

THE ROAD TO

NetZero

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LINDA KALCHER AND NEIL MAKAROFF DISCUSS IF THE EU WILL LEAD THE CHARGE IN THE GREEN ECONOMY

CLIMATE CHANGE WILL IMPACT CENTRAL BANKS. FRANK ELDERSON ON HOW POLICYMAKERS MUST REACT

AUDE CEFALIELLO EXAMINES THE CONSEQUENCES OF CLIMATE CHANGE FOR PUBLIC HEALTH

SUSTAINABLE DEVELOPMENT

Foreword

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elcome to the Summer edition of *The Road to Net Zero*, a *World Commerce Review* supplement. This publication has been prepared in response to readership demand for an overview of the steps being taken in the transition to a cleaner and greener sustainable world.

All aspects of climate action are examined, with the most respected authors providing the reader with the most comprehensive information available. Our brief is to provide all the data necessary for the readership to make their own informed decisions. All editorials are independent, and content is unaffected by advertising or other commercial considerations. Authors are not endorsing any commercial or other content within the publication. ■

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“Know thyself”

Failure to meet the Paris climate goals impact on central banks' work, argues Frank Elderson. To avoid long-term policy mistakes, policymakers must address the resulting structural changes

For centuries the oracle of Delphi guided those seeking advice on what the future might hold¹. Perhaps the most famous prophecy originating here from the Temple of Apollo is the one delivered during the Ancient Greek era to Croesus, the King of Lydia. When he consulted the oracle about going to war with Persia, he was told that if he were to attack, *“a great empire would fall.”*

Emboldened by this apparent foresight, King Croesus went to war. And an empire did indeed fall. But it was the Lydians, not the Persians, who were defeated. The oracle was right. Yet King Croesus had overlooked the considerable room for interpretation that the prophecy allowed, with significant implications for his assessment of the outlook and the consequences of his decisions.

Today, policymakers count not on prophecies and oracles but on facts and science when assessing the outlook so they can make informed decisions. But while facts and science leave far less room for interpretation and uncertainty than ancient prophecies, they cannot eliminate it entirely.

The scientific method requires established knowledge to be scrutinised and reviewed, especially – though certainly not exclusively – knowledge that pushes the boundaries of modern science. So science-based models that are used to describe what happens in the real world need to be updated regularly, in terms of both their structure and their parameters.

And we have to acknowledge that these models are subject to uncertainty, including statistical, measurement and policy uncertainty. These caveats are relevant whenever we use these models to describe what has happened in the past, and they are especially relevant when assessing how present day knowledge is used to project an outlook for the future.

At the same time, policy must remain robust in the face of this uncertainty and build on what is scientifically established. Policymakers need to identify and spell out those questions that, if resolved, would reduce uncertainty and increase the level of confidence with which decisions are taken.

Analysis by the ECB and other central banks and supervisors repeatedly shows that, from an economic perspective, an orderly transition is by far preferable to alternative scenarios of doing nothing or doing too little too late

I will discuss how the prevailing evidence from climate and nature science can inform the actions of public authorities, even those that are not responsible for climate and nature policy, such as central banks and supervisors². These public authorities – just like companies and individuals – are increasingly taking decisions whose outcomes will be subject to the tangible consequences of the ongoing climate and nature crises.

In fact, in a ground-breaking ruling earlier this week, the European Court of Human Rights, explicitly referring to *“the compelling scientific advice provided, in particular, by the Intergovernmental Panel on Climate Change”*, established that States *“need to put in place the necessary regulations and measures aimed at preventing an increase in greenhouse gas concentrations in the Earth’s atmosphere and a rise in global average temperature beyond levels capable of producing serious and irreversible adverse effects on human rights.”*³

So how can we ensure that decisions taken today reflect what we know about climate science while remaining robust in the face of uncertainty?

Fundamental challenges of failing to meet the goals of the Paris Agreement

Currently, the best assessment by climate scientists tells us that the world is not on a path to limit the increase in the average global temperature to 1.5 degrees Celsius above pre-industrial levels – the overarching goal of the Paris Agreement. We are not even on course to limit the increase to 2 degrees.

In fact, last November the UN Emissions Gap Report concluded that the world is on track for an average increase of 2.9 degrees, and even that will only be achieved if all government commitments to mitigation measures are implemented⁴.

In other words, without a full and prompt implementation of these commitments, we will see an increase of even more than 2.9 degrees. In any case – acknowledging the uncertainty – the world is currently heading for a temperature rise far above the Paris Agreement goals.

This raises a number of critical challenges for maintaining wellbeing as we know it. These go far beyond the economic challenges that may emerge and will be particularly relevant for central banks and supervisors.

In a recent report, the European Environment Agency sent a dire message about climate risks, pointing out that *“several climate risks have already reached critical levels”* and observing that *“[i]f decisive action is not taken now, most climate risks could reach critical or catastrophic levels by the end of this century.”*⁵

Global heating will have an impact on food, water and energy security and the health of the general population, and these effects will be aggravated by ecosystem degradation, which is itself worsened by global heating. Moreover, increasing climate and natural hazards can disrupt critical infrastructure, putting people’s livelihoods and even their basic needs at risk.

There may also be second-round effects that compound the direct impact of an increase in climate and natural hazards. One example of this would be changes in migration flows, which like other such second-round effects are generally not yet accounted for in models of the impact of climate change and nature degradation. But the more severe the climate scenario, the more likely it is that these flows will increase, and the greater the impact these increasing flows will have⁶.

In addition, the Intergovernmental Panel on Climate Change (IPCC) has been increasingly emphasising the risks of various tipping points. These are critical thresholds that, when breached, will lead to large, accelerating and irreversible changes to our climate system.

According to the most recent IPCC assessment report from 2021, the risk of reaching these tipping points is already assessed as being high if the average global temperature increase amounts to between 1.5 and 2.5 degrees. And it is assessed as very high if global temperatures increase by 2.5 to 4 degrees⁷.

Climate science can provide indications of potential tipping points and what their consequences might be, like the melting of the Greenland ice sheet and the impact it would have on global sea levels. There is, however, no scientific consensus yet on the systemic changes that might occur after these tipping points are reached.

Further research is therefore urgently required here, especially in light of the current trajectory for global heating⁸. Over the last 12 months, the global average temperature was already 1.5 degrees above pre-industrial levels.

Structural economic challenges

Let me now turn to the implications for the global economy if temperatures increase by significantly more than 2 degrees. The structural economic consequences will be profound, with impacts on both the supply and demand sides of the economy.

First, resources will have to be dedicated to protecting citizens and society from increased climate and natural hazards like wildfires, droughts and floods.

Second, to the extent that the increase in hazards can no longer be avoided, the economy will need to cater for the critical needs that the European Environment Agency identifies as being at risk. Specifically, maintaining adequate food production, water availability and health care will require substantially more resources than those sectors currently receive.

Third, beyond catering for these critical needs, the economy will undergo further structural transformation as both preferences and production possibilities change. Tourism is a case in point, with destinations that are currently popular no longer being similarly in demand or even accessible in the future.

Another example is international trade, which may be forced to redevelop as existing routes and ports become unavailable and others open up. And there will also be a reallocation between sectors, with some losing out while others benefit, much like we have seen following the pandemic and the energy crisis.

Fourth, the economy needs to be made resilient to the increase in climate and natural hazards. The existing capital stock – including people's homes – will need to be upgraded and adapted, with all the increases in structural costs this entails. Achieving such resilience may even require physically relocating part of the capital stock to avoid proximity to areas that will be heavily exposed to hazards.

Any capital stock that is not made resilient to hazards will most likely see its economic lifespan shorten significantly. This will take the form of higher depreciation rates, which imply greater financial risks for anyone with exposures to the capital stock.

It is particularly noteworthy that investments that are currently being made to green the capital stock may not be immune to this effect. For example, a hydroelectric power plant may become obsolete prematurely if a river runs dry or changes course.

Resilience to the more disastrous climate and nature outcomes that are the consequence of failing to meet the Paris Agreement goals should, therefore, feature prominently in any decisions related to mitigation investment that are being taken today.

A key challenge for economic policymakers will be to ensure that the economy is suitably prepared to undergo these structural transformations. If it is not, there is a significant risk that economic and financial factors will actually exacerbate the critical challenges we will face in a world that overshoots the goals of the Paris Agreement.

Against this backdrop, it will be crucial for economic policymakers to identify potential barriers to effective and efficient adaptation. First, a failure to coordinate may lead to investment being misallocated. Some investments may not materialise at all if the private sector fails to consider the benefits for society.

And others may materialise but only inefficiently, for example if investment in cooling homes and offices takes place at the level of individual households and firms.

Second, structural adjustment in an economy requires the right combination of flexibility, education and social safety nets to navigate an inclusive and effective adaptation process.

Third, financial bottlenecks may emerge. Increased uncertainty due to potential climate and natural hazards may lead to an increase in risk premia, which in turn could hold back investment. And this situation could be exacerbated if it is no longer possible to obtain insurance against certain risks – or if it is only possible at a prohibitive cost⁹.

Besides the greater frequency and impact of hazards, uninsurable risks occur when hazards become systemic – in other words, when a hazard would affect the entire population at once if it were to materialise. And when such risks are uninsurable, individuals and firms – as well as the financial institutions that finance them – need greater loss-absorbing capacity themselves. This self-insurance will mean that – all other things being equal – the aggregate propensity to invest decreases further.

Bottlenecks in the flow of finance that reduce investment or that lead to misallocation can be mitigated with a sound banking system and well-developed capital markets that bolster transparency and ensures climate- and nature-related risks are properly priced.

Against this backdrop, there is an urgent need to complete the banking union and the capital markets union – as the ECB has previously called for – irrespective of the climate and nature scenario that ultimately materialises.

In areas where private investment bottlenecks cannot be resolved, governments may need to step in with increased public investment and safety nets. This would give rise to significant government contingent liabilities that are not yet appropriately reflected in credit ratings or in institutional economic governance frameworks.

The relevance for central banks and supervisors

Many of the challenges I have mentioned – both the critical and the structural economic challenges – fall to policymakers in other areas, rather than central banks and supervisors. But the challenges presented and the policy choices that are taken in response will have a bearing on the environment in which central banks and supervisors pursue their mandates to maintain price stability and ensure the safety and soundness of banks.

First, our objectives are even more important in a world that is facing increased climate and natural hazards. Price stability and sound banks provide an anchor that makes an economy – and therefore a society – more resilient to shocks. The more frequent and intensive the shocks, the more important it becomes that the anchor doesn't break.

Second, while our tasks become more important when the world around us becomes more daunting, maintaining price stability and a sound banking sector becomes more complicated. And this is not just because shocks are more frequent and more intense. It also becomes more complicated to assess the type of shock that is hitting the

economy, yet this is crucial to gauging the potential risk to price stability or to the soundness of banks, as well as the appropriate policy response.

It could raise questions about whether climate and natural hazards can be fully captured in the traditional categorisation of demand, supply and financial shocks that are inherent in most macroeconomic models. For example, my fellow ECB Executive Board member Isabel Schnabel has suggested thinking about the impact of climate change on inflation using concepts that she has referred to as 'climateflation', 'fossilflation' and 'greenflation'¹⁰.

The Basel Committee on Banking Supervision, meanwhile, has already established that climate-related risks translate into the traditional types of risk that banks consider¹¹. This covers credit risk, liquidity risk, market risk and operational risk, including litigation risk¹².

However, the exact mechanisms of mapping actual hazards to risks still need to be analysed further to fully capture climate-related factors in quantifiable regulatory and supervisory requirements.

Third, climate and natural hazards limit the productive capacity of the economy. Some of the consequences may eventually fade – although they may well persist for quite some time – for example if supply chains are disrupted as a result of hazards materialising. Others may be permanent, for example if nature providing critical services – including land use and fisheries – becomes degraded.

In both cases, the risk of the economy running into capacity constraints would be greater. Therefore, to properly assess the state of the economy and identify risks, central banks and supervisors need to further deepen their understanding of the supply side of the economy, just as we had to do after the pandemic and the energy crisis.

This also means that we need to extend the horizon of our analyses well beyond the typical horizon considered today. Climate science gives us a window into the rest of this century. What we can see through this window should be taken seriously, including by central banks and supervisors as we identify and assess risks in the pursuit of our mandates. The time to think seriously about the long term is now.

Fourth, the combination of heightened uncertainty and a greater need for self-insurance could lead to an increase in the propensity to save in the private sector. This could create space for the investment that is so urgently needed and – in the absence of increased savings – would lead to an increase in the equilibrium real interest rate¹³.

At the same time, if owing to coordination failures the increased savings are not channelled towards providing the investment needed, the equilibrium real rate of interest would instead be depressed. As this equilibrium rate is the interest rate that prevails when all shocks to the economy have dissipated and monetary policy is neither accommodative nor restrictive, it is an important yardstick for central banks. Thus, for monetary policy, understanding which of these effects ultimately dominates will be key.

Fifth, increasing financial risks arising from the climate and nature crises can impair the soundness of financial institutions and the stability of the financial system as a whole. Should these risks materialise – despite all our efforts to mitigate them – the transmission of our monetary policy could be affected.

Monetary policy decisions would be transmitted through the financial system and the economy in a less orderly and less predictable manner, potentially making it more difficult for us to achieve our price stability objective.

More generally, the effectiveness and efficiency of our policies benefit from well-functioning markets. This holds true in terms of both our ability to maintain price stability and the need to avoid the risk of our monetary policy impulses unduly contributing to a misallocation of resources.

Concluding remarks

The Temple of Apollo in Delphi famously bore the inscription “*Know thyself*” – a maxim that is often understood to mean “*know your limits.*”

Know what you know and know what you don’t know – this is what I have sought to convey to you.

And act upon that knowledge in a way that is robust in the face of known and unknown uncertainties, to avoid making avoidable mistakes like that of King Croesus after he consulted the oracle of Delphi. This includes identifying and seeking answers to questions that reduce uncertainty and increase the scope of ‘no-regret’ policy actions.

This will require policymakers to engage with stakeholders beyond their own fields of expertise – just like the Bank of Greece is doing through the interdisciplinary Climate Change Impacts Study Committee, which recently announced the preliminary results of analytical work on the economic, social and environmental impacts of climate change in Greece¹⁴.

Experts from all disciplines – including climate and nature scientists, biologists, economists, legal experts and sociologists, to name just a few – will need to work closely together in responding to the multifaceted challenges ahead. If ever there was an urgent need to pool knowledge and draw on different fields of expertise, it is now.

Let me be clear: my remarks are by no means a signal that we should throw in the towel on mitigation. Quite the opposite. I hope that I have been able to show you why, in light of the prevailing climate science, no effort should be spared in working towards the goals of the Paris Agreement.

The European Climate Law requires it, and the European Court of Human Rights has ruled that governments that fail to meet their climate commitments are violating human rights. Analysis by the ECB and other central banks and supervisors repeatedly shows that, from an economic perspective, an orderly transition is by far preferable to alternative scenarios of doing nothing or doing too little too late¹⁵.

That said, even though climate and nature policymakers are under a legal obligation to deliver on the goals of the Paris Agreement and even if they have committed to achieving these objectives, they still have a duty to prepare for risks that lie ahead as the entire world needs to live up to its obligations – and it is not a given that it will – and critical thresholds may have already been surpassed.

The duty to prepare for these risks also holds for central banks and supervisors in the pursuit of their mandates. We must both unwaveringly strive for the best and diligently prepare for what climate science tells us lies in store.

It is not a Delphic prophecy that is calling for action. It is facts and science. ■

Frank Elderson is a Member of the Executive Board and Vice-Chair of the Supervisory Board of the European Central Bank

Endnotes

1. To my knowledge, there are at least three instances of central banks and supervisory authorities paying tribute to the ancient oracle. The semi-structural macroeconomic model of the Dutch economy that De Nederlandsche Bank uses for its projections is named DELFI. In ECB Banking Supervision we have developed a tool named Delphi that integrates market indicators and information from the media to better understand risk developments affecting banks in real time. And central banks have been described as giving “Delphic” forward guidance when communicating about how they intend to adjust policy in relation to incoming data.
2. I have emphasised in other speeches that central banks are not climate and nature policymakers, but climate and nature policy takers. See, for example, Elderson, F (2023), [“Policymakers as policy takers – accounting for climate-related and environmental factors in banking supervision and monetary policy”](#), speech at the Peterson Institute for International Economics, 21 April.
3. European Court of Human Rights (2024), [“Judgment Verein KlimaSeniorinnen Schweiz and Others v. Switzerland – Violations of the European Convention for failing to implement sufficient measures to combat climate change”](#), press release, 9 April.
4. United Nations Environment Programme (2023), [Emissions Gap Report 2023: Broken Record – Temperatures hit new highs, yet world fails to cut emissions \(again\)](#).
5. European Environment Agency (2024), [European climate risk assessment](#).
6. According to the World Bank, climate change could contribute to the movement of 216 million people within their own countries by 2050, unless concrete climate and inclusive development actions are taken. See Clement, V et al (2021), [Groundswell Part 2: Acting on Internal Climate Migration](#), World Bank Group, Washington, D.C.
7. Intergovernmental Panel on Climate Change (2021), [Climate Change 2021 – The Physical Science Basis](#).
8. The Central Banks and Supervisors Network for Greening the Financial System has previously developed scenarios to assess how economies might look on different climate policy paths. In future work it will prioritise the inclusion of non-linear elements – like climate tipping points – in its models (see Aerts, S, Spaggiari, M and Stracca, L (2023), [“Climate](#)

scenarios: procrastination comes at high cost, The ECB Blog, 4 December). For it to achieve this, climate and nature science will be crucial in advancing its understanding of tipping points.

9. Together with EIOPA the ECB has issued a discussion paper that outlines policy options to promote climate catastrophe insurance that could mitigate the effect of reduced insurability, see ECB and EIOPA (2023), *“Policy options to reduce the climate insurance protection gap”*, Discussion Paper, April.

10. Schnabel, I (2022), *“A new age of energy inflation: climateflation, fossilflation and greenflation”*, speech at a panel on *“Monetary Policy and Climate Change”* at The ECB and its Watchers XXII Conference, 17 March.

11. Basel Committee on Banking Supervision (2021), *Climate-related risk drivers and their transmission channels*, April.

12. On litigation risk, see Elderson, F (2023), *““Come hell or high water”: addressing the risks of climate and environment-related litigation for the banking sector”*, speech at the ECB Legal Conference, 4 September.

13. See, for example, Schnabel, I (2024), *“R(ising) star?”*, speech at The ECB and its Watchers XXIV Conference session on *Geopolitics and Structural Change: Implications for Real Activity, Inflation and Monetary Policy*, 20 March.

14. Bank of Greece (2023), *“Preliminary results of the studies on the vulnerability assessment and the impact of climate change in Greece”*, 15 December.

15. Emambakhsh, T et al (2023), *“The Road to Paris: stress testing the transition towards a net-zero economy”*, Occasional Paper Series, No 328, ECB

This article is based on a *keynote speech* delivered at the Delphi Economic Forum IX, Delphi, 12 April 2024.

Seizing leadership in the net zero economy

The EU is at a crossroads. Linda Kalcher and Neil Makaroff discuss if the European Union will lead the charge in the green economy or trail behind its global competitors in the US and China

The European Union stands at a pivotal juncture in its industrial history. As the continent prepares to advance its economic trajectory through the next phase of the European Green Deal, it faces a critical question: Will it lead the charge in the green economy or trail behind its global competitors in the US and China?

The European Green Deal as a basis for modernisation

The initial phase of the Green Deal helped Europe navigate through the aftermath of COVID-19 and the energy insecurities following Russia's war on Ukraine. The policies adopted in the last five years are delivering results: renewable deployment is booming at an unprecedented scale.

In 2023, a total of 56 gigawatts (GW) of solar and 17 GW of wind capacity were added, marking an unprecedented pace of renewable deployment. For the first time, wind power generation surpassed gas power, significantly enhancing energy security and reducing reliance on imported fuels.

Progress is also evident with electric vehicles (EVs) and heat pumps, leading to the emergence of new industries and jobs. The Hauts-de-France region, for example, is becoming a significant battery manufacturing hub, generating 20,000 jobs and contributing to the EU's goal of producing 90% of its batteries domestically by 2030.

Similarly, the regions of Silesia, northern Czechia and Slovakia are emerging as significant centres for heat pump manufacturing, which is crucial for reducing dependency on imported heat pumps and revitalising local economies. These regions are witnessing job creation and investment inflows that are setting a template for others to follow.

The European Green Deal is not just an environmental or energy initiative; it is a comprehensive modernisation agenda with concrete results: it has laid a robust foundation for Europe's energy transition, cutting imports of oil and gas by one third by 2030 and making [electricity more affordable](#).

The 27 EU countries are achieving significant milestones in renewable energy deployment, enhancing energy security by cutting fossil fuel imports, and delivering socio-economic benefits. These early successes are setting the stage for a prosperous and competitive future for the EU - but the job is not done yet.

The time for decisive action is now; Europe must not hesitate. Investment cycles of companies are 10-15 years, so decisions taken in the next five years are vital for competitiveness and the path to climate neutrality

EU risks falling behind in the global race to net zero

As the world moves faster towards a climate neutral future, Europe finds itself at risk of falling behind. China's dominance in the production of key net zero technologies is evident, with 60% of mass production in strategic areas like solar photovoltaics and EV batteries controlled by China. 25% of electric vehicles and batteries and more than 90% of solar panels sold in Europe are [imported from China](#).

China pursues this out of economic and security interests, aiming to supply global markets. The United States is trying to catch up by rapidly scaling up its EV production through the Inflation Reduction Act (IRA). Meanwhile, energy prices in Europe are twice as high compared with China and the US, another impact on the competitiveness of the EU's industry.

The need for a holistic industrial strategy

To remain competitive, Europe needs a modern, holistic industrial strategy that combines decarbonisation goals with reindustrialisation. Such a strategy would ensure that Europe does not remain a passive consumer of imported zero-carbon technologies but rather, becomes a powerhouse of industrial innovation. Key components of this European industrial strategy should include:

Investing in a manufacturing base and creating jobs: building a robust manufacturing base is essential to ensuring the production of key net zero technologies within Europe. This investment will create millions of new jobs in the net zero industry, providing economic security and fostering regional development.

Using the single market with standards and creating lead markets: the next few years are key to leveraging the power of the single market through the implementation of stringent standards and lead markets for green products. This will encourage the use of domestically-produced clean technologies and materials, driving demand and investment in European-made products.

Decarbonising the existing industry: transforming the current industrial base to adopt low-carbon technologies is crucial. This involves producing green steel, chemical and glass, increasing energy efficiency and promoting the use of renewable energy sources. Decarbonising existing industries will reduce reliance on fossil fuels, enhance resilience to energy price volatility and ensure long-term competitiveness in the global market.

Such a comprehensive industrial strategy will not only help Europe catch up in the global race for zero-carbon technologies but also establish it as a leader in clean industrial practices.

Long-term vision as the compass for action

Defining the direction starts with the 90% climate target as proposed by the European Commission. This target is the cornerstone of a European Industrial Strategy, planning the decarbonisation of the economic base and identifying necessary net zero industries.

Strategic Perspectives' latest report, *Forging Economic Security and Cohesion in the EU* (2024), shows that cutting net greenhouse gas emissions by 90% by 2040 addresses environmental concerns and drives economic and industrial transformation. Key to this goal is shifting to renewable energy, with plans to electrify half of the EU economy, decarbonise the electricity sector by 2037, phase-out coal by 2030 and achieve 80% renewable electricity by 2040, requiring 70 GW of new renewable capacity annually.

The economic and security benefits of reaching the 2040 climate target are substantial. By 2035, decarbonising the power sector is expected to reduce electricity prices by 12% and household energy bills by two-thirds, potentially saving European households approximately €449 billion by 2040.

This transition will enhance the competitiveness of European industries while also strengthening the EU's energy independence and reducing its exposure to fossil fuel price volatility and geopolitical risks. The projected savings of up to €856 billion in fossil fuel imports between 2025 and 2040 underscore the economic advantages of this shift.

A comprehensive European Industrial Strategy is essential to complement the Green Deal. It can integrate political commitment, adequate funding and targeted investments to modernise the industrial base. This strategy can create a unified European value chain, support reindustrialisation in transitioning regions and generate new jobs in net zero industries by 2040. This approach can ensure the EU's competitiveness globally and enhance economic resilience and cohesion across member states.

Investing in building net zero industries and value chains

Europe has maintained a strong share in wind power manufacturing and heat pumps, with domestic production covering 85% and 73% of market demand, respectively.

However, the European wind industry faces challenges due to value chain disruptions and inflation, leading to job losses and a weakened business case.

A European Industrial Strategy is an opportunity to also create net zero value chains. For example, currently, lithium extracted in Portugal is exported to China to be refined and then imported back in Europe in the form of a battery.

A pan-European Industrial Strategy would enable strategic partnerships across the continent, such as linking France's burgeoning battery industry with lithium resources in Portugal and manufacturing capabilities in Spain. These alliances are crucial for developing a resilient and integrated European supply chain, from the material to the technology and recycling.

This has the potential to reindustrialise regions and create additional jobs. Our latest report shows that, with a European Industrial Strategy, 1.6 million additional green jobs can be created in manufacturing by 2035, with a total of 2.1 million by 2040.

This reindustrialisation can help regions in transition, such as those affected by the decline of traditional industries, by providing new economic opportunities and employment security.

A single market fitted to net zero to support the demand

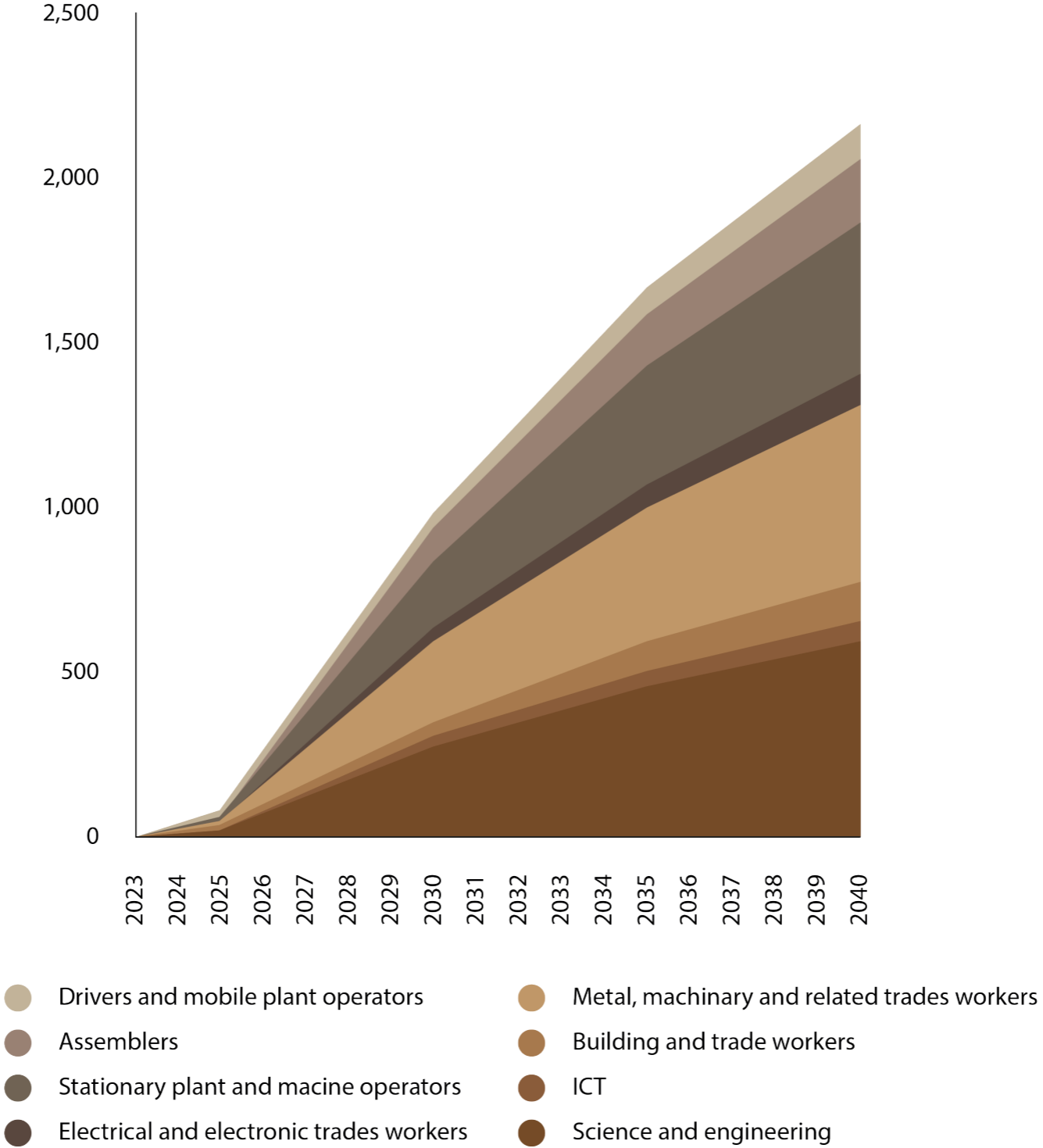
To support the demand for net zero technologies and materials, the EU could adapt its single market by setting high standards, creating lead markets and leveraging public procurement. These measures aim to reduce dependence on technology and fossil fuel imports, ensuring a resilient supply chain and fostering economic security.

Establishing rigorous standards and creating lead markets is crucial for competitiveness. By defining 'green' materials and setting quotas, ie. for green steel in key industries such as automotive and wind power, the EU can enhance innovation and predictability for manufacturers. This approach supports early adoption of green practices and drives the transition to a net zero economy.

Public procurement plays a pivotal role in boosting the market for EU-made green products. Including sustainability criteria in public tenders can drive demand for innovative technologies. With over 14% of gross domestic product (GDP), public procurement helps industries adopt new standards early, supporting local manufacturers and aligning public spending with environmental goals. Enhancing domestic manufacturing and the circular economy could save the EU billions annually in technology and material imports by 2040.

Figure 1. New jobs created in the net zero industry under an industrial strategy (in thousands of jobs)

www.worldcommercereview.com



Abundant and affordable zero-emissions electricity to strengthen competitiveness

The ongoing energy crisis exacerbated by geopolitical tensions underscores the importance of energy security. The EU imported €640 billion in fossil fuels in 2022, and approximately €375 billion in 2023, even with reduced prices. Energy prices remain a critical issue, being significantly higher in Europe compared to China and the US, which pressures businesses alike.

Achieving abundant and affordable zero-emission electricity is crucial for strengthening Europe's competitiveness. The EU's current dependence on fossil fuels makes its economy vulnerable to price shocks. Electrifying the industry is essential to make it less vulnerable to international energy markets and restore competitiveness with China and the US.

Investments to make Europe's industry thrive

To prevent deepening economic disparities and a fragmented single market, it is crucial to avoid a two-speed Europe where some countries advance faster than others due to differing fiscal capacities.

A new financial architecture should incorporate better coordination of national investments and the establishment of a European Green Deal Investment Fund that also strengthens cohesion. This fund would facilitate common investments into the transition, particularly in countries with more fiscal constraints.

This approach is especially important as the end of the NextGenerationEU program will reduce European investments in climate action by €35 billion per year from 2026.

By fostering a unified approach and ensuring all regions can remain prosperous and competitive, the EU can maintain cohesion and economic security while achieving its climate goals. To help Europe's industry thrive, substantial investments are necessary.

Our report highlights that cumulative investments of €668 billion between 2023 and 2040 could generate €233 billion of new economic activity in industrial sectors, boosting the productivity of the economy by 10%. This new financial architecture should include better coordination of national investments and the establishment of a European Green Deal Investment Fund to support common investments into the transition, especially in countries with more fiscal constraints.

By ensuring a unified and pragmatic investment strategy, the EU can prevent a fragmented market, promote balanced economic growth and achieve its ambitious climate targets.

Europe's path forward

Europe has the resources, the expertise and the economic framework to lead the world in zero-carbon technology and industrial innovation. By investing in a strategic, continent-wide industrial overhaul, Europe can secure a prosperous future and establish itself as a leader in the global zero-carbon economy.

The time for decisive action is now; Europe must not hesitate. Investment cycles of companies are 10-15 years, so decisions taken in the next five years are vital for competitiveness and the path to climate neutrality. The upcoming EU elections and strategic decisions from EU institutions will determine whether Europe leads or lags in the global shift towards a zero-carbon future. ■

Linda Kalcher and Neil Makaroff are respectively Executive Director and Director of Strategic Perspectives

An assessment of IRA climate measures

The background of the slide features a stylized cityscape with various green buildings of different heights and shapes. In the center, there is a large green circular graphic that resembles a sun or a moon, with several green leaves and branches extending from it. The overall color palette is dominated by shades of green and blue, creating a clean and modern aesthetic.

Simon Voigts and Anne-Charlotte Paret assess emissions reduction, fiscal costs and the macro effects of the Inflation Reduction Act

There is a wide gap between most countries' greenhouse gas (GHG) mitigation pledges and actual policy implementation, putting the global economy widely off track to honour the 2015 Paris Agreement (UN Environment Program 2023). The Inflation Reduction Act (IRA), signed into law by President Biden on 16 August 2022, aims to significantly narrow that implementation gap in the US, in addition to pursuing other objectives.

In a recent paper (Paret and Voigts 2024) we apply the IMF's new Global Macroeconomic Model for the Energy Transition model (GMMET, see Carton *et al* 2023) to assess the impact of those IRA measures that are related to climate and energy security, focusing on both GHG emissions and the macroeconomy up to 2030.

While the IRA has been discussed extensively (including on Vox, see for example Fajeau *et al* 2023 and Attinasi *et al* 2023), we contribute to the literature by employing a model that captures key measures in a granular fashion, by assessing complementary policies to bridge the remaining gap to the US' medium-term climate pledge, and by shedding light on the dynamic implications of a permitting reform.

GMMET builds on the IMF's Global Integrated Monetary and Fiscal model (GIMF), which is a large-scale, non-linear, structural, multi-country New Keynesian dynamic general equilibrium model for quantitative monetary and fiscal policy analysis. GMMET adds a granular, sector-specific modelling of key GHG-emitting sectors that allow to capture sectoral idiosyncrasies playing a crucial role for emission mitigation.

These sectors include: (i) an electricity generation sector with different technologies (renewables, coal, gas, nuclear) and explicit treatment of intermittent generation from renewables; (ii) a transportation sector with conventional cars, electric vehicles (EVs) and a charging station network (giving rise to network effects); and (iii) fossil fuel-specific mining sectors.

Due to GMMET's sectoral granularity, most key measures have a direct representation in the model, so that their uptake is determined endogenously. To proxy for the IRA's tax on profits made by large corporations and the excise tax on stock buybacks and exemptions, the measures are assumed to be funded by corporate income taxes, implemented as a tax on the profit from the ownership of firms.

The social value of the induced emission cuts outweighs their fiscal costs

The following measures are modelled:

- **Electricity sector measures:** The Clean Electricity Production Tax Credit (PTC) is represented by a 33% subsidy on the model's renewable utility's total production cost, while the New Advanced Manufacturing Production Tax Credit is a 40% subsidy on the price of capital good employed by the utility. The Nuclear Power Production Tax Credit raises nuclear power investment such that capacity increases by roughly 15%.
- **Transport sector measures:** The Clean Vehicle Credit is a gradually increasing subsidy on EV purchases reaching 15% by 2030 (proxying for a slow increase in the share of manufacturers fulfilling domestic content requirements). The Alternative Fuel Refueling Property Credit exogenously increases the charging network density by 13.4%, based on an estimate of the charger station supply elasticity in Cole *et al* (2023). Both measures have a direct model representation, as the choice between both car type and the charging station network are explicitly modelled to capture network externalities.
- **Other measures:** The Carbon Capture and Sequestration Tax Credit and measures related to agriculture and waste exogenously reduce the tradable goods emission intensity. The various measures aimed at improving residential energy efficiency improve productivity on the bundle of natural gas and oil that is used by households for home heating. This allows to capture the general equilibrium impact of reduced fuel demand. Spending for all three measures is captured as government spending.

The impact of the IRA

Selected key results emerge from our analysis and are presented in the following. Absent permitting-related investment delays, IRA climate measures deliver large emission reductions at manageable fiscal costs and with an expansionary but very small impact on the overall economy:

- The share of renewables in the electricity mix rises by around 19 percentage points by 2030, at the expense of gas and coal. The Clean Electricity Production Tax Credit and the New Advanced Manufacturing Production Tax Credit lower the renewable utility's overall generation costs and, respectively, the price of capital.

As shown in Figure 1, this triggers a surge in renewable investment and reduces investment in coal utilities via crowding out. Gas investment ticks up slightly due to its role as a back-up for renewables, and investment in nuclear power rises mildly from the Nuclear Power Production Tax Credit. The subsidies boost the total volume of electricity generation and thereby reduce the electricity price.

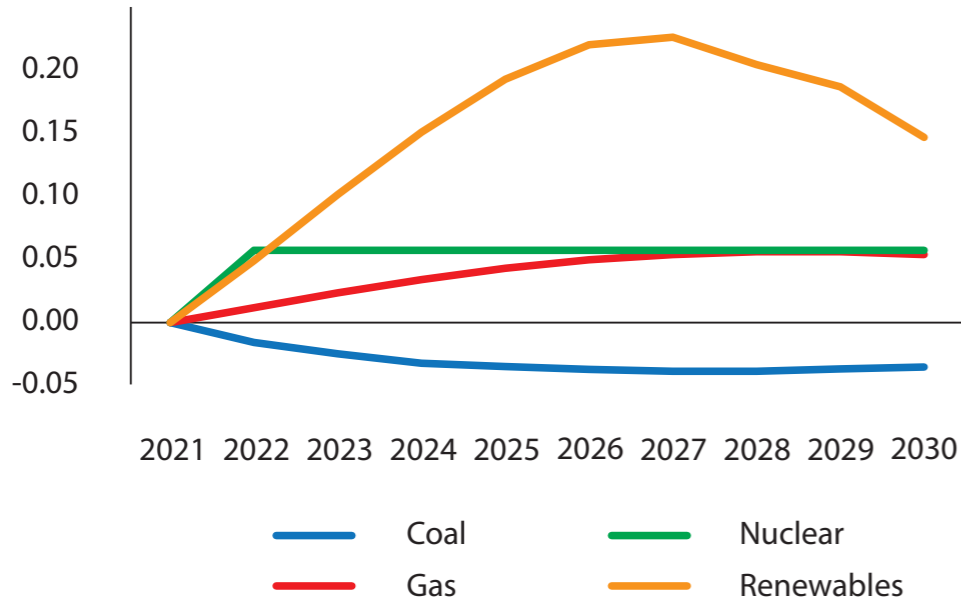
- The share of EVs in newly purchased cars increases by slightly less than 5 percentage points upon introduction of the Clean Vehicle Credit in 2022, and thereafter rises gradually to reach 19% by 2030. The charging station density increases when the Alternative Fuel Refueling Property Credit is adopted, and then rises gradually until it more than doubles by 2030. EV adoption and charger deployment reinforce another in a virtuous circle driven by network externalities, where a denser charging network incentivises EV adoption, while a rising EV share incentivises charger deployment.
- The impact on the macroeconomy is expansionary but very modest in size. Aggregate investment rises, reflecting investments in the electricity and manufacturing sectors. The latter is driven by lower electricity prices as energy and capital are assumed to be complements. This complementarity, combined with the non-distortionary source of funding, provide the key explanation for the mild increase in output of close to 0.25% by the end of the decade.

The remaining aggregates exhibit a milder response, and the impact on inflation and the policy rate are

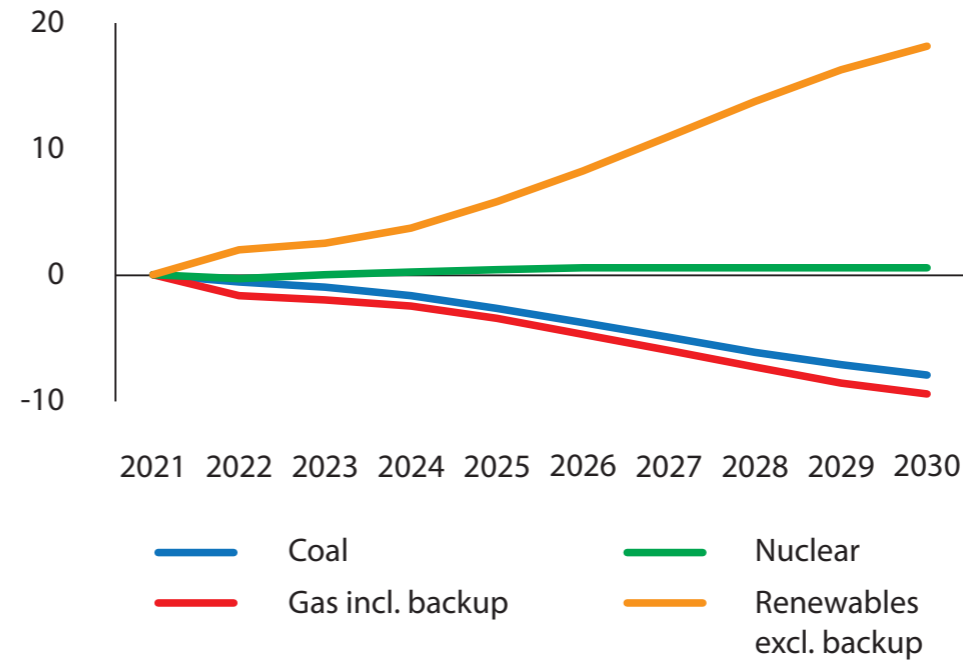
Figure 1. Electricity mix

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Electricity investment
percent of GDP



Electricity mix
percentage point difference



Electricity generation and price
percent difference

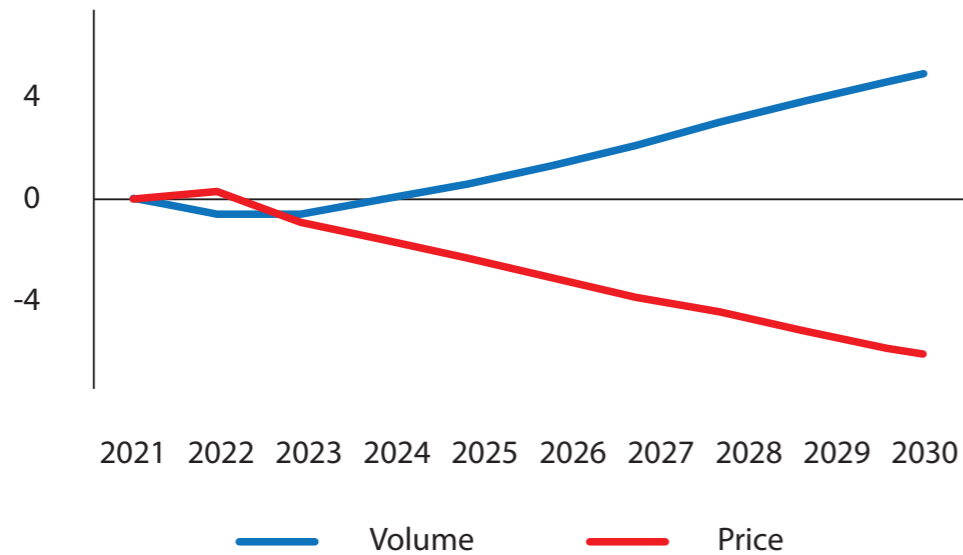


Figure 2. EV share

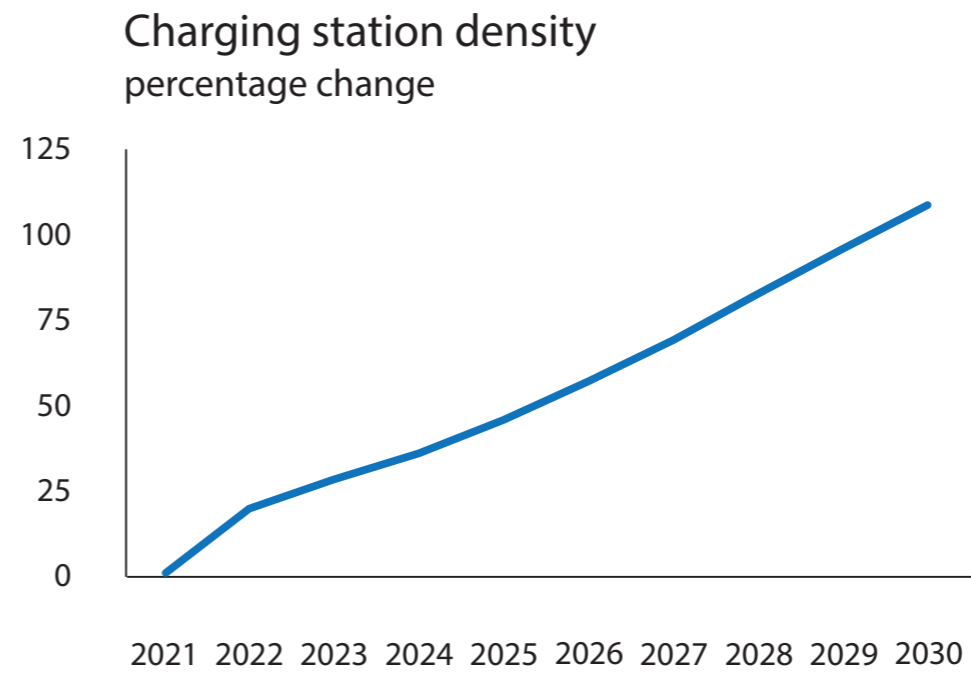
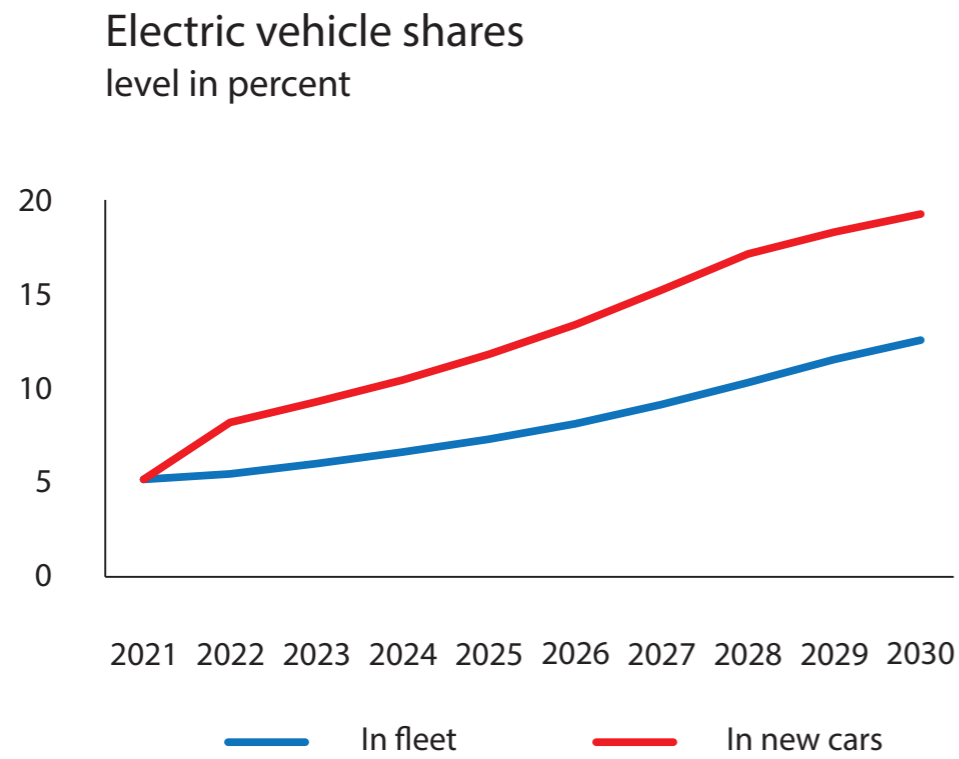
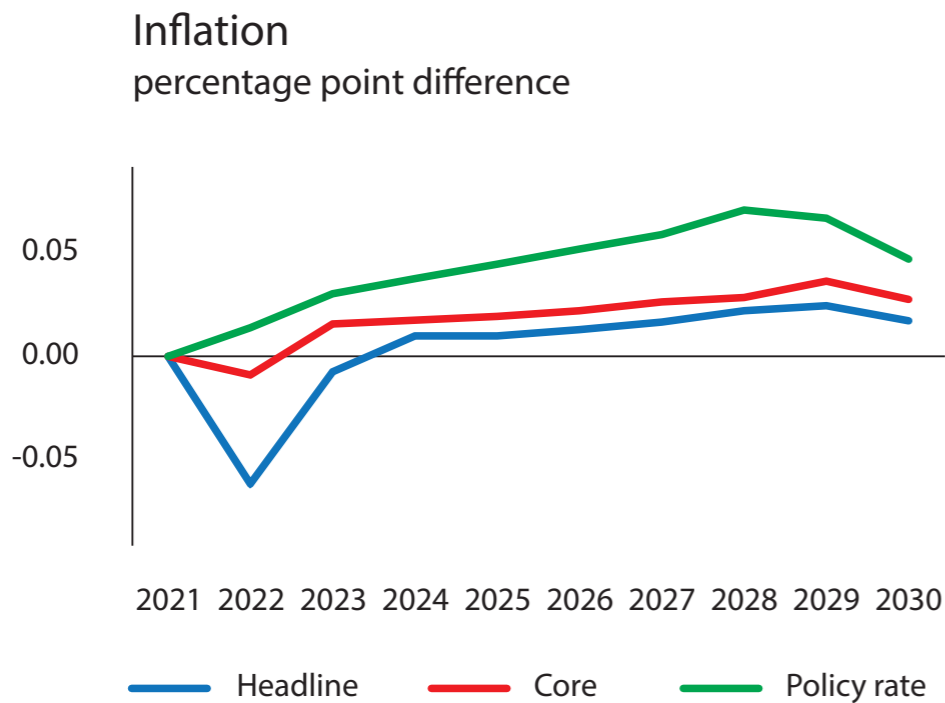
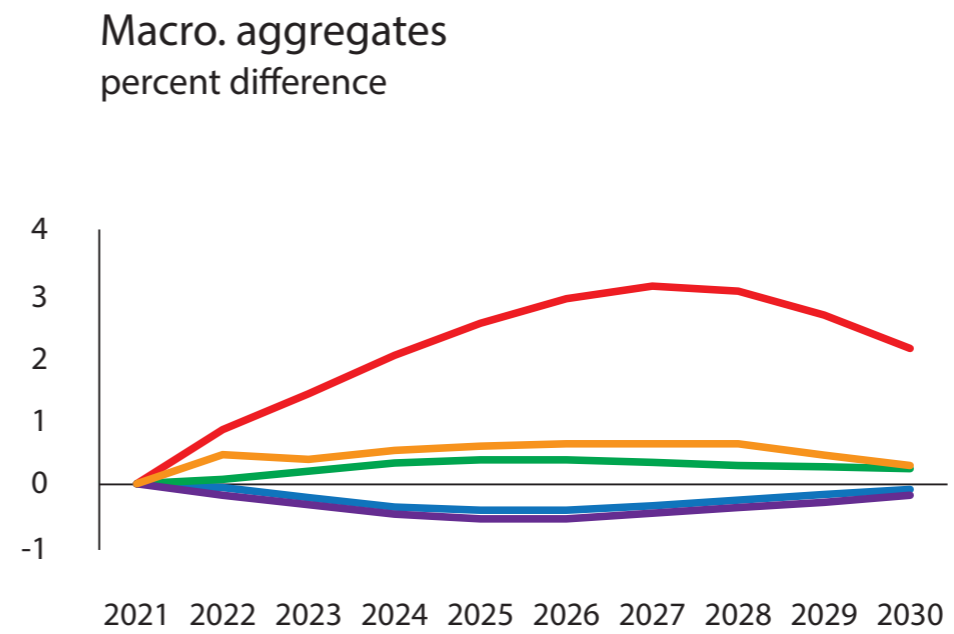
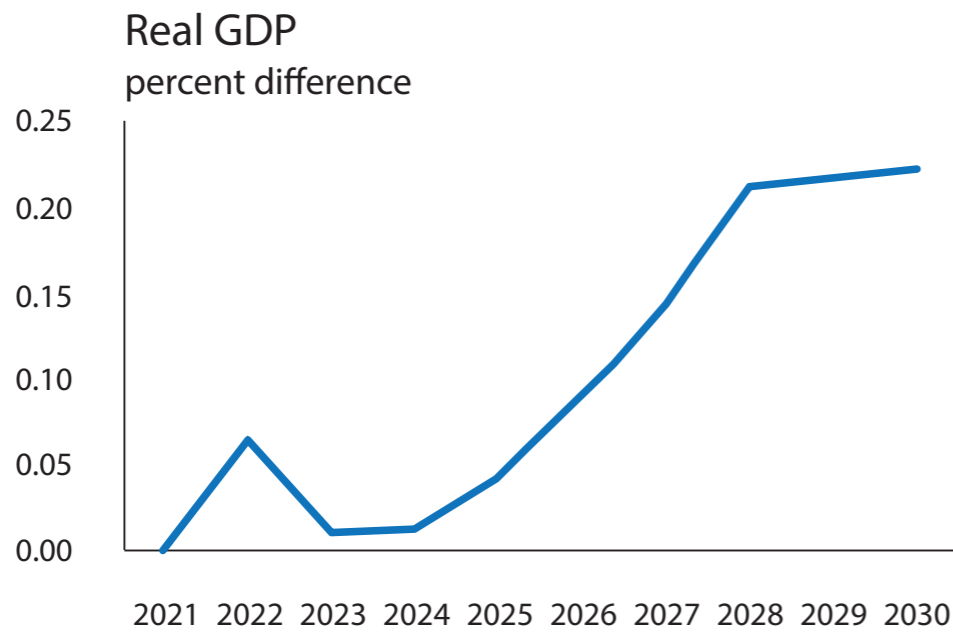


Figure 3. Impact on the macroeconomy



- Priv. cons.
- Inv.
- Gov. cons.
- Exports
- Imports

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negligible. The main explanation for the muted macroeconomic impact is that the electricity sector, where the IRA has the largest effect, is small. While the depicted impact is obtained from a simulation with lump-sum funding of the measures, the results under corporate income financing are virtually identical; the only noticeable difference is that output rises by roughly half as much (given the small magnitude of the adjustment, it is almost identical in absolute terms), owing to the additional tax-induced distortions.

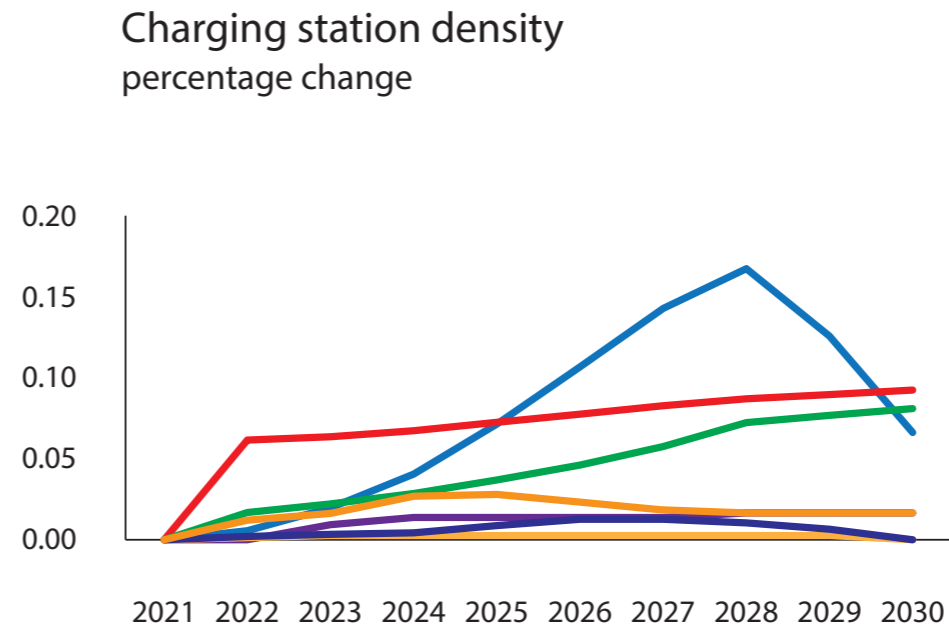
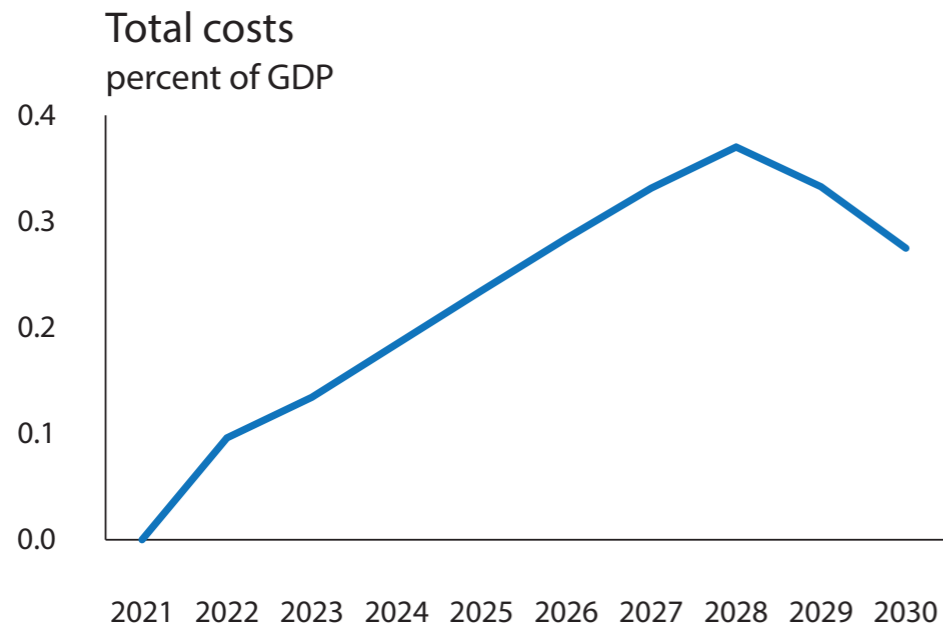
The takeaway is that, even when the funding side is modelled appropriately, climate-related IRA measures have a vanishingly small impact on output and inflation.

- Total fiscal costs are estimated to be in the same order of magnitude as in the 2023 update by the CBO/JCT (CFRB, 2023). They rise over time as subsidy take-up increases (especially for capital goods employed by the renewables utility), and peak at about 0.4% GDP towards the end of the decade, when renewables investment comes down as the capital stock has grown. Applying these cost shares to nominal GDP projections from the October 2023 World Economic Outlook, and cumulating through 2030, yields undiscounted total costs of about \$700 billion.

Together with IRA climate-measures that are not modelled (and whose emission impact is therefore not captured) total costs stand at \$820 billion. This is well above the initial CBO/JCT estimate of about \$350 billion over this period (CBO, 2022), but only moderately above the \$590 billion by 2030 estimated in the 2023 update of JCT scores, and relatively close to some other recent estimates (eg. Fajeau *et al* 2023).

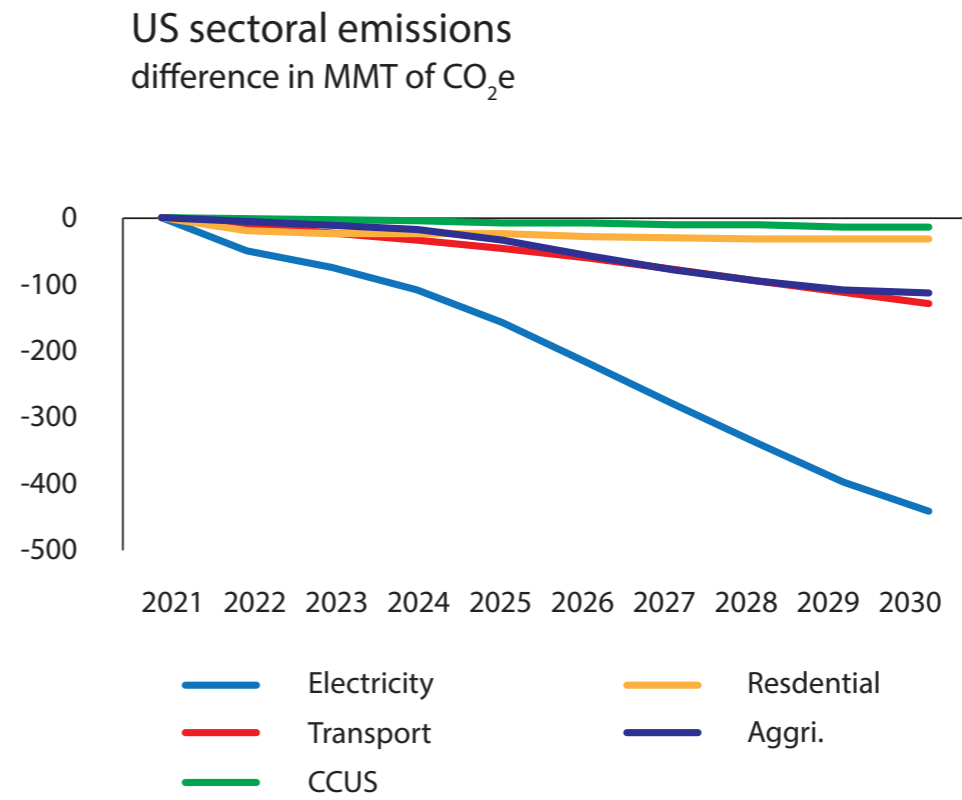
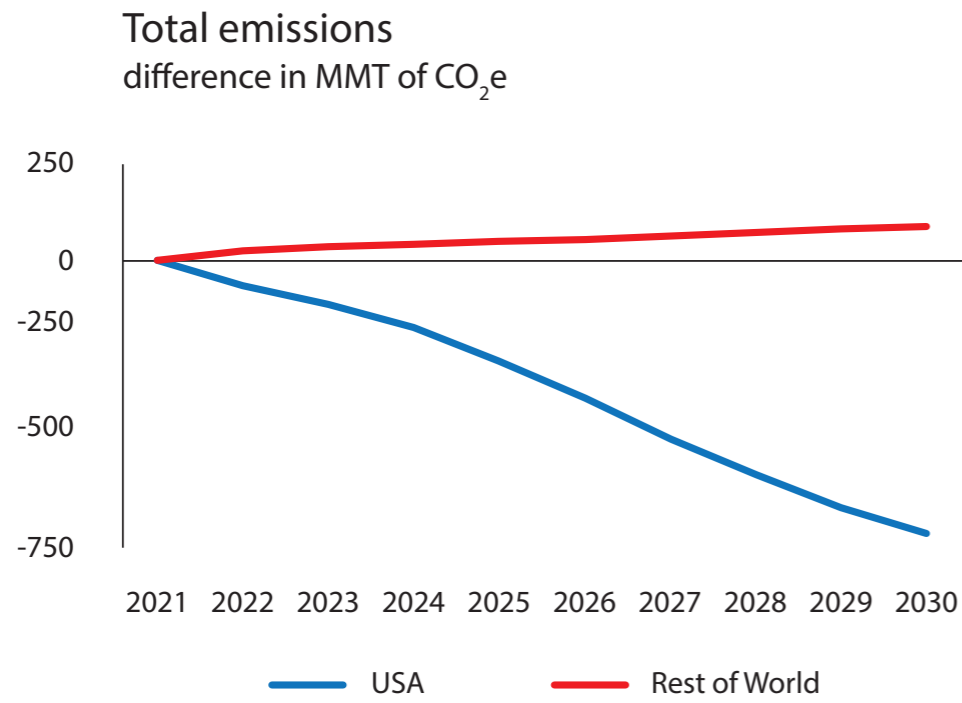
- Total annual emissions decline by about 710 MMT by 2030, mostly driven by electricity generation, followed by the transport sector and agricultural measures. Assuming a no-policy emission reduction of 27% between 2005 and 2030, IRA measures bridges slightly less than half of the way to the mitigation target of

Figure 4. Fiscal costs



- Ren. man. sub.
- Ren. PTC
- EV sub.
- Nuc. sub.
- CCUS
- Resident
- Aggri.

Figure 5. Annual emissions



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a 50-52 percent reduction over this period. Emissions in the rest of the world increase by about 100 MMT. With weaker demand from the US, fossil fuel prices decline on global markets, causing an uptick in foreign consumption.

The social value of the induced emission cuts outweighs their fiscal costs.

While GMMET does not feature warming damages, and therefore does not allow for a cost-benefit analysis, we still provide an indication that the IRA's climate measures carry a social value greater than their fiscal cost. To approximate the measures' desirability, we compare the fiscal costs per ton of GHG reduction from our simulation with a plausible estimate of the social costs of carbon (SCC), \$185 per tonne, taken from Rennert *et al* (2022).

The ratio of cumulative fiscal costs over cumulative emission reductions – a metric for average fiscal abatement costs – stands at about \$400/tCO₂ in 2022, but then declines swiftly to reach the SCC of \$185/tCO₂ in 2029 and settles at \$50/tCO₂ in the long run (the decline results from subsidy-induced investments yielding long-term emission reduction benefits). This suggests that by the end of the decade, the social value of IRA emission reductions greatly outweighs their fiscal cost, making the measures highly desirable from a cost-benefit viewpoint.

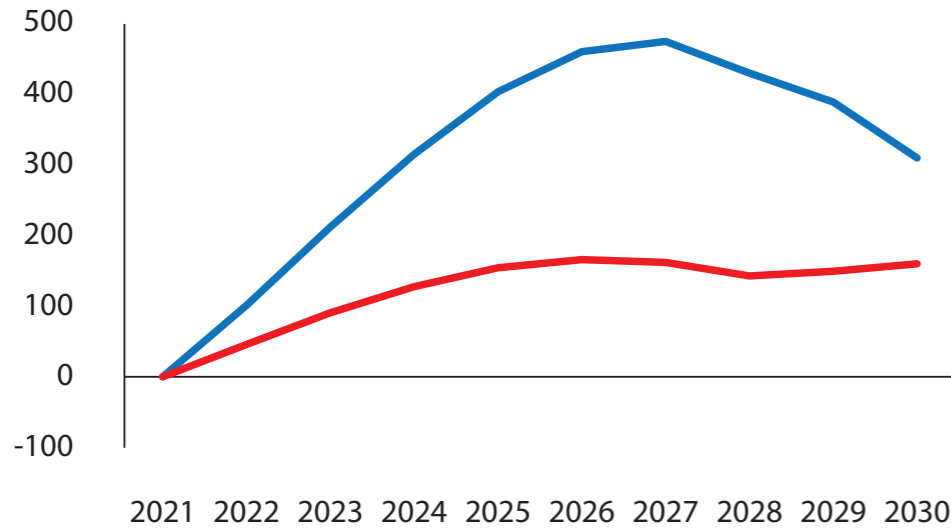
Reducing permitting-related delays in energy investment is crucial to unlock the measures' full potential.

The National Environmental Policy Act of 1970 requires federal permit for infrastructure projects, including for energy, and this permitting process takes around 4.5 years on average (eg. American Clean Power Association 2023). This is captured by an adjustment in electricity investment rigidity.

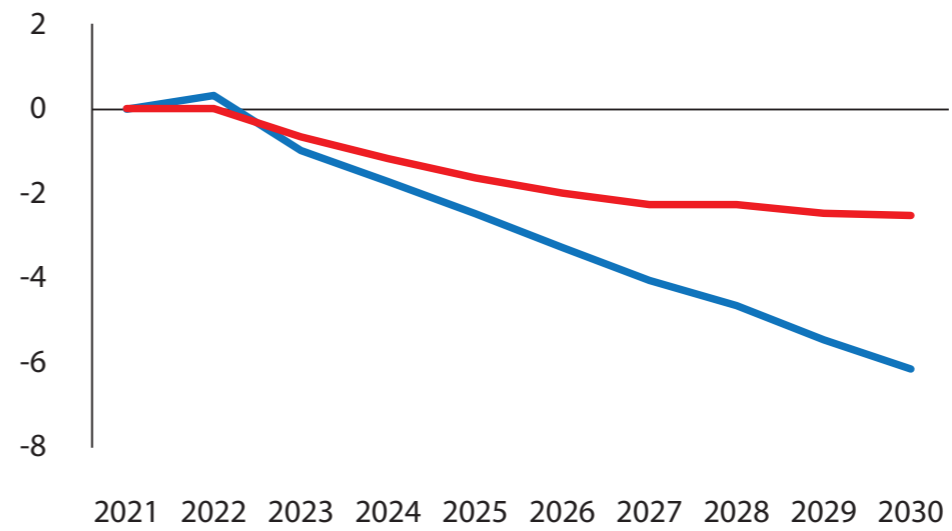
Figure 6. Outcomes

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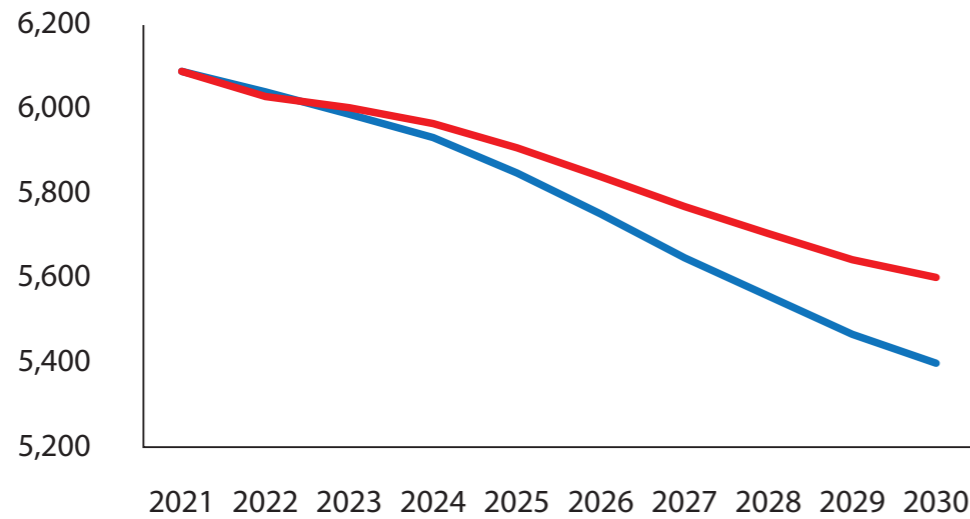
Renewable investment
percent change



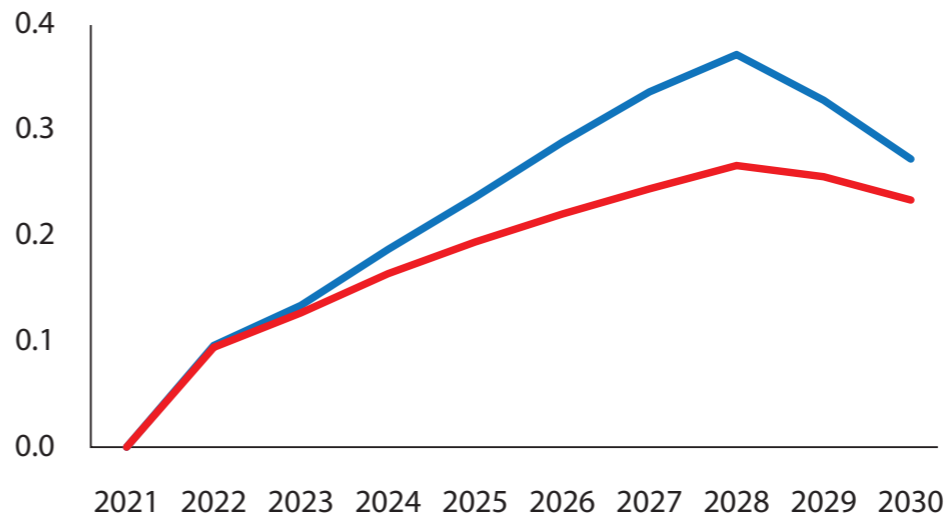
Electricity price
percentage point difference



Total emissions
difference in MMT of CO₂e



IRA total costs
percent of GDP



— Permitting reform in 2023 — No reform

If permitting delays remain in place (ie. if permitting processes are not shortened, in contrast to the previous simulation), the investment surge in renewable generation is attenuated, delaying the addition of new generation capacity and with it the decline in the electricity price.

Emissions drop by only two-thirds of the amount in the absence of permitting delays, and the dampened take-up of renewable subsidies cuts fiscal costs, while the implications for the adjustment of output and inflation are negligible in absolute terms.

Additional policies

In our paper, we also consider two hypothetical measures that could complement the IRA to substantially reduce the mitigation policy implementation gap. The measures target areas of low-cost emission abatement that are not addressed to a significant extent by the IRA:

- A regulatory measure (introduced as a feebate-like tax) that reduces the coal share in the electricity mix by about one percentage point each year. This would tap into room for low-cost abatement resulting from 15% post-IRA coal share in 2030 (lacking targeted measures, IRA only curbs electricity generation from coal via crowding-out).
- A regulatory measure leading oil and gas industries to abate about three-quarters of today's methane emissions. The associated costs are modelled as a decline in the productivity in GMMET's oil and gas mining sectors, calibrated based on abatement costs estimates. Emissions from these industries have recently been estimated to be vast, at nearly 400 MMT of CO₂e, while about 300 MMT could be abated at minimal costs (IEA, 2023).

However, observed emission cuts have been negligible relative to their potential. The effectiveness of IRA provisions aimed at curbing methane emissions is likely to be minor, as legislative details (including reporting thresholds and emission aggregation rules) limit the scope of emissions that are covered (Mahajan *et al* 2022 expect 2030 emissions to decline by only 29 MMT).

When the IRA climate measures are complemented by the two regulatory measures, the drop in coal power plant investment becomes stronger, which amplifies the rise in renewables and gas investment. Regarding electricity generation volume and price, the disinvestment from coal triggered by the regulation works in the opposite direction from IRA subsidies, boosting renewable generation capacity.

Initially, the decline in coal generation dominates, but the IRA-induced surge in capacity more than offsets this from 2026 onwards, leading to a rise in the electricity volume (and a decline in the price) by the end of the decade. In the short term, the regulatory measures slightly reduce output and push up inflation, but the overall picture is virtually unchanged. This is not surprising given that methane abatement comes at minimal cost and that the coal regulation lowers its electricity share very gradually.

However, the complementary regulatory measures greatly reduce emissions, which would drop by a total of about 1,300 MMT by 2030, nearly covering the remaining gap to the emission reduction target. ■

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Rippling out

Biden's tariffs on Chinese electric vehicles will impact Europe. Uri Dadush on how the US approach diverges from that of the EU, which is building a case for countervailing duties under WTO rules

On 14 May, United States President Joe Biden announced new tariffs on China under Section 301 of the Trade Act of 1974 (unfair trade)¹. The additional tariffs – on top of earlier tariffs, including those imposed by President Trump – cover imports from China in several sectors, including semiconductors (tariff rises from 25 percent to 50 percent), solar cells (from 25 percent to 50 percent), electric vehicle batteries (from 7.5 percent to 25 percent) and electric vehicles (EVs; from 25 percent to 100 percent).

Most of these products are already subject to high duties or extensive trade-remedy measures, so the amount of imports from China covered by the new tariffs, including EVs, is small at \$18 billion. In fact, the US imports essentially no EVs from China.

However, it is a sector of great concern to the European Union, which in October 2023 opened an anti-subsidy investigation into Chinese EVs, which may trigger countervailing duties². The US move may therefore have implications for the pending EU decision on countervailing duties on China.

An extraordinary decision, driven by domestic politics

The US decision on Chinese EVs is extraordinary in four respects:

- First, the 100 percent tariff is prohibitive. Ostensibly justified by China's own subsidies, it would imply that half of the cost of Chinese EVs is paid for by government funds, far beyond the range of other estimates (Transport & Environment, 2024).
- Second, unlike previous protection episodes, such as when the US was responding to the threat of Japanese car manufacturers³, there are virtually no Chinese car imports today, and US manufacturers, especially General Motors, already have large footprints in China, whereas they were marginal in Japan. Though GM

sales in China have declined recently, for more than a decade until 2023, China was a profit engine and the company's top sales market⁴.

- Third, the EV tariffs depart from the US emphasis on national security to adopt anti-China measures (unless one believes that EVs are meandering Chinese spies), suggesting that all sectors are now in play.

The tariffs also quash any notion that the US intends to abide by World Trade Organization rules. These two considerations, by themselves, increase policy uncertainty globally and are bound to have a dampening effect on international trade and investment

- Fourth, the measure runs counter to the Biden Administration's green transition goals, which include large tax breaks for EVs, intended to lower the cost for consumers of green alternatives.

The decision on EVs and its timing are strictly political and reflect the extraordinary power of the United Auto Workers union in swing states in the run-up to the US presidential election. The decision is nevertheless a surprise in the light of recent efforts at China-US rapprochement, including exchanges at senior military level, and talks on AI and climate change.

China will be affronted and many China-dependent US firms, which had hoped for tariff reductions, will be disappointed. The decision is, however, consistent with US Trade Representative Katherine Tai's 'Worker Centric' trade policy which claims to place workers' interests ahead of those of firms⁵.

Global impact

The immediate economic impact of the tariffs will be minimal at the macro level, whether on quantities, prices, or exchange rates; \$18 billion is tiny relative to the size of the two economies, and even the \$500 billion that China exported to the US in 2023. Even so, they will hurt some Chinese companies and US importers. The effect on US consumers and prices will be minimal and take the form of lost future opportunities rather than immediate cost, especially in relation to EVs.

China's retaliation (it always retaliates) will be proportionate and limited. If the past is a guide, retaliation will affect mainly some US agricultural exports, which can be sourced easily elsewhere, and US exporters will be compensated for their losses in China.

But even if the Chinese government does not retaliate against US car exports and investments in China (which it continues to court), the Chinese consumer is unlikely to respond well to America's extreme measure on EVs when he or she chooses the next car to buy.

Perhaps more worrying is the further escalation of tensions with China that the tariffs represent – a dangerous trend with many repercussions. It may undermine any Chinese willingness to play a moderating influence on the war in Ukraine.

The tariffs also quash any notion that the US intends to abide by World Trade Organization rules. These two considerations, by themselves, increase policy uncertainty globally and are bound to have a dampening effect on international trade and investment (Al-Thaqeb and Algharabali, 2019).

The US approach diverges from that of the EU, which is building a case for countervailing duties under WTO rules. Although the outcome may also be new tariffs, in the EU there will have been due process based on evidence. But politically, prohibitive US tariffs place enormous pressure on the EU to apply its own.

Even though there is no immediate threat of trade diversion, EU firms such as Stellantis, and unions that lobby for tariffs, will argue that Chinese EV exporters, cut off from the US market, will focus on the huge EU market instead. Though EU firms are still the largest exporters of EVs from China to the EU by a wide margin, the share of Chinese indigenous manufacturers is rising rapidly.

The adverse effect on trade relations of the new tariffs will extend beyond trade under the WTO to encompass trade under regional agreements. This is because US politicians are determined to avoid China-sourced products coming

in through the back door – strict rules of origin are already there to prevent that – and to prevent the products of Chinese-invested companies from entering.

In their view, even if batteries, EVs and semiconductors are manufactured by a Chinese-invested company in a US trading partner, and are entitled to tariff-free treatment under a regional agreement, they should be discouraged.

This also applies to Chinese companies producing in the US⁶. Mexico and Morocco are two examples of US regional trade agreement (RTA) partners that host Chinese manufacturers of batteries and soon of EVs, where frictions are bound to rise.

Even though the EU remains more open to Chinese producers on its territory than the US (eg. BYD in Hungary, CATL in Germany and Hungary), it will face a similar challenge with its RTA partners if, as expected, it applies its own tariffs on Chinese EVs.

These tensions among parties to RTAs, together with China's retaliation against EU and US EV tariffs, is likely to mark this episode as a classic example of protectionist contagion.

A separation of Chinese and US value chains?

The EV value chain is destined to increase greatly in importance to mitigate climate change. From the standpoint of US industrial policy, a big question raised by the prohibitive tariffs on Chinese EVs and by the accompanying resistance against hosting Chinese producers is whether a US EV/battery value chain entirely separate from China is sustainable and realistic.

The US is undoubtedly capable of developing such a chain, but can it do so at reasonable cost and without falling behind in quality and efficiency? On the answer to this question rests the calculation of long-term consumer losses from the tariffs against the counterfactual, the speed of the US green transition, the burden on government finance from the possibility of more subsidies, and even the solvency of US car companies.

Even a cursory examination of China's current competitive advantage in EVs suggests that the answer to the question is no. China produces almost twice as many EVs as the EU and US combined, the share of EVs in new car registrations is rising rapidly, and it has reportedly moved ahead at the combined quality/price/technology frontier⁷.

The latest BYD Model, the Seagull, sells in China at slightly less than \$10,000, and has been highlighted as an illustration of China's competitiveness⁸. Tesla founder Elon Musk has been openly pessimistic about the West's ability to compete with Chinese cars⁹.

China's cost advantage arises from a combination of scale, advanced and lower-cost battery technology, availability of IT and AI expertise, lower labour costs, and intense competition in the Chinese market, with dozens of domestic and foreign producers active.

Central and provincial government subsidies still play a role, and their extent is what the EU investigation will evaluate. The only available and presumably reliable numbers on subsidies received are those declared by Chinese publicly traded companies such as BYD, and are small relative to turnover or value added¹⁰.

China's EV exports increased by over 60 percent in 2023 to reach 1.2 million units, directed mainly at Europe, Mexico and several emerging markets in Asia. Since the biggest Chinese EV manufacturers and their battery suppliers

have developed distinctive assets (brand, technology and design), they are now able to set up manufacturing and distribution channels overseas, in markets including Thailand, Indonesia, Australia, Morocco, Mexico and Hungary. Chinese EV manufacturers are also rapidly gaining market share in China, where competitors are increasingly struggling.

As EVs become even more established worldwide, the scale advantage of the most successful Chinese producers over US-based producers will only increase, as will their capacity to target individual markets with customized products on a common platform.

Finally, it is important to note that the largest US car companies, Ford and General Motors, are not in the best shape to compete in the intensifying EV market. Standard and Poor's rates Ford's and GM's long-term debt at BB+ and BBB respectively, just below and just above investment-grade.

The market capitalisations of BYD and Xiaomi, the two largest Chinese EV producers, are \$86 billion and \$62 billion respectively, while those of GM and Ford are both around \$50 billion.

The EU's strategy

Should the EU adjust its policies in the light of the new Biden tariffs, and if so, how? Note that since there will be no surge of Chinese EVs diverted from the US market, it is not a given that the EU needs to alter its course.

The EU's trade strategy on EVs must pursue six main objectives: 1) a fair deal for EU manufacturers insofar as they are affected by China's subsidies in excess of subsidies they receive at home, and one that is in line with WTO rules; 2) stand up for the interests of EU car exporters and manufacturers in China, which are also recipients of various subsidies; 3) the long-run health and competitiveness of the EU car industry; 4) protect the interests of consumers,

especially those with low incomes, who would benefit greatly from cheaper cars; 5) ensure the speed of the green transition; 6) maintain a cooperative and constructive relationship with China for both economic and geopolitical reasons. To progress towards all six objectives simultaneously is a challenge, but can be done:

- The EU's stated objective should be to arrive at competitive neutrality in the EV sector, enhancing and not preventing fair competition that will promote productivity growth and innovation.

Accordingly, the countervailing duty margin on Chinese EVs should be computed objectively and realistically; it should be defined and documented in a way that is entirely robust to legal challenge at the WTO.

It should also take account of subsidies at home to reduce the EU's vulnerability to a Chinese counter: if the net subsidy is found to be zero, the countervailing duty margin should be zero, and the countervailing duty, if any, should be set at the minimum level consistent with the findings.

The duty should be accompanied by a proposal to set up a China-EU working party with a mission to identify and monitor EV subsidies, and to reduce them with a view to eliminating the duty margin over a defined period.

- To ensure the long-term vibrancy and competitiveness of its car industry, to safeguard the interests of its consumers, to sustain the green transition, and to maintain good relations with China, the EU should adopt an open-door policy on Chinese inward investment in its EV and battery sectors¹¹, while insisting on continued fair treatment of its firms that have already established footholds in the Chinese market. The EU may need to prepare, ultimately, to confront US restrictions on China-invested cars produced in Europe, such as Geely-owned Volvos.

- It is possible that, once embarked on this course, the EU may nevertheless face an excessively rapid penetration of imported Chinese EVs sometime in the future. Should that happen, the EU may resort to a WTO-compatible safeguard measure.

The advantage of the safeguard course is that the increase in tariffs would be time bound (three years). Safeguard tariffs must, however, apply to all imports, not only those from China. ■

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Endnotes

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Heat stress at work

There are significant consequences of climate change for public health. Aude Cefaliello argues that intense heat is not just a hot topic but a political emergency

Climate change is creating new risks to which workers are exposed in unequal fashion. The first sectors to feel the impact of extreme temperatures, such as agriculture or construction, are also those with extremely precarious workforces. This impact will be complex, adversely affecting physical and mental health in both direct and indirect ways.

Applying the general principles of prevention to heat stress is possible but it will require a thorough overhaul of how work is organised and the adoption of European legislation that lays down a minimum protective threshold for all workers in Europe.

In 2022, 62,000 deaths in Europe were attributed to the summer heat. This figure, likely an underestimate, is only one among the many examples illustrating a growing challenge that we must address, namely the significant consequences of climate change for public health and the world of work.

Year after year, we have 'record temperatures', pushing us to the realisation that the 'historic' heatwaves of 20 years past have now become the new normal. The European Environment Agency forecasts a steady rise in average temperatures as well as increasingly frequent and intense heatwaves.

Each summer, workers die because of the intense heat, but they are also at risk from other aspects of climate change and ever more extreme weather conditions (flooding, storms, wildfires, etc.). The time for 'crisis management' is over; we must rethink how work is organised to ensure that workers do not lose their lives while they earn their living.

The change in our means of production and organisation is all the more important and urgent because climate change will not impact workers equally. If we do nothing, then the working conditions in sectors where workers are

already exposed to physical danger, such as agriculture, construction or the emergency services, will deteriorate further.

According to Eurofound, 23% of workers in the European Union are exposed to high temperatures for at least a quarter of their working hours; that proportion climbs to 36% in agriculture and industry, and to 38% in construction. These sectors are also known for having precarious working conditions and recruiting more vulnerable workers (temporary work and employment of foreign nationals).

In the absence of specific legislation on heat stress, there is no guarantee that employers will abide by the recommendations

If (legal) safeguards are not sufficiently robust, these workers are likely to be the next victims of the heatwaves which, in the words of Eric Klinenberg, are 'silent, invisible killers of silent, invisible people'.

The multi-faceted impact of global warming on workers' health

Climate change will affect all workers in all sectors in all countries, but its impact will not necessarily be the same or have the same intensity across the board. First, there are key differences in people's working environments.

The European Agency for Safety and Health at Work (EU-OSHA) stresses that outside workers are most vulnerable to climate change, although its repercussions will extend to all sectors, in particular the emergency services, water supply, energy, transport and construction. The frequency and nature of climate risks will also not be the same for everyone.

Outside workers (including those working in construction, agriculture or maintenance of public spaces) are most exposed to extreme climate conditions (intense heat, but also UV radiation), whereas those working in the emergency, rescue and cleaning/maintenance services often find themselves in high-risk situations because of climate crises such as floods, landslides, storms, droughts and wildfires. Here, a lack of structural resources could aggravate the situation given that climate emergencies will increase the need for this kind of assistance.

When it comes to heat, indoor workers whose jobs require physical effort (eg. in warehouses or on production lines) will also be affected. Rises in temperature and humidity increase the risks involved in these kinds of jobs. The impact on health can be immediate, ranging from cramp and oedema to loss of consciousness and even death.

However, studies also point to the long-term risk of exposure to intense heat and its potential to cause heart, kidney or liver damage. The negative consequences of heat exposure may also have more long-term effects in the form of chronic tiredness, sleep disturbances and temporary infertility (especially for men).

Where workers' mental health is concerned, the INRS (the French National Scientific Research Institute) and ANSES (the French Agency for Food, Environmental and Occupational Health and Safety) note the greater psychosocial risks associated with global warming. The mere fact that heat is tiring and poses an additional cognitive strain (that can cause irritability or even violence) is a risk to workers (tension and conflict) when interacting with colleagues and non-colleagues alike.

Cognitive fatigue also increases the risk of accidents at work, especially because it reduces concentration and can lead to woolly decision-making in the work environment (posing extreme danger when driving or operating machinery).

As EU-OSHA has stressed in its guidance on heat stress, published in 2023, heat has not only direct (short-term and long-term) but also indirect effects on workers, through the exacerbation of existing risks such as air pollution, self-heating materials, the occurrence of biological agents, and exposure to chemical substances¹.

Heat can also affect the application of certain OSH prevention measures, most notably the wearing of PPE, potentially even turning it into a risk itself.

OSH principles applied to heat stress prevention

Incorporating climate hazards into occupational risk assessments is emerging as a key issue in workers' safety in Europe. The need to adopt sector-appropriate preventive measures, which acknowledge that the impact of climate conditions depends on the type of work concerned, underlines the importance social partner involvement in this issue.

Where heat-related risks are concerned, EU-OSHA's recent guide shows that it is perfectly possible to implement a collective system of technical and organisational preventive measures within an individual organisation.

The principles already set down in the 1989 Framework Directive (Directive 89/391/EEC) on health and safety at work can also be applied to heat stress, for example the obligation of the employer to evaluate all workplace risks and to adopt (first collective then individual) preventive measures following an information and consultation process with the workers and/or their representatives.

Employers should evaluate the risks created by climate change, taking various factors into account, including a worker's protective clothing, age and health. For heat exposure, biological differences should also be taken into account, given that some studies note that women may be less heat-tolerant than men.

According to EU-OSHA, the application of the existing obligation to develop a comprehensive, consistent policy to prevent heat stress should lead to the implementation of heat action plans, an early warning system and the implementation of safe working practices.

Risk assessment should be followed by the introduction of a hierarchy of controls, perhaps including emergency procedures and a 'buddy' system. Working in isolation poses a considerable risk in itself given that it is very difficult for someone to assess their own heat tolerance and that, if an incident occurs, assistance from a third party is vital for administering first aid and raising the alarm with the emergency medical services.

Additionally, the information that workers should receive on the dangers of heat stress should include descriptions to help them recognise the symptoms of heat-related injuries and illnesses, measures to reduce the risk,

acclimatisation procedures and procedures to follow in the event of heat-related illness. However, in the absence of specific legislation on heat stress, there is no guarantee that employers will abide by the recommendations.

A legislative void

The other issue is that the measures recommended by EU-OSHA require the option for workers to adjust their time schedules and a needs-based reduction in labour intensity, regardless of economic pressures, which may require a larger workforce.

Currently, and especially in sectors with a vulnerable workforce, the reality of power differentials is obviously unlikely to lead workers to behave in a way that prioritises their health.

Consequently, in France, the sociologist Annie Thébaud-Mony, a specialist in occupational health, is advocating express reference to heat-related risks in the Labour Code, including changes to working schedules during periods of high temperatures. Nonetheless, no express provisions have yet been adopted, despite evidence of many heat-related health risks.

Despite this, some countries, such as Spain, have taken measures to reorganise work schedules during intense heat. In Greece, the guards working in the Acropolis have secured an adjustment to their time schedules that avoids their working in the afternoon during heatwaves. This flexibility is vital to protect workers' health but should apply across the board so that all sectors can benefit.

Legislation varies considerably from one country to another in Europe. In Spain, measures based on weather alerts are in place to prohibit outdoor working in periods of extreme heat. In Portugal, the temperature of a workplace must by law be between 18 and 22 degrees Celsius and have a specific humidity management system.

In the Belgian 'law on thermal environmental factors', targeted at both heat and cold, action is mandatory when the legal occupational exposure temperature limit is exceeded (according to the Wet Bulb Globe Temperature index, which strictly speaking considers not just temperature but also other elements like humidity and wind).

Although there are recommendations in Germany, there is no legal occupational exposure limit value on heat stress. The problem is that today's Berlin is tomorrow's Madrid. Legislation needs to be harmonised to provide a minimum protective threshold for all workers in Europe.

In this 'legislative void', national case law has begun to provide some answers regarding ad hoc protection for workers. In 2015 in France, roofers exercised their 'right to withdraw' in the event of serious, imminent heat-related danger and stopped working during a heatwave.

In Italy, a 2015 ruling found that where working conditions were unsafe or temperatures were 'prohibitive', workers have the right to stop working with no loss of earnings or danger of dismissal.

True worker protection requires a paradigm shift

Today, we face a political emergency. From a European legislative standpoint, there is a genuine difference between indoor jobs and outside jobs, with outdoor workers excluded from the protective scope of some directives.

The sectors most affected are also those where precariousness is highest; we are once again in danger of sweeping the risks these workers face under the carpet. We must resist the discourse and fatalistic narrative that says, in effect, that nothing can be done, that it's an 'occupational hazard', or all part of the job.

The fact that conditions will become increasingly extreme is unfortunately a reality for the coming years, but we have a choice as to how we are going to respond collectively and how we decide to protect (or let down) the workers concerned.

But ensuring that workers are genuinely protected means revising economic needs and objectives downwards. We must restore human beings to the heart of how work is organised. The current neoliberal momentum means that we cannot maintain production and also ensure workers' health.

In other words, workplaces must see either an increase in available resources or a reduction in the pressures of work. All the recommendations point in one direction: the best preventive measures require workers to be able to regulate their own hours and tasks so that they can alternate rest periods with work.

This means giving some autonomy back to workers; but that autonomy will only be genuine if it is exercised in an environment where economic pressures and power are controlled and attenuated.

It would be naïve to assume that workers will behave in a way that prioritises their own health and their colleagues' if doing so puts their jobs at risk. In view of climate change, we need to adopt measures that will enable workers to be heard, empowered, recognised and protected. ■

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