



Accelerating Renewable Energy

"There is a tide in the affairs of men which, taken at the flood, leads on to fortune; Omitted, all the voyage of their life is bound in shallows and in miseries. On such a full sea are we now afloat. And we must take the current when it serves, or lose our ventures." William Shakespeare.

Reduce Global Heating

There is an urgent requirement, in fact an imperative, to reduce the ever increasing level of global temperature rises while there is still a chance to avoid the worst effects of rising sea levels from melting ice.

Decarbonisation of the Global Economy

Shift to Renewable Energy

The world must transition from fossil fuels to renewable energy sources like solar, wind, and hydropower. This is critical for reducing greenhouse gas (GHG) emissions, which are the main driver of global warming and ocean acidification. This means a rapid acceleration of scaling up offshore wind, floating solar, and hydrogen storage technologies.

Electrification of Transport and Industry

Electrifying sectors like transportation and heavy industry can significantly reduce GHG emissions. Initiatives to promote electric vehicles (EVs) and green hydrogen for industrial processes are key steps. More effective government policies that encourage EV adoption, public transit electrification, and industrial decarbonisation are required.

Carbon Markets

Implementing carbon pricing mechanisms (e.g., carbon taxes or cap-and-trade systems) encourages businesses to reduce emissions and invest in clean technologies. There is a clear disconnect between the carbon markets and the acceleration of renewable energy, with regulatory bodies making it harder not easier to get finance for renewable energy projects

Urgency of Reducing Emissions

The Role of Oceans in Climate Regulation

The carbon cycle stability, responsible for regulating the level of greenhouse gases in the troposphere (the lowest part of Earth's atmosphere), begins and ends in the oceans. The Pacific El Niño Southern Oscillation (ENSO) is a naturally occurring large-scale climatic phenomenon involving fluctuating ocean temperatures, has accelerated dramatically, adversely affecting all of the world's weather systems. The world's oceans are polluted by a "plastic smog" made up of an estimated 171 trillion plastic particles that if gathered would weigh around 2.3 million tons, according to a new study. The level of plastics (fossil fuel based) in the oceans are rapidly altering the balance of the ocean ecosystems, destroying marine animals, fish and plants and their habitat. To date, no government thinks that the oceans are their responsibility. Because they are global systems, and very few are thinking about the planet as a whole. As a species, humanity has been very poor at whole systems thinking.

The Problem of Greenwashing

The challenge is to accurately message the need for urgent climate action in a world that often prioritises short-term gains and populist spin over long-term sustainability and accurate research. Promoting renewable energy insights to institutional investors and policymakers to take a more balanced and sustainable approach requires a

concerted effort amongst thought leaders from every sector of civil society. This leadership is currently not coming from global governments, especially the countries responsible for most of the global heating. Wealthy countries are currently engaged in mixed messaging because of political influence on politicians by the existing energy stakeholders, particularly the fossil fuel companies.

Current Energy Insights

Just 100 companies in the world have been responsible for 71% of the global greenhouse gas emissions that cause global warming since 1998, according to The Carbon Majors Database, a report recently published by the Carbon Disclosure Project (CDP).

There are many published renewable energy insights from industry, academic and business sources with a range of target audiences and content.

Industry-Focused Platforms

There are a number of platforms such as clean tech blogs, industry news, energy innovation insights, and power industry communities for renewable energy, grid and climate topics.

Science and environment publications offer expert opinions from a scientific and environmental angle, including peer-reviewed research and deep analysis on energy issues, including renewable energy trends.

Business and tech outlets provide energy innovation information, and data driven and business insights on cloud infrastructure related to renewable energy.

Social media & community platforms enable communications amongst groups focused on energy, climate change, and sustainability professionals.

Investment Challenges in Renewable Energy

However many large organizations and non-profit organizations there are around the world promoting the transition to clean energy, investors are biased in favour of existing technologies with a profit history. This means that small cleantech innovation start ups often struggle. Serious innovation is falling by the wayside as these companies cannot find the investment they require to develop new ideas to fruition in the marketplace.

Investment in Clean Technology

Governments and investors are at last talking the talk, and taking their first uncertain steps towards funding the transition to renewable energy. While there is high-quality research, national self-interest, and past economic paradigms still pervade deep analysis.

Global Efforts

One very positive aspect for addressing climate change, is the number, size and quality of organizations across the globe providing quality information, research, news and advice.

Low Carbon Strategies

There are many organizations that focus on critical issues related to climate, energy, and sustainable development. They often work with governments and businesses to support low-carbon energy transition strategies, for example Carbon Trust UK, Rocky Mountain Institute, World Research Institute, The Stockholm Environment Institute, to name a few. They provide insights and promote sustainable investments while working with a network of investors, especially those focused on environmental impact.

Financially Sustainable and Responsible Investment (PRI)

These organizations encourage investors to incorporate environmental, social, and governance (ESG) factors into their investment decision-making. They promote long-term sustainability over short-term profits. Examples include the Principles for Responsible Investment (backed by the UN), the International Finance Corporation (IFC - part of the World Bank Group). These organizations invest and promote investment in sustainable projects with a focus on long-term outcomes, particularly in developing economies. They have a keen interest in renewable energy and institutional investors looking beyond immediate profits. Ceres is an advocacy organization working to steer institutional investors and businesses towards more sustainable practices, emphasising the economic benefits of climate action, and Rockefeller Foundation supports a broad array of initiatives, including renewable energy, and focuses on long-term, sustainable development. They invest in innovations that can shape climate-resilient economies.

Sustainable Innovation Projects

Switzerland's Solar Impulse Foundation is a leading light for promoting technology innovation, with more than 1000 efficient solutions for a clean economic growth on its website. In fact there are thousands of small companies offering renewable energy and other sustainable technology innovation solutions in every country requiring a financial incentive to succeed.

Paris Agreement Off Track

Climate Science

The science is clear, the messages are clear, and yet action to decarbonise energy is lagging behind the thinking, while reports on extreme weather events and attribution to climate change make it undeniable that continuing global heating by burning fossil fuels is the problem.

The IPCC scientists AR6 scenarios are the best we have. The AR6 details the devastating consequences of rising greenhouse gas (GHG) emissions around the world – the destruction of homes, the loss of livelihoods and the fragmentation of communities, for example – as well as the increasingly dangerous and irreversible risks if we fail to change course. Adaptation measures can effectively build resilience, but more finance is needed to scale solutions. Incentives are required to increase the financing to the level required to avoid the high risk and even worse case scenarios towards which we are currently heading.

Mind the Gap

Climate finance flows have grown consistently over the past decade, but they still lag far behind what is needed to meet the goals of the Paris Agreement. The Climate Policy Initiative September 2023 study estimates that USD 6.2 trillion of climate finance is required annually between now and 2030, and USD 7.3tn by 2050, to deliver Net Zero – a total of almost USD200tn. The following illustration of tracked finance shows how far the world is lagging behind delivering Net Zero emissions.

“As things stand, fully implementing unconditional Nationally Determined Contributions (NDCs) made under the Paris Agreement would put the world on track for limiting temperature rise to 2.9°C above pre-industrial levels this century.” - UNEP Emissions Gap Report 2023. Since this report was published, the gap has widened.

Figure ES.1: Global tracked climate finance and estimated annual climate finance needs through 2050 (USD million)



Source: Climate Policy Initiative

Financial Investment Incentives

The Problem of Greenwashing

In recent years, governments appear to be engaging with lobby groups and vested interests who promote an economic rationalism for unproven technologies such as Carbon Capture and Storage (CCS), Geoengineering research, and Short Lived Climate Forcers (SLCF) including stratospheric aerosol injections. All of these technologies are potentially highly dangerous, and there are no models which prove safety. In fact, investors and governments appear to be deeply resistant to one strategy that has a chance of working, which is providing deep financial incentives for renewable energy, and disincentives to greenhouse gas emissions from deforestation and ocean pollution and overfishing.

The Problem of Renewable Energy Credits

Renewable energy credits cannot currently be easily applied in the high carbon emitting countries, where the transition is needed most. While eventually approval can be found for a solar panel in a developing country to be eligible for carbon credit selling to the carbon markets, getting approval in the big polluting countries such as the USA, the European Union, China and India requires a Catch 22 test known as 'Additionality', which requires that a renewable energy project has to prove the project would not have happened if it had NOT been eligible for carbon credits. This is clearly a tautology, and a clear disconnect between reality and policy at the national and international levels.

Investment Memes

Large institutional investors might be talking about serious, long-term strategies around sustainability. However the reality is that they are easy victims for greenwashing, greenspin, and technologies that look attractive on paper, such as Carbon Capture and Storage, and Cloud Seeding hype that have respectively a huge carbon footprint, and the capacity for massive environmental toxification through chemical spills, unpredictable seismic disturbance to underground and undersea carbon storage, and irreversible damage to the water tables that supply the 8 billion inhabitants with clean water.

Risk Frameworks

Ensemble Learning

The context for risk models often have inherent biases from out-of-date economic paradigms which did not consider the natural world to have any value. Improvements could be made to current risk models by aggregating the thinking in current risk frameworks, without obscuring the tail risks i.e. the chance of a loss occurring due to a rare event, as predicted by a probability distribution. using current Machine Learning and Artificial Intelligence technologies to provide an accurate global position.

The current situation presents a clear challenge to break through the noise that is coming from short term thinking. Finding a message that resonates with organizations actively pursuing responsible investment strategies or engaging in policy advocacy for sustainability to a receptive audience is a pressing requirement. And so effectively did the fossil fuel industry campaign against an effective price on carbon emissions, either as a market price, a tax, or a cap and trade mechanism, that currently, the only effective method of reducing emissions in time to stop ourselves from destroying the planet's stable climate for human beings, appears to be off the table.

Globally, there are national and corporate risk models, though they vary in scope, detail, and the types of risks they address. These models are used to assess and manage the potential impacts of various risks, including environmental, economic, geopolitical, and, increasingly, climate-related risks.

National Risk Models

National risk models are typically used by governments to assess the potential impact of various risks on the country's infrastructure, economy, and population. These models are often managed by government agencies or national think tanks, and they incorporate climate change, natural disasters, and geopolitical risks. Key examples include:

National Climate Risk Assessments (NCRAs)

Many countries have developed their own versions of climate risk assessments. These models evaluate vulnerabilities to climate change and aim to prepare for climate impacts like rising sea levels, extreme weather events, and changes in agriculture or energy systems. The UK Climate Change Risk Assessment (CCRA) and US National Climate Assessment are good examples.

National Security Risk Models

In many countries, risks related to climate change have been incorporated into broader national security assessments. For example, the US Department of Defense now includes climate change in its strategic planning because of the potential for resource shortages, conflicts over water, and migration pressures.

Disaster Risk Models

Governments often use disaster risk models to prepare for natural disasters, many of which are worsened by climate change. These models simulate the effects of extreme weather, such as hurricanes, floods, or wildfires. For example, FEMA in the US uses risk models for disaster preparedness.

Economic Risk Models

National economic risk models often consider the effects of market changes, trade disruptions, and, increasingly, climate risks. For example, the Bank of England and European Central Bank include climate-related risks in their financial stability assessments.

Corporate Risk Models

Corporations, particularly in sectors exposed to long-term risks like energy, insurance, and finance, use risk models to evaluate potential impacts on their business and to inform decision-making. These models often integrate environmental, social, and governance (ESG) factors as part of their risk analysis.

Enterprise Risk Management (ERM)

Most large corporations use some form of ERM to assess risks to the company's operations, reputation, and financial performance. Increasingly, climate change is seen as a material risk. For example, companies use risk models to evaluate the impact of carbon pricing, extreme weather events, or shifts in consumer demand for more sustainable products.

Climate Risk Models

Many corporations, especially those in energy, agriculture, or real estate, are starting to incorporate climate risk into their decision-making. These models predict the financial impacts of things like rising sea levels, temperature changes, or regulations on emissions. Companies like BlackRock and Moody's now offer climate risk assessments as part of their services.

Scenario Analysis

Financial institutions and companies use scenario analysis to model how different climate futures could impact their bottom line. For example, Task Force on Climate-related Financial Disclosures (TCFD) encourages companies to model climate-related risks and opportunities under different temperature scenarios (e.g., 1.5°C, 2°C, or 4°C of warming).

Supply Chain Risk Models

These models help companies assess how climate change might impact their supply chains. For example, they could evaluate how extreme weather or regulatory changes might disrupt the flow of raw materials or finished goods.

Growing Focus on Climate in Risk Models

Both national and corporate models are increasingly integrating climate risk as a key variable. More has to be done to place emphasis on the urgency of addressing climate risk. The following examples are a starting point of what must be done to shift the thinking of the public and private sectors.

Network for Greening the Financial System (NGFS)

A group of central banks and financial regulators working to understand and mitigate climate-related risks in the global economy.

The World Economic Forum

The WEF publishes its Global Risks Report, which increasingly highlights environmental risks like climate change, extreme weather, and biodiversity loss.

Carbon Disclosure Project

The CDP encourages companies to disclose their climate-related risks and opportunities, and how these factors are integrated into their risk management frameworks.

Global Carbon Accounting

What can be measured can be managed. Real-time carbon accounting and the kind of transparency and accuracy that would genuinely change how emissions are tracked and valued is urgently required.

Accuracy and Transparency

The idea of accurate carbon accounting, with a price heading towards \$200 per tonne, tied to embodied carbon and real-time tracking, could be transformative. It addresses the core issues with carbon pricing today—low prices and poor accuracy—that undermine the whole system. With more granular, real-time data from the grid and fuel stations, it would not only be possible to reward renewable use effectively, but it would also push industries towards genuine, verifiable reductions in emissions, instead of the manual estimates that are being made by companies and governments to the United Nations as part of the obligation to report on carbon emissions. These estimates are just that, high level estimates that neglect many factors, and fail to properly account for the natural carbon reservoirs in natural ecosystems and Earth's biosphere.

The Role of the COPs

The UNFCCC Conference of Parties, the COPs are there to provide an equal voice to countries large and small. In reality, particularly in recent years, the conferences have been influenced by lobby groups, vested interests, and the large self-serving national governments. COP29, scheduled for November 2024, looks like being no different, and fossil fuel companies and countries lobbying is part of the wider problem of vested interests diluting real action.

Our best hope is that the tide can shift quickly to new mechanisms, like finding a way to penalise greenhouse emissions and reward renewable energy development on a truly global scale. This is the only way to gain momentum and institutional backing that we must adopt to avoid the worst ravages of extreme weather events that are only just beginning.

Raising the Carbon Price

The current level of ambition to address climate change is not enough either at the national level or globally. Having a universal high price on carbon would make all the difference.

Improving Emissions Monitoring

Accurate carbon accounting, based on embodied carbon (the total emissions involved in production), with a carbon price at least \$200 USD per tonne, with an onus on data proof, not subjective human interpretation, could still work to deliver the Paris Agreement objective of limiting “the increase in the global average temperature to well below 2°C above pre-industrial levels” and pursue efforts “to limit the temperature increase to 1.5°C above pre-industrial levels.”, considerably less than where we are currently heading (3+ degrees).

The Role of AI

Accurate carbon accounting and carbon pricing could be embedded within climate models, augmented by Deep Learning, Neural Networks, Generative Models and other AI methodologies that are rapidly advancing currently. Accurate real-time carbon data would help countries and corporations model climate risks more precisely, assess regulatory risks, and position themselves better to mitigate long-term impacts. This could drive demand for more rigorous carbon pricing frameworks and incentivize real action.

The Role of Cloud Technologies

The use of cloud technology to monitor real-time carbon emissions from national electricity grids and transport fuel stations to measure near real time fossil fuel emissions would be a good start to putting a realistic price on carbon emissions. Carbon accounting to accurately apply a price to goods based on the embodied carbon in the manufacturing supply chain must be rapidly adopted.

The Role of Rewards

Providing disincentives to carbon intensive agribusiness to leave alone forests and other natural carbon sinks, rather than destroy them for farming and growing crops. Overfishing of oceans has to be stopped by making it cost inefficient and ineffective.

To reward the use of renewables and accurate supply chain carbon accounting to calculate carbon savings, with a strong level of financial incentive is essential. This is not difficult to do, as all the algorithms to make the carbon accounting accurate to each of the economic activities are already readily available. Publication of near real time carbon accounting with cloud technology and associated audit trails is a very easy proof step, given the urgency of the situation. The problem seems to be that we are being prevented from accurate greenhouse gas emissions monitoring until it suits wealthy vested interests such as national governments, supported by fossil fuel industry lobby groups.

Addressing Climate Risk

National and corporate risk models definitely exist, and climate change is becoming an integral part of them. Accurate carbon accounting can influence how these models are constructed and how they drive decision-making at both national and corporate levels to make better decisions and provisions for the extreme weather events that are now certainly coming.

Carbon Cycle

To iterate, the ocean carbon cycle and the impact of plastics is crucial and often overlooked. Governments do tend to avoid responsibility for the oceans, which is problematic since the oceans are the largest carbon sink on the planet. Addressing the ocean's role in carbon sequestration, alongside the harm from fossil fuel-based plastics, would add an important dimension. Accurate carbon accounting that includes ocean health could lead to more comprehensive, systems-based approaches to climate action.

Whole Systems Thinking

Incorporating whole systems thinking would expand the perspectives that have been taken based on over specialised sector-specific climate strategies. Ignoring interconnected systems like oceans and carbon cycles, the ENSO and the AMOC, the acceleration of the Greenland and Antarctic ice melt, leads to partial solutions that fail to curb emissions meaningfully. There is a need for holistic, global frameworks that account for planetary boundaries, not just national interests. It is clear that accelerating renewable energy over fringe technologies such as CCS and cloud seeding, prolonging natural gas and coal is the only sane and just forward pathway.

International Cooperation

There is an urgent requirement for international responsibility over oceans and for integrated thinking on carbon, climate, and ecosystems.

Accurate, real-time carbon accounting isn't just a technical solution but a pathway to whole-system change. Without addressing both land and ocean carbon dynamics, we cannot stabilize Earth's climate.

National governments, the UNFCCC, UNEP and UNDP must step up to focus on international environmental governance or climate finance. And this requires that wealthy countries must support meaningful solutions to climate stability, because climate change knows no borders.

Call to Action

A Global Initiative for Real-Time Carbon Monitoring and AI-Driven Climate Risk Models

The climate crisis transcends borders, and the current piecemeal approach to carbon accounting and emissions monitoring has proven insufficient. The future of climate action must be built on transparent, accurate, and globally coordinated data.

International AI and ML Ensemble Learning for Climate Risk Models

We propose the formation of an international AI consortium tasked with developing ensemble learning and fusion models that aggregate data from national and corporate risk models. These models can be enhanced with cutting-edge machine learning and neural networks to predict the financial, ecological, and societal impacts of climate change with unparalleled accuracy. By fusing disparate datasets and models from across the globe, this initiative can create a unified climate risk framework, bypassing national biases and vested interests.

Through deep learning algorithms, we can identify patterns and correlations that humans cannot, enabling governments and businesses to make informed decisions based on the most precise risk assessments. These models can incorporate real-time emissions data and climate impact assessments, offering a truly global perspective on the risks and opportunities tied to decarbonization.

Global Cloud Initiative for Real-Time Emissions Monitoring

We call for the establishment of a global cloud-based platform to monitor real-time carbon emissions from all key sectors—energy, transportation, industry, and agriculture. This system would collect data from national electricity grids, fuel stations, and major industrial emitters to create a public, transparent, and verifiable database of carbon emissions.

By leveraging cloud technology, this platform can provide instant feedback on global emissions trends, creating a robust, data-driven mechanism for enforcing carbon pricing and rewarding emissions reductions. Real-time emissions tracking would eliminate the lag and inaccuracy associated with self-reported national emissions data and drive rapid decarbonization across borders.

Beyond National Interests: Improving Global Governance Structure

To avoid the failures of COPs past, we must design an improved system of global climate governance—one that is independent of national self-interest and vested corporate influences. This governance structure could oversee the deployment of the global cloud emissions platform, ensuring that the data is used to penalise major emitters and reward renewable energy development through a truly global system of carbon credits, taxes, and incentives.

Without addressing emissions at both the global and local levels, we risk further entrenching the status quo, where greenwashing and half-measures prevail. Only through integrated international efforts can we stabilise the climate and safeguard our planet for future generations.

Funding and Collaboration

This effort will require multilateral cooperation, funded by a coalition of governments, international organizations, and private entities that understand the true cost of inaction. Wealthy nations and institutional investors must step up, providing the financial backing necessary to implement these critical initiatives.

The technology exists. The science is clear. What we lack is the collective will to act. The time for isolated, self-serving strategies is over. The only path forward is one of global solidarity, transparency, and accountability.

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