

User-Centred Energy Systems

Passing a social tipping point: why achieving consensus on climate action just got a lot harder and what it means for the energy transition

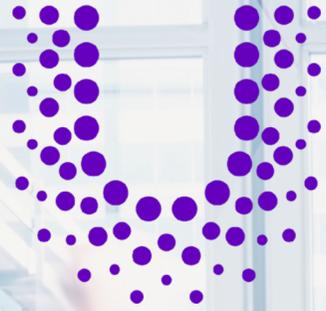
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David Shipworth <d.shipworth@userstcp.org | d.shipworth@ucl.ac.uk>

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User-Centred Energy Systems

Passing a social tipping point:

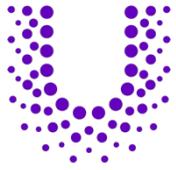
Users TCP Academy: 2022-10-26

お願い
この先は危険ですので、
これ以上前へ行かないよう
お願い致します。

The future is
dangerous
Don't go any further
Please.



ホテルバーモラル軽井沢
Hotel Balmoral Karuizawa



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The argument in a nutshell – the macro picture

Geopolitical crisis

- The world is deglobalizing - becoming ideologically multipolar disunited, inflationary and poorer. This fuels populism.

Demographic crisis

- The ratio of those not in work to those in work - is rising rapidly, increasing state burdens, reducing global productivity and creating intergenerational tensions

Climate crisis

- Climate change impacts are occurring sooner and are greater than anticipated, driving a shift from mitigation to adaptation.

Epistemic crisis

- Social and synthetic media are eroding liberal democracies' capacity to reach social consensus while strengthening authoritarian states.



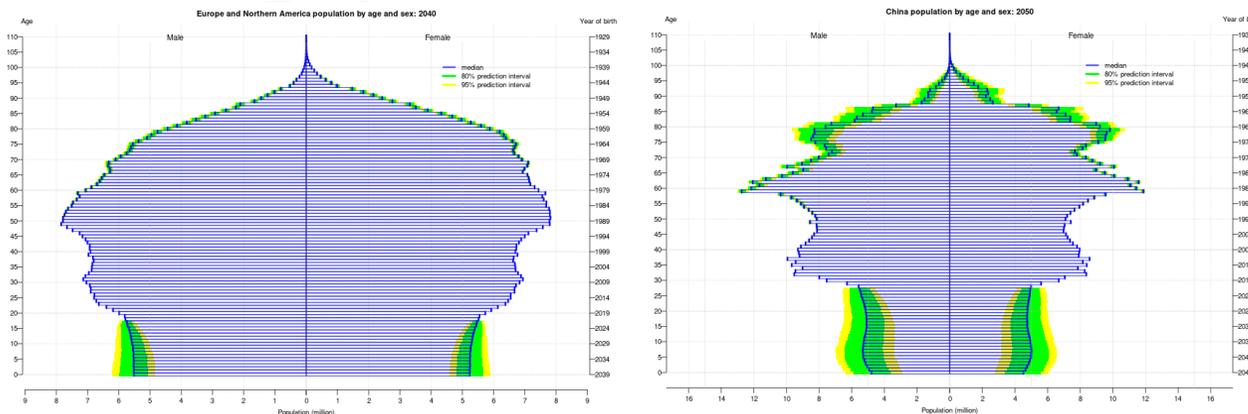
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The argument in a nutshell – the macro picture

Geopolitical crisis



Demographic crisis



Climate crisis

Climate change already worse than expected, says new UN report

The effects of warming are already driving people from their homes as seas rise, as well as killing trees and animal species. We can adapt, but also urgently need to make deep and immediate emissions cuts to head off even worse impacts, experts say.

BY KIERAN MULVANEY



Epistemic crisis

WHY THE PAST 10 YEARS OF AMERICAN LIFE HAVE BEEN UNIQUELY STUPID

It's not just a phase.

By Jonathan Haidt

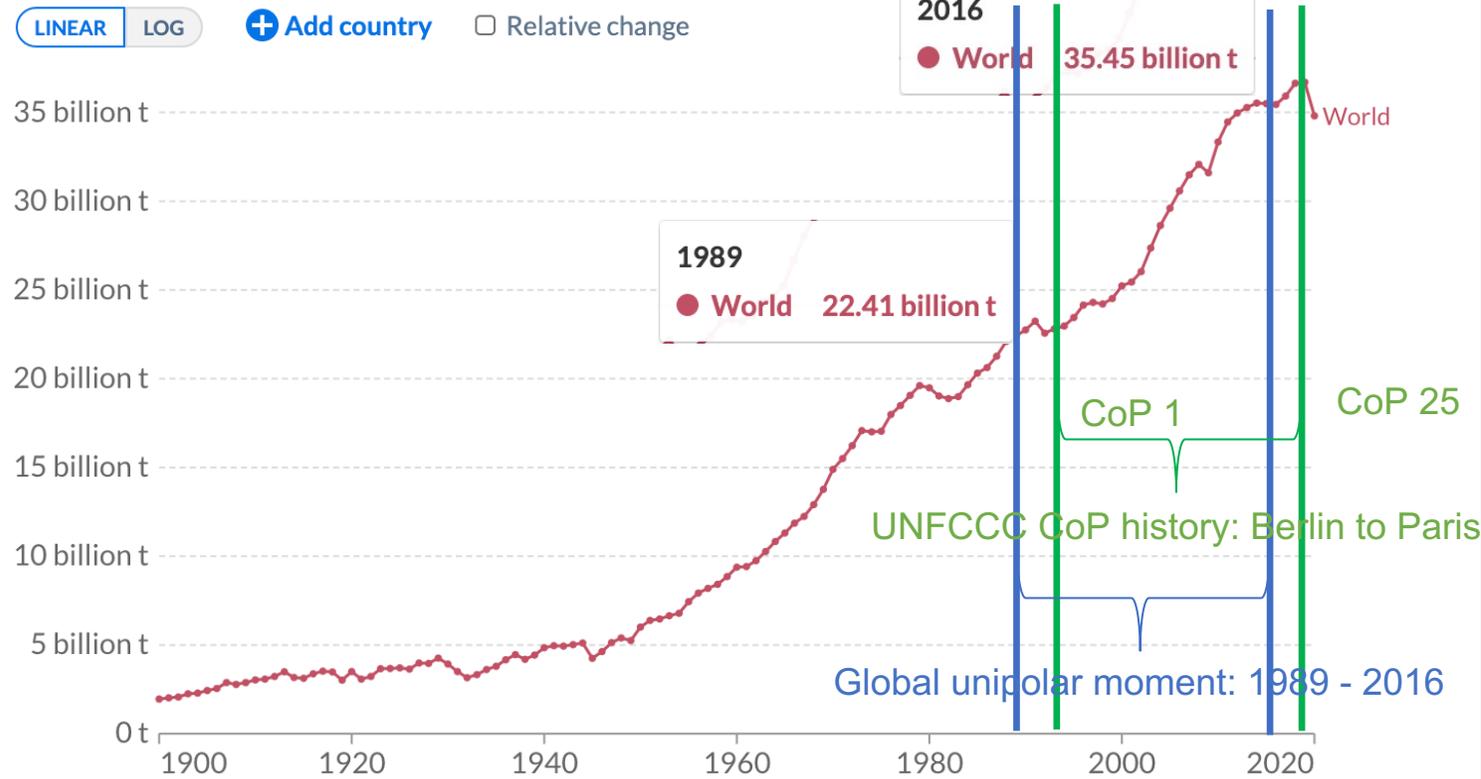


The 'Global unipolar moment' and the CoPs

Annual CO₂ emissions

Carbon dioxide (CO₂) emissions from fossil fuels and industry. Land use change is not included.

Our World
in Data



Source: Global Carbon Project

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY

1750 2020

CHART

MAP

TABLE

SOURCES

DOWNLOAD



Related: [CO₂ data: sources, methods and FAQs](#)

- The 'Global Unipolar Moment' is from the fall of the Berlin wall in 1989 to the election of Trump and Brexit in 2016/7
- The UNFCCC CoPs coincide with this
- It will never have been easier to reach global consensus on climate action than then.

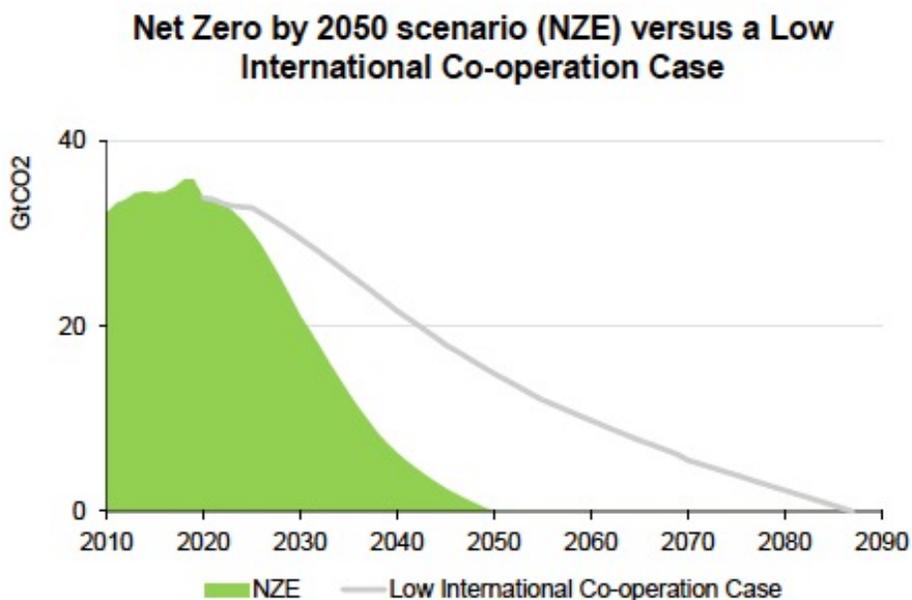
<https://ourworldindata.org/co2-emissions>



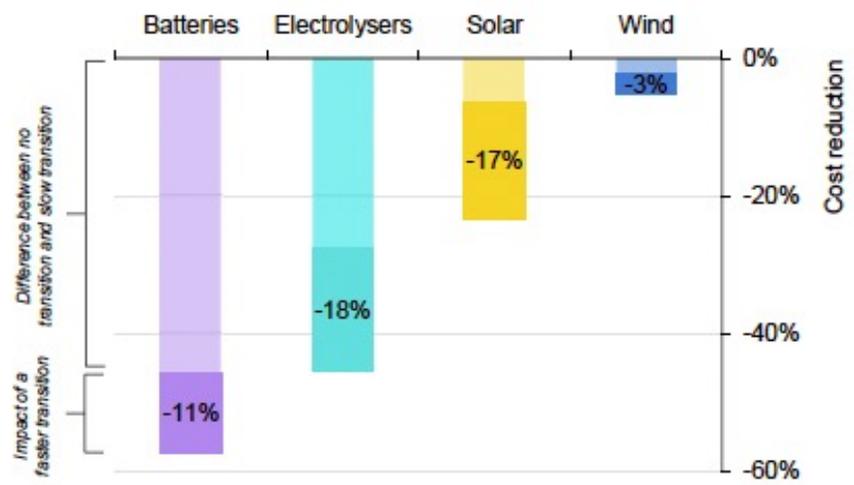
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Global cooperation is key to climate mitigation

Figure 1 International cooperation and technology cost reduction



Cost difference between a slow and fast transition in 2030 for key clean energy technologies



IEA, IRENA & UN Climate Change High-Level Champions say international cooperation is key to delivering decarbonization

Sources: IEA, 2021, Way et al., 2022.

Without international collaboration, the transition to net zero global emissions could be delayed by decades. The costs of critical low carbon technologies could be significantly lower in a fast global transition, which can only be achieved by the collective action of many countries.



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As multipolarity increases, energy security and climate obligations will become geopolitical ‘cards on the table’.

"China is willing to make efforts with Russia to assume the role of great powers" Xi Jinping.

- SCO summit Uzbekistan 2022-09-15

"Iran, Turkey and Myanmar propose tighter trade relations with Russia and China."

- MIT Tech. Review 2022-09-22

Xi Jinping sees a "severe and complex international situation". The CCP must be "prepared for dangers in peacetime" as well as "preparing for the storm".

- <https://on.ft.com/3eL4ISU> 2022-10-21

China suspends climate talks with US after Pelosi Taiwan visit

- <https://www.politico.eu/article/china-suspends-climate-talks-with-us/>





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The Climate Crisis: Climate models have systemically underestimated the climate impacts of warming

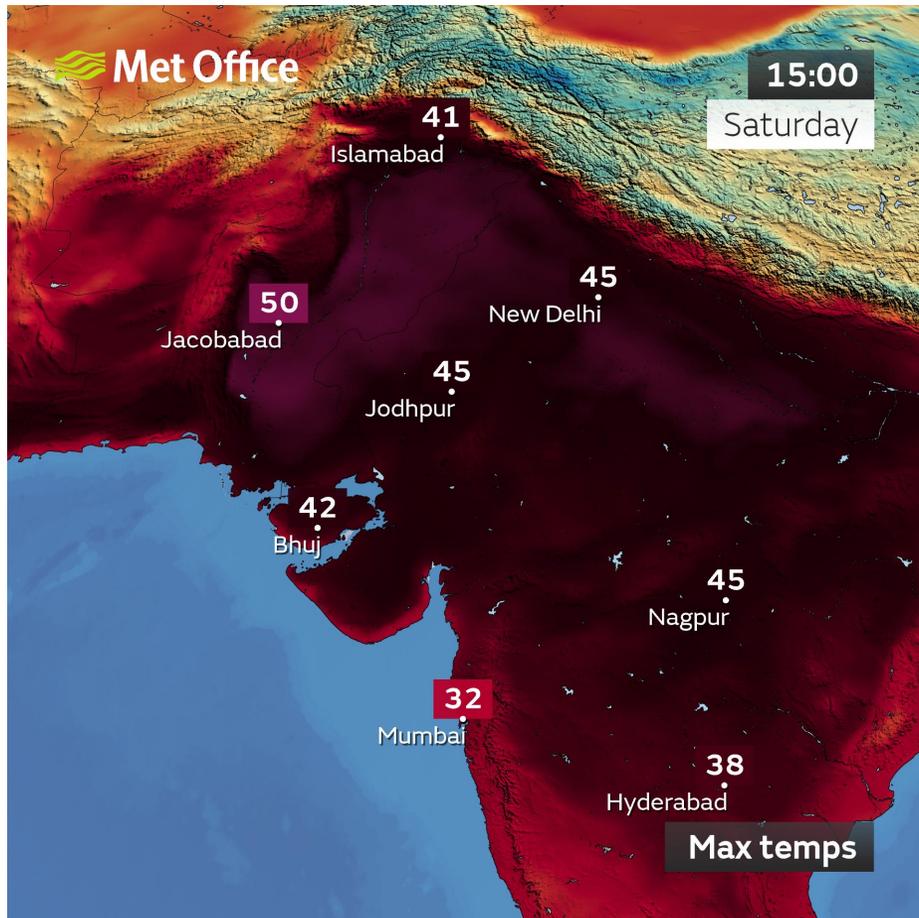
- “...one of the most striking conclusions of our report is that we’re seeing adverse impacts that are much more widespread and much more negative than expected” at that level of temperature increase.
 - Camille Parmesan Co-author of IPCC AR6 Climate Change 2022: Impacts, Adaptation and Vulnerability Summary for Policymakers



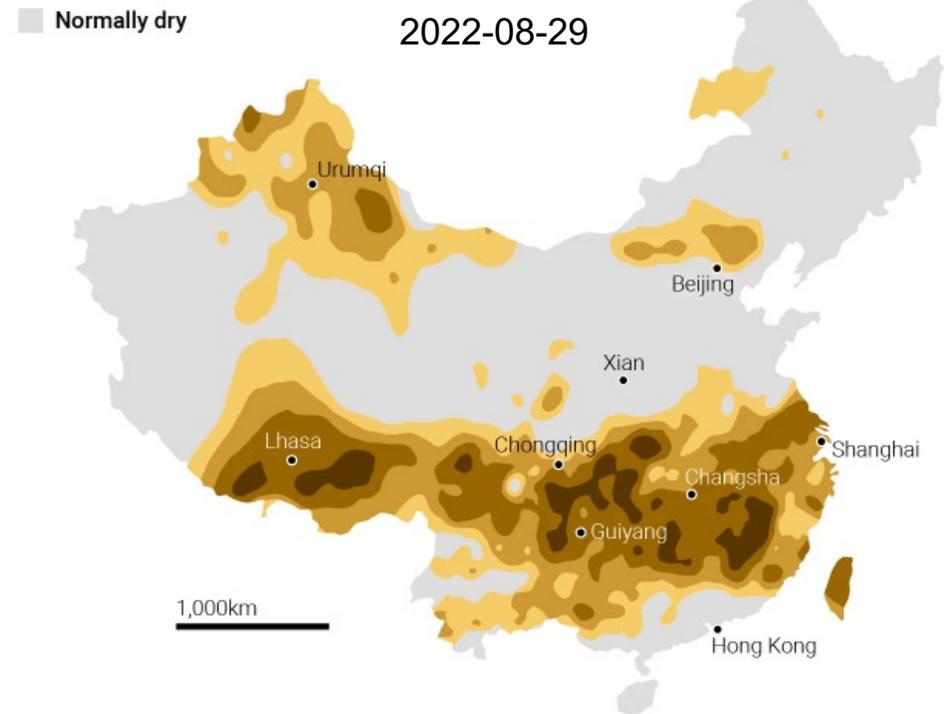


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The Climate Crisis: Climate models have systemically underestimated the climate impacts of warming



- Abnormally dry**
Dryness slowing planting and some water deficits
- Moderate drought**
Some damage to crops and some water shortages
- Severe drought**
Crop losses likely and water shortages common
- Extreme drought**
Major crop losses and widespread water shortages



<https://blog.metoffice.gov.uk/2022/05/12/parts-of-pakistan-and-north-west-india-to-endure-50c-temperatures/>
<https://multimedia.scmp.com/infographics/news/china/article/3190803/china-drought/index.html>

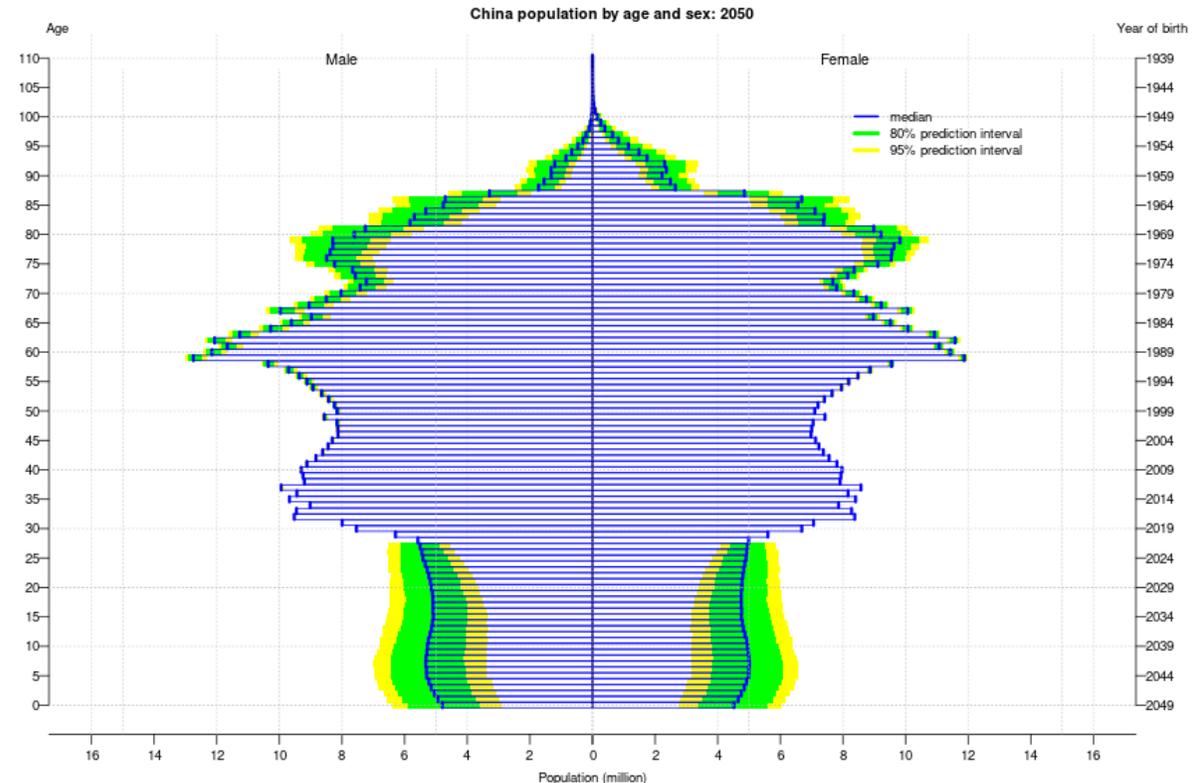
India banned wheat exports after heatwave. Chinese's grain stockpiles at record lows due to drought



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The Demographic Crisis: The rising dependency ratio

- “The time-staggered nature of the industrialisation process...means that much of the world’s population faces mass retirements followed by population crashes at roughly the same time. ...The 2020s are the decade when it all breaks apart”
 - Zeihan 2022 ‘The End of the World is just the Beginning’ p.60
- ‘Combine geopolitics and demographics and we know there will be no new mass consumption systems. Even worse, the pie that is the global economy isn’t going to simply shrink; it is being fractured into some very non-integrated pieces...”
 - Zeihan 2022 ‘The End of the World is just the Beginning’ p.73



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United Nations, DESA, Population Division. *World Population Prospects 2022*. <http://population.un.org/wpp/>

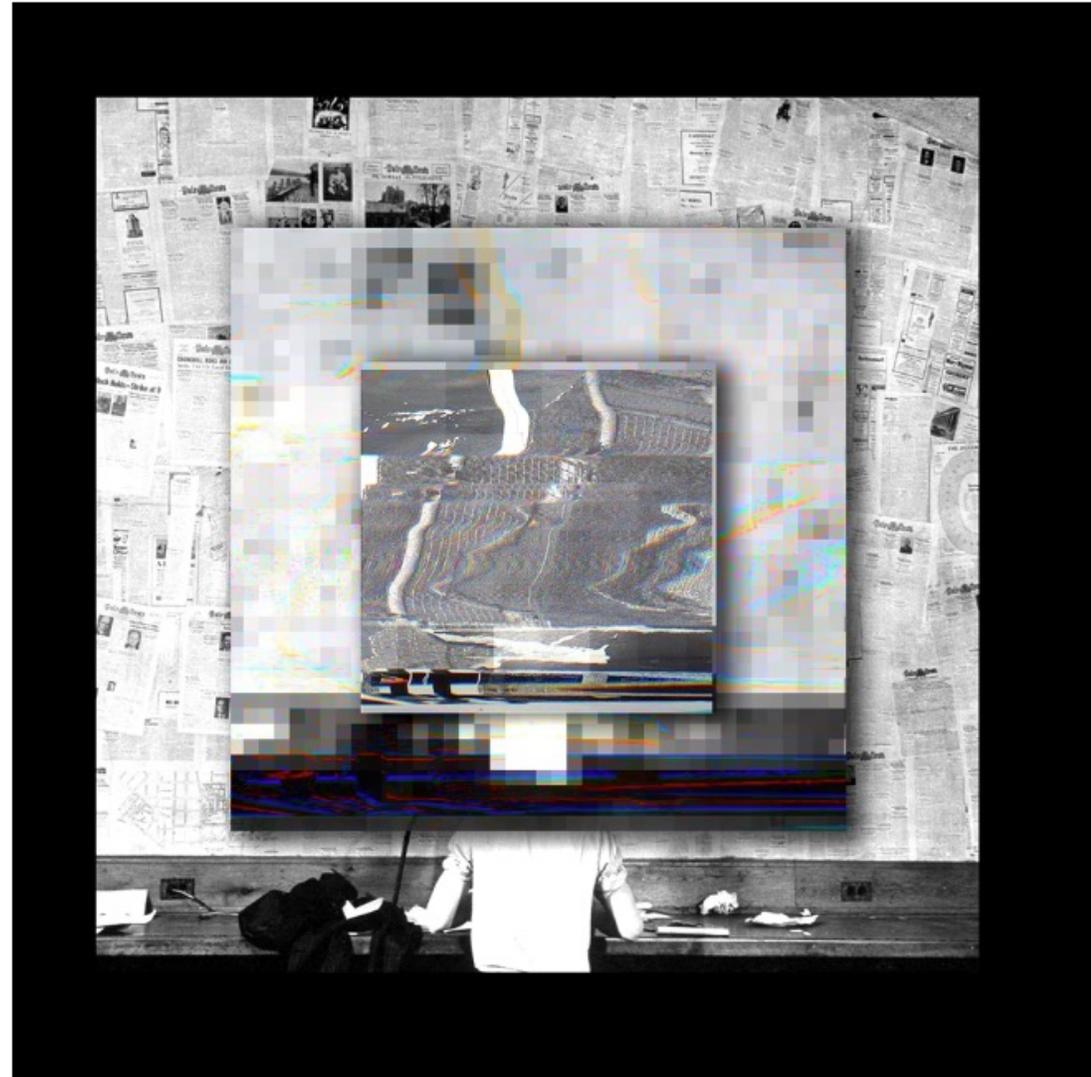
China population by age and sex: 2050.
UN DESA: Population division.



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The Epistemic Crisis: Synthetic and Social media

- “Social scientists have identified at least three major forces that collectively bind together successful democracies: social capital (extensive social networks with high levels of trust), strong institutions, and shared stories. Social media has weakened all three.”
 - Haidt 2022 Why the Past 10 Years of American Life Have Been Uniquely Stupid - The Atlantic
- Surveillance Capitalism and the attention economy create social division in liberal democracies (Meta, Twitter, etc)
- Surveillance Authoritarianism creates social cohesion in autocratic and authoritarianism states (Xuexi Qiangguo ‘Xi Thought’ app)



John Phillips/Life Magazine via Getty / Arsh Raziuddin / The Atlantic



The European picture: stagflation + populist nationalism

Economic crisis: Stagflation

- Post-covid supply chain and workforce constraints suppress productivity.
- Governments want to 'inflate away' Covid debt
- Local + global price rises lead to 'stagflation' in Europe to the mid to late 2020s.
- This fuels populism.

Resource crisis: Food

- "RED ALERT: A global food crisis like no other" (UN World Food Programme)
- Conflict, Climate, Covid and Costs.
- European refugee influx from the 'ring of fire' and Ukraine at time of economic hardship.
- This fuels populism

Economic crisis: Resilience

- Reshoring supply chains increases costs without increasing productivity.
- Post-covid supply chain constraints limit capacity and increase costs
- This fuels inflation

Resource crisis: Energy

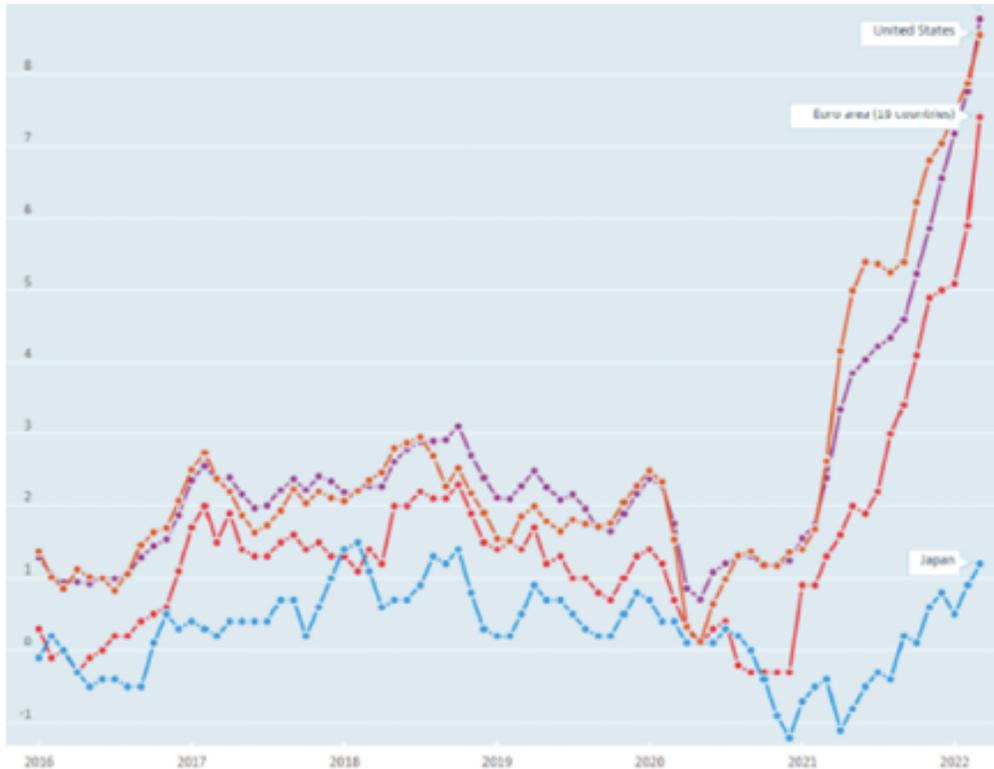
- Removing Russian oil and gas dependency has driven energy price inflation, fertilizer price inflation and government debt.
- Economic sanctions restructure trading and political relationships in region.



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Economic crisis: Stagflation

Inflation in OECD area surges to 8.8%



In the sharpest increase since 1988, consumer prices in the OECD area rose by 8.8% year-on-year in March 2022. Around one fifth of OECD countries recorded double-digit inflation, with the highest in Turkey at 61.1%.

Energy price inflation also soared, reaching 33.7% year-on-year in March, its highest rate since May 1980. Excluding food and energy, year-on-year inflation increased to 5.9% in March, after 5.6% in February 2022.

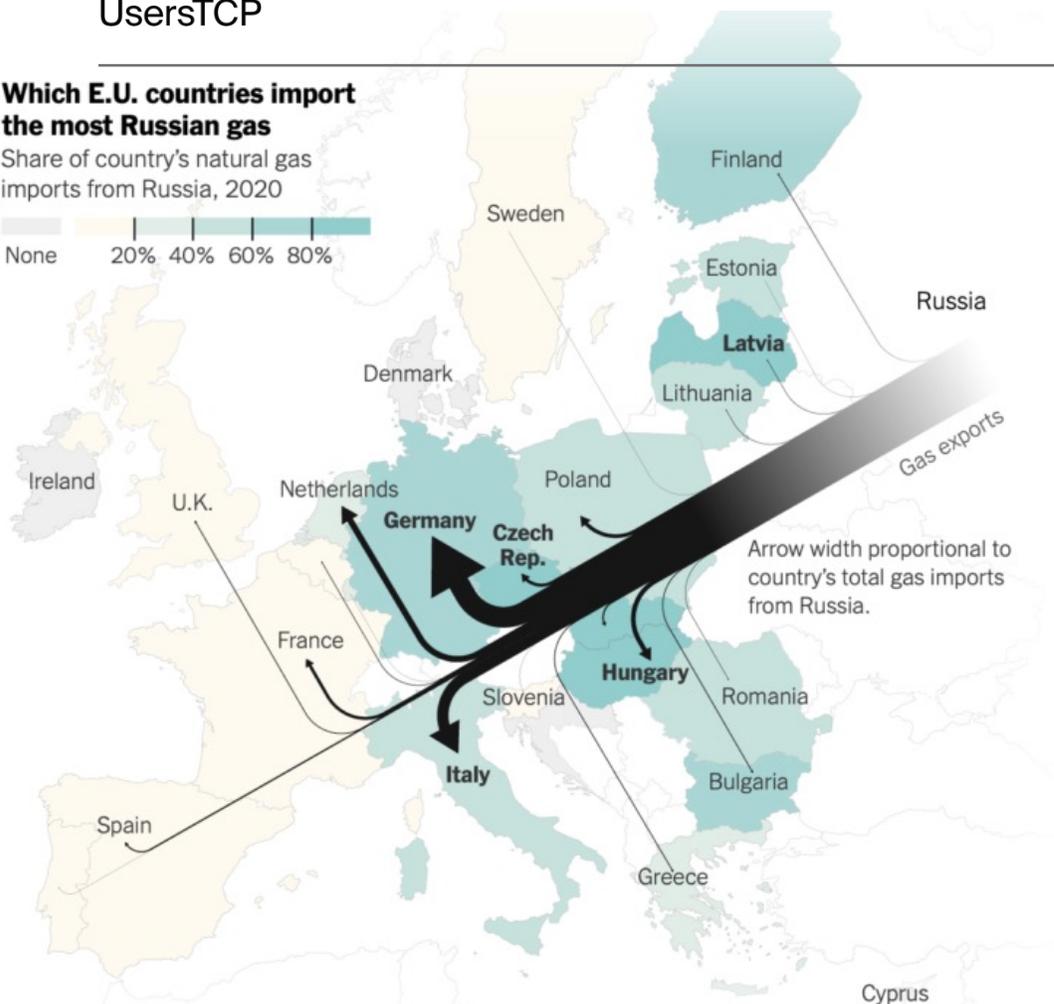


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Resource crisis: Energy

Which E.U. countries import the most Russian gas

Share of country's natural gas imports from Russia, 2020



Arrow width proportional to country's total gas imports from Russia.



<https://flowingdata.com/2022/02/17/map-of-russian-gas-exports/>

Source: EuroStat and the British Department for Business, Energy & Industrial Strategy • Note: Austria did not report the source of its natural gas imports in 2020. Data includes both piped and liquefied natural gas.

By Samuel Bailey (sam.bailus@gmail.com) - Own work, CC BY 3.0, <https://commons.wikimedia.org/w/index.php?curid=8454588>



Refugee crisis on Europe's doorstep: <https://www.unhcr.org>

Ukraine emergency

UNHCR has declared **Ukraine a Level 3 emergency** – the highest level we have.

In light of the ongoing humanitarian crisis in Ukraine, UNHCR is working with local authorities, UN agencies, and civil society partners to provide emergency assistance and protect the most vulnerably affected.

More than 7.2 million

individual refugees from Ukraine recorded across Europe since 24 February

Over 12.6 million

border crossings from Ukraine (Note: This figure reflects cross-border movements and not

Ethiopia Tigray emergency

A full-scale humanitarian crisis is unfolding as thousands of refugees flee ongoing fighting in Ethiopia's Tigray region to seek safety in eastern Sudan.

Since the violence began in early-November 2020, refugees have been arriving at remote border points that take hours to reach from the nearest towns in Sudan. **Many are women and children.** Most left with barely any belongings and arrived exhausted from walking long distances over harsh terrain.

45,449

refugees from Ethiopia's Tigray who have fled into Sudan

96,000

refugees from Eritrea hosted in the Tigray region

100,000

internally displaced people in the Tigray region before the ongoing crisis

[Full statistics](#)
Last updated 30 November 2020

Syria emergency

After 10 years of crisis, life is **12.4 million**

Afghanistan emergency

Millions of people in Afghanistan are experiencing misery and hunger amid decades of conflict, the collapse of the country's economy, years of drought, and freezing wintertime temperatures.

Afghanistan, which has endured repeated humanitarian crises, faces its darkest time.

UNHCR and its partners have launched joint response plans to deliver vital humanitarian relief. There are 24 million people inside Afghanistan and 5.7 million Afghans and host communities in five neighbouring countries who need support.

24 million

people in Afghanistan in need of vital humanitarian relief

800,000

people newly displaced within Afghanistan in 2021 ([OCHA](#))

3.5 million

people internally displaced by conflict in Afghanistan by 31 December 2021

5.7 million

Afghans and host communities in five neighbouring countries in need of support

Yemen emergency

Over 20 million

People in need of humanitarian aid in Yemen

Over 4 million

Internally displaced people in Yemen

137,000

Refugees and asylum-seekers in Yemen, mainly having fled

After more than six years of conflict, Yemen remains the world's largest humanitarian crisis and millions of displaced Yemenis are only a step away from famine.

Ongoing conflict has displaced four million Yemenis, devastated the country and fractured its health services and food supplies, leaving **66 per cent of the population dependent on humanitarian**

Sahel emergency

2.6 million

Internally displaced people (IDPs)

930,000

Refugees and asylum-seekers

[Full statistics](#)
Updated February 2022

The Sahel is facing one of the fastest growing displacement crises in the world – and yet it is one of the most forgotten.

Intense and indiscriminate violence has **forced millions to flee across the region**, both within countries and across borders.

This deteriorating **humanitarian and protection emergency is now further compounded by the impact of the climate crisis, COVID-19, and food insecurity.**



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Putin aims to split Europe on sanctions & Ukraine support

“This is probably the most delicate phase of this decades-long game of chicken,” said a senior European diplomat. “He is actively trying to sow discord. His hope is to drag it out until winter and use the social discontent to actually widen the very real rifts — both intra-EU and transatlantic — that for now stay below the surface.”

- West shrugs off Putin’s nuclear ‘bluff’ and vows to keep up Ukraine support
<https://on.ft.com/3qWhX5q>





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The swing to right wing populist leaders in Europe

“Do you want peace, or do you want air conditioning?” Mario Draghi



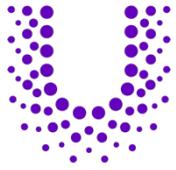
After a month of negotiation, the so-called “Tidö accord” was signed and announced on Friday and Kristersson announced that the Moderates, the Christian Democrats and the Liberals will form Sweden’s next government with the support of the Sweden Democrats. [EPA-EFE/JONAS EKSTROEMER]

Sweden Democrats



Rightwing partners share the stage in the final days of the Italian election campaign. From left, League leader Matteo Salvini, Forza Italia’s Silvio Berlusconi and Brothers of Italy leader Giorgia Meloni © Alberto Pizzoli/AFP/Getty Images

Brothers of Italy



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March 2022 - reasonable worst-case scenario

Scenario:

- Land gas pipelines across Ukraine and Belarus destroyed leaving Nordstream & Blue stream only
- Putin cuts supplies through these to drive division in European response to war; or
- EU sanctions Russian gas (hard to quickly reroute to other markets)
- Europe recommissions all available nuclear & coal plants ASAP and ramps up drilling, mining and fracking

Consequences:

- Phased shut-down of heavy industry in Germany, Austria, Italy and Turkey at least
- Extensive energy rationing in Europe homes and businesses
 - Austria & Germany activating gas rationing plans
- Sharp economic downturn (recession)
- Sharp rise in energy prices
- Reinvestment in EU hydrocarbons



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2023 - 2025 reasonable worst-case scenario

Scenario:

- Russia's invasion of Ukraine becomes bloody and protracted in much of the East
- The West supports Ukrainian resistance with weapons and reinforces NATO borders
- Economic recession across EU and globally
- EU faces rising costs from:
 - Integration of Ukrainian refugees
 - Historically high fuel and food prices
 - Increased defense spending
- Europe tries to decrease coal, oil and gas
- Europe tries to increase low carbon energy sources against constrained supply chains of raw materials and concerns over material supply chain security.

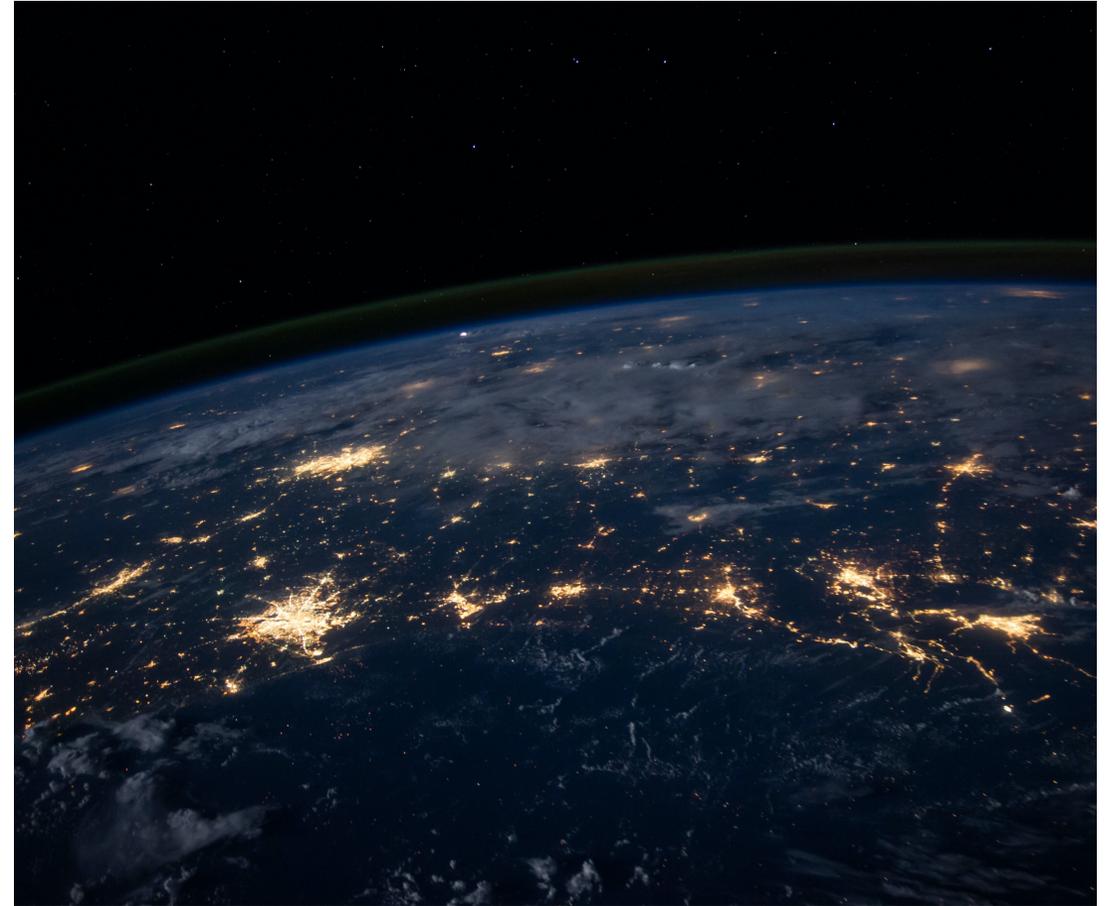
Consequences:

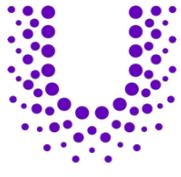
- Energy transition slows due to economic outlook and materials constraints
- Populism rises in Europe as refugee integration and recession cause social divisions
- Economy stays in recession and inflation remains high
- Popular support of decarbonisation declines as a political priority
- Russia becomes increasingly economically and politically isolated and dependent on China and South Asia as its primary trading partners



Rebalancing of the 'trilemma' back towards energy security and energy affordability

- Priority 1: Energy Security
- Priority 2: Energy Affordability
- Priority 2: Decarbonisation
- We were seeking cost minimal solutions under carbon constraints
- We are now seeking carbon minimal solutions under security and affordability constraints
- Governments may retreat from liberalised market solutions
- **Complex market-based solutions may be seen as too risky. Consumer protection and energy security become the priority.**





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As multipolarity increases, energy security and climate obligations will become geopolitical 'cards on the table'.

- Energy security issues will come to dominate Nations' thinking.
- The race to decarbonize will become a race to become energy independent.
- Lower carbon independence will be a 'nice to have' – energy security a 'must have'.
- Low carbon materials supply chains will become political levers to exert influence over global trade.
- Demand for energy independence (at all levels) may increase – driving DER uptake (including generators) but lowering assets' grid participation.



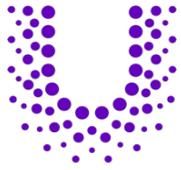


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The energy transition will be a rough ride

- Uncertainty and volatility in energy markets will increase driven by intermittency and climate events
- State and non-state actors will deliberately manipulate hydrocarbon markets to try to break other countries' resolve to decarbonize
- Managing price/affordability risk for end users will become a key policy priority
- **Understanding of user perceptions and response to price shocks and volatility is needed. How will different users react?**



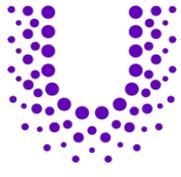


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Public debate over net zero will be fractious

- The debate over how best to deliver net zero will become more divided, politicised and socially fractious
- Liberal democratic countries will find it hard to reach and maintain social consensus on issues as shared value systems are eroded by fractured social information channels.
- **Building trust, and maintaining a coherent social narrative around the need, means, affordability and equity of decarbonisation is critical.**





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Solutions will need to address adaptation as well as mitigation

- GHG emissions continue to rise
- Climate impacts accelerate
- Climate risks are immediate and local
- Public support shifts to adaptation
- Governments prioritize adaptation
- Focus shifts to adaptation + mitigation
- Users prioritize personal over collective safety in personal spending
- **Need to understand users' climate risk perceptions and priorities**
- **Need to understand user issues around adaptation technologies**





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Accelerating climate impacts will increase focus on 'radical' solutions

- Governments will increasingly grasp at 'sliver bullet' solutions including:
 - Nuclear Fusion
 - Space-based solar
 - Carbon sequestration
 - Geoengineering
- IPCC 6th AR says atmospheric removal now necessary to stay <math><1.5^{\circ}\text{C}</math>
- Citizen's perceptions of high-risk high-reward solutions needed.
- Who welcomes such approaches who rejects them – how does the public debate play out?



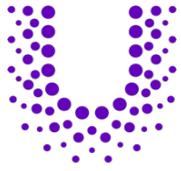


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Designing for both climate and security resilience will be a key focus

- Resilient systems are harder to disrupt and faster to recover
- Resilience strategies:
 - Include some redundancy
 - Make systems reconfigurable
 - Make system cybersecure
- Trade off system peak efficiency for greater breadth of operating conditions
- **Understanding users' risk perceptions and responses is key. These differ from costs and drive users' decisions.**





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Regulation will remain the primary mechanism of change – but the focus of regulation will change

- Under social stress governments fall back on policy and regulation
- Social acceptance of strong policy action may increase
- Social expectations of security, affordability and carbon neutrality may increase
- Informing policy and regulation will become increasingly important
- Understanding and informing the social debate matter.
- Maintaining trust will be essential.



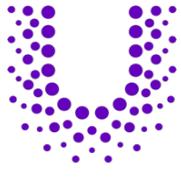


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Electrification will happen fast - DSR will financially dominate EE

- DSR costs will fall faster than EE costs
- Electrification of heating, cooling and transport will increase sharply.
- Grid side flexibility will be insufficient
- DSR from non-energy sector assets will be increasingly necessary
- **Recruiting, aligning, and controlling such assets under all relevant market operating conditions is therefore important.**



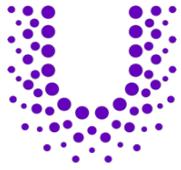


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Private sector 'heavy lifting' of DSR/EE will face a shifting landscape of value

- Everything will be changing simultaneously. Forecasting will become less reliable and planning horizons will shorten.
- Economic value will ebb and flow throughout the transition.
- Being able to predict where, when, for how long and how much value will be created will be central to businesses delivering resilient, net zero products and services.
- Observatories, digital twins and ways of building and sustaining user engagement will be central to this.





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Additional references and sources

Demetri Kofinas '[Hidden Forces](#)' podcast

- Dmitri Alperovitch | Russia-Ukraine War & Risks of NATO-Russia Escalation | Ep.235
- Julia Friedlander | Economic Warfare & the Weaponization of the US Dollar | Ep.236
- Jon Wolfsthal | Risks of Nuclear War & the Escalation Ladder | Ep.240
- Chris Painter | Preparing the U.S. & Europe for Russian Cyber Attacks | Ep.241

[Doomberg.substack.com](https://doomberg.substack.com)

- 'Farmers on the brink' Mar 26 2022
- 'It's time to get serious about energy' Feb 25 2022

