build anything together

Climate change and the cloud: we scale sustainably

Fred Plais & Leah Goldfarb

18 November 2022 // SymfonyCon 2022

platform.sh

// Fred Plais

CEO & co-founder, Platform.sh

- Serial Tech entrepreneur
- Building digital products & web projects since 2000
- French citizen living in California (USA)
- Passionate about reducing tech's environmental impact

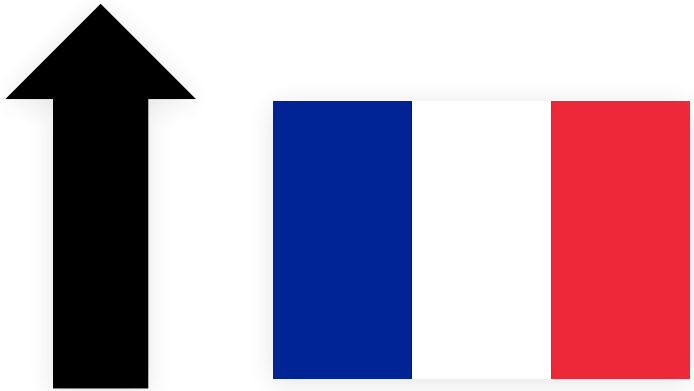
// Leah Goldfarb

Environmental Impact Officer, Platform.sh

- PhD in physical chemistry: atmospheric focus
- Climate specialist
- Passionate about reducing tech's environmental impact
- US citizen living in France

// Question: PHPs CO_2 impact?

v7.4 -> 8.1



France's emissions : ~300 $MtCO_2$/year‡

Austria's emissions : ~65 $MtCO_2$/year‡

‡http://www.globalcarbonatlas.org/en/CO2-emissions (2021)

// *Guesstimate* : PHP's CO_2 contribution

CO_2 globally*	ICT 4% GHG‡	*WWW*	*PHP powered websites*

40,000 $MtCO_2$ /year × **4%** × **25%** × **77%**** of all websites

= **300 Mt CO_2/yr**

*joint-research-centre.ec.europa.eu/ (2020)

‡2040:Belkhir & Elemeligi (2018)

*Count not volume (!)

// *Guesstimate:* averted CO_2 v7.4 → 8.1

v7.4 -> 8.1

Conversion factor
electricity-> CO_2

300
$MtCO_2$/year

×

30%**
faster/
less electricity

× **0.75**

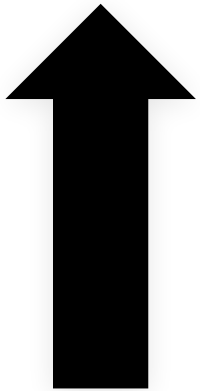
=

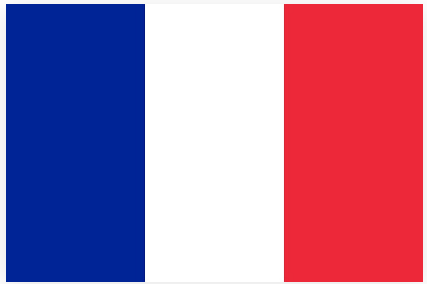
67 Mt CO_2
potentially† averted

**https://externals.io/message/116323

† Even if this estimate is too large (by an order of magnitude?), still

// Back of the envelope†





v7.4 -> 8.1

France's emissions : ~300 $MtCO_2$/year‡

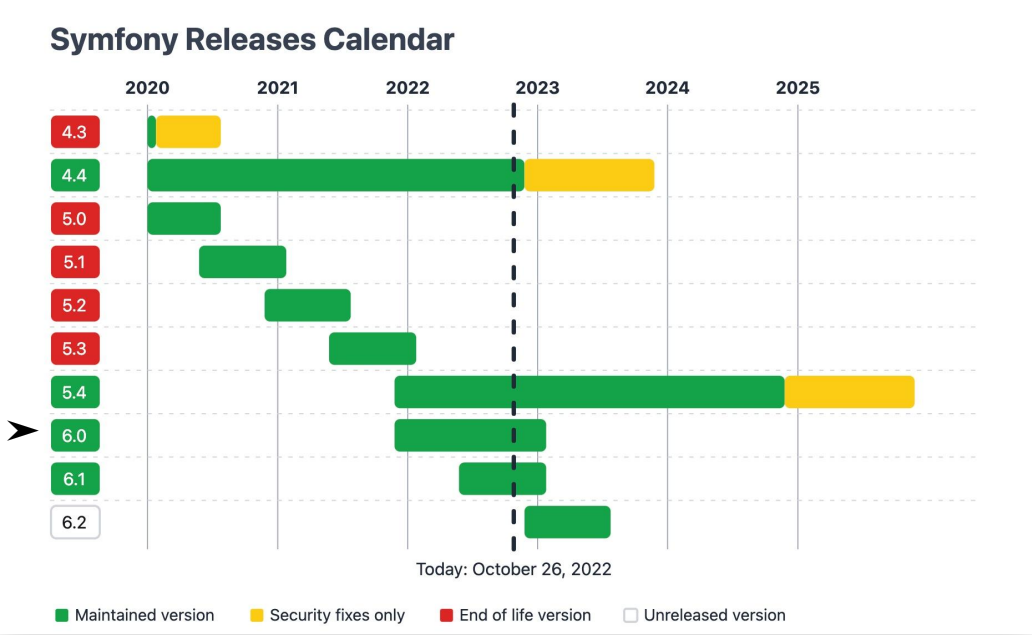
Austria's emissions : ~65 $MtCO_2$/year‡

‡http://www.globalcarbonatlas.org/en/CO2-emissions

† Even if this estimate is too large (by an order of magnitude?), still

// Why stop with PHP updating?

- **5-10% of websites use Symfony**
- **Updating Symfony* would further speed applications and reduce resource use**



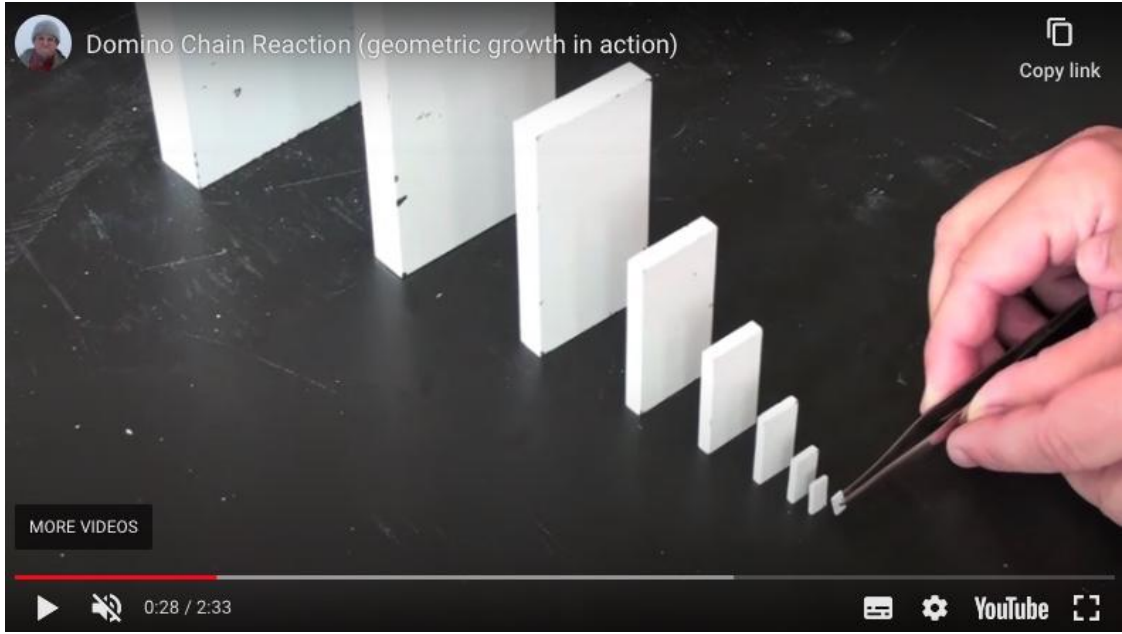
➤ Updating: version x.4 to (x + 1).0 → legacy code removed

Symfony

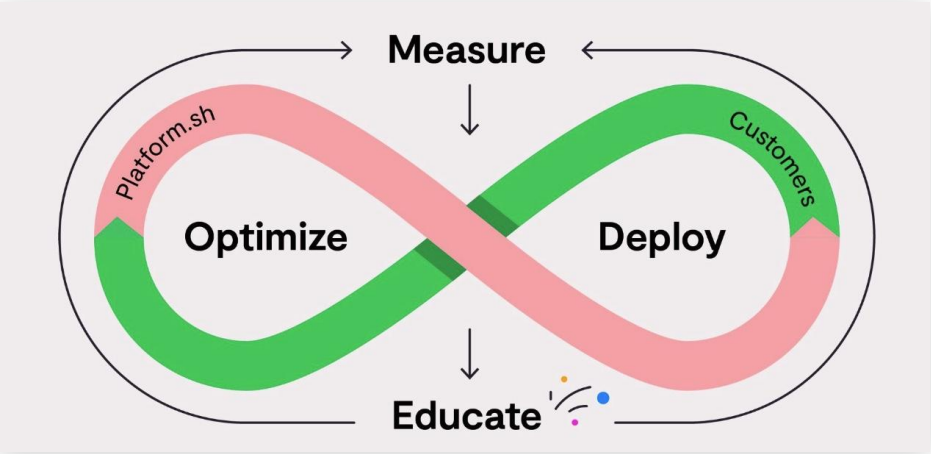
// Leveraging resource optimization

One small action could lead to big carbon reductions

#updatetophp8.1
#updateSymfony6.2



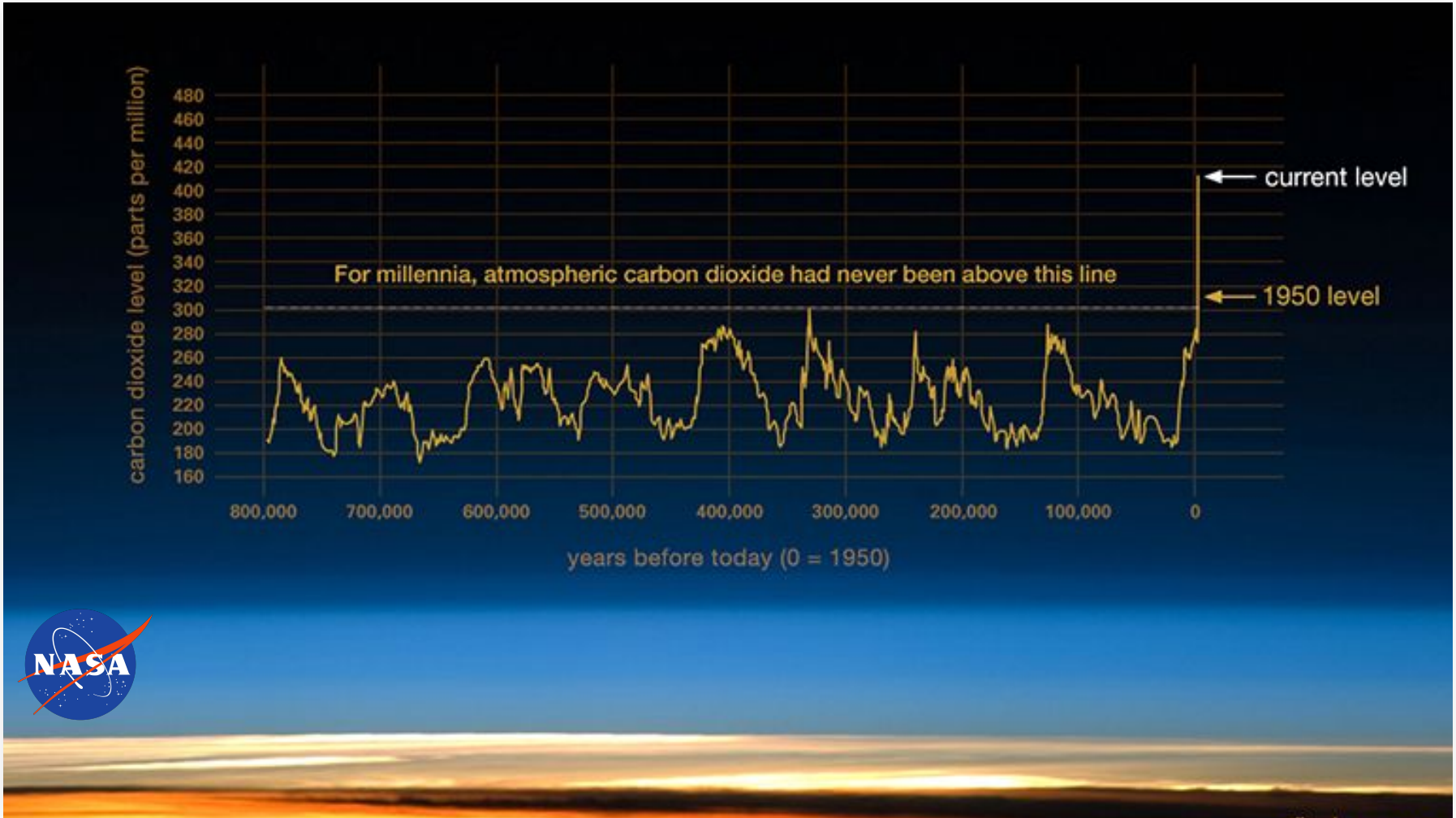
// Outline



Why you don’t need another server

- Climate change
- Role of the ICT community
- MODE strategy
- Next steps

// Climate change


carbon dioxide level (parts per million)
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
For millennia, atmospheric carbon dioxide had never been above this line
current level
1950 level
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
years before today (0 = 1950)
NASA

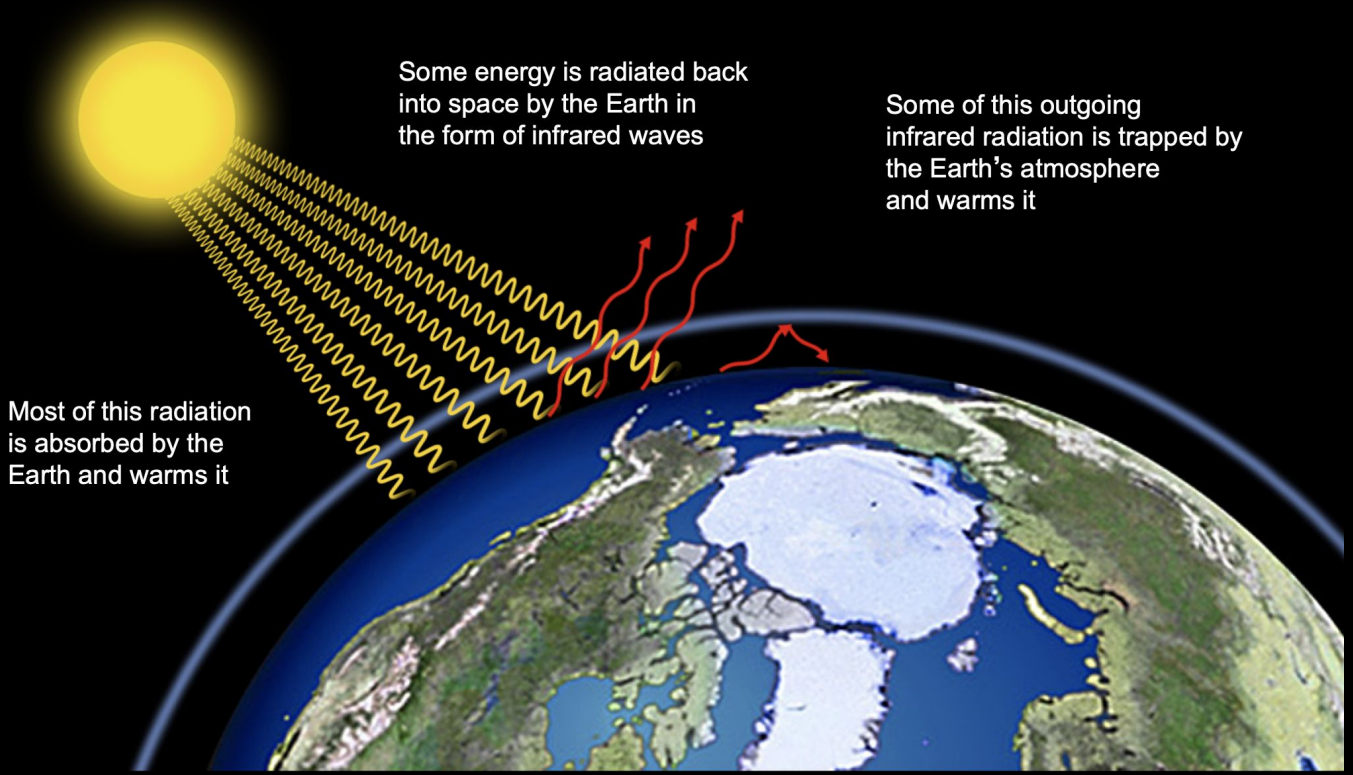
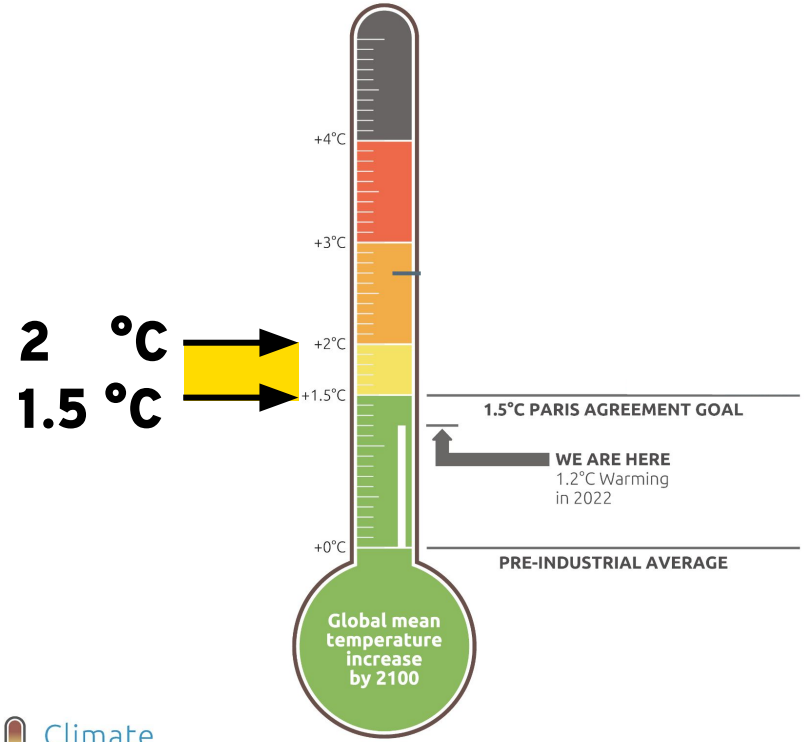


Image: Climate Reality

// Paris Agreement & projections

Today's policies: 2.7 °C

2030 pledges: 2.0 °C

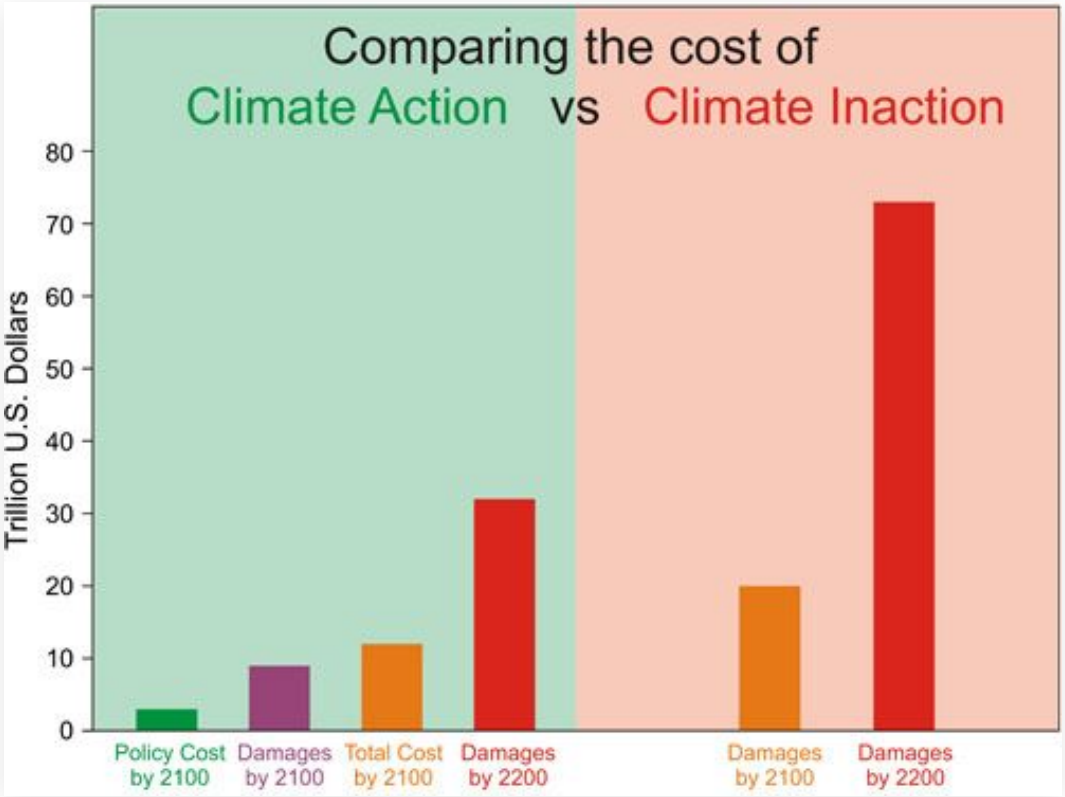


CAT warming projections
Global temperature increase by 2100

November 2022 Update

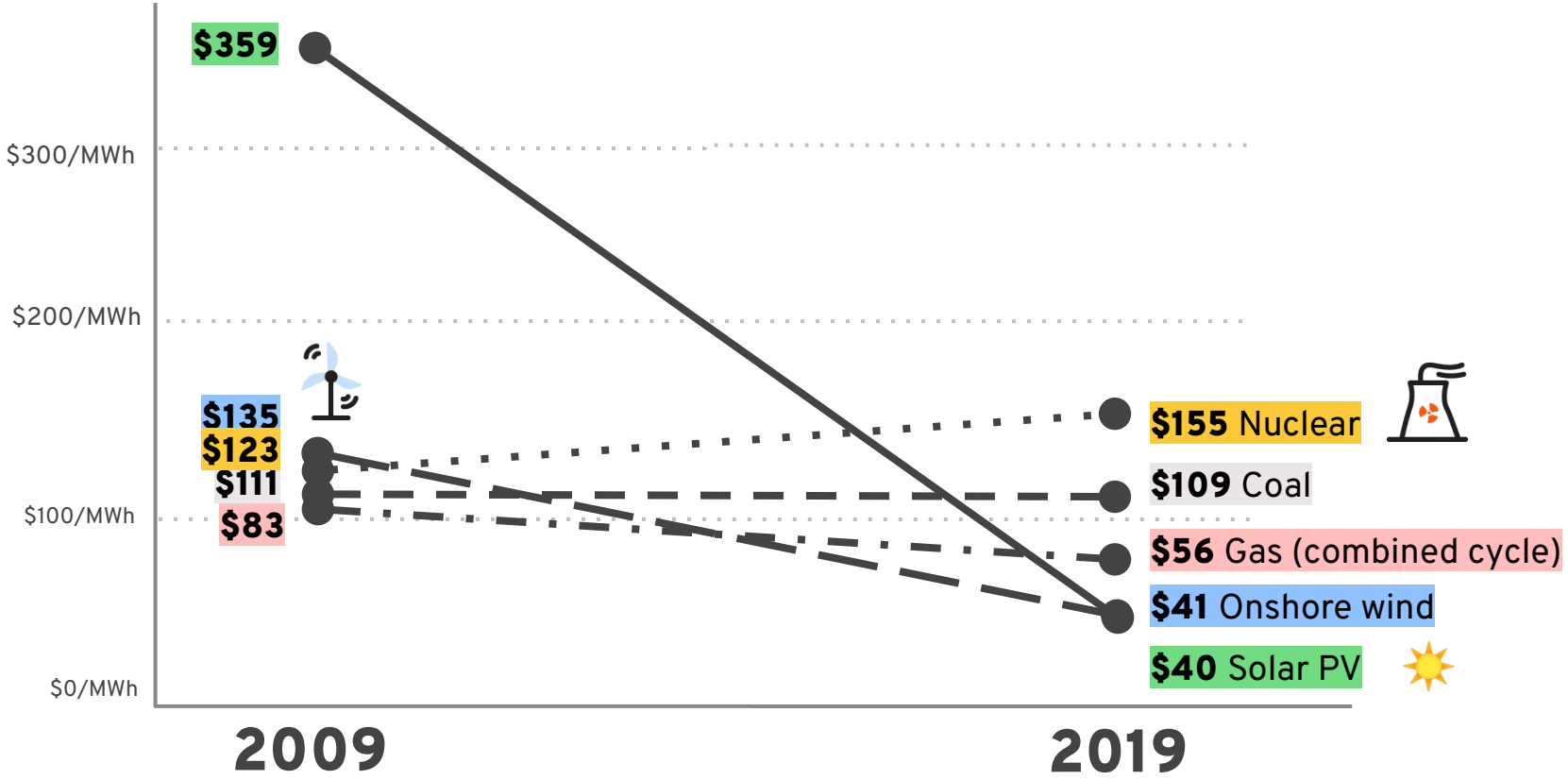
Climate Action Tracker

// Long-term: it is cheaper to act now on climate



https://skepticalscience.com/graphics.php?g=11

// Cost of electricity by source



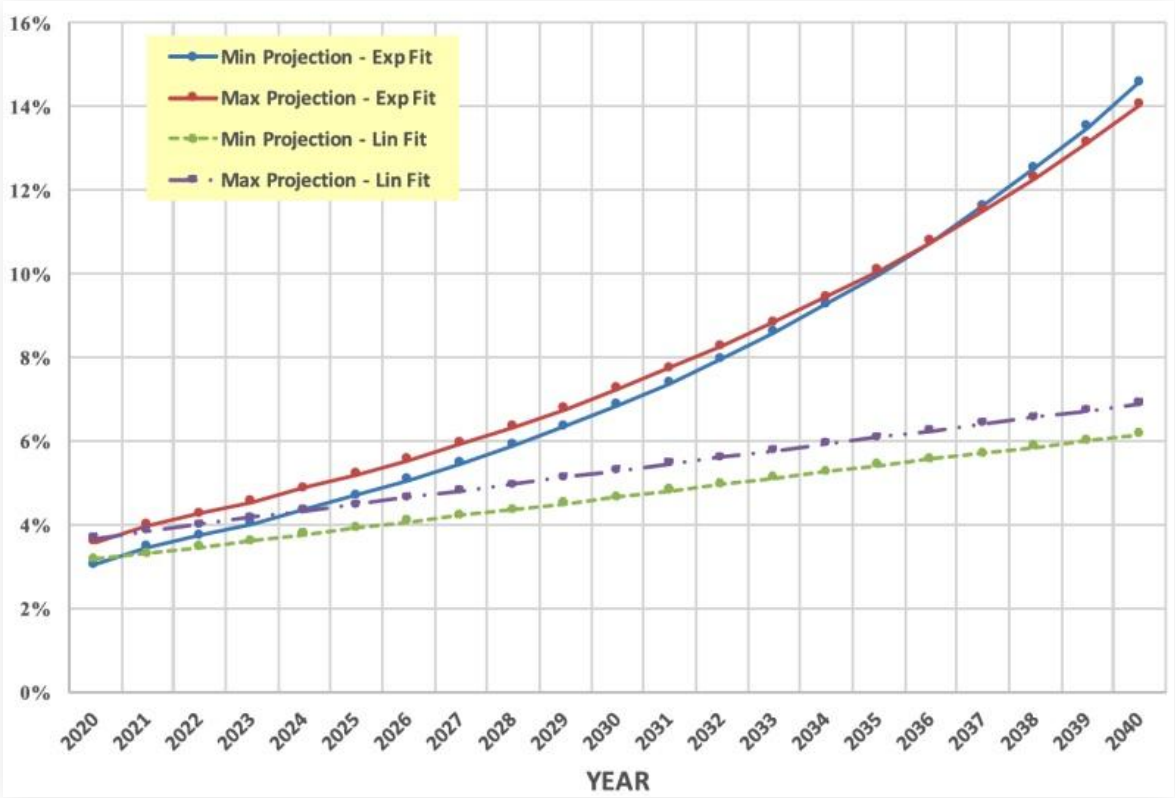
https://ourworldindata.org/cheap-renewables-growth

// Role of the IT community

// ICT global carbon footprint relative to total global footprint

% ICT's total global carbon footprint

~4% (2020)



15% (2040) max

~7% (2040) min

2040:Belkhir & Elemeligi (2018)

// Cloud carbon auditing: boundary conditions*

Inside the scope

Data centers:

- Servers manufacturing,
- Electricity
- Refrigerant
- Gas consumption
- All based on servers lifetime assessment

Network:

- Fixed networks (includes office internet router)
- Mobile networks backbone Electricity
- Models: ADEMExARCEP and free.fr studies

Outside of the scope

- Network manufacturing parts
- End-user devices

*From our carbon auditor: Greenly

// Learnings and actions

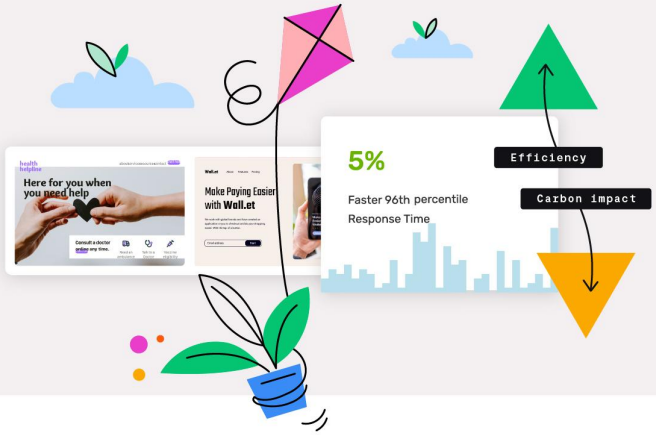
// Climate is not an afterthought

For years, Platform.sh has said climate is *not* an afterthought

- In April 2021, Platform.sh **signed the Climate Act**
  + Committed to carbon audits
  + 50% cut to emissions by 2030

You don't need another server

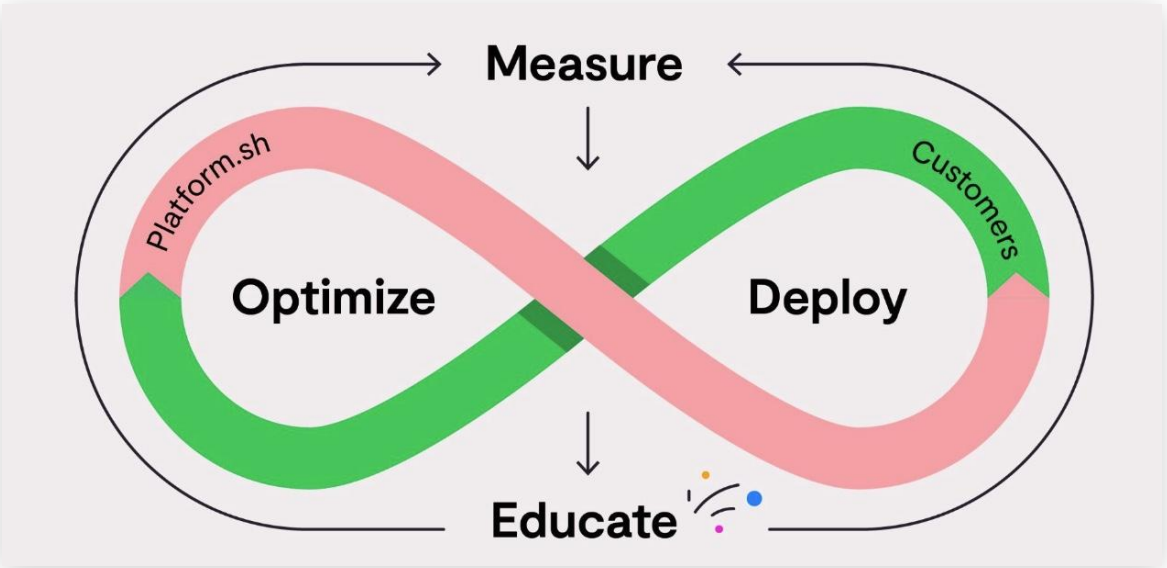
A greener way to host



The ICT sector accounts for 4% of global carbon emissions

Belkhir & Elemeligi (2018)

// M.O.D.E.

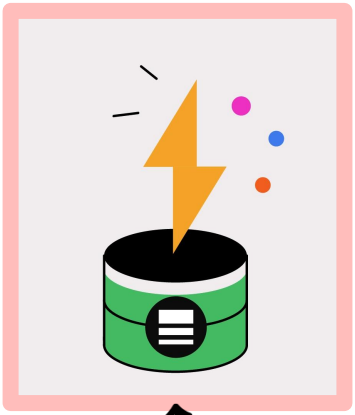


// Measure: carbon auditing

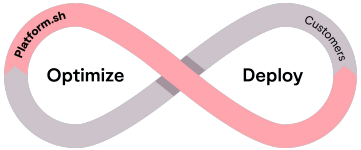
- Third-party certified by Greenly using the GHG protocol
- 2020 carbon audit results (tCO_2eq)

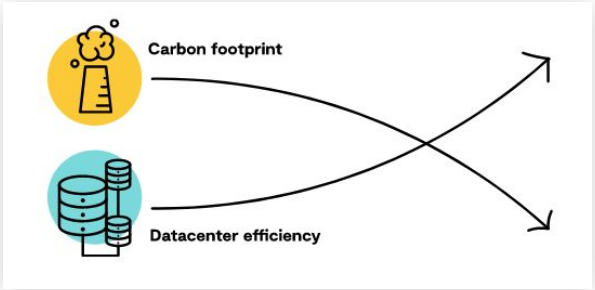
Type	tCO_2eq
Scope 1	5
Scope 2	1
Scope 3	**4 014** (88 PSH +3926 clients)
TOTAL	**4 020**

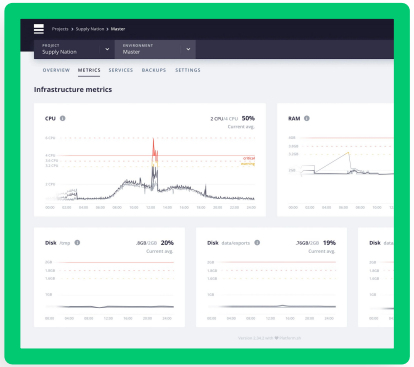
// Optimize: it is a shared responsibility



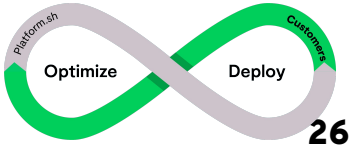
Density







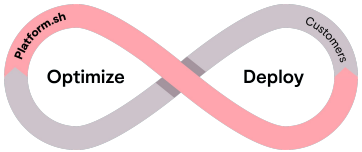
App/code



// Fewer resources mean less electricity used

10x higher density for production

14x higher density for development



Up to 12X fewer servers used*

Standard approach

Platform.sh

* Greenly certified comparison to AWS EC2 virtual machines

// Optimize your performance

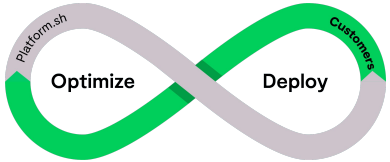
Following the adoption of Blackfire.io in the development workflow, up to

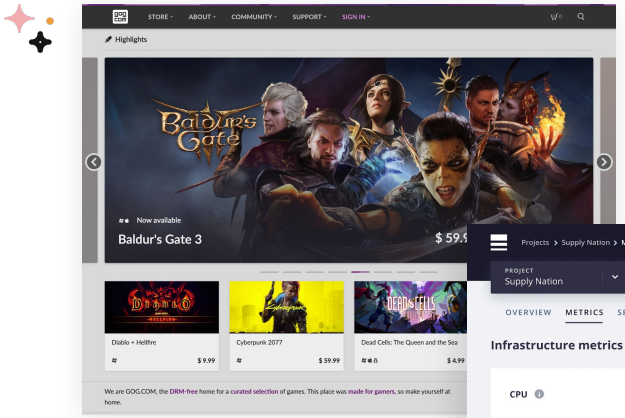
20x

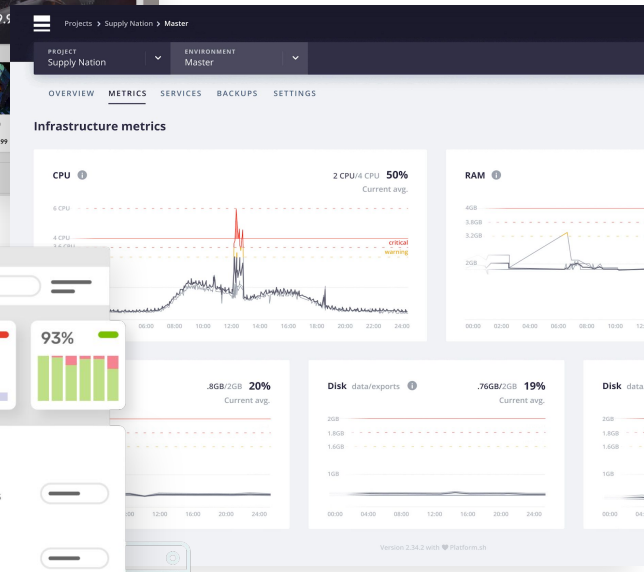
more concurrent orders for GOG.com

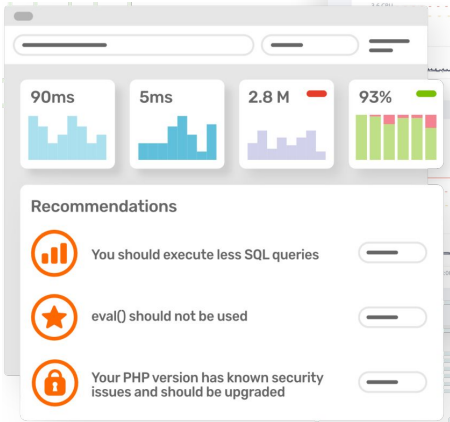
With Blackfire:

- Measure loading times
- Identify bottlenecks
- Follow recommendations

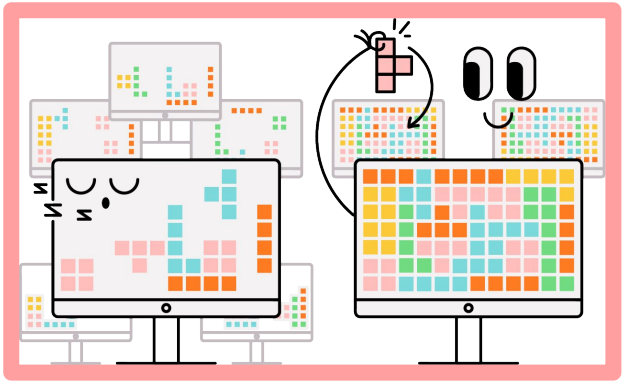






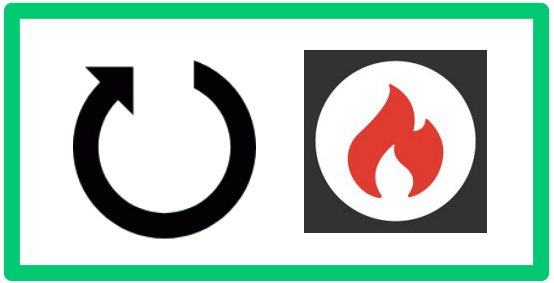


// Optimizing: reduces electricity consumption

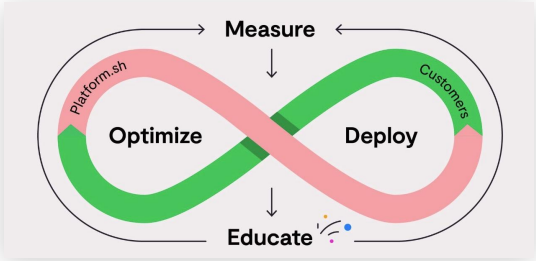


Virtual machine

Platform.sh

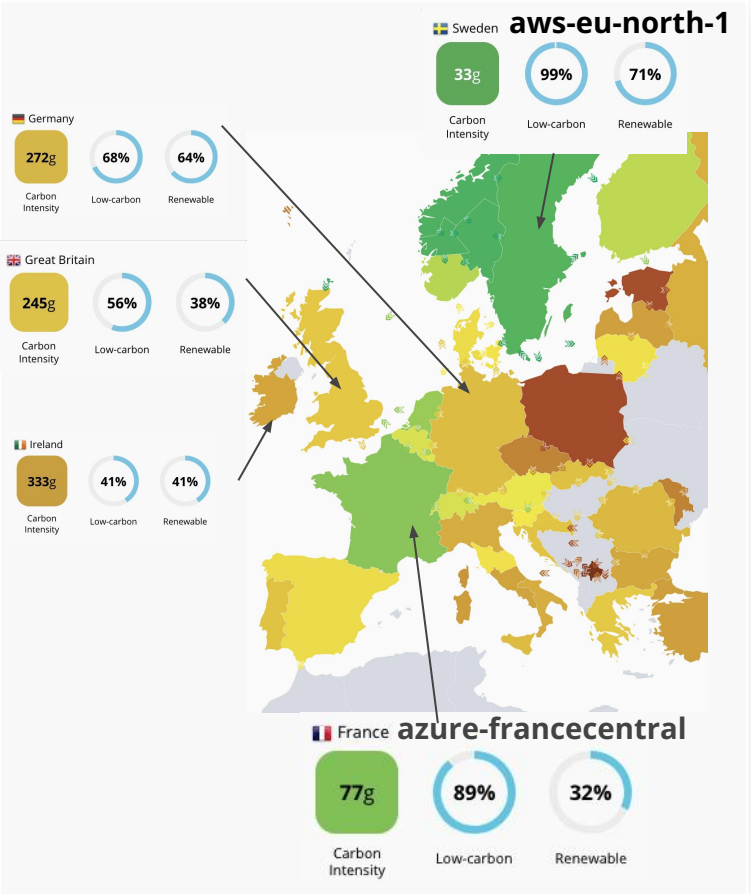


+ ↓ **electricity (up to 12x)** → ↓CO_2 by up to 9x



+ Updating software
+ Use an **APM** (Application Performance Monitor) such as Blackfire

// Deploy: to greener regions



1. A measurement of CO_2 produced per electricity produced
2. Carbon intensity can vary in time
3. This shows the importance of a location-based, rather than market-based approach

https://app.electricitymap.org/map

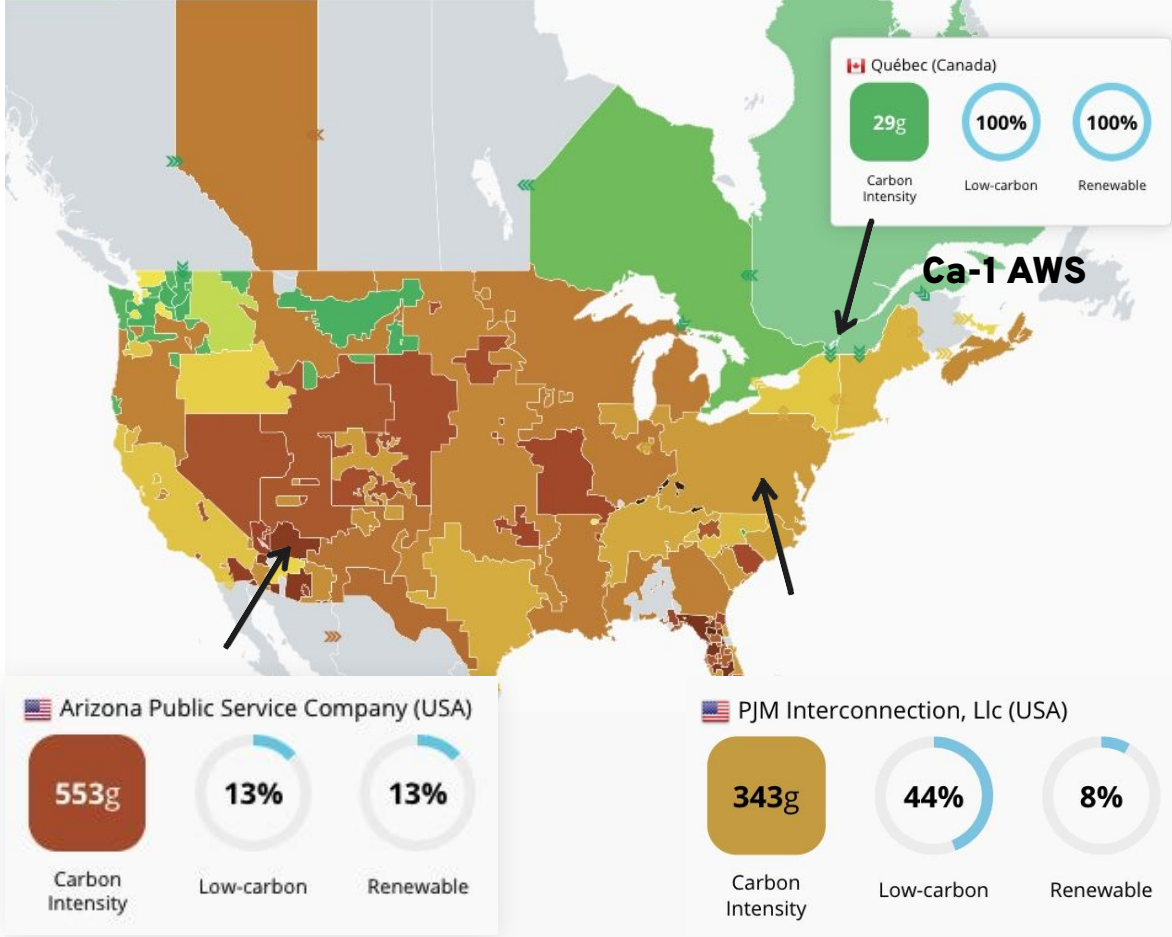
Deploy: to greener regions

3 choices:

Up to a 15x difference in carbon intensity

+ 🇨🇦 Quebec, CA **~30** (gCO_2eq/kWh)
+ 🇺🇸 Northern,Va **~350** (gCO_2eq/kWh)
+ 🇺🇸 El Mirage, AZ **~500** (gCO_2eq/kWh)

Data from app.electricitymap.org/map



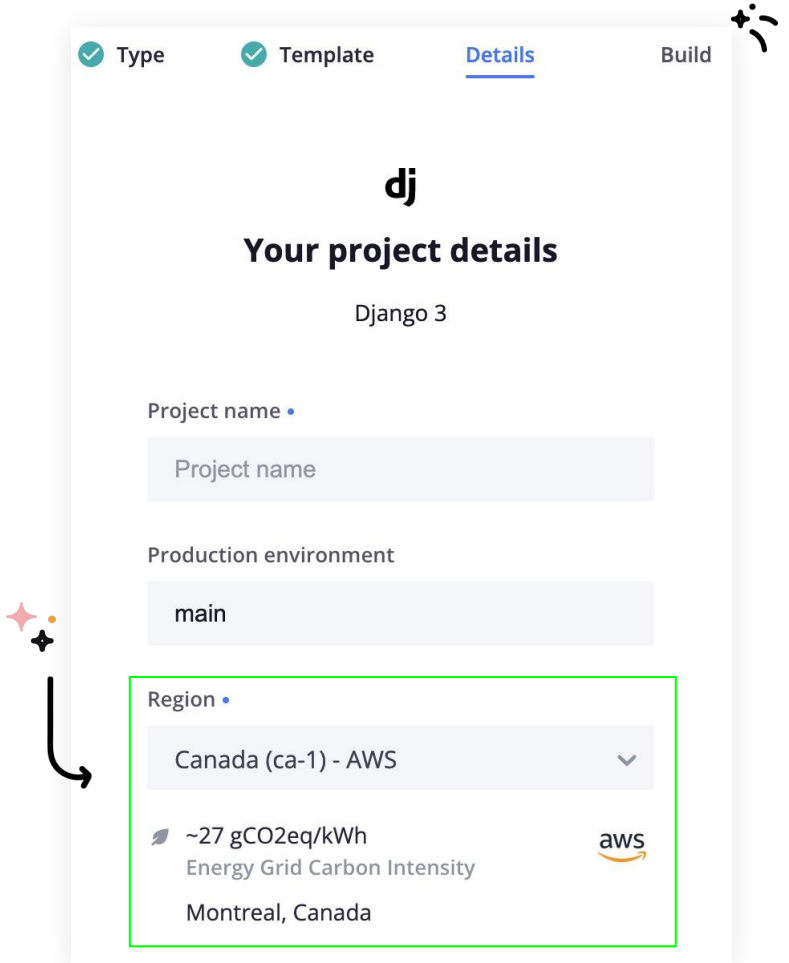
West US 3 Azure

East US 4 GCP

// Carbon intensity transparency

Full transparency on the underlying carbon intensity of the region's electricity grid provider

https://console.platform.sh



// Educate

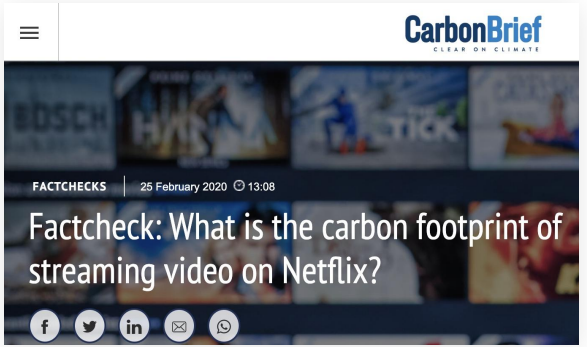
- Carbon auditing is in its infancy
- Carbon auditors: network is less resource-intensive
- Our 2020 audit
  - \+ 19% compute
  - \+ 9% storage
  - \+ 72% transfer

2015

- **2021 audit (tbc)**
  - \+ 35% compute
  - \+ 11% storage
  - \+ 54% transfer

2020

How viral cat videos are warming the planet



// We partner to reduce your carbon footprint

We prioritize on density and servers' optimization and green localization deployment

Efficiency and density

5-12x more efficient

Greenly certified

Observability and monitoring

Up to 20x better performance

blackfire.io
A Platform.sh company

Location deployment

Up to 15x CO_2 reduction

// Conclusions

- **We must act now to address climate change**
  - We have solutions; it is question of how fast we act
- **You can take action**
  - Update PHP and Symfony, use a APM
  - Move projects to greener regions
  - This will result in
    - Faster apps
    - Reduction in greenhouse gas emissions
- **Follow-up talk (9:50, Platform Room)**
  - Calculating what we can't see: carbon emissions in the cloud

build
anything
together

Thank you!

//

Fred Plais
CEO co-Founder, Platform.sh

Leah Goldfarb
Environmental Impact Officer

platform.sh