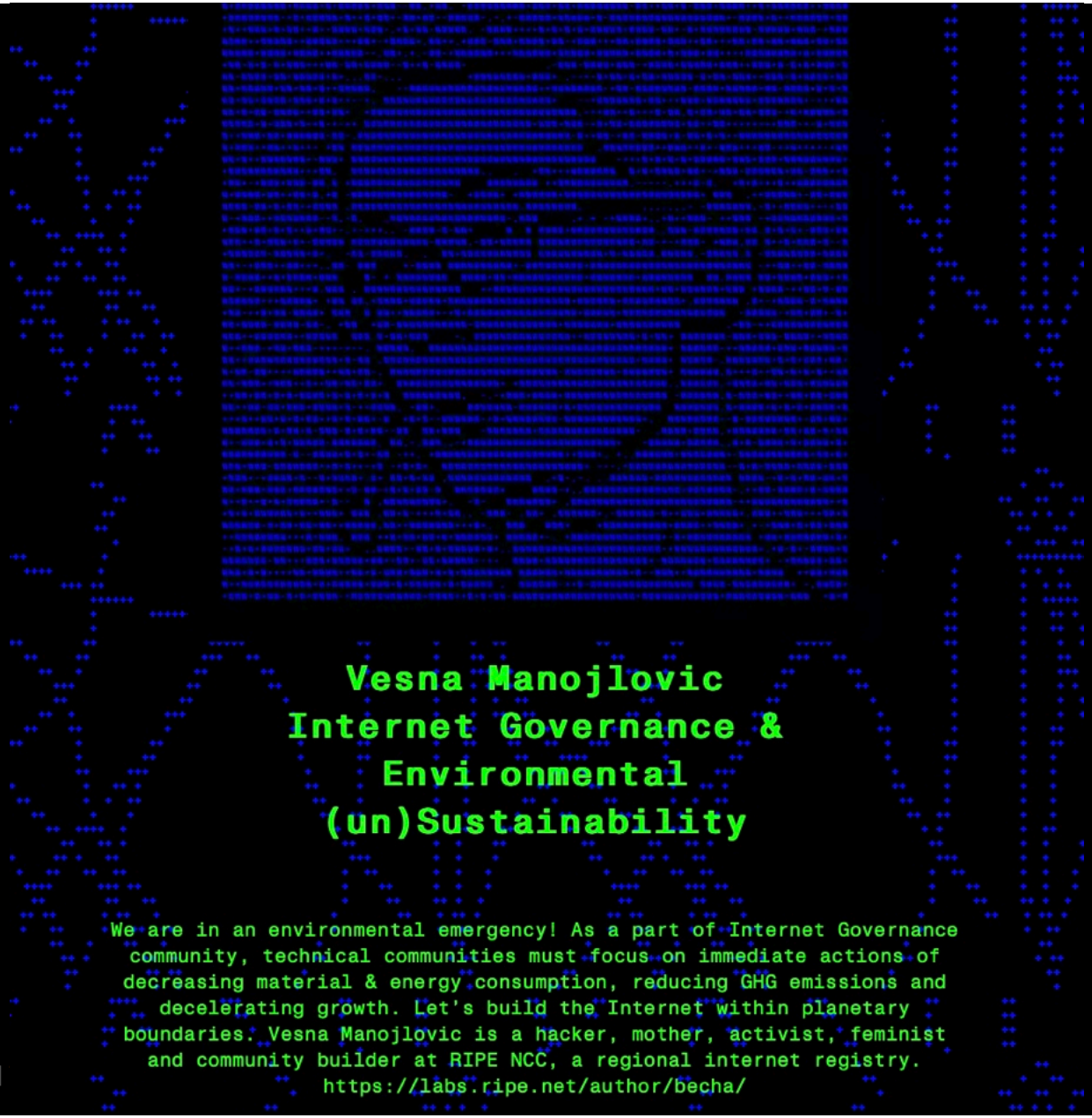
RIPE NCC
RIPE NETWORK COORDINATION CENTRE

Internet Governance & Climate Action

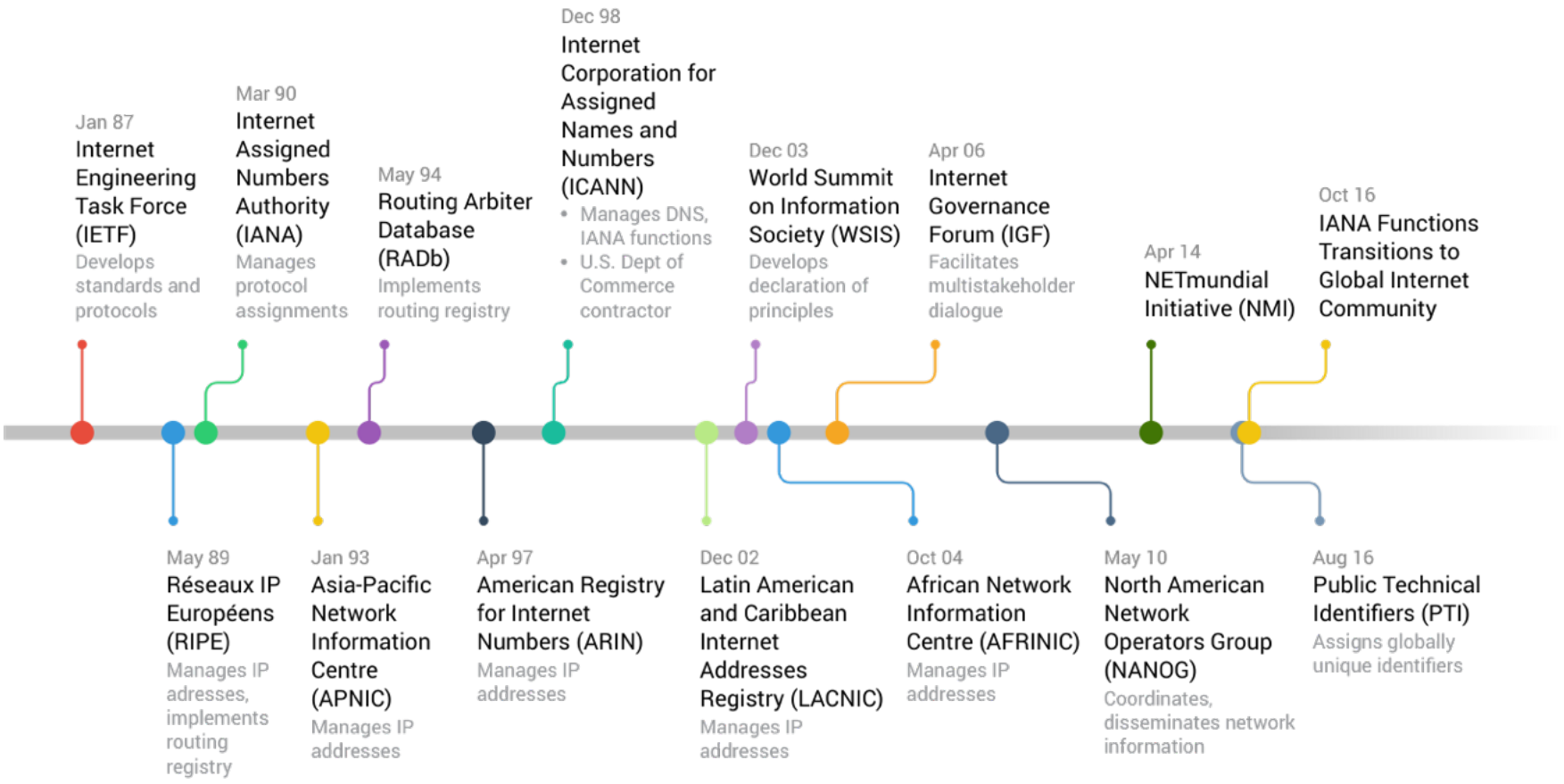
Vesna Manojlovic | Senior Community Builder
BECHA@ripe.net | @becha@v.st

"Traces of Power"
https://top.permacomputing.net/

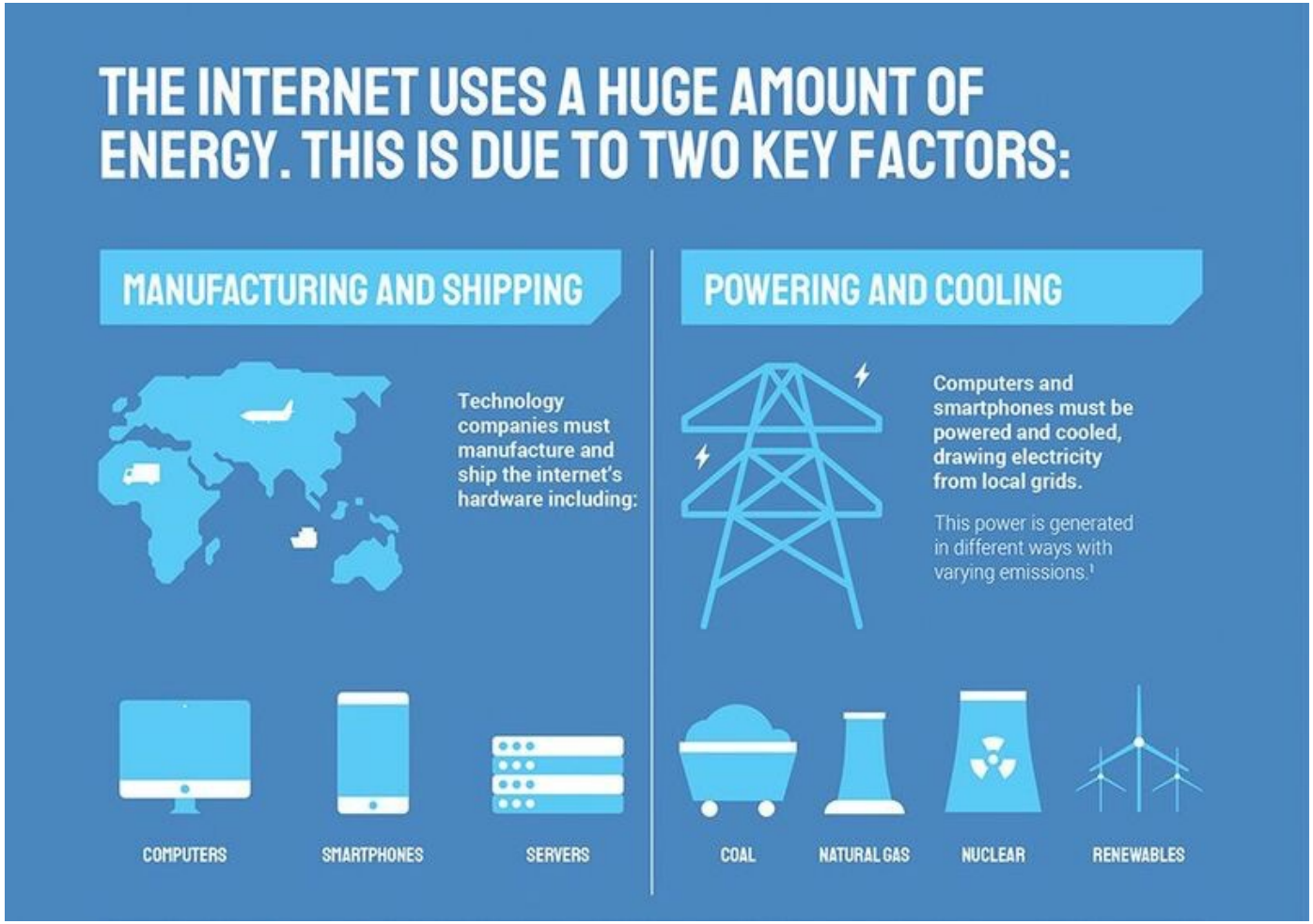
Vesna Manojlovic | 2024-03-07 | WdKA, Rotterdam


Vesna Manojlovic
Internet Governance &
Environmental
(un)Sustainability
We are in an environmental emergency! As a part of Internet Governance community, technical communities must focus on immediate actions of decreasing material & energy consumption, reducing GHG emissions and decelerating growth. Let's build the Internet within planetary boundaries. Vesna Manojlovic is a hacker, mother, activist, feminist and community builder at RIPE NCC, a regional internet registry.
https://labs.ripe.net/author/becha/

Internet governance timeline



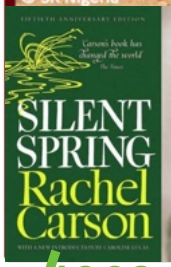
“Data is the New Oil”



1860s - 1910s, England
Statistician Florence Nightingale & physician Elizabeth Garrett Anderson, women's suffrage movement

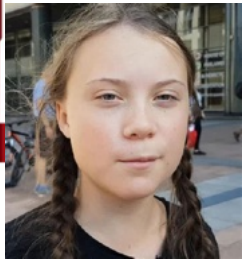
1920s, Brazil
Biologists from National Museum, environmental protection

1960 - present, USA
Science for the People collective, anti-war and social justice



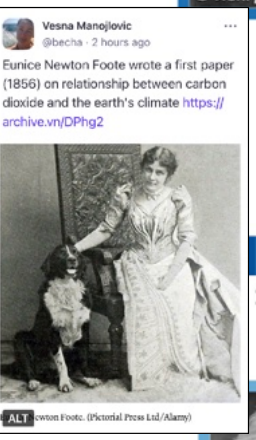
1962

2020s, Worldwide
Scientist Rebellion, climate and ecological breakdown



1860 1890 1920 1950 1980 2010

2018 - present, Argentina
Biologist Esteban Servat, social struggles and environmental abuse



1856!

1957, USA & Europe
Nobel winners' Russell-Einstein Manifesto, abolition of atomic weapons and war

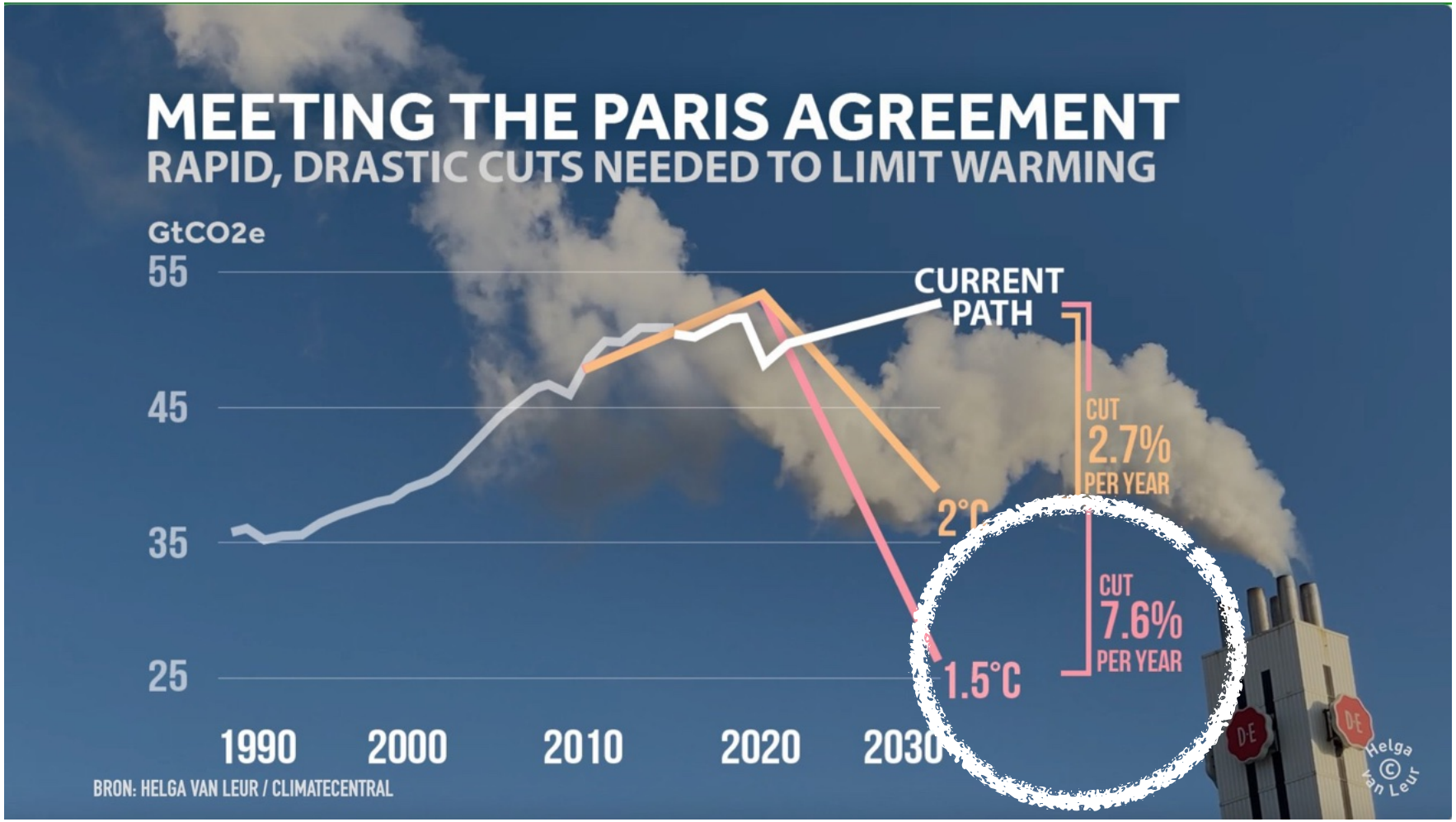
1988 - present, USA
Climatologist James Hansen, climate change

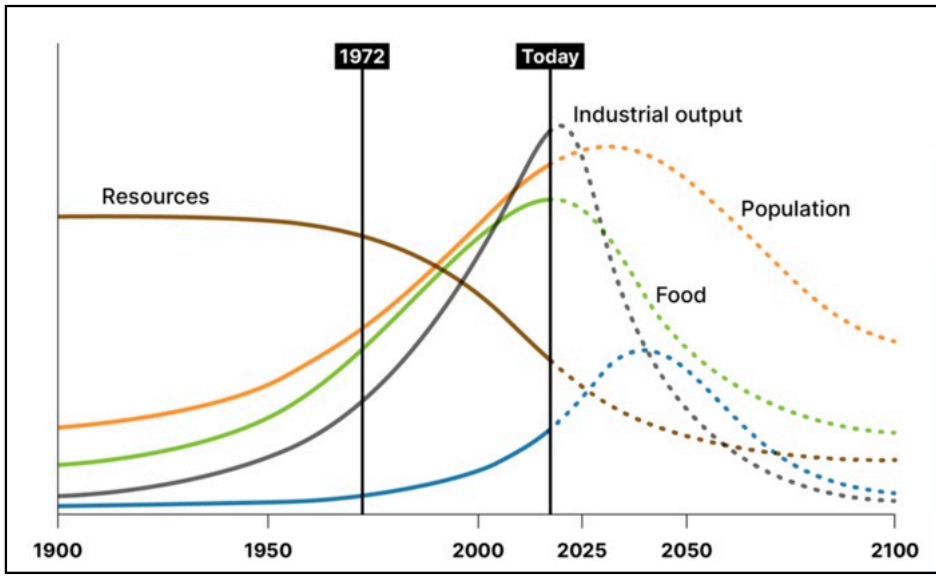
FRIDAYS FOR FUTURE

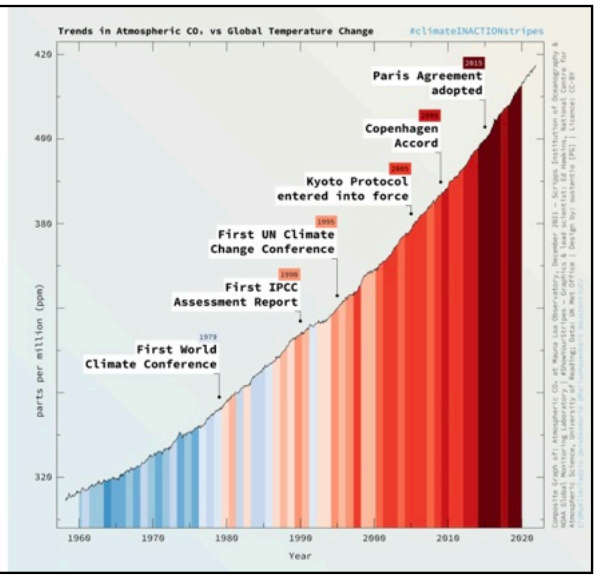
extinction rebellion

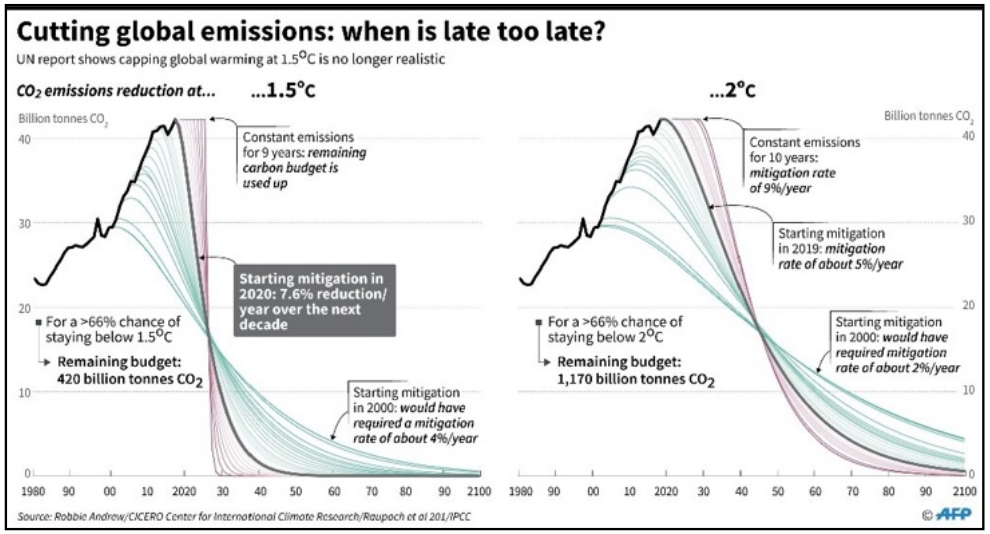
scientist rebellion_

POWER TOGETHER
XR 2020

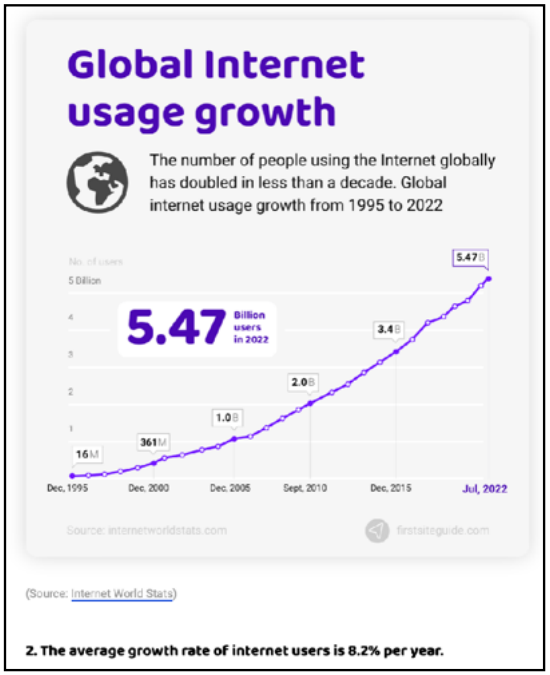

MEETING THE PARIS AGREEMENT
RAPID, DRASTIC CUTS NEEDED TO LIMIT WARMING
GtCO2e
55
45
35
25
1990
2000
2010
2020
2030
CURRENT PATH
2°C
1.5°C
CUT 2.7% PER YEAR
CUT 7.6% PER YEAR
BRON: HELGA VAN LEUR / CLIMATECENTRAL
Helga © van Leur


1972
Today
Industrial output
Resources
Population
Food
1900
1950
2000
2025
2050
2100


Trends in Atmospheric CO₂ vs Global Temperature Change
#climateINACTIONstripes
Paris Agreement adopted
Copenhagen Accord
Kyoto Protocol entered into force
First UN Climate Change Conference
First IPCC Assessment Report
First World Climate Conference
parts per million (ppm)
Year


Cutting global emissions: when is late too late?
UN report shows capping global warming at 1.5°C is no longer realistic
CO₂ emissions reduction at...
...1.5°C
...2°C
Billion tonnes CO₂
Constant emissions for 9 years: remaining carbon budget is used up
Starting mitigation in 2020: 7.6% reduction/ year over the next decade
For a >66% chance of staying below 1.5°C
Remaining budget: 420 billion tonnes CO₂
Starting mitigation in 2000: would have required a mitigation rate of about 4%/year
Constant emissions for 10 years: mitigation rate of 9%/year
Starting mitigation in 2019: mitigation rate of about 5%/year
Starting mitigation in 2000: would have required mitigation rate of about 2%/year
For a >66% chance of staying below 2°C
Remaining budget: 1,170 billion tonnes CO₂
Source: Robbie Andrew/CICERO Center for International Climate Research/Raupach et al 201/IPCC
AFP

Global Internet usage growth
The number of people using the Internet globally has doubled in less than a decade. Global internet usage growth from 1995 to 2022
5.47 Billion users in 2022
(Source: Internet World Stats)
2. The average growth rate of internet users is 8.2% per year.



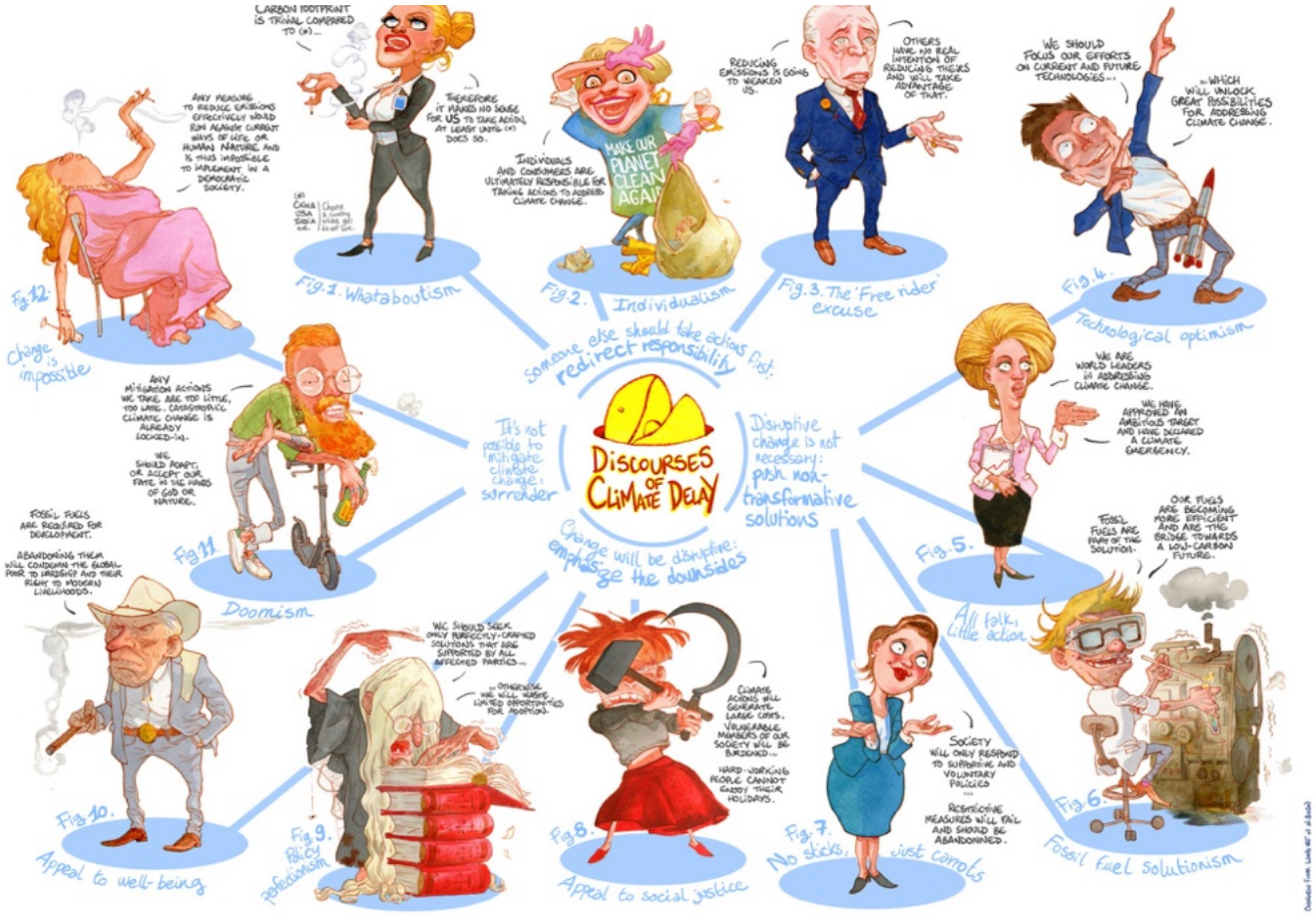
Source: https://www.statista.com/statistics/263264/top-companies-in-the-world-by-market-capitalization/

Global trends in digital and energy indicators, 2015-2021

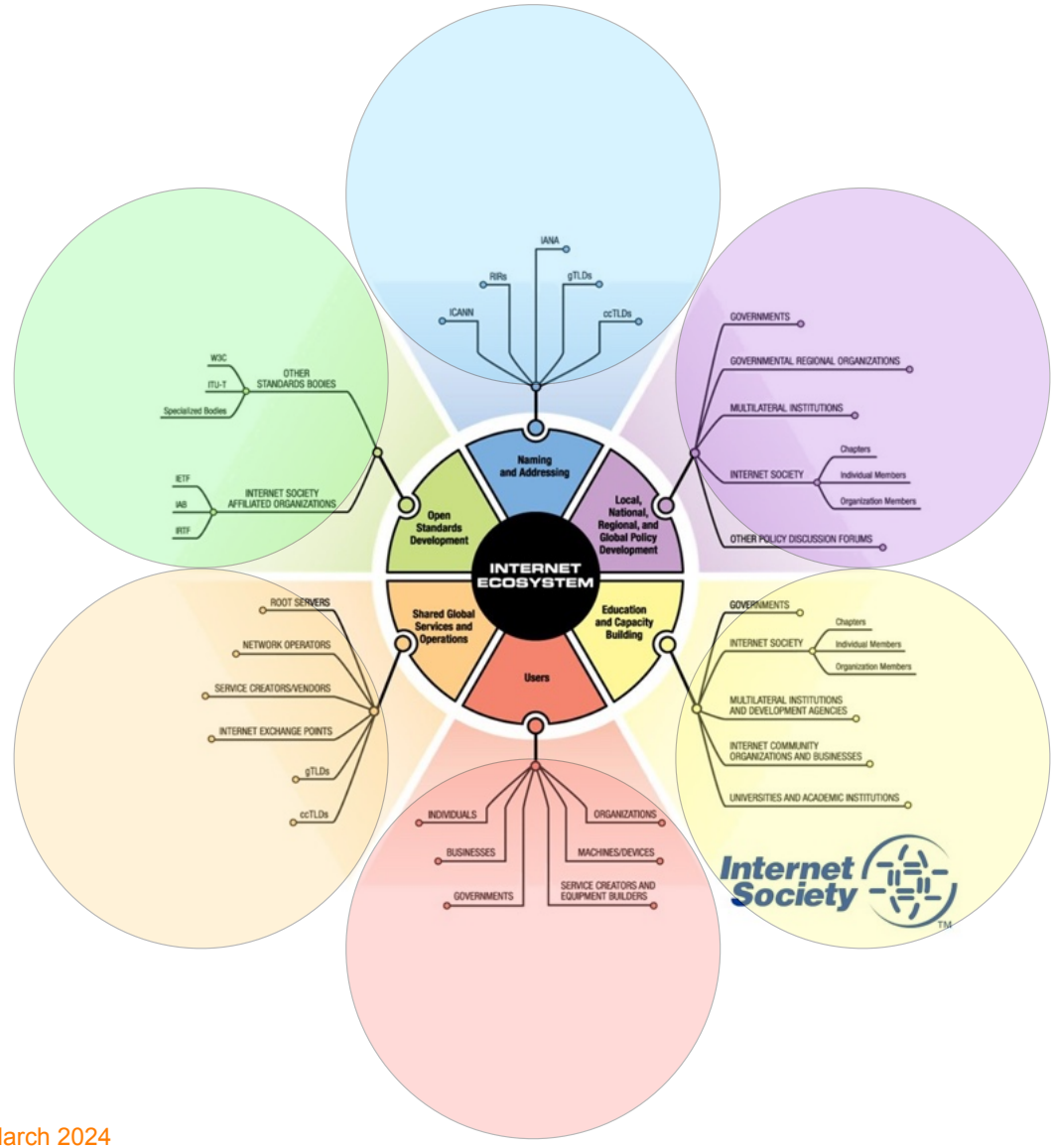
	2015	2021	Change
Internet users	3 billion	4.9 billion	+60%
Internet traffic	0.6 ZB	3.4 ZB	+440%
Data centre workloads	180 million	650 million	+260%
Data centre energy use (excluding crypto)	200 TWh	220-320 TWh	+10-60%
Crypto mining energy use	4 TWh	100-140 TWh	+2 300-3 300%
Data transmission network energy use	220 TWh	260-340 TWh	+20-60%

Source: https://www.iea.org/reports/data-centres-and-data-transmission-networks

“Delay is the New Denial”

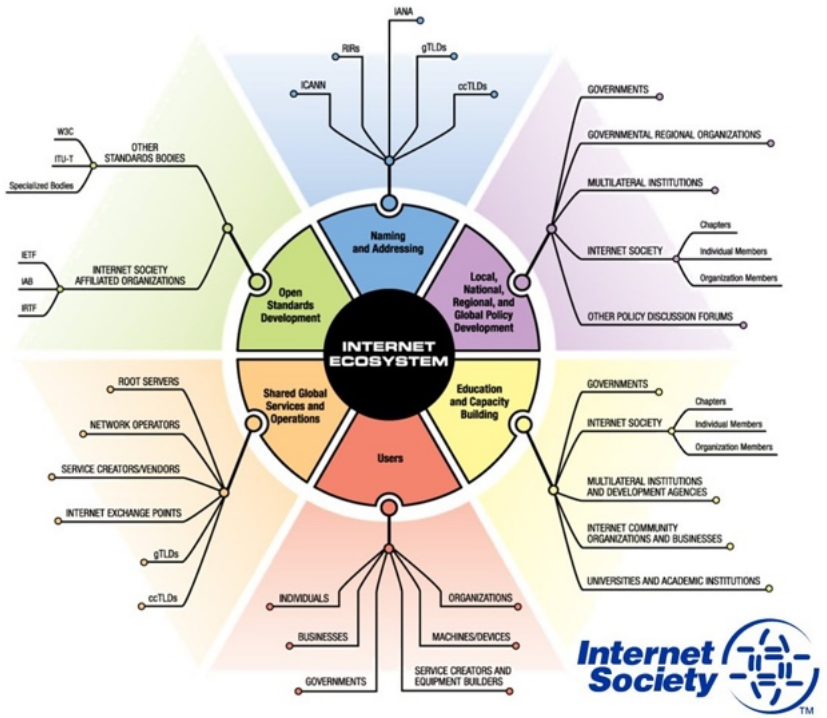


https://www.researchgate.net/publication/342596080_Discourses_of_climate_delay


INTERNET ECOSYSTEM
Naming and Addressing
Local, National, Regional, and Global Policy Development
Education and Capacity Building
Users
Shared Global Services and Operations
Open Standards Development
IANA
RIRs
gTLDs
ICANN
ccTLDs
GOVERNMENTS
GOVERNMENTAL REGIONAL ORGANIZATIONS
MULTILATERAL INSTITUTIONS
INTERNET SOCIETY
Chapters
Individual Members
Organization Members
OTHER POLICY DISCUSSION FORUMS
W3C
ITU-T
Specialized Bodies
OTHER STANDARDS BODIES
IETF
IAB
IRTF
INTERNET SOCIETY AFFILIATED ORGANIZATIONS
ROOT SERVERS
NETWORK OPERATORS
SERVICE CREATORS/VENDORS
INTERNET EXCHANGE POINTS
gTLDs
ccTLDs
GOVERNMENTS
INTERNET SOCIETY
Chapters
Individual Members
Organization Members
MULTILATERAL INSTITUTIONS AND DEVELOPMENT AGENCIES
INTERNET COMMUNITY ORGANIZATIONS AND BUSINESSES
UNIVERSITIES AND ACADEMIC INSTITUTIONS
INDIVIDUALS
BUSINESSES
GOVERNMENTS
ORGANIZATIONS
MACHINES/DEVICES
SERVICE CREATORS AND EQUIPMENT BUILDERS
Internet Society

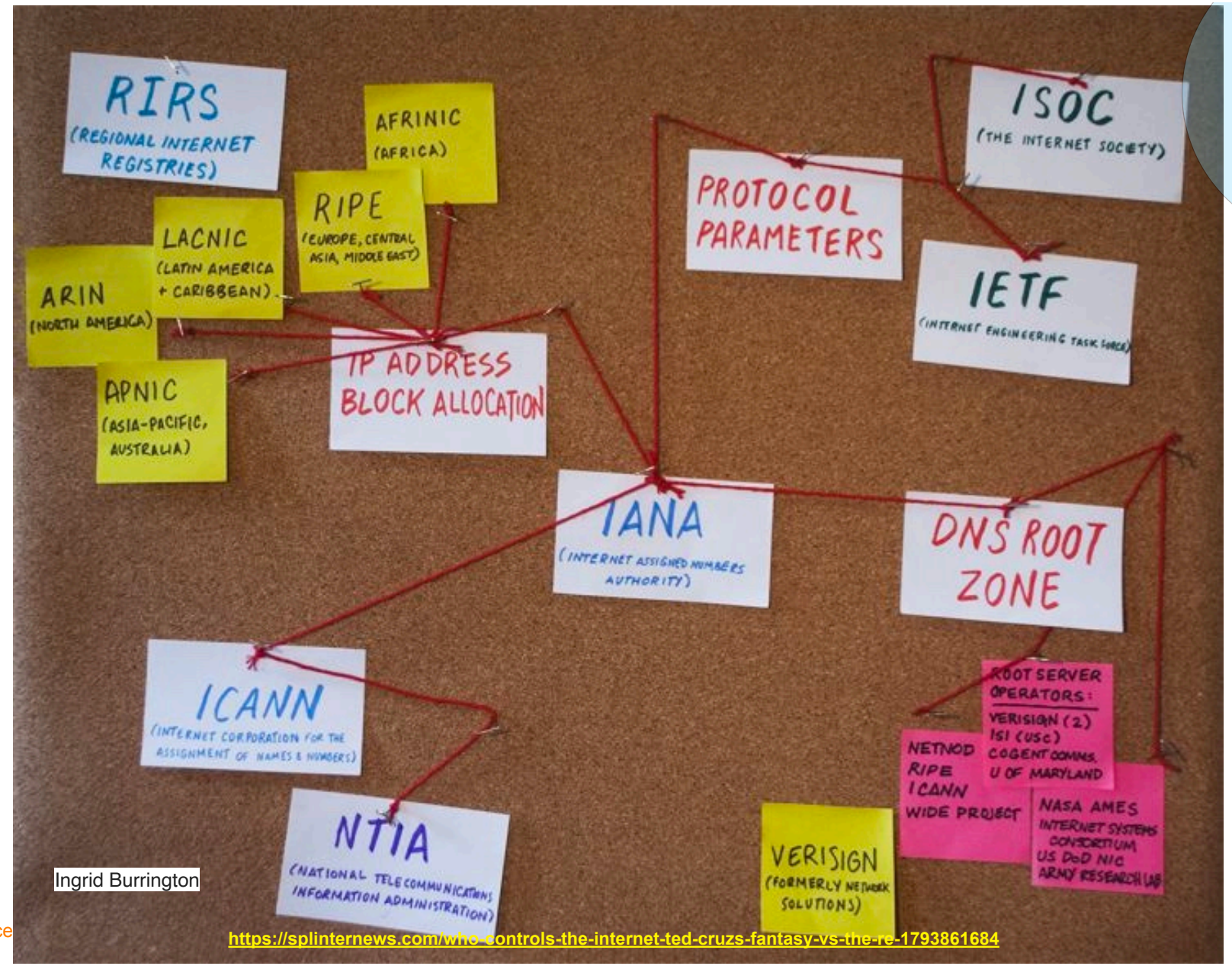
Multistakeholder Model of Internet Governance

- Blue: Naming & addressing
- Orange: Network Operators
- Green: Technical Standards Bodies
- Purple: IG Policy Coordination
- Yellow: UN & & Governments & Regulators
- Red: “Users” & academics & Artists & hackers & (Digital Rights) activists & NGOs …



https://wiki.techinc.nl/Internet_Governance_and_hackers

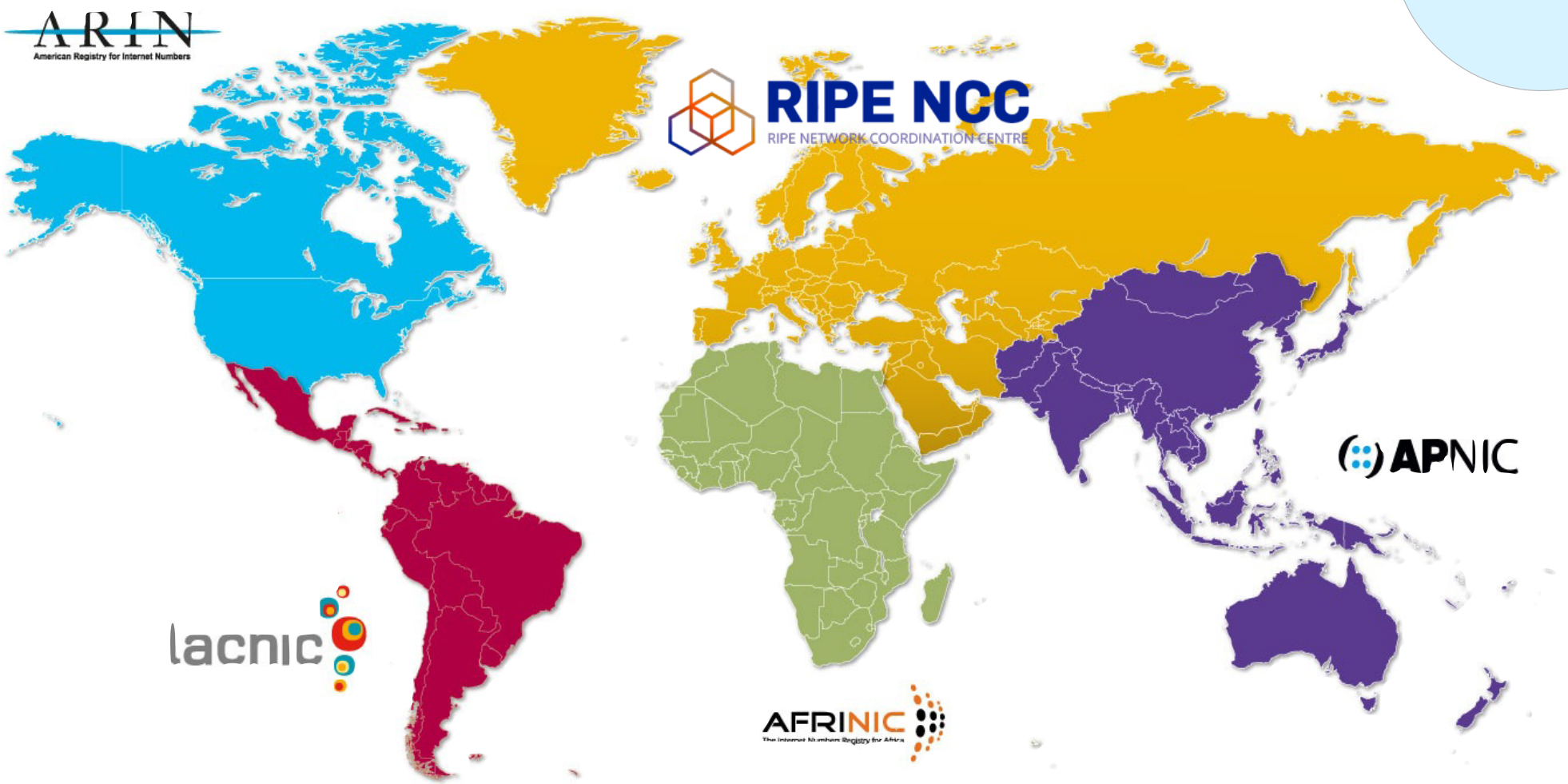
X



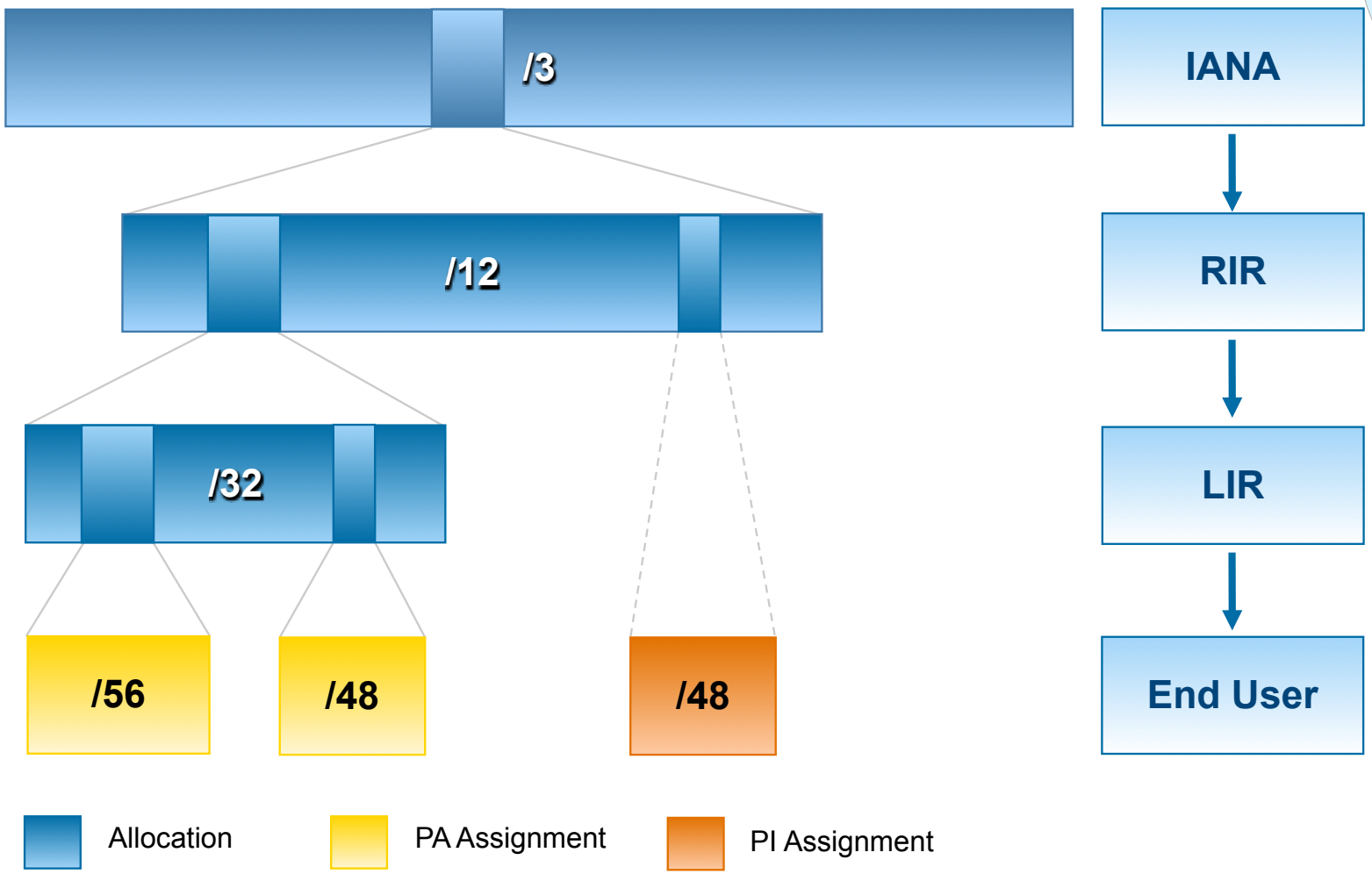
Ingrid Burrington

https://splinternews.com/who-controls-the-internet-ted-cruzs-fantasy-vs-the-re-1793861684

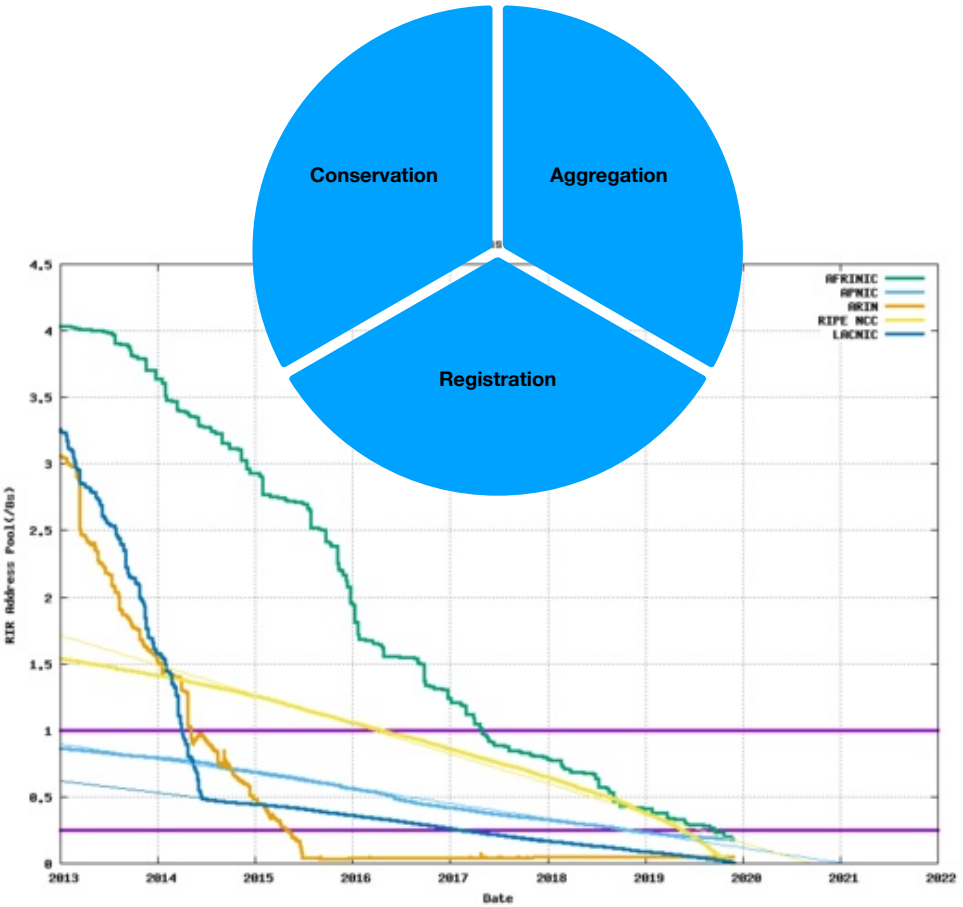
Regional Internet Registries

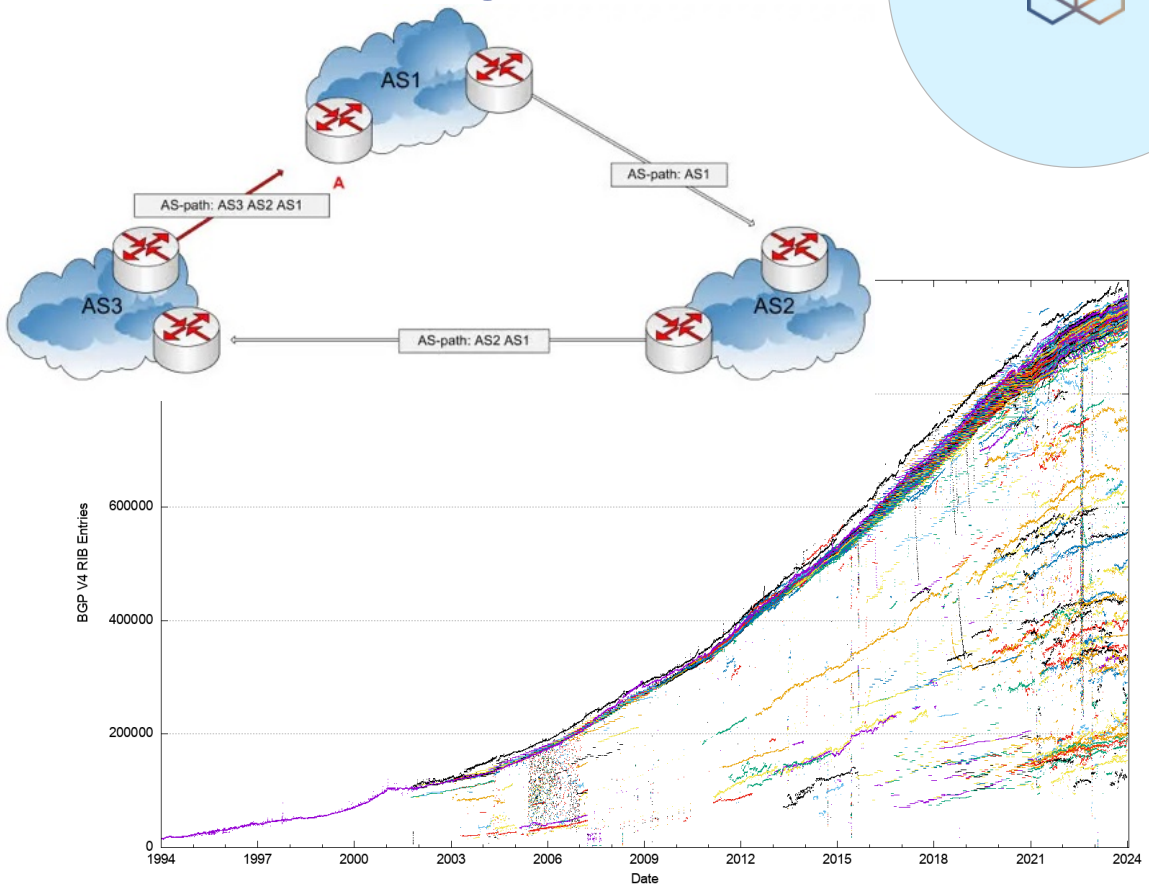


IPv6 Addresses Distribution



Principles for Fairness & Routability





https://en.wikipedia.org/wiki/IPv4_address_exhaustion

https://blog.apnic.net/2024/01/09/measuring-bgp-in-2023-have-we-reached-peak-ipv4/

RIPE (community) and the RIPE NCC

Join RIPE Community

In-Person Training

& Online Webinars, open to all!

learning.ripe.net

The 12th South East Europe Regional Meeting

- Athens

22-23 April 2024

ripe.net/see-12

RIPE Meeting

- Krakow

20-24 May 2024

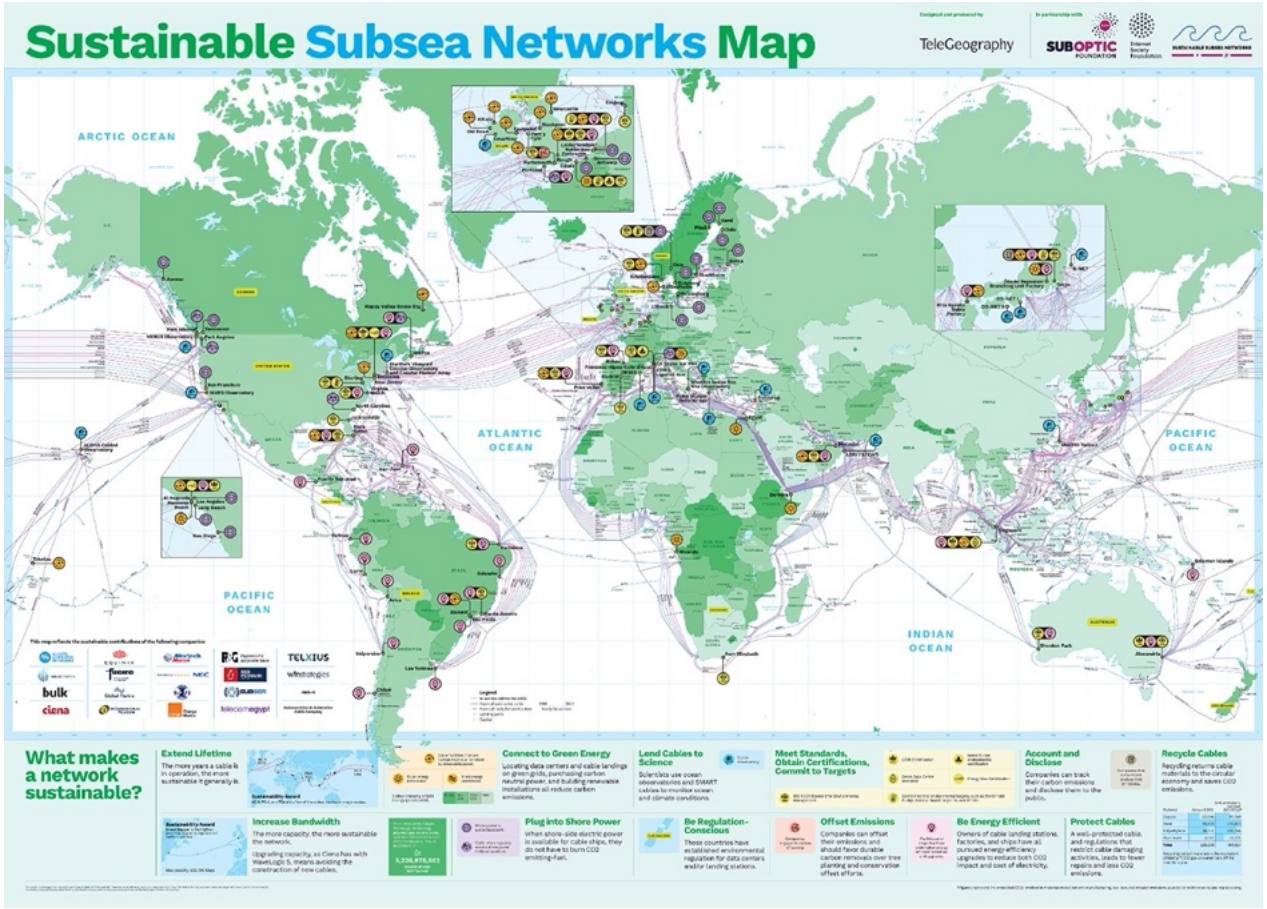
ripe88.ripe.net

- **Join forum.ripe.net**
- **Articles & podcasts: Labs.ripe.net/sustainability**
- **Academic Grants: ripe.net/raci**

RIPE Meeting Talks on Sustainability

- RIPE75 (October 2017): “Internet Services and Energy Demand”, Mike Hazas https://ripe75.ripe.net/archives/video/154/
- RIPE81 (October 2020): Sustainable ICT Procurement, Michael Oghia, https://ripe81.ripe.net/programme/meeting-plan/bof/#mon14
- RIPE84 (May 2022): Towards a Fossil Free Internet, Chris Adams, Green Web Foundation https://ripe84.ripe.net/archives/video/751/
- RIPE85 (October 2022): 13 Propositions for a Burning World, Tobias Fiebig, MPI INF; Doris Aschenbrenner, Aalen University https://ripe85.ripe.net/archives/video/877/
- RIPE86 (May 2023): The Environmental Impact of Internet: Urgency, De-Growth, Rebellion , Vesna Manojlovic https://ripe86.ripe.net/archives/video/1001/
- RIPE87 (November 2023): The Internet of Tomorrow Must Sleep More and Grow Old, Romain Jacob, ETH Zurich https://ripe87.ripe.net/archives/video/1143/

Network Operators / Internet Industry



https://labs.ripe.net/nogs/

https://www.dns-oarc.net/

https://www.centr.org/

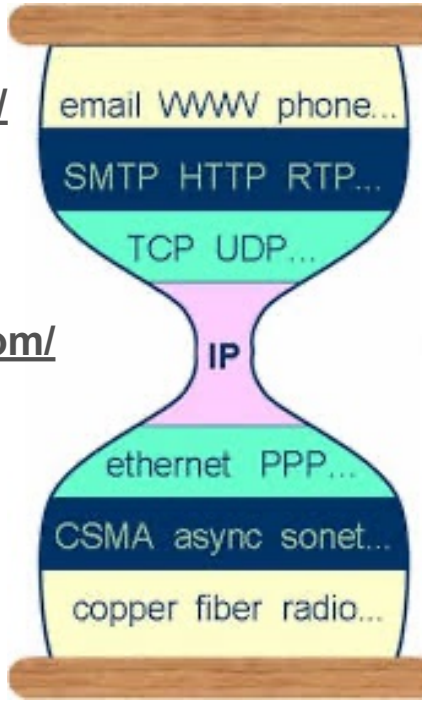
https://www.peeringdb.com/

https://www.euro-ix.net/

https://etno.eu/

https://www.gsma.com/

https://www.eudca.org/



Internet Industry & Climate Action

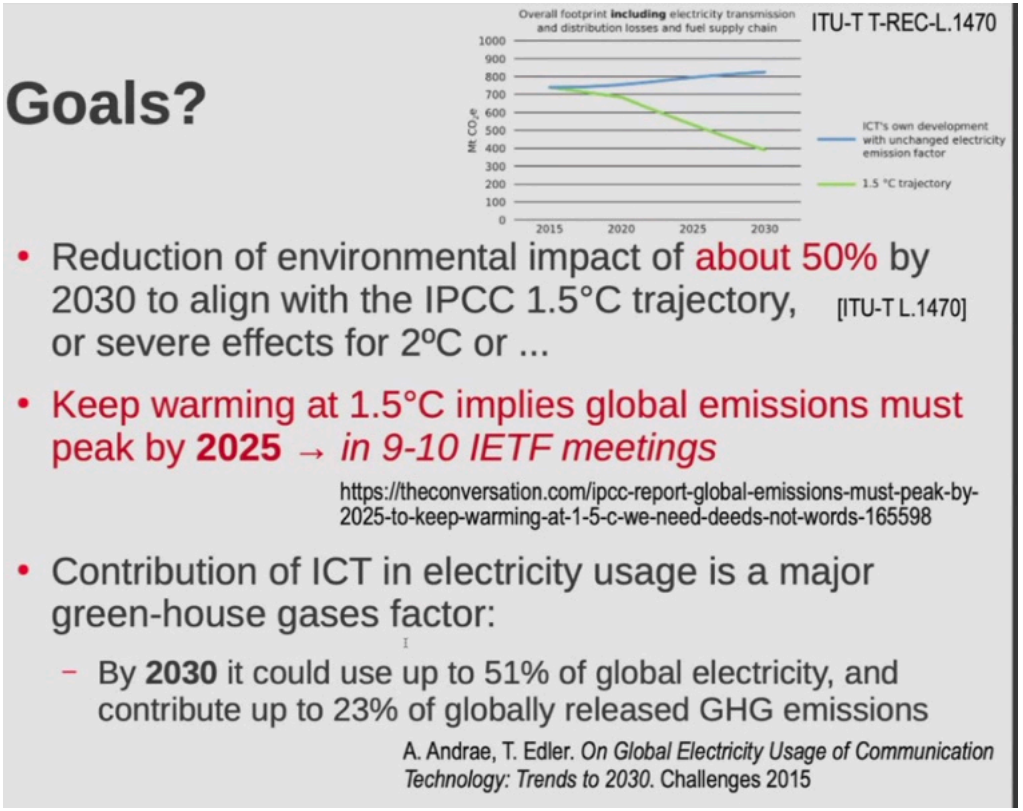
- "**Energy Consumption** in Data Centres and Broadband Communication Networks in the EU" (2024-02-16), (by European Commission's Joint Research Centre)
  https://publications.jrc.ec.europa.eu/repository/handle/JRC135926

- “The central role of **climate action** in achieving the United Nations’ Sustainable Development Goals” by Inter-University Sustainable Development Research Programme https://www.nature.com/articles/s41598-023-47746-w.

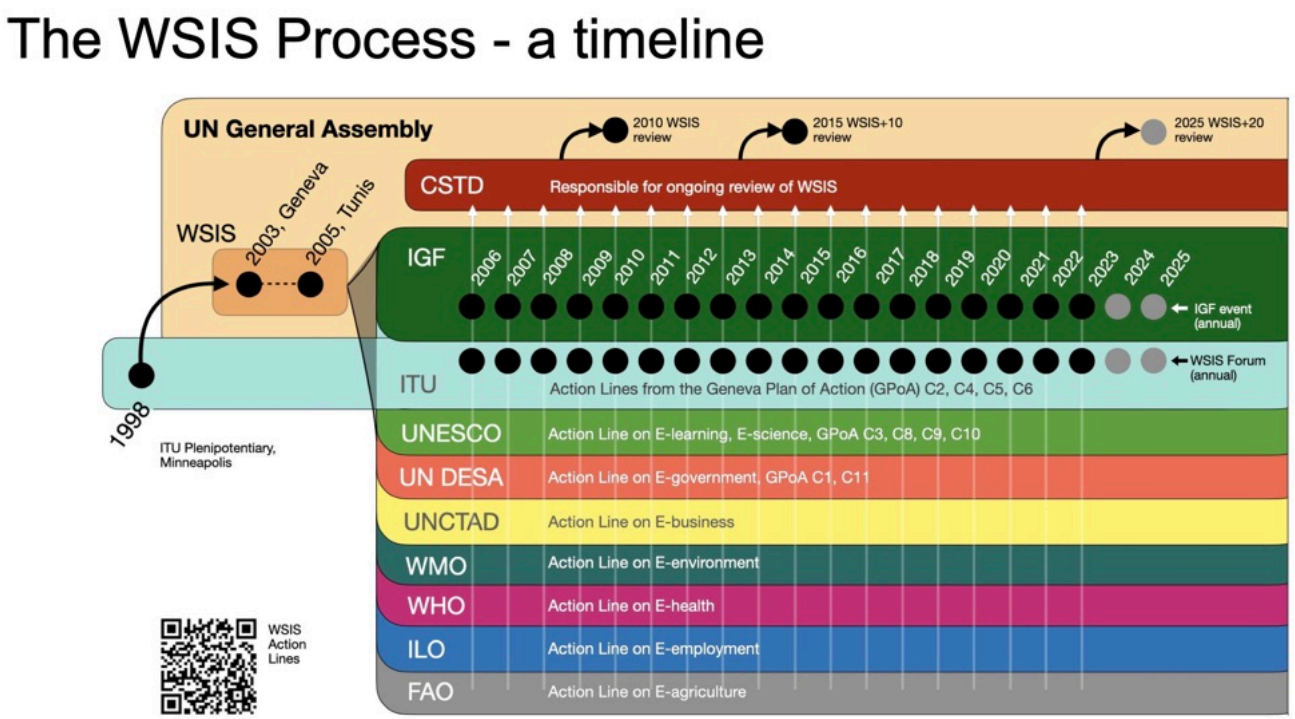
- GSMA "2024: State of the Industry on **Climate Action**" https://www.gsma.com/betterfuture/wp-content/uploads/2024/02/Mobile-Net-Zero-2024-State-of-the-Industry-on-Climate-Action.pdf

IETF & IAB

- **e-impact group**
  - https://datatracker.ietf.org/group/eimpact/about/
- **IRTF: GAIA**
  - https://datatracker.ietf.org/rg/gaia/about/
- **IAB: BIAS workshop**
  - The Internet is an important tool to reach the SDG
  - https://datatracker.ietf.org/group/biasws/about/
- **RFC8890** https://ftp.ripe.net/rfc/rfc8890.pdf
  - https://labs.ripe.net/author/becha/the-internet-is-for-the-empowerment-of-end-users/



Global Digital Compact & SDGs



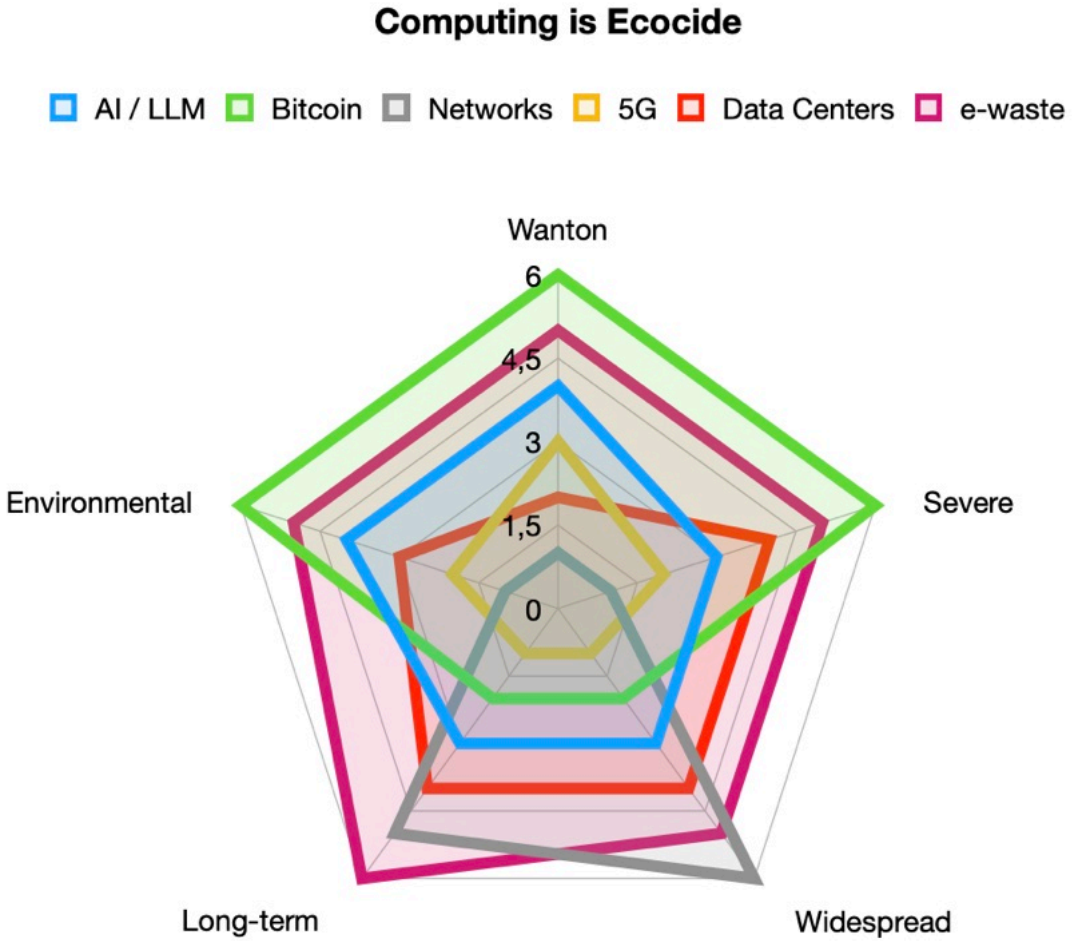
https://internet.exchangepoint.tech/internet-governance-roadmap-2024/

https://datatracker.ietf.org/meeting/interim-2024-iab-07/materials/slides-interim-2024-iab-07-sessa-internet-governance-now-00

https://www.apc.org/en/news/bringing-gender-justice-lens-uns-global-digital-compact

Internet Governance & SDGs

- **February 2024, EURALO** https://atlarge.icann.org/ralos/euralo
- **EuroDig:** https://eurodigwiki.org/wiki/WS_04_2023
  - Greening Internet Governance: **EuroDig 2020** https://eurodigwiki.org/wiki/Greening_Internet_governance_–_Environmental_sustainability_and_digital_transformation_–_2020/2021
- **IGF 2023**
  - "Climate change and Technology implementation" https://www.youtube.com/watch?v=eirpgX_U5EA
  - https://labs.ripe.net/author/gergana_petrova/igf-2023-liveblog/
- **2021:** https://seedig.net/seedig7-sustainable-future/
- **ITU in 2020: "reduce ICT GHG emissions by 45% by 2030"**



https://wiki.techinc.nl/User:Becha/AI_is_ecocide

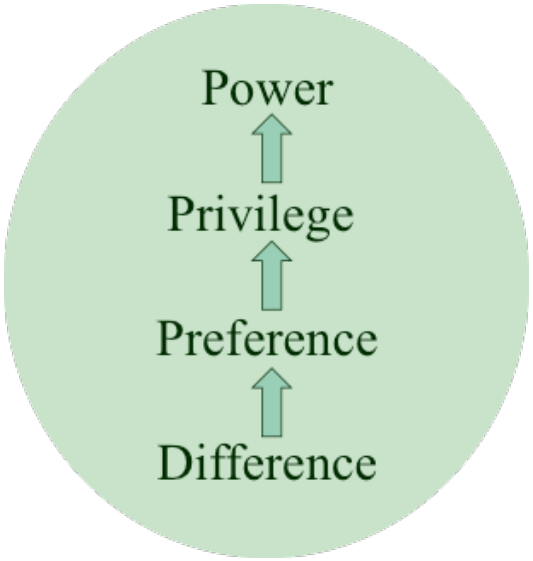
“Civil Society”: Academia, (h)Activists, NGOs…

- **Computing Within Limits**
  - https://labs.ripe.net/author/becha/computing-within-limits-2023/
  - https://computingwithinlimits.org **(18-19.June)**
- **Bits & Bäume (part of CCC)**
  - https://labs.ripe.net/author/becha/towards-climate-justice-in-tech/
  - http://bits-und-baeume.org/
- **Many other communities for climate action in tech**
  - https://wiki.mozilla.org/Projects/Sustainability/Research
  - https://www.sigplan.org/Resources/Climate/
  - https://climateaction.tech/community/
  - https://www.apc.org/en/news/mobilising-collective-action-environmental-justice-and-sustainability-2020
  - https://varia.zone/8m/ **(8. March)**

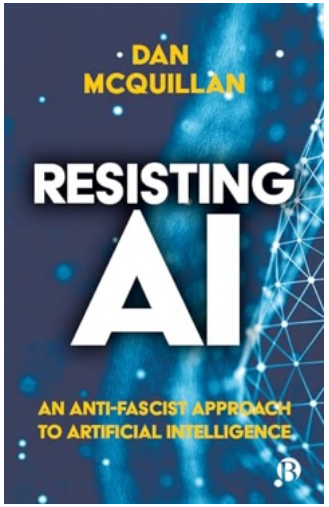
all technical decisions are political

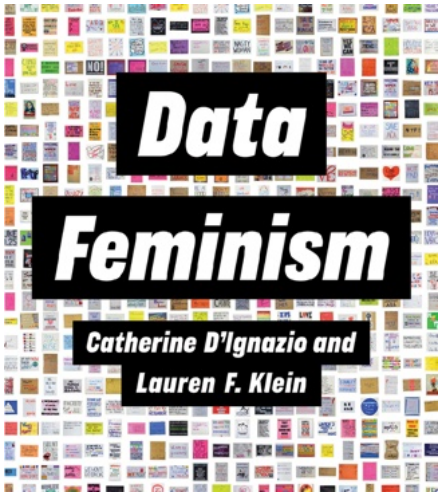
authentic engine

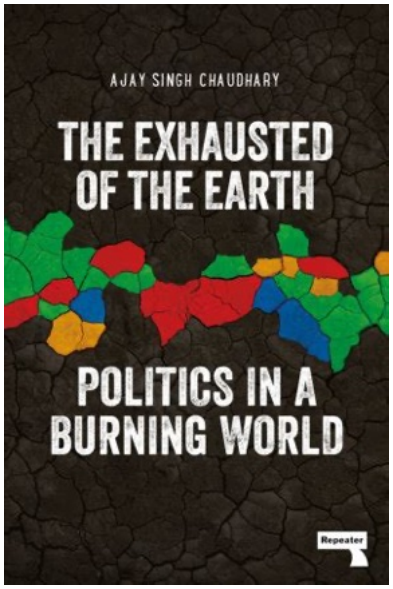
Technical Is Political

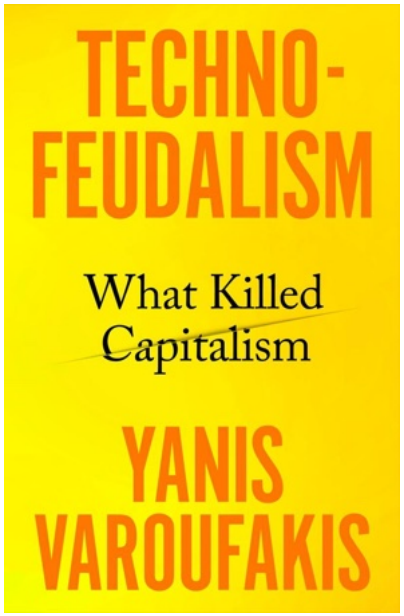


- varia.zone/8m/
- “No research on a dead planet” https://www.frontiersin.org/articles/10.3389/feduc.2023.1237076

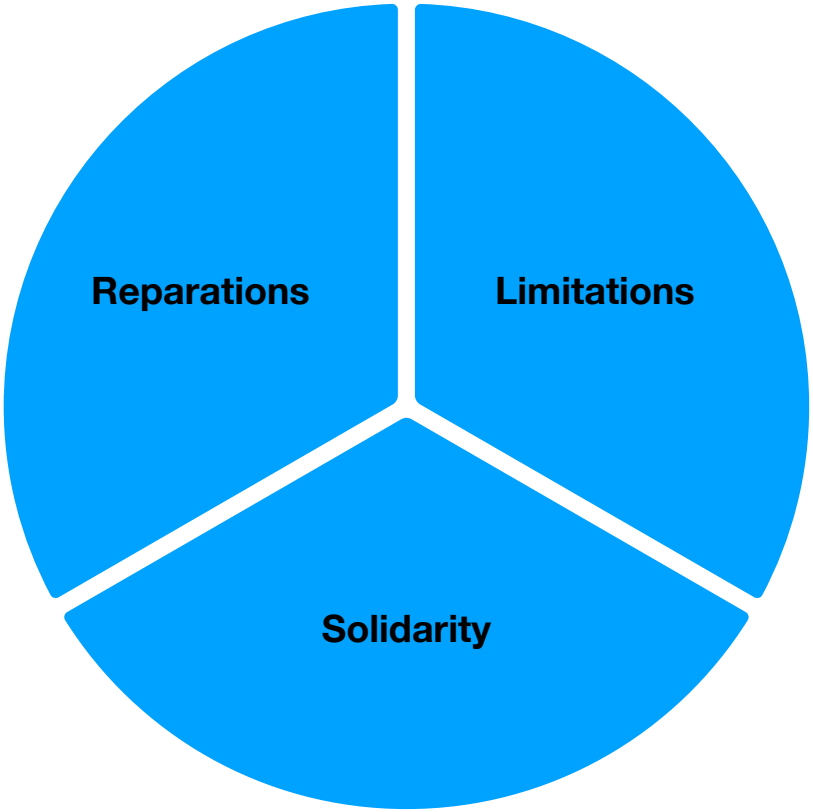








Principles for Climate Justice in Tech

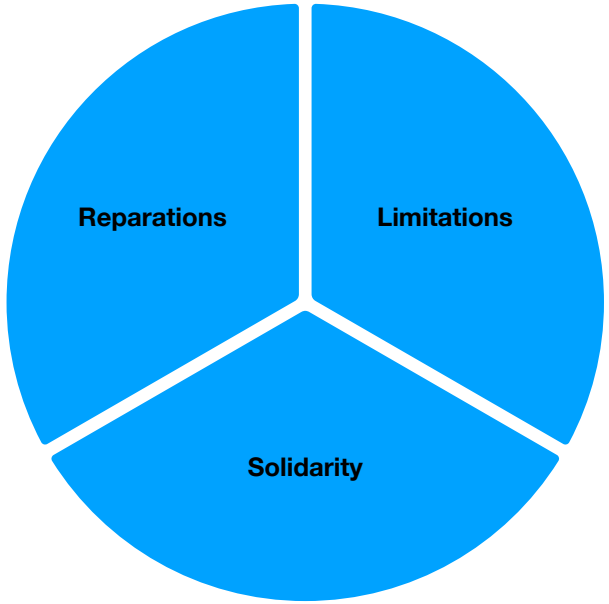


https://labs.ripe.net/author/becha/towards-climate-justice-in-tech/

Principles for Climate Justice in Tech

- “Towards Climate **Justice** in Tech”
  - https://labs.ripe.net/author/becha/towards-climate-justice-in-tech/
- **Limiting** extractivism & decreasing growth

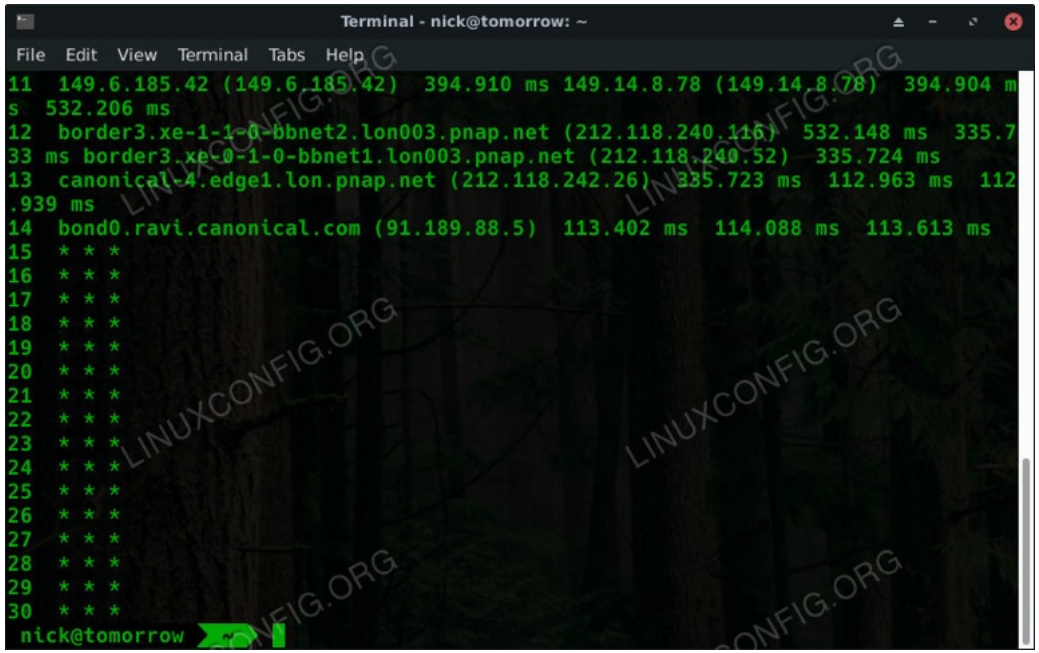
- **Reparations**: giving back to the most affected communities
- Acting in **solidarity** with the frontline communities & centering marginalised groups; mutual aid

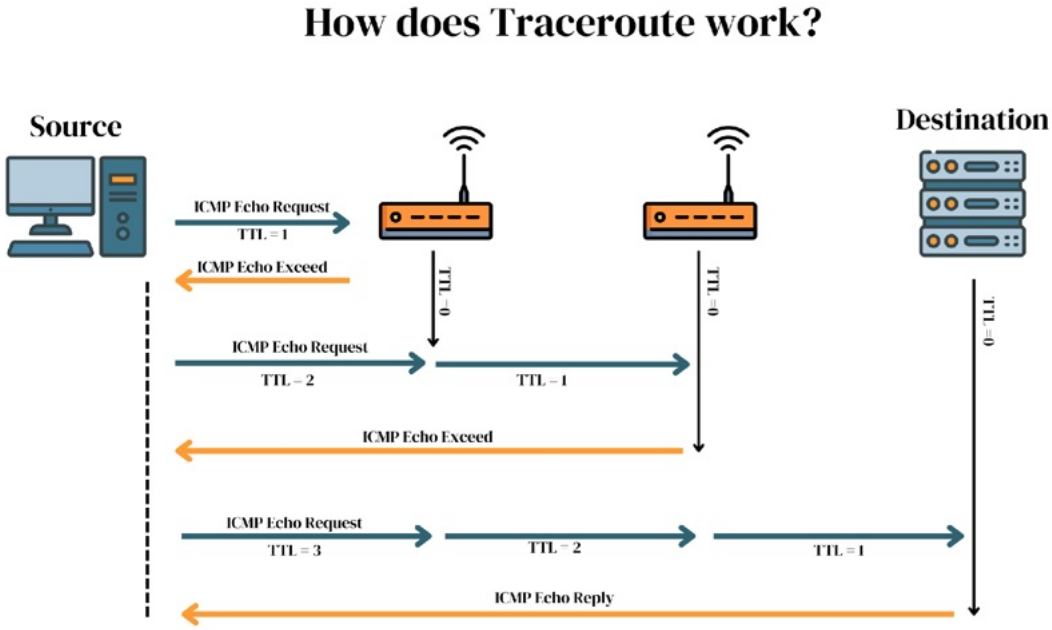


https://www.frontiersin.org/articles/10.3389/feduc.2023.1237076

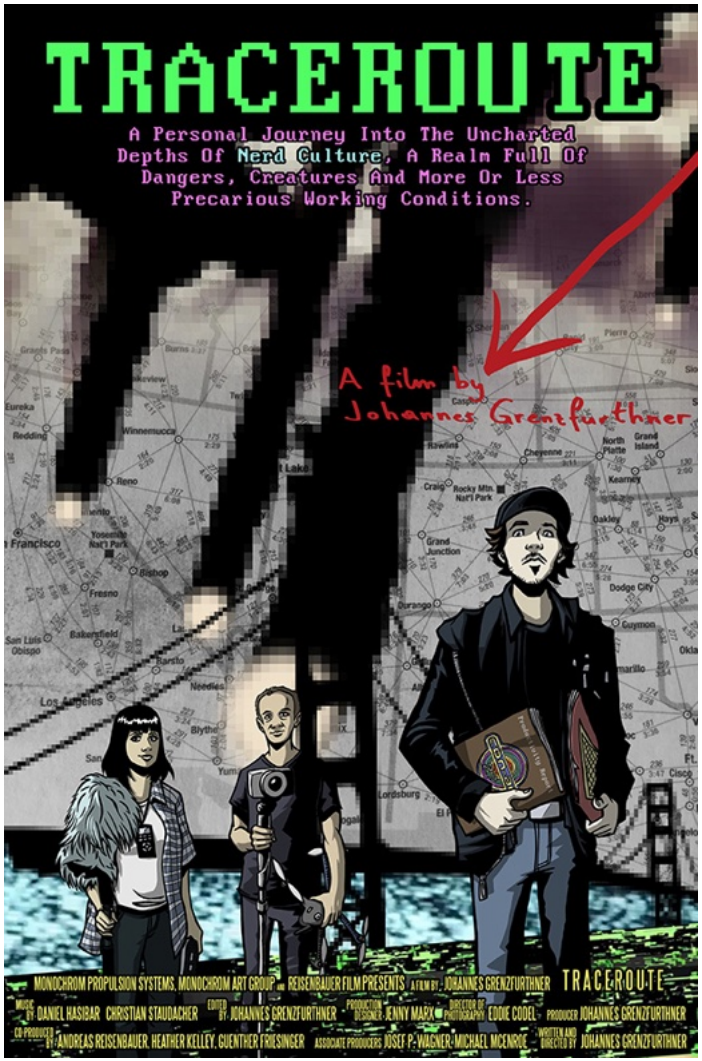
varia.zone/8m/

traceroute





- https://wiki.techinc.nl/User:Becha/InternetPlumbing/Traceroute_Much
- **https://Atlas.RIPE.net**
- https://ipmap.ripe.net/



http://monochrom.at/traceroute/

Extra Slides

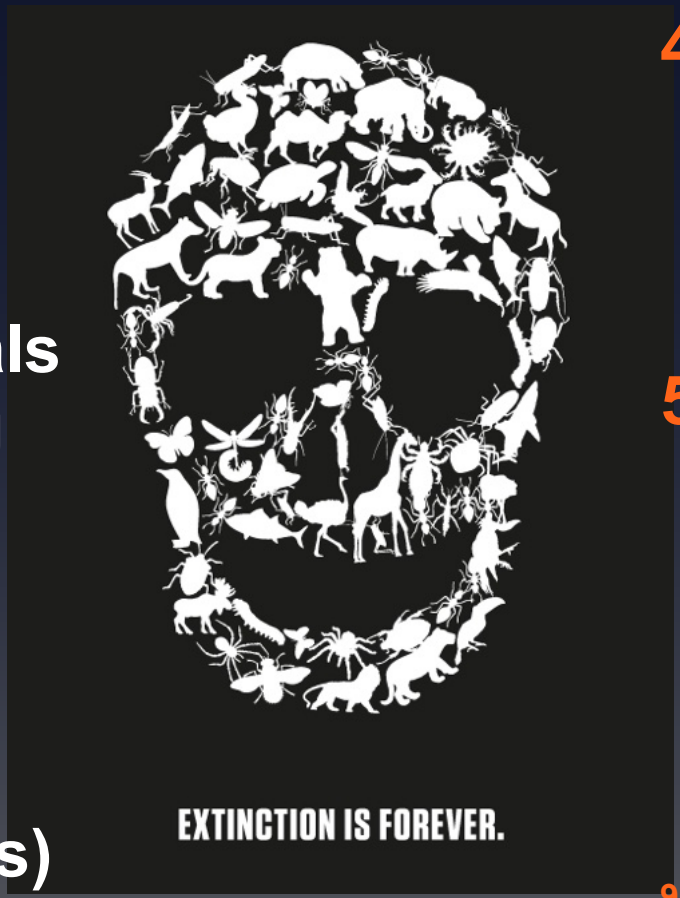
https://wiki.techinc.nl/Sustainability

Calls for Actions

- **Join** existing communities & mailing lists & events
  - https://wiki.techinc.nl/Sustainability#Communities
  - https://wiki.techinc.nl/Sustainability#Mailing_Lists
  - https://wiki.techinc.nl/Sustainability#Events
- **Work together** on reducing environmental impact
- **Act** in solidarity with marginalised groups, frontline populations, endangered ecosystems

Problems Statements: **ICT's** Death Cycle

1. **Materials are extracted in violent & polluting ways**
2. **Shipping (of materials & equipment) is using fossil fuels**
3. **Equipment is produced by using fossil fuel energy (& exploitative conditions)**



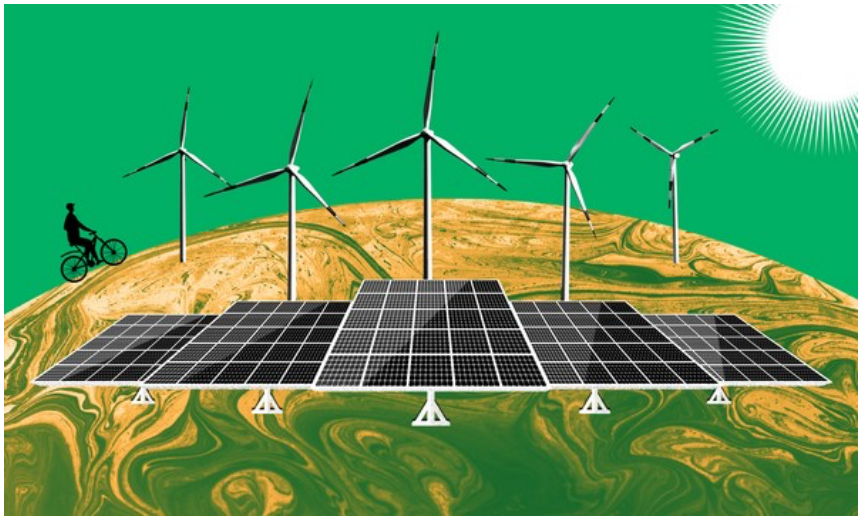
Extinction is forever. - Laura Uselis

4. **Operating networks & data storage uses electricity sourced by burning fossil fuels**
5. **Disposing old equipment is wasteful & polluting & unjust**

9. **Flying to conferences is a terrible luxury**

Minimal Solutions: the Opposite of Death-cycle!

1. **Re-Use** existing materials
    1. or **re-source** materials in sustainable & just ways
2. Use **renewable** energy sources
    1. (**refuse** fossil fuels)
3. Produce locally (**reduce** shipping)
4. **Decrease** energy usage **-7.6% /year**
5. **Reduce** new equipment needs: **Repair; Repurpose; Recycle**
6. Do Not Fly**! (take a train / bike, or use email / chat)**



STAY GROUNDED

Economics

https://www.apc.org/en/news/our-circular-future-if-youre-reading-youre-part-environmental-problem

My Top 10 21st-Century Alternative Economic Theory Books:

- Giving Economy, Heather Marsh (in "Binding Chaos", 2013)
- Post-carbon Economy, Naomi Klein (in "On Fire", 2021)
- Caring Economy, Riane Eisler (2007) : http://caringeconomy.org/
- Decolonising Economics, Nonhlanhla Makuyana (2021) https://decolonisingeconomics.org/
- Ecofeminism, Maria Mies and Vandana Shiva (2014) https://www.environmentandurbanization.org/ecofeminism
- Mutualism, Sara Horowitz (2021)
- Doughnut Economics, Kate Raworth (2017) https://doughnuteconomics.org/
- Mission Economy, Mariana Mazzucato (2021)
- The Support Economy: Shoshana Zuboff (2002) http://www.thesupporteconomy.com/
- Enlightenment Economics, Diane Coyle (in "The Economics of Enough", 2011)

- https://labs.ripe.net/author/becha/ripe-community-resilience-economy-of-care/

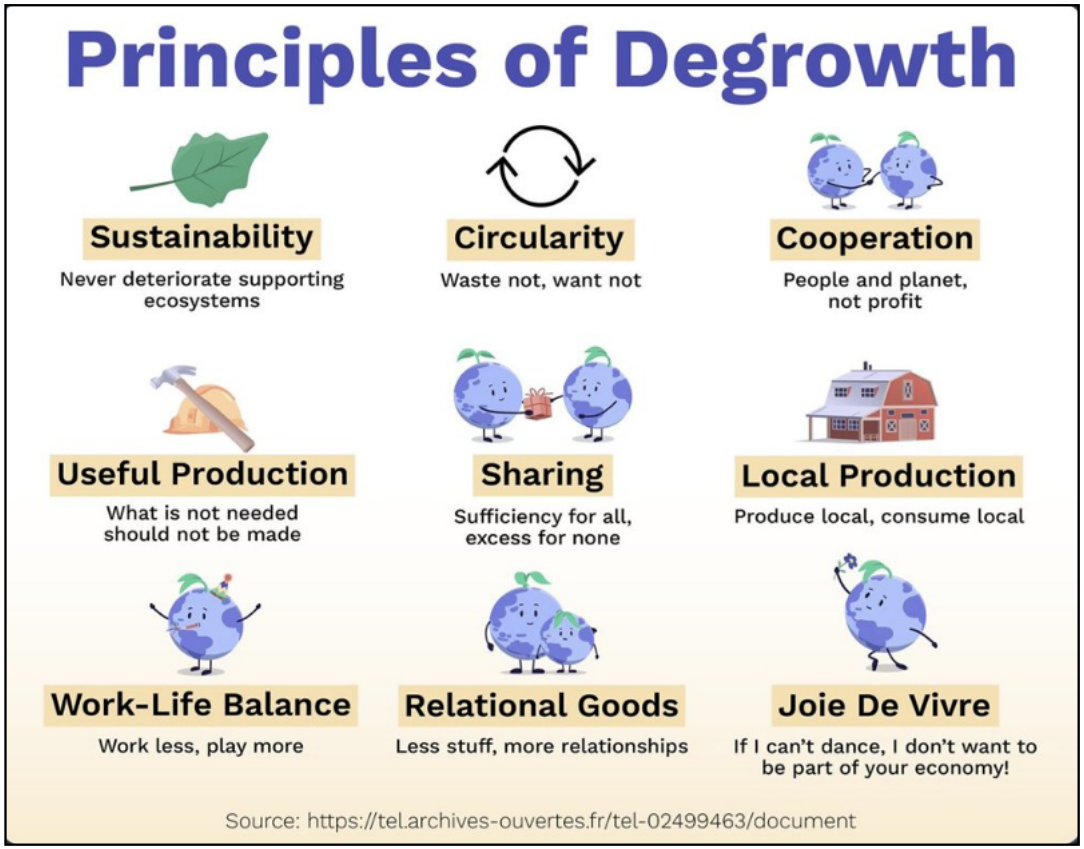
“Why Haven't We Bent the Global Emissions Curve?”

- **(… “In Three Decades of Climate Mitigation”)**
  - “Annual Review of Environment and Resources” (October 2021) https://www.annualreviews.org/doi/full/10.1146/annurev-environ-012220-011104
  - “…the centralization of power and the privileges that accompany [it] have coalesced around a particular worldview”
  - “inequities in economic and political power have allowed those who benefit from the status quo to protect their interests”
  - => Rapid & Radical Changes, or Chaos & Collapse
- **Biases: “tech is neutral” / “we are the good guys” bias / techno-optimism**
  - efficiency myth (Jevons paradox)
  - aligned with dominant power structures
  - focused on growth

> the scale and rapidity of change now required of human societies, can no longer be reconciled with a massaged form of the status quo. In a real sense, a critical tipping point has emerged. Whatever direction is chosen, the future will be a radical departure from the present. Societies may decide to instigate rapid and radical changes in their emissions at rates and in ways incompatible with the Zeitgeist, or climate change will impose sufficiently chaotic impacts that are also beyond the stability of the Zeitgeist. Within both of these futures, the existing power structures and paradigm associated with the Davos cluster are simply unfit for purpose.

DeGrowth

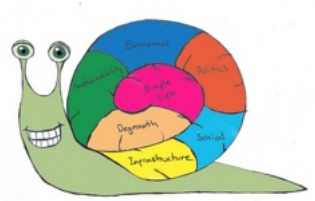
- A Degrowth Perspective on Artificial Intelligence - Analysing the Appropriateness of Machine Learning to a Degrowth Contex https://www.research-collection.ethz.ch/handle/20.500.11850/622669
- Degrowth can work — here's how science can help: https://www.nature.com/articles/d41586-022-04412-x
- Digital Degrowth https://zagreb.degrowth.net/en/9_int_dg_conf/public/events/184



ARUNDHATI ROY
THE COST OF LIVING
FLAMINGO
NO ONE IS TOO SMALL TO MAKE A DIFFERENCE
GRETA THUNBERG
THE DISPOSSESSED
URSULA K. LE GUIN
Graeber
Fragments of an Anarchist Anthropology
paradigm 14
SMALL IS BEAUTIFUL
E. F. Schumacher
ABACUS
A DECOLONIAL FEMINISM
FRANÇOISE VERGÈS
Not Too Late
Edited by REBECCA SOLNIT & THELMA YOUNG LUTUNATABUA
The Coming Insurrection
The Invisible Committee
Semiotext(e)
P.M.
BOLO'BOLO
SEMIOTEXT(E)
adrienne maree brown
EMERGENT STRATEGY
AK PRESS
VAGABONDS
WE ARE 'NATURE' DEFENDING ITSELF
FREMEAUX and JORDAN
AGAINST DOOM
JEREMY BRECHER
PM
DAVID ABRAM
THE SPELL OF THE SENSUOUS
Vintage
AGAINST HIS-STORY, AGAINST LEVIATHAN!
PERLMAN
LESS↓IS↑MORE
Jason Hickel
Practical Utopia
Michael Albert
PM
WHY CIVIL RESISTANCE WORKS
Chenoweth & Stephan
Columbia
Reason for Hope
Jane Goodall with Phillip Berman
WARNER BOOKS
NAOMI KLEIN THIS CHANGES EVERYTHING
RE-ENCHANTING THE WORLD
Silvia Federici
PM
"RAW DATA" IS AN OXYMORON
GITELMAN, EDITOR
Instituute of Network Cultures
Sabine Niederer
Networked Content Analysis: The Case of Climate Change
THE NECESSARY REVOLUTION
PETER SENGE,
BRYAN SMITH, NINA KRUSCHWITZ,
JOE LAUR, AND SARA SCHLEY
BROADWAY
Data Feminism
Catherine D'Ignazio and Lauren F. Klein
ONDERDEEL VAN DE OPLOSSING
Een didactiek voor SYSTEEMDENKEN
D4S
DIGITAL RESET
Redirecting Technologies for the Deep Sustainability Transformation

Science & Ethics of De-Growth

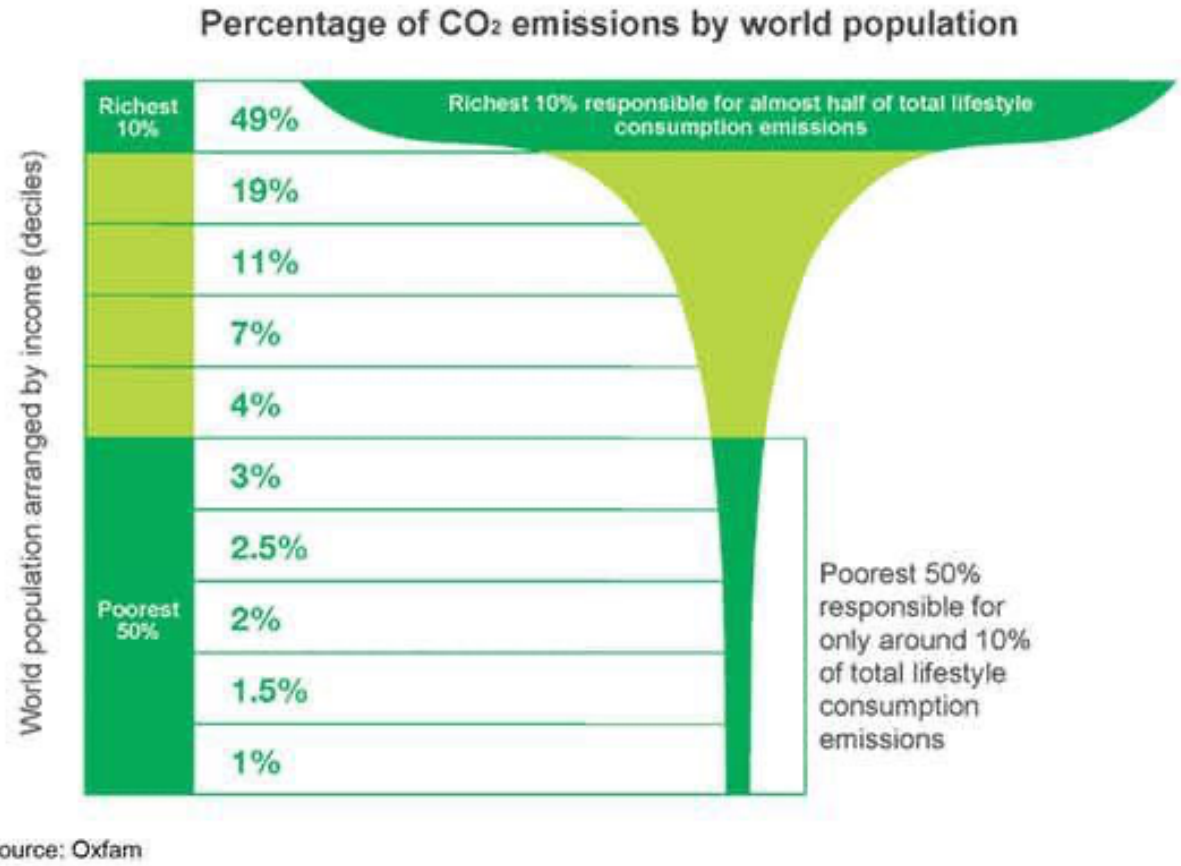
- **Academic Journal on Degrowth (May 2023) : feminist, anarchist, decolonial views**
  - https://www.degrowthjournal.org/issues/2023-volume-1/
- **Esther Turnhout as Chair of Science, Technology & Society, University of Twente**
  - https://vimeo.com/760282599 & https://www.utwente.nl/en/academic-ceremonies/inaugural-lectures/booklets/booklets-2022-2023/inaugural-booklet-professor-esther-turnhout-14-october-2022.pdf
- **“Resplendent care-full climate revolutions”, Farhana Sultana**
  - https://www.farhanasultana.com/wp-content/uploads/Sultana-Resplendent-Climate-Revolutions-2022.pdf
- **“Handbook of Critical Environmental Politics”**
  - https://www.e-elgar.com/shop/gbp/handbook-of-critical-environmental-politics-9781839100666.html



- **Combatting climate change & #Polycrisis means embracing degrowth**
  - https://climateactionaustralia.wordpress.com/2023/01/22/why-combatting-climate-change-means-embracing-degrowth-polycrisis/
  - https://www.noemamag.com/degrowth-in-japan
  -

Inequalities: North vs South

Figure 1: Global income deciles and associated lifestyle consumption emissions



Source: Oxfam

Decolonizing Internet, Economy, Ecology…

VANDANA SHIVA

"I think the combination of feminism and ecology creates two potentials. First, I have seen feminism that is not ecological become a new oppressor. I have seen environmentalism that is not feminist enough also become a new elitism. Ecofeminism prevents those two new forms of elitism by saying, No, it's about society and nature. It's about other ways of thinking"

Nonhlanhla Makuyana

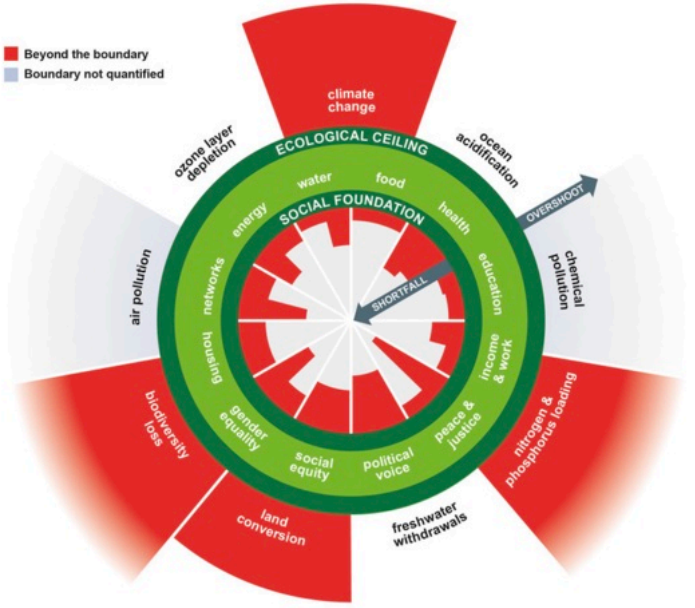
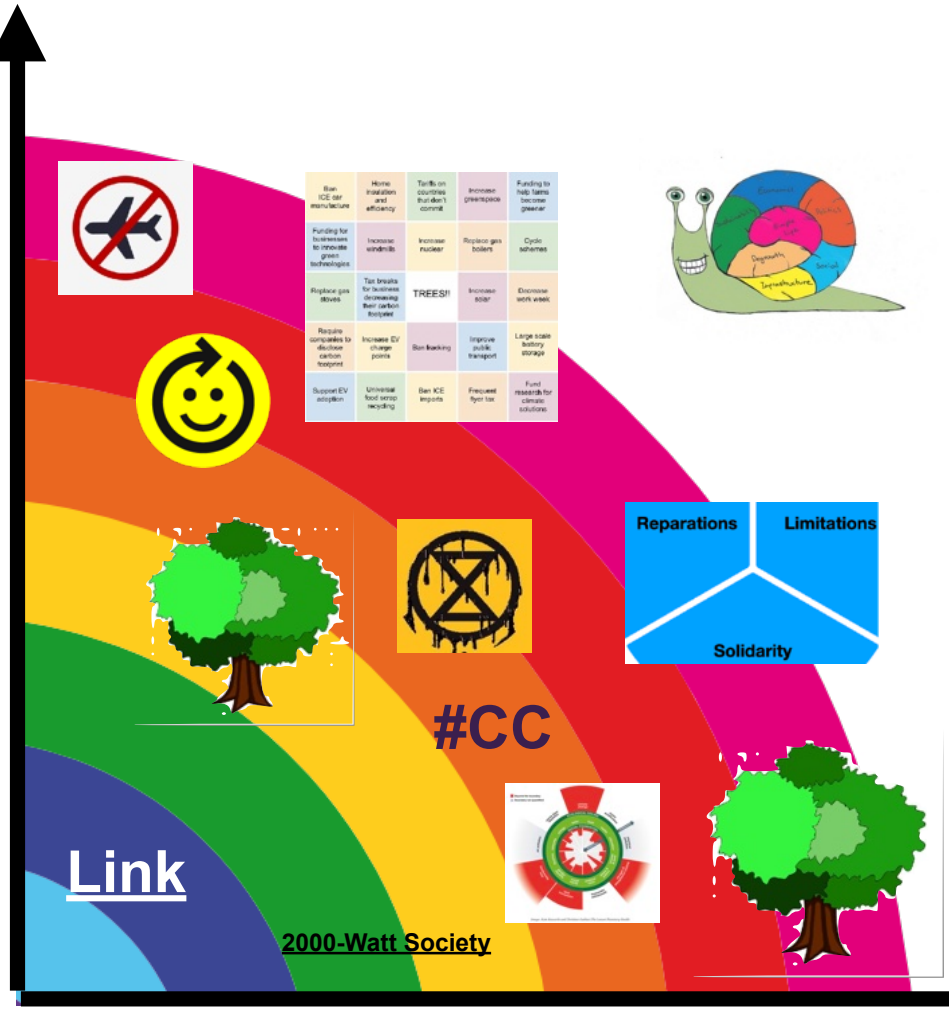


Image: Kate Raworth and Christian Guthier/The Lancet Planetary Health

Data Feminism, Data Justice

https://datafeminism.io/

Table 2.1: From data ethics to data justice	
Concepts That Secure Power Because they locate the source of the problem in individuals or technical systems	**Concepts That Challenge Power** Because they acknowledge structural power differentials and work toward dismantling them
Ethics	Justice
Bias	Oppression
Fairness	Equity
Accountability	Co-liberation
Transparency	Reflexivity
Understanding algorithms	Understanding history, culture, and context



Community / Corporate (#CC)

1. Set the target for net-zero emissions (by 2030?)
2. OKR: 10% less per year, every year
3. Create RIPE Sustainability Task Force
4. Fund sustainability projects & research
5. Move from CSR to ESG reporting
6. Create Co-operatives & community ISPs
7. Implement ITU standards (L1460-L1520)
8. Join IETF e-impact & GAIA efforts
9. STOP with AI, LLM, 5G, QI, BC, HFT, NFT, Web3

https://labs.ripe.net/author/becha/towards-climate-justice-in-tech/

"Imagining an internet that serves environmental justice" APC 2020, https://www.apc.org/en/project/technology-environmental-justice-and-sustainability

Network Operators Tips

- Kubernetes Efficient Power Level Exporter (Kepler) https://sustainable-computing.io/
- Carbon-neutral self-hosting & software development: https://codeberg.org/Codeberg/Community/issues/856
- Environmental sustainability at GitHub https://github.blog/2021-04-22-environmental-sustainability-github/
- Orange: Deep Sleep Mode for WiFi : slashes gateway power consumption to under 1W: “Sustainability in Broadband” webinar: https://app.livestorm.co/rethink-technology-research/faultline-webinar-series-2023-or-sustainability-in-broadband?type=detailed
- SubSee Cables Sustainability Map https://suboptic.org/page/sustainability-map
- Carbon-Intelligent Global Routing in Path-Aware Network https://netsec.ethz.ch/publications/papers/green_routing2023.pdf
- Green OSPF https://www.sciencedirect.com/science/article/abs/pii/S1084804516300662
- Optimizing Power Consumption in High-End Routers (Juniper) https://www.linkedin.com/pulse/optimizing-power-consumption-high-end-routers-sharada-yeluri/
- High Bandwidth Router Power Consumption & Cisco 8800 Power Provisioning https://xrdocs.io/8000/blogs/cisco-8800-power-provisioning/

Social Scientist about Operators' Community

- **Uta Meier-Hahn**: "Internet Interconnection: Networking in Uncertain Terrain"
  - https://labs.ripe.net/author/uta_meier_hahn/internet-interconnection-networking-in-uncertain-terrain/ (2015)

- The Regulatory Conditions of IP Interconnection (2016)
  - https://labs.ripe.net/author/uta_meier_hahn/the-regulatory-conditions-of-ip-interconnection/

- The Internet was Built on Trust. But What Does it Run On? (2017)
  - https://labs.ripe.net/author/uta_meier_hahn/the-internet-was-built-on-trust-but-what-does-it-run-on/

https://sdgs.un.org/goals

Researchers & Academia

- labs.ripe.net/sustainability
- ComputingWithinLimits.org
- ACM SIGPLAN (Special Interest Group on Programming Languages) & Climate : https://www.sigplan.org/Resources/Climate/
- ACM SIGCAS: Computers and Society https://www.sigcas.org/events/sigcas-showcase-2022/
- Theoretical Computer Scientists for Future (tcs4f.org) made a pledge to “reducing our emissions by at least 50% before 2030 relative to pre-2020 levels.”
- https://www.nsuweb.org/circle-g-sustainability-ethics-environment-call-for-papers/

IETF Recommendations*

- For the corporations & communities:
  - **reduce by 7.6% / year on all metrics** (emissions, materials, water, energy…)
- **Create NZE-WG**
  - "**N**et **Z**ero **E**missions" **W**orking **G**roup
- **Add "Sustainability Considerations" section to every ietf-draft, RFC, BCP**

** personal opinion*

What should we not do?

- Use systems that are are energy inefficient
  - Proof of work, old hardware, inefficient algorithms and protocols (computation a
- Use bad energy sources
  - Fossil fuels
  - Energy sources that are not green, renewable, clean....
  - Large greenhouse gas emissions and air pollution
- Luxury consumerism
- Systems that produce a lot of non-recyclable e-waste
- Systems with wasteful over-consumption of water, land, minerals
- Digital colonialism
  - Use of resources, export of e-waste for "recycling"
- Predatory systems that that have a negative impact on society
  - Crypto-assets
- Use nonsense numbers that do not add up
- Send too many ACKs.
- Fly, use ICT systems instead

EU / Green Digital / ICT

- EU Commission proposed to cut greenhouse gas (GHG) emissions by at least 55% by 2030 … & becoming climate neutral by 2050 (**economy**)
  - https://climate.ec.europa.eu/eu-action/european-green-deal/2030-climate-target-plan_en
- European Green **Digital** Coalition: “net-zero no later than 2040”
  - https://digital-strategy.ec.europa.eu/en/policies/european-green-digital-coalition
- International Energy Agency: “align **ICT** with climate-based targets”
  - https://www.iea.org/reports/data-centres-and-data-transmission-networks

International Reduction Goals

- International Energy Agency: “align ICT with climate-based targets”
  - https://www.iea.org/reports/data-centres-and-data-transmission-networks
- **Setting the NZE targets!** https://sciencebasedtargets.org/net-zero/
- ITU in 2020: “reduce ICT GHG emissions by 45% by 2030”
  - https://www.itu.int/en/mediacentre/Pages/PR04-2020-ICT-industry-to-reduce-greenhouse-gas-emissions-by-45-percent-by-2030.aspx
  - https://www.itu.int/rec/T-REC-L/en

Regulatory BCP

- Redirecting Technologies for the Deep Sustainability Transformation, TU Berlin
  - https://doi.org/10.14279/depositonce-16187.2
  - https://digitalization-for-sustainability.com/digital-reset/
- A Telco Sustainability Reality Check: December 2022
  - https://go.abiresearch.com/lp-telco-sustainability-reality-check
  - human-centered decision-making will continue to evaluate the challenges and opportunities of addressing the climate crisis, working together with technology to drive reductions of global carbon emissions, water use, and waste.

Reducing Use & Emissions of Devices

- "The Rare Metals War: The Dark Side of Clean Energy and Digital Technologies", Guillaume Pitron https://www.nhbs.com/the-rare-metals-war-book
- “An Ontology Of Electronic Waste“ Maurits Fennis
  - https://theanarchistlibrary.org/library/an-ontology-of-electronic-waste
- Prefer: https://en.wikipedia.org/wiki/Low-power_electronics
- (reducing) Emissions From Computing Onboard Autonomous Vehicles https://ieeexplore.ieee.org/document/9942310

Layer 9

Political Demands for Digitalisation & DeGrowth

Three requirements must be met for digitalisation to work for sustainability:

- The social and environmental impacts of producing and operating **digital devices, infrastructures and data centres** must be reduced. To make a difference in the short term, this report presents a combined strategy for digital sufficiency, repairability, circularity, and efficiency.
- The growth-oriented **business models of Big Tech companies** must be controlled and eventually replaced by business models that are oriented towards the common good. This report points out three policy pathways that can initiate this transition.
- The governance of **data and artificial intelligence** needs to actively pursue an information-based circular economy. This report shows which new institutions are required, and which policies can put data and AI in the service of sustainability.

- **https://digitalization-for-sustainability.com/digital-reset/**

Political Demands, Bits & Bäume 2022

1. Digitisation within the planetary boundaries
2. Global justice and regional self-determination
3. Redistribution of technological design power, democracy and participation
4. Fair digitisation, sustainable technology design and social issues
5. Protection of digital infrastructure and IT security

https://bits-und-baeume.org/konferenz-2022/forderungen/#heading

Solidarity with Alternative Movements

- **Society & Economy:**
  - Intersectional Environmentalism, Regeneration **https://urban-arena.eu/** , Eco-socialism, Green New Deal, Sufficiency Movement…
- **Tech:**
  - **Decentralisation, federation, self-hosting, Divestment, "Green Tech", "Right To Repair" Movement …**
  - **Community-owned & community-run networks** https://datatracker.ietf.org/group/gaia/about/
  - **https://feministinternet.org/**
  - **Digital Rights & Climate Justice:** https://www.theengineroom.org/new-report-at-the-confluence-of-digital-rights-climate-justice/
  - **https://sdialliance.org/**

My Top 10 21st-Century Alternative Economic Theory Books:

- Giving Economy, Heather Marsh (in "Binding Chaos", 2013)
- Post-carbon Economy, Naomi Klein (in "On Fire", 2021)
- Caring Economy, Riane Eisler (2007) : http://caringeconomy.org/
- Decolonising Economics, Nonhlanhla Makuyana (2021) https://decolonisingeconomics.org/
- Ecofeminism, Maria Mies and Vandana Shiva (2014) https://www.environmentandurbanization.org/ecofeminism
- Mutualism, Sara Horowitz (2021)
- Doughnut Economics, Kate Raworth (2017) https://doughnuteconomics.org/
- Mission Economy, Mariana Mazzucato (2021)
- The Support Economy: Shoshana Zuboff (2002) http://www.thesupporteconomy.com/
- Enlightenment Economics, Diane Coyle (in "The Economics of Enough", 2011)

- **https://labs.ripe.net/author/becha/ripe-community-resilience-economy-of-care/**

COUNTER COMPUTING: https://counter-n.net/

- → decolonial computing, Stefanie Wuschitz,
- → insurgent computing, Anna Engelhardt
- → minimal computing, Andrew Lison
- → permacomputing, Marloes de Valk, Ville-Matias Heikkilä
- → more-than-binary computing, Juan Pablo García Sossa
- + frugal computing, Wim van der Bauwhede
- + junkard computing, Jennifer Switzer
- + off-the-grid / SolarPunk & https://doingthedoughnut.tech/
- + low-tech, “green tech”, slow tech, durable tech, circular tech

Artists, Activists, Hackers

- Anatomy of AI https://anatomyof.ai
- AMRO: https://www.radical-openness.org/
- **APC** (etc) https://www.apc.org/en/blog/shifting-priorities-planet-new-research-grounds-digital-rights-struggle-climate-and
- Counter Cloud Action Day https://diagram.institute/12o/
- Digital Depletion Strike https://multiplace.org/8m
- https://Rebellion.Global
- https://climateaction.tech/
- Bits & Bäume https://bits-und-baeume.org/en/

Inspiring Examples

- Reduce, Repair, Repurpose, Recycle (equipment)
- Community Networks, Mesh, Low-power networking, disaster-recovery net
- Decolonising the Internet, Feminist Internet, Solar Internet
- Low-tech, Slow tech, Retro-tech, Green Tech, Appropriate Technology
- Counter Computings: Frugal-, Convivial-, Benign-, Permacomputing
  - https://wiki.techinc.nl/Sustainability#Alternative_Computings
- Self-hosting, federation, decentralised networks

SolarPunk, Climate-Fiction

- - Fifth Sacred Thing, Starhawk
- - Speaker for the Dead, Orson Scott Card
- - The Dispossessed, Ursula K. Le Quinn
- - WalkAway, Cory Doctorow
- - Beyond Civilisation (series), Daniel Quinn
- - Diamond Age, Neal Stephenson
- - Parable of the Sower, Octavia Buttler
- - Donna Haraway
- - HumanKind: Timothy Morton
- - Tim Fox

Urgency, Degrowth, Rebellion

- “Environmental Impact of the Internet" at RIPE86, Rotterdam, May 2023

- https://labs.ripe.net/author/becha/environmental-impact-of-internet-urgency-de-growth-rebellion
- https://ripe86.ripe.net/archives/video/1001/
- https://wiki.techinc.nl/File:Xs-vesna-e_impact-ripe86-short-and-long.pdf

SELF-ACTUALISATION
Pursue Inner Talent Creativity Fulfillment
SELF-ESTEEM
Achievement Mastery Recognition Respect
BELONGING - LOVE
Friends Family Spouse Lover
SAFETY
Security Stability Freedom from Fear
PHYSIOLOGICAL
Food Water Shelter Warmth
WiFi
battery
Economics
Politics
Sustainability
Simple Life
Degrowth
Social
Infrastructure