RAND EUROPE

Knowledge Economy 2045

A vision for the future

WORKSHOP PROCEEDINGS

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Published by the RAND Corporation, Santa Monica, Calif., and Cambridge, UK

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About this document

Knowledge Economy 2045

Knowledge Economy[1] 2045 (KE2045) is a project led by RAND Europe, in collaboration with the Scotia Group, St Andrews (ILCR), The University of Cambridge (Peterhouse), The University of Oxford (Smith School), the International Bar Association (IBA), and the British Institute of International and Comparative Law (BIICL).

KE2045 moves beyond the narrow Net Zero 2050 lens, reframing the challenge as a holistic transformation to a knowledge economy by 2045 – where decarbonisation is not a siloed target but is embedded across finance, governance and technology. The point is not to chase climate targets in isolation, but to treat 2045 as the new moonshot: climate outcomes become a consequence of economic transformation, not the other way around. This approach provides a framework that can be adopted, legislated, and coordinated internationally, shifting the focus from compliance to systemic change. Net Zero 2050 remains a necessary milestone, but it is not sufficient; what is required, is to make decarbonisation intrinsic to the evolution of the global economy – a knowledge economy that drives climate solutions, underpins sustainable growth and puts planetary stewardship at the core of every sector. This is the only framework that is both politically and scientifically robust, because it links climate action to economic transformation, rather than treating it as a standalone mitigation exercise.

Three Horizons workshops

As part of this project, RAND Europe implemented the Three Horizons Framework, carrying out a series of workshops. The workshops' Three Horizons approach maps the transition from current energy-economic arrangements (Horizon 1) through emerging alternatives (Horizon 2) to the transformed knowledge-based energy economy of 2045 (Horizon 3). Through three virtual sessions in the autumn of 2025, the team engaged diverse stakeholders in mapping pathways from current energy-economic arrangements to the KE2045 vision. The workshop methodology combines rigorous policy analysis with participatory scenario development, reflecting both academic rigor and a commitment to democratising expertise.

Participants worked together to identify specific institutional innovations, policy mechanisms and international agreements necessary to realise energy systems that embody knowledge economy principles of accessibility, experimentation and collaborative innovation. The ultimate goal was to develop actionable roadmaps that connect immediate energy transition challenges to

1 The concept of the knowledge economy has evolved from Fritz Machlup's pioneering identification of 'knowledge industries' in 1962 through Peter Drucker's articulation of 'knowledge workers' to Paul Romer's endogenous growth theory emphasising innovation as the primary driver of economic development. This intellectual trajectory reveals a fundamental shift from economies based on physical capital and natural resources to systems where intellectual capabilities, information processing and collaborative innovation become the primary sources of wealth creation and competitive advantage. (Machlup 1962; Drucker 1967; Romer 1990)

the transformative potential of democratised knowledge-based production by 2045.

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Funding

The Knowledge Economy 2045 project is funded by Professor Dr Malik R Dahlan.

Acknowledgements

RAND Europe would like to thank Professor Dr Malik R Dahlan for his support and vision in initiating this work. We would also like to thank all participants in the workshop sessions for their valuable insights.

Executive summary

Issue

Current global governance, legal and economic frameworks – largely rooted in Western and state-centric traditions – are increasingly ill-equipped to manage the complex, interdependent challenges of the 21st century. Demographic shifts, climate instability, technological transformation and growing inequities between the Global North and South are exposing structural limitations to how global coordination and accountability are organised. Institutions such as the United Nations (UN), International Monetary Fund (IMF) and World Trade Organization (WTO) continue to operate through narrow, siloed mandates that struggle to address interconnected crises spanning finance, trade, migration and digital sovereignty.

At stake is the ability to reimagine governance and institutional design for a multipolar world by 2045 – one in which power, authority and responsibility are distributed more equitably, and legitimacy derives not from dominance but from inclusion, solidarity and responsiveness to planetary and human needs. This context also demands a rethink of the underlying economic logic: moving beyond monetary systems that prioritise short-term efficiency towards those that value global public goods such as climate stability, peace, culture and biodiversity.

Approach

There were two workshop sessions exploring complementary dimensions of transformation:

- **Session 1: Third horizon – a new world order**
  Participants examined how multipolar governance and law might evolve if leadership shifts towards the Global South. Discussions focused on moving beyond 'Westphalian' state sovereignty to more fluid, networked systems of cooperation. Breakout groups explored principles of subsidiarity, interdependence and dignity as foundations for 2045 governance, as well as mechanisms to balance sovereignty with collective global action. Panellists critiqued the dominance of Western frameworks and proposed reforms to institutions that foster accountability, inclusiveness and a 'voice for nature'.
- **Session 2: The supply chain of meaning**
  This session focused on economic and technological infrastructures underpinning global resilience. Breakout groups explored how supply chains, energy systems and financial architecture can evolve from optimising cost and speed towards embedding justice, sustainability and social value. Panellists analysed lessons from recent disruptions (pandemics, energy shocks) and debated how hybrid physical-digital systems, carbon tokenisation and Pigouvian incentives might support both resilience and equity.

Throughout both sessions, discussion emphasised the need for bold structural reforms alongside localised and inclusive approaches. Ideas for transitional activities between 2025 and 2035 included reforms to global representation, piloting of Global South leadership councils, fiscal instruments linked to public goods, and participatory platforms for decision making.

Workshop outcomes

Workshop breakout groups produced a wide range of ideas, from the transformation of existing institutions, the proposal of radical new economic and monetary systems, and the importance of including marginalised perspectives representing the Global South and even nature itself. Below we summarise some of the key concepts visited during workshop discussions and significant themes that have emerged.

Across all discussions, the workshop articulated a shared vision: by 2045, global governance should reflect multipolar leadership and solidarity, enabling inclusive, resilient and ethically grounded systems that align economic activity with environmental stewardship and human dignity. This transformation will depend on innovative institutions, equitable financial mechanisms and a renewed commitment to the common good in a deeply interconnected world.

Conceptual shifts were emphasised, including:

World governance without world government: Participants envisioned distributed, cooperative networks replacing rigid state-centric models.

Economics of public goods: Panellists proposed new currency and valuation systems backed by ecological and social contributions rather than extractive productivity.

Subsidiarity and multilevel governance: Decisions should be made at the most effective level, integrating regional, local and global perspectives.

And thematic insights emerged, such as:

Inclusion and representation: Greater participation of the Global South, local communities, and even nature, was seen as essential for legitimacy and equity.

Institutional reform: Existing bodies need transformation to bridge silos and foster trust; finance and trade governance must be rebalanced.

Resilience and justice: Supply chains, technologies and energy systems should prioritise resilience, fairness and sustainability over efficiency.

Ethical boundaries: Technology and AI should serve moral and ecological ends, governed through transparent, ethical frameworks.

Positive narratives: Communication of global transitions must highlight cooperation and opportunity rather than catastrophe.

Recommendations for KE2045 policymakers

Based on the discussions across the two workshop sessions, we have drawn together the following seven recommendations from workshop participants for KE2045 policymakers:

1. **Reform global institutions**

   Increase Global South and marginalised representation in major bodies (UN, WTO, IMF) and pilot inclusive leadership and participatory platforms.

2. **Embed resilience and justice in supply chains**

   Create frameworks for resilient, just and inclusive supply chains, address trade imbalances, and ensure fair access to essentials.

3. **Accelerate the energy transition**

   Subsidise green energy to reduce fossil fuel reliance, align infrastructure with climate goals, and promote international cooperation on energy security.

4. **Innovate financial systems for sustainability**

   Develop new financial models (e.g. carbon-backed currencies, regeneration funds) that price externalities to reward positive impacts and integrate fiscal compensation for local contributions to global goods.

5. **Strengthen digital and physical infrastructures**

   Invest in hybrid physical-digital systems for supply chains and energy, while enhancing cybersecurity and data governance.

6. **Promote holistic, system-wide resilience**

   Foster cross-disciplinary and multilevel governance and embed ethics and morality in tech and policy solutions.

7. **Shape positive, inclusive narratives**

   Communicate environmental and global cooperation benefits positively, while involving diverse stakeholders in narrative and policy development.

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1. Workshop session 1
The new world playbook
Governance | Law | Multipolarity

1.1. Purpose

'This session is not about predicting the future, it is about *imagining* it. Together, we will test ideas, challenge assumptions, and consider the architectures that might guide humanity through the 21st century.'

The focus of workshop session 1 was a Third Horizon[2]; a new world order. Below we layout the scenario framing the discussion across the two breakout groups, focused on what this new world looks like in 2045, and how it works.

1.2. Scenario

The year is 2045 and new legal and institutional architectures have begun to take shape in the void left by the fractured old global order. In this new multipolar world, authority is no longer concentrated in a handful of Western powers but distributed across diverse regions and voices.

This session will examine how by 2045 the Global South rose to legal leadership, shaping frameworks that prioritise dignity, sovereignty and interdependence. Beyond the Westphalian model of states as isolated actors, we imagine new post-Westphalian approaches that are fluid, plural and rooted in shared responsibility for global challenges.

1.2.1. Themes to explore

Based on this scenario, we identified the following themes to explore:

- Emerging institutions and treaties for climate, migration, digital sovereignty and resource sharing
- Evolution of legal systems guided by non-Western traditions and philosophies
- Multipolarity as a pathway to equity
- Governance frameworks designed for dignity, not only efficiency or control

2 The term 'Third Horizon' in the context of global affairs refers to a desired, long-term, and fundamentally new vision for a global system that could emerge as a successor to the current dominant, but increasingly failing, system. It stems from the 'Three Horizons Framework' developed by futurists and strategic planners. In this framework, Horizon 1 (H1) represents the current, dominant 'business as usual' system. Horizon 2 (H2) is a space of transition, innovation and experimentation. It involves new ideas, movements and initiatives that challenge the status quo. Horizon 3 (H3) is the long-term, visionary alternative – a fundamentally different, viable, and often more sustainable and equitable 'new world' or global order. As a shaping vision, the third horizon is based on deep aspirations and new worldviews (e.g. global cooperation, regenerative cultures, new governance models) that are currently only visible in 'pockets of the future in the present'. (Sharpe 2020; International Futures Forum, 2026)

1.3. Breakout group 1: Multipolar governance and legal leadership

Focus: How governance and law might function in a multipolar world where authority is distributed globally.

The discussion in breakout group 1 centres on how global governance and law might evolve in a multipolar world by 2045, particularly if leadership shifts towards the Global South. Participants explored the need for new guiding principles and questioned how a 'post-Westphalian' system could foster more fluid, cooperative networks beyond rigid, state-centric models. They debated the effectiveness of current institutions like the World Trade Organization (WTO), International Monetary Fund (IMF) and United Nations (UN), noting that while trade governance works relatively well at the international level, finance remains dominated by national central banks, limiting global coordination. The group emphasised the importance of including Global South voices and addressing local concerns, especially given demographic shifts and resource distribution, and discussed the potential for new forms of representation (such as a voice for nature) and multilevel governance that balances subsidiarity with collective action. Overall, the conversation highlighted the need for more inclusive, adaptable and cross-disciplinary approaches to global governance in response to shifting power dynamics, climate challenges and emerging technologies, while ensuring legitimacy, accountability and solidarity across diverse actors and regions.

Questions for discussion:

- By 2045, if global governance is led by the Global South, what core principles (e.g. dignity, equity, interdependence) might guide decision making?
- How could a 'post-Westphalian' world operate, where states are not isolated actors but part of fluid, cooperative networks?
- Which emerging institutions or treaties might dominate global governance for climate, migration, digital sovereignty or resource sharing?
- How do we balance the sovereignty of individual states with the necessity for collective action on global crises?
- What mechanisms would ensure legitimacy and accountability in a world of shifting alliances and fractured trust?

Prompt:
'Imagine a global council in 2045 setting rules for climate, trade and technology. Who sits at the table, and how do decisions reflect multipolar leadership rather than Western dominance?'

Panellists raise a critique of current global governance and legal structures, noting that they are largely built on Western frameworks and values. There is a question around solidarity in not only governance and legal structures but also beyond the rule of law, incorporating principles that reflect the needs and realities of a broader portion of the world's population.

The limits of international organisations

Panellist 1: When speaking about multipolar leadership, Panellist 1 queried whether we are referring to the leadership of individual countries or organisations. Does multipolar leadership require organisations like the UN, or is it more about bilateral discussions? The panellist claimed that if the intention is to have discussion between countries and regional organisations, then the forum for that discussion needs to be less rigid than the UN. While countries and organisations should sit at the same level, the panellist believed that organisations should be limited to participating as observers.

Panellist 2: One problem of the current setting is the siloed focus of institutions, and the constrained set of tools they will apply to problems as a result. For example, the IMF takes a narrow focus on monetary matters, and while it is beginning to work on supply chains and technologies, it still addresses these areas through particular monetary levers. Similar is true of legislation and policy regarding trade and climate. This highlights not only the need for multipolar leadership (in the sense of a distribution of authority) but also for cross-disciplinary skills and approaches.

The panellist called for 'multilevel governance', where decisions are made following a 'principle of subsidiarity'.[3] They argued that not all goals can be achieved centrally, and that there is a need to consider regional and local particularities. One example where non-siloed, multi-governance thinking works – albeit imperfectly – is with respect to the three pillars of international economic law: money, investment and trade. In each pillar, one level of governance predominates (e.g. the WTO sets global rules for trade and resolves disputes). However, in the area of international finance, governance is less effective: central banks, which operate at the national level, have the most power over monetary policy and financial stability. International bodies like the IMF and World Bank exist, but national interests and policies often dominate, making global coordination more difficult.

A voice for the Global South

Panellist 3: The panellist drew attention to the Global South and ensuring that the concerns of local communities are voiced. They called for a more bottom-up approach, adopted on a principled basis, to ensure that marginalised and excluded perspectives are considered.

Panellist 4: The panellist highlighted changing demographics, climate-related risks leaving parts of the world unliveable and associated questions of migration between the Global North and South. They suggested that there is an artificiality to the distinction between the problems faced by these two groupings due to the interconnectedness of these challenges across borders.

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3 'Subsidiarity' holds that sociopolitical decisions should be made at the most local level possible, and that higher-level, central authorities should only intervene if a goal cannot be sufficiently achieved by lower levels of government. The principle of subsidiarity was formally introduced into EU law in the Treaty on European Union (Article 5(3)), formally committing the ratifying states to a hierarchy wherein member states can retain and exercise their competencies at the national level and in which the central EU authorities maintain a position where they are obligated to intervene only when member states cannot attain their goals. (Ken 1994; European Union 2012)

Panellist 5: The panellist called for a voice representing nature in governing bodies. They pointed to leadership of the Global South in court discussions around recognising rights of nature.

Panellist 6: The panellist picked up the point on demographics and climate risk, stressing the issues of rising temperatures and unliveable places. They raised the risk that failure to evolve our governance structures will exacerbate the sense of haves and have-nots.

Panellist 4: The panellist supported the hypothesis of Panellist 6, stating that increasing migration flows are already leading to a backlash in the form of increasing populism. They suggested better assimilation strategies would help quell populist responses to immigration. Besides capturing the voices of the Global South, as supported by Panellist 3, the panellist held that it will be important for a broader range of actors to be involved in the development and exploitation of Global South resources. They took the case of Chinese involvement in African resource development as an example of economic determinants (debt, need for investment) undermining the independence of some countries' thinking. In other words, some African countries' policies and decisions are influenced by economic pressures that can limit their ability to act independently or prioritise their own long-term interests. If other actors take a greater stake in these resources, African countries may find themselves less beholden to single actors such as China, and able to make more independent decisions.

Finally, Panellists 1 and 3 called for reforms of existing institutions to foster a greater sense of global community, understanding and listening.

1.4. Breakout group 2: Designing institutions for 2045

Focus: Reimagining institutions that address global challenges while fostering equity and shared responsibility.

Breakout group 2's discussion focused on reimagining global institutions to better address complex challenges like climate change, pandemics and migration by 2045, with an emphasis on equity, dignity and shared responsibility. Participants questioned how new governance frameworks could move beyond traditional efficiency and centralised control, instead prioritising inclusion and legitimacy in a multipolar world where trust in established powers is fractured. The group highlighted the importance of adequate funding, inclusive structures and the provision and development of education, food and health in the Global South. The group also discussed the importance of recognising both formal and informal governance systems, and proposed innovative ideas such as a global regeneration fund, citizen assemblies and smart currencies to incentivise stewardship of global public goods. Overall, the conversation highlighted the need for holistic, adaptive and participatory institutions capable of aligning economic activity with social well-being and environmental sustainability, while ensuring that the voices and resources of the Global South are fully integrated into global governance.

Questions for discussion:

- What kind of institutions or governance frameworks are needed to address global challenges like climate change, pandemics and migration by 2045?
- How can these institutions be designed to prioritise dignity, equity and inclusion rather than efficiency or centralised control?
- How might digital technology, AI or decentralised networks reshape global decision making and accountability?
- In a multipolar world, how do institutions maintain legitimacy when trust in traditional powers is fractured?
- Can we envision cooperative structures that allow diverse regions to contribute equally without dominance by any single power?

Prompt:
'Imagine a global institution in 2045 tackling climate or migration crises. How does it operate, who participates and how are decisions enforced fairly across regions?'

Panellist 7: The panellist expressed that there is a need for world governance that leaves all countries better off, but pointed to challenges to achieving substantive change in the face of political friction and lacking infrastructure. They said that funding or resources for action is crucial. When money and resources are available for concrete action, it helps align and motivate the interests of different stakeholders, and the effective distribution and availability of these resources are the essence of a 'global system of benefit'.

Panellist 8: The panellist stated that the knowledge economy must focus on education. In the context of the Global South, economic development funding must also prioritise food and health. In order to implement this, an array of instruments urgently need changing. Furthermore, addressing environmental challenges will help promote higher quality of life.

Panellist 9: The panellist emphasised ecological and generational justice, stressing we need institutions that can cater to both nature and people. They proposed these institutions use the concept of 'global commons'[4] as a governance framing. They proposed mechanisms such as a global regeneration fund (funded by global common levies and tax on AI), citizen assemblies,

4 The 'global commons' refers to natural systems, domains and resources that lie outside the jurisdiction of any one state and are accessible to all. Traditionally, examples of global commons include the oceans, atmosphere, Antarctica and outer space, while bodies have recently advocated for an expanded view that encapsulates domains such as cyberspace and the interconnected ecosystems and services that keep the planet stable – such as rainforests, subsurface and climate. (Schrijver 2016; Chertoff et al. 2014; Rockstrom et al. 2024)

cross-border collaboration and a suitable smart currency with pricing and re-pricing mechanisms that incentivise the funding of global public goods and tax payments.

Other overarching themes from this second breakout group were the need for fluid and holistic institutions, the restructuring and reorientation of global financial institutions towards sustainable growth, recognition of formal and informal governance systems – as well as universities and research institutes – in world governance and alignment of economic activity with social wellbeing and environmental stewardship in order to facilitate transformational change. Similarly to the first breakout group, panellists emphasised that the UN would not suffice as a world government structure and requires reform.

1.5. Seeding the transition

Following the breakout group discussions, the moderators brought together panellists to discuss potential activities that might move us towards the institutional and governance structures explored in the breakout groups.

> 'We've just imagined *what* global governance, law and institutions might look like in 2045. Now we'll turn to the *'how'* – what concrete steps between now and 2035 could realistically move us towards those futures?'

The moderators briefly recapped the themes explored in the breakout group discussions, highlighting the shared principles or goals emerging from panellists' visions:

- **Breakout group 1**: Multipolar governance and legal leadership
- **Breakout group 2**: Inclusive, equitable institutions for 2045

Panellists were then prompted to explore specific activities that could begin the transition process:

Guiding question: 'What *policy actions or institutional reforms* could begin this transition in the next decade (2025–2035)?'

Examples to spur ideation:

- Reforming representation in existing bodies (UN, WTO, IMF)
- Embedding indigenous and local knowledge into climate treaties
- Creating pilot 'Global South leadership councils'
- Testing digital participatory platforms for global decision making

The focus of panellists' deliberations was structural shifts to economic and monetary policy. Panellist 10 proposed that shifts of similar magnitude to the shift to the Bretton Woods[5] system will be necessary to achieve goals for the global benefit. Panellists proposed that a critical conversation needs to be had about the purpose and impact of currencies – there is an opportunity for new systems based on digital assets and carbon markets, which could reshape global finance, just as Bretton Woods did. But can new forms of value such as cryptocurrencies or tokenised carbon credits[6] become currencies

5 The Bretton Woods Agreement (1944) created a new international monetary order after World War II, establishing the IMF and World Bank, and pegging currencies to the US dollar (which was tied to gold). This was a foundational shift in how the world managed money, trade and economic cooperation.

6 'Carbon tokenisation' refers to converting carbon credits (which represent a reduction of greenhouse gas emissions) into digital tokens on a blockchain. This makes carbon credits easier to trade, track and verify, potentially increasing the transparency and efficiency of carbon markets.

in their own right, and not just function as investments or commodities? Panellists called for an acceleration of the conversation around carbon tokenisation, recognising that digital currencies backed by global public goods (such as reduced greenhouse gas emissions) could fundamentally change the valuation and exchange of assets, making climate action (for example) more integrated with financial markets. On this point panellist 9 elaborated that global public goods could include peace and culture, proposing a shift wherein monetary policy is designed to be backed by the provision and maintenance of global public goods. Panellist 10 suggested that the creation of a new financial centre, which manages international currencies and transactions, could reduce the influence of any single nation's political agenda on global finance, thereby depoliticising global finance. However, they added that this would require robust, impartial mechanisms or institutions to resolve disputes and mediate conflicts in the new system, ensuring fairness and trust, as well as transparent, universally accepted benchmarks to measure progress, compliance and effectiveness within the new framework.

Panellist 9 also underlined the importance of monetising externalities – putting a price on side effects of economic activities, so that those responsible for negative externalities such as carbon emissions pay for them, while those creating positive externalities (preserving culture, achieving peace, protecting biodiversity) are rewarded. As part of this framework, recognition and value would need to be placed on localisation – local contributions to global public goods should be compensated through the market.

Mechanisms for fiscal integration and compensation can take inspiration from the Carbon Border Adjustment Mechanism (CBAM),[7] cap and trade policies,[8] and other means of internalising externalities. Panellists suggested that, ultimately, these changes in economic and monetary policy could merit a new economy theory of productivity. In the era of decarbonisation, it is necessary to rethink the balance of nature against energy priorities and critically assess our assumptions around power consumption and productivity. Panellist 10 took the example of AI, questioning the productivity impact of this technology and the apparent trade-offs. They referred to the AI sector's large and growing power requirements, significant expenditure on data centres and chips, and the associated tech stock bubble that is developing. They suggested these developments raise questions over how energy is priced and allocated and suggested that power should be treated as a public good.

In other words, another way of thinking about the required shift in thinking on global monetary policy is with reference to the tension between natural-capital (such as biodiversity and other nature-based public goods) and energy-based (kWh, where energy consumption is roughly a proxy for economic growth) backing of currency. Each approach has different implications: nature-based currencies aim to preserve ecosystems, while energy-based currencies focus on economic productivity and energy security. The tension is over which foundation better supports sustainability and economic stability.

With regards to this prompt, panellists also reflected that fundamental UN reform might outweigh the costs.

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7 CBAM policies impose a fee or tariff on imported goods based on the greenhouse gases emitted during their production, to ensure imports face the same carbon costs as domestic products and prevent carbon leakage.

8 Cap and trade policies are market-based environmental regulations that set a limit (cap) on total emissions and allow companies to buy and sell (trade) permits for those emissions

Overall, the discussion of next steps advocated for a new financial paradigm where currencies and policies reflect global public goods, internalise environmental costs and drive sustainable transformation.

1.6. Summary

The group summarised the workshop's deliberations as follows:

'World governance without world government'

The panellists collectively advocated for a more inclusive, adaptable and multipolar system of global governance by 2045, that moves beyond Western-centric, state-based models to embrace diverse voices (especially from the Global South and nature), cross-disciplinary approaches and institutional reforms that ensure legitimacy, accountability and solidarity. The panellists advocated for bold structural reforms in economic and monetary policy to move towards more inclusive, equitable and sustainable global governance by 2045. They emphasise the need for new forms of value (like carbon-backed digital currencies and monetised global public goods such as peace and culture), monetising both positive and negative externalities, and reforming global institutions to support these changes.

The key takeaways were as follows:

Beyond state-centric models: A call to move past rigid, state-centric ('Westphalian') systems to more fluid, cooperative networks. There was debate over whether multipolar leadership should be exercised through organisations like the UN or through more flexible, bilateral/regional forums.

Western frameworks: Panellists critiqued the dominance of Western values in current global governance and legal structures and called for **solidarity with the Global South beyond law:** this includes a push to incorporate principles that reflect the needs of a broader global population, not just those enshrined in Western legal traditions.

Effectiveness of institutions: Current institutions like the WTO are seen as relatively effective for trade, but finance remains dominated by national central banks, limiting global coordination. Institutions like the IMF are criticised for narrow, siloed approaches, highlighting the need for cross-disciplinary, multilevel governance. To rectify these limitations, panellists called for reforms that foster a greater sense of global community, understanding and listening within existing institutions, as well as the creation of a new financial centre that can depoliticise international monetary policy.

Subsidiarity principle: Not all goals can be achieved centrally; regional and local particularities must be considered. There is a need for multilevel governance that balances local autonomy (subsidiarity) with collective action.

Inclusion of Global South: Emphasis was placed on including voices from the Global South and addressing local concerns, especially as demographics and resource distribution change.

Voice for nature: Some panellists advocated for representation of nature in governance, noting leadership from the Global South in recognising rights of nature.

Demographics and climate risks: Changing demographics and climate risks were seen as interconnected global challenges, not just issues for the Global South.

Resource exploitation: Concerns were raised about economic pressures (e.g. Chinese investment in Africa) undermining the independence of some countries. There was a call for a wider range of actors to be involved in resource development to prevent dependency.

Structural shifts in economic and monetary policy: Need for **major changes in economic and monetary systems**, comparable to the historical shift to the Bretton Woods system. Panellists highlighted the **opportunity for new systems** based on digital assets and carbon markets, which could reshape global finance.

Monetising externalities: There was strong support for **putting a price on externalities** – making those who cause negative impacts (like carbon emissions) pay and rewarding those who create positive impacts.

2. Workshop session 2
The supply chain of meaning
Technology | Energy | Finance

2.1. Purpose

'This session invites participants to imagine supply chains not just as technical systems, but as moral and political ones. Together, we will map the futures of provision, power and meaning that flow through the arteries of the global economy.'

The focus of workshop session 2 was the 'supply chain of meaning'. Below we describe the scenario framing the discussion across the breakout groups, exploring revaluation of supply chains to embed environmental and social justice, resource flows, sustainability and security.

2.2. Scenario

By 2045, the world's supply chains look radically different from the ones we knew at the start of the century. Once optimised for speed and cost, they have been rewired to prioritise *resilience, justice and innovation*.

This session explores how new architectures of exchange, regulation and technology reshaped the way resources, energy and finance flow across borders. We consider the transitional role of gas, the rise of hybrid delivery models, the advent of carbon tokenisation and the growing influence of host-government financing. Drawing from RAND's Energy Transition Roadmap, we reflect on what it means to build supply chains that serve people as much as markets.

2.2.1. Themes to explore

Based on this scenario, we identify a number of themes to explore:

- Balancing efficiency with resilience in global trade
- How supply chains become instruments of justice, not just profit
- Energy transitions: the contested role of gas as a bridge fuel
- Hybrid delivery models: merging physical and digital infrastructures
- Carbon tokenisation and its impact on global finance
- The resurgence of host-government financing and local control

2.3. Breakout group 1: Rewiring the supply chain. From efficiency to resilience and justice

Focus: Explore how global supply chains can evolve from being optimised for cost and speed, to systems that actively embed fairness, resilience and social value.

Guiding questions:

Lessons from disruption: What vulnerabilities did the crises of the early 21st century (pandemics, climate shocks, geopolitical tensions) reveal in our supply chains? Which of those vulnerabilities have we successfully addressed and which persist in new forms?

Resilience vs. efficiency: How can we balance efficiency, innovation and resilience without inflating costs or creating new inequities? What role should governments and international organisations play in managing that balance?

Justice and inclusion: What would it mean for a supply chain to be just, not just efficient or green? How might local communities and smaller economies gain agency within restructured global networks?

2.3.1. Learning from disruptions

Disruption of supply chains has brought place into focus. The importance of place, from the national to the regional and to the global, has come to the fore, with new attention given to concretely understanding supply chains. The impacts of supply chain disruption have fostered a new willingness to trade cost, speed and efficiency for resilience.

Panellist 1 drew a comparison between the 2008 financial crisis and recent supply chain disruptions. Just as financial institutions took on and accepted greater risk to pursue cost reductions and new ways of working, so too have market participants accepted greater risk in extending their supply chains. Between the 1970s and today, particularly in manufacturing, companies have extended their supply chains globally, sourcing materials and components from farther away to reduce costs and increase efficiency. This globalisation was enabled by advances in technology (computers, data management), which made managing complex supply chains feasible. At first, extending supply chains seemed like a rational trade-off: lower costs and new capabilities in exchange for accepting more risk. However, just as in finance, these risks can be underestimated or poorly understood until a crisis exposes them. The question remains as to how best we price in the risk of supply chain disruption to market participants.

Panellist 2 raised that from a regulatory perspective, COVID-19 associated supply chain disruption has been informative. In the current situation, economic levers such as trade policy and tariffs also impact how risks of supply chain disruption are gauged. Simultaneously, breakthroughs in the sourcing and use of rare earth elements (REEs) and critical raw materials (essential for technologies enabling the green and digital transition) are leading to new dimensions in supply chains. The panellists highlighted that risk is being felt at many levels, but the way risk is priced in markets (e.g. through insurance, commodity prices or financial instruments) doesn't reflect reality. Rather, pricing mirrors perceptions and expectations of risk. They pointed to the price

of gold (often seen as safe asset, and which reflects underlying anxieties about stability) and world (in)stability; they claimed that given current uncertainties around risks, there is no regulatory or economic framework that can fully address or stabilise the situation.

Panellist 3 expressed agreement with panellist 1, elaborating that COVID-19 made us more aware of what supply chains should be and the issues present in previous supply chains. They took the example of UK supermarket supply chains, where the same fruit and vegetables are available all year, despite seasonality. Taking the view that is neither an efficient nor a rational approach, they identified a 'regression' from globalised supply chains to more regional ones. They predicted both negative and positive impacts of this change, but in particular expect the change to 'make us safer'.

2.3.2. Resilience vs. efficiency

If we think about which aspects of supply chains help or hinder the KE more broadly, our focus comes to managing scarcity. Resources such as REEs, chips and electricity for power data centres, for example, are increasingly crucial to geopolitical and economic security. Supply chain disruptions can swiftly create scarcity in these resources. The emerging question is around how governments and intergovernmental organisations think about scarce resources – will their management require a more nation-based or internationalist approach?

Panellist 2 proposed that access to data and algorithms should be considered alongside resources such as REEs and chips. Data and algorithms are becoming more important than the actual goods and services being sold (and for the production of which they are necessary inputs), with entrepreneurs thinking about the impact of data flows, for example. They suggested that law has become a stumbling block to data flows, and pointed to potential responses, such as Trump's radical policies of deregulation, or 'open up and see where it settles' versus protectionist regulatory frameworks. They highlighted that traditional regulatory approaches are no longer sufficient. Data and algorithms are fundamentally different from physical goods, requiring new ways of thinking about regulation. The panellist's residual questions included what specific aspects of data and algorithms we want to regulate, and how to do it, if at all?

Panellist 4 described knowledge layers in the supply chain of AI: energy, hardware, software, algorithms, data, the interface and, lastly, society. It is impossible to think about AI systems without thinking about the user.

Panellist 1 questioned how to find a balance between efficiency and resilience. In a perfect market, price would reflect all risks, and the market would deliver an effective solution that meets resilience goals. The issue is that unregulated markets don't fully account for distant risks – the 2008 financial crisis being a case in point. New risks are emerging beyond the control of national governments, such as cryptocurrencies, which – like environmental risk prediction – are hard to design and price into risk calculations with real accuracy. Regulatory systems tend to over-regulate as a result and market systems tend to ignore long-term risks and issues that aren't priced in. All these factors and behaviours need to be considered together to understand trade-offs.

Panellist 5 shared their conception of resilience and drew attention to political systems. COVID-19 taught us that sometimes we need to look at resilience more critically and prepare for worst-case scenarios. They proposed that resilience is about the ability to respond, recover, adapt and cope. Technologies will help us manage these crises and achieve resilience, but ethical and moral considerations should draw limits around what technologies

can do. They also highlighted a key lesson learned from the financial crisis: composition fallacy.[9] Risks to an individual don't necessarily correspond with the risk to the system as a whole. Moreover, effective resilience requires a holistic, system-wide perspective.

2.3.3. Justice and inclusion

Panellist 2 brought attention to the impact of market bubbles – such as the AI bubble – on food. If supply chains are to be conceptualised as just, what actions can be taken when supply chain disruptions – such as market-shocks induced by market bubbles bursting – affect food, medicine and other essentials? Panellist 2 mentioned that a positive outcome of the 2008 financial crisis was the establishment of the G20 to steer the world through the crisis, suggesting this may be necessary to navigate the impact of supply chain disruption on the provision of essentials. They pointed to countries like Brazil demonstrating the capabilities needed in this environment – capacity to issue carbon credits, ability to build data centres and leverage over food. They also emphasised that we can't ignore the impact supply chains had prior to COVID-19. They gave the example of the Arab Spring as in part catalysed by food scarcity and associated inflation, leading to extensive demonstrations. They questioned how this risk can be managed while moving towards KE2045.

Panellist 5 said that while food is important, it is also important to mention water. The weaponisation of these essentials is creating new dynamics that are changing the geopolitical environment and future of conflict.

Panellist 6 highlighted the lack of action to address the global trade imbalance. This is particularly important in the context of Africa, with a great deal of imbalance between the Global North and Global South, which has real impact on people's lives.

Panellist 4 followed on the points on supply chains and lessons to be learned from Brazil, describing how in Brazil the food supply chain is dominated by a few conglomerates. While the world looks to Brazil as an important player in the food supply chain, which they viewed positively, it is important to note the concentration of the food supply chain within a few companies, and the poor internal distribution of the supply chain in Brazil.

2.4. Breakout group 2: The convergence of energy, technology and finance

Focus: Examine how the flows of energy, capital and data are merging, and what this means for power, ownership and the planet.

9 The composition fallacy is the mistaken belief that if each individual part of a system is safe, the system as a whole is safe. In reality, risks can accumulate and interact in ways that create vulnerabilities at the system level. For example, if all banks sell risky assets at once, it can trigger a market collapse, even if each bank is acting prudently. (Finocchiaro 2015; Hirakata et al. 2020)

Guiding questions:

Energy transitions and geopolitics: How has the transitional role of gas reshaped geopolitical alliances or dependencies? What lessons can we draw from these shifts as we move towards fully renewable or hybrid systems?

Digital and physical infrastructures: How are hybrid delivery models (combining physical logistics and digital tracking systems) transforming trade and resource management? And where do new risks (cybersecurity, data monopolies, exclusion) emerge?

2.4.1. Energy transition and geopolitics

Panellist 7 argued for a policy approach, where low taxes on green energy (rather than just high taxes on polluters) are used to drive the green transition. This approach relies on the idea that reducing the tax burden on clean technologies will 'spur production'. They made reference to Pigouvian taxes as a strategy to reduce pollution.[10] In this context, reduced taxes for clean technology producers would be a Pigouvian subsidy to encourage beneficial activities.

Panellist 8 discussed the utility of gas for transitioning away from coal as it is less polluting, though warned of geopolitical dependencies that can threaten energy security, such as Europe's fuel dependence on Russia. As evidence of this, the panellist pointed to increased energy prices resulting from the war in Ukraine and the interconnection of energy supply chains. They emphasised that when countries plan their future energy capacity, they must carefully consider not just domestic production but also the stability and reliability of international supply chains. In light of these considerations, they highlighted that transitioning to renewable energy sources will be more cost efficient. With regards to expanding gas capacity, they maintained that we should continue using the natural gas infrastructure that already exists, rather than building new capacity, as there is a risk of new infrastructure becoming a 'stranded asset' in the future: as emission targets become binding, fossil fuel infrastructure may need to be retired early, making new investments risky. Rather than build new infrastructure, existing infrastructure should be used only until it can be phased out in line with climate goals. Any investment in new facilities or infrastructure should be made only if the benefits clearly outweigh the costs. They concluded by highlighting the challenge of aligning infrastructure investments with the pace of the energy transition.

10 Pigouvian taxes (named after economist Arthur Cecil Pigou) are designed to internalise the external costs of pollution by making polluters pay a tax equal to the social cost of their emissions. This raises the cost of polluting activities, discourages pollution and encourages cleaner alternatives. (Vernengo 2017)

Panellist 9 highlighted that the energy transition is already challenging, but geopolitical disturbances such as US-EU competition amplify the challenge. They argued that greater protectionism will harm the transition by making it more expensive for companies and consumers, noting that this impact is already being felt. They stressed that international institutions are needed to manage these conflicts.

Panellist 10 pointed out that gas often determines electricity prices[11]; when gas prices rise, electricity prices also rise, even if renewables are part of the mix. Nevertheless, they called for the cheapest forms of power to be prioritised, highlighting the economic and geopolitical vulnerabilities that relying on fossil fuels creates. They noted that fossil fuel trade routes have been shown to be easy to interfere with, and that when countries rely heavily on imported gas, sanctions or disruptions can lead to shortages and price spikes, harming their economies and energy security. In contrast, renewable energy is typically produced domestically, reducing reliance on imported fuels and the risks associated with international trade routes. By investing in renewables, countries can reduce their exposure to geopolitical risks.

Panellist 11 questioned whether the new KE could be mapped with the energy transition.

Panellist 7 suggested that as we phase out fossil fuels, we should use taxes or fees collected from brown energy to directly support the growth of green energy. This aligns with Pigouvian principles – using economic incentives to correct market failures and drive the energy transition.

Panellist 12 suggested that waste, sunlight and human waste are under-explored and under-optimised potential sources of cheap and viable energy.

2.4.2. Digital and physical infrastructures

Panellist 12 highlighted that moving towards distributed energy generation with the support of appropriate incentives and taxes can make energy systems more secure, resilient and less exposed to geopolitical risks including cyberattacks.

Panellist 8 noted that hybrid delivery models combining complementary sources (physical and digital) help reduce uncertainty in supply chains, trade and resource management. Additionally, hybrid models enhance data generation and gathering beyond mere tracking, enabling modelling of how different resources or trade flows are brought together, improving planning and responsiveness. They highlighted that energy maps[12] and green corridors[13] are becoming increasingly complex as systems become more interconnected, increasing the risk of dangers such as cascading failures, data mismatches, or vulnerabilities that can be exploited or that may go unnoticed in a complex system. They emphasised the importance of identifying and managing risk through a combination of regulations and hedging devices.

Panellist 9 highlighted both the potential benefits of regulatory alignment in the energy

11 In many energy markets, the price of electricity is determined by the cost of the last (marginal) unit of energy needed to meet demand. Often this is natural gas, which means that even if cheaper sources are available, the price is still influenced by gas prices.

12 Energy maps are visual or digital tools that display the geographic distribution of energy resources, infrastructure, consumption and emissions.

13 Green corridors are dedicated routes or networks that facilitate the large-scale movement of renewable energy or the decarbonisation of sectors like shipping, industry or transport.

transition and the current challenge posed by the lack of global regulatory structures. This gap can hinder progress and create barriers to a truly global shift towards clean energy.

Panellist 10 argued that because there are currently insufficient incentives for organisations to protect energy infrastructure from cyberattacks, the state must take a more active and forceful role in ensuring cybersecurity. Panellist 11 questioned whether states are sufficient to defend energy security. Panellist 8 brought attention to projects being financed by DG Research and Innovation researching cyberattacks on energy and network systems in order to create forecasts that might inform policymaking.

2.4.3. Concluding remarks

Panellist 8 concluded that a holistic approach to planning transition pathways is needed. They argued that decisions should not be based solely on financial costs, but must also consider broader social, environmental and economic impacts. Recognising and evaluating trade-offs is essential for sustainable and equitable change.

Panellist 10 highlighted the importance of effective communication. They suggested that advocates for environmental action need to improve how they present their case to the public. Rather than relying on 'apocalyptic narrative' we should focus on positive narratives that sell environmental preservation. Panellist 12 reinforced this notion, stressing that the narrative should be both simple and positive. Panellist 9 added that the narrative should emphasise global collaboration.

2.5. Key takeaways

These takeaways highlight a shift in thinking away from optimising for efficiency and cost and towards embedding resilience, justice and sustainability in supply chains and energy systems. The panellists emphasised the need for new regulatory frameworks, international cooperation and holistic approaches to risk and resilience, with a strong focus on ethical considerations and effective communication.

Key takeaways from the panellists' deliberations were as follows:

Supply chain vulnerabilities and lessons from disruption

- **Crises exposed weaknesses:** Events like pandemics, climate shocks and geopolitical tensions revealed significant vulnerabilities in global supply chains.
- **Risk pricing is inadequate:** Market mechanisms (insurance, commodity prices) often fail to reflect real risks, instead mirroring perceptions and expectations.
- **Regulatory gaps:** There is no comprehensive framework to stabilise or fully address these risks, especially as new dimensions (e.g. REEs, critical raw materials) emerge.

Resilience vs. efficiency

- **Shift in priorities:** Organisations are increasingly willing to trade cost and speed for resilience, especially after recent disruptions.
- **Balancing act:** The challenge is to balance efficiency, innovation and resilience without inflating costs or creating inequities.
- **Role of governments:** Governments and international organisations must help manage this balance, particularly regarding scarce resources like REEs and data.
- **Data as a resource:** Data and algorithms are becoming as crucial as physical goods, requiring new regulatory approaches.

Justice and inclusion

- **Beyond efficiency and green:** Supply chains should aim for justice, not just efficiency or environmental sustainability.
- **Impact on essentials:** Disruptions can affect food, medicine and water, sometimes leading to social unrest (e.g. Arab Spring).
- **Global imbalances:** Persistent trade imbalances, especially between the Global North and South, have real impacts on communities.

Energy transition and geopolitics

- **Policy approaches:** Lower taxes on green energy (Pigouvian subsidies) can spur production and support the transition.
- **Geopolitical dependencies:** Reliance on imported fuels (e.g. gas from Russia) creates vulnerabilities; renewables can reduce these risks.
- **Infrastructure risks:** Investments in new fossil fuel infrastructure risk becoming stranded assets as climate targets tighten.
- **International institutions:** Greater protectionism hampers the energy transition; international cooperation is needed.

Digital and physical infrastructures

- **Hybrid models:** Combining physical logistics with digital tracking enhances resilience and planning, but introduces new risks (cybersecurity, data monopolies).
- **Complexity and vulnerability:** Interconnected systems increase the risk of cascading failures and require robust risk management.

Resilience as a system-wide perspective

- **Holistic approach needed:** Effective resilience requires looking beyond individual risks to system-wide vulnerabilities.
- **Ethical boundaries:** Technologies can help manage crises, but ethical and moral considerations must set limits.

Communication and narrative

- **Positive messaging:** To drive public support, advocates for environmental action should focus on positive, collaborative narratives rather than apocalyptic ones.

3. Conclusion and recommendations

The KE2045 workshop explored how global governance, supply chains and energy systems must evolve to meet the challenges of a multipolar, knowledge-driven world by 2045. Panellists highlighted the need to move beyond Western-centric, state-based models and embrace inclusive, resilient and sustainable approaches that reflect the realities of a diverse global community.

Across the two workshop sessions, participants converged on a shared understanding: the systems that currently govern our political, economic, technological and ecological futures are no longer fit for purpose. Both sessions highlighted fractures within the prevailing order – whether in the form of unequal governance, unsustainable production models, or narrowly defined efficiency metrics – yet also articulated pathways for transformation. This concluding chapter synthesises those insights into an emerging framework for global interdependence and justice by 2045.

The overall takeaways from the workshop form the prefiguration of a potential policy agenda that might accelerate progress towards KE2045.

3.1. Policy recommendations for pursuing KE2045

Based on the workshop discussions, participants identified the following policy recommendations to achieve the KE2045 vision.

1

Reform global institutions

- Advocate for reforms of the UN, WTO, IMF and other bodies to increase representation from the Global South and marginalised communities.
- Pilot new leadership councils and participatory platforms that test inclusive governance models.

2

Embed resilience and justice in supply chains

- Develop regulatory frameworks that prioritise resilience, justice and inclusion in supply chains.
- Support local agency and smaller economies within global networks.
- Address trade imbalances and ensure equitable access to essentials.

3

Accelerate the energy transition

- Implement Pigouvian subsidies for green energy and reduce reliance on imported fossil fuels.
- Align infrastructure investments with climate targets to avoid stranded assets.
- Foster international cooperation to manage energy security and transition risks.

4

Innovate financial systems for sustainability

- Explore new financial paradigms, such as carbon-backed digital currencies and global regeneration funds.
- Monetise externalities to reward positive contributions and penalise negative impacts.
- Ensure fiscal integration and compensation mechanisms for local contributions to global public goods.

5

Strengthen digital and physical infrastructures

- Invest in hybrid models that combine physical and digital systems for supply chain and energy management.
- Develop robust cybersecurity and data governance frameworks to manage new risks.

6

Promote holistic, system-wide resilience

- Encourage cross-disciplinary approaches and multilevel governance that balance local autonomy with collective action.
- Integrate ethical and moral considerations into technological and policy solutions.

7

Shape positive, inclusive narratives

- Communicate the benefits of environmental action and global cooperation through positive, collaborative messaging.
- Engage diverse stakeholders in shaping the narrative and policy agenda.

Ultimately, the workshop's proceedings converge on a unifying vision: world governance without world government. This vision is neither an abandonment of order nor an endorsement of fragmentation, but rather a call for cooperative frameworks that honour diversity while managing interdependence. Participants envisaged institutions grounded in the principle of subsidiarity – acting at the lowest effective level but cooperating on a global scale when collective action is indispensable.

As the Global South emerges as a centre of demographic, cultural and ecological leadership, governance by 2045 may be characterised less by dominance and more by distributed stewardship. Economic activity will be reframed within planetary boundaries; legal and financial instruments will evolve to reflect ecological and cultural value; and resilience will be measured not only by how systems withstand shocks but by how they nurture fairness and regeneration.

Appendix

Methods

What is foresight?

Globalisation and greater uncertainty present challenges and opportunities and there is a need to understand current actions and help decision making. 'Foresight is a tool to craft ideas, fix problems, build new visions and construct strategies for the future. […] Strategic foresight is the ability to think systematically about the future, scanning the external environment for signals of change, and translating those insights into actionable strategies.'[14]

Principles of foresight

Foresight works best when it combines solid evidence and data with creative thinking. Making room for imagination in foresight helps us avoid getting stuck in narrow ways of thinking. For strategic planning, imagination allows us to look beyond the obvious trends and consider how different factors might interact in unexpected ways. This broader, more flexible approach helps us spot risks and opportunities that might not be visible from the data alone.

Foresight is stronger when it includes a range of viewpoints. By involving different stakeholders, we ensure that our thinking reflects both local and global factors. This diversity helps us build more complete and realistic stories about the future, making our plans more robust and effective.

Foresight provides a space for stakeholders to talk openly about future challenges and opportunities. By looking ahead together, we can better prepare for what might come and plan for the changes that will be needed for positive transformative change.

14 Holt (2023).

What is the Three Horizons method?

The Three Horizons Framework is a strategic tool designed to help organisations and leaders navigate complex and uncertain futures. The Three Horizons approach offers a structured way to examine current assumptions, anticipate emerging changes and identify opportunities for innovation and adaptation to complex policy challenges.

The framework visualises change across three overlapping timeframes, each representing a distinct mindset:

- **Horizon 1: The present state**, characterised by established practices, operational stability and current assumptions. This horizon reflects the managerial mindset, focused on maintaining what works today.
- **Horizon 2: The transitional space**, where adaptation and entrepreneurial activity occur. Here, organisations respond to pressures and opportunities, experimenting with new approaches and innovations that may disrupt or enhance existing models.
- **Horizon 3: The future vision**, defined by transformative change and new paradigms. This horizon embodies the visionary mindset, exploring what could be possible and desirable in the long term.

Rather than treating the future as a distant point, the Three Horizons Framework encourages us to recognise that elements of all three horizons exist simultaneously. This perspective helps us to make sense of overlapping waves of change and the tensions between maintaining stability, managing transition and pursuing transformation.

Professor Dr Malik Dahlan speeches

The following speeches, delivered by Professor Dr Malik Dahlan, were presented to key stakeholders to communicate the principal findings of this work.

Pre COP30 Speech

Special address by Prof. Dr. Malik R. Dahlan

2045: The New Horizon – From Law to Hope, from Knowledge to Justice Pre-COP30 Global Summit, Rio de Janeiro – November 2025

Excellencies, distinguished justices, colleagues and friends –

It is a privilege to address you from Jeddah, Saudi Arabia, and to join you here in Rio, looking with great expectation toward the Corcovado Mountain – a city that has always turned rhythm into renewal.

We meet at a time when the world needs a new rhythm.

The age of deadlines has exhausted us – 2030, net-zero, the next tariff, the next crisis, perhaps even the next collapse.

But humanity cannot live by countdowns alone.

We need a horizon – a shared point in time and space that we can look forward to and work toward together.

That horizon is 2045.

The Knowledge Economy Transition by 2045 – KE2045 – began as a partnership between the Scotia Group and RAND Europe in July 2025, anchored in our previous work following Glasgow Net Zero and the Global Energy Transition Roadmap at the 78th United Nations General Assembly, and later joined by the Global Energy Transition Think Tank Network.

Its driving force is to craft not another summit or target, but a system that can sustain both human dignity and planetary balance by 2045.

Bringing together experts in climate, supply chains, law, economics and geopolitics – and in partnership with institutions such as St Andrews, Cambridge and Harvard, alongside our friends at the International Bar Association – KE2045 rests on a single shared insight: that the old model, built on extraction, inequality and efficiency at any cost – the neoliberal orthodoxy – is no longer viable.

We speak at a moment of anxiety – of possible world trauma, of an AI-driven economic bubble, of social fracture within the very states that once promised stability.

Even here in the Middle East, we are still reeling from one of the darkest moments of collective human loss, while the ghosts of socioeconomic breakdown still haunt us, 15 years after the Arab Spring.

So we asked:

How do we change the narrative?

How do we deliver hope?

What would it mean to design an economy that grows by sharing knowledge rather than consuming nature?

How can law, technology and finance be realigned to serve the same moral purpose – prosperity without depletion?

Our conclusion was simple yet radical:

Knowledge is the world's most renewable resource.

When governed by law and shared through justice, it becomes the cleanest fuel of all.

And as we move forward, we must develop in harmony with nature – co-creating with it, rather than imposing upon it.

This is how we ensure that the knowledge economy is not only intelligent, but sustainable.

To guide this transition, we used the Three Horizons method:

Horizon 1 – the world we know: fragile supply chains, extractive finance, institutional fatigue.

Horizon 3 – the world we seek, for our children and their children: sustainable, inclusive, lawful and just.

Horizon 2 – the decade now upon us – the decade of construction.

Between 2025 and 2035 we must:

Rebalance global systems from efficiency to resilience.

Build hybrid infrastructures – renewable grids fused with secure data networks.

Shape the power and potential of generative AI so that it serves human ingenuity, not replaces it.

Reform international institutions to reflect the realities of a multipolar world.

Create financial tools that reward regeneration – smart currencies, carbon credits, capability tokens – all anchored in law.

And most importantly, change the narrative: from crisis management to capability building, from fear to confidence, from guilt to grace.

We are all the architects of this future.

Our agenda is not austerity – it is institutional imagination.

I am deeply honoured to share this day with the judiciary of Brazil, and with hundreds of judges joining in person and virtually from the United Kingdom, India and across the world.

Because the courts remind us of something essential:

The rule of law is the first clean technology.

It purifies trust.

It converts chaos into cooperation.

It is the invisible grid upon which every other transition depends.

When law provides clarity for carbon currencies and carbon markets, stability for investment and justice for citizens, it turns the intangible into the investable.

Impact becomes more valuable than numbers.

Without law, there is no finance; without justice, there is no progress.

The Knowledge Economy Transition by 2045 is, above all, a jurisprudential project – a renewal of legitimacy through shared rules and shared meaning.

But 2045 is not just about institutions or markets; it is about people.

A knowledge economy is powered by educated minds, ethical algorithms and inclusive systems.

That means universal investment in education, health and digital literacy – especially across the vulnerable world.

From now on, we must not only account for but also embrace our vulnerabilities.

We must treat knowledge as a public good, not a private weapon.

The goal is not to hoard intelligence and data but to circulate it – as light circulates, illuminating everything it touches.

So what do I mean when I say that 2045 is the world's new currency?

I mean that it is the measure by which our generation will account for hope – a form of intergenerational justice.

A currency backed not by gold or carbon or code, but by trust, justice and capability.

Each nation, community, institution and citizen contributes to its value – by how we share, how we educate, how we build.

In a world of division, 2045 becomes the common denominator – the lawful horizon we can all invest in.

From Rio – this city of rhythm, renewal and redemption – I call out to the world:

Let us lay three shared foundations for the coming decade:

A Knowledge Commons Treaty Logic – to safeguard data and discoveries as public goods over the next two decades, sharpening our legal architecture.

A Compute Access Facility, built around the Knowledge Unit – a carbon-linked currency that democratises digital and scientific capacity for all communities.

An International AI Stack Compact – a Brazilian-led effort to empower mayors and youth as builders of local green economies, avoiding the black-hole competition of AI arms races and offering a pathway forward.

Let these be known as the Rio Foundations – the first bricks with which to build our 2045 world.

And I know – we are all tired of COPs.

But as we descend from the Mountain of the Redeemer – from vision to action – into Belém, we do so with purpose.

And I'm pleased to share that on the 20th of November at COP30 in Amazonia, we will officially launch the Knowledge Economy effort, in partnership with the UNFCCC Innovation Hub, to transform the narrative of vulnerability into impact – providing multilateral institutions and policy experts with a framework to repurpose their functional existence.

This is about moving beyond endless deadlines and reports to a living architecture of realignment – so that KE 2045 would allow the UN system to re-engineer itself.

In doing so, we hope to create a common language for tech entrepreneurs and innovators to engage with this system, ensuring that technology and governance evolve hand in hand.

My friends, every civilization survives on its ability to imagine beyond crisis.

We have imagined war; we have imagined peace.

Now, let us instead dare to imagine continuity.

2045 is not a deadline – it is a covenant. It is our currency.

A promise that humanity will grow not only wealthier, but wiser.

We change the narrative today:

A new future.

A new vision to unite the nations.

A new call to action.

2045 begins here.

Obregado.

COP30 Keynote speech

Keynote address by Prof. Dr. Malik R. Dahlan

COP30, UNFCC, Belem, Brazil – November 2025 (delivered virtually)

Legitimacy in the Knowledge Age: An Invitation to a 20-Year Framework

Excellencies, colleagues and friends,

We meet at a time when the surface of the international system still looks intact, but the foundations are under strain.

Trade continues. Markets function. This institution still convenes us.

And yet, following the pandemic, we are living through a structural transition.

Geopolitical blocs are hardening.

Trust in institutions is eroding.

Climate impacts are accelerating.

Inequalities are deepening.

Intergenerational confidence is broken.

And artificial intelligence is amplifying every vulnerability.

This is not just another crisis. It is a shift from one organising logic of the world to another.

Section one. The real fault line: legitimacy.

The post-war system assumed that institutions like the United Nations, the Bretton Woods bodies and the rules-based order would be seen as broadly legitimate.

That legitimacy rested on a shared narrative about progress, a shared belief in certain economic models, and a basic level of civic knowledge and trust.

Those conditions no longer hold.

Today, many societies, especially in the Global South, doubt that the existing architecture can protect their people, their environments or their futures.

We have a legitimacy problem before we have a policy problem.

If we do not address that, no amount of technical climate design or financial engineering will be enough.

We also face a quieter, deeper crisis: the capture of knowledge itself.

Public understanding of climate, economics and risk is increasingly shaped by concentrated wealth, through media, platforms and sponsored 'expertise' whose business model depends on delay and confusion.

We are not just in a data crisis. We are in a knowledge crisis.

When knowledge is hijacked, democracy and multilateralism lose their bearings.

If we want legitimacy, we must reclaim knowledge as a public good.

Section two. We need a framework for the knowledge age.

The world we are moving into is defined by knowledge and data, intangible assets, digital and computational infrastructure, planetary risk and AI – a new layer of synthetic cognition.

Yet our institutions still behave as if we live in a purely industrial, physical, territorial economy.

We need a framework that recognises knowledge as a core source of value, vulnerability as a core source of claims, and legitimacy as a core asset.

This is what I mean when I speak about the knowledge economy transition.

Section three. What KE2045 is – and what it is not.

KE2045 is not a finished blueprint or a new grand theory.

It is an invitation to work together over the next 20 years on three linked tasks.

First.

A new way to measure vulnerability and legitimacy, so that climate and social risks trigger support and restructuring, not just endless negotiation.

Second.

A governance framework for knowledge and AI, an international AI stack, so that data, compute and AI systems serve as global enablers, not new instruments of monopoly, disinformation or exclusion, with the rule of law guarding the integrity of our knowing.

Third.

A standing process for legal and institutional foresight, a lab format, anchored in places like this Innovation Hub, that brings states, judges, regulators, Indigenous voices, young people and technologists into structured conversation about the rules of the emerging order, including how to design long-term, stress-tested – and even interest-free – impact investment structures that reward resilience rather than short-term extraction.

If we can make progress on these three, we will have begun to rebuild the foundations of legitimacy for this new age, and to free public knowledge from capture.

Section four. The role of the Global South.

This framework cannot be written by the same centres of power that designed the old one.

Countries like Brazil, Saudi Arabia, Indonesia, South Africa, and many others, are no longer peripheral.

They are central to energy transitions, to demographic futures, to innovation and to climate stability.

Non-state actors, like technology entrepreneurs, must also be partners in this mission.

The Global South must be a co-author of the next system, not just an implementer.

KE2045 is deliberately designed as a space where that authorship can be exercised, through joint metrics, joint governance experiments, and joint institutional design.

Section five. A personal word.

I come from a tradition in which legitimacy did not come primarily from military power or financial architecture, but from something more demanding: moral authority, restraint, and the willingness to act as a custodian rather than an owner.

Civilisation is held together not only by law and markets, but by conscience.

In recent years, knowledge itself – not just data or statistics, but our shared sense of what is true – has been hijacked.

In such a world, technocrats are not enough.

Technocrats can design the scaffolding, but they cannot supply the meaning.

That is why, at times, institutions need what I will call prophetic voices – not in a religious sense, but voices that insist on conscience, on responsibility, and on the difference between what we can do and what we should do.

If we design the next 20 years without that moral axis, without some sense of shared responsibility and restraint, then any knowledge- or AI-based order will reproduce the very injustices and instabilities we are trying to escape.

Section six. What I am asking from you.

I am not asking you today to endorse a fixed plan.

I am asking that we acknowledge the legitimacy crisis openly.

That we accept the need for new frameworks for productivity, where knowledge is treated as a public good and not a private asset, so that we can flourish together.

And that a small coalition of willing states and institutions work with us to turn this vision into three practical elements by 2030.

If, by 2030, these are in place, a vulnerability and impact metric, a governance framework for knowledge and AI stack, and a collective legal and institutional foresight function, we will have done more for long-term stability than any single declaration could claim.

We use the name KE2045 because rebuilding the foundations of a global order is a generational task.

2045 is not a prediction.

It is a horizon, roughly one generation in which to move from an exhausted industrial logic to a knowledge- and legitimacy-centred one.

2030 is the real test of our seriousness.

If we have not laid these foundations by then, 2045 will remain a slogan, not a pathway.

The United Nations does not need another slogan.

It needs Sherpas for the knowledge transition, trusted guides to help it move from an industrial, state-centric order to a knowledge-based, legitimacy-centred one.

KE2045 is offered in that spirit.

Section seven. Closing.

The world is changing whether we act or not.

We can continue to optimise inside a fading system, or we can begin, carefully, collaboratively and honestly, to design the one that will follow.

KE2045 is our invitation to you to do the latter.

Thank you.

Abbreviations

Abbreviation	Full Form / Meaning
BIICL	British Institute of International and Comparative Law
CBAM	Carbon Border Adjustment Mechanism
G20	Group of Twenty (international forum for governments and central bank governors)
IBA	International Bar Association
ILCR	Institute for Legal and Constitutional Research
IMF	International Monetary Fund
KE2045	Knowledge Economy 2045
REEs	Rare earth elements
UN	United Nations
WTO	World Trade Organization

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