Manufacturing



Electricity



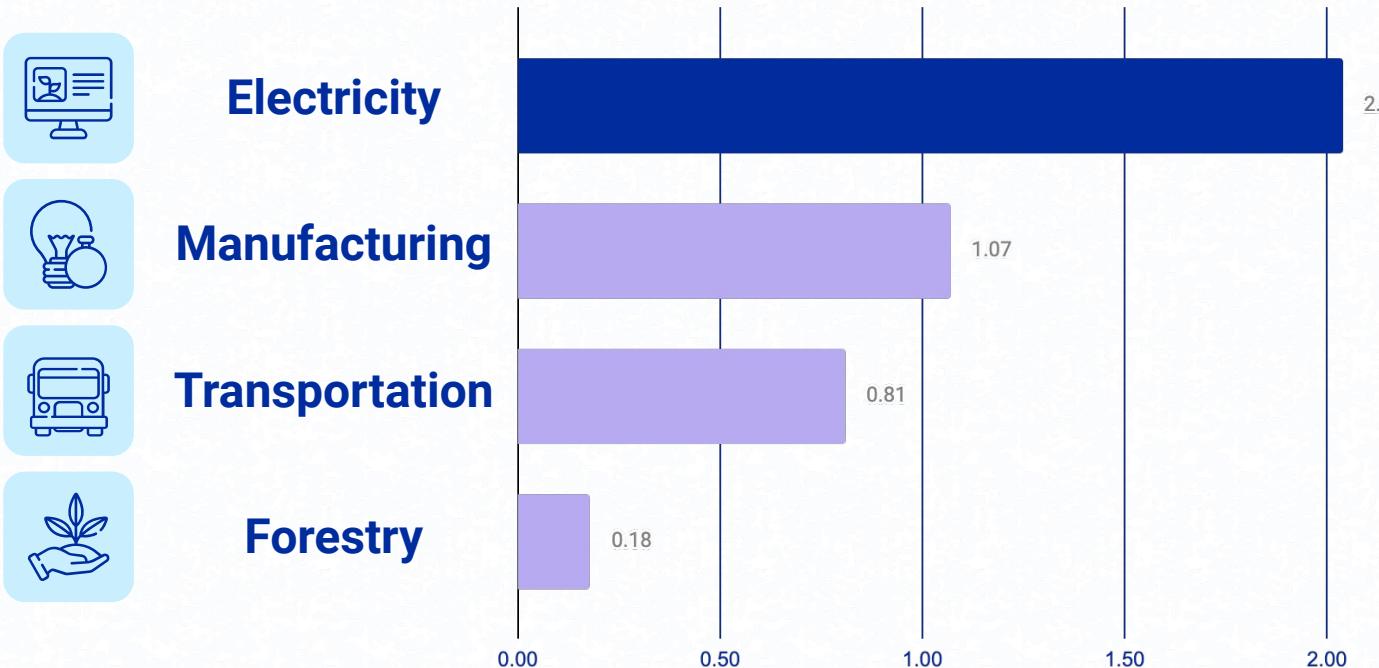
Transportation



Forestry

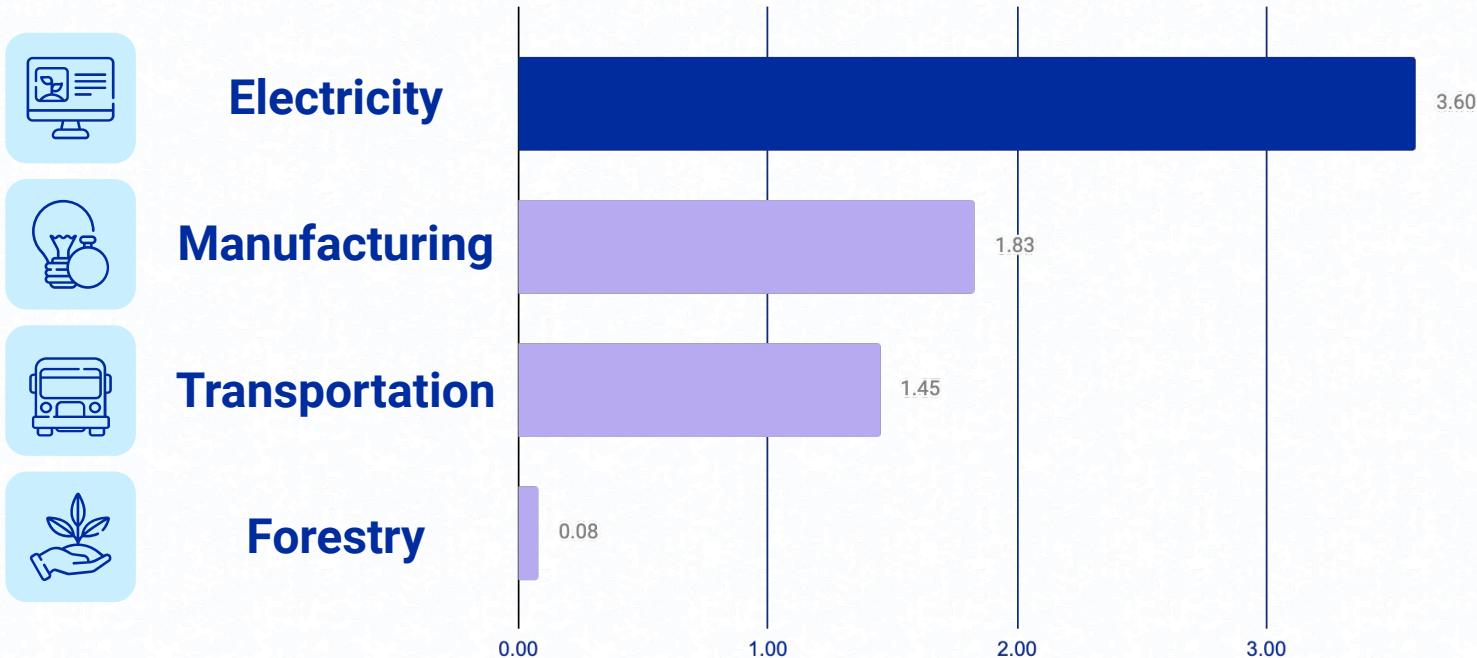
Per Capita Greenhouse Emission Contribution, Global, 2019

In tonnes of carbon-dioxide emissions per person per year



Per Capita Greenhouse Emission Contribution, Netherlands, 2019

In tonnes of carbon-dioxide emissions per person per year



Agenda

01

Industry Impact
on the
Environment

02

Use Case
Walk Through

03

Ways to Get
Involved



Industry Impact on the Environment

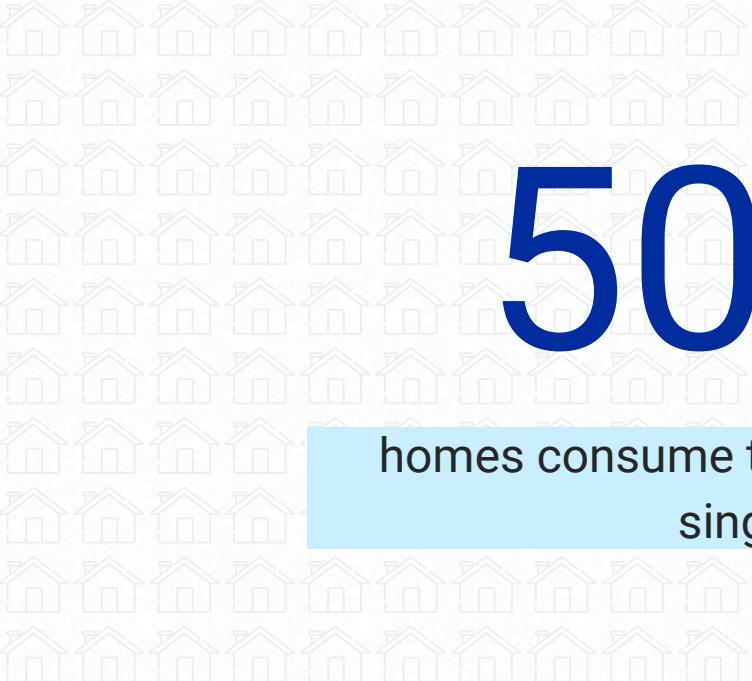


Industry Impact on the Environment



The Cloud now has a greater carbon footprint
than the **airline industry**

Data Centers



50,000



homes consume the equivalent electricity of a
single data center

Data Centers

Data centers are among the **largest and fastest growing consumers** of natural resources



Water for Power & Cooling

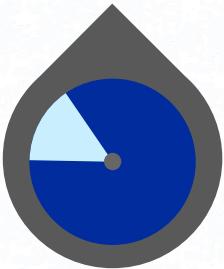


Land



Generated Electricity

Data Centers' Footprint



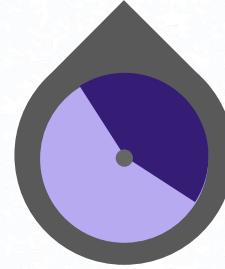
88%

Allocated to cooling
and maintaining
redundant fail-safes



12%

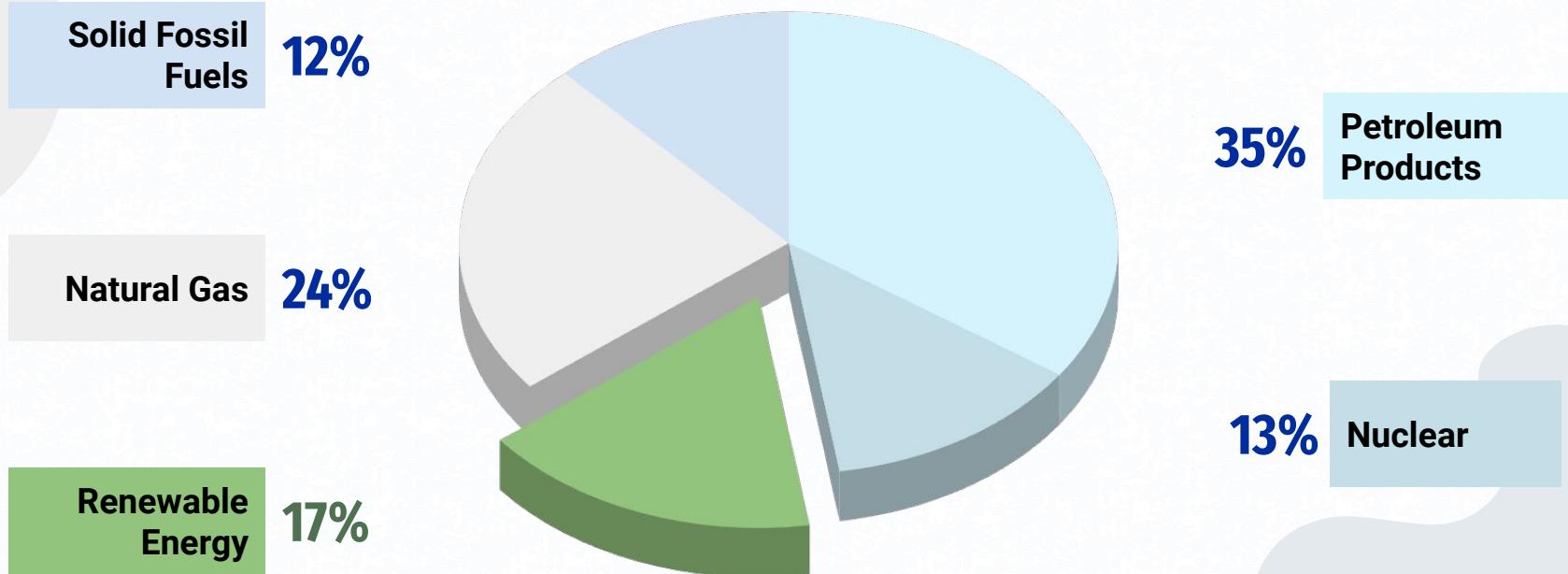
Consumed for
active computational
processes



40%

Electricity usage
consumed
for cooling alone

Electricity != Clean



The European Climate Law
includes a legal objective for the Union
to reach climate neutrality
by 2050

Use Cases





First: close your eyes and imagine...

Two large gaming companies



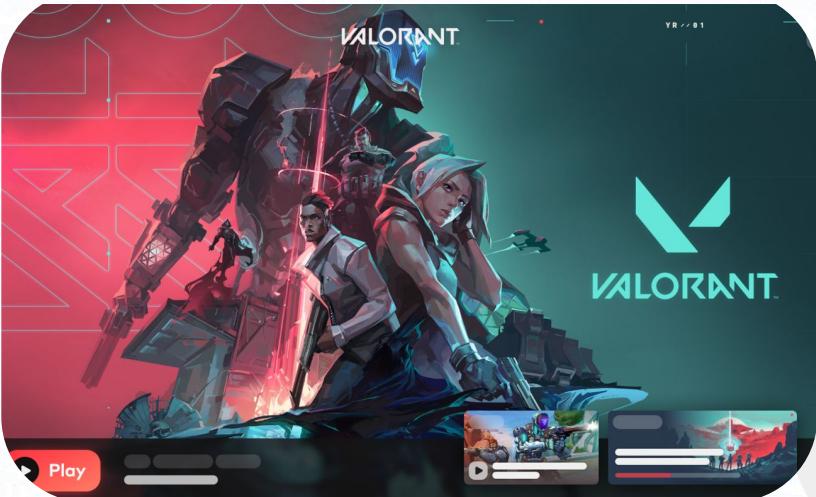
Use Case: Large (AAA)

A large team is shipping a new
multiplayer game to an existing platform
of multiplayer games and maintaining a
large community of users.

Real World Case: AAA

Riot Games

- Riot [Client](#)
 - League of Legends
 - League of Legends: Wild Rift
 - Legends of Runeterra
 - Teamfight Tactics
 - Valorant



Use Case: AAA

Company K

- ❖ Improved microservices efficiency
- ❖ Seamless multi-cloud migration
- ❖ Increased portability

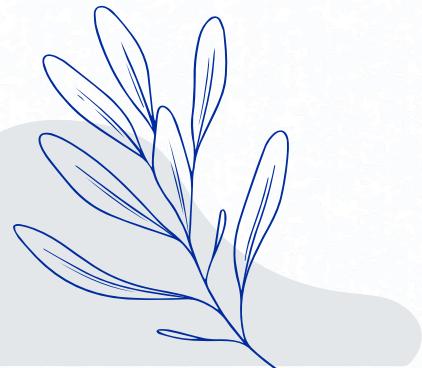
Company V

- ❖ Performance overhead
- ❖ Resource limitations
- ❖ Complexity

Use Case: Medium

A smaller team of developers are shipping
a **multiplayer game**. They are maintaining a
large community of users.

Real World Case: Indie Acquisition



Use Case: Indie Acquisition

Company K

- ❖ App stability & availability
- ❖ Cost & complexity
- ❖ Integration

Company V

- ❖ Increased infrastructure costs
- ❖ Limited scalability
- ❖ Complex deployment and management

Use Case: Small

A small team of developers are shipping a
multiplayer game. They are beginning to
think about scaling.

Real World Case: Indie Game

Netspeak Games

- ❖ Single developer
- ❖ Game delivery in 6 months
- ❖ Open source libraries
- ❖ Containerized Unreal Engine



Use Case: Indie Game

Company K

- ❖ Complexity
- ❖ Scalability & Automation
- ❖ Resource Efficiency

Company V

- ❖ Difficulty in managing VMs
- ❖ Non-ephemeral resources for testing
- ❖ Cost considerations

Use Case: Individual

A single developer shipping a single player game. The goal is just to ship, not yet to scale.

Real World Adoption Case: Individual

Kube DOOM

- ❖ Open Source testing
- ❖ Test your own Kubernetes project's resiliency
- ❖ Kill Pods with a FPS game



Use Case: Individual

Person K

- ❖ Learning curve
- ❖ Resource requirements
- ❖ Scalability

Person V

- ❖ Smaller learning curve to start
- ❖ Quicker set up
- ❖ Non-ephemeral resources for testing

What Does This Mean?

- ❖ Benefits scale down (to a point)
- ❖ Migrating early can positively affect long-term impact
- ❖ Kubernetes is not the perfect solution to environmentally conscious coding

Get Involved



Stand Up



Get Involved



Upstream
Projects



Offsetting
Emissions



Developing
Practices



Upstream Projects

- ❖ Developing
 - [GreenFrame](#)
- ❖ Testing
 - [Prometheus](#)
- ❖ Hosting
 - [Agones](#)
- ❖ Community
 - [CNCF Environmental Sustainability Working Group](#)



Offsetting Emissions

- ❖ What the heck?
- ❖ Who the heck?
- ❖ Any hecking ESG benefit?



Better Developing Practices

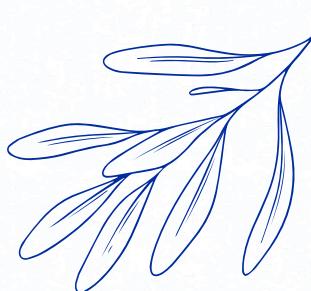
- ❖ Train Small
- ❖ Test Small
- ❖ Upstream Projects



Takeaways

- ❖ Tech companies have a tangible environmental impact
- ❖ Kubernetes is not a complete solution to environmentally conscious coding
- ❖ Benefits scale down (to a point)

Get Involved

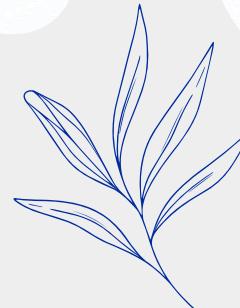


❖ Offsetting environmental impact

- [Video game companies take steps to tackle environmental issues](#)
- [The Arbor Day Foundation and PlayStation Partner to Plant Trees Via New Video Game, Horizon Forbidden West](#)
- [These tech companies are accelerating permanent carbon removal to save the planet](#)

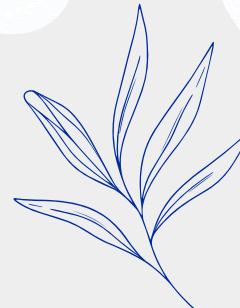
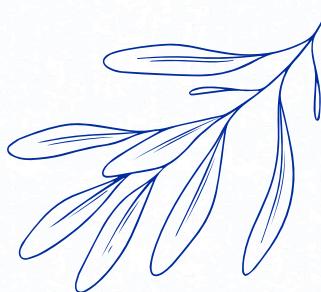
❖ Better developing practices

- [Developers Can Save The Planet](#)
- [Emissions Impact Dashboard for Azure](#)
- [Argos: Measure The Carbon Footprint Of Software, Improve Developer Practices](#)



Further Resources

- ❖ <https://playing4theplanet.org/>
- ❖ [7 Steps to Simplify Kubernetes Adoption](#)
- ❖ [Optimize game servers hosting with containers](#)
- ❖ [If Gaming is an Environmental Nightmare, then so is Hiking](#)
- ❖ [How Kubernetes Accelerates Multiplayer Game Development](#)
- ❖ [Red Hat Donates Kepler Tool for Tracking Power Usage to CNCF](#)
- ❖ [The Staggering Ecological Impacts of Computation and the Cloud](#)
- ❖ [Toward Greener Gaming: Estimating National Energy Use and Energy Efficiency Potential](#)





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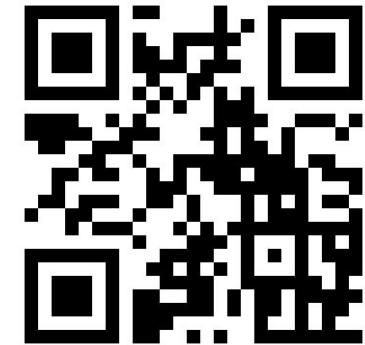


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We ❤️ feedback! 