
THE MITIGATION MAZE: BEYOND PLEDGES TO PLANETARY ACTION

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ABSTRACT

The international community stands at a critical juncture where the rhetoric of climate commitment, embodied in the Paris Agreement's Nationally Determined Contributions (NDCs), starkly contrasts with the trajectory of global emissions. This article, "The Mitigation Maze: Beyond Pledges to Planetary Action," interrogates the persistent and perilous gap between pledges and effective implementation. It posits that this chasm is not a simple failure of will but a complex "mitigation maze"-a labyrinth of interconnected legal, political, economic, and technological barriers. The article first provides a critical legal assessment of the international pledge-based framework, analysing the evolution from Kyoto to Paris and the inherent limitations in the legal character and ambition of NDCs. It then systematically dissects the primary obstacles hindering progress, from institutional inertia and vested interests to financial shortfalls and technological lock-in. Moving from diagnosis to prescription, the analysis illuminates key pathways to navigate the maze. It highlights the transformative potential of strategic climate litigation in forcing government and corporate accountability, the necessity of domesticating international commitments through robust national climate legislation, and the critical role of realigning global financial flows away from fossil fuels. By examining sectoral transformations and the power of non-state actors, the article argues for a polycentric, integrated strategy. It concludes that escaping the mitigation maze requires transcending the paradigm of voluntary pledges and embracing a new form of courageous, multi-level governance that hardwires accountability into every facet of planetary action, thereby transforming aspirational goals into a secured, liveable reality.

Keywords: Climate Change, Climate Law, Mitigation, Nationally Determined Contributions (NDCs), Paris Agreement.

1. Introduction - The Anatomy of the Mitigation Maze

1.1 The Planetary Imperative and the Crisis of Credibility

The scientific consensus, articulated with ever-increasing urgency by the Intergovernmental Panel on Climate Change (IPCC), presents an unequivocal reality: anthropogenic climate change poses a grave and mounting threat to human wellbeing and planetary health.¹ The window of opportunity to secure a liveable and sustainable future for all is rapidly closing. The physical impacts—from catastrophic wildfires and record-breaking heatwaves to devastating floods and sea-level rise—are no longer distant projections but the lived experience of millions globally. This scientific imperative demands a global response of unprecedented scale and speed, centred on the rapid and deep mitigation of greenhouse gas (GHG) emissions.

In response, the international community has constructed a complex architecture of climate governance, culminating in the landmark Paris Agreement of 2015.² This treaty, celebrated for its near-universal adoption, symbolises a global political consensus on the need for action. It establishes a clear goal: to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit it to 1.5°C.³ Yet, nearly a decade after its adoption, a profound crisis of credibility haunts the international climate regime. A chasm has opened between the stated ambitions of nations and their collective actions, between the celebrated promises made in global forums and the hard, often politically fraught, work of domestic implementation. The world remains dangerously off-track, with current policies projected to lead to a temperature rise of around 2.7°C or more by the end of the century, a scenario the UN Secretary-General has described as a “highway to climate hell.”⁴ This disconnect is the central paradox of contemporary climate governance.

1.2 Defining the “Mitigation Maze”: The Pledge-to-Action Gap

This article conceptualises the gap between climate promises and outcomes as the “Mitigation Maze.” This metaphor is chosen deliberately to move beyond a simplistic narrative of failed

¹ IPCC, Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (AR6, 2023) Summary for Policymakers, A.1.

² Paris Agreement (adopted 12 December 2015, entered into force 4 November 2016) 55 ILM 740.

³ *id.*, art 2(1)(a).

⁴ United Nations, ‘Secretary-General’s remarks to the press on the IPCC Working Group III report on Climate Change’ (4 April 2022) <https://www.un.org/sg/en/content/sg/press-encounter/2022-04-04/secretary-generals-remarks-the-press-the-ipcc-working-group-iii-report-climate-change> accessed 1 September 2025.

political will. A maze is not an empty space but a complex structure with intricate passages, dead ends, and hidden pathways. Similarly, the failure to translate climate pledges into sufficient planetary action is not merely a lack of intent but the result of navigating a formidable labyrinth of interconnected barriers. These barriers are structural, woven into the fabric of our legal, political, economic, and social systems.

The core of this maze is the “pledge-to-action” gap. The primary instruments of the Paris Agreement are the Nationally Determined Contributions (NDCs), wherein each state party outlines its post-2020 climate actions. While these pledges represent the political will of nations, they are frequently beset by two distinct but related shortfalls. The first is the “ambition gap”: the aggregate effect of all current NDCs is insufficient to meet the Paris Agreement’s temperature goals.⁵ The second, and arguably more pernicious, is the “implementation gap”: the chasm between the targets set out in the NDCs and the concrete domestic policies and measures enacted to achieve them.⁶ Many nations have not yet put in place the laws, regulations, and investment frameworks required to meet even their own stated, often inadequate, targets.

The Mitigation Maze, therefore, is the sum of the forces that create and perpetuate these gaps. It includes the legal ambiguities of international agreements, the powerful inertia of incumbent fossil fuel-based economies, the short-termism of political cycles, the immense challenge of mobilising trillions in green finance, the complexities of ensuring a just transition for all, and the deep-seated behavioural patterns that underpin high-carbon societies.

1.3 Thesis and Roadmap

The central thesis of this article is that navigating the Mitigation Maze and closing the pledge-to-action gap requires a radical shift beyond the dominant paradigm of voluntary, top-down international pledges. While such pledges are a necessary starting point, they are fundamentally insufficient to drive the required transformation. Escaping the maze demands a multi-level, polycentric strategy that embeds accountability and accelerates action across all domains of governance. It requires a move from “soft” aspirations to “hard” legal obligations, from

⁵ UNFCCC, ‘Synthesis report on the aggregate effect of the nationally determined contributions’ (26 October 2022) FCCC/CP/2022/4.

⁶ See for example, Pieter Pauw and others, ‘Mind the gap: the persistent lack of progress in implementing Nationally Determined Contributions (NDCs)’ (2020) 1(1) Climate Action 1.

peripheral green finance to a systemic realignment of the global financial architecture, and from incremental policy tweaks to systemic, sector-wide transformations.

To substantiate this thesis, the article is structured in five parts. This introduction has set the stage by defining the planetary imperative and the concept of the Mitigation Maze.

Part II provides a critical legal and political assessment of the international architecture of pledges. It traces the evolution from the Kyoto Protocol to the Paris Agreement, dissecting the strengths and weaknesses of the NDC-based system, the transparency framework, and the contested legal character of these national commitments.

Part III delves into the maze itself, systematically identifying and analysing the key barriers to implementation. It explores the political, economic, technological, and social obstacles that stall, divert, or block the pathway from pledge to action.

Part IV shifts from diagnosis to prescription, charting concrete pathways beyond the pledge-based paradigm. This section explores three critical sets of levers for change: (1) legal and judicial levers, focusing on the catalytic role of climate litigation, national climate laws, and corporate governance reform; (2) financial and economic levers, examining the realignment of capital, the abolition of fossil fuel subsidies, and the operationalisation of carbon markets; and (3) technological and social levers, discussing mission-oriented innovation and the crucial role of non-state actors.

Finally, Part V concludes by synthesising the article's arguments. It reiterates the need to move from a maze to a map-a clear, integrated plan for polycentric climate governance. It concludes with a call for the courageous, decisive, and just leadership required to transform aspirational pledges into the concrete planetary action necessary to secure a liveable future.

2. The Architecture of Pledges - A Critical Assessment of the International Framework

The contemporary international climate regime, anchored by the Paris Agreement, is the product of a decades-long evolution in global environmental law and diplomacy. Its structure reflects a deliberate shift away from the perceived failures of its predecessor, the Kyoto Protocol, towards a more flexible, inclusive, and nationally-driven model. However, this very flexibility, designed to ensure universal participation, has created an architecture of pledges

whose capacity to drive sufficient and timely action is a subject of intense legal and political debate.

2.1 From Kyoto to Paris: An Evolution of Commitments

The 1997 Kyoto Protocol represented the first attempt to create legally binding obligations for GHG mitigation.⁷ It operated on a top-down model, establishing quantified, economy-wide emission reduction targets for a list of developed countries (listed in Annex I of the UNFCCC) to be achieved within a specific commitment period. It also introduced a principle of “common but differentiated responsibilities and respective capabilities” (CBDR-RC), effectively creating a firewall between the obligations of developed and developing nations. While pioneering in its use of market-based mechanisms like the Clean Development Mechanism (CDM), the Protocol faced significant challenges. Its top-down, rigid structure was a key reason for the non-ratification by the United States, and its limited country coverage meant it addressed a shrinking portion of global emissions as emerging economies grew.⁸

The perceived shortcomings of Kyoto heavily influenced the negotiations leading to the 2015 Paris Agreement. Diplomats and policymakers sought a new model that could overcome the political impasse and bring all nations, including the US and major emerging economies like China and India, into a single legal framework. The result was a paradigm shift from a top-down imposition of targets to a bottom-up, “pledge and review” system.⁹ The Paris Agreement’s core is not a set of internationally negotiated emission targets, but a framework that requires each country to put forward its own “Nationally Determined Contribution” (NDC).¹⁰

This architectural choice was a masterstroke of diplomacy, achieving the near-universal participation that had eluded Kyoto. By allowing countries to determine their own contributions based on national circumstances, it respected national sovereignty and lowered the political cost of joining. However, this inclusivity came at a price. The Agreement sacrifices the certainty of pre-defined, legally binding emission targets for the flexibility of nationally

⁷ Kyoto Protocol to the United Nations Framework Convention on Climate Change (adopted 11 December 1997, entered into force 16 February 2005) 2303 UNTS 148.

⁸ David G Victor, *The Collapse of the Kyoto Protocol and the Struggle to Slow Global Warming* (PUP 2001).

⁹ Robert Falkner, ‘The Paris Agreement and the new logic of international climate politics’ (2016) 92(5) *International Affairs* 1107.

¹⁰ Paris Agreement (n 2) art 3, art 4.

determined pledges. The critical question that has defined the post-Paris era is whether this bottom-up system, with its procedural obligations and review mechanisms, can generate the collective ambition and implementation needed to meet the treaty's own temperature goals.

2.2 The NDC Cycle: Ambition, Implementation, and the Global Stocktake

The Paris Agreement is designed as a dynamic, iterative process, not a static treaty. It seeks to ratchet up ambition over time through a five-year cycle. Each Party is required to submit an NDC every five years, with each successive NDC representing a progression beyond the Party's previous one and reflecting its highest possible ambition.¹¹ This "ratchet mechanism" is the engine room of the Agreement, intended to progressively close the ambition gap.

The first major test of this process has yielded mixed results. While many countries submitted updated or new NDCs in the lead-up to COP26 in Glasgow, the UNFCCC's synthesis report found that their combined effect was still grossly insufficient, placing the world on a path to a 2.5°C temperature rise.¹² This highlights the ambition gap: the collective pledges on the table do not add up to the global goal. Furthermore, the implementation gap persists, with analysis from bodies like the Climate Action Tracker indicating that the actual policies in place in many countries are not even sufficient to meet their existing, inadequate NDCs.¹³

To address these gaps, the Agreement established the Global Stocktake (GST).¹⁴ Mandated by Article 14, the GST is a comprehensive, collective assessment of progress towards the Agreement's long-term goals, conducted every five years, with the first concluding at COP28 in 2023. The GST is intended to be the central accountability moment in the Paris cycle, a process to "take stock" of where the world is and to inform the preparation of the next round of NDCs, thereby creating a feedback loop to enhance ambition and action. The outcome of the first GST was a call for Parties to contribute to a global transition away from fossil fuels, triple renewable energy capacity, and double energy efficiency by 2030.¹⁵ However, the legal force of this outcome is that of a recommendation; it does not impose new specific obligations

¹¹ *ibid*, art 4.3.

¹² UNFCCC (n 5).

¹³ Climate Action Tracker, 'Global update: Governments still not acting on climate crisis' (November 2022) <https://climateactiontracker.org/publications/global-update-november-2022/> accessed 1 September 2025.

¹⁴ Paris Agreement (n 2) art 14.

¹⁵ UNFCCC, 'Outcome of the first global stocktake' (Decision 1/CMA.5, 13 December 2023) FCCC/PA/CMA/2023/L.17.

on individual countries. Its effectiveness hinges on its ability to exert political pressure and provide a clear, scientifically grounded signal to governments as they prepare their 2025 NDCs.

2.3 The Enhanced Transparency Framework: A Panopticon with Blind Spots?

If the NDC cycle is the engine of the Paris Agreement, the Enhanced Transparency Framework (ETF) is its navigation system. Established under Article 13, the ETF creates a unified, mandatory system for all countries to report on their GHG inventories and on their progress in implementing and achieving their NDCs. This information is then subject to a process of technical expert review and a facilitative, multilateral consideration of progress.

The ETF is a significant improvement on the previous bifurcated transparency system under the UNFCCC, applying common modalities and procedures to all Parties while providing flexibility for those developing countries that need it considering their capacities. In theory, the ETF functions as a form of “managerial” enforcement.¹⁶ By making national actions and progress (or lack thereof) visible to the international community, it aims to build trust, share best practices, and facilitate accountability through political pressure and public scrutiny—a ‘panopticon’ effect where the knowledge of being watched encourages compliance.

However, the ETF has inherent limitations. Firstly, its effectiveness depends on the quality, timeliness, and completeness of the data reported by countries, which can be a significant capacity challenge for many developing nations. Secondly, the review process is facilitative and non-punitive. It is designed to identify areas for improvement, not to sanction non-compliance. While it can name and shame, it lacks the “teeth” of a formal compliance mechanism with legal penalties. Its power is soft, relying on the influence of reputation and the pressure exerted by peer governments and civil society. The framework can illuminate the implementation gap, but it cannot, by itself, close it. It is a powerful tool for transparency, but transparency alone is not a substitute for action.

2.4 The Legal Character of Pledges: A ‘Hard’ Promise or ‘Soft’ Aspiration?

A central legal question that defines the strength of the Paris Agreement is the binding nature of the NDCs themselves. The answer is nuanced and contested, lying at the heart of the “pledge

¹⁶ Abram Chayes and Antonia Handler Chayes, *The New Sovereignty: Compliance with International Regulatory Agreements* (Harvard University Press 1995). This ‘managerial’ model is often contrasted with a traditional ‘enforcement’ model of international law.

and review” architecture.¹⁷ Under international law, the Paris Agreement is undoubtedly a legally binding treaty. States that have ratified it are bound by its provisions. However, not all provisions within a treaty create obligations of the same character.

A careful reading of the text reveals a deliberate “differentiation of legal character.”¹⁸ Certain provisions are framed in mandatory language (e.g., “shall”), creating clear, legally binding procedural obligations. For instance, Parties *shall* prepare, communicate, and maintain successive NDCs (Article 4.2), and they *shall* account for their NDCs (Article 4.13). Similarly, the obligations to participate in the ETF and the Global Stocktake are legally binding.

In stark contrast, the core substantive content of the NDCs—the actual emission reduction targets—is not legally binding under international law. Article 4.2 states that each Party shall *prepare* an NDC that it *intends to achieve*. The object of the legal obligation is the preparation and communication of the pledge, not its achievement. This drafting was a crucial political compromise necessary to secure the participation of key countries, notably the United States, where a treaty with binding emission targets would have faced insurmountable hurdles in domestic ratification.

Therefore, a country that fails to meet its NDC target does not, *per se*, violate the Paris Agreement, provided it has fulfilled the procedural obligations of reporting and review. This design choice has profound implications. It avoids a traditional, top-down enforcement model but relies instead on a complex interplay of political pressure, national self-interest, and the normative force of the Agreement’s goals. It creates a system where the primary locus of accountability shifts from an international compliance body to the domestic sphere. The legal “hooks” for ensuring NDCs are met are not to be found in the international treaty itself, but in the domestic laws and policies that countries enact to implement their pledges, and in the courtrooms where citizens and NGOs are increasingly turning to hold their governments to account, as will be explored in Part IV.

3. Navigating the Maze - Key Barriers to Implementation

While the international framework sets the stage, the real drama of climate action unfolds at

¹⁷ Daniel Bodansky, ‘The Legal Character of the Paris Agreement’ (2016) 25(2) Review of European, Comparative & International Environmental Law 142.

¹⁸ Jutta Brunnée, ‘The Legal Character of the Paris Agreement: A Differentiated View’ in Daniel Klein and others (eds), The Paris Agreement on Climate Change: Analysis and Commentary (OUP 2017).

the national and subnational levels. It is here that pledges collide with the messy reality of politics, the inertia of established economies, and the deep-seated structures of modern society. This section deconstructs the Mitigation Maze, identifying the primary barriers that impede the translation of climate commitments into tangible, on-the-ground action. These barriers are not discrete but interconnected, creating a web of reinforcing obstacles that makes progress slow and arduous.

3.1 Political and Governance Barriers: The Sovereignty Paradox

The most formidable barriers are often political. The very principle of national sovereignty that underpins the Paris Agreement's bottom-up structure also serves as a primary obstacle to its success. This "sovereignty paradox" means that while global cooperation is essential, ultimate decision-making power rests with national governments, which are often driven by short-term interests that conflict with long-term climate goals.

- i. **Short-Termism and Political Cycles:** Democratic governments operate on electoral cycles of a few years, a timescale fundamentally misaligned with the multi-decadal challenge of climate change. The immediate political costs of climate policies—such as carbon taxes that raise fuel prices or regulations that affect established industries—are often more visible and electorally potent than the long-term, distributed benefits of a stable climate.¹⁹ This creates a powerful incentive for politicians to delay difficult decisions, prioritising near-term economic concerns and electoral survival over long-term planetary health.
- ii. **Vested Interests and Lobbying:** The transition away from fossil fuels directly threatens the business models of some of the world's most powerful and well-funded corporations. The fossil fuel industry and related sectors have historically engaged in, and continue to engage in, extensive lobbying efforts to delay, weaken, or block meaningful climate policy.²⁰ This influence is exerted through political donations, public relations campaigns that question climate science or exaggerate the costs of action, and the "revolving door" between industry and government, creating a powerful political drag on ambition.

¹⁹ Anthony Giddens, *The Politics of Climate Change* (2nd edn, Polity Press 2011).

²⁰ Robert J Brulle, 'The climate lobby: a sectoral analysis of lobbying spending on climate change' (2018) 18(3) *Climatic Change* 1.

- iii. Institutional Inertia and Fragmentation: Effective climate action requires a “whole-of-government” approach, coordinating policy across ministries of energy, transport, finance, agriculture, and industry. In most countries, however, governance is siloed. A ministry of environment may champion ambitious climate targets, but its efforts can be undermined by a finance ministry promoting fossil fuel subsidies or a transport ministry planning new highways. Overcoming this institutional inertia and achieving policy coherence is a monumental governance challenge that few nations have successfully mastered.²¹

3.2 Economic and Financial Barriers: The Trillion-Dollar Stalemate

The scale of the economic transformation required for decarbonisation is immense. While the costs of inaction are far greater, the upfront investment needed presents a staggering barrier, creating a financial stalemate that stalls progress, particularly in the developing world.

- i. The Climate Finance Gap: The transition to a net-zero economy requires trillions, not billions, of dollars in annual investment.²² The Paris Agreement reaffirmed the pledge by developed countries to mobilise USD 100 billion per year by 2020 to support climate action in developing countries—a target that was only met for the first time in 2022, two years late.²³ This failure has not only hampered mitigation and adaptation projects on the ground but has also eroded trust between the Global North and South, complicating international negotiations. The true need is orders of magnitude larger, and the current system of public climate finance is wholly inadequate to the task. The challenge is to shift the far larger pools of private capital, which requires de-risking green investments and creating clear, stable policy signals.
- ii. Perverse Incentives: Fossil Fuel Subsidies: Simultaneously, governments worldwide continue to provide enormous financial support for the production and consumption of fossil fuels. The International Monetary Fund (IMF) estimates that total fossil fuel

²¹ Navroz K Dubash, ‘The politics of climate change in India: narratives of equity and co-benefits’ (2013) 22(3) Review of Policy Research 371.

²² Amar Bhattacharya, Nicholas Stern and others, ‘A New Agenda for Global Climate Finance’ (LSE Grantham Research Institute on Climate Change and the Environment, 2023).

²³ OECD, ‘OECD confirms 2022 climate finance goal met for the first time’ (29 May 2024) <https://www.oecd.org/newsroom/oecd-confirms-2022-climate-finance-goal-met-for-the-first-time.htm> accessed 1 September 2025.

subsidies amounted to USD 7 trillion in 2022.²⁴ These subsidies represent a profound market distortion. They artificially lower the price of fossil fuels, discouraging energy efficiency and making renewables less competitive. They are, in effect, a negative carbon price, actively incentivising the very activities that climate policy seeks to curtail. Phasing out these subsidies is one of the most logical and impactful climate policies available, yet it remains politically perilous due to public resistance to higher energy prices and intense industry lobbying.

- iii. The Challenge of Carbon Pricing: Putting a price on carbon, either through a tax or an Emissions Trading System (ETS), is widely considered by economists to be the most efficient mechanism to drive economy-wide decarbonisation.²⁵ By internalising the external costs of pollution, carbon pricing creates a powerful incentive for businesses and consumers to reduce emissions. However, implementation is fraught with difficulty. Politically, new taxes are unpopular, and the distributional impacts can be regressive, disproportionately affecting low-income households if not designed carefully with revenue recycling or rebate schemes. For ETS, setting the cap at an appropriately ambitious level and managing price volatility are significant technical challenges. The result is that while over 70 carbon pricing initiatives are in place globally, the majority cover a limited portion of emissions at a price too low to drive transformative change.²⁶

3.3 Technological and Infrastructural Barriers: The Carbon Lock-In

Our modern world is built upon a foundation of carbon-intensive infrastructure. The energy we use, the way we travel, the buildings we inhabit, and the industries that produce our goods are all part of a deeply entrenched system that creates a powerful “carbon lock-in” effect.²⁷

- i. Infrastructural Inertia: Power plants, electricity grids, road networks, airports, steel mills, and cement kilns have long operational lifetimes, often spanning several decades. The vast capital already invested in this high-carbon infrastructure creates a powerful

²⁴ Simon Black and others, ‘Fossil Fuel Subsidies Surged to Record \$7 Trillion’ (IMF Blog, 24 August 2023) <https://www.imf.org/en/Blogs/Articles/2023/08/24/fossil-fuel-subsidies-surged-to-record-7-trillion> accessed 2 August 2025.

²⁵ William D Nordhaus, *The Climate Casino: Risk, Uncertainty, and Economics for a Warming World* (Yale University Press 2013).

²⁶ World Bank, ‘State and Trends of Carbon Pricing 2024’ (World Bank Group, 2024).

²⁷ Gregory C Unruh, ‘Understanding carbon lock-in’ (2000) 28(4) *Energy Policy* 817.

inertia that resists change. Retiring these assets before the end of their economic life is costly, while building new, low-carbon alternatives requires massive upfront investment and careful planning. The existing infrastructure creates path dependency, making it easier and cheaper in the short term to continue with the fossil-fuelled status quo than to pivot to a new system.

- ii. **Innovation and Deployment Gaps:** While the cost of renewable energy technologies like solar and wind has plummeted, significant technological hurdles remain in other areas. Decarbonising “hard-to-abate” sectors like heavy industry (steel, cement), long-haul aviation, and shipping requires the rapid development and commercialisation of new technologies such as green hydrogen, sustainable fuels, and large-scale carbon capture, utilisation, and storage (CCUS). Furthermore, even with mature technologies like renewables, a key barrier is deployment at scale, which involves not just manufacturing but also upgrading electricity grids, streamlining permitting processes, and developing robust supply chains.
- iii. **Grid Integration and Energy Storage:** The transition to a power system dominated by variable renewable energy sources (VRES) like wind and solar presents a major technical challenge. The sun does not always shine, and the wind does not always blow. Ensuring a reliable electricity supply 24/7 requires a smarter, more flexible grid, along with massive investment in energy storage solutions, from batteries to pumped hydro and other emerging technologies. This grid and storage infrastructure is a critical enabler of the energy transition, but its development lags far behind the deployment of VRES in many regions.

3.4 Social and Justice Barriers: The Just Transition Imperative

Finally, the transition to a net-zero economy is not merely a technical or economic challenge; it is a profound social one. If not managed carefully, the transition could exacerbate existing inequalities and create new ones, leading to social resistance that could derail the entire process. The concept of a “just transition” is therefore not an optional add-on but a core prerequisite for successful and durable climate action.²⁸

²⁸ ILO, ‘Guidelines for a just transition towards environmentally sustainable economies and societies for all’ (ILO 2015).

The phase-out of coal mining, for example, threatens the livelihoods and cultural identity of entire communities. The shift to electric vehicles could impact auto-mechanics trained on internal combustion engines. The costs of climate policies, if not designed progressively, can fall most heavily on those least able to bear them. A just transition requires proactive policies to support affected workers and communities, including social dialogue, investment in new green industries in affected regions, and robust social safety nets. Failure to address these justice concerns not only has profound ethical implications but also creates a political backlash, as seen in movements like the “gilets jaunes” (yellow vests) in France, which was initially sparked by a proposed fuel tax increase. Ensuring that the benefits of the green transition are shared broadly and its costs are distributed equitably is essential for building the durable social and political consensus needed for deep decarbonisation.

4. Pathways Beyond Pledges - Levers for Planetary Action

The Mitigation Maze is formidable, but not inescapable. Navigating it requires moving beyond a reliance on the voluntary pledge-and-review system and activating a range of more potent, mutually reinforcing levers for change. This section explores three critical sets of pathways—legal, financial, and technological/social—that can hardwire accountability into our governance systems and accelerate the transition from promises to planetary action. These levers operate at multiple levels, from the courtroom to the boardroom, and from national parliaments to city halls, creating a polycentric web of pressure that can drive systemic transformation.

4.1 Legal and Judicial Levers: Forcing Accountability from the Courtroom

In the face of political inertia, citizens, NGOs, and even subnational governments are increasingly turning to the courts to force climate action. The judicial branch of government is emerging as a critical, if sometimes reluctant, arena for climate governance, translating the soft aspirations of international policy into hard, legally enforceable domestic obligations.

4.1.1 The Rise of Strategic Climate Litigation

The last decade has witnessed a surge in strategic climate litigation around the world.²⁹ These cases are moving beyond traditional environmental law claims and are increasingly grounded in constitutional law, human rights law, and corporate tort law. The landmark 2019 decision of

²⁹ Joana Setzer and Catherine Higham, ‘Global trends in climate change litigation: 2023 snapshot’ (LSE Grantham Research Institute on Climate Change and the Environment, 2023).

the Dutch Supreme Court in *Urgenda Foundation v State of the Netherlands* was a watershed moment. The court ordered the Dutch government to reduce its GHG emissions by at least 25% by the end of 2020 compared to 1990 levels, finding that the government's inadequate climate policy constituted a breach of its duty of care under the Dutch Civil Code and a violation of its obligations under the European Convention on Human Rights.³⁰

This precedent has inspired a wave of similar cases. In Germany, the Federal Constitutional Court in *Neubauer, et al. v Germany* ruled that the government's climate law was partially unconstitutional because it offloaded the burden of emissions reductions onto future generations, violating their fundamental rights to a humane future.³¹ These cases against governments are powerful because they reframe climate change as a fundamental rights issue and establish a judicially enforceable minimum standard of climate action.

Simultaneously, a new front has opened against corporate actors. The 2021 ruling in *Milieudefensie et al v Royal Dutch Shell plc* ordered the energy giant to reduce the CO2 emissions of its entire global portfolio (Scope 1, 2, and 3) by 45% by 2030 relative to 2019 levels.³² This was the first time a court had held a private company responsible for contributing to climate change and ordered it to align its business strategy with the Paris Agreement's goals. While under appeal, the case has sent shockwaves through the corporate world, demonstrating that the judiciary can act as a powerful mechanism to hold even the largest private polluters to account.

4.1.2 Domesticating Paris: The Power of National Climate Acts

For international pledges to have real teeth, they must be “domesticated”—translated into national law. A growing number of countries are adopting overarching framework climate change acts, which serve to embed long-term climate targets into the domestic legal system and create mechanisms for accountability. The United Kingdom's Climate Change Act 2008 is the archetypal example.³³ It established a legally binding long-term target for emissions reduction (now net-zero by 2050) and created a system of five-yearly “carbon budgets” to ensure a clear pathway to that target. Crucially, it also established the independent Climate

³⁰ *Urgenda Foundation v State of the Netherlands* [2019] ECLI:NL:HR: 2019:2007.

³¹ *Neubauer, et al v Germany* [2021] 1 BvR 2656/18.

³² *Milieudefensie et al v Royal Dutch Shell plc* [2021] ECLI:NL: RBDHA: 2021:5337.

³³ Climate Change Act 2008 (UK).

Change Committee to advise the government and report to Parliament on progress.

These laws are transformative. They create policy certainty for investors, provide a durable framework that can survive changes in government, and establish a clear legal basis for judicial review. When a government fails to meet its obligations under its own climate act, it can be challenged in court, creating a powerful domestic feedback loop for accountability that is much stronger than the facilitative review process at the international level. The proliferation of such framework laws is a critical step in moving from the soft law of NDCs to the hard law of domestic obligations.

4.1.3 Corporate Governance and Climate Risk Disclosure

A third legal lever operates within the domain of corporate and financial law. Regulators and investors are increasingly recognising that climate change poses a material financial risk to companies and the financial system.³⁴ This has led to a push for mandatory disclosure of climate-related risks and opportunities. The recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) have become the global benchmark, providing a framework for companies to report on their governance, strategy, risk management, and metrics related to climate change.

Many jurisdictions, including the UK, the EU, and New Zealand, are now moving to make TCFD-aligned disclosures mandatory. This shift from voluntary to mandatory reporting is crucial. It forces companies to integrate climate considerations into their core business strategy and risk management processes. It also provides investors, lenders, and insurers with the information they need to accurately price risk and allocate capital towards more sustainable activities. Furthermore, it creates a basis for litigation against corporate directors who fail in their fiduciary duty to manage climate-related risks on behalf of their shareholders.

4.2 Financial and Economic Levers: Realigning Capital for a Green Future

The scale of the green transition requires a fundamental rewiring of the global financial system. Capital must be shifted away from high-carbon assets and channelled towards climate solutions

³⁴ Mark Carney, 'Breaking the tragedy of the horizon – climate change and financial stability' (Speech at Lloyd's of London, 29 September 2015).

at an unprecedented rate. This requires more than just incremental increases in green finance; it demands a systemic realignment of incentives and regulations.

4.2.1 Mobilising Finance and Ending Perverse Subsidies

Achieving the Paris goals requires mobilising trillions in investment. While public finance, particularly for adaptation and capacity building in developing countries, remains critical, it can only ever be a fraction of the total needed. The primary task is to steer the vast pools of private capital managed by pension funds, insurance companies, and asset managers. This can be achieved through a variety of mechanisms:

- i. **De-risking Instruments:** Using public money strategically through blended finance vehicles, guarantees, and first-loss capital can reduce the risk for private investors and unlock investment in emerging markets and novel technologies.
- ii. **Central Bank Mandates:** Central banks and financial regulators are beginning to incorporate climate risk into their mandates, using tools like climate stress tests for banks and adjusting collateral frameworks to favour green assets.
- iii. **Green Bonds and Taxonomies:** The growth of the green bond market provides a dedicated channel for financing climate projects. This is supported by the development of “green taxonomies,” such as the one in the EU, which provide a clear classification system to define which economic activities can be considered environmentally sustainable, thereby combating greenwashing.

The most direct way to realign financial flows is to stop funding the problem. As discussed in Part III, the elimination of the USD 7 trillion in annual fossil fuel subsidies would free up enormous public resources and remove a major distortion from the energy market, levelling the playing field for clean energy.³⁵ This remains a politically challenging but economically essential step.

4.2.2 Operationalising Carbon Markets under Article 6

Article 6 of the Paris Agreement provides a framework for countries to voluntarily cooperate

³⁵ Black and others (n 24).

in achieving their NDCs using carbon markets. If designed with high integrity, these markets can be a powerful tool to lower the overall cost of mitigation and raise ambition. Article 6 establishes two main mechanisms:

- i. Article 6.2: Allows for bilateral or plurilateral agreements to trade “internationally transferred mitigation outcomes” (ITMOs).
- ii. Article 6.4: Creates a new global carbon market, a successor to the Kyoto Protocol’s CDM, to trade credits from specific emission reduction projects.

After years of contentious negotiations, the rulebook for Article 6 was largely finalised at COP26. The key challenge now is implementation. To be effective, these markets must ensure environmental integrity. This means avoiding “hot air” (credits for reductions that would have happened anyway), preventing double counting (where both the buying and selling country claim the same emission reduction), and ensuring that a share of the proceeds is directed to adaptation finance. If these rules are robustly applied, Article 6 could help channel finance to where it is most cost-effective, but if implemented poorly, it risks becoming a mechanism for greenwashing rather than genuine mitigation.

4.3 Technological and Social Levers: Driving Systemic Transformation

Legal and financial levers create the enabling conditions, but the transition ultimately happens through technological innovation and social change, transforming the core sectors of our economy and empowering a broader range of actors.

4.3.1 Mission-Oriented Innovation and Sectoral Deep Dives

While market forces can drive much innovation, the scale and urgency of the climate crisis require a more proactive, “mission-oriented” approach from the state.³⁶ This involves governments setting clear, ambitious targets for key sectors and using public procurement, R&D funding, and industrial strategy to accelerate the development and deployment of critical technologies. Deep, systemic transformation is needed across key sectors:

- i. Energy: The transition is well underway with the rapid growth of solar and wind but

³⁶ Mariana Mazzucato, *Mission Economy: A Moonshot Guide to Changing Capitalism* (Allen Lane 2021).

must be accelerated. This requires not just building more renewables, but also modernising grids, scaling up energy storage, and managing a planned and just phase-out of coal-fired power.

- ii. **Transport:** The focus is on a rapid shift to electrification for road transport, coupled with massive investment in high-quality public and active transport (walking and cycling) infrastructure. For aviation and shipping, the challenge is to commercialise sustainable fuels and improve efficiency.
- iii. **Industry and Buildings:** Decarbonising heavy industry requires breakthroughs in green hydrogen, electrification, and CCUS. In the built environment, the focus is on deep energy efficiency retrofits for existing buildings and stringent standards for new construction to move towards net-zero-ready buildings.

4.3.2 The Indispensable Role of Non-State and Subnational Actors

The Paris Agreement explicitly acknowledges the crucial role of non-Party stakeholders. Cities, subnational regions, businesses, and civil society are not just passive recipients of national policy but are often at the forefront of climate action.³⁷

- i. **Cities:** As hubs of population, economic activity, and emissions, cities are critical arenas for mitigation. Mayors and city governments often have direct control over key sectors like transport, buildings, and waste management, and can be more agile and ambitious than national governments. Networks like C40 Cities connect the world's megacities to share best practices and drive collective action.
- ii. **Businesses:** A growing number of corporations are adopting ambitious net-zero targets through initiatives like the Science Based Targets initiative (SBTi) and the UN-backed Race to Zero campaign. While concerns about greenwashing remain, this corporate movement is creating a powerful demand signal for clean energy and low-carbon products, driving change through global supply chains.
- iii. **Civil Society:** From youth-led movements like Fridays for Future, which have profoundly shifted the public discourse, to environmental NGOs that conduct research,

³⁷ Harriet Bulkeley and others, *Transnational Climate Change Governance* (CUP 2014).

advocate for policy, and bring strategic litigation, civil society plays an indispensable role in holding governments and corporations accountable and building the broad social mandate for ambitious climate action.

This polycentric web of action, where cities, businesses, and citizens act in parallel with and often ahead of national governments, is essential for escaping the Mitigation Maze. It creates multiple, reinforcing pressure points for change, making the system more resilient and dynamic than a purely state-centric approach.

5. Conclusion - From a Maze to a Map

The journey through the Mitigation Maze reveals a landscape of profound complexity. The gap between the solemn pledges of the Paris Agreement and the stark reality of our planetary trajectory is not a simple failure of political will but the product of a deeply entrenched system of legal, economic, and political structures that favour inertia over transformation. The bottom-up, nationally determined architecture of the international climate regime, while a triumph of diplomatic inclusivity, has proven insufficient on its own to catalyse the speed and scale of action required. The maze is real, and its walls are high.

5.1 Synthesising the Argument: Beyond the Pledge Paradigm

This article has argued that escaping this maze requires a fundamental shift in our approach to climate governance. We must move beyond the “pledge paradigm”-the hopeful but ultimately fragile belief that voluntary, nationally determined commitments, reviewed periodically, will be enough. The evidence of the past decade is clear: pledges are a necessary but profoundly insufficient foundation. The real work lies in building a robust scaffolding of accountability around these pledges, transforming them from soft aspirations into hard, enforceable, and actionable commitments.

We have traced the anatomy of the maze, from the legal nuances of the Paris Agreement that create “binding procedures but non-binding outcomes,” to the formidable barriers of political short-termism, the perverse incentives of fossil fuel subsidies, and the powerful lock-in of carbon-intensive infrastructure. These obstacles are not discrete but interwoven, creating a Gordian knot that cannot be untangled by a single solution.

5.2 An Integrated Vision for Polycentric Governance

The pathways out of the maze, therefore, must be equally interconnected. The solution is not a single silver bullet but a “silver buckshot” of mutually reinforcing strategies. This article has illuminated a set of powerful levers that, when used in concert, can create a new, more effective model of climate governance.

This model is polycentric, recognising that action must be driven simultaneously from multiple centres of authority. It is a model where:

- i. International law sets the normative goals and establishes the procedural framework (the Paris Agreement).
- ii. Domestic law translates those goals into binding national targets and carbon budgets, creating clear legal obligations (Climate Change Acts).
- iii. The judiciary acts as a crucial backstop, enforcing those domestic laws and upholding fundamental rights to a stable climate, holding both governments and corporate polluters to account (strategic litigation).
- iv. The financial system is rewired through regulation and market innovation to starve the fossil fuel economy of capital and fund the green transition (mandatory disclosures, subsidy reform, carbon pricing).
- v. Technological innovation is directed by mission-oriented policy to solve the hardest decarbonisation challenges.
- vi. Non-state actors-cities, businesses, and civil society-act as dynamic laboratories of ambition, often moving faster and further than national governments and creating a groundswell of pressure for change from below.

In this integrated vision, these levers do not work in isolation. Climate litigation is more powerful when it can point to a specific legal duty in a national climate act. Corporate action is accelerated when faced with mandatory disclosure rules and investor pressure. National governments are more likely to raise their ambition when pushed by pioneering cities and a vocal civil society. It is the synergistic interplay of these forces that can turn the vicious cycle

of inertia into a virtuous cycle of accelerating action.

5.3 A Call for Courageous Governance

Ultimately, navigating the maze and implementing this integrated vision is not a technocratic exercise. It is a question of governance and leadership. It requires political courage: the courage to confront powerful vested interests, to make decisions whose benefits will be realised long after the next election, and to have honest conversations with citizens about the scale of the transformation required and the need to manage it justly. It requires corporate courage: the courage to fundamentally realign business models with planetary boundaries, even when it means sacrificing short-term profits. And it requires civic courage: the courage to continue demanding more, to hold leaders accountable, and to build the broad, resilient social consensus for change.

The Mitigation Maze is a construct of our own making. Its walls are built of our laws, our economic models, and our political habits. We built them, and we can dismantle them. By moving beyond a simple faith in pledges and embracing a more robust, multi-level, and accountability-focused approach, we can transform the maze into a map-a clear, actionable guide towards a just, prosperous, and climate-secure future. The time for wandering is over. The time for determined concerted action is now.