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THE FUTURE OF IN A NET ZERO WORLD TRADE



A strategic foresight
analysis to 2040

Conducted by Foresight Intelligence
for the European Climate Foundation

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“Scenarios are thought experiments about uncertain futures. Although they cannot predict what will happen, they are useful tools to think ahead and anticipate what could happen. Thus, scenarios are a necessary foundation to prepare for and shape the future.”

Dr. Johannes Gabriel
Founder & Managing Director of Foresight Intelligence

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Foreword



Prof Laurence Tubiana, CEO of the European Climate Foundation



I am delighted to introduce this report which sheds much-needed light on the importance of trade in the fight against climate change.

There is no doubt that trade is essential to establishing green economies and delivering net zero.

Russia's war on Ukraine has highlighted the extent of countries' interdependence in food and energy supplies, and the severe consequences that arise when trade between them is disrupted – not least in terms of the soaring cost of living.

But that mutual reliance extends to many other sectors too – and while greater self-sufficiency and circularity measures have a role to play, these risks cannot be entirely mitigated.

Looking to the not-so-distant future, we expect exponential growth in demand for the critical raw materials associated with delivering batteries, electric vehicles and many other aspects of net zero economies.

This will see many countries rely heavily on each other for materials and know-how – perhaps as never before. And this report makes abundantly clear that this will require countries to forge new kinds of trading relationships. For

instance, countries trading with those in the Global South will need to finally recognise long-standing demands for greater value-retention.

Recognising the huge challenges of the present and facing up to what the future likely holds is deeply uncomfortable but absolutely necessary if we are to avert the worst-case scenarios and adapt to the rest.

This report does exactly that. It sets out three sobering but plausible scenarios for trade in 2040. Between them, they outline not only the severe potential disruptions to trade in everything from food to critical raw materials, but also the growing geopolitical headwinds that challenge our ability to recognise our common needs and cooperate.

Most importantly, it sets out a positive, practical vision of how to future-proof our current trade agenda and face up to these unprecedented challenges.

As a final note, I would like to thank our partners at Foresight Intelligence for helping develop the scenarios and vision set out in this report and the many and varied experts who contributed their time and knowledge in the numerous workshops that were at the heart of this project.

Executive Summary

The trade and climate nexus

Over the course of the past year, the European Climate Foundation (ECF) conducted a comprehensive strategic foresight process exploring what trade could and should look like in a world that seeks to reach net zero greenhouse gas emissions by mid-century to curb climate change. This was motivated by the lack of a clear vision for the role of trade in climate action.

International trade has been an essential element of global economic expansion and remains a critical precondition for many commercial activities worldwide. It is by no means dissociated from efforts to address the climate emergency. International transport of traded goods emits greenhouse gases; trade facilitates the production and consumption of carbon-intensive products, while also allowing more countries to access low-carbon technologies. Trade rules were originally meant to facilitate trade, at a time when

climate change was not a public policy priority, and they now need to evolve. Equally, the effects of climate change on trade – which are already being felt today – are likely to escalate. Aligning trade policy with the climate emergency is becoming increasingly urgent.

In partnership with the consultancy Foresight Intelligence, this project explored alternative futures for trade in a changing climate. Most importantly, it proposes a vision for an international trade regime aligned with the global climate goal of the Paris Agreement, reaffirmed by the Glasgow Climate Pact as the imperative to reach net zero emissions by mid-century. The results of the foresight process suggest how Europe could play its part in reaching this vision, while recognising the need for robust international partnerships, particularly with developing countries.¹

¹ The strategic options are aimed at contributing to a sustainable future for everyone and we invite other regions' policymakers and experts to consider them, as well.

How the project unfolded (in 30 seconds)

This work builds on a dozen workshops that brought together a total of more than 80 experts from diverse disciplines to engage in strategic foresight. After having identified key uncertainties with high impact on the future of trade and climate, participants elaborated plausible, **explorative scenarios** and their underlying policy narratives to 2040. A normative track then developed a **vision** to align trade and climate, and a set of robust **strategic options** to support it.

Strategic foresight was adopted as a methodology that provides a robust, rigorous framework for imagining a

highly uncertain future by telling us where to look and allowing to plan for and shape the path ahead. This process has entailed countless hours of debate, deliberation, voting and validation among group members, resulting in only the scenarios and options that have passed the crucible. Accordingly, the ideal vision presented, along with strategic options, offer one trajectory to mutually reinforce the priorities of the trade and climate communities. Together with the three alternative scenarios, we hope you will find ample food for thought on the possibilities as we seek to navigate towards a net zero world.



A vision for a climate-aligned trade regime

The vision describes a world committed to tackling the climate emergency cooperatively. Many countries have developed new eco-social contracts by including all sectors of society in participatory deliberations on economic and ecological development models. Support for multilateralism and easing of geopolitical tensions have unlocked fundamental reforms to align three distinct areas with climate goals in: taxes, public goods, and trade.

International tax agreements on minimum corporate and capital gains taxes dry out tax havens. New taxes on the emissions of luxury consumption, such as yachts and jets, on shipping and aviation discourage emissions and bolster public funds for green transitions. Development banks receive expanded funding and mandates to become drivers of decarbonisation. They implement a 1.5°C compatibility criterion for all funded projects, which they monitor rigorously.

Countries agree on emissions accounting methodologies, collect and share data on green technologies and their inputs. They also become more active in key transformation sectors, establishing “people’s public-private-partnerships” to guarantee human rights, social and ecological standards along supply chains. Producer responsibility is extended to achieve greater circularity, and many businesses and local governments streamline their sustainability efforts, which are audited by independent third parties.

International trade rules are also brought in line with climate goals. Recognising the need to be able to distinguish products based on their carbon content, WTO members abstain from challenging one another over measures that encourage lower emissions in production. Bolstered by agreement on common methods of emissions accounting, this permits a form of positive, carbon-based discrimination between “like” products, without which a ton of steel, for instance, could not be distinguished from another on the basis of the emissions of their respective production methods.² The WTO facilitates accelerated technology and innovation transfer; it upends the dichotomy of developed and developing countries, to specify their rights and obligations;³ and members revise the Agreement on Subsidies and Countervailing Measures to minimise frictions on climate-related subsidies. Under its auspices, 85 countries ratify a “Green Free Trade Agreement”. Outside of the WTO, international investment agreements are reformed to scrap protections for fossil fuel projects and energy and mining companies are barred from litigation over “stranded assets”.

² Measures necessary to mitigate the effects of climate change are added to the exceptions to the General Exceptions in Article XX of the GATT.

³ For example, through a renegotiation of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) and creating avenues for compulsory licensing.



Strategic options

Taking account of the vision developed by the normative track, as well as the challenges identified in the explorative scenarios, the following ideas for strategic action are meant to help European actors to start shaping developments towards the vision.⁴

The first three initiatives have been honed by the group as the most easily deployed options on a short timeframe, with the best prospects to contribute to the vision developed by the normative track, while the remainder have been shown to be robust against the widest range of uncertainties in the explorative scenarios.

1. Motivated by civil society pressure, the EU ensures that its trade agreements contribute to achieving its Nationally Determined Contributions (NDC) as well as its trading partners' throughout their implementation. An expanded sustainability assessment and continuous review process ensure alignment of trade agreements with NDCs.
2. This option advocates for European stakeholders to coalesce around a **consensus carbon measuring methodology**. Eurostat could open a statistical observatory to monitor the flow of carbon between EU member states trading partners. On this basis, the EU could advocate for global agreement on measuring embedded carbon as precondition for functioning carbon trade.
3. The EU Carbon Border Adjustment Mechanism (CBAM) has generated much debate, including in WTO circles. To ensure the mechanism's efficiency and its WTO compatibility of the CBAM, and address questions arising from its implementation, the European Commission and trading partners institutionalise a **continuous discussion and feedback process** on issues arising during implementation, which later **informs the CBAM's review process**.
4. To secure sustainable and resilient supply chains, the EU could reinvent and reframe its trade relations into **Trade+ (Strategic) Alliances**. By focusing on local value retention, it could become an attractive alternative to more extractive investments and contribute to green production capacities and green transitions in partner countries.

⁴ The foresight methodology requires a focus on a discrete actor, whereas the global nature of the challenge and agency of governments and stakeholders outside of Europe is fully recognised.



5. For technology inputs in particular, the EU could focus on long-term relationships with critical raw materials (CRM) exporting countries. **CRM-with-(mutual)-benefits** agreements would focus on environmental and social sustainability, local industry development and value retention, e.g., via technology licensing mechanisms in exchange for stable and affordable CRM supply.
6. To create faster and more equitable diffusion of mitigation and adaptation know-how and technology, the EU could propose establishing **Cooperatives for International Climate Action**. These would include support for smart climate policy making (in mitigation and adaptation), technology transfer and investment, in addition to existing mechanisms such as public procurement, contracts for difference (beyond the energy sector), or carbon trading under Article 6 of the Paris Agreement.
7. To improve maritime trade infrastructure's resilience to weather- and climate-related damages, the EU could launch a **Climate Resilience & Adaptation Fund for Trade Infrastructure**, relying on its financial institutions and via public private partnerships. The fund would offer (1) risk assessments and anticipatory climate vulnerability mappings; (2) loans for improving the climate resilience of infrastructure; and (3) disaster relief grants for sustainable reconstruction.

What the future may hold for trade and climate: explorative scenarios



The below three scenarios were developed to explore a future for trade that is both very unpredictable and unlikely to be a linear continuation of the past, as recent geopolitical events made clear. Each is a plausible, even if unlikely scenario for the evolution of trade and climate to 2040. Somewhere between them can be found what will likely play out over the next 17 years or so.

Anticipating the challenges which may lay ahead as geopolitical headwinds combine with worsening climate impacts is difficult but essential work. By doing so the scenarios help us to transcend the many short-term considerations which weigh down policymaking, and provide some agency in averting worst-case scenarios and adapting to the challenges that will inevitably remain. They were also used to stress-test the above strategic options.

Blue scenario

Politics, politics, politics! National interests fragment trade

In 2040, trade is contentious, regional, and expensive. The world is divided into fuzzy Northwestern and Southeastern trade spheres, imposing diverging standards and redirecting supply chains. The WTO remains ineffective as disputes rise. Ambitious standards on carbon emissions, diffusion of green technologies, and shorter supply chains have reduced trade's carbon-intensity. Some countries in the Global South have monetised natural carbon sinks and ecosystem services, adding to their CRM-fuelled growth. National adaptation efforts are partly successful, but failure to cooperate diminishes their overall effect. Driven by supply shocks and "green populism", Europe becomes an island of sufficiency. As material consumption grows elsewhere, the world heads towards 2.7°C warming by 2100.

Red scenario

From competition to cooperation to disintegration. The water trigger

In 2040, trade is highly restricted, deglobalised and disrupted by extreme climatic and weather events. A broken hydrological cycle has brought global water scarcity, disrupting food supplies, energy production, trade and transport infrastructure. Agricultural products and (commodified) water are the only freely traded goods in a contested geopolitical context. The WTO remains paralysed and China has turned inward. Countries and businesses alike regionalise supply chains. Adaptation efforts are partially successful, but the diffusion of green technologies remains highly insufficient. The world is heading towards 4.4°C warming by 2100 and turns to geo-engineering as the last attempt to halt global climate change.

Yellow scenario

Coming together, but missing the Paris Goals

In 2040, trade is booming and mostly decarbonised – net zero goods and services are default options. Green energy, inputs, products, and services constitute a growing share of global trade. Global CRM value chains link Africa and South America to the rest of the world via ASEAN processing and refinement facilities. Supply chains suffer from occasional disruptions, but are diversified and resilient. Sino-American rapprochement unlocks WTO reform that aligns trade and climate goals. Liberalisation efforts are soon joined by many post-default countries in the Global South, culminating in the 2035 United Nations Transformation Summit. It overcomes key challenges of climate cooperation, but comes too late to address deteriorating climatic conditions, environmental degradation and increasingly frequent extreme weather events. While economic activity and trade are decarbonising rapidly, material consumption continues to grow. This blocks the path towards limiting global warming to 2°C by 2100.

What's next?

The ECF's commitment to shed a light on the future of trade and climate does not end with this report. By presenting the vision, strategic options, and future uncertainties articulated by the expert group convened through this process, our ultimate goal is to have the engagement of readers, policymakers and stakeholders, in the EU and beyond, who will help shape the future of trade in a net zero world.

Your reactions, ideas, and inspirations arising from this report - in any form - are welcome through the contact page of the Future of Trade website, where we will periodically post updated information about events and complementary research as part of this initiative.

www.netzerotrade.org



1.0 Introduction



1.1

The “Future of Trade” project

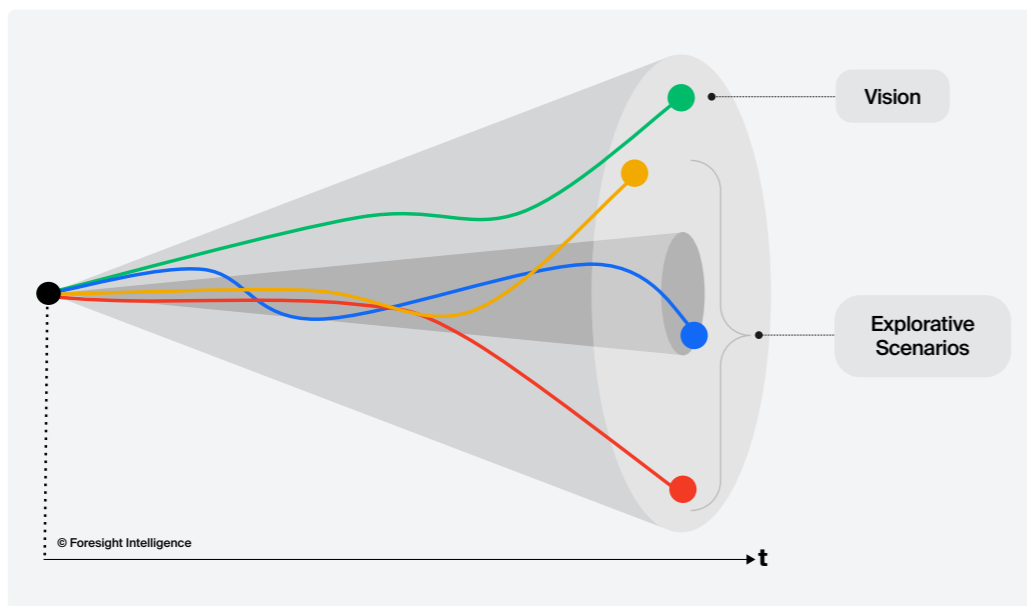
Despite recent acknowledgments of the interconnectedness of climate change and trade,⁵ policy communities concerned with these issues often operate in silos. There is no clear picture of how developments in either realm affect the other, let alone a vision for how trade needs to be adapted to contribute to solving the climate crisis, while adjusting to its effects.

The European Climate Foundation brought together a group of experts from different disciplines in the first half of 2023 to investigate possible futures of global trade in the context of decarbonisation efforts. The project aims to improve communication between communities, help address these issues and provide actionable policy options to start shaping the future of trade in a “net zero” world.⁶

It used a comprehensive set of tailor-made strategic foresight methods enabling the group to systematically conceptualise and analyse three alternative scenarios to explore what trade and climate could plausibly look like in the future, and one vision to describe a desirable future for trade in a “net zero” world (see figure 1).

This report summarises the project’s results. It aims to contribute imaginable, alternative, contrasted futures of trade in the face of climate change, a topic that regularly arises in policy discussions, yet lacks a vision to anchor it. The presented scenarios and policy options are meant to inspire debate and shape action today that leads to a sustainable tomorrow. Accordingly, these thought experiments shed light on critical uncertainties and challenges ahead, and propose practical steps towards coping with them.

Figure 1: The future cone with schematic illustration of three explorative scenarios and a vision⁷



⁵ See for example [Foreign Affairs July/August 2023](#).

⁶ “Net zero means cutting greenhouse gas emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere, by oceans and forests for instance.” ([UN, 2023](#))

⁷ Illustration by Foresight Intelligence©

1.2

A brief overview of the “Future of Trade” project components

After an initial conception stage, a dozen workshops were held between January and June 2023, gathering some 80 experts in trade, economics, climate sciences, international relations, and other relevant fields. This report builds on their expertise. The “Trade 2040” project was facilitated by Foresight Intelligence, an organisational consultancy specialised in strategic foresight. The project comprises four phases:⁸

A) Thematic Scoping

The scope was defined as *Trade in a World Approaching Net Zero in 2040*, conscious that many net neutrality targets are set for 2050, but that key decisions along that pathway will need to be taken within the next two decades. The project asked the following questions:

- “What could trade in 2040 in a world approaching net-zero look like? And what opportunities and especially underestimated or even unseen threats might lie ahead?”
- “What would a desirable future of trade in 2040, in line with the path towards net zero, look like? And what steps could be taken already today to move into the right long-term direction?”

B) Explorative scenarios

Participants brainstormed factors that influence trade in 2040 and identified the most impactful trends and key uncertainties. They developed alternative assumptions about

the future state of these factors, which they combined into coherent scenarios. The group selected three comparatively different raw scenarios that go beyond best- or worst-case variations to develop further into holistic descriptions of pictures and histories of the future. Scenario drafts were validated in three regional feedback sessions (Asia, Africa and Europe, the Americas), and refined to sharpen gained insights.

C) Visioning

Expanding upon the influential factors collected for the explorative scenarios, participants selected factors with significant impact potential and malleability. Identifying and combining the most desirable, yet plausibly imaginable future states of these factors produced a comprehensive ideal, yet reachable vision for the future. Creating roadmaps through a technique called backcasting revealed sequences of challenges on the path ahead, and thus gave the opportunity to develop ideas on how to overcome the.

D) Strategic implications

During the strategic implications phase the group defined long-term goals and interests from the EU’s perspective (see chapter 3). It scanned and assessed threats revealed in the explorative scenarios, ensuring that no hidden or underestimated threats remain overlooked. Participants then developed ideas for strategic action to prevent threats from materialising or to cope with threats in case they appear. Lastly, they tested how well each idea would fare across alternative scenarios and in the face of associated threats.

⁸ For more details see section “Methodological approach” in the annex.



1.3

Structure of this report

The report does not follow the sequence of the methodological steps outlined above. First, the report presents a vision for the future of trade (**chapter 2**), before describing alternative developments in the form of three explorative scenarios (**chapter 3**). An overview over broad insights attained during the project follows (**chapter 4**). The report concludes with a set of strategic policy options (**chapter 5**) that are designed a) to actively push into the direction of the vision and b) to better prepare for alternative, less favourable developments described in **chapter 3**. The annex gives more details regarding the methodological approach, participants, intermediate results, and more.

2.0

A vision for trade in 2040 in a net zero world

The purpose of the following vision is to concretely describe a desirable future end-state and to make long-term success imaginable. While the vision itself may seem idealistic and not the most likely in today's context, it can serve as a north star for strategic planning. The vision described below was created in an expert group process that ensured its feasibility through extensive roadmapping elements. The vision comprises four key aspects:

2.1

Global order built on new eco-social contracts

In 2040, international relations are highly cooperative: permanent membership of the UN Security Council has been expanded to include India, Japan, Germany, Brazil, Nigeria and South Africa, better reflecting the geopolitical realities of the day.⁹ Moreover, the US, China and the EU have found ways to temper rivalry and increase cooperation between them, such as on space exploration, trade, and net zero technologies.

At the same time, domestic politics across the globe have evolved. Many countries have involved all sectors of their societies (businesses, consumers, labour, civil society) in discussions on their economic development models; sectoral net zero roadmaps; and the implementation of their nationally determined contributions (NDCs).

The resulting new eco-social contracts have ensured the fairness and intergenerational justice of sustainable transitions, while contributing to

the achievement of decent work. Developing countries, in particular, were able to raise Human Development Index scores, and many have achieved upper middle income status. Access to modern renewable energy, sanitation and health, and social protection has been expanded and most people can live on their wages. Less than five percent of the world's population is living below the poverty line. The convergence of wage structures has curbed the most egregious forms of labour outsourcing.

This sea-change has been underscored by the elevation of climate change and environmental issues in governments' priorities – for example giving veto-power to ministries with climate responsibility over legislation with negative mitigation or adaptation impacts. Such enhanced climate ambition, including of high emitters,¹⁰ in conjunction with domestic support for effective multilateralism, has unlocked reforms on taxation and finance, the provision of public goods, and trade rules.

Taxation and finance

Closing the transition financing gap has succeeded partly due to important global finance evolutions: first, global agreements on taxation, tax standards, and financial data sharing have been reached. Binding minimum tax rates on corporations and capital gains have stopped a race to the bottom; a global financial register, financial data sharing and better cooperation between revenue authorities have dried up illicit financial flows and tax havens.

Secondly, new taxes on the emissions of luxury items, such as private yachts and jets, effectively curtail the most ecologically damaging consumption habits while generating additional public revenues for climate finance. Greenhouse gas (GHG)-emissions from international shipping and aviation are taxed at the same rate as domestic fossil fuels, thereby incentivising local production, climate-smart supply chains and a move away from “just in time” delivery modes.

⁹ Inspired by the 2005 proposal of the G4 Group. New permanent members initially dispense the right to veto for at least 15 years. (see [German FO, 2022](#))

¹⁰ India, for example, commits to net-neutrality already by 2055, indicating a functioning ambition cycle.

2.3

Thirdly, development banks are given more financial resources to proactively identify and finance climate-transition- and green investment opportunities, while divesting from polluting assets. Their mandates have been aligned with the requirements of the climate crisis: more stringent application of transparency and

accountability measures, together with a new 1.5°C-compatibility criterion for investment projects, have turned development banks into powerful green transformation agents. Their support and monitoring of mitigation and adaptation investments is vital for generating and directing needed climate finance.

States and the provision of public goods

A global consensus on measurement methodologies for GHG emissions and other environmental externalities embedded in goods and services has been established. Focusing on countries' territorial and imported emissions opens a window for more climate cooperation within the Common But Differentiated Responsibilities (CBDR) framework.¹¹

A global framework agreement on information collection and sharing on renewable energy technologies and their CRM inputs has been reached. This enhances transparency and accountability along supply chains, and improves the efficiency, stability, and sustainability of CRM markets. Collected data, including on GHG-emissions and working conditions, is evaluated and binding international eco-social

production standards are developed. States actively manage these sectors via new *People's Public-Private-Partnerships* (4P) governance models in mining sectors. The active involvement of workers, civil society and local communities ensures sustainability and adherence to human rights.

Producer responsibility has been expanded to include circularity requirements, waste and pollution prevention. This has empowered increasingly climate-conscious consumers to confidently make “climate friendly” choices. Moreover, businesses, local and regional governments have formalised their sustainability pledges in so-called *Polycentric Determined Contributions* (PDC), which streamline their efforts. PDCs are standardised, monitored and audited by third parties. 95 percent of Fortune 500 companies have signed PDC commitments.

¹¹ “In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.” ([UN Rio Declaration, 1992, Principle 7](#))

2.4

Updated trade rules

Aligning trade with climate goals has required updates to existing trade regulation, such as:

1. Reform to the country status classification system: WTO members have resolved the long-standing conflict over (self-)classification by some developing countries, introducing a more nuanced system, with more differentiated rights and obligations when it comes to decarbonisation and development.
2. Reform of key WTO agreements, including the General Agreement on Trade and Tariffs (GATT): WTO members have agreed to the possibility to discriminate between “like products” based on their carbon-content. A number of countries rely on taxation or regulation of embedded emissions at the border to avoid carbon leakage. The WTO has revised the Agreement on Subsidies and Countervailing Measures to minimise frictions on climate-related subsidies.
3. Conclusion of the Green Free Trade Agreement (GFTA) under WTO auspices: WTO negotiations on a GFTA have been revived and successful. The agreement is signed by 85 countries, covering more than 95 percent of trade in climate-friendly goods and services. The agreement is expansive, covering also intermediate inputs to green value chains.
4. Reform of global energy governance systems: fossil fuel investment protections, such as in the Energy Charter Treaty and other relevant investment agreements, have been lifted; sunset-clauses on energy contracts have been accelerated; and parties to international investment agreements (IIAs) agree to exclude legitimate climate measures from the scope of investor-state dispute settlement (ISDS) applicability. Private investors can no longer sue states over “stranded” fossil fuel assets resulting from decarbonisation policies.
5. Accelerated technology transfer and innovation, e.g., through the reform of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS): At the initiative of the International Renewable Energy Agency (IRENA), signatories establish a patent pool for mitigation and adaptation technologies and create mechanisms for related patent-sharing and licensing between developed and developing countries. WTO members agree to create expanded space for compulsory licensing in instances where significant environmental benefit would not otherwise be realised.

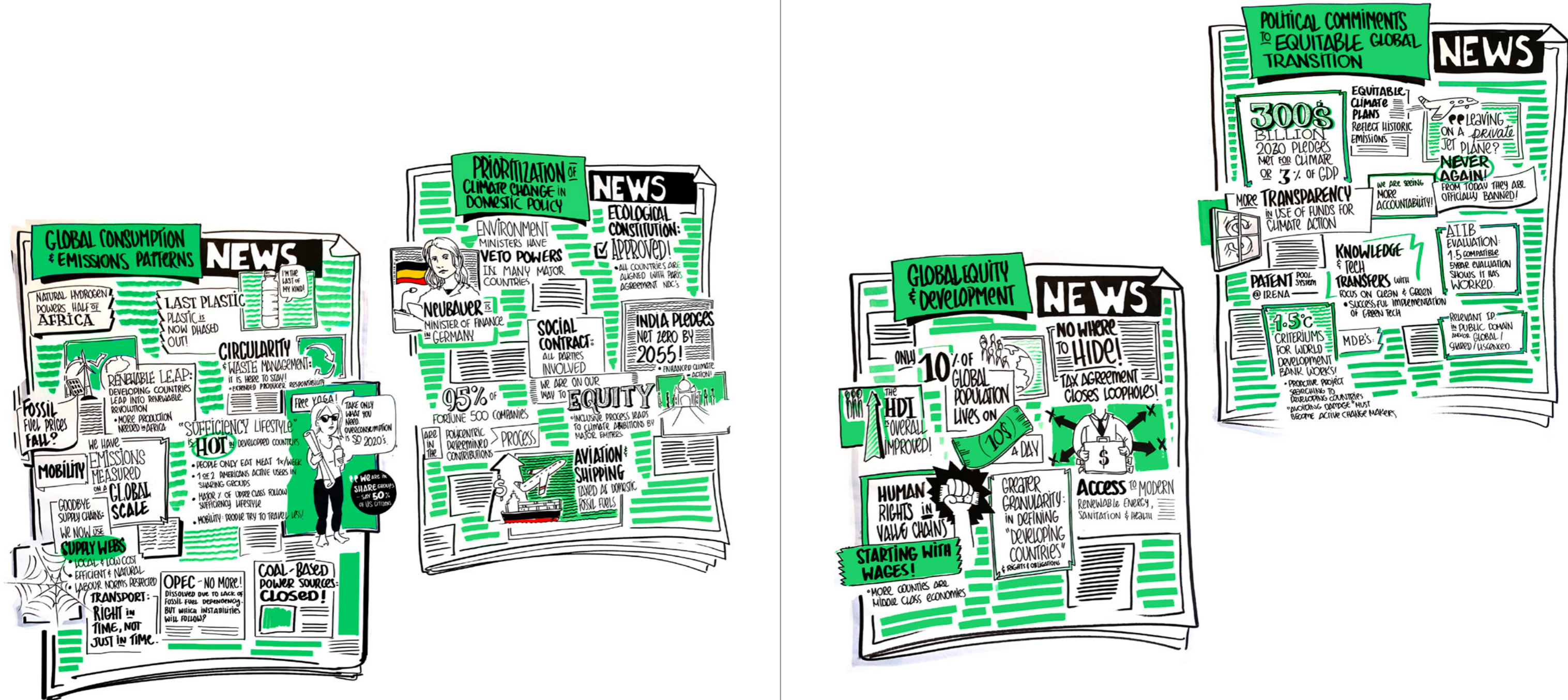
Taken together, these reforms catalyse trade in goods and services essential for reaching net zero, while minimising the negative environmental and social impacts of these growing value chains.



Figure 2: Visualisation of parts of the conceptualisation process for the vision

While the developments described above are plausible, they nonetheless rely on a “best possible outcome” a myriad of possible paths. Sound strategic planning, however, also needs to account for suboptimal or even

adverse developments. The Future of Trade project therefore developed other, less favourable scenarios. The next chapter presents three alternative futures, brought about by other, equally plausible sets of developments.



3.0

Three explorative scenarios



The scenarios presented below are three out of many possible futures that were considered. They go beyond simplistic best- and worst-case narratives and describe structural and at times surprising changes. They illuminate disparate corners of the future cone, generating insights from developments that are less frequently considered.

While the scenarios are comparatively different, they are developed on a set of shared assumptions and relevant trends. Defining them is important to limit the room of possibilities to a manageable size that allows strategic thinking and shaping and avoids resignation to destiny. Shared assumptions include:

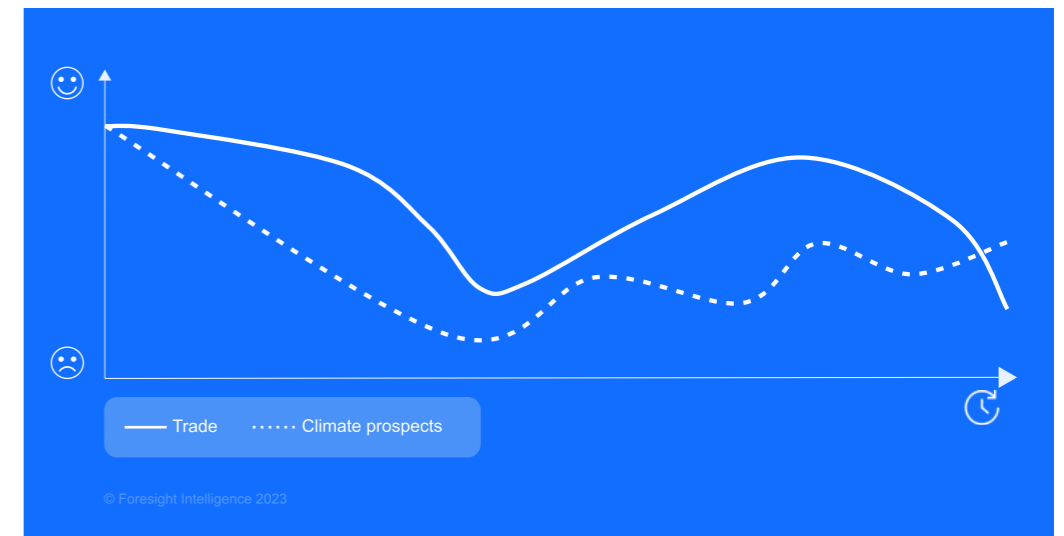
- Neither China, the USs, nor Europe will experience political disintegration.
 - There will be no war between NATO and Russia, nor violent escalation of Sino-American competition, and no war in East Asia (in particular in the South China Sea or or the Korean Peninsula).
 - Demand for CRM, low-carbon fuels such as green hydrogen, and renewable technologies will grow exponentially as decarbonisation efforts continue.
 - Some, albeit low level of demand for fossil fuels will persist in 2040 despite the energy transition.
- Four relevant trends are valid across the scenarios:
1. Global efforts to reach net-zero GHG emissions by 2050 will continue, but on different policy paths. Countries continue to define and follow their own decarbonisation targets.
 2. Green technologies, clean industries and new materials will continue to be developed and deployed.
 3. Geopolitical and economic competition will increase as the world shifts away from the Washington Consensus.
 4. Unilateral measures affecting trade, such as subsidies and export restrictions, will increase.

Within the boundaries of these shared assumptions, the following scenarios present colourful and nuanced sketches of what the future of trade could be by 2040.

3.1

Blue scenario

Politics, politics, politics! National interests fragment trade



Decoupling precipitates fuzzy trade spheres amid WTO paralysis

In April 2024, a Sino-American ministerial summit in Beijing ends without Communiqué, precipitating a continued deterioration of bilateral relations throughout the 2020s. This estrangement accelerates a Chinese turn away from exports, focusing instead on domestic CRM processing capacities and high-tech industries. By the end of the decade, China will have solved its ageing population's care crisis with a fleet of artificial intelligence (AI)-enhanced robots. Chinese manufacturing capacity shifts to other countries in the Global South, which only partly compensates for the hefty drop in Sino-American trade.

Trade in the 2020s is increasingly disrupted and fragmented. Unilateral emissions reduction measures, such as the Inflation Reduction Act or the combination of the EU Carbon Border Adjustment Mechanism (CBAM) with the revised Emissions Trading System (ETS) complicate trade. The WTO fails to manage a convergence of crises: the US blockade of its Appellate Body; increasing applications of exemptions on strategic goods and services; and failure to update its rule book, such as on digital services. As coherent trade frameworks break down, global trade is channelled by two large and fuzzy trade spheres: NoW and SotE.¹² Their divergence in standards creates powerful path dependencies. Different rules on social and ecological sustainability complicate trade, for example of hydrogen and its derivatives.

¹² NoW (North and West) comprises the G7, EU, Australia and South Korea, pulling in many Latin American countries. SotE (South other than East) is centred around China, and comprises the other BRICS and ASEAN. It connects to many African countries.

The ICT sector is most impacted, as distinct specifications on wifi routers, digital devices, and communication protocols establish *de facto* exclusive techno-spheres.

Weather events caused by climate change and ensuing political reactions further hinder trade, especially of agricultural products amid recurring food insecurity. For example, in 2026, severe drought conditions in India lead it to ban rice exports. Trade and transport infrastructure is significantly, if sporadically, disrupted. The vulnerability of ports and waterways to erratic rainfall becomes clear when the Rhine has to close for maritime transport several times between 2027 and 2029 and the Port of Durban is devastated by a storm flooding in the same year.

By 2030, the global trade environment reaches a nadir. While the EU and US conclude wide ranging cooperation agreements on innovation – such as on AI-enhanced agriculture, they fiercely compete on manufacturing, including through export restrictions and subsidies. Formal disputes and countervailing measures reach a record high. Supply chains for high tech manufacturing and digital service delivery run almost exclusively within the boundaries of respective trade spheres.

New markets and manufacturing capacities propel the Global South

Trade in CRM bucks the trend, doubling in volume between 2023 and 2033. In return for converting ever more natural habitat into mining areas, CRM-rich countries negotiate “tech-for-CRM” deals to aid their transitions. At the same time, CRM supply chains remain

exploitative: insatiable demand and cut-throat competition soften commitments to human rights and local development, while proceeds are shared between foreign multinationals and local elites. In 2031, riots break out across Chile, as miners demand higher compensation amidst record profits for multinational lithium producers.

Despite limited CRM value retention, government revenues in many countries in the Global South are booming. In addition to demographic dividends, deepening South-South integration, and manufacturing migrating from China, COP 35 brings another revenue stream: functioning carbon markets and a mechanism of payment for ecosystem services. Henceforth, countries like Brazil and Indonesia issue vast amounts of carbon credits and monetise the protection of natural habitats, thereby productively using their natural carbon sinks and rich ecosystems. This makes conservation an economically viable alternative to farmland or mining conversion.

Benefitting countries reinvest a portion of their revenues in climate adaptation projects, which are promoted as a form of social policy. Technology transfers make some of these national adaptation efforts remarkably successful. However, a lack of international coordination and cooperation impedes the overall effectiveness of adaptation. For example, Senegal and Nigeria are the only countries of the Sahel region that successfully employ AI-assisted seeding, irrigation and fertilisation to rehabilitate desertified land. These adaptation efforts stimulate trade in green technologies and services from North to South within the respective trade spheres.

Green populism and China’s “Great Greening” lead the EU into circularity

In the years 2036 to 2038, green populists win national elections in the United States, Japan, and many European countries. Since mid-decade, economic growth in the Global North has been reversed by a culmination of ageing populations, polarised politics, trade wars, and a cyclical downturn. Breaching the 1.5°C global warming threshold in 2035 has further boosted the political salience of climate change. A blend of ambitious green policies and protectionism has thus gained credence, and political power. In the late 2030s, Global North is financially weak, increasingly sceptical of free trade, yet maintains its climate ambition.

In 2038, the Chinese government introduces measures to fully decarbonise its construction sector. *Inter alia*, it establishes the Chinese Export Adjustment Mechanism (CEAM) and dictates that domestically produced low-carbon steel and other metals, cement, sand, and a list of chemicals must be sold on the Chinese market first. Restricted access to Chinese construction materials hits the European construction industry particularly hard. European legislators react immediately by pausing CBAM levies for a year, and passing immediate and stringent construction waste management regulation. EU member states also agree to a minimum of 90 percent recyclable or carbon-neutral materials

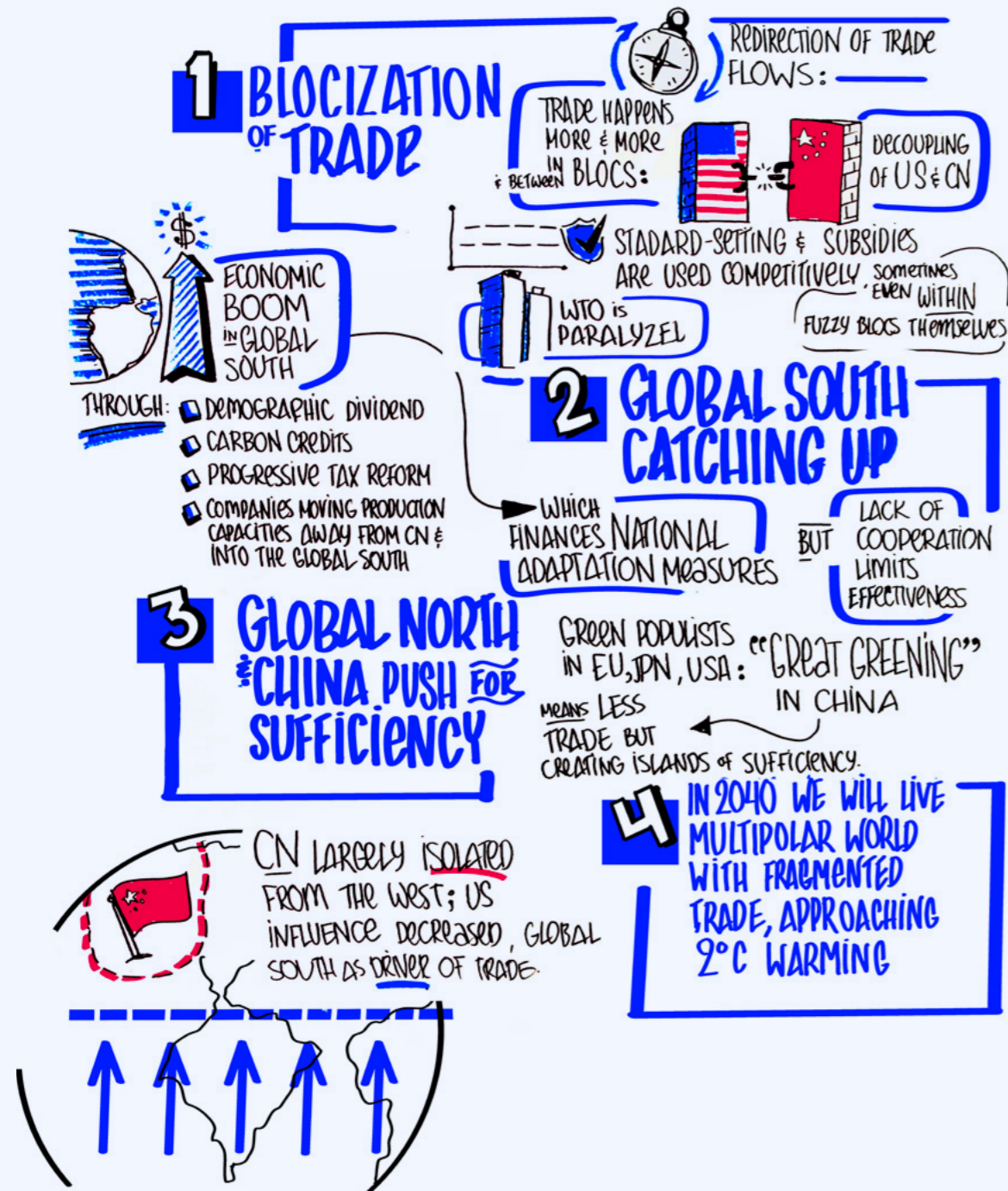
for all commercial and private buildings from 2040 onwards. Public awareness of material consumption spikes, translating into consumers’ conscious decision to consume less. EU imports fall significantly as it becomes an island of sufficiency in a world of material intensive growth.

This is trade in 2040

In 2040, trade volumes are low. Trade is regional and largely happens within two fuzzy trade spheres. Trade disputes spike and the WTO remains incapacitated by multiple crises. Plummeting trade between China and the West has been partly offset by countries in the Global South with CRM deposits and manufacturing capacity offshored from China. ASEAN countries also experience increasing demand for green inputs from China. The Global South is thus a driver of trade. Diverging standards between spheres complicate the trade in essential sectors, such as hydrogen or digital services. Tough carbon standards, regionalisation, lower transport emissions, and increasing servitisation have lowered the carbon-intensity of trade. Despite this, global emissions trend towards a warming of 2.7°C by 2100.

Technology in focus

The monetization of carbon sinks presupposes solving two sets of technical problems: First, the verification of carbon sinks' health and intactness requires the reliable monitoring of vast and inaccessible areas of land. This is neither easy, nor cheap. The deployment of AI-assisted satellite imagery could provide a scalable solution. Compatibility of data-storing and -sharing systems and energy efficiency of system maintenance are further challenges.



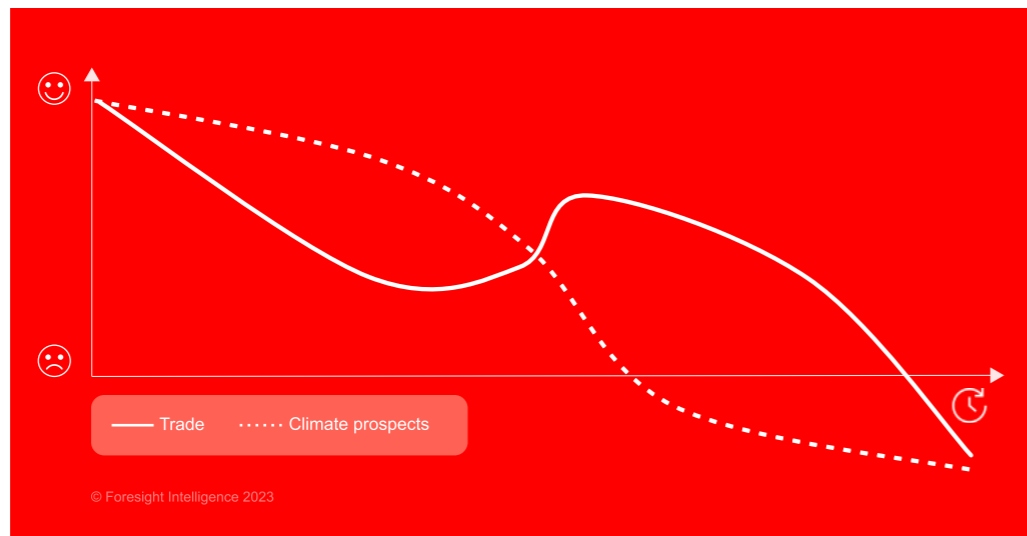
Second, making conservation economically viable requires enhancing food production without expanding land use. The opportunity costs for natural habitat is arable land, and thus food. These costs are particularly high in the context of recurring food insecurity. Progress in vertical farming techniques, hydro- or aeroponics, could provide solutions.



3.2

Red scenario

From competition to cooperation to disintegration. The water trigger



Economies decouple, tank, and restructure

In 2024, trade between China and the G7 shrinks by more than 8 percent from the previous year. Over the next decade, China pursues increased self-sufficiency and more selective export markets along the Belt and Road Initiative: “Made in China 2025” is followed by the “Harmonious Consumption” strategy, which mandates 90 percent of consumption to be from domestic production. It relies heavily on Russia and select partners in the Global South to satisfy its needs in raw materials, workforce, and export markets, while trade with the West dwindles.

The following years witness a restructuring of the global economy. The Sino-Western disentanglement produces a multitude of supply chain disruptions, such as for battery precursors or solar panels. The ensuing economic chaos leads the world into

recession and countries to reconsider their supply chains – particularly for strategic and green goods and services. Chile, Vietnam, and India become important exporters of intermediate goods. ASEAN countries profit immensely from demand for high tech inputs, such as integrated circuits and semiconductors. Countries with natural resources form supply cartels to control global prices. In 2025, the Organization of Nickel Exporting Countries is formed, followed soon after by the Manaus Club of Forest Nations. Importing countries, meanwhile, focus on reducing their exposure to supply chain disruptions. Import substitution, re- and nearshoring gain momentum in spite of costs. By 2027, the EU sources 70 percent of automotive inputs domestically. Advancement in 3D printing and product circularity reduce its import dependence, except on energy. Green hydrogen imports to support its industrial base become a vital concern and pillar of engagement with Africa.

In the late 2020s, trade has shifted: multilateralism has given way to targeted bi- or minilateral agreements. Where possible, countries have regionalised their supply chains. Commodity market consolidation has increased the price of many traded goods. Political developments promote these shifts, as ever-more isolationist politicians win elections. In her inaugural speech as newly elected French president, Marine LePen vows to “never again submit the French people to the whims of globalisation”. The prospects for reversing the shrinking of trade in manufactured goods seem dim.

Food and water scarcity drive free trade

2028 sees the first of many major climatic disruptions to global food supply. Erratic weather events destroy harvests in India, Thailand, Vietnam, and Pakistan, leading to skyrocketing prices and food riots, including in Senegal, Côte d’Ivoire, and Nigeria. Droughts in Russia and Ukraine lead to failed wheat harvests, causing famines in East and North Africa. As rainfall patterns become erratic, droughts and floods become the norm. In hard hit areas, such as the Sahel and Europe, a frantic search for solutions commences. Large vertical farms are erected, and AI is deployed to optimise water usage. In 2029, the EU inaugurates the European Water Agency (EWA) in Bucharest to address the water crisis.¹³ As agricultural imports from the Americas partially stabilise European and African food markets, the necessity of free trade for food security becomes irrefutable, and applying trade restrictions on agricultural goods or

technology becomes an internationally recognised taboo. Global trade in agricultural products resumes in an otherwise contested environment.

In the early 2030s, water scarcity becomes global. The Congo Basin and the Amazon have been deforested and converted into farmland and CRM mining pits. This land use change has caused atmospheric rivers to start behaving irregularly. Previously fertile areas in Argentina, Brazil, and the US-Midwest dry up, making monoculture farming impossible. Countries tackle water scarcity with a triple approach: agricultural innovations; rationing policies; commodification and trade of water. During the 2030s, the number of desalination plants quadruples and is projected to surpass 100,000 by 2040, located everywhere from the Mediterranean and the Arab peninsula, to the coastal regions of Africa and Latin America. Water trade immediately boosts trade volumes as “desalination-for-export” facilities are built near major trading centres.

Climate impacts destroy the physical foundations for production and trade

Water scarcity also physically disrupts trade through damages to production sites, trade routes and transport infrastructure. The Panama Canal has become unusable for parts of the year and European waterways dry up. Shipping insurers demand exorbitant premiums on winter business. Desertification and sand storms damage roads and railways in the MENA region. Manufacturing output suffers from energy shortages in parts of the world.

¹³ It is mandated to coordinate improvements to water systems and oversee research and development in water conservation and freshwater conversion technologies.

Increasing demand for electricity from desalination, CRM- and green hydrogen production enhances vulnerability to energy supply disruptions. Across the globe, cooling water shortages force nuclear power plants to shut down repeatedly.¹⁴ Hydrologic power is produced at 65 percent of global capacity in 2031. High tech sectors are most impacted as water shortages slow down CRM extraction. The earlier lifting of the deep sea mining moratorium stabilises the CRM supply, but causes political friction.

In the early 2030s, the international system seems incapable of responding to these water challenges. Water scarcity has forced millions of people to emigrate. Migration on this scale is met with hostility. International tensions spill over into trade relations. The WTO descends into irrelevance, as countries justify restrictive measures by invoking Article XXI's security exceptions. Trade disputes between the US, EU, and China multiply. When the 1.5°C threshold is passed in 2035, trade in anything other than food and water has collapsed. Businesses pursue de-risking strategies to cope with this uncertainty. Multinationals pursue vertical integration and circularity strategies, shorten and insulate supply chains, and substitute imports with additive manufacturing. For example, in 2035, Volkswagen's board approves the group's restructuring into three separate continental affiliates. This trend further depresses trade volumes and growth.

By the mid-2030s, investments in adaptation technologies have led to some breakthroughs, but diffusion remains highly insufficient. Artificial intelligence has proved effective in genetically modifying seeds, but intellectual property questions remain unresolved. In 2037, official development aid remains the sole diffusion channel for this type of adaptation technology. In March 2040, the United States and China chair negotiations at the UN premises in Bonn on the deployment of large-scale geo-engineering projects to save a warming planet.

This is trade in 2040

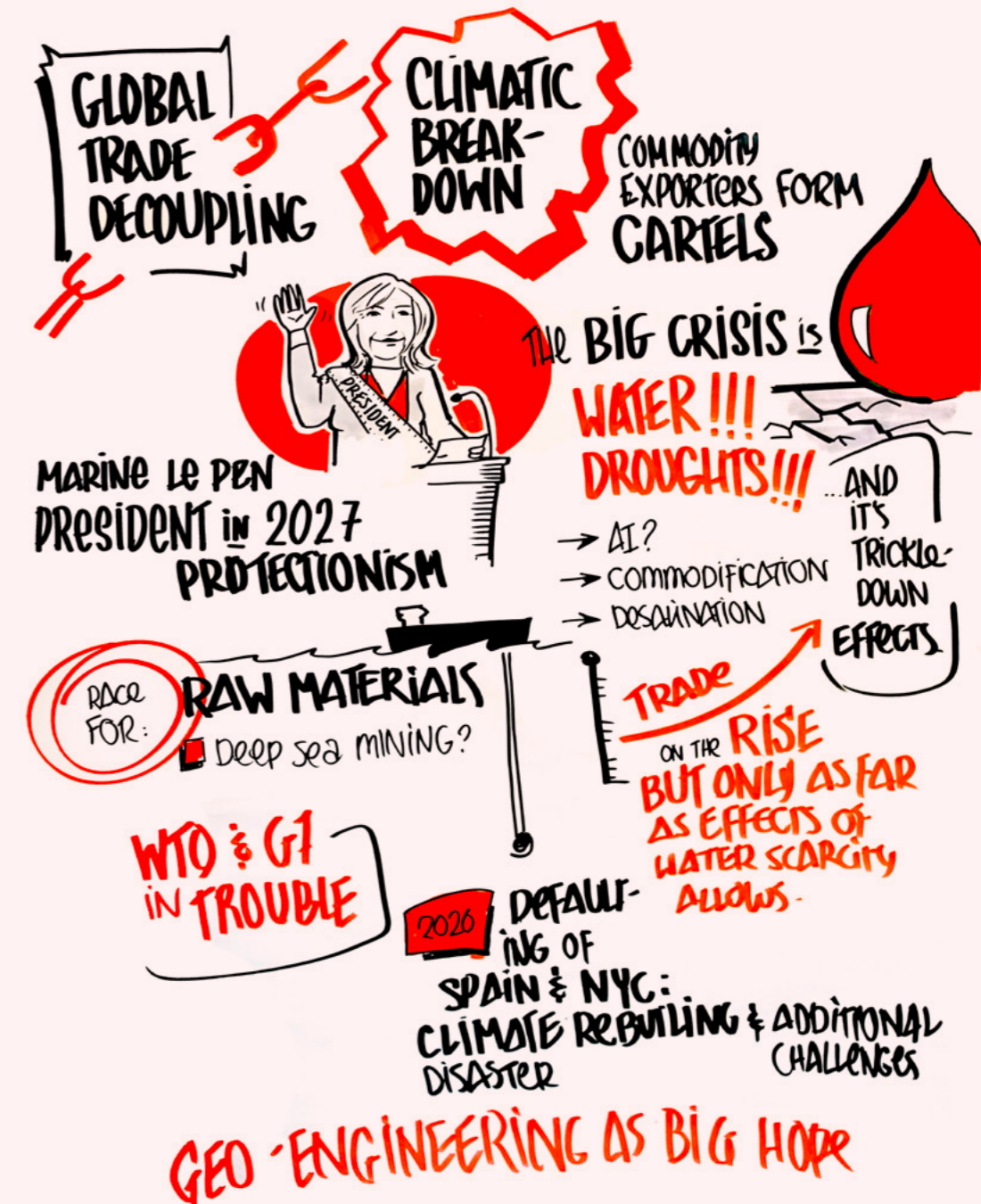
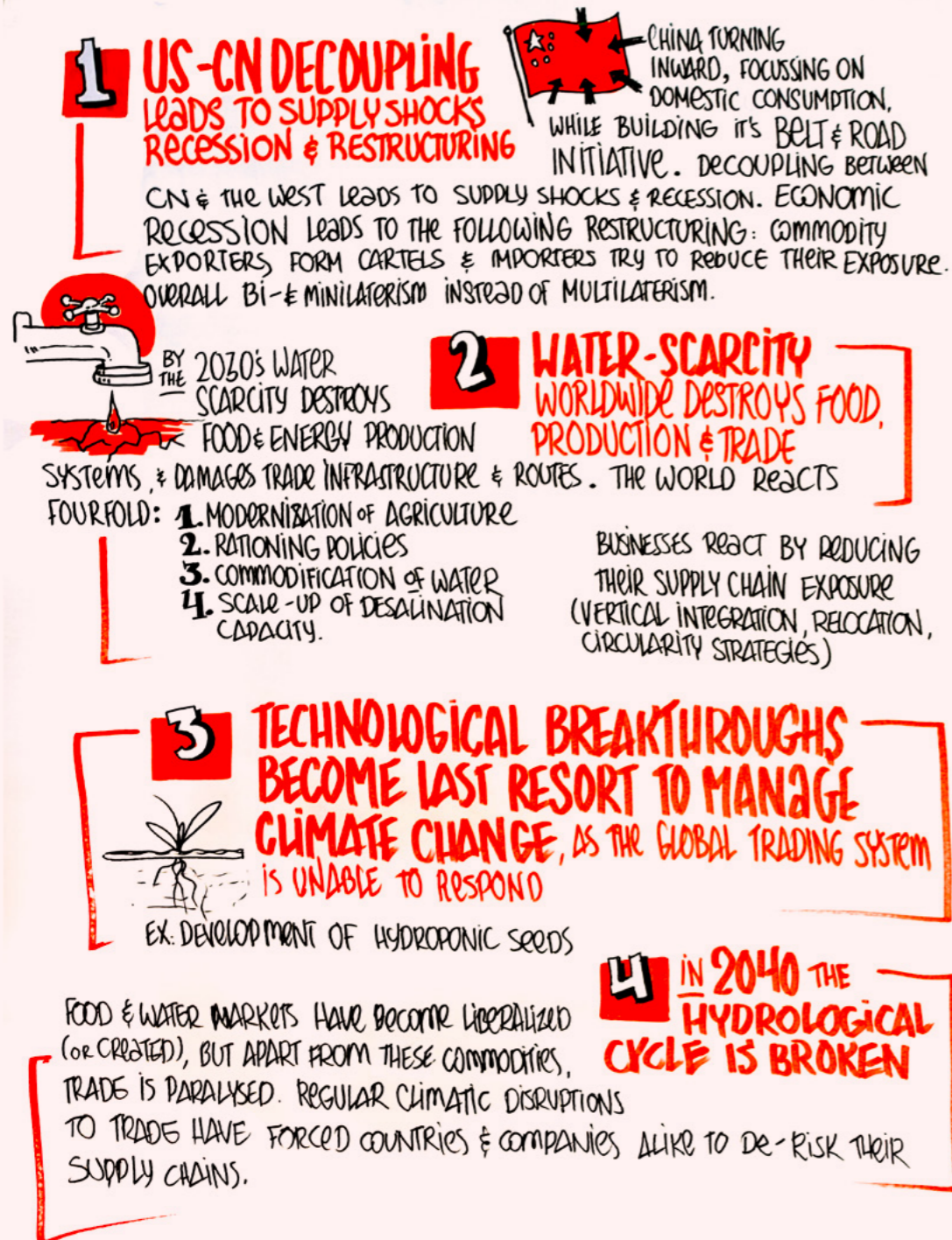
In 2040, trade volumes are low and supply chains are regional. In the context of pervasive water scarcity, trade in anything except food and water has collapsed. The global trading system is choking. Production and trade infrastructure is regularly disrupted, prompting countries and companies alike to seek near-shoring and self-sufficiency. Technological solutions can only partly offset the disruptions to climate and trade.

¹⁴ Examples include: PAKS 1-4 in Hungary; CERNAVODA 1-2 in Romania; ROSTOV 1-3 in Russia; KAKRAPAR 1-2 in India; COMANCHE PEAK 1-2 and RIVER BEND-1 in the US. ([Global Nuclear Power Tracker](#), [Global Energy Monitor](#), 2023)



Technology in focus

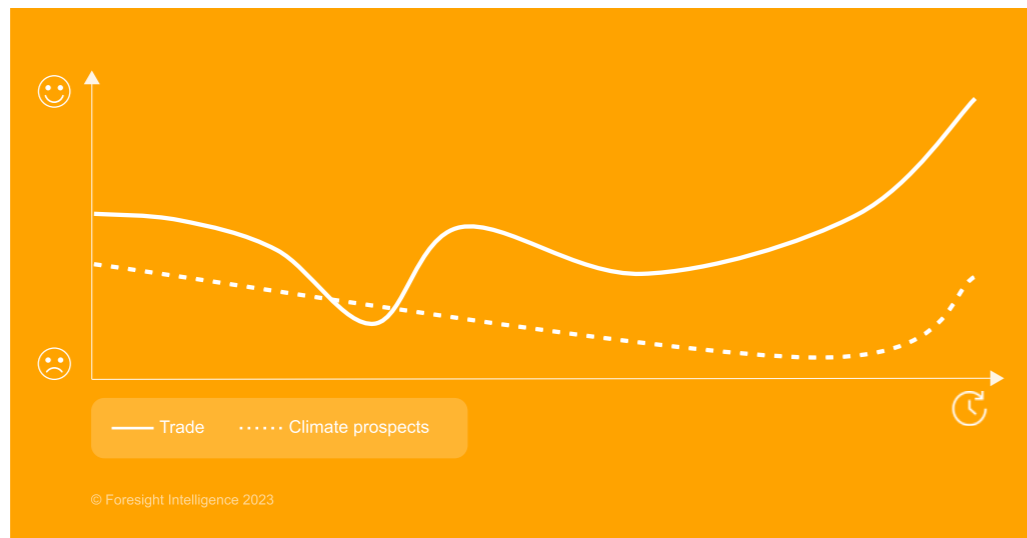
This scenario shows an over-reliance on technological breakthroughs. One of such technologies is carbon capture and storage (CCS) – a technology for emission avoidance, not mitigation. Considering high carbon prices and the mitigation gap, CCS is hailed as a needed backstop to cut emissions. The fossil fuels industry, keen on remonitizing its depleted carbon fields, advocates large scale deployment. Unfortunately, CCS is water intensive, which leads to rapidly rising costs in the context of widespread water scarcity. In the end,, CCS does not deliver, contributing to the worst climate prospects among the scenarios.



3.3

Yellow scenario

Coming together, but missing the Paris goals



Climate-induced food scarcity and global recession

The 2020s are a decade of food crises. The absence of multiple, successive rainy seasons in the US-Midwest, the Black Sea region, Southern Cone nations, and Vietnam lead to failed harvests – general scarcity of food and soaring prices ensue. Across the globe, people are hit with decreased disposable income and food insecurity. Except for the United States, which deploys innovative agri-tech on a large scale, affected bread basket regions experience a rise in emigration. The global economy slows down and trade in non-essential goods and services collapses.

Societal reactions to these shocks are intense and polarised. While some call for more international cooperation on food system resilience – including through agri-tech transfers – others reject trade on security grounds. The

world's struggle to find an answer to supply insecurity further entrenches the gridlock at the WTO, thus unable to adapt its regulatory framework to the challenges of the 21st century. The United Nations launches the “World Food Fund” (WoFF), but it struggles to secure states’ buy-in. Countries renege on their financing pledges and hesitate to share intellectual property in agri-tech without compensation.

Climate-induced sovereign defaults and trade reintegration

Briefly, the global economic outlook brightens in 2027, when China resets its growth model. After years of turmoil, supply chain resilience via diversification and integration is the new objective. The Dual Circulation strategy is ended; support for state-owned enterprises is scaled down; and reforms to foreign direct investment rules are announced. Furthermore, China launches a large

lending facility, offering affordable loans for its green technologies to developing countries. In the US, the 2024 presidential elections had brought yet another China-hawk into the White House, but a prolonged economic downturn shifted US discourse on China towards economic rapprochement, helped by the election of a more liberal-minded president in 2028. Her easing of trade restrictions precipitates thawing Sino-American relations that help end the stalemate at the WTO, boosts bilateral trade, and provides optimism for more cooperation on trade and global challenges.

For some countries, this optimism comes too late. In 2028, Peru declares a climate-induced sovereign debt default. High grain prices have brought fear of malnutrition to countries in Sub Saharan Africa and Central America. Food subsidy schemes drain public coffers and foreign currency reserves. Moody’s downgrading of Peru’s credit rating forces refinancing negotiations.

Two dozen small and well integrated economies follow Peru into default. This creates migratory pressures towards Europe and North America and disrupts domestic politics in affected countries. Prolonged droughts had facilitated the ascend of populist parties, hailing economic nationalism as the solution to food insecurity. Economic collapse then discredits incumbent governments, bringing new parties into power. This younger generation of politicians turns to liberal reform, freer trade, and international collaboration. Many join China in pushing for a revival of the global trading system,¹⁵ and conclude trade and broader cooperation

agreements on CRM and hydrogen. In 2030, over twenty small and medium sized economies, largely from the Global South, accede to the Agreement on Climate Change, Trade, and Sustainability (ACCTS), while the WTO finds consensus on subsidies related to climate mitigation. Progressive national tax reforms across the globe underscore international reform efforts. South-South integration and demand for green technologies and inputs drive up trade volumes. CRM trade doubles between 2023 and 2033.

A global transformation compact: too little, too late?

By 2033, the global economy is booming. Between 2032 and 2034, average national tax revenues increase by more than 20 percent, enabling investments in climate adaptation and mitigation. Recurring and intensifying climate impacts compel governments to fund the large-scale roll out of adaptation technologies. Benefitting from the consequent demand are ASEAN countries as key suppliers of transition inputs, such as semiconductors. Some African countries are able to scale up green hydrogen production and –export using their wind and solar potential.¹⁶ Global value chains thus shift towards the Global South.

International cooperation culminates in the 2035 UN Transformation Summit (UNTS). It is preceded by tacit Sino-American understanding on intellectual property and technology transfers. The Summit aims at aligning trade cooperation to accelerate decarbonisation.

¹⁵ Among others Vietnam, Sri Lanka, Pakistan, Egypt, Kenya, Ethiopia, Nigeria, Jamaica

¹⁶ Including Mauritania, Morocco, Nigeria, Namibia and South Africa



The UNTS:

1. establishes a governance structure to manage cascading and transboundary climate risks;
2. calls on the WTO to expand its regulations to digital goods and services, and develop a framework for green technology transfers;
3. defines waivers on intellectual property rights for adaptation and mitigation technologies and passes a resolution on the mutual recognition of sustainability standards;
4. appoints a task force to harmonise trade frameworks and incentive structures for climate resilience across key trade routes and commodities;
5. delegates the World Bank to coordinate lending to green hydrogen and opens discussions on the diversification and sustainability of CRM supply chains.

The largest global compact since the Paris Agreement sets new standards for the world economy. By 2038, most products and services are net zero emissions by default. The transport sector is decarbonising rapidly, driven by a plummeting price of batteries and green hydrogen, and most global supply chains are diversified and resilient. The UNTS finally aligns the trade and sustainability agendas.

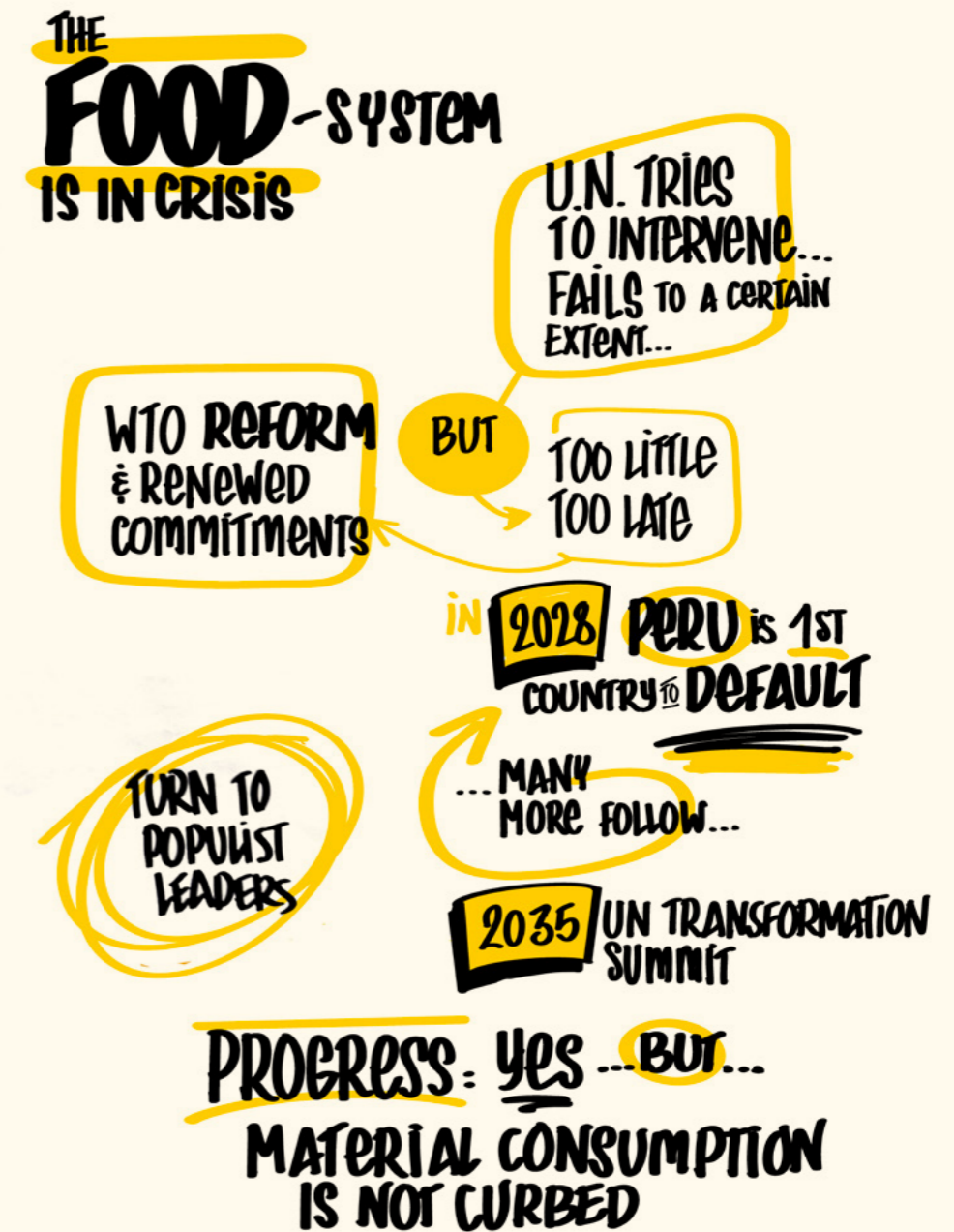
Success comes too late to curb the increasingly violent and frequent extreme weather events. As the declaration of the 5th anniversary meeting of the UNTS, Parties state: "Although we embraced green technologies and decarbonisation, it was not enough. We need less material consumption and more circularity to mitigate climate change effectively – Yet, success remains within reach."

This is trade in 2040

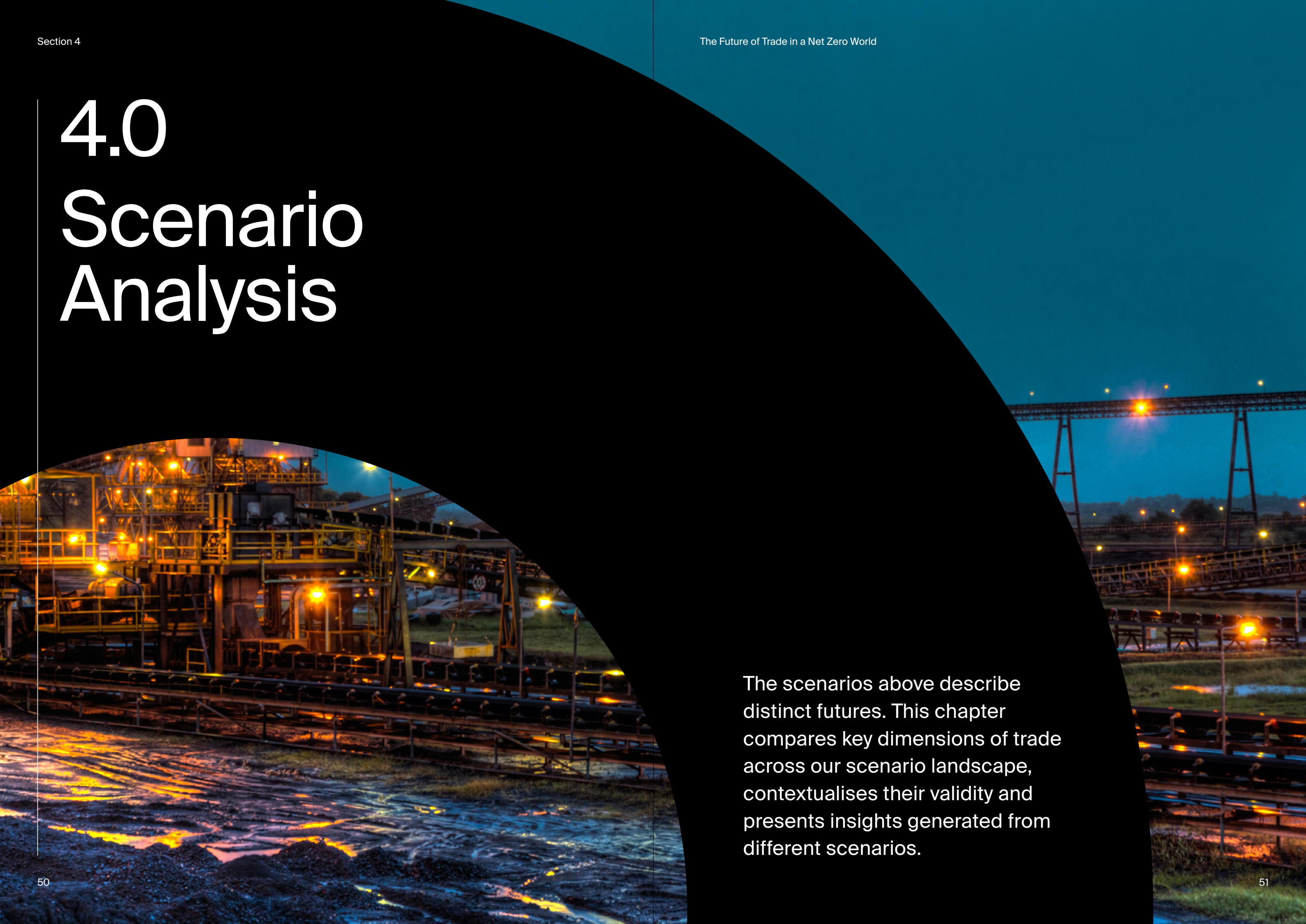
In 2040, trade is booming, free and mostly decarbonised. China, and many small and medium-sized countries in the Global South, are engines for global trade integration. Countries have come together to align trade and climate agendas, with the former becoming an engine of the latter.

Technology in focus

Important for the unfolding of this scenario is solving problems associated with the storage of hydrogen. Among the different methods of storing hydrogen, the most stable and cost effective are also very energy intensive. Countries that present the highest potential for the production of green hydrogen also currently suffer from electricity poverty. The technological challenge is thus to improve the energy- and cost efficiency of hydrogen production processes, as well as to increase green electricity production and storage capacity in hydrogen producing countries.



4.0 Scenario Analysis



The scenarios above describe distinct futures. This chapter compares key dimensions of trade across our scenario landscape, contextualises their validity and presents insights generated from different scenarios.

Table 3: Scenario comparison

Indicator	Plausible Alternatives			Preferred Future
	Blue	Red	Yellow	Vision
Composition of trade*	AP ↘, NR ↗, MG ↗	AP ↗, NR trade is volatile, MG ↘	AP ↘, NR ↘, MG ↗	
Trade in green goods	↗	↘	↗	↑
State of WTO	☹️	☹️	😊	😊
Trade restrictions	↗	↗	First ↗, then ↘	↗ for carbon-intensive goods and services; ↘ for green goods and services
Mitigation and Adaptation Tech diffusion	↗ within blocs, ↘ between blocs	↘	↗	↑
Carbon-intensity of trade	↘	↘	↘	↘
Global warming	Towards ~2.7°C by 2100	Towards ~4.4°C by 2100	Towards ~2°C by 2100	Below 2°C by 2100

* AP: agricultural products; NR: natural resources; MG: manufactured goods.

Figure 3: Scenario comparison by trade category



4.1

A note on validity

Probability is not the yardstick by which to judge the methodological and practical quality of scenarios. Normative and explorative scenario processes do not aim to predict the future. In fact, it is often more insightful to investigate alternative futures that lie at the fringes of the future cone, where surprising or often-overlooked dynamics and interactions play out. One can confidently assume that none of the described scenarios will happen as described, their interest lies in the generation of new insights as plausible futures.

Plausibility is the currency in foresight. Creating narratives that lie between the obvious and the absurd can improve our perception of what is around us – for example by uncovering budding trends, or contemplating their interactions – and thus spark ideas and impetus for action. Plausibility requires impeccable internal coherence of all aspects within a scenario. To arrive at these scenarios, a full cross-impact-balance-analysis was conducted: the consistency around 65,000 combinations of projections was checked and the three most consistent selected for further development. The scenarios were then validated in regional events (Americas, Africa and Europe,

and Asia). Given the group's European leaning, special attention was given to feedback from other world regions.

Blind spots remain inevitable, but can be minimised. A diverse participant pool, reflecting different backgrounds, stakeholders, and fields of expertise is a prerequisite. The inclusion of outside voices for external validation is another helpful tool. While this project employed both, reflecting on the results reveals many areas worthy of further contemplation: The role of important states, such as India, South Africa, or Brazil, and many other

regional and middle powers remains underexposed. Many technological pathways, in hydrogen and food production, alternative propellants, or water management, and relevant domains, such as cyberspace or space infrastructure deserve more elaboration. The effects of an incipient AI-revolution could not be explored within the boundaries of our research questions. Acknowledging these blind spots, which are in part caused by the need for brevity and concision, shows also the potential for future topics for investigation and contemplation.¹⁷

4.2

Insights from the scenarios

Venturing through the scenario landscape has revealed a multitude of contingencies. Uncertainty can emanate from a wide range of sources and apply to varying degrees to single or multiple scenarios, and even beyond them. While impacting trade, their consequences and potential threats go far beyond its realm.

The impacts of climate change can become much more severe, and materialise sooner than imagined in the scenarios. Tipping points could irrevocably change the landscape of alternative futures. In such a case, the blue scenario would no longer be plausible, the yellow scenario could play out at a much faster pace, and red would become the new current expectation.

Food insecurity of varying degree, caused by drought-induced harvest failures and severe disruptions in agricultural trade, is described in detail in all three scenarios, in the short- (yellow) and medium term (blue, red). It is a danger that is already

perceived by experts from a current perspective, with the potential to upend trade and climate agendas.

Disruptions to trade infrastructure by climatic and extreme weather events are most pronounced in the red scenario, but are also featured in the other two. Occasional disruptions are already a reality, and expected to increase in the future. An additional threat to trade infrastructure could be the weaponisation of space infrastructure, such as GPS-satellites. Such actions would be plausible under the conflictive international relations that all three scenarios describe at different times in the future. A topic for additional analysis could be the role and vulnerability of space infrastructure for trade and adaptation.

The supply of critical raw materials is a priority across scenarios. In the yellow scenario, China leverages its domestic CRM supply for itself first, and later binds CRM-exporting countries to its economy. The red scenario describes CRM cartels

increasing global prices. Water shortage impedes CRM extraction, precipitating the end of the moratorium on deep sea mining, inviting unforeseen geopolitical and ecological consequences. Only in the yellow scenario does the world manage to establish diversified and sustainable CRM supply chains. A stable and sustainable supply of CRM is essential for achieving decarbonisation targets, maintaining economic growth, and improving social and ecological sustainability along supply chains.

The liberal trade order is in decline in the blue scenario, where it is replaced by bi- and unilateralism, protectionism, and the emergence of fuzzy trade- and technospheres. In the red scenario, the WTO breaks down, and Sino-American decoupling shrinks trade volumes. The ability of (democratic) governance systems to steer is decreased.

Increasing use of disinformation could amplify the hostility of a contested international order in both scenarios. In the yellow scenario, by contrast, a more equitable liberal order is created, advanced by China and many countries of the Global South, bringing in line global trade and climate agendas.

These scenarios show the intricate link between trade and climate change. On one hand, trade cannot function properly in a world of extreme climate and weather events. On the other hand, trade is needed to facilitate mitigation and adaptation. They further show that trade policies and the trade regime more broadly must change to help the world remain on track with its climate goals.

The next chapter contains ideas for practical policy options to leverage the opportunities and mitigate the threats that the scenarios presented.



5.0 Strategic Policy Options



The ideas described in this chapter illustrate stakeholders' room to manoeuvre for shaping developments, first towards the vision, and thereafter for coping with alternative, even unwanted, futures. Successfully navigating the future requires pushing for the vision while at the same time avoiding or preparing for threatening alternatives.

The project defined one specific addressee: The European Union. While the scenarios are global in reach, they were assessed against the EU's and its member states' goals towards trade in a net zero world. Participants prioritised five goals against which scenarios were later assessed:

1. Employing trade policy to further climate goals, for example via high environmental standards, and the avoidance of carbon leakage;
2. Incentivising partners to strengthen their climate commitments and ensuring that its own trade agreements include ambitious mitigation and adaptation chapters;

3. Maintaining competitiveness of domestic industries during the green transformation;
4. Securing (access to) socially and ecologically responsible, stable supply chains for critical raw materials (CRM) and other materials and resources, such as water, food, and energy;
5. Preserving, promoting and improving the global rules-based trade order, e.g., by working towards WTO-reform and negotiating plurilateral agreements on "WTO-plus" issues.

Consequently, the proposed policy options are predominantly tailored to address these priorities of European stakeholders and decision-makers.

5.1

Pushing towards the vision

5.1.1 Integrating climate into existing trade agreements

The EU could develop a streamlined legal approach to align its existing free trade agreements (FTA) with its climate commitments and those of its trading partners. This could provide an example of climate alignment that enables broader bottom-up reform of trade rules.

This strategic option advocates for a purpose-driven debate on climate-aligned trade agreements between relevant stakeholders, including civil

society.¹⁸ In particular, legal work could be undertaken to identify the most effective ways to ensure that the EU's trade agreements contribute to the achievement of the Nationally Determined Contributions (NDC) of the EU and its trading partners, from the outset and throughout their implementation. Reviewing and syncing agreements with NDCs is a continuous process, as agreements need to be updated in line with dynamic climate goals. Eventually, such a revision and updating mechanism could convince all WTO members of the necessity and feasibility of NDC-led trade policy.

¹⁸ Recognising existing attempts to align free trade agreements with commitments under the Paris Agreement, while echoing the assessment that more needs to be done for effective alignment (see e.g., CISDL, 2022).

Concrete actions include:

- Conducting sustainability impact analyses (SIA) and monitoring of trade agreements on the basis of the parties' NDCs, national decarbonisation and biodiversity objectives, and other relevant Sustainable Development Goals with regular negotiations on necessary adjustments;
- Identifying legal options and proposing avenues for integration (e.g., via general exceptions, interpretation of GATT's Article III, sectoral carve-outs for investment protection chapters and investor-state dispute-settlement (ISDS) applicability, mirror clauses for specific environmentally damaging goods);
- Proposing ready-to-use policy instruments, such as climate waivers, climate-modulated tariffs, and linkages with incentive systems, such as financing through the European Green Deal and Global Gateway.

Applying these mechanisms to an existing FTA with a like minded country would show the feasibility of climate-proofing existing trade agreements and making trade a tool for achieving climate goals. Agreement with the United States, and coordination with China would help cover a critical mass of global trade and emissions.

In order to raise the topic on the political agenda, European civil society organisations (CSOs), such as philanthropic institutions engaged in the trade, energy, agriculture, and climate fields, launch a political campaign to highlight the trade-climate nexus and

discrepancy between FTAs and NDCs. They mobilise political pressure on the European Parliament to call on the European Commission to systematically develop and apply this expanded SIA and monitoring mechanism to all trade negotiations and retrofit existing trade agreements with climate measures. Political campaigns are also directed at the national level, to develop and propose legislation, and identify political champions to carry through proposals bilaterally and at various international fora (G20, G7, WTO, OECD).

These efforts are given political support by the Coalition of Trade Ministers on Climate, who invite climate ministers to their deliberations and call on the aforementioned institutions to adopt a political declaration to launch fundamental WTO reform for the alignment of trade with climate and SDGs.

5.1.2 Standard carbon measure and trade observatory

This option advocates for the coalescence around a carbon measuring methodology and creating a statistical observatory to monitor the flow of carbon between trading partners. It addresses different groups of stakeholders interested in such a standard measure.

Currently, multiple carbon measures are being developed simultaneously by industries in collaboration with academia. European civil society organisations, such as philanthropic institutions, could promote political debate and coalescence around one single methodology to measure carbon embedded in trade. Furthermore, European legislators should adopt this

consensus methodology and employ it to launch a statistical observatory of trade- and carbon flows between EU member states and their trading partners. Over time, the resulting data would be used by a range of civil society, government and media stakeholders to track egregious cases of carbon leakage and encourage companies to decarbonise their international value chains.

Eurostat could also approach international partners to explain, offer technical support for, and collect feedback on its approach. Specifically, Eurostat should take action to: understand the methodologies employed by other national statistical agencies; determine their comparability with the EU's approach; and identify gaps in data. A continuous process of mutual learning, improvement, and consensus-building around methodological questions is crucial to overcome the mutual recognition difficulties of different aggregation methodologies. Eurostat, in cooperation with other statistical offices, could publish yearly embedded GHG emissions in imports and exports at EU and member state level, thereby allowing for a more objective assessment of carbon leakage and global carbon footprinting. This could encourage policy cooperation for the decarbonisation of joint value chains.

European institutions should flank this initiative diplomatically. For example, the EU could call on the WTO's Technical Barriers to Trade Committee to begin systematically analysing different carbon measures, their respective advantages and disadvantages, particularly with a view towards ease of implementation. Consensus in the

Committee on an ideal set of standards would enable global application of the measure. The EU should also approach trusted and representative international organisations, such as the OECD, UNEP, WTO, UNFCCC, and multipliers, such as the UN High Level Group on the Net-Zero Commitments of Non-State Entities, to take up the methodology. Their political support is essential for the endeavour to be seen as environmentally, and not politically motivated. The network should include researchers from all regions of the world to ensure its impartiality.

To dispel scepticism further, the process could start with a few most suitable import categories, and expand successively. The statistical observatory would gradually grow, data quality improve, and the accounting methodology consolidated. The resulting database and methodology would provide the empirical baseline and measuring tool for imported- and exported goods' true (carbon) contents – as a precondition for fair and functioning global markets.

5.1.3 Continuous CBAM implementation framework

EU institutions and trading partners work together to ensure the efficacy, currency and WTO compatibility of CBAM and other border carbon adjustments (BCA), and address questions arising from their implementation

The next European Commission, including directorates for trade, taxation, and climate could enter into discussions with the EU's trading partners on CBAM implementation, while consulting Domestic Advisory Groups, civil society,

proactive business groups, including the International Chamber of Commerce (ICC), and the European Economic and Social Committee (EESC) on this process. These discussions serve four purposes:

1. Facilitate trade with the EU by preventing trade distortions and disputes arising from CBAM implementation. An open-minded dialogue is aimed at understanding the practical issues faced by its trading partners, and making compliance as accessible as possible, especially for companies from developing countries;
2. Improve EU CBAM's regulation by providing empirical evidence and insights from these discussions to CBAM's review process under Art. 30,¹⁹ and solutions to identified issues;
3. Negotiate transition periods and possible carbon-price reductions with trading partners in accordance with their capacities and transition pathways;
4. Provide a blueprint for a BCA in line with WTO rules for other countries and trade blocs.

Point four can inspire broader debate at the WTO about making BCA and other climate-related trade tools compatible with global trade rules. Discussions could start on the most uncontentious goods, and expand if discussions are constructive. Eventually the WTO's Committee on Trade and Environment could propose its own collaborative

climate measures and be mandated to monitor the implementation of BCAs and other climate-related trade measures.

At the same time, the EU could bring the issue onto the agendas of international trade negotiations to set the preconditions for a successful development and integration of BCA. For example, the EU and its members could:

1. Push for an OECD agreement on a minimum carbon price floor;
2. Put discussions on general principles of CBAM regulation, such as the measurement of carbon prices and emissions reporting frameworks on the G20 agenda;
3. Advocate within UNFCCC to strengthen the NDC framework, to improve data quality on sustainability commitments and indicators;
4. Form joint working groups with the UK, Canada, and other jurisdictions with carbon prices and BCA, to coordinate and streamline the CBAM design and implementation process.

Taken together this could improve the regulation and functioning of the EU CBAM, ensure the compatibility of BCA with WTO commitments, minimise trade distortions and disputes, and advance the development of further climate measures in accordance with global trade rules.

¹⁹ Article 30 describes the reporting and review component of the CBAM regulation. The Commission shall inform the Council and Parliament about the possibilities to extend the scope of the regulation and an assessment of its governance system. Where appropriate, the review should be accompanied by a legislative proposal. (Reg. EU 2023/956)

5.2

Avoiding or preparing for alternative futures

Unfortunately, the future is undetermined and the vision described above might not come to fruition. Instead, the world in 2040 might look quite different. The “Trade 2040” project developed three explorative scenarios to anticipate possible challenges for shaping the future of trade, in order to develop strategic options to avoid or better cope with them. The three scenarios – blue, red, and yellow – are presented here in brief and at length in chapter 4.

The blue scenario describes trade in 2040 as stagnant, contentious, regional, and expensive. The world is divided into a fuzzy Northwestern (NoW) and Southeastern (SotE) trade sphere, imposing diverging standards and redirecting supply chains. The WTO remains ineffective as disputes rise. Ambitious standards on carbon emissions, diffusion of green technologies, and shorter supply chains have reduced trade’s carbon-intensity, however. Countries in the Global South generate considerable income from the extraction of needed CRM. Those with large natural habitats have monetised their natural carbon sinks and ecosystem services, contributing to their economic growth. National adaptation efforts are partly successful, but failure to cooperate diminishes their overall effect. Driven by supply shocks and eco-consciousness, Europe becomes an island of sufficiency. As material consumption grows elsewhere, the world heads towards 2.7°C warming by 2100.

The red scenario sees trade in 2040 that is highly restricted, deglobalised and disrupted by extreme climatic and weather events. A broken hydrological cycle has brought global water scarcity, disrupting food supplies, energy production, trade- and transport infrastructure. The world responds with liberalising food markets and establishing water markets. Agricultural products and (commodified) water remain the only freely traded goods in a contested geopolitical context. The WTO remains paralysed and China has turned inward. Countries and businesses alike regionalise supply chains. Adaptation efforts are partially successful, but the diffusion of green technologies remains highly insufficient. The world is heading towards 4.4°C warming by 2100 (cf. SSP5-8.5) and turns to geo-engineering as the last attempt to stop planetary overheating.

In the yellow scenario, trade in 2040 is booming and mostly “decarbonised” – net zero goods and services are the default. Green energy, inputs, products, and services constitute a growing share of global trade. Global CRM value chains link Africa and South America to the rest of the world via ASEAN processing and refinement facilities. Supply chains suffer from occasional disruptions, but are diversified and resilient. Sino-American rapprochement unlocks WTO reform that aligns trade and climate agendas. Liberalisation efforts are soon joined by many post-default countries

in the Global South, culminating in the 2035 UN Transformation Summit (UNTS). It successfully addresses key hurdles of climate cooperation, but comes too late to address deteriorating climatic conditions. Reducing material consumption remains the world’s last hurdle towards limiting warming to 2°C by 2100.

Such developments are all plausible and compel us to navigate uncertainty by simultaneously pursuing the vision while anticipating suboptimal or undesirable developments and outcomes. The following ideas are “no-regret” options to prepare for multiple alternatives at the same time.

5.2.1 Trade+ (strategic) alliances

Realising the wide ranging and devastating (security) effects of supply chain disruptions – particularly, but not limited to the food, water, and energy sectors – the EU should reinterpret, reframe, expand and elevate its trade relations. It could pursue a diplomatic offensive to establish strategic partnerships with key trade partner countries – when possible at regional level²⁰ – that combines sustainable trade, external action, development cooperation and security policy. The EU and its trading partners should put sustainability at the centre of their negotiations, including by opening up existing trade agreements. Recognising respective priorities and interests, while acknowledging the potential consequences of unsustainable development would constitute a strong foundation for This would require a shift

in mindset by EU negotiators, taking seriously the priorities, interests and agendas of its partners, as well as the potential consequences of their unsustainable development on its own future, in order to achieve strong cooperative relationships that deliver:

- a) A shift to sustainable and resilient production in EU and partner countries;
- b) Sustainable and fair global trade based on sustainable supply chains;
- c) Provide options for developing countries to diversify their foreign direct investment inflows.

Such partnerships would have to be adaptable to navigate an uncertain geopolitical and climatic future: An inclusive and regular review process, and co-created risk assessments would allow the evaluation of past progress and the prioritisation of joint actions. Principles of good governance and accountability could be developed and evaluated jointly.

The trade-related actions to achieve this could include:

1. Increasing financing and identifying new mechanisms to cover the costs of green transitions, including for green infrastructure, technology, and skills, in partner countries, with focus on sustainable food systems and efficient water management.
2. Reducing non-tariff barriers to sustainable trade through mutually negotiated standards, with possible priority focus on water efficiency and food systems innovations.

²⁰ A good example is the 2023 conclusion of the EU-Kenya Economic Partnership Agreement, which the Commission described as the national implementation of a framework agreement with the East African Community from 2016 ([Dombrovskis, 2023](#)).

3. Supporting value retention and green industrial capacity in partner countries through “contracts for difference”.

In establishing partnerships, the EU should demonstrate their benefits, including through active diplomatic and business outreach in partner countries.

5.2.2 CRM with (mutual) benefits

The EU should develop stable long-term relationships with CRM exporting partners in order to ensure their supply and sourcing capacity, while also developing European CRM mining and processing capacity in compliance with strong sustainability standards.

The basis for such partnerships is a framework that can be applied to agreements on trade and investment, environmental protection, and strategic CRM partnerships.

Developing this framework is in line with the objectives of the Critical Raw Materials Act, further detailing how the ambition of “expanding the EU’s network of strategic partnerships with a value chain approach and strong sustainability dimension” can be achieved.²¹ It is compatible with other CRM policy instruments, such as the Global Gateway initiative as a funding vehicle for supply chain projects.

The framework should promote projects that are attractive for partners. In contrast to conventional CRM cooperation projects, the EU should favour and foster more environmentally and socially sustainable modes of operation as part of its CRM cooperation projects, as well as local value creation – offering long-term benefits over short-

term profits. For this value proposition, agreements should contain:

- Guaranteed investments via CRM bonds, technology transfers through licensing and joint ventures, policy and technical support for local value creation and downstream industrial development;
- Mutually agreed social, human rights, and environmental standards, including on circularity;
- Strong monitoring tools that involve civil society and local businesses to rule out “extractivism”;
- Dispute settlement and protection against free-riding (e.g., via purchasing guarantees).

Under such a suitable framework, a German small or medium-sized enterprise could, for example, licence its breakthrough in electrostatic separation technology to a Moroccan entrepreneur erecting a CRM processing plant, gaining access to new international markets for his intellectual property, without having to assess local legal, political, and macroeconomic conditions, or build its own capacities. At the same time, it enables the development of local modern manufacturing capacity.

To garner interest, the framework should be flanked by sustained diplomatic engagement. Leveraging its political capital in international fora in a sustained way is essential for the proliferation of partnerships. Agreement with the United States on common standards would go a long way in creating incentives for others to join in, and establishing broad international consensus on sustainable and resilient CRM supply chains. The

development of such a framework should start as soon as possible, while climate mitigation is atop the global political agenda, and before supply chain shocks materialise.

5.2.3 Cooperatives for International Climate Action (CICAs)

The EU and its member states mobilise their diplomatic arsenal to start discussions on intensified international climate mitigation and adaptation cooperation across sectors. The aim is to achieve faster and more equitable knowledge and technology diffusion and to accelerate decarbonisation and adaptation. At the same time, CICAs would present an opportunity for European green tech companies to access new markets and establish new business relations.

CICAs would take stock of existing technology gaps on mitigation, adaptation and resilience, including in food, water and desalination sectors. They would establish and reinforce targeted cooperation programs across key stakeholders for faster development, deployment and scale up of technology and be responsive to sectoral interest and equity. The EU should frontload investments on water management and agricultural resilience to incentivise participation by other countries. At the same time, CICAs would work to ensure broad market access for new technologies, create opportunities for sharing intellectual property on mitigation and adaptation, and foster a uniform trade

environment, free of non-tariff barriers. It would build on existing initiatives,²² and include research and innovation policy cooperation. At its heart would be a licensing scheme for mitigation and adaptation technology patents, but European universities and other research institutions could play an auxiliary role and benefit from resulting projects.

Cooperatives would embed strong outside review and disclosure requirements, assessment periods, and sunset clauses to exit when deemed ineffective. A common structure of advisory bodies bringing together government, private sector and research institutions would govern CICAs. Participation would be open to all relevant stakeholders committed to funding new technologies in developing countries: Multinationals and industry, governments from developed and developing economies, civil society organisations, international financial institutions and development banks.²³

As technologies become fit for market, international financial institutions would commit to pay the extra cost via “contracts for difference” and give institutional policy support for deployment. This financial commitment is counted under climate finance.

A second stocktake should be completed in 2028, so that a framework for transnational sectoral collaboration can be piloted in 2030. Roadmaps for decarbonisation should be agreed at sectoral level working backwards from 2050.

²² Such as Mission Innovation, Clean Energy Ministerial International Deep Decarbonisation Initiative, Leaders group on Industrial Transition, CGIAR (Consultative Group on International Agricultural Research), IEA Technology Agreements, UNIDO, ISO, FAO.

²³ There would need to be a dedicated effort towards China, currently less involved in the UNFCCC ‘Breakthrough Agenda’.

5.2.4 Climate Resilience & Adaptation Fund for Trade Infrastructure (CRAFTI)

This strategic option seeks to mitigate the increasing risks of climate- and weather-induced damages to maritime trade infrastructure, including current and future shipping routes, and port facilities. Ensuring the climate-resilience of this infrastructure not only secures European supply chains but also contributes to the smooth operation of international trade writ large, to the benefit of all trading nations and businesses.

The EU would launch the fund, while the European Bank for Reconstruction and Development (EBRD) and European industry players, such as shipping majors, logistics service providers and transport insurers would provide seed money. The fund would be open to other stakeholders, including international and regional organisations, countries, and industry representatives. Membership of climate-vulnerable developing countries along the EU's strategic supply chains would be particularly encouraged. Its steering committee would include representatives of the European Commission, European External Action Service, EBRD, industry associations from developing and developed countries, and representatives of the countries in which projects are planned. A consultative body across all actors in the supply chain (ports, logistics, insurers, telecommunications and navigation infrastructure operators), IGOs and CSOs would inform the decision-making process.

The fund is partly financed through membership fees that apply to all members, except developing countries.

In return, members gain access to three distinct functions:

1. Risk assessment services via commissioning anticipatory mappings of climate vulnerability of infrastructure and trade routes. This service is free and necessarily precedes the following service;
2. Loans for long-term infrastructure projects aimed at increasing the climate-resilience of vulnerable infrastructure. Preference and EU co-financing is given to projects facilitating the trade in essential goods like food, medicine, and CRM to the EU. Infrastructure specific to carbon-intensive trade is excluded from funding;
3. Grants for short-term disaster relief and climate-resilient reconstruction are dispersed through the fund. It also lends technical support for sustainable and climate-resilient reconstruction and maintains best-practice exchanges with the UN Office for Disaster Risk Reduction. Where climate change makes reconstruction unviable, CRAFTI helps develop alternative routes.

The political process and outreach to initiate CRAFTI should start as soon as possible, with a view of conducting the first risk assessments by the end of 2026.

Although the expert participants of the "Trade 2040" project created many strategic options, the list of ideas cannot be comprehensive; a different group of people would have developed different or additional options. No strategic option is a silver bullet and there is always more that needs to be done. Accordingly, the reader is invited to think of more ideas for action to shape the future.



Annex



Abbreviations

ACCTS	Agreement on Climate Change, Trade, and Sustainability
ASEAN	Association of Southeast Asian Nations
BCA	Border Carbon Adjustments
CBAM	Carbon Border Adjustment Mechanism
CBDR	Common But Differentiated Responsibility
CCS	Carbon Capture and Storage
CEAM	<i>Chinese Export Adjustment Mechanism</i>
CGIAR	Consultative Group on International Agricultural Research
CICA	<i>Cooperatives for International Climate Action</i>
COP	Conference of the Parties
CRAFTI	<i>Climate Resilience & Adaptation Fund for Trade Infrastructure</i>
CRM	Critical Raw Materials
EBRD	European Bank for Reconstruction and Development
EESC	European Economic and Social Committee
FAO	Food and Agriculture Organization
GATT	General Agreement on Trade and Tariffs
G20	Group of 20
G7	Group of 7
GCC	Gulf Cooperation Council
GHG	Greenhouse Gases
GTFA	Green Free Trade Agreement
IIA	International Investment Agreement
ICC	International Chamber of Commerce
ICT	Information and Communication Technology
IRENA	International Renewable Energy Agency
ISDS	Investor-state-dispute-settlement
ISO	International Organization for Standardization
MENA	Middle East and North Africa
NDC	Nationally Determined Contributions
NoW	<i>Northwestern (trade sphere)</i>
OECD	Organization for Economic Cooperation and Development
PDC	<i>Polycentric Determined Contributions</i>
PPPP	<i>People's Public-Private-Partnership</i>
PPP	Private-Public-Partnership
SIA	Sustainability Impact Assessment
SotE	<i>Southeastern (trade sphere)</i>
TRIPS	Agreement on Trade-Related Aspects of Intellectual Property Rights
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
UNTS	<i>United Nations Transformation Summit</i>
WTO	World Trade Organization

The italicised items are things that have been "imagined" by the foresight group.

Glossary

Backcasting: The activity of establishing roadmaps from a certain point in the future to today.

Environment scanning: the activity of brainstorming and collecting factors that potentially affect developments relevant to the topic under investigation.

Factor assessment: the activity of assessing factors collected during environment scanning according to their relative impact on the topic and uncertainty of development.

Green populism: a blend of politics that combines populist communication techniques and measures with high ambitions for climate action.

Influential factors: factors that affect or influence developments relevant to the topic under investigation.

Pre-mortem analysis: a strategic foresight technique aimed at testing and improving the robustness of strategic options. It deliberately investigates possible points of failure, in order to enable preempting them.

Roadmaps: thought experiments consisting of a plausible path from a desired future to today, including possible hurdles and actions needed to overcome them.

Stress-testing: the activity aimed at increasing the robustness of strategic options by assessing their effectiveness against the background conditions of different scenarios.

Threat scanning: the activity of brainstorming and collecting potential future threats to the achievement of an actor's stated goals or vision for the future.

Threat assessment: the activity of assessing the potential threats collected during threat assessment according to their impact, uncertainty, and controllability.

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Participants included

Adrien Assous

Léa Auffret

Paul Baker

Richard Baron

Kimberley Botwright

Claire Bulger

Andrew Child

Joseph Dellatte

Victor do Prado

Duncan Edmondson

Virginia Enssle

Lucy Gilliam

Marcel Hadeed

Kateryna Holzer

Letitia Jentel

Poorva Karkare

Matthew Langdon

Kate Larsen

Pierre Leturcq

David Luke

Peter Lunenborg

Cecilia Mattea

Dan Plechaty

Christoph Scherrer

Aylin Shawkat

Katie Swan-Nelson

Colette van der Ven

Mark Workman

All participants took part in the project in a personal capacity. Results are derived from a group process, therefore statements and ideas cannot be attributed to individual participants, nor reflect the opinions of their institutions.

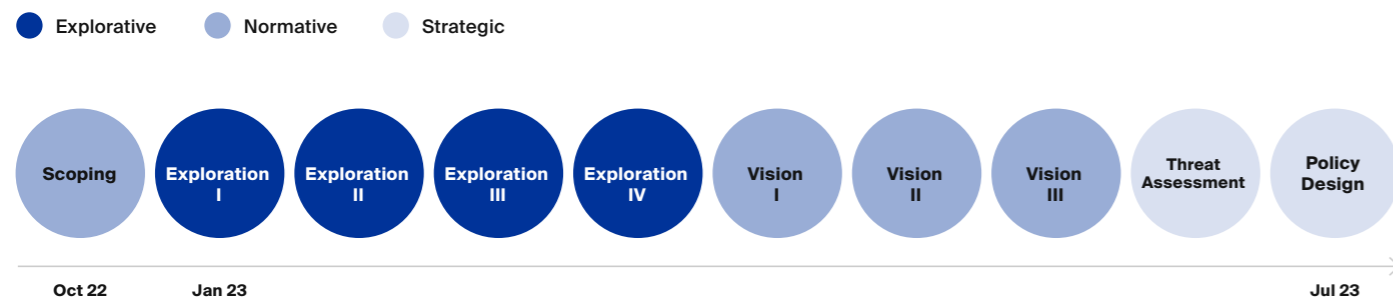
We also want to acknowledge and thank all participants of the interim events for their time and contribution to the validation of the scenarios.

Methodological approach

In total, a series of nine workshops was held between January and June 2023 (see overview illustration in the next chapter). Four workshops – one virtual and three in person – comprised the explorative track. The normative track included three workshops, of which one was virtual. The strategic track consisted of two in-person workshops. A total of six preparatory surveys preceded workshops. A total of four groups of participants participated – one each in the explorative and normative track, the threat analysis and policy design workshop. Participants were invited based on their background and field of expertise, in order to guarantee a diversity of perspectives within the groups.

The project started with a scoping exercise (1) to define and delineate the topic under investigation and formulate guiding questions. *The Future of Trade in a World Approaching Net Zero 2040* reflects the universally recognised reference point of net neutrality by 2050, and the practical imperatives of the employed foresight methodology. Given that the future cone grows exponentially over time, extending the time horizon further than 2040 would have had detrimental effects on the quality and usefulness of attained insights. It was therefore defined that in 2040, by and large, the world was still pursuing the path towards decarbonisation by 2050.

Figure 4: The overall project process



The explorative track

Guiding questions for the explorative track were: “What can trade in 2040 in a world approaching net-zero possibly look like? And what opportunities and threats might lie ahead?” It approached these questions by first conducting an environment scanning (2). Participants were asked in a survey to name

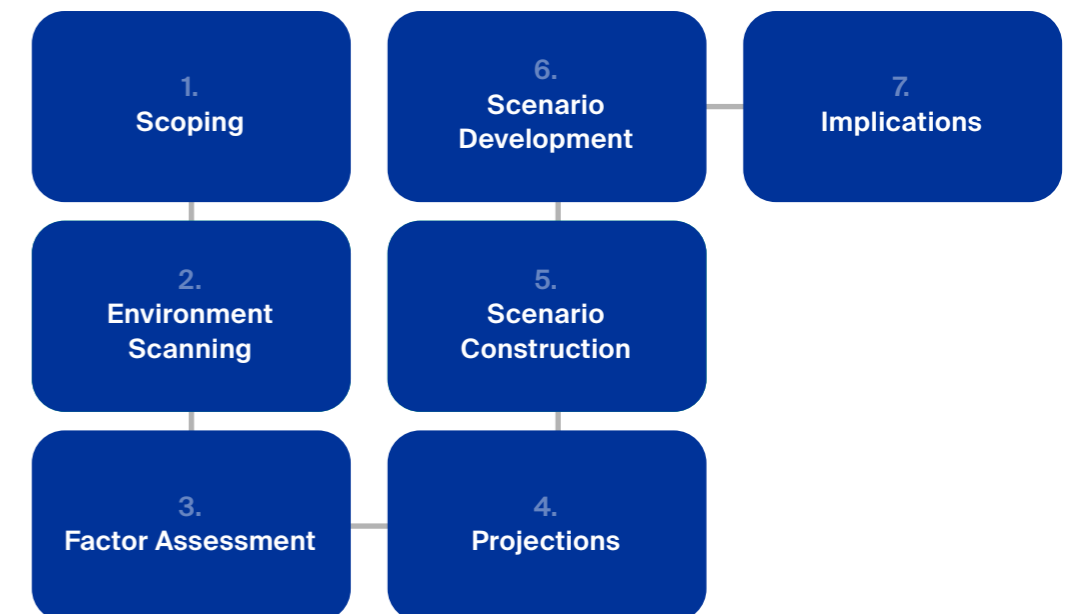
influential factors for the future of trade. Over 100 submissions were clustered into 52 influential factors. In the kick-off workshop, participants conducted an uncertainty-impact analysis (3) to define relevant trends (high impact, low uncertainty) and key uncertainties (high impact, high uncertainty). Key trend assumptions comprised: *Continuous innovations and growing markets;*

Conflict, competition and shift away from Washington Consensus; Incentives for unilateral actions have increased; On track to achieving net zero by 2050. Then, participants selected eight key uncertainties around which to construct the explorative scenarios:

- *Food Systems Disruptions and Government Responses;*
- *China's Growth Model and Integration in the Global Economy;*
- *Climate-Induced (and other) Damages on Trade Infrastructure, Routes, and Production Hubs;*
- *Adaptation Efforts; Demand and Value Allocation of Critical Raw Materials (CRM);*
- *Fiscal Space;*
- *Approaches to Trade Cooperation in 2040;*
- *Material Consumption (Influenced by Preferences and Regulation) and its Geography.*

Projections (4) of plausible developments – that were mutually exclusive and cumulative exhaustive – were constructed for each key uncertainty, thus capturing the entire possibility space. Next, a cross-impact-balance analysis tested the internal consistency of each possible projection pair (see illustration in the next chapter). Scenario frameworks were constructed (5) using the most coherent combinations of projections of the eight key uncertainties. These were further developed (6) into complete explorative scenarios by elaborating both a heuristic picture and history of the future. The explorative track ended with a first elaboration of threats and opportunities for the EU and drawing implications (7) from the scenarios.

Figure 5: Overview of the Foresight Intelligence explorative scenario planning process



The normative track

In the normative track, a new group of experts sought to answer the question: “what would a desirable future of trade in 2040 look like? And what steps could be taken already today to move into the right long-term direction?” (1).

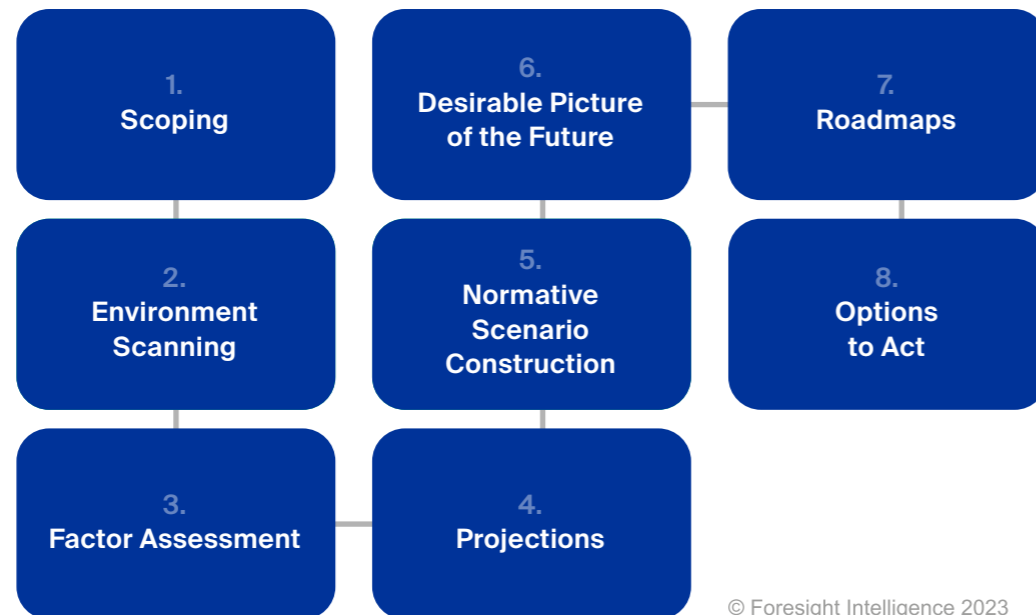
Building on, and adding to the list of influential factors developed during the explorative track (2), participants conducted an uncertainty-controllability-impact analysis to determine six key uncertainties (3) for a vision for the future of trade. These included:

- *New trade rules enabling climate ambitions;*
- *Global consumption emissions patterns;*
- *Level of geo-economic and geopolitical conflict;*
- *Prioritisation of climate change in domestic policy (in line with global climate goals);*
- *Political commitments to equitable global transition (by global north, including money, knowledge, technology transfers, de-risking, ...);*
- *Global equity in development.*

Next, projections were developed (4) on the worst case, status quo, the utopian best case; and the imaginable (plausible) best case. The imaginable best cases were combined to construct a normative scenario (5). A desirable picture of the future (6) was drafted, and potential inconsistencies discussed in the plenary.

Next, the group decided which aspects of the vision to focus on to conduct a backcasting exercise (7). It defined the assumption that the *global order would be built on new eco-social contracts and selected taxation and finance; states and the provision of public goods; and updated trade rules* as topics for roadmaps. Backcasting roadmaps is an iterative process of identifying hurdles and solutions, and their preconditions, retracing the path from a defined endpoint in the future to today. Roadmaps provided a starting point for discussions on possible strategic options (8). These were created in working groups and validated by the plenary using a pre-mortem analysis.

Figure 6: Overview of the Foresight Intelligence normative scenario planning process



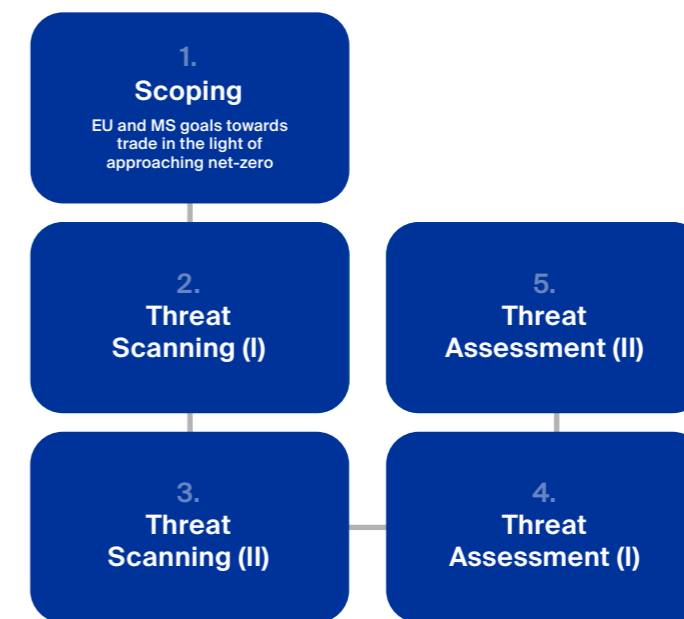
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The strategic track

The strategic track was dedicated completely to analysing the implications derived from the scenarios: It developed strategic options for the explorative scenarios and stress-tested the strategic options developed in the normative track. It consisted of a threat assessment and a policy design workshop. The threat assessment workshop started with a definition of EU

goals, in order to then analyse threats to achieving these goals emanating from the three explorative scenarios and beyond. After collection, threats were then assessed using a novelty-impact assessment. The group determined threats too important to miss, as well as those that are underappreciated or neglected. Thus a selection of threats to focus on was determined for the scenario landscape.

Figure 7: Overview over Foresight Intelligence threat analysis process

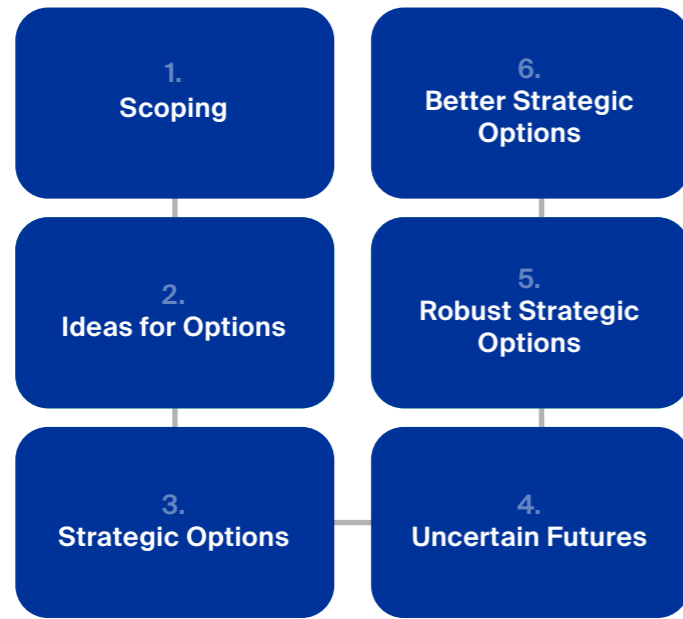


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The final, strategic policy design workshop developed strategic policy options for the EU based on the threats identified. Initial ideas were submitted in a survey. During the workshop, four ideas were selected according, in part, to the size of the current strategic gap in the policy space. They were then refined to clearly attributable, actionable items, before being stress-tested against the

conditions of each explorative scenario. This testing allowed the group to make the developed policy options more robust against the backdrop of uncertain futures. A pre-mortem analysis was the final step before finalisation of strategic options. The strategic track concluded with a stress-testing survey for the policy options developed in the normative track.

Figure 8: Overview over Foresight Intelligence strategic policy design process



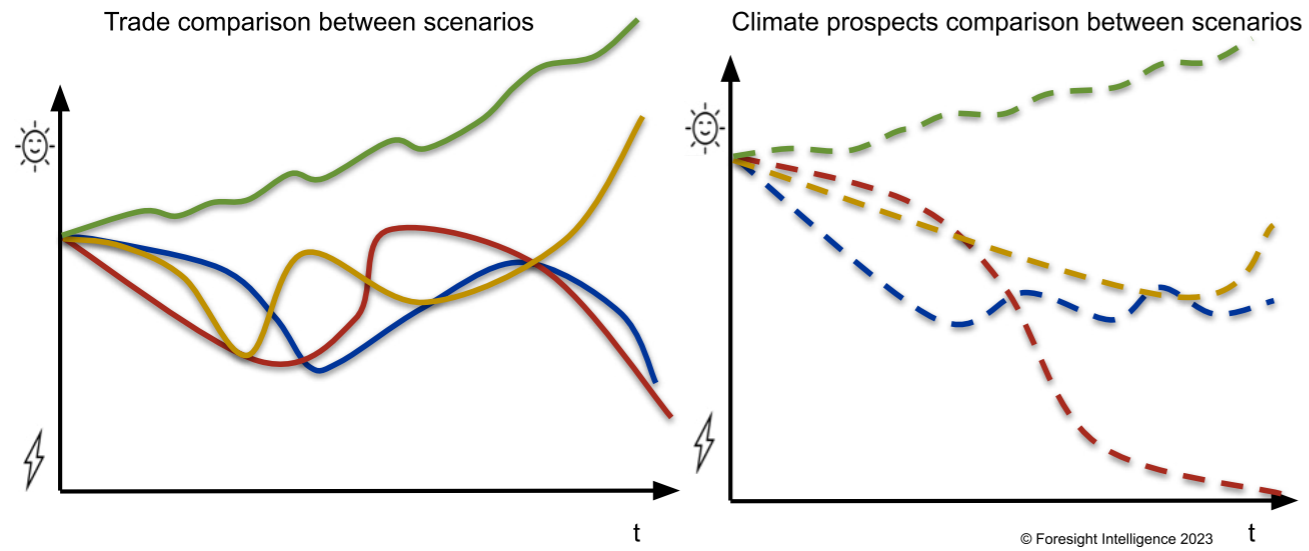
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Tables and visualisations

Table 4: Threats identified in the strategic track

	Blue Scenario	Red Scenario	Yellow Scenario
Climate prospects	Climate impacts more or less on the level as expected. Pathway: 2.7°C by 2100	Frequent and severe climate impacts. Pathway: 4.4°C by 2100	Pathway: 2°C by 2100 If overconsumption is solved; otherwise heading towards tipping points?
Food security	Disrupted, especially late 2020s, intensified through im- and export restrictions. In 2030s, international cooperation on adaptation helps to manage food insecurity.	Massive insecurity; water scarcity. Water cycle is broken. Malnutrition. Agriproduct trade down; supply insecurity.	The massive disruptions to food supply in the 2020s depress agricultural trade and lead to ongoing malnutrition in Central America and Sub Saharan Afrca until they are solved by the World Food Fund and adaptation efforts at the end of the 2020s.
Trade infrastructure	Occasionally disrupted in the late 2020s. Potentially including infrastructure in space due to weaponization of space.	Water scarcity physically disrupts production, trade routes and transport infrastructure massively (Panama Canal). Potentially including infrastructure in space due to weaponization of space.	Regularly disrupted. Potentially including infrastructure in space due to weaponization of space.
CRM	CHN uses its own CRM for itself first. Later, it uses its technosphere to monopolize CRM even more and bind CRM exporting countries.	CRM cartels (led by CHN) increase prices because supply is hampered by water scarcity. Deep sea mining could have feedback effects on food systems.	Managed through the UN Transformation summit (diversification and sustainability of CRM supply chains is discussed); however, under non-western rules.
(Trade) order	In decline because of emerging trade- and technospheres. Decreased ability of (democratic) governance systems to steer. Breakdown of WTO / international rules-based (trade) order (see red).	Supply chain insecurity does not lead to cooperation but to decline of (trade) order. US-CHN competition fuels the decline of (trade) order(s). Decreased ability of (democratic) governance systems to steer. Breakdown of WTO / international rules-based (trade) order (see blue).	A more equitable liberal order is created, bringing in line the climate and trade agendas. <i>However, the EU loses relative influence to China.</i>

● Opportunity ● Severe Threat ● Less Severe Threat ● Minor Threat



Quantified directional development of key trade dimensions compared to 2023 and each other

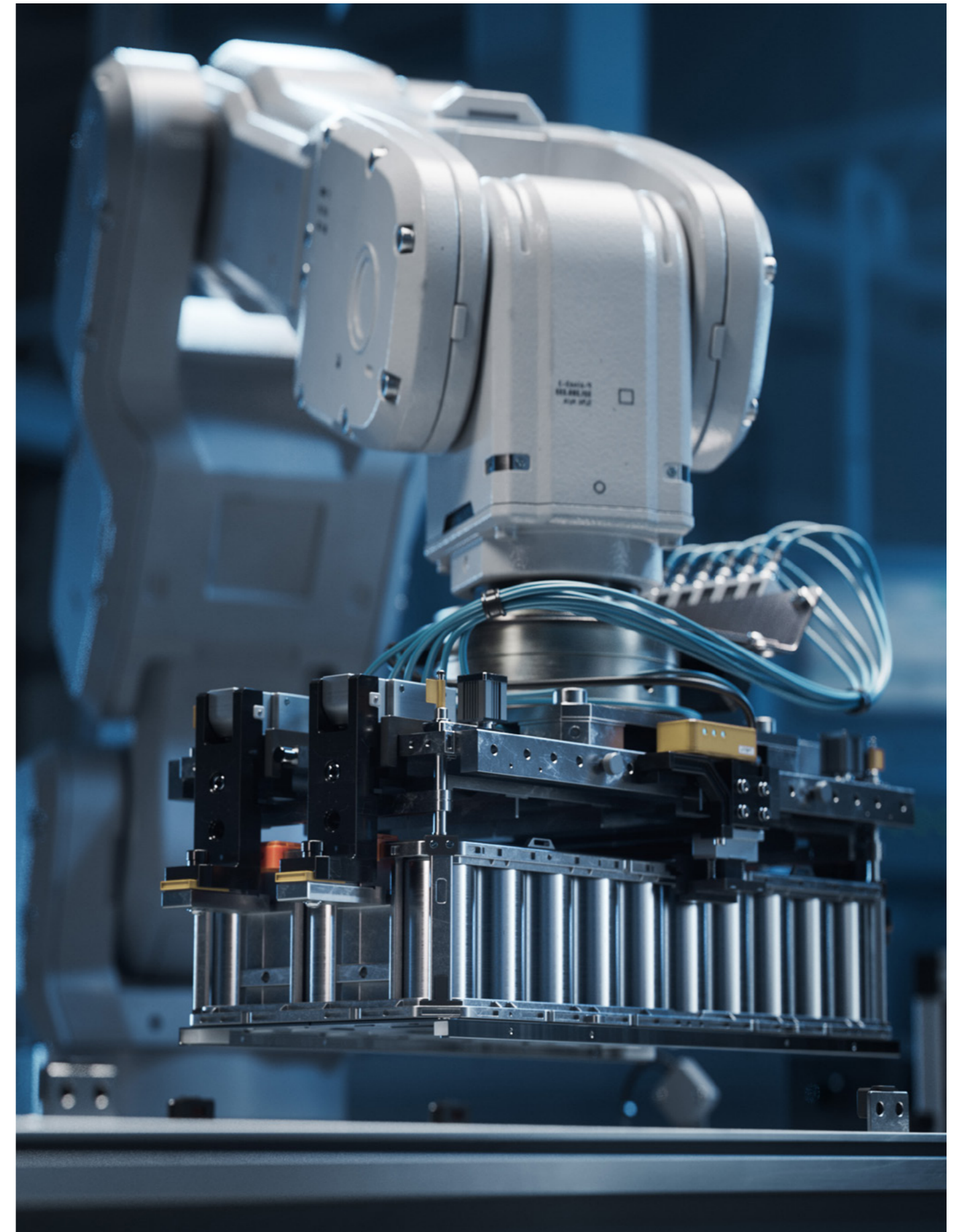
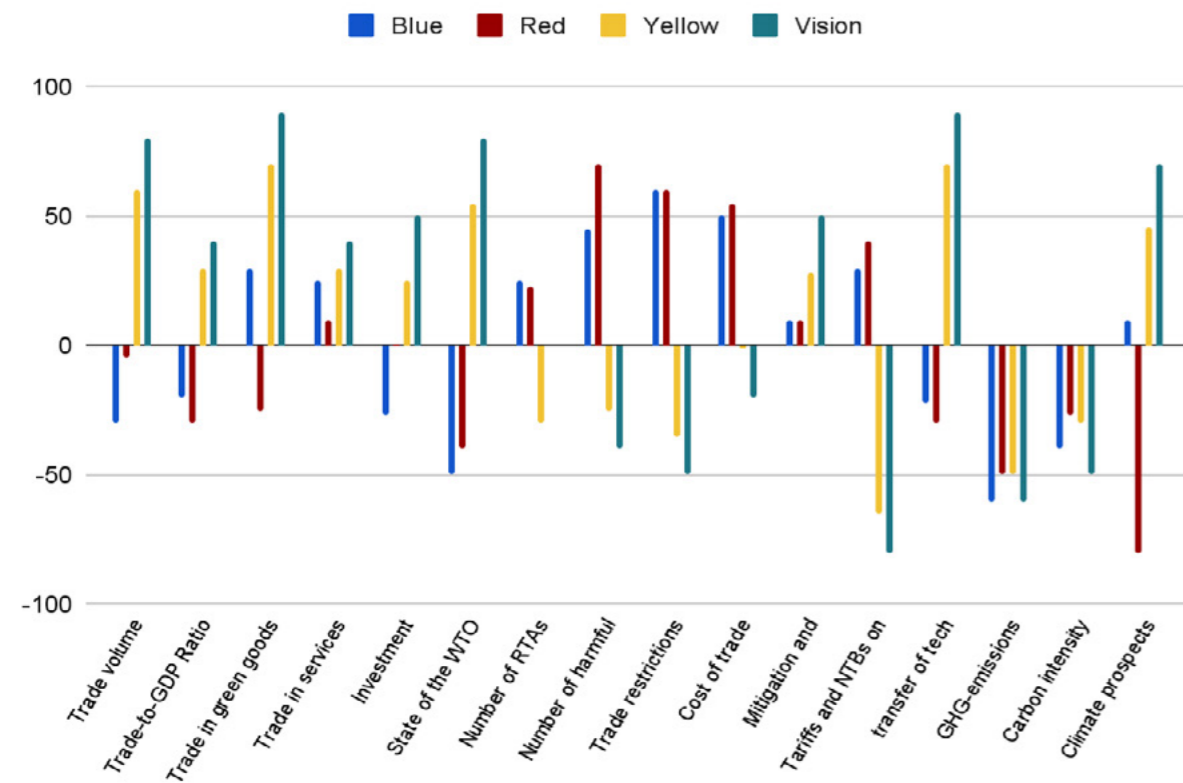


Figure 9: Example from the cross-impact-balance-assessment

