



**RIPE NCC**  
RIPE NETWORK COORDINATION CENTRE

# **Environmental Impact of Internet: *Urgency, DeGrowth, Rebellion***

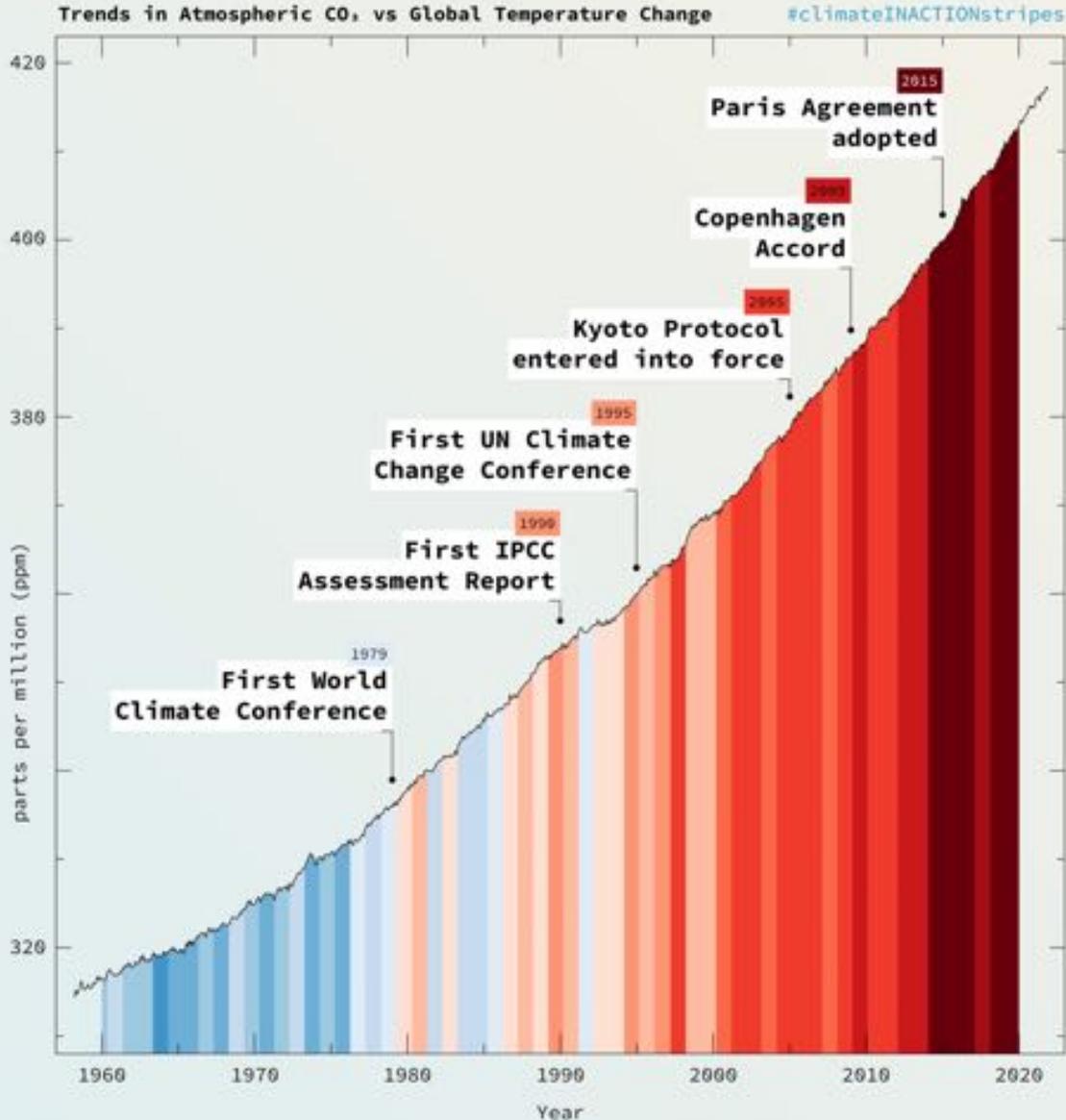
Follow-up on IAB Workshop on e-impact

[\*BECHA@ripe.net\*](mailto:BECHA@ripe.net)

Vesna Manojlović | May 2023 | RIPE86, Rotterdam

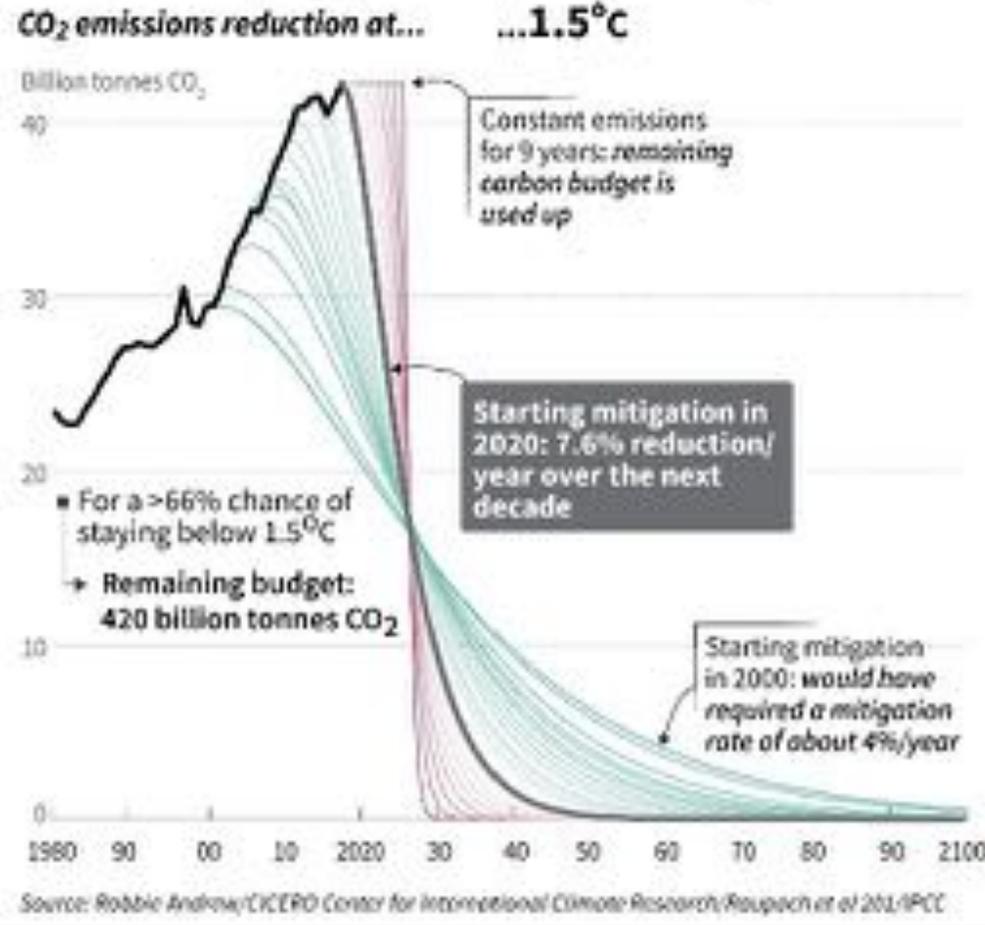


# Polycrisis



## Cutting global emissions: when is late

UN report shows capping global warming at 1.5°C is no longer realistic

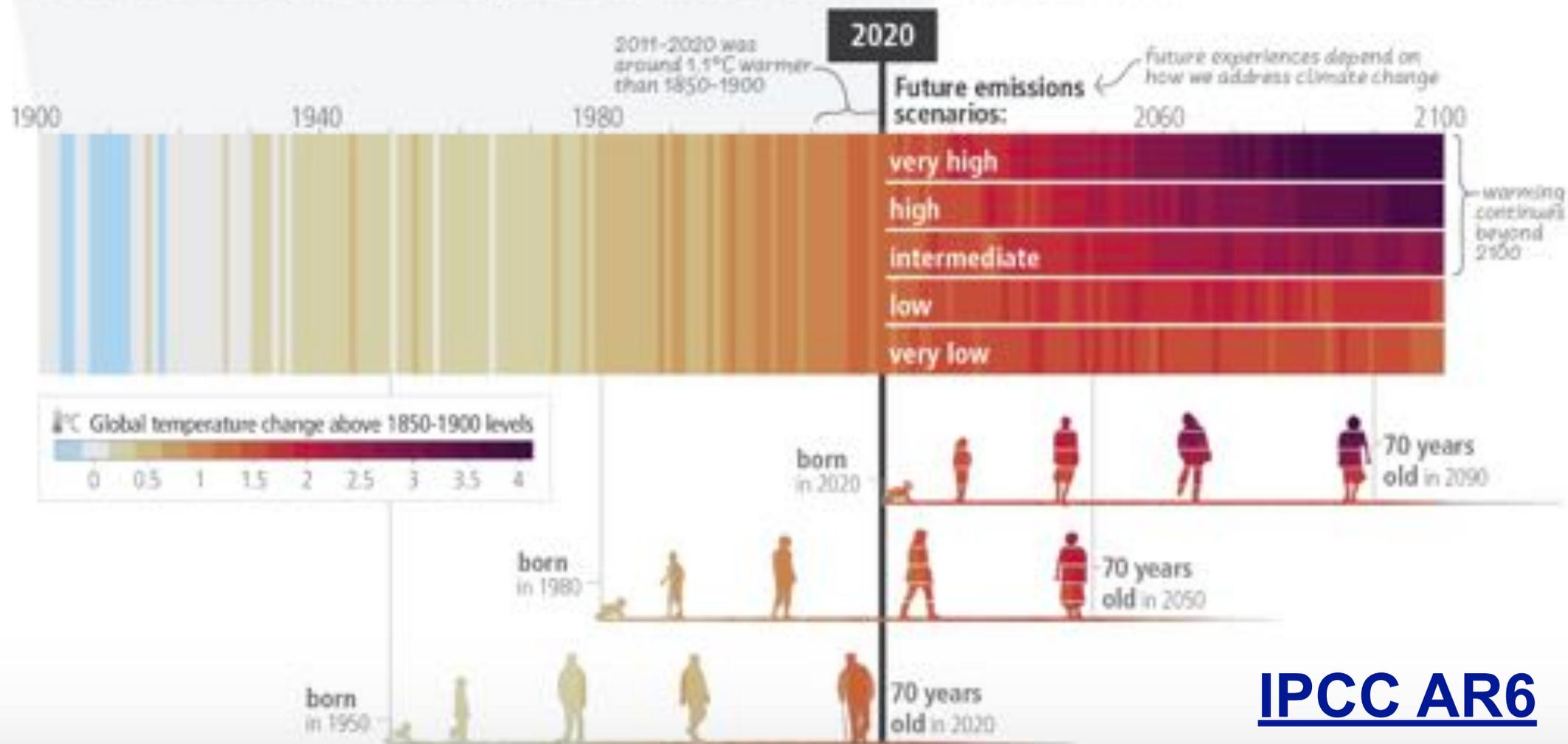


**“This calls for immediate discussion!”**



“Life of Brian”, Monty Python (1979)

c) The extent to which current and future generations will experience a hotter and different world depends on choices now and in the near-term



# IETF / RIPE e-impact Timeline



- **IAB Workshop: December 2022** : <https://www.iab.org/activities/workshops/e-impact/>
  - 30 papers 40 presentations and 50 knowledgeable & opinionated participants
  - My [report \(December 2022\)](#); Draft IAB [report](#): February 2023; IETF 116: March 2023 ([minutes](#))
  
- **Goals**
  - *“Full understanding of Internet's environmental impact*
  - *Continuous improvement of our technology.*
  - *Launching research relevant activities”*
  
- **Future**: IETF 117 (San Francisco) & IETF 118 (Prague); RIPE87 (Rome)
  - *Discussion list: <https://www.ietf.org/mailman/listinfo/e-impact>*

# Recommendations\* for IETF



- For the corporations & communities:
  - **reduce by 7.6% / year on all metrics** (emissions, materials, water, energy...)
- **Create NZE-WG**
  - **“Net Zero Emissions” Working Group**
- **Add “Sustainability Considerations” section to every ietf-draft, RFC, BCP**

*\*my personal opinion*

## What should we not do?

- Use systems that 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 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

*from an IAB workshop slide deck*



# Principles of Degrowth



## Sustainability

Never deteriorate supporting ecosystems



## Circularity

Waste not, want not



## Cooperation

People and planet, not profit



## Useful Production

What is not needed should not be made



## Sharing

Sufficiency for all, excess for none



## Local Production

Produce local, consume local



## Work-Life Balance

Work less, play more



## Relational Goods

Less stuff, more relationships



## Joie De Vivre

If I can't dance, I don't want to be part of your economy!

Source: <https://tel.archives-ouvertes.fr/tel-02499463/document>



# 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.

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)

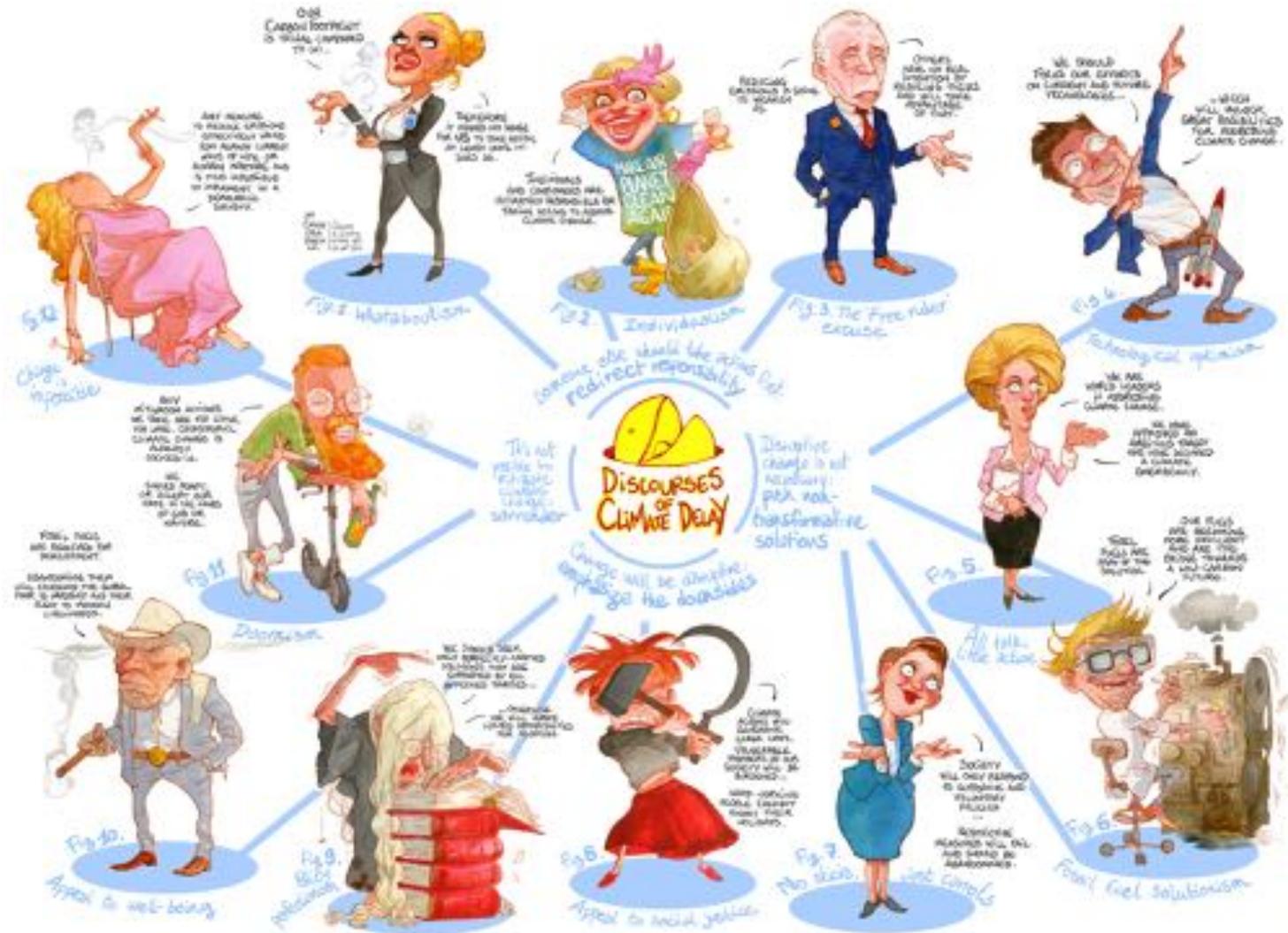
## 4. Decrease energy usage

-10%  
/year

## 5. Reduce new equipment needs: Repair; Repurpose; Recycle

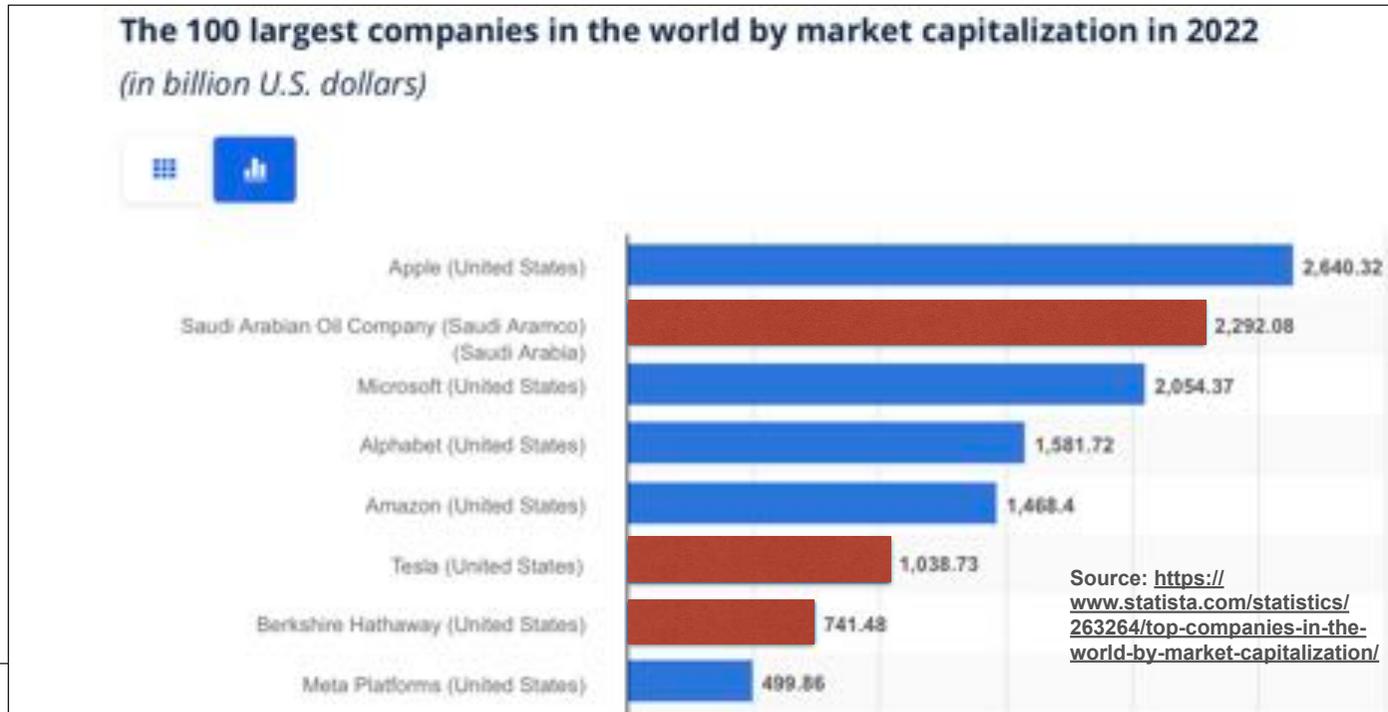
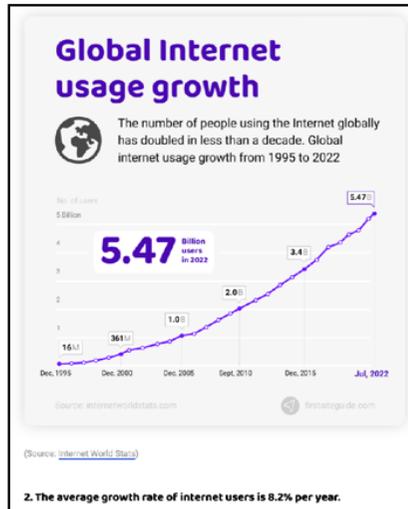
6. Do Not Fly! (take a train / bike, or use email / chat)





[https://www.researchgate.net/publication/342596080\\_Discourses\\_of\\_climate\\_delay](https://www.researchgate.net/publication/342596080_Discourses_of_climate_delay)

# ICT & Growth



### 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>



# ICT & Climate: Regulations & Standards



- **EU Commission proposed to cut greenhouse gas (GHG) emissions by at least 55% by 2030 ... & becoming climate neutral by 2050**

- [https://climate.ec.europa.eu/eu-action/european-green-deal/2030-climate-target-plan\\_en](https://climate.ec.europa.eu/eu-action/european-green-deal/2030-climate-target-plan_en)

- **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>

- **International Energy Agency: “align ICT with climate-based targets”**

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

- **European Green Digital Coalition: “net-zero no later than 2040”**

- <https://digital-strategy.ec.europa.eu/en/policies/european-green-digital-coalition>

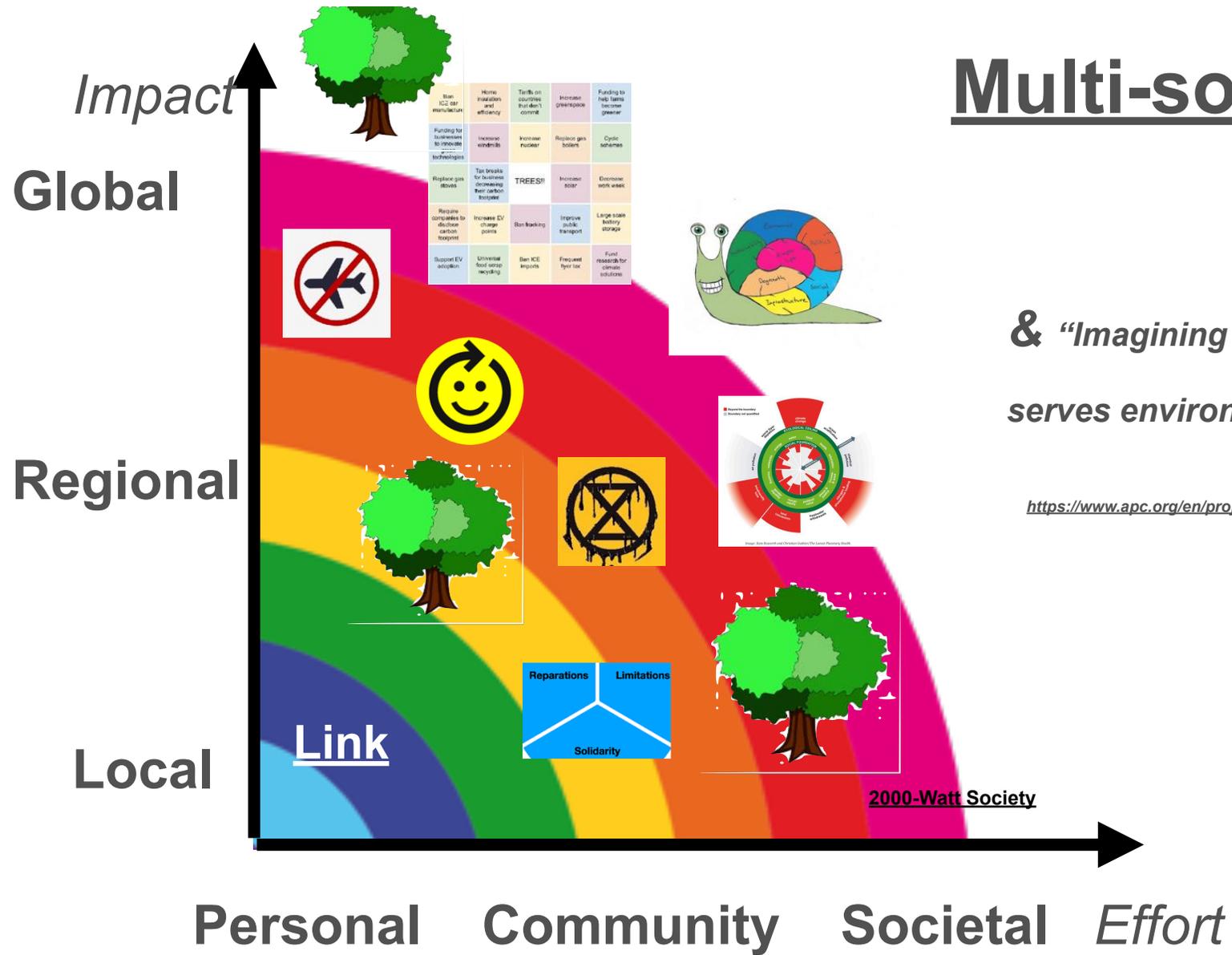


# MEETING THE PARIS AGREEMENT

## RAPID, DRASTIC CUTS NEEDED TO LIMIT WARMING



BRON: HELGA VAN LEIJN / CLIMATECENTRAL



# Multi-solving



& “Imagining an internet that serves environmental justice” APC 2020

<https://www.apc.org/en/project/technology-environmental-justice-and-sustainability>

# My Personal Rebel!

- Alisa in January 2004, RIPE 47, Amsterdam
- Alisa in 2022, XR action against private Jets



Join



scientist rebellion\_

A horizontal bar with a gradient from blue on the left to red on the right, with a white underline beneath the text above it.

# Conclusions

- **Urgency**

- we are in an emergency!
- focus on immediate action!

- **De-Growth**

- decreasing consumption & emissions, decelerating growth, **decide together**
- join communities of solidarity: [ripe.net/events](https://ripe.net/events)

- **Rebellion.Global**

- reject fossil fuels
- re-think existing power structures
- take responsibility for global impact & systemic changes : [join us!](#)



# Acknowledgements



- IAB: Jari Arko, Wim Vanderbauwhede, Eve M. Schoole
- DRxCJ: Fieke Jansen, Maya Richman, Shayna Robinson , Becky Kazansky ...
- RIPE: Mike Oghia, Chris Adams, Tobias Fiebig
- XR: Pippa, Alisa, Julian Oliver ; Marleen, Foppe, ...
- UnCiv: Podinski, Yo, Patrice, Natacha, Kruno, Claudia, GoRi, Nana, Arnd
  
- Inspiration: Ursula K. LeGuin, starhawk, Zapatistas, Elinor Ostrom , Greta Thunberg
  
- (Slides: wiki & RIPE meeting archives)



# Extra Slides

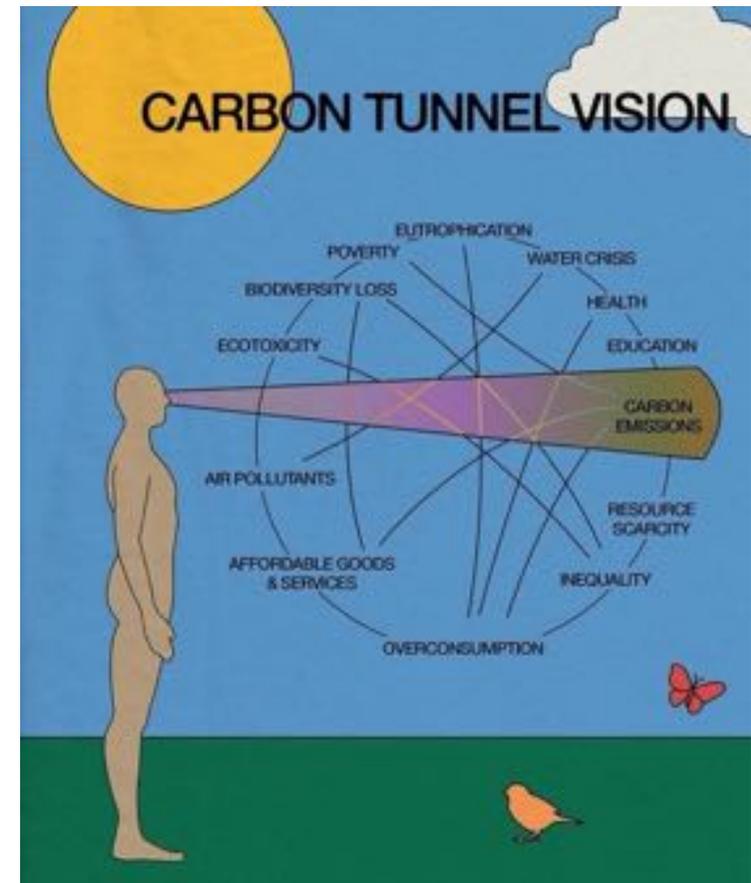
# Context



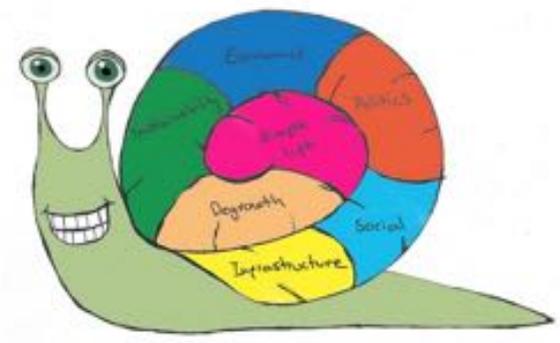
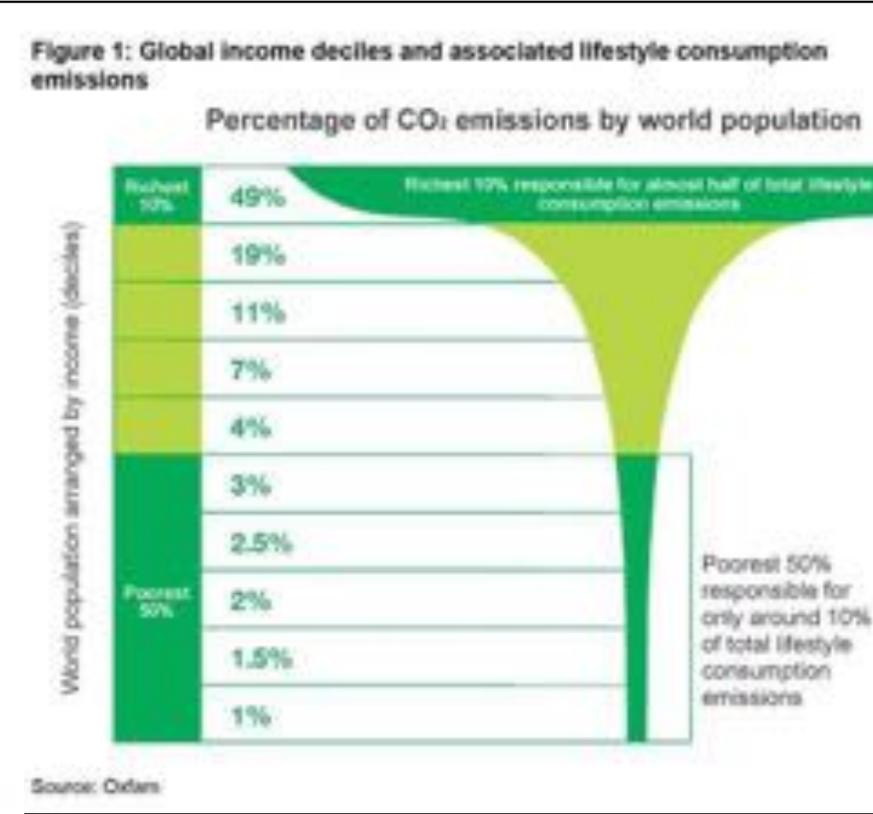
- Polycrisis

- *“The future is already here, it’s only not evenly distributed” (W.G.)*

- Multi-solving



# ICT, DeGrowth & Climate Justice



# Definitions



- **DeGrowth**

- A political, economic, and social movement based on ecological economics and anticonsumerist and anticapitalist ideas.

- **Sustainability**

- ability of people to co-exist on Earth over a long time.
- countering climate change, loss of biodiversity, pollution

- **Rebellion: refusal of obedience**

- <https://fullspectrumresistance.org/resources/>

- **Polycrisis**

- interlocking & simultaneous catastrophic events, with compounding effects (environmental, geopolitical and economic)
- <https://www.resilience.org/stories/2023-05-01/navigating-the-polycrisis-life-in-turbulent-times/>

- **IPCC.ch**: Intergovernmental Panel on Climate Change

- **Net Zero** / Carbon Neutral / != Climate Neutral

- **Climate Justice** & syllabus

- **Mitigation** / DeCarbonization

- **Solastalgia**

- **Multi-solving**

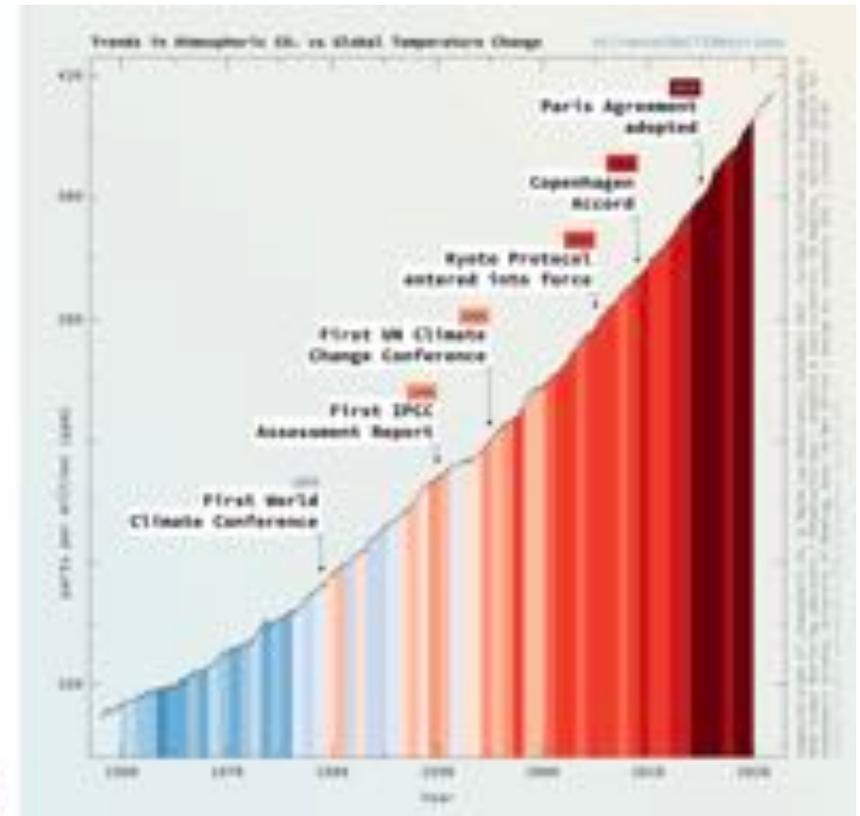
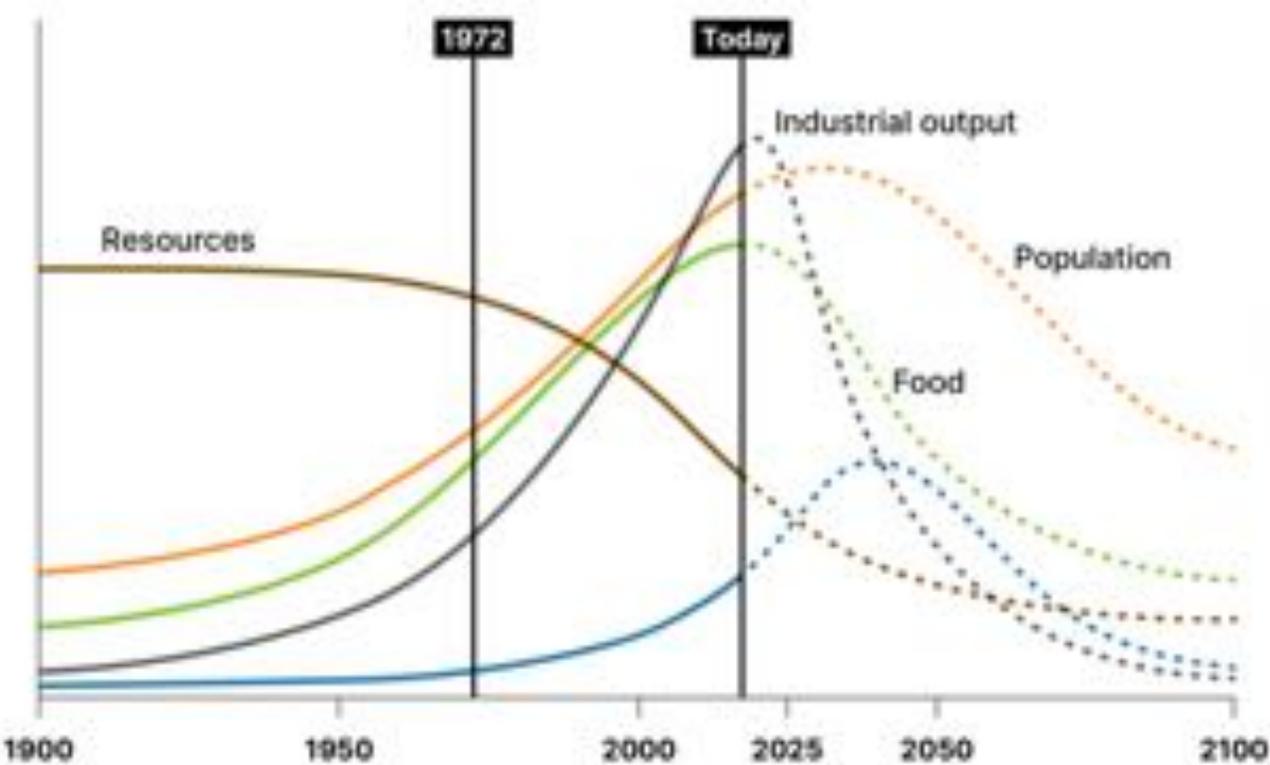
- Pooling of expertise, funding, and political will to solve multiple problems with a single investment of time and money



# Urgency

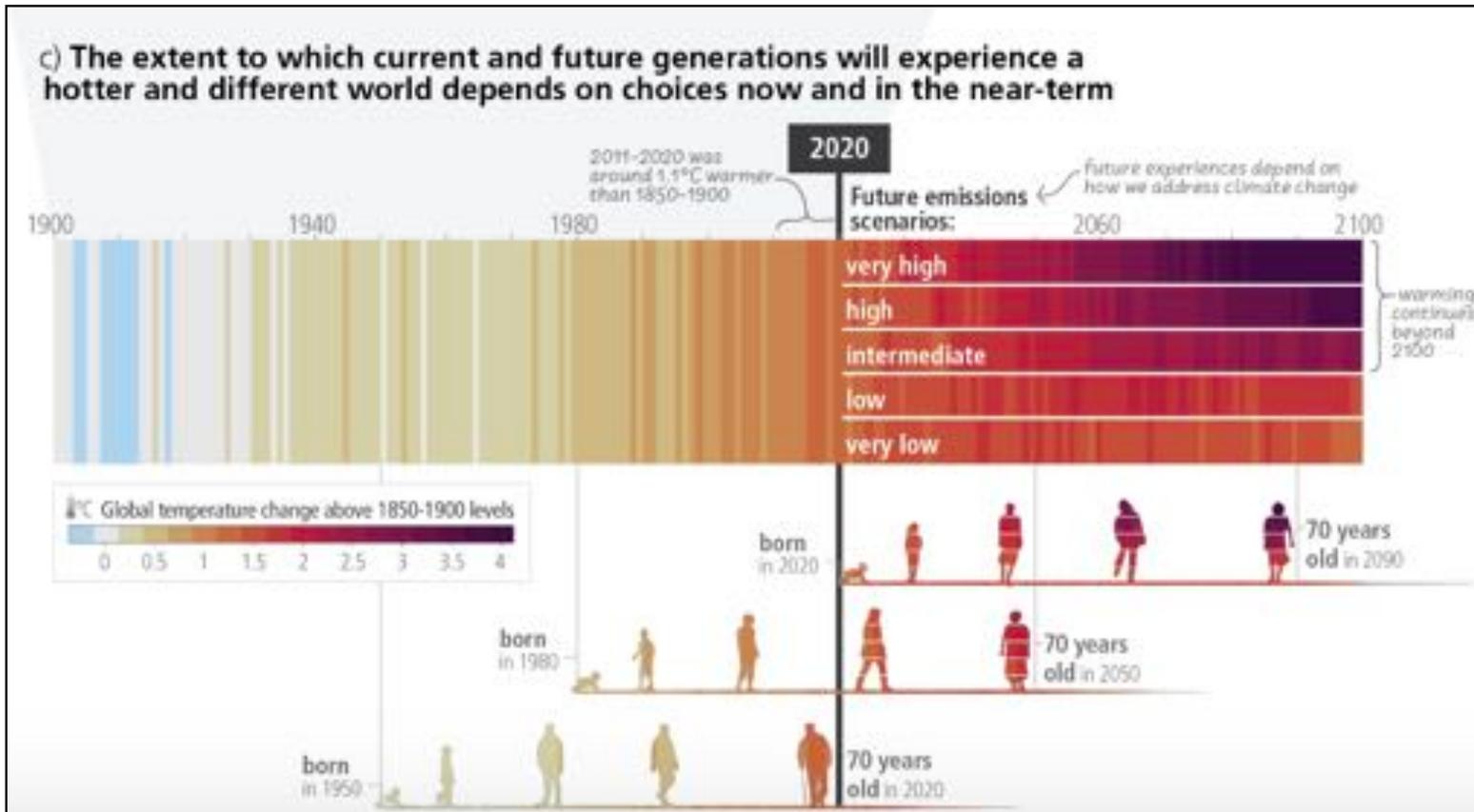
# Problem Statement: Science View

- “Limits to Growth” (1972), “Earth4All” (2022) & IPCC
  - by “Club Of Rome” (Donella Meadows et.al.)



# Latest IPCC Report

- March 2023 <https://www.ipcc.ch/report/ar6/syr/> & a [summary](#)



Vesna Manojlovic | LOCOS Seminar | March 2023

18:00  
Mastodon  
theguardian.com

**Climate crisis**  
Scientists deliver 'final warning' on climate crisis: act now or it's too late

**IPCC report says only swift and drastic action can avert irrevocable damage to world**

- **Analysis: Humanity at the crossroads**
- **Timeline: The IPCC's reports**

**Fiona Harvey** *Environment editor*  
Mon 20 Mar 2023 13:00 GMT

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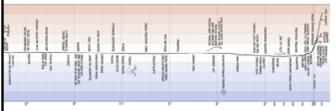
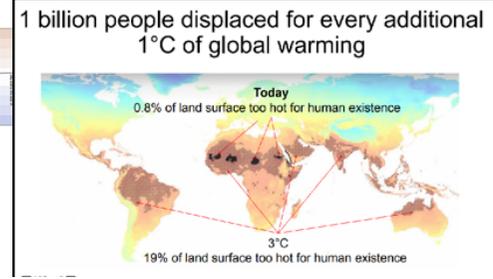
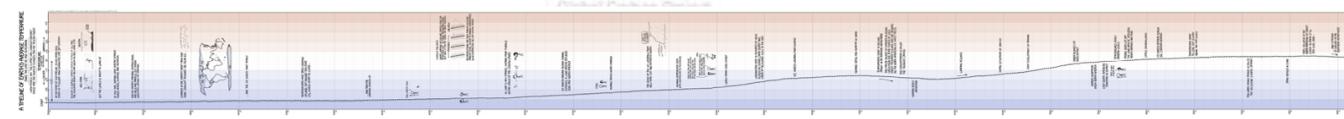
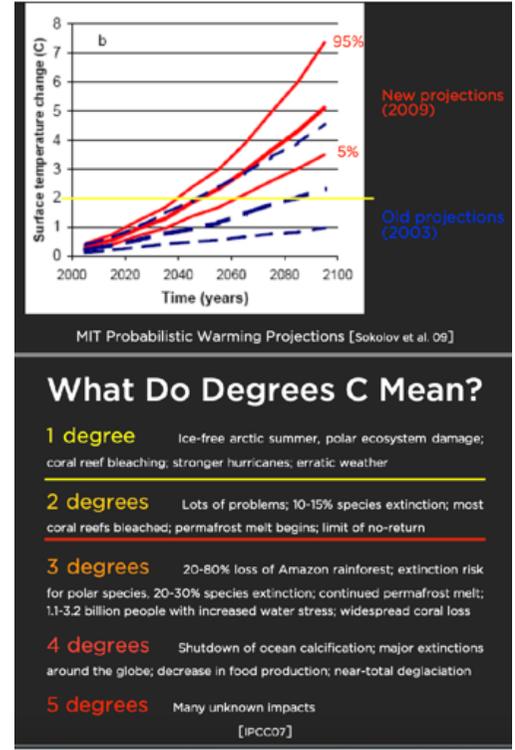
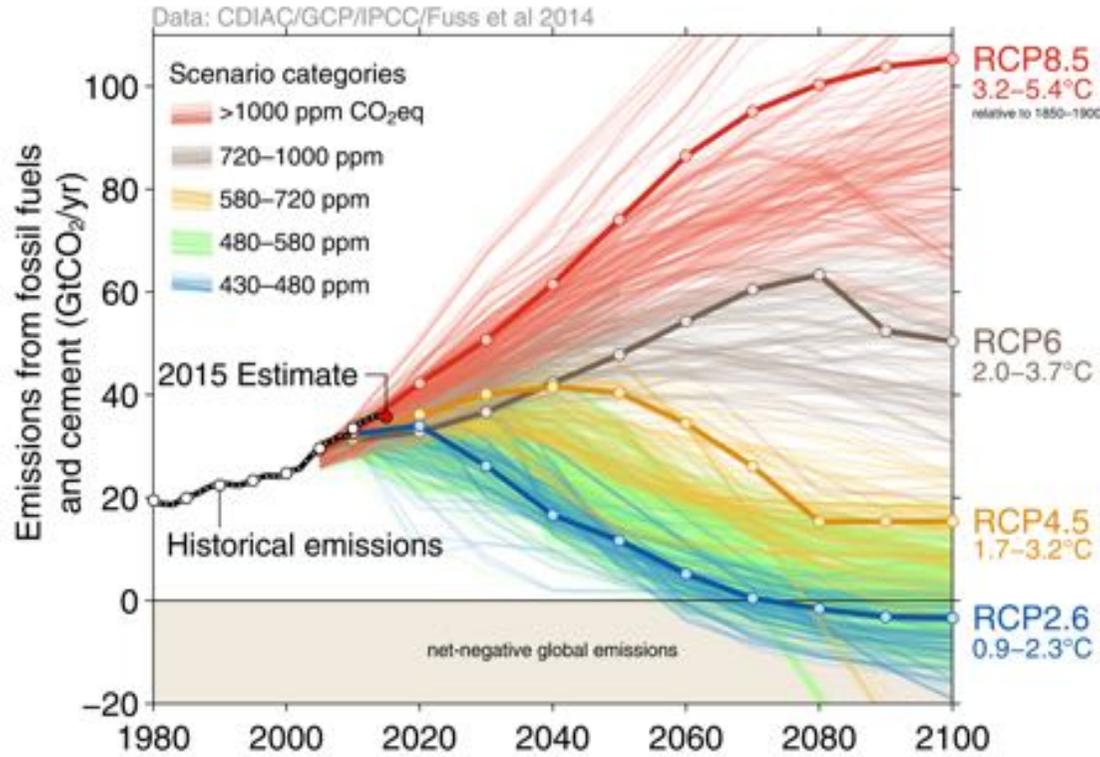
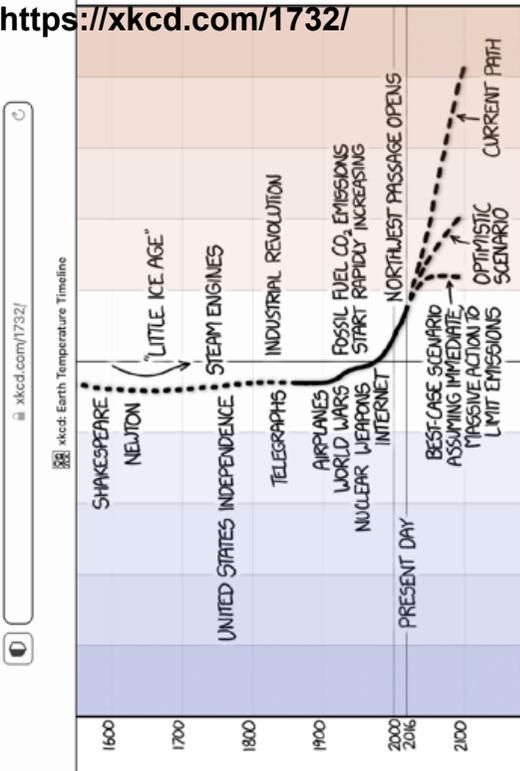
Scientists have delivered a "final warning" on the climate crisis, as rising greenhouse gas emissions push the world to the brink of irrevocable damage that only swift and drastic action can avert.

The Intergovernmental Panel on Climate Change (IPCC), made up of the world's leading climate scientists, set out the **final part of its mammoth sixth assessment report** on Monday.

# Emissions & Extinctions



<https://xkcd.com/1732/>



# “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.



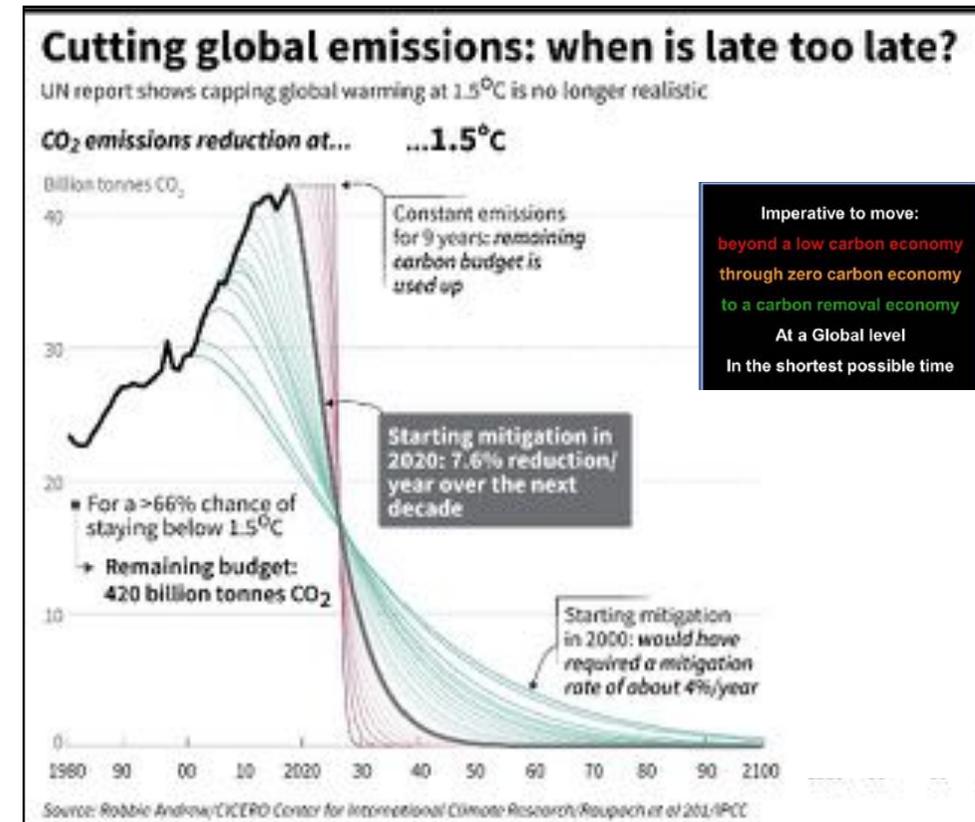
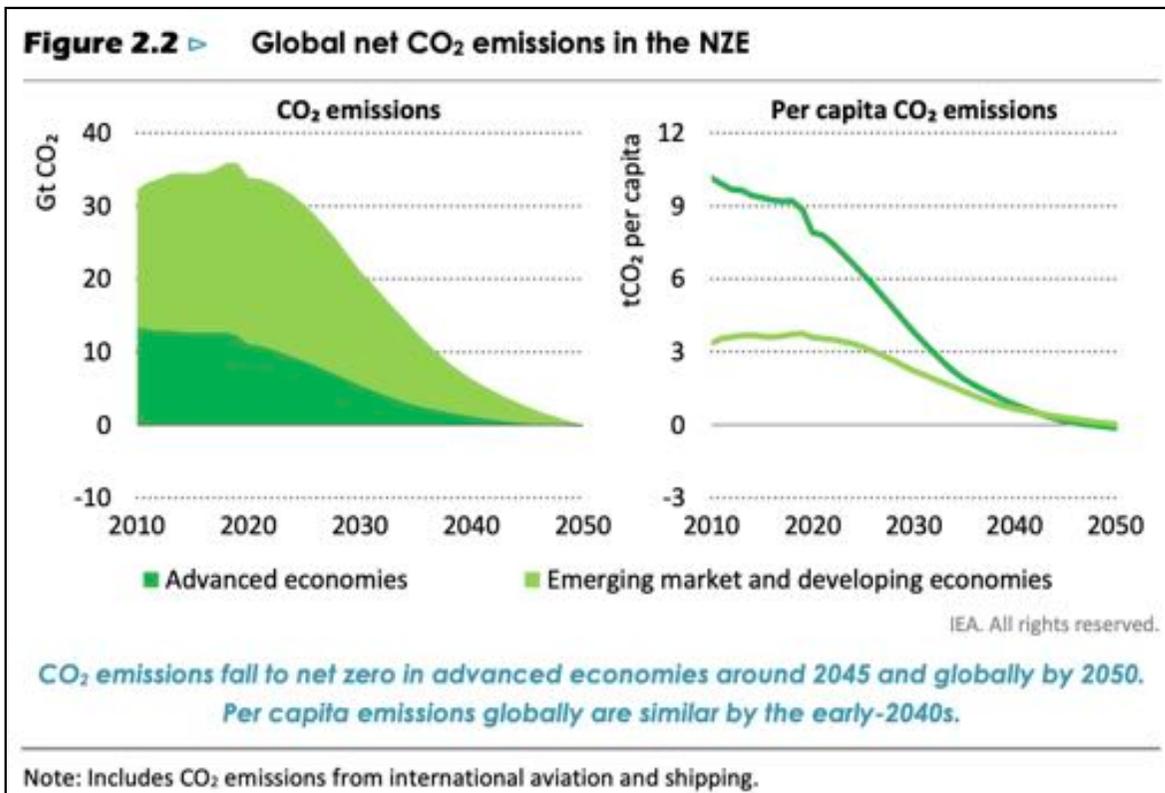
# De-Growth

# CO2 Emission Decrease Targets



- International Energy Agency: Net Zero Emissions (NZE) by 2050

- <https://trid.trb.org/view/1856381>



# Regulating DeGrowth: UN, OECD, EU



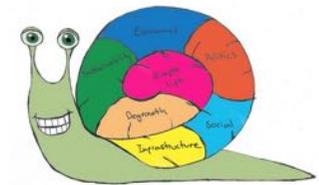
- **UN:** <https://www.un.org/en/climatechange/net-zero-coalition>
- **OECD report on “Climate Tipping Points”, December 2022**
  - <https://www.oecd.org/environment/climate-tipping-points-abc5a69e-en.htm>
  - recommended that we should “*drastically* reduce emissions within this decade” (before 2030)
- **EU Commission’s proposal to cut greenhouse gas (GHG) emissions by at least 55% by 2030 ... & becoming climate neutral by 2050**
  - [https://climate.ec.europa.eu/eu-action/european-green-deal/2030-climate-target-plan\\_en](https://climate.ec.europa.eu/eu-action/european-green-deal/2030-climate-target-plan_en)
- **EU Parliament “Beyond Growth” 15-17. May 2023**
  - [beyond-growth-2023.eu](https://beyond-growth-2023.eu) & <https://reimagine-economy.eeb.org/>
  - <https://www.greeneuropeanjournal.eu/not-growing-but-thriving-the-beginning-of-a-paradigm-shift/>



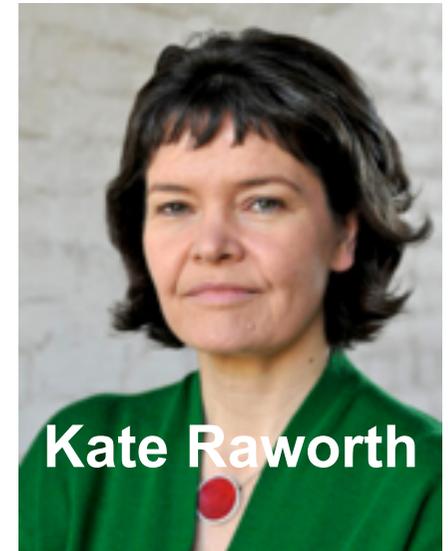
# Science & Ethics of De-Growth



- **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>



# Decolonizing Internet, Economy, Ecology...



Kate Raworth

## 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

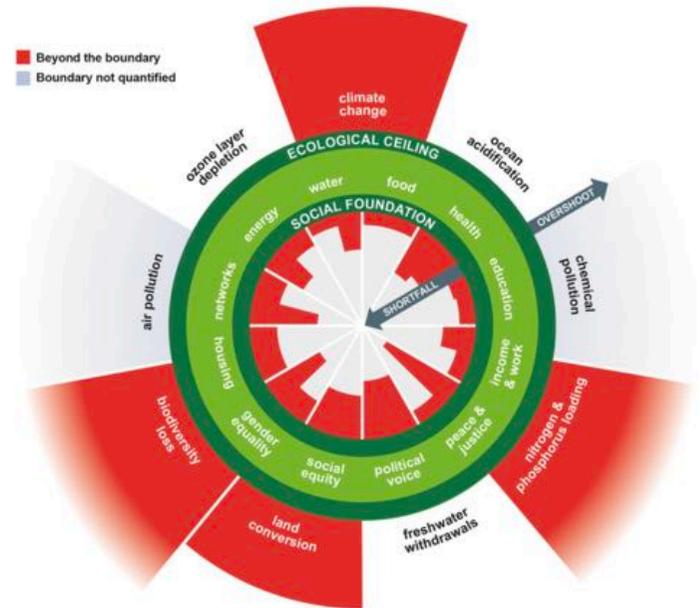


Image: Kate Raworth and Christian Guthrie/The Lancet Planetary Health

# 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.theengineerroom.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/>



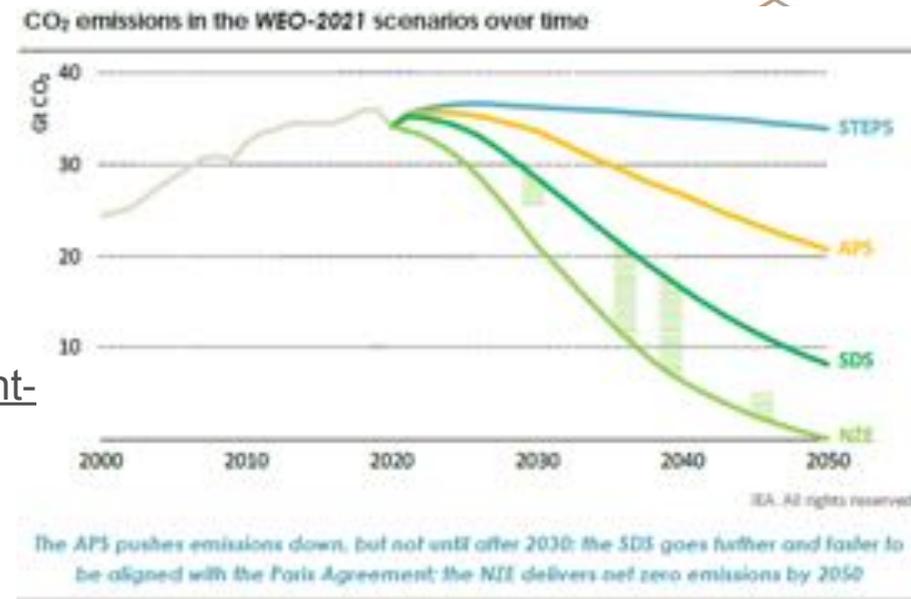
- → decolonial computing, Stefanie Wuschitz,
- → insurgent computing, Anna Engelhardt
- → minimal computing, Andrew Lison
- → permacomputing, Marloes de Valk, Ville-Matias Heikkilä
- → more-than-binary computing, Juan Pablo García Sossa
- + frugal computing, Wim van der Bauwhede
- + junkard computing,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



# ICT & DeGrowth

# ICT & DeGrowth: ITU, IEA, EU

- 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>
- International Energy Agency: “align ICT with climate-based targets”
  - <https://www.iea.org/reports/data-centres-and-data-transmission-networks>
- European Green Digital Coalition: “net-zero no later than 2040”
  - <https://digital-strategy.ec.europa.eu/en/policies/european-green-digital-coalition>



# Digitalisation & DeGrowth Demands



- <https://digitalization-for-sustainability.com/digital-reset/>

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.

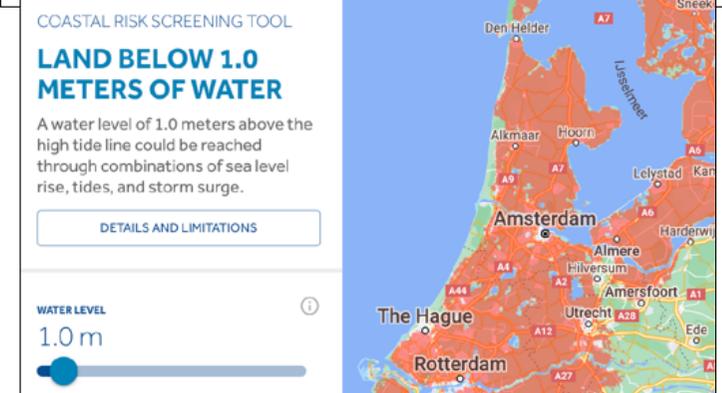
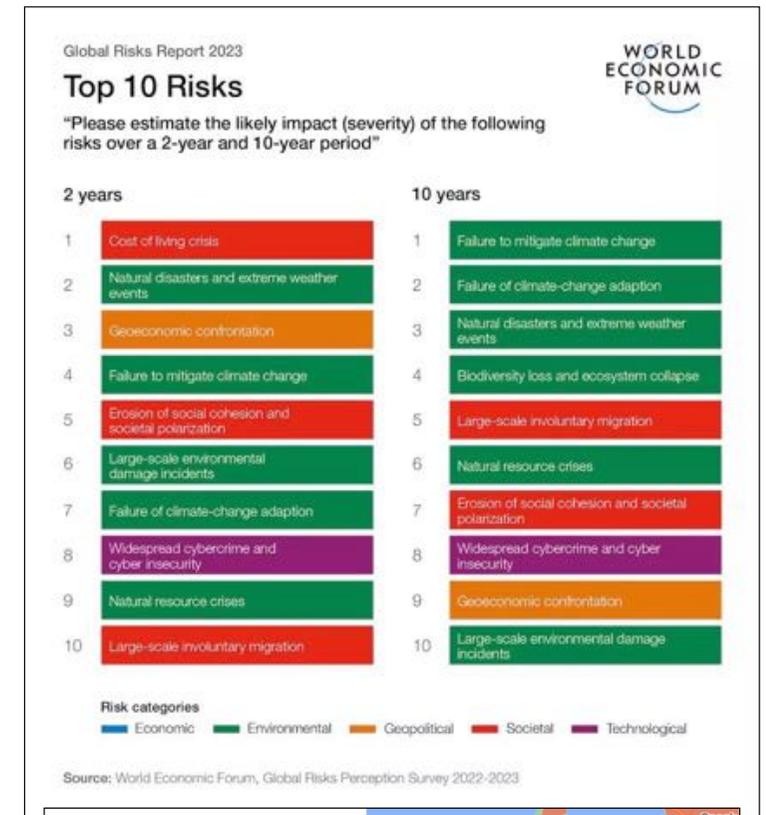
## Political Demands, Bits & Bäume 2022

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>

# Climate Impact on the Internet

- **Nanog, 2018:** [https://pc.nanog.org/static/published/meetings/NANOG74/1768/20181001\\_Barford\\_Keynote\\_Lightsout\\_Climate\\_v1.pdf](https://pc.nanog.org/static/published/meetings/NANOG74/1768/20181001_Barford_Keynote_Lightsout_Climate_v1.pdf)
- **“Data Centres Must Face Climate Change”**
- <https://labs.ripe.net/author/ggm/surviving-the-flood-how-data-centres-and-the-internet-must-face-climate-change/>
- **WEF Global Risk Report 2023**
- [https://www3.weforum.org/docs/WEF\\_Global\\_Risks\\_Report\\_2023.pdf](https://www3.weforum.org/docs/WEF_Global_Risks_Report_2023.pdf)
- **“... the data centers (can) flood as the climate (chaos) encroaches, we can run out of the water to cool the data centers, the surveillance pipelines can melt as the climate becomes more erratic and less hospitable...”** Meredith Whittaker, May 2023
- <https://www.fastcompany.com/90892235/researcher-meredith-whittaker-says-ais-biggest-risk-isnt-consciousness-its-the-corporations-that-control-them>



# “Data is the New Oil”

- **Data Centers over-consumption of water, electricity, land**

- <https://www.youtube.com/watch?v=wOJmAClrqj4> (Stroomnet, De Avondshow met Arjen Lubach) (2023)
- <https://www.akcp.com/blog/data-centers-coping-with-climate-change-induced-wildfires/>
- <https://www.datacenterdynamics.com/en/opinions/why-data-centers-need-to-talk-about-water/>
- <https://www.consultancy.uk/news/28772/10-ways-businesses-can-reduce-their-digital-carbon-footprint>
- <https://www.oregonlive.com/silicon-forest/2022/12/googles-water-use-is-soaring-in-the-dalles-records-show-with-two-more-data-centers-to-come.html>
- <https://www.washingtonpost.com/climate-environment/2023/04/25/data-centers-drought-water-use/>
- <https://www.newscientist.com/article/2354801-google-has-finally-revealed-how-much-water-its-data-centres-use/>

- **Dutch Protests against Data Centers**

- <https://www.wired.com/story/microsoft-netherlands-hyperscale-data-centers/>
- <https://www.youtube.com/watch?v=OiPoR9OvD0Y> (Nederland als harde schijf | Zondag met Lubach) (2020)
- <https://youtu.be/lpQN32dXt10?t=218> (Datacentrum in Zeewolde | De Avondshow met Arjen Lubach) (2022)
- & <https://www.dutchnews.nl/news/2022/03/facebook-puts-zeewolde-data-centre-plan-on-hold-after-protests/>

Vesna Manojlovic | RIPE86 | May 2023



Impact ↑

Global

Regional

Local

Ban ICE car manufacture	Home insulation and efficiency	Tariffs on countries that don't control	Increase greenpass	Funding to help farms become greener
Funding for businesses to innovate green technologies	Increase windfall	Increase nuclear	Reduce gas boilers	Cycle schemes
Tax breaks for businesses to reduce their carbon footprint	Replace gas stoves	TREES!!	Increase solar	Decrease work week
Require companies to disclose carbon footprint	Increase EV charge points	Sun banking	Improve public transport	Large scale battery storage
Support EV adoption	Universal food waste recycling	Ban ICE airports	Frequent flyer tax	Fund research for climate solutions

# 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/>

Personal Community Societal *Effort*

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

**Table 2.1: From data ethics to data justice**

<b>Concepts That Secure Power</b>	<b>Concepts That Challenge Power</b>
Because they locate the source of the problem in individuals or technical systems	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



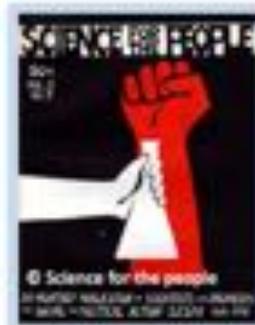
# Rebellion



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



**1920s, Brazil**  
Biologists from National Museum, environmental protection



**1950 - present, USA**  
Science for the People collective, anti-war and social justice



**2020s, Worldwide**  
Scientist Rebellion, climate and ecological breakdown

Vesna Manojlovic @bechs - 2 hours ago  
Eunice Newton Foote wrote a first paper (1856) on relationship between carbon dioxide and the earth's climate <https://archive.vn/DPhg2>



1860

1890

1920

1950

1980

2010

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



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



**1988 - present, USA**  
Climatologist James Hansen, climate change



# 2023-05-07 Students occupy 22 European schools & universities

Presenter name | Event | Date

# scientist rebellion\_



(pictured: 11 March 2023, The Hague)

# Join Existing Digital Rights & Climate Justice Communities



- [APC.org](https://apc.org)
- [RightsCon.org](https://rightscon.org)
- [Scientists Rebellion](https://scientistsrebellion.org)
- <https://climateaction.tech/>
- [Computing Within Limits](https://computingwithinlimits.org) 14&15 June
- [Bits und Bäume](https://bitsundbaeume.org), 16&17 June
- DeGrowth Conference: 29.8. Zagreb  
<http://odrast.hr/>
- **Mailing lists:**
  - DRxCJ: [digital-rights-climate-justice@groups.io](mailto:digital-rights-climate-justice@groups.io)
  - DeGrowth: [degrowth-world@lists.riseup.net](mailto:degrowth-world@lists.riseup.net)
  - [unciv.nl](https://unciv.nl)
- **More events: [ripe.net/events](https://ripe.net/events)**



# **Degrowth Recommendations per Working Group**

# My suggestions at IAB workshop:



## Structural Problems // Towards Climate Justice

- **Inequality of "e-impact"**
  - digital colonialism ("digital divide")
  - economic exploitation & externalising costs / harms
  - extractivism, pollution, e-waste
- **Fallacy on Endless Growth**
  - Consumerism / Luxury / "Innovation"
  - Short-term thinking & convenience
- **Addiction to Fossil Fuels**
  - and wasteful over-consumption of water, land, minerals, energy
- **Solidarity, Respect, Reparations**
  - Stopping the harms
- **Sufficiency & Modesty/Frugalism**
  - Limiting Extractivism
  - Decreasing Growth
  - Focus on Commons/Common Good/FLOSS
- **Abandon Fossil Fuels**
  - use small amounts of renewable energy;
  - reparability, circularity, efficiency, durability

## Suggestions for this workshop

- **Session 2: What do we (not) know**
  - consider water & materials (over)usage, rather than "just" energy & CO2: "DATA IS THE NEW OIL"
  - put efforts in actual actions, not more measurements: "perfect is the enemy of the good (enough)"
- **Session 3: Improvements**
  - consider conservation/decrease/reduction/limitation as a criteria for success (10% less per year!)
  - consider "disaster scenarios", emergency situations & extreme climate as baseline requirements
  - beware of techno-optimism, efficiency paradox (https://www.oxfam.org.uk) & power-differentials
- **Session 4: Next steps**
  - working in solidarity with " frontline communities" (RFC8800) & activists (e.g. <https://clj.org/gaia/>)
  - working together with existing organisations in Climate Justice fields (APC, SIGCAS, D4S, SOC, CCC...)
  - small step: adding "Sustainability & Climate Justice Considerations" to each IETF draft!

- ... have been not practical enough.
- Now: practical tips for each Working Group

# Connect-WG: Operating De-Growth



- **Kubernetes Efficient Power Level Exporter (Kepler)**
  - <https://sustainable-computing.io/>
- **Carbon-neutral self-hosting & software development:**
  - <https://codeberg.org/Codeberg/Community/issues/856>
  - <https://github.blog/2021-04-22-environmental-sustainability-github/>
- **<https://suboptic.org/page/sustainability-map>**
- **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>

# Routing-WG



- **Carbon-Intelligent Global Routing in Path-Aware Networks**
  - [https://netsec.ethz.ch/publications/papers/green\\_routing2023.pdf](https://netsec.ethz.ch/publications/papers/green_routing2023.pdf)
- **SCION: <https://github.com/scionproto/scion>**
- **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/>
- **"Kilowatt hour per Gigabyte - How hungry is your network?"**
  - <https://wiki.geant.org/display/SIGNOC/17th+SIG-NOC+meeting+-+Paris%2C+France>

# Cooperation-WG: Politics of De-Growth



- **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.

# NCC-Services WG (Members' De-Growth)



- **“Ranking of ten leading telecom operators for sustainability.”**
  - Sustainability Index by ABI Research (Q1 2022)
  - <https://www.abiresearch.com/press/deutsche-telekom-telefonica-vodafone-and-kpn-are-leaders-in-abi-researchs-telco-operators-sustainability-index/>
- **“How five of the world’s biggest telecom operators deal with their greenhouse gas emissions” (February 2023)**
  - \* AT&T, Verizon, NTT, China Mobile and Deutsche Telekom.
  - <https://telecoms.com/opinion/how-five-of-the-worlds-biggest-operators-deal-with-their-greenhouse-gas-emissions/>
- **Carbon reporting regulations are rising. Small businesses need to keep up.**
  - <https://app.wedonthavetime.org/posts/5fa28ad9-11b7-47e9-9926-913ff1f915ab>

# BCOP for (business / telco) DeGrowth



- **Set the NZE targets** <https://sciencebasedtargets.org/net-zero/>
- **Use ITU standards:** <https://www.itu.int/rec/T-REC-L/en>

<a href="#">L.1460</a>	Connect 2020 greenhouse gases emissions - Guidelines
<a href="#">L.1470</a>	Greenhouse gas emissions trajectories for the information and communication technology sector compatible with net zero
<a href="#">L.1471</a>	Guidance and criteria for information and communication technology organizations on setting Net Zero targets
<a href="#">L.1480</a>	Enabling the Net Zero transition: Assessing how the use of information and communication technology solutions can reduce greenhouse gas emissions of other sectors
<a href="#">L.1481</a>	Guidance on how to address Connect2030 targets on net abatement
<a href="#">L.1500</a>	Framework for information and communication technologies and adaptation to the effects of climate change
<a href="#">L.1501</a>	Best practices on how countries can utilize ICTs to adapt to the effects of climate change
<a href="#">L.1502</a>	Adapting information and communication technology infrastructure to the effects of climate change

# IoT-WG (Building & Disposing of Less “Things”)



- **"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>
- [https://en.wikipedia.org/wiki/Low-power\\_electronics](https://en.wikipedia.org/wiki/Low-power_electronics)
- **Emissions From Computing Onboard Autonomous Vehicles**
  - <https://ieeexplore.ieee.org/document/9942310>

repair.eu

The infographic features three circular icons on a dark blue background. The first icon is a red circle with a black smartphone and an exclamation mark. The second is a red circle with a black recycling symbol and a sad face. The third is a yellow circle with a black recycling symbol and a happy face.

E-waste is the fastest growing waste stream in the world. Only 15-20% is recycled

53 million tonnes of e-waste are produced each year the equivalent weight of 350 cruise ships' worth of electronics

Community repair prevents waste, saves CO2 and mends hearts

# MAT-WG: Measuring De-Growth



- **Green Networking Metrics**

- <https://datatracker.ietf.org/doc/html/draft-cx-green-metrics>

- **Quantum Internet hackathon 2022: measuring sustainability**

- <https://github.com/becha42/ClimateJustice/blob/main/ReportHackathon2022.md>

- **“Big business climate pledges must be measured” (audited)**

- <https://genevasolutions.news/climate-environment/peter-bakker-big-business-climate-pledges-must-be-measured>

- **Ultimate measure of staying within planetary boundaries:**

- Swiss example <https://newrepublic.com/article/168750/switzerland-cop27-2000-watt-society>



# “Green Tech” Tips

- **Document: Sustainable subsea optic cables industry**
  - <https://suboptic.org/page/sustainability-map>
- **“Build a Sustainable, Carbon-Aware Cloud” Microsoft**
  - <https://www.youtube.com/watch?v=s7K7QkhWnFU>, 1 May 2023
- **Benchmark for sustainable software / FOSS Energy Efficiency Project**
  - <https://eco.kde.org/handbook/>
- **Write “Open Source for Climate Tech”, IEEE**
  - [https://engagestandards.ieee.org/sosh\\_free\\_webinar\\_series.html](https://engagestandards.ieee.org/sosh_free_webinar_series.html) , 19 April 2023
- **Legislate: Right to Repair: European Commission**
  - [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_23\\_1794](https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1794), March 2023

# “Green Tech” Tips 2



- **Learn: “Climate + Technology + Justice”, Liberal Studies at Duke**
  - <https://liberalstudies.duke.edu/new-summer-2023-climate-technology-justice-designing-natures-futures>
- **Make off-grid micro 'internet' on solar power**
  - for emergencies, camping, protests, or building community autonomy and dual power.
  - <https://open.substack.com/pub/anarchosolarpunk/p/offgridinternet>
- **Edit Wikipedia with Green Tech expertise**
  - <https://www.canarymedia.com/articles/climate-crisis/wikipedia-has-a-climatetech-problem>
- **Degrowth can work — here’s how science can help:**
  - <https://www.nature.com/articles/d41586-022-04412-x>
- **“Server Infrastructure for Global Rebellion”, #36c3**
  - [https://media.ccc.de/v/36c3-11008-server\\_infrastructure\\_for\\_global\\_rebellion](https://media.ccc.de/v/36c3-11008-server_infrastructure_for_global_rebellion)

# “Green Tech” Tips 3



- Emergency/peace response <https://icanpeacework.org/2022/12/key-findings-ican-forum-2022/>
- <https://www.easst.net/article/the-environmental-footprint-of-social-media-hosting-tinkering-with-mastodon/>
- <https://blog.ltgt.net/climate-friendly-software/>
- <https://commonplace.doubleloop.net/reclaiming-the-stacks-ecosocialism-and-ict>
- <https://www.sgr.org.uk/events/science-superpower-or-techno-dead-end-what-would-globally-responsible-britain-look>
- The making of critical data center art <https://journals.sagepub.com/doi/10.1177/14614448221149>
- Environmental effects of digitization <https://www.sciencedirect.com/science/article/pii/S1877343523000>
-

# Green (Tech) Tips 4



- Least Developed Countries <https://www.itu.int/itu-d/reports/statistics/facts-figures-for-ldc/>
- <https://medium.com/@p.vonhellermann/the-tragedy-of-the-non-commons-4bfad884cdbe>
- <https://www.theguardian.com/environment/2023/apr/20/down-to-earth-ipcc-emissions>
- Red herrings <https://www.salon.com/2023/05/13/how-big-oil-is-manipulating-the-way-you-think-about-climate-change/>
- Planetary boundaries <https://phys.org/news/2023-05-earth-unlivable-tide.html>
- <https://nationalinterest.org/blog/reboot/twelve-discourses-climate-delay-165920>
- World Meteorological Organization: <https://public.wmo.int/en/media/press-release/global-temperatures-set-reach-new-records-next-five-years>
- <https://www.uu.nl/en/news/stand-up-for-the-ocean-read-erik-van-sebilles-inaugural-lecture>

# Additional Links



- <https://labs.ripe.net/author/becha/towards-climate-justice-in-tech/>
- <https://labs.ripe.net/author/becha/data-feminism-from-data-ethics-to-data-justice/>
- <https://labs.ripe.net/author/becha/computing-within-limits-2022-event-wrap/>
- <https://labs.ripe.net/author/becha/ripe-community-resilience-every-society-has-the-internet-they-deserve/>
- <https://labs.ripe.net/author/becha/ripe-community-resilience-nature-is-healing/>
- <https://zenodo.org/record/7047049#.YzGNcy0RqgA> (The Role of Life Scientists in the Biospheric Emergency)
- [https://wiki.techinc.nl/Hackers\\_tribes#Other\\_animals\\_against\\_Technology](https://wiki.techinc.nl/Hackers_tribes#Other_animals_against_Technology)
- [https://en.m.wikipedia.org/wiki/Jevons\\_paradox](https://en.m.wikipedia.org/wiki/Jevons_paradox)
- <https://UnCiv.nl>

# More IETF Links



1. [Report from the IAB Workshop on Environmental Impact of Internet Applications and Systems, 2022 draft-iab-ws-environmental-impacts-report](#)
2. [Challenges and Opportunities in Green Networking draft-cx-green-ps](#)
3. [Green Networking Metrics draft-cx-green-metrics](#)
4. [An Overview of Energy-related Effort within the IETF draft-eckert-ietf-and-energy-overview](#)
5. [A Framework for Energy Aware Control Planes draft-retana-rtgwg-eacp](#)
6. [Sustainability Insights draft-almprs-sustainability-insights](#)



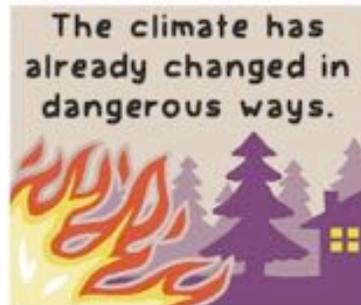
Which of these is true about climate change?

It's too late to take action.

Everything will be fine.



The answer? Neither is true.



It's not too late. It's not fine.

It's exactly the time to demand a better world.

Rosemary Mosco & Climate Adam