Unlocking Climate Technologies for Global South

— Impact Future Project —

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— Impact Future Project —

Unlocking Climate Technologies for Global South

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ASPIRE CIRCLE

Aspire Circle is a non-profit Trust which promotes enlightened social leadership. Founded in 2007, it builds and scales five impact communities through Scholarships, Fellowships, Internships, IFP (Impact Future Project) Community Leadership, and Impact Hub Community Partnerships. To date, Aspire Circle has awarded 34 scholarships, admitted 250+ Fellows and engaged 200+ IFP leaders.

THE ENERGY & RESOURCES INSTITUTE

TERI is an independent, multi-dimensional organization, with expertise in research, policy, consultancy and implementation. TERI has a host of innovators and agents of change in the energy, environment, climate change and sustainability spheres, having pioneered conversations and action in these areas for over four decades.

ASPIRE IMPACT

Aspire Impact is the pioneering Impact Rating & Certification initiative in the Global South. Established in 2020 as a social enterprise, it uses a 4P Impact Assessment Framework to evaluate corporations, banks, funds, and non-profits in terms of ESG, Sustainability, and Impact. Through rigorous evaluations based on 40 Impact Standards and 150+ KPIs, Aspire Impact awards Green, Silver, Gold & Platinum Leaf ratings. It also leads India's esteemed thought leadership project, the Impact Future Project, featuring 11 research reports to date with contributions from over 250 CXOs as co-authors.

IMPACT FUTURE PROJECT (IFP)

The Impact Future Project (IFP) is a thought-leadership platform and an "appreciative enquiry" about the imminent Impact Economy or Capitalism 2.0. The initiative is for the public good, to (a) generate transformative investment ideas, (b) develop standards-based impact measurement framework, and (c) design a digital platform for standards-based, ESG, Sustainability & Impact Assessments.

DESAI & ASSOCIATES

Desai & Associates (D&A) is an innovative finance-focused academic, advocacy and advisory firm helping funders, founders & policymakers identify and deploy innovative solutions to sustainable development challenges in climate, inclusion and livelihoods. D&A's mission is to drive better capital allocation, democratise knowledge and drive tri-sector (Samaaj, Sarkaar, Bazaar) collaboration on intersectional issues.

MAHINDRA UNIVERSITY

Imparting quality education is the primary vision at Mahindra University. The objective is to ensure that the University gives the students, as they start their professional careers, a proper foundation and a clear pathway for their career growth through the encouragement of our esteemed faculty mentors and peers and to become an institution playing a significant role in the global dynamics of research, development and higher learning in science, technology, and liberal arts.

PROTEAN E-GOV TECHNOLOGIES

Protean eGov Technologies Ltd., is one of the key IT enabled service providers engaged in conceptualizing, developing and executing nationally critical and population scale greenfield technology solutions. The company has extensively collaborated with the government over the last 25 years in creating digital public infrastructure and developing innovative citizen centric e-governance solutions.

M1XCHANGE

M1xchange was launched on 7th April 2017 to service the finance needs of MSME across India. The exchange enables MSMEs to secure finances by converting their trade receivables into liquid funds, on without recourse basis. The exchange has hosted Nationalised, Private and Foreign banks to finance these receivables at most competitive rates with a unique model of bidding by the banks.

CAPGEMINI

Capgemini is a global leader in partnering with companies to transform and manage their business by harnessing the power of technology. The Group is guided everyday by its purpose of unleashing human energy through technology for an inclusive and sustainable future. It is a responsible and diverse organization of 340,000 team members in nearly 50 countries.

THE ROCKEFELLER FOUNDATION

The Rockefeller Foundation seeks to inspire and foster large-scale human impact that promotes the well-being of humanity by identifying and accelerating breakthrough solutions, ideas and conversations.

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Founder's Preface

Dear Friends,

The global ESG, Sustainability and Impact movement, induced by a global pursuit of sustainable life by consumers, businesses, investors and governments; emboldened by global commitments like SDGs or Net Zero; is now an unstoppable force. At the end of 2020, USD 59 trillion of USD 150 trillion of global AUM (Assets Under Management), as per GSIA, had moved to the Impact Continuum, i.e., either in ESG, Sustainability or Impact Investments. We are well on our journey to an Impact Economy.

However, to accelerate timely global transition to Net Zero, we must catalyse the transfer of Climate Technologies to Global South nations, who categorically state the need for financial-assistance, low-carbon technology transfer and capacity-building as core to meeting their obligations under the UNFCCC and Paris Agreement. We should not let Intellectual Property Rights, for example, to become a hindrance; and rather generate win-win strategies. Therefore, in early 2023, given Indian presidency of G20, and Aspire Impact's vantage point in advising global South corporations towards SDGs, ESG or Net Zero; proposed two ideas, one each for Climate Technology and Climate Finance, to enable greater innovation. We are grateful that the T20 Secretariat approved creation of two Expert Working Groups to develop these two ideas further.

This publication, co-authored by one of our two Working Groups, outlines our idea to establish a Climate Technologies' Clearing House (CTCH), which will facilitate as a Trade Hub, transfer of climate technologies to Global South governments and corporations.

We are indebted to the 23 experts who came together multiple times to co-author this publication, under the leadership of Corey Glickman and Anirban Ghosh. Mahindra University's Sustainability Centre and Desai & Associates were thoughtful Knowledge and Convening Partners, respectively. My special thanks go to Harpreet Kaur of Aspire Impact for her diligent primary drafting. We hope this idea gets its due consideration.

Finally, I must thank our primary sponsors Capgemini, long-term supporters of our Impact Future Project, and supporting sponsors- The Rockefeller Foundation and Protean e-Gov Technologies for their generous support.

We hope this publication will spur more creative thoughts on how we can all partner, in a win-win way, through trade and commerce, to usher an era of true sustainability. Aspire Impact will continue to measure the world's transition to sustainable Impact.

Sincerely,

Amit Bhatia
Founder & CEO
Aspire Impact & Aspire Circle

Messages

Co-Chair

Equitable access to innovative climate solutions is essential for rapid global progress to a net-zero future. Technologies must flow from the "haves" to the "have-nots" for a just and effective transition. A climate-tech clearing house can be a transformative collaborative step that breaks traditional barriers which hinder the seamless flow of technologies between stakeholders. The resultant benefits of rapid scale-up, accelerated adoption and vibrant climate-tech markets will take the idea of a net-zero world from the realm of incredulity to the realm of possibility.

Anirban Ghosh
Head, Centre for Sustainability,
Mahindra University

Co-Chair

The formation of a technology clearing house led by India's G20 Presidency and T20 leadership initiative will launch climate technology and policy making to the forefront delivering Just Transition solutions in the developing world.. The working group of experts from around the globe have come together to create this report. The innovations featured in these publications are supported by extensive research with the goal of creating a true impact in the quest for climate change that is measurable and therefore accountable at a global scale.

Corey Glickman
VP - Global Head Sustainability and Design
Consulting Services, Infosys

Quotes from Co-Authors

"Mankind is at cross-roads. We may end up destroying the earth and ourselves if we don't act quickly. We have all the technology and the science at our disposal. We do not have the awareness of the consequences of our collective actions."

Alok Jagdhari
Managing Partner, 92Angels

"The burning need is a handshake that marries the existing tech and risk capital from the global north with the consumer markets and resources of the global south, and that takes deployment beyond climate mitigation to innovations in climate adaptation and circular economy."

Ashish Mehta
Founder & Managing Partner,
Second Nature Sustainable Solutions

"The idea of a Climate Technologies Clearing House could be a game-changer for how technology flows occur. However, it must provide an independent, objective, and transparent process to assess clean technologies to avoid green-washing."

Dr. Amrita Goldar
Senior Fellow and Thematic Lead, Climate Change Urbanization and Sustainability, ICRIER

"We are already seeing the effect of Climate change and it is imperative that we use and propagate all the possible mitigation methods including appropriate climate technology, reduction in usage of fossil fuels along with deep behaviour change to address this really important challenge."

Alka Talwar
Ex Chief CSR & Sustainability Officer,
Tata Chemicals Limited

"Apart from the decarbonization of the power sector, one of the key levers for any clean energy transition strategy must include rapid improvements in energy efficiency across all energy-consuming sectors."

Girish Sethi
Senior Director-Energy Program,
TERI, New Delhi

"A climate technologies clearinghouse house with a collective bargaining mechanism is a requirement if emerging economics are expected to transition to net zero and help drive global emissions targets."

Kartikeya N Desai
Founder & CEO, Desai & Associates

"A perfect solution to tackle climate change is a right collaboration between Climate Tech Innovators, Investors and industries. Technology transfer will ensure the right synergy to build sustainable products and organizations."

Kiran Sarkar
Head Sustainability (Automotive & Farm Equipment Sector), Mahindra & Mahindra Limited

"North-South decarbonization tech engagements need to be a two-way flow. A focus on early-stage, high-impact technologies like chemical recycling, low-cost electrolyzers, etc., will drive incrementality. To encourage collaboration, a customized IPR framework that focuses on patent pooling and voluntary licensing is a key enabler."

Masood Mallick
CEO, Re Sustainability Limited

"Global South must strive to not only adopt but to pioneer sustainability tech. Indigenization of sustainability tech will lead to cost-effective and customised solutions that can truly scale."

Rahul Singh Tomar
Associate Chief of Staff to the CEO,
Ather Energy

"Climate Tech can be a complex topic with a wide range of technologies. I like the process the group undertook to have focussed discussions and come up with practical recommendations."

Rohit Bhatia
Chief Product Officer, Aspire Impact

"Clean technology will play a key role in ushering rapid and orderly energy transition. Right from reducing the cost of hydrogen generation, better energy management, round the clock power supply the need for clean technology is immense in the global economy. Equitable knowledge sharing across the globe is equally essential in mitigating climate change."

Rajeev Kumar
Vice President, Business Development and Integration, bp India

"The successful adoption of climate change technologies will require inclusive, people-centred approaches, enabled by collaborative international policy."

Sabina Curatolo
Impact Consultant

"We are all searching for technologies that can help us move to a low carbon world. A holistic approach to incorporating low cost well tested solutions can enable adoption of behaviours that enable all to move from Business-As-Usual. This book aims to assess, analyse and provide push in this direction."

Dr. Sunita Purushottam
Board Chairman Global Building performance Network, Head sustainability and CSR, Mahindra Lifespace Developer Limited

"A set of climate technology enablers is needed to continually accelerate innovation and investment into new solutions and technologies that address our ESG ambitions. Responsible technology governance, policy, partnerships, data & tools, capacity development, skills and finance mechanisms are the key."

Swapnil Joshi
Director, Sustainability & Design, Infosys Ltd.

"The net zero goals can only be achieved with the promotion of green technology and practices. Issues of availability and equitable access need to be dealt with especially in developing countries."

Suruchi Bhadwal
Senior Fellow and Program Director, Climate and Air, TERI

"Climate change is not a future problem - it's here and now. It's critical that nations come together to pool technologies that can pave a path for the world to move towards carbon neutrality. Thus a Clearing House Facility, within the G20 nations, is much needed."

Tanya Singhal
Founder, Mynzo Carbon (MyNetZero)

"In order to solve for the UN SDGs and address systemic issues like climate change, biodiversity loss and the growing social inequities, we require a fundamental shift in mindsets that work towards creating new radical ways to collaborate, enable and harness the collective intelligence globally and mobilize capital that links the Global North and Global South. We must acknowledge that "time" is not an infinite resource and our success will be based on creating positive real-world outcomes and not just investing into BAU."

Zarmeen Pavri
Co-Founder and Partner, SDGx

Executive Summary

The escalating effects of climate change underscore the urgent need for sustainable development through the adoption of climate technologies. These technologies offer promising solutions to mitigate greenhouse gas emissions and support adaptation efforts, particularly in vulnerable regions such as the Global South. However, their implementation is hindered by various challenges, including financing constraints, limited access, intellectual property rights concerns, greenwashing practices, and ambiguity in technology selection criteria and often mismatched research and development budget allocations.

In response to this critical challenge, Aspire convened distinguished figures, including industry leaders, climate organizations, sustainability experts, think tanks, investors, and other influential stakeholders. This collaborative harnessed their collective wisdom, experience, and expertise, synthesizing their contributions into this research publication that profoundly encapsulates their collective insights. Facilitated by dynamic brainstorming sessions and transparent live anonymous voting, this consortium united to sculpt the dimensions of a transformative solution, prominently centered around the inception of the Climate Technologies' Clearing House (CTCH). This joint endeavor not only harmoniously defined the visionary landscape of this indispensable institution but also signifies the potential for substantial climate leadership.

Acting as a central hub for climate technology trade and commerce, the CTCH would facilitate connections between climate technology buyers and suppliers. This collaborative approach would empower the Global South to leverage its collective bargaining power and attain equitable access to vital climate technologies.

The benefits of the Clearing House are manifold. By aggregating demand and optimizing sourcing processes, it would reduce costs for buyers, making climate technologies more affordable and accessible. Moreover, the CTCH would provide valuable market intelligence, equipping participants with informed decision-making capabilities regarding technology adoption and deployment. Additionally, the CTCH could streamline negotiations on technology transfer and intellectual property rights, fostering cooperation and expediting the process for faster technological advancements. Furthermore, this platform would facilitate increased technology orders for sellers, ensuring a mutually beneficial exchange and expediting technology transfer.

To uphold the credibility and effectiveness of the Clearing House, stringent measures are essential. Prioritizing technologies based on verifiable criteria including Impact ROI, preventing greenwashing, and conducting comprehensive impact assessments for each supplier will ensure transparent and authentic sustainable solutions.

The establishment of a CTCH embodies a pivotal stride toward achieving global climate objectives. By fostering international cooperation, co-development, and indigenous innovations, the facility strives for equitable access to climate technologies. It aims to catalyze inclusive climate innovations using a circular economy framework, minimizing resource exploitation and waste.

Distinguished from existing institutions such as the International Solar Alliance (ISA) and the Climate Technology Centre and Network (CTCN), CTCH embarks on a broader mission, shouldering the responsibility to carry forward their mandates with a widened scope. In doing so, the CTCH amplifies its commitment to tangible actions rather than remaining confined to mere rhetoric, setting a new standard for driving concrete change in climate technology deployment and collaboration.

The proposed climate tech clearinghouse represents a paradigm shift in the way we approach climate solutions. Its unique focus as a trade and commerce platform sets it apart from traditional knowledge-centric institutions. By prioritizing action-oriented collaboration and trade in climate technologies, it can highlight that concrete actions are crucial for effective climate change mitigation and adaptation.

As a dynamic Public-Private Partnership, the clearinghouse's emphasis on self-reliance aligns with the growing recognition that individual stakeholders, businesses, and communities must take ownership of their climate actions. Central to its mission is the belief that there is no time to wait any further. Climate change demands immediate and decisive action. As a trade and commerce hub for climate technologies, it is poised to revolutionize the way climate solutions are developed, shared, and implemented worldwide.

The G20 presidency presents India with an unparalleled opportunity to take the forefront in driving climate action. Through this pivotal role, Aspire aligns with this momentous endeavor, aiming to facilitate transformative change in climate technology adoption, transfer, and collaboration.

Introduction

As the impacts of climate change continue to worsen, it is increasingly important to promote sustainable development through the adoption of climate technologies. Developing countries, in Asia, Africa, and Latin America, which make up the Global South, are particularly vulnerable to the effects of climate change due to their limited resources and susceptibility to natural disasters. Climate technologies and innovations can help to reduce greenhouse gas emissions (GHGs) and support the mitigation of and adaptation to the impacts of climate change. The Global North, which includes developed countries in Europe, North America, and parts of Asia, has a unique opportunity and responsibility to play a critical role by leveraging its experience and resources, to fight climate change through the transfer of technological innovations and solutions and support the Global South achieve their climate objectives.

The initial investment required for such technologies is enormous. In the 2015 Paris climate agreement, developed nations pledged $100 billion to the developing world annually by 2020. However, reports show only a fraction of these investments has actually materialized[1]. An investigative special report by Reuters found that large sums are going to strange projects including a coal plant, a hotel and chocolate shops. No official guidelines for what activities count as climate finance, lack of a uniform system of accountability, lack of transparency, no penalties for missing the target, and no common accounting standard - are some of the reasons for questionable climate funding.[2] Overall, an average annual capital investment of approximately $3.5 trillion[3] will be required from now until 2050 to construct a global economy that achieves net-zero emissions. This amount represents a substantial increase from the current level of $1 trillion per year. Apart from financing issues, many of these innovations require advanced research and development (R&D) and technical capacity for installation. There are challenges in terms of access too. Many of the green climate technologies are not available in developing countries and the cost of procuring them is incredibly high due to the exchange being done in the currency of the developed nations. Concerns relating to Intellectual property rights (IPR), national security, economic competitiveness, greenwashing also hinder the success of the idea.

It is evident that adopting climate technologies will contribute significantly to reduction in climate change emissions or GHGs to 45% by 2030, from 2010 levels, and reach net-zero by 2050. It is important to note that pressure of reaching net zero doesn't affect every country equally. Developing nations and poorer countries, with richer fossil fuel resources, are required to have a higher investment, relative to their GDP, than already developed nations. For example, while the global average of capital requirements is 7.5% of GDP, India’s requirements are 10.8% of its GDP on physical assets for energy and land-use systems for a net-zero 2050

[1] https://www.oecd-ilibrary.org/sites/d28f963c-en/1/3/1/index.html?itemId=/content/publication/d28f963c-en&_csp_=91f270eef9995f9eead11c083bdb0928&itemIGO=oecd&itemContentType=book#figure-d1e902

[2] https://www.reuters.com/investigates/special-report/climate-change-finance/?utm_source=pocket-newtab-intl-en

[3] https://www.energy-transitions.org/publications/financing-the-transition-etc/

scenario as per the Network for Greening the Financial System (NGFS)[4].

A workable, practical solution could be to create a Climate Technologies' Clearing House (CTCH) facility for climate technology transfer, which can overcome the above-mentioned barriers and ensure that climate technologies are accessible, affordable, and effective in addressing the urgent challenges of climate change in the Global South. The countries of the developing world should come together and partake in collective bargaining to bring down the costs of the technologies and materials they require from the developed nations. To unlock the potential of these technologies for the Global South, a new collaborative approach is needed that promotes technology transfer, access to finance, knowledge sharing, capacity building, and collaboration. The International Solar Alliance, launched at the COP-21 in Paris, is one such multilateral body and a collective effort by India and France to facilitate and incorporate solar energy in industries and operations. Some of the technologies that can be focused upon could be renewable energy, green hydrogen, energy efficiency, water management technologies, etc.

There are immense benefits that Global North can also reap from this arrangement in terms of access to larger markets, more trade, and valuable commercialization assistance. By collaborating closely with the Global South, the Global North can leverage their entrepreneurial strengths to maximize the commercial success of their technologies. This paradigm extends an unparalleled opportunity for the Global South to take an equally leading role. Leveraging circular economy principles and innovative business models, these regions can establish themselves as pioneering centers for sustainable technology advancement. This collaboration fosters a symbiotic relationship where technology development and commercialization expertise complement each other, leading to greater overall impact in addressing climate change.

The world needs positive action and impact. Despite many things failing this ambition, climate action is required with much more vigour. There is a need for the wills of politicians, countries, industries, investors, and consumers to converge and help build a platform based on the essential tenets of international cooperation, co-development, indigenization, and just transition.

[4] https://www.mckinsey.com/featured-insights/future-of-asia/asias-net-zero-transition-opportunity-and-risk-amid-climate-action

1 Climate Change Imperative

Holding the increase in the global average temperature to well below 2° C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5° C above pre-industrial levels is essential to mitigate the severe impacts of climate change and safeguard the well-being of present and future generations.

Between the first Earth Summit, held in Stockholm, Sweden in 1972, the first COP Summit held in Germany in 1995 to latest COP 27 in Sharm-El-Sheikh, Egypt and the G20 summit in Bali, Indonesia- there is invaluable, irreversible time worth 5 decades- lost in innumerous meetings, negotiations, agreements, treaties; none of which could save the world from where it is today- with Earth's vital signs reaching "code red" and humanity facing a climate emergency.

Power generation by burning fossil fuels, cutting down forests, using transportation, and too much consumption has caused long-term shifts in temperatures and weather patterns by adding enormous amounts of greenhouse gases, leading to greenhouse effect and eventually global warming. In the last 50 years, more than 11,000 disasters could be attributed to weather, climate, and water extremes globally, with over 2 million deaths and losses of $3.64 trillion[5]. Carbon dioxide peaked this year at levels not seen for millions of years[6] rendering 3.3 billion people vulnerable[7].

The G20 theme in 2022 of "Recover Together, Recover Stronger" and COP 27's commitment to "Delivering on People and Planet" sounded the clarion call for a crusade against climate catastrophes because climate breakdown is happening sooner than expected and the window to act is closing fast.

Under the Indian Presidency, the G20 in 2023 has taken up the mantle of a noble goal - 'One Earth, One Family, One Future' - a vision that echoes the truth that all nations, all peoples, all species, are bound together in an intricate web of life.

Fortunately, climate technologies hold an important key to unlocking the solutions that we need. From providing solutions for mitigation strategies such as renewables, carbon capture and storage to adaptation measures such as early warning systems, smart water management systems, and drought-tolerant crop varieties, these technologies offer a path forward towards a sustainable future. Corporates, globally, and especially in the Global South, can play a critical role as catalysts for the transfer of climate technologies from the Global North. By investing in and adopting these technologies, they can accelerate the transition towards a sustainable future while also promoting economic growth and development in their regions.

The Global North has an equally critical role to play in facilitating climate technology transfer to the Global South. As the countries with the most advanced economies and technological capabilities,

[5] https://public.wmo.int/en/media/press-release/weather-related-disasters-increase-over-past-50-years-causing-more-damage-fewer#:~:text=According%20to%20the%20WMO%20Atlas,US%24%203.64%20trillion%20in%20losses.

[6] https://www.forbes.com/sites/davidbressan/2022/06/05/carbon-dioxide-peaked-in-2022-at-levels-not-seen-for-millions-of-years/?sh=6a00889217c2

[7] https://theprint.in/world/code-red-for-humanity-3-3-billion-people-are-vulnerable-uns-climate-change-report-says/867520/

they have a responsibility to support the transition to a low-carbon, sustainable future for all by way of financing, knowledge sharing, and policy support. It is as much a commercialization opportunity also for the developed nations.

By embracing these technologies and working together, we can chart a course towards a net-zero future that will benefit all of us, and our One Earth.

Sources and Size of GHG Emissions

As per United Nations, the way to achieve net-zero is by cutting greenhouse gas emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere, by oceans and forests for instance. In order to facilitate this, it is important to estimate the magnitude of the problem and to understand the sources and size of such emissions.

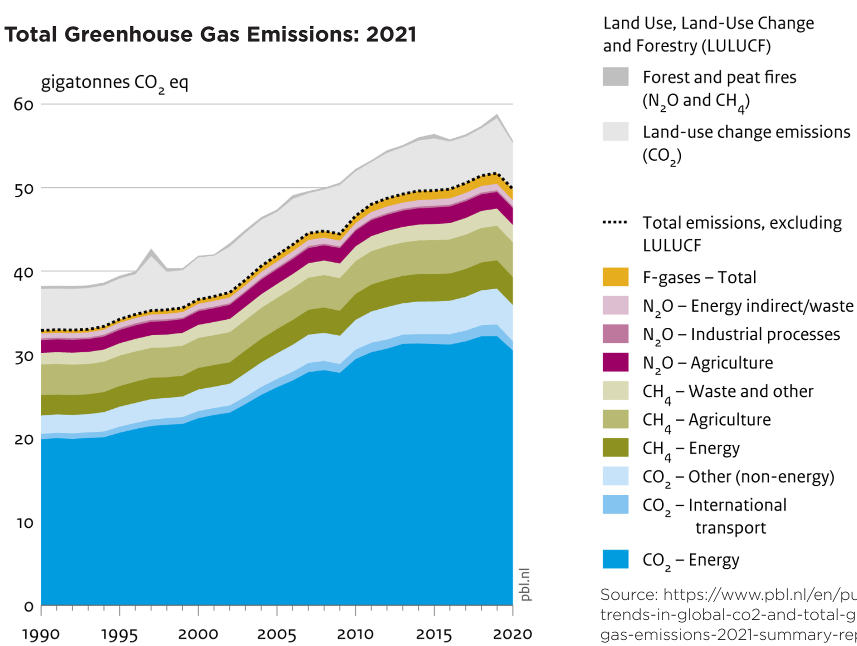
SIZE OF EMISSIONS

As per a report by PBL Netherlands Environment Assessment Agency[8], global net anthropogenic GHG emissions were 55.5 $GtCO_2$ in 2020. These emissions had reached 59 GtCO2 in 2019, about 12% higher than in 2010 and 54% higher than in 1990. In 2020, when the global economies slowed down due to COVID, the emissions declined by around 6%. However, global carbon dioxide emissions have experienced a robust resurgence. Global emissions were 2%, or 60 million tonnes, higher in December 2020 than they were in the same month a year earlier. This uptick in global carbon emissions as we approached the close of the previous year serves as a clear reminder that there remains a considerable gap in our efforts to expedite the global shift towards cleaner energy solutions.[9]

[8] Oliver J.G.J. (2022), Trends in global CO2 and total greenhouse gas emissions: 2021 Summary report. PBL Netherlands Environmental Assessment Agency, The Hague.

[9] https://www.iea.org/news/after-steep-drop-in-early-2020-global-carbon-dioxide-emissions-have-rebounded-strongly

Total Greenhouse Gas Emissions: 2021

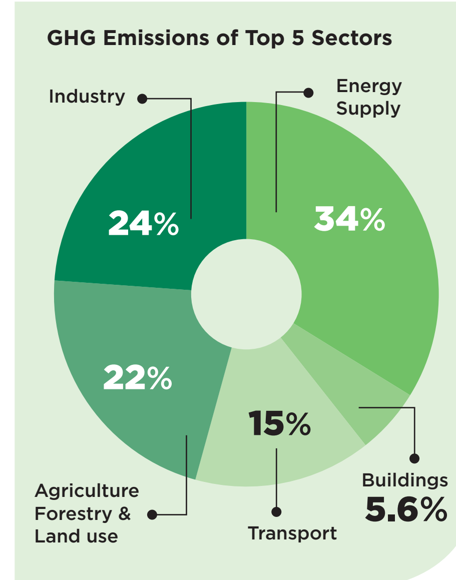


Source: https://www.pbl.nl/en/publications/trends-in-global-co2-and-total-greenhouse-gas-emissions-2021-summary-report

SOURCES OF EMISSIONS

IPCC[10] attributes the emissions to 5 sectors namely – Energy Supply; Industry; Agriculture, Forestry & Land Use; Transport; and Buildings. It is important to recognize the primary sources, so that nations and corporations can chart out domain specific net-zero trajectories and interim objectives.

From the chart, it is evident that Industries are one of the key factors contributing to aggravated climate change. Various industries, while essential for meeting the needs of people, sometimes unavoidably contribute to the emission of greenhouse gases into the atmosphere. The amount and type of these emissions along with their timing can cause changes in the Earth's temperature. The ways companies progress in the future in regard to their GHG emissions will closely determine the result for the climate. The urgency of achieving net-zero targets pressurizes the private sector to work in accordance with the objectives.



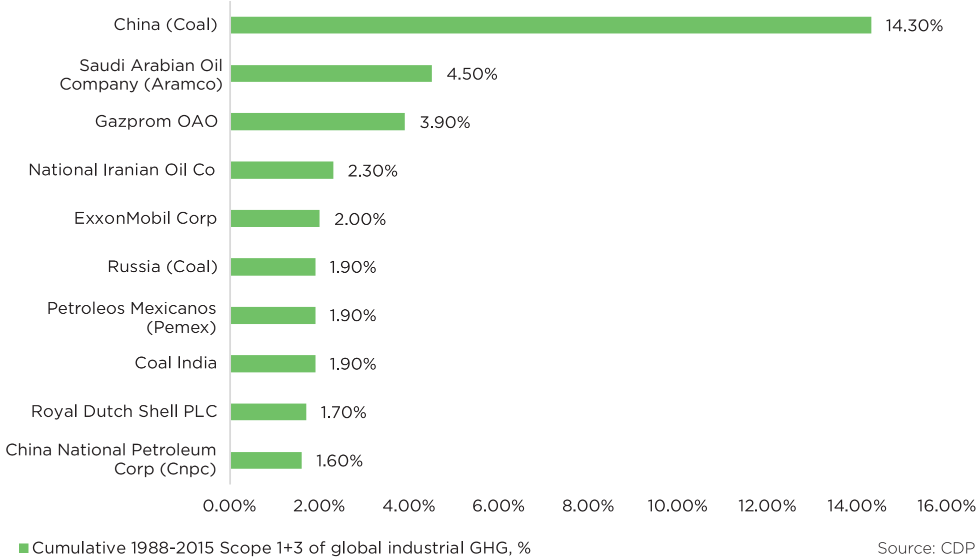
Source: https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SPM.pdf

[10] https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SPM.pdf

Corporate Climate Commitments & Actions Differ

A study by Carbon Disclosure Project (CDP) titled "The Carbon Majors Database"[11] published with 2017 data, highlighted how fossil fuel companies have doubled their contribution to global warming by emitting as much greenhouse gases in 28 years as in the 237 years between 1988 and the birth of the industrial revolution. It concluded that 51% of the GHGs can be traced to just 25 corporate and state producers, with Top 100 contributing to 71% of GHG emissions!

Top 10 Emitters



Source: CDP

The State-owned and Investor-owned fossil fuel companies have the most direct dilemma of profits vs. purpose as to restrict the climate change to 2°C, they must abandon USD 2 trillion worth of fossil fuel reserves[12]. Can they overcome the temptation?

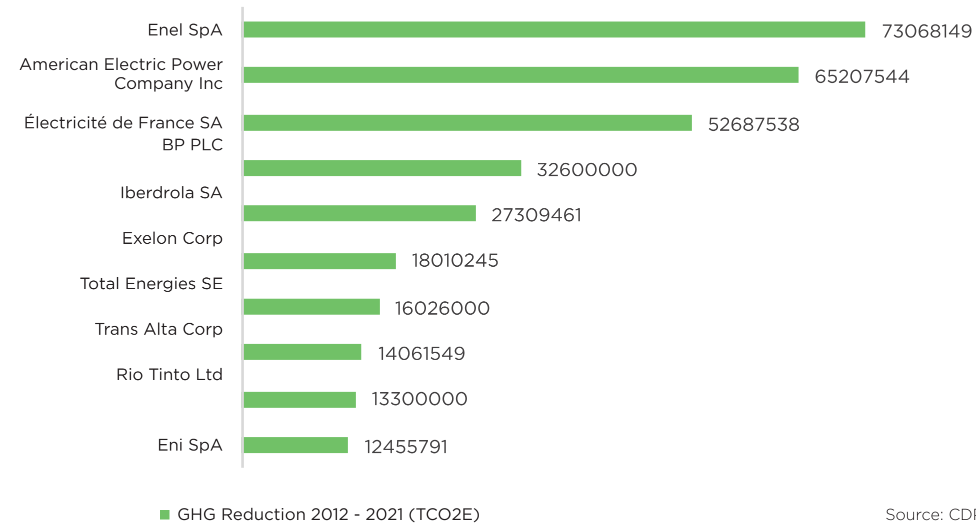
Just like CDP's database of biggest emitters, their data was used by another climate research and rankings initiative, Corporate Knights[13] to determine the biggest emission savers (between 2012-2021). This research showcased how 20 corporations, from 8 sectors, slashed their GHG Scope 1 and 2 emissions by 43%, from 862 million tonnes to 489 million tonnes. However, not all these GHG gases were removed from the planet as many of these corporations achieved the same through divestment, not due shutting down plants, retiring polluting assets or efficiency measures, which is truly desirable. Instead, what we see is international oil companies curtailing or decelerating their

[11] https://cdn.cdp.net/cdp-production/cms/reports/documents/000/002/327/original/Carbon-Majors-Report-2017.pdf?1501833772

[12] Carbon Tracker (2015): The $2 trillion stranded assets danger zone

[13] https://www.corporateknights.com/rankings/other-rankings-reports/2022-carbon-reduction-20/carbon-reduction-20/

Top 10 Savers



Source: CDP

decarbonisation commitments, paying higher dividends to shareholders, buying back more shares and – in some countries – lobbying governments to reverse clean energy policies.[14] The sectors where these savings were visible were Oil & Gas, Power, Industrials, Metals & Mining, Waste, Agriculture & Forestry, Transportation, and Buildings.

What is striking is that many corporations are taking their carbon footprint seriously. Four of the biggest emitters (BP, Rio Tinto, Shell and Total) therefore also figure in the list of the biggest savers. However, when the problems and solutions are clear, one must question why is the world not acting fast enough?

[14] https://www.aljazeera.com/opinions/2023/7/6/i-thought-fossil-fuel-firms-could-change-i-was-wrong?utm_campaign=greenfin&utm_medium=email&utm_source=newsletter&mkt_tok=MjExLU5KWS0xNjUAAAGNMNXFSRVK8-mkeEaSXV1dH5oeHNPkfnaLXE11DUxg7SBaee_jTkqFWCTSmfwnUBSEGed_k1J_i0-Zct-DjFongwHptz-roXI0uRBFESMESNpiGQ

Pursuit of Net-Zero Goals

Climate change is a multi-faceted, multi-dimensional global issue that impacts local sciences, economics, societies, politics, and morality. The overarching goal of global climate action is to limit global warming to well below 2°C above pre-industrial levels, and to pursue efforts to limit warming to 1.5°C. But achieving this goal is a complex process that involves many working parts.

To effectively respond to this pressing global challenge, governments, businesses, civil society organizations, international agencies, and individuals must prioritize a set of climate imperatives. These climate imperatives are key actions needed to reduce greenhouse gas emissions, increase global ambition, build climate resilience, transition to a low-carbon economy, address social equity and justice, and foster international cooperation – each one of which is an essential piece of the global climate puzzle. There have been several key agencies, bodies, boards, agreements, and treaties that have provided landmark climate imperatives.

Timeline of Key Climate Actions and Disclosures Since 1900

Early Recognition and Scientific Foundation

1900 Swedish scientist Svante Arrhenius publishes the first scientific paper on the greenhouse effect, which explains how increasing atmospheric carbon dioxide levels could lead to global warming.

1972 The United Nations Conference on the Human Environment is held in Stockholm, marking the first international gathering to address environmental issues.

1987 The Montreal Protocol is signed, phasing out the production and consumption of ozone-depleting substances such as chlorofluorocarbons (CFCs).

International Agreements and Environmental Awareness

1988 Intergovernmental Panel on Climate Change (IPCC) is established to provide scientific assessments on climate change.

1992 The United Nations Framework Convention on Climate Change (UNFCCC) is signed, establishing the framework for international cooperation on climate change.

1997 The Kyoto Protocol is adopted, committing developed countries to reducing their greenhouse gas emissions by an average of 5% below 1990 levels by 2012.

Heightened Concern and Global Actions

2007 IPCC releases its Fourth Assessment Report, stating that human activity is very likely causing global warming and that urgent action is needed to reduce greenhouse gas emissions; IPCC awarded the Nobel Peace Prize

2013 Carbon Disclosure Project (CDP) releases its first report on corporate greenhouse gas emissions and climate change risks and opportunities.

2015
- The Paris Agreement is adopted, setting a goal to limit global warming to well below 2 degrees Celsius above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5 degrees Celsius. Each country sets its own emissions reduction targets and commits to reporting progress.
- Task Force on Climate-related Financial Disclosures (TCFD) is established by the Financial Stability Board to develop recommendations for more effective climate-related financial disclosures.
- Science-Based Targets initiative (SBTi) is launched to encourage companies to set emissions reduction targets in line with climate science.

Urgency and Calls for Accelerated Action

2018 IPCC releases its Special Report on Global Warming of 1.5°C, which highlights the urgent need for rapid and far-reaching transitions in land, energy, industry, buildings, transport, and cities to limit global warming to 1.5 degrees Celsius.

2021
- G7 leaders commit to reaching net-zero emissions by 2050 and phasing out the use of coal for electricity generation by 2025.
- The United States officially re-joins the Paris Agreement under the Biden administration, after withdrawing from the agreement under the previous administration.

Source: Aspire Impact analysis

Pathways to Net-Zero

Pathways are like roadmaps for countries and corporates to achieve the ambitions of the Paris Agreement and ultimately the Sustainable Development Goals (SDGs). While country-level pathways are broader, corporate level planning have to be commensurate with the industry or sector group for optimal solutions.

For example, if we look at India's transition to low-carbon economy as per its recent submission at COP27, we see a focus on the following:

1. Low Carbon Development of Electricity Systems Consistent with Enhanced Development Benefits
2. Develop an Integrated, Efficient, Inclusive Low-Carbon Transport System
3. Promoting Adaptation in Urban Design, Energy and Material-Efficiency in Buildings, and Sustainable Urbanisation
4. Promote Economy-Wide Decoupling of Growth from Emissions and Development of an Efficient, Innovative Low-Emission Industrial System
5. CO2 Removal and Related Engineering Solutions
6. Enhancement of Forest and Vegetative Cover Consistent with Socio-Economic and Ecological Considerations
7. Economic and Financial Aspects of Low-Carbon Development

The transition plan is long-term and leaves enough space for flexibility, owing to new technological developments, global economic trends, and international cooperation.

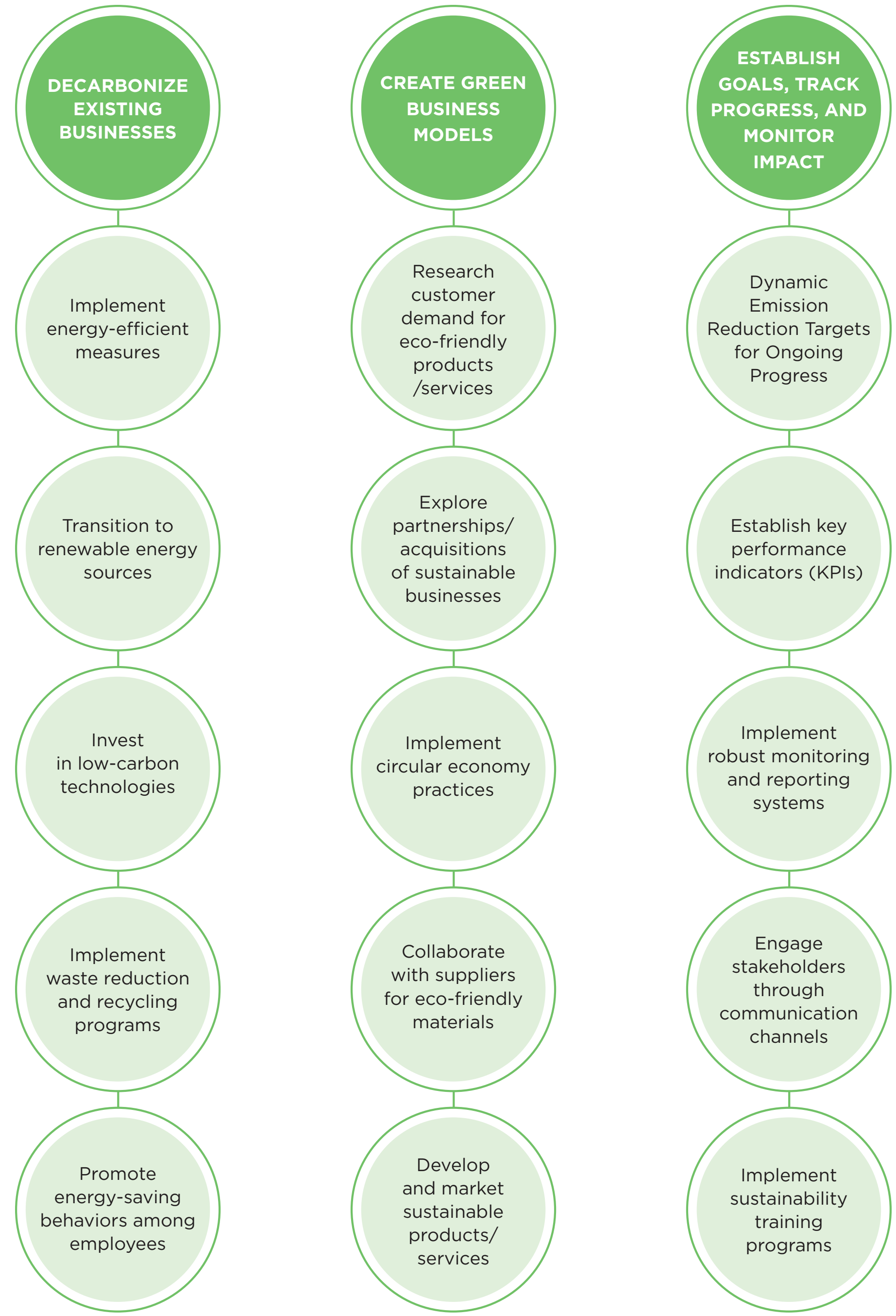
Corporate pathways must take inspiration from the larger national targets and lay out a progress roadmap for their own similar goals. They must implement science-based decarbonization plans. These plans should be holistic, and companies must commit to decarbonizing both their footprint as well as for their value chains. Short-term goals must be in place to determine tangible progress. Regular checks would ensure accountability towards the goals.

Plans to achieve net-zero must be codified in actual policies to bind different stakeholders to the objective. Implementation of policies would ensure progress and accountability. Policies on a national and subnational level can incentivize and fund progress towards net-zero. This can be done through right policy framework and including incentives, mandates, and regulations which set the expectations regarding low carbon energy standards.

The roadmaps should be sketched out in a practical manner, prioritizing initiatives based on their ease of implementation. The road-maps ought to have practical use – transitioning to green power in a phased manner, greening logistics, decarbonising processes and better energy management. They must not be too idealistic and should be able to be put into action to solve real-world problems.

Although the goals may appear feasible and well-defined, adhering to the recommendations becomes challenging when the necessary resources, such as finance, technology, or cooperation, are lacking. Meeting these requirements is a demanding task for developed nations, let alone envisioning the difficulties faced by developing or poor countries.

Pathways to Net-Zero



Source: Aspire Impact analysis

Net-Zero Transitions for Countries and Companies

A net-zero economy refers to one in which greenhouse gas emissions are balanced out by carbon removal. Net-zero transitions for countries and companies are crucial in mitigating the worst effects of climate change. The transition will not be easy, but it is essential.

The global push towards net-zero targets is gaining momentum. With approximately 140 countries, accounting for 88% of global emissions (including India's 7% share), 92% of global Gross Domestic Product (in PPP terms), and encompassing 85% of the global population, having net zero targets, the scale of this collective effort is substantial[15].

There are multiple ways to achieve these goals. Investing in climate technologies is one. While some countries are focusing on renewable energy sources, such as solar and wind power others are investing in carbon capture and storage technologies. Still others are promoting energy efficiency and conservation. Companies can also play a role in the net-zero transition. Many companies have set ambitious goals to reduce their emissions, and many are investing in new technologies to help them achieve these goals.

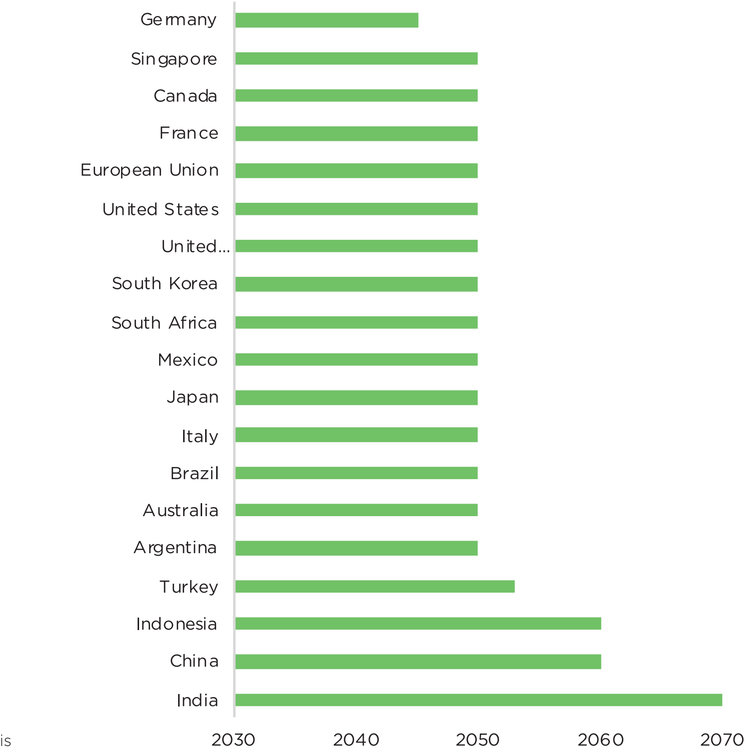
As for the G20 nations, while many have expressed their commitment to net-zero targets, the journey towards achieving these goals is far from complete. Despite the promising intentions, there remains a significant gap between verbal commitments and the implementation of concrete legislative measures or enforceable review processes.

In context of companies, MSCI released a net-zero tracker report[16] on the progress made by world's listed companies towards curbing climate risk. As per the report, more listed companies are setting climate targets and reporting at least some of their Scope 3 emissions (about 35% of the listed companies in the MSCI ACWI IMI Index, total number of companies = 9030). As of March 31, 2023, about 44% of listed companies had published a climate target, while 17% of listed companies committed to align their decarbonization target with SBTi standards.

[15] https://zerotracker.net/#companies-table

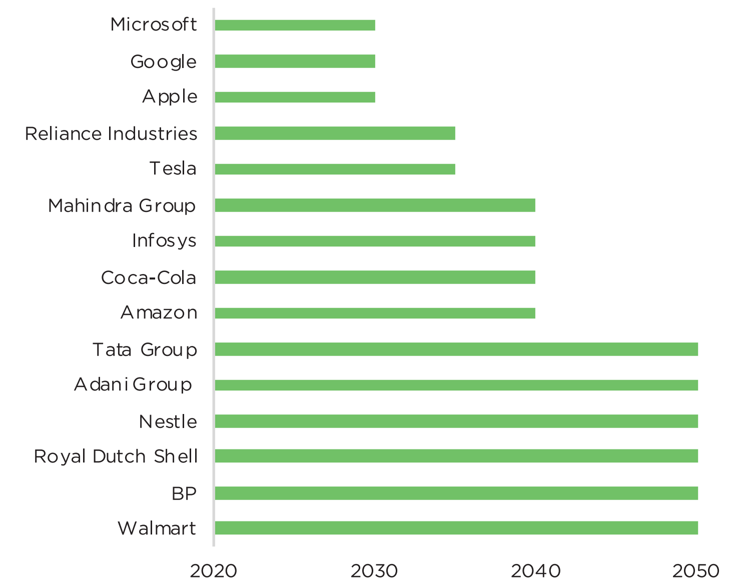
[16] https://www.msci.com/documents/1296102/38217127/NetZero-Tracker-May.pdf

Sovereign Commitments to Net-Zero



Source: Aspire Impact analysis

Corporate Commitments to Net-Zero



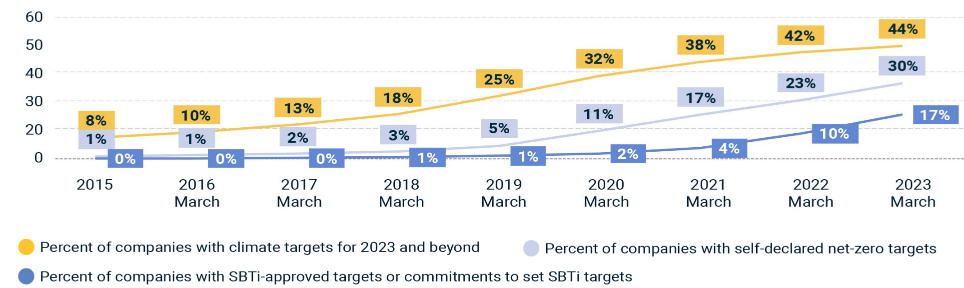
Source: Aspire Impact analysis

G20 Net-Zero Commitments

	Target year	All emissions covered	Only reductions/ removals domestically	Enshrined in law	Legally binding review process	Comprehensive planning
Argentina	Net zero target announced (2050)					
Australia	2050	Yes	No	Not yet / in polcy document	Non-binding / in process	No
Brazil	Net zero target announced (2050)					
Canada	2050	Yes	Yes	Yes	Yes	Limited details
China	Before 2060	No	No	Not yet / in policy document	Non-binding in process	Limited details
France	2050	Yes	Yes	Yes	Yes	Yes
EU	2050	Yes	Yes	Yes	Yes	Yes
Germany	2045	Yes	No	Yes	Yes	Limited details
India	Net zero target announced (2070)					
Indonesia	Net zero target announced (2060)					
Itlay	2050	Yes	Yes	Not yet / in policy document	Yes	No
Japan	2050	Yes	No	Yes	Non-Binding / in process'	Limited details
Mexico				No target announced		
Russia	2060	Yes	No	Yes	Non-binding / in process	Limited details
Saudi Arabia	Net zero target announced (2060)					
South Africa	Net zero target announced (2050)					
South Korea	2050	Yes	Yes	Yes	Non-binding / in process	Limited details
Turkey	Net zero target announced (2053)					
UK	2050	Yes	No	Yes	Yes	Yes
USA	2050	Yes	No	Not yet / in policy document	Non-binding / in process	Limited details

Source: https://i0.wp.com/www.climate-transparency.org/wp-content/uploads/2022/10/CT2022-SR-key-graphs6.png?ssl=1

Listed Companies Setting Climate Targets (% of MSCI ACWI IMI)



Source: https://www.msci.com/documents/1296102/38217127/NetZero-Tracker-May.pdf

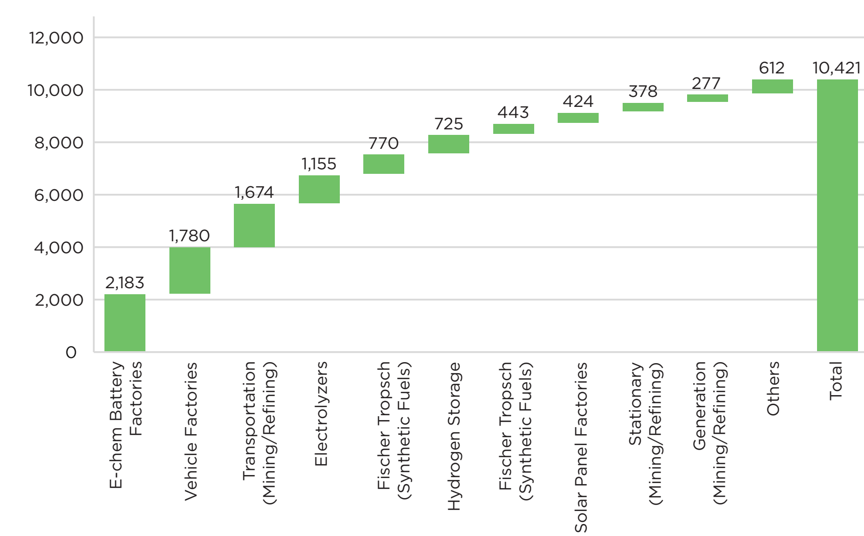
Just Transition Can Prevent Neo-Colonialism

Climate change is a global problem that affects everyone, but not everyone equally. Those who contribute the least to the problem are often the ones who suffer the most from its impacts. This is known as the unequal burden of climate change. As per the Climate Inequality Report 2023[17], Climate impacts are not equally distributed across the world: on average, low-and middle-income countries suffer greater impacts than their richer counterparts.

A Sustainable Energy Economy, at a $10.4 trillion investment requirement over 20 years, is 60% of the Cost of Continuing Fossil Fuel Investments

[17] https://wid.world/wp-content/uploads/2023/01/CBV2023-ClimateInequalityReport-2.pdf

Global Energy Economy: Investment Required



Source: TESLA Master Plan Part 3- Sustainable Energy for All[18]

A Just Transition will require investments to avoid unequal burden, green colonialism, green grabbing & other exploitative practices

- Climate change is a global collective action problem that can only be tackled through multilateralism and international cooperation as per Article 6 of Paris Climate Accord
- Global South will seek to nurture domestic producers of environmental goods and services. The domestic and foreign policies of developed countries, to address emissions – through carbon border adjustment mechanisms – can affect Global South adversely, without achieving their stated objectives
- We must facilitate a global technology transfer regime where the associated costs of these technologies are met from international climate funds.
- Enabling low-carbon technologies and emerging scientific fields may require institutions to create global technological standards to encourage production and use
- It is also important to ensure that discussions surrounding just transition and neo-colonialism also encompass considerations of mineral extraction (especially rare earth metals) and other raw material. It's important to emphasize that the Global South should not be subjected to a situation where it becomes beholden to the West due to mining and materials exploitation.

Recognizing and addressing the underlying social and economic inequities that expose certain people and countries to the adverse effects of climate change is crucial. This entails promoting the development of infrastructure, technologies, and solutions in developing or under-developed nations, ensuring they have access to the necessary resources for both adaptation and mitigation to cope with climate change impacts. Additionally, empowering these countries to have a voice in decision-making processes is essential to shaping outcomes that positively influence their quality of life and future prospects. Climate justice, inclusion, indigenization, and balancing mitigation-adaptation efforts is the key.

[18] Note: Materials that require significant capacity growth are: For mining: nickel, lithium, graphite and copper. For refining: nickel, lithium, graphite, cobalt, copper, battery grade iron and manganese. n addition to initial capex, 5%/year maintenance capex with a 20-year horizon is included in the investment estimate. Using these assumptions, building the manufacturing infrastructure for the sustainable energy economy will cost $10 trillion, as compared to the $14 trillion projected 20-year spend on fossil fuels at the 2022 investment rate.

2 The Power of Climate Technologies

The preservation of our planet is a pressing concern. Fortunately, there is cause for optimism, as we possess a broad range of technologies and solutions that can help us mitigate and adapt to climate influences to a great extent. These technologies have the potential not only to reduce greenhouse gas emissions, but also to enhance energy efficiency, promote sustainable practices, and drive innovation and economic growth. According to McKinsey study on Europe's net-zero pathway, if broadly adopted, climate technologies may provide around 60% of the emissions reductions required to stabilise the climate by 2050.[19]

In the context of climate technologies, it is important to understand that technological innovations are multidimensional, multi-component, and evolutionary in nature. UNFCCC defines technology transfer as 'a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change among different stakeholders' and being inclusive of 'the process of learning to understand, utilize and replicate the technology, including the capacity to choose it and adapt it to local conditions and integrate it with indigenous technologies'[20].

Growing Demand for Climate Technologies

As Net-zero commitments grow, climate technologies become essential for furthering these initiatives because they offer creative solutions, boost effectiveness, and allow for widespread deployment and far-reaching benefits. According to a McKinsey report, because there is such a great demand for climate technologies, there are enormous potential markets and investment opportunities. By 2025, according to their projections, next-generation technologies might bring in $1.5 trillion to $2 trillion in annual capital investments. They identify a group of 5 technology families, namely electrification, agriculture, power grid, hydrogen, and carbon capture - that can abate 40% of GHG emissions by 2050 to remain on the 1.5 degree pathway.

Further analysis reveals that, in a scenario where the world reaches net zero by 2050, capital spending on equipment and infrastructure with relatively low emissions intensity would average $6.5 trillion a year—more than two-thirds of the $9.2 trillion in annual capital spending during that time. And it is expected that almost all of those low-emissions assets would include climate technologies.

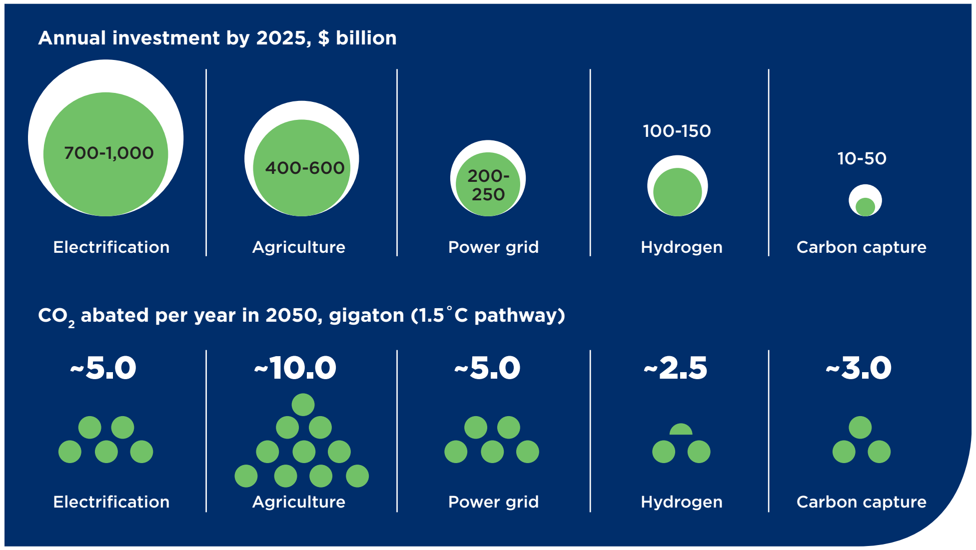
Another analysis by BCG[21] outlines 8 such technologies other than solar and wind, which can help abate up to 29GTCo2.

[19] https://www.mckinsey.com/capabilities/sustainability/our-insights/innovating-to-net-zero-an-executives-guide-to-climate-technology

[20] Intergovernmental Panel on Climate Change (IPCC), 'Summary for Policymakers' in B Metz et al (eds), Special Report: Methodological and Technological Issues in Technology Transfer (IPCC 2000)

[21] https://www.bcg.com/publications/2023/next-generation-climate-mitigation-technologies

McKinsey's 5 Climate Technologies and their Investment and Emission Abatement Potential



Source: https://www.mckinsey.com/capabilities/sustainability/our-insights/innovating-to-net-zero-an-executives-guide-to-climate-technology

Eight Emerging Climate Technologies

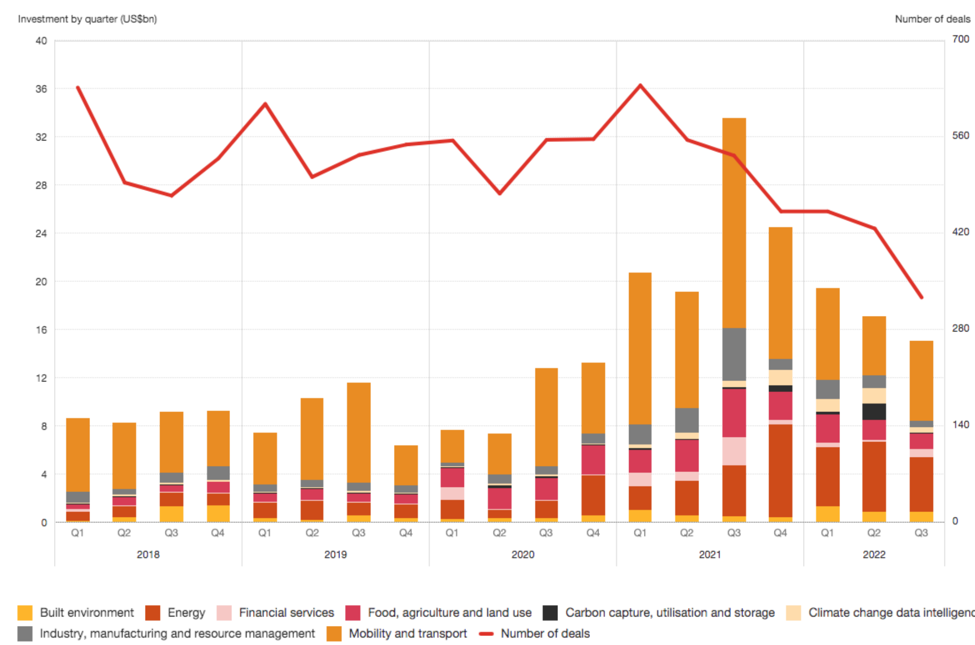
	Cumulative global market size through 2050	Abatement potential per year at scale
Electric vehicles	$25 to $30 trillion	5-7 Gt CO2e
Clean steel	$10 to $15 trillion	~1 Gt CO2e
Green cement	$7 to $10 trillion	3-4 Gt CO2e
Sustainable aviation fuel	$4 to $6 trillion	~1 Gt CO2e
Direct air capture	$3 to $4 trillion	5-7 Gt CO2e
Low-carbon hydrogen	$3 to $4 trillion	3-5 Gt CO2e
Long-duration energy storage	$3 to $4 trillion	N/A-enables renewables
Advanced nuclear small modular reactors	$0.6 to $0.7 trillion	2-4 Gt CO2e

There are other opportunities also that can be tapped as a result of climate technologies. According to the findings of the New Climate Report[22], adopting an ambitious approach to climate action and transitioning towards a low-carbon, sustainable growth trajectory has the potential to yield a substantial economic benefit of US$26 trillion by 2030 when compared to continuing with business-as-usual practices. Additionally, this transformative shift could lead to the creation of more than 65 million new jobs in low-carbon industries by the year 2030.

Market Growth and Investment Opportunities

A staggering $260+ billion has been invested in climate tech between 2018 Q1 and 2022 Q3, including 550 megadeals worth $100 mn+ out of 9800+ deals since 2018, as per PwC's Climate Tech Study 2022[23]. 2018-2021 also witnessed several blockbuster deals of over $1 billion. For every venture capital dollar, 14 cents goes to climate tech companies[24].

Global venture funding going toward climate tech start-ups



Source: https://www.pwc.com/climatetech

Note: The surge in climate tech investment in 2021 can largely be attributed to a few megadeals facilitated through special purpose acquisition companies (SPACs). However, doubts were raised about the sustainability of SPACs as major contributors to climate tech investment in the medium term, leading to a subsequent decline in funding. -PwC

[22] https://newclimateeconomy.report/2018/executive-summary/

[23] https://www.pwc.com/climatetech

[24] https://www.pwc.com/gx/en/services/sustainability/publications/state-of-climate-tech.html

Twenty Climate Technology Groups: New Precious Commodities

Climate technologies are becoming the new precious commodities, driving the transition to a sustainable future. However, in the midst of numerous options, making the right choice can be challenging. Aspire has tried to tackle this issue by arranging several available technologies into 20 different groups.

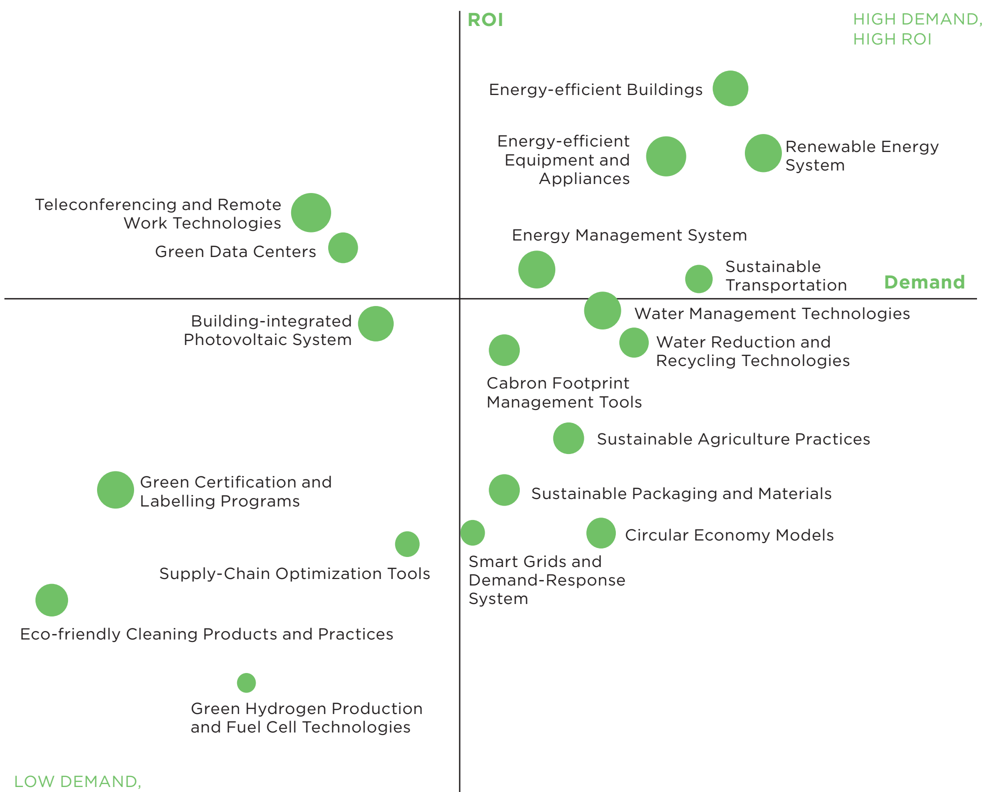
Tech. Names	Demand	Maturity	ROI
Renewable Energy Systems (Includes: solar panels, wind turbines, geothermal systems, biomass power plants, hydropower, Tidal Power, Wave Power)			
Energy-efficient Buildings (Includes: smart lighting, HVAC systems, insulation, passive design, green roofs)			
Sustainable Transportation (Includes: electric or hybrid vehicles, bike/car-sharing programs, telecommuting, public transportation, Intelligent Transportation Systems (ITS))			
Waste-Reduction and Recycling Technologies (Includes: composting systems, waste-to-energy, closed-loop systems)			
Green Data Centres (Includes: energy-efficient servers, cooling systems, virtualization, renewable energy sourcing)			
Water Management Technologies (Includes: water-saving fixtures, water reuse systems, rainwater harvesting, greywater systems)			
Smart Grids and Demand-Response Systems (Includes: energy storage, dynamic pricing, microgrids, distributed energy resources)			
Carbon Capture and Storage Technologies (Includes: post-combustion capture, oxy-fuel combustion, mineral carbonation)			
Sustainable Agriculture Practices (Includes: regenerative farming, precision agriculture, agroforestry, soil carbon sequestration, sustainable forestry)			
Circular Economy Models (Includes: closed-loop production, product reuse and recycling, product-as-a-service models)			
Energy Management System (Includes: building automation, real-time energy monitoring, energy analytics, demand-side management)			
Green Certification and Labelling Programs (Includes: LEED, Energy Star, BREEAM, Green Globe)			
Carbon Footprint Management Tools (Includes: carbon accounting software, emissions tracking, carbon offset programs)			
Supply-Chain Optimization Tools (Includes: eco-labelling, life-cycle assessment, sustainable sourcing, supplier engagement)			
Green Hydrogen Production and Fuel Cell Technologies (Includes: fuel cell vehicles, stationary fuel cells, electrolysis)			
Energy-Efficient Equipment and Appliances (Includes: LED lighting, Energy Star-rated products, 80%-efficiency HVAC, 40%-f40% fixtures)			
Teleconferencing and Remote Work Technologies (Includes: video conferencing, collaboration tools, virtual events)			
Sustainable Packaging and Materials (Includes: biodegradable packaging, recycled materials)			
Building-integrated Photovoltaic Systems (Includes: solar facades, solar roofs, solar shading systems)			
Eco-friendly Cleaning Products and Practices (Includes: green cleaning products, waterless cleaning, 40%-impact cleaning methods)			

Source: Survey of Experts' Working Group

Climate Technologies: The Priority List

These technologies underwent thorough evaluation by our Experts' Working Group, assessing their demand, maturity, and return on investment (ROI) to aid decision-making for prioritization, purchase, and deployment.

Climate Technologies Priority List (Demand, ROI)



The bubble size indicates Maturity of the technology.

Source: Survey of Experts' Working Group

The Priority list

1. Energy-Efficient Buildings
2. Renewable Energy Systems
3. Energy Efficient Equipment and Appliances
4. Sustainable Transportation
5. Energy Management Systems

The priority list of climate technologies consists of high-demand and high-ROI solutions that hold great promise in addressing the urgent challenges of climate change. These technologies have also been evaluated based on their maturity levels.

Leading the list are energy-efficient buildings, which incorporate innovative designs, insulation, and advanced systems to optimize energy use. The cost savings on energy bills make them a win-win solution for both the environment and the economy.

Renewable energy systems, like solar, wind, and hydroelectric power, have revolutionized the global energy landscape, generating clean electricity without harmful emissions. As the demand for sustainable energy rises, these systems play a vital role in reducing carbon emissions and enhancing energy security.

Energy-efficient equipment and appliances play a crucial role in curbing energy consumption across sectors. By optimizing energy usage and promoting responsible practices, they become a compelling choice with high demand and attractive returns on investment.

Sustainable transportation is another priority as cities and countries seek to mitigate the environmental impact of the transportation sector. Transformative solutions like electric vehicles and improved public transportation options are embraced in this domain.

Energy management systems serve as critical tools for optimizing energy use and reducing wastage in various settings. With advanced technologies and smart controls, they enable efficient energy utilization, leading to significant energy and cost savings.

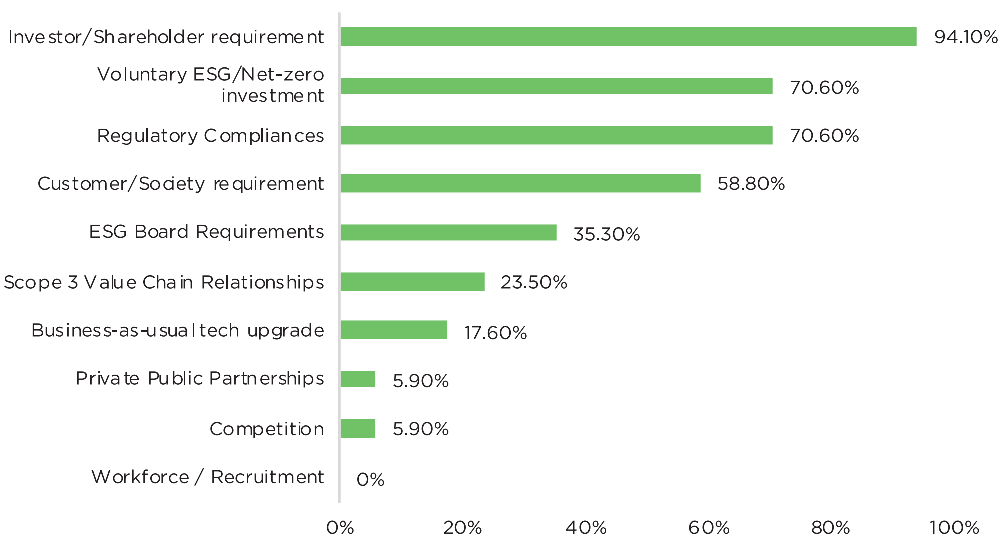
In contrast, green hydrogen production and carbon capture and storage technologies represent low-demand and low-ROI climate solutions. Although promising in decarbonizing industries and achieving climate goals, their implementation currently faces challenges such as high initial costs and complex infrastructural requirements. However, ongoing research and technological advancements may pave the way for greater adoption and improved returns on investment in the future.

Driving Factors Behind Climate Technologies Growth and Acquisition

Corporations and nations play a central role in driving the demand for climate technologies. The urgent need to address climate change and transition to more sustainable practices has led both private and public entities to seek innovative solutions that can help reduce greenhouse gas emissions, promote clean energy, and foster environmental stewardship. There are several reasons behind this drive. Some of the crucial ones are arranged according to their importance, as indicated by expert opinions from our Working Group.

The acquisition of climate technologies is driven by a combination of internal and external factors, including net-zero goals, regulatory compliance, customer demands, and investor expectations. Embracing sustainable practices and climate technologies has become essential for businesses aiming to thrive in a world increasingly focused on environmental stewardship and responsible corporate behaviour.

Driving Factors Behind Climate Technologies Acquisition



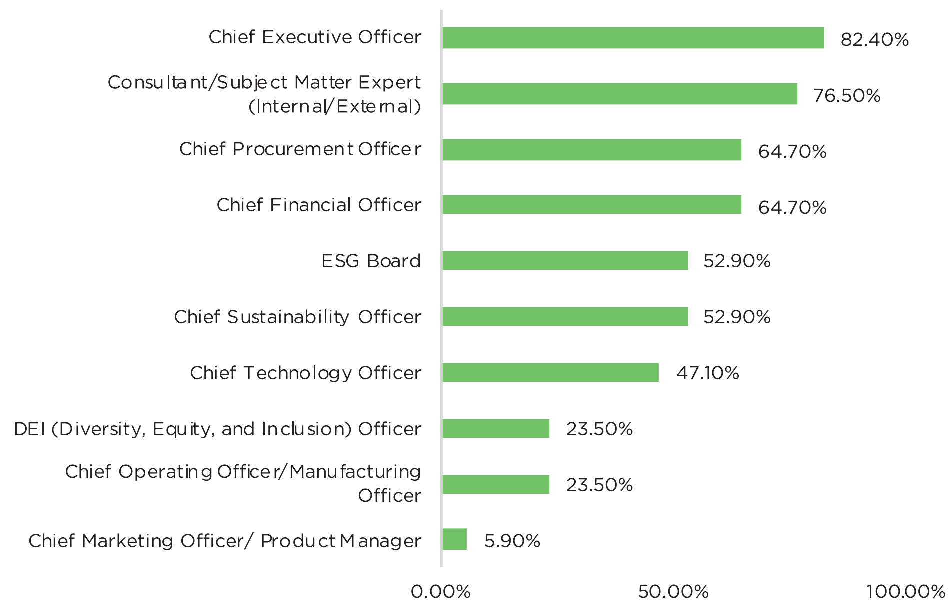
Source: Survey of Experts' Working Group

Important Roles in Climate Technologies Acquisition

Key decision-makers for tech acquisition are spread across various roles within an organization. However, the Chief Executive Officer (CEO) emerges as the most influential figure in making these decisions, garnering the highest percentage of support, as per the opinions of an expert panel. The CEO's role in tech acquisition decisions is critical due to their strategic vision, ultimate accountability, leadership influence, and facilitation of cross-functional decision-making.

Consultants (Internal/External), the ESG Board and the Chief Sustainability Officer (CSO) all play significant roles in tech acquisition decisions. The inclusion of these roles highlights the growing importance of sustainability and ESG considerations in shaping technology acquisition strategies for organizations.

Important Roles in Climate Tech. Acquisition Decisions



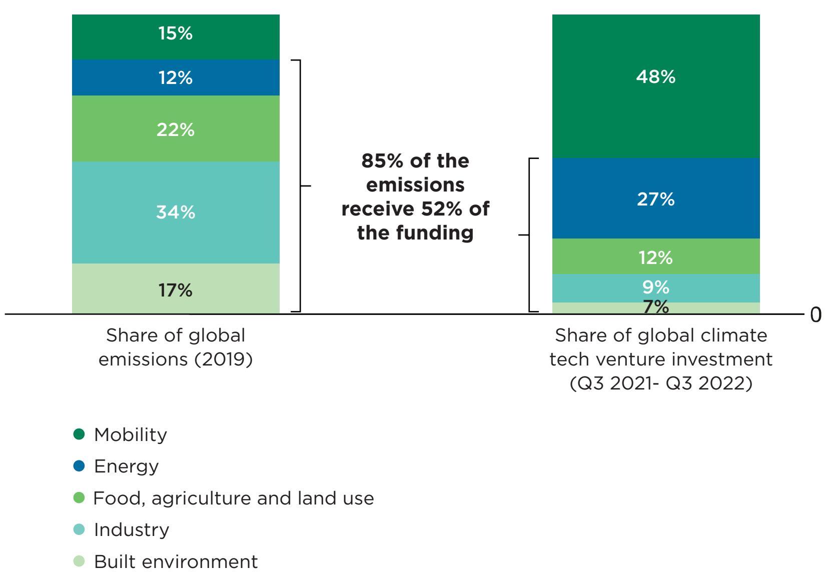
Source: Survey of Experts' Working Group

Inefficient Market for Climate Technology Investment

While a number of factors have contributed to the boom in the market, the market cannot be deemed efficient as yet. The amount of money invested in climate technology is still out of proportion to the amount of GHGs released into the environment by each sector. For example, Industry adds 34% to global emissions but has managed to secure only 9% of the total venture investment. On the contrary, Mobility has garnered 48% of the investments with only 15% contribution to emissions.

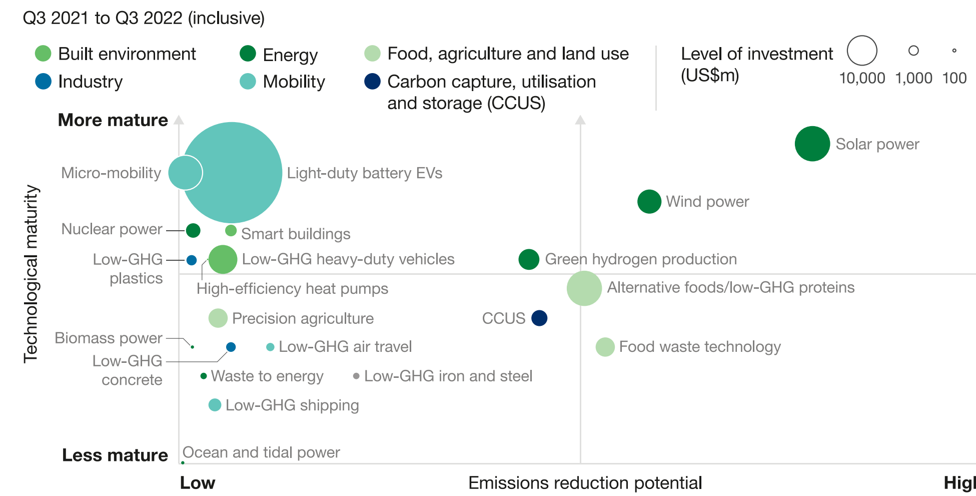
This market disparity can be attributed to factors such as market perception, technology maturity, regulatory environment, risk perception, and innovation potential. Sectors with high emissions may be seen as less attractive or riskier for investment compared to sectors like mobility, which benefit from supportive policies and perceived market demand. A mature, fully efficient market will also take into consideration the technological maturity with emission-reduction potential or climate impact. The current funding lacks this trend.

Share of global emissions and climate tech venture investment by sector



Source: https://www.pwc.com/climatetech

Market Inefficiencies



Note: Based on a subset of technologies reflecting funds raised and technologies in hard-to-abate sectors.

Source: https://www.pwc.com/climatetech

Despite the inefficiencies and biases, the market for climate technology has expanded as a result of a variety of causes. Among the most significant are the cost of climate change as it is becoming more and more obvious as we witness more frightening weather events, rising sea levels, and other effects. Due to this, there is a growing need for methods to lessen the effects of and prepare for climate change. This is encouraging investment in technology that might aid in the economy's decarbonization.

More money has to be invested in climate technology development, transfer, and deployment, especially where it can make the most difference quickly. The private investment markets have to mature too. In the near future, developing nations apart from China. will seek roughly $1 trillion in external financing, coming from private finance, official development finance, and concessional finance, each year to fulfil the ambitions of the Paris Agreement and associated development objectives. While this number may capture attention from a political standpoint, it pales in comparison to the vast scale of the global economy, which exceeds $100 trillion annually[25].

[25] https://www.brookings.edu/wp-content/uploads/2023/02/Chapter-1.-Keys-to-Climate-Action-Overview.pdf

Equitable Access to Climate Technologies

Equity is crucial in addressing climate change as it ensures impartial and well-adjusted distribution of the benefits and burdens of climate protection efforts. It aims to alleviate the disparate impacts and exposures faced by marginalized communities due to climate change. By promoting equity, we can create a more just and inclusive transition to a green and sustainable future, where all individuals, communities, corporations, and countries have equal opportunities to flourish and contribute to sustainable development.

❶ ENVIRONMENTAL IMPACT

Equitable access to climate technologies allows for a more widespread adoption of clean and sustainable solutions. By providing access to renewable energy technologies, energy-efficient systems, and sustainable practices, we can significantly reduce greenhouse gas emissions and mitigate the impacts of climate change.

For example, access to renewable energy technologies can help to reduce reliance on fossil fuels, which are a major source of greenhouse gas emissions. Access to energy-efficient technologies can also help to reduce energy consumption and emissions. This leads to cleaner air, reduced pollution, and preservation of ecosystems and biodiversity.

❷ SOCIAL JUSTICE AND EMPOWERMENT

Ensuring equitable access to climate technologies promotes social justice and empowers poor and developing nations. By making these technologies available to disadvantaged nations, we can address environmental inequalities and enhance their resilience to climate change impacts. Equitable access allows communities to actively participate in climate action, improving their quality of life, health, and well-being. Climate technologies enable energy access in remote and underserved regions.

Off-grid solar systems and mini-grids can empower communities in Africa, Asia, and Latin America by providing reliable electricity for lighting, charging electronic devices, and powering productive activities.

❸ ECONOMIC OPPORTUNITIES

Climate technologies present significant economic opportunities. Equitable access enables a broader range of communities to engage in the green economy, creating new jobs, fostering local entrepreneurship, and stimulating economic growth. By promoting the transfer and adoption of climate technologies, we can foster innovation, attract investments, and enhance competitiveness in the global market.

For example, solar, electric vehicle, green buildings, and waste management are some of the rapidly growing industries and are creating millions of new jobs.

❹ CAPACITY BUILDING AND KNOWLEDGE SHARING

Equitable access to climate technologies promotes capacity building and knowledge sharing. By providing access to training, technical assistance, and education, communities can develop the skills and expertise needed to deploy, operate, and maintain these technologies. This leads to the development of local capabilities, fosters innovation, and creates a foundation for sustainable development.

An example is the International Solar Alliance's programs that offer training and capacity building to member countries, empowering them to harness solar energy and drive their own clean energy transitions. Through such initiatives, communities become empowered to not only benefit from climate technologies but also actively contribute to their advancement and application.

❺ RESILIENCE AND ADAPTATION

Climate technologies play a vital role in building resilience and adaptation to climate change impacts. Equitable access allows vulnerable communities to implement climate-resilient infrastructure, early warning systems, and adaptive practices. This enhances their ability to withstand extreme weather events, such as floods or droughts.

For instance, climate technologies, such as precision agriculture techniques and efficient irrigation systems, support sustainable farming practices, leading to increased agricultural productivity and food security. Drip irrigation systems have been successfully implemented in arid regions like Israel, enabling efficient water usage for crop cultivation.

❻ GLOBAL COLLABORATION AND SOLIDARITY

Equitable access to climate technologies promotes international collaboration and solidarity. By ensuring that all nations, particularly developing countries, have access to these technologies, we can foster cooperation, knowledge exchange, and shared responsibility in addressing climate change. This contributes to a more unified global response and strengthens the effectiveness of international climate agreements.

For example. various bilateral and multilateral initiatives promote international technology cooperation to facilitate the transfer of climate technologies. For instance, partnerships like the Technology Mechanism, Clean Energy Ministerial, and Mission Innovation foster collaboration among countries to accelerate the development and deployment of clean energy technologies. Also, developing countries engage in South-South Cooperation to share knowledge, experiences, and technologies among themselves. Through initiatives like the South Centre, countries from the Global South collaborate in technology transfer, capacity building, and policy exchange to address climate change collectively.

Ultimately, the pursuit of equitable access to climate technologies must emphasize the dedication to impartially and efficiently distributing the benefits and responsibilities of climate protection endeavors. This notion transcends mere inclusion, encompassing a comprehensive framework that embraces an array of strategies for achieving parity and inclusiveness.

A pivotal aspect within this framework revolves around the principle of two-way technology transfers. This principle encompasses not only the diffusion of cutting-edge climate technologies from developed to developing nations but also encourages the reciprocal sharing of indigenous knowledge and localized solutions. Furthermore, the expansion of market access for climate technologies is pivotal in promoting fairness. By facilitating the integration of these technologies into diverse markets, we empower nations to adopt technologies that resonate with their specific requirements and capacities. Finally, the concept of optimal resource management (particularly rare earth materials and other raw material) underscores the importance of judiciously utilizing resources. This strategy, rooted in resource-consciousness, aligns harmoniously with equity, ensuring that the benefits of these technologies are harnessed for the greater good without exacerbating existing disparities. These approaches build more resilient corporations and nations, creating a ripple effect of positive change across various aspects of society.

Accessing and Financing Climate Technologies

The process of technology transfer can be a complex and multifaceted issue. The inherent disparities in climate change exposure among nations and the multi-stage nature of technology transfer pose significant challenges from the outset. Obstacles may emerge at every stage of the process. Some of the prominent obstacles include:

1 FINANCIAL CHALLENGES

Large-Scale Deployment and Investment Requirements: The development and deployment of climate technologies often involve substantial initial investments. For instance, a small business interested in transitioning to energy-efficient machinery may face financial barriers due to the high upfront costs involved.

Insufficient Financial Mechanisms: The availability of financing options specifically designed for climate technologies is limited. Traditional financing sources may not adequately cater to the unique requirements and risks associated with climate technology projects, resulting in a gap in financial support.

Furthermore, there is another significant aspect to consider. In countries like India, financing typically has short terms of 3-5 years or even less (e.g., lease agreements). However, climate technologies often have longer asset lifespans, leading to extended payback periods and ROI. This disparity emphasizes the crucial need for providing long-term capital support for climate technology assets to promote sustainable and effective climate action.

Access to International Climate Finance: Developing nations often face challenges in accessing and efficiently utilizing these funds. The complexity of the application process, stringent requirements, and lack of capacity in navigating international climate finance mechanisms pose obstacles for accessing adequate financial support. Small island nations vulnerable to sea-level rise may struggle to access affordable financing for climate resilience projects due to limited access to international climate finance mechanisms.

Absence of Secondary Markets: The limited availability of clear and well-established secondary markets for renewable energy assets, such as solar panels, creates uncertainty for lending institutions. In case of a borrower defaulting on a loan using solar panels as collateral, the lender may face challenges recouping their investment due to the absence of a readily available market for used solar panels. Consequently, lending institutions may be hesitant to accept renewable energy assets as sole collateral for loans, potentially leading them to require additional collateral or higher interest rates to mitigate their risk. This lack of confidence from lenders can create barriers for renewable energy projects, hindering the sector's growth and making it difficult for enterprises to secure the necessary funding.

Re-insurance and Underwriting Challenges: Re-insurance and underwriting pose challenges as climate change intensifies. More frequent and severe weather events like hurricanes, floods, and wildfires strain the insurance industry. Costs for underwriting properties, particularly in vulnerable zones, surge due to amplified climate risks. For example, in California, insurance firms are increasing rates, limiting coverage, or withdrawing from certain regions due to catastrophic weather events such as wild fires.

2 INFRASTRUCTURE CHALLENGES

Insufficient infrastructure: Inadequate infrastructure, including roads, power lines, and other necessary support systems, presents challenges for the implementation of climate technologies, particularly in developing countries. In a rural area of a developing country, the absence of a reliable electricity grid infrastructure hinders the implementation of solar power systems. Without a functional power grid, it becomes challenging to connect and distribute the electricity generated by solar panels, limiting the potential benefits and accessibility of clean energy in the region.

3 POLICY AND REGULATORY CHALLENGES

Inadequate Policy Frameworks: Insufficient or outdated policies pose obstacles for technology providers and users, hindering the access and financing of climate technologies. For instance, a lack of clear and supportive policies in a particular country may hamper the growth of EV adoption. Without incentives, subsidies, or regulations to promote EVs, potential buyers may be deterred, and businesses related to EV charging infrastructure may struggle to secure financing for expansion

Regulatory Uncertainties: Complex permitting processes and uncertainties surrounding regulations create barriers to accessing and financing climate technologies. For example, countries with intricate and unclear permitting procedures can cause significant delays or even prevent the successful deployment of climate technologies. Additional challenges are created by factors such as import duties, tariff restrictions, and their frequent changes.

4 INTELLECTUAL PROPERTY RIGHTS (IPRS) CHALLENGES

Limited access due to IPRs: IPR protection creates challenges for developing countries in accessing and replicating climate technologies. For example, a developing country seeking to establish a domestic CCS facility may face barriers due to IPRs held by a small number of companies. These IPRs restrict access to crucial design and manufacturing processes, hindering the country's ability to produce cost-effective CCS locally. Currently, most development for these projects is dominated by countries in Europe and Americas[26].

Debates on IPRs: Perspectives on IPRs in climate technologies vary, with developed countries emphasizing the need for protection to encourage innovation, while developing countries advocate for enhanced global access to promote technology transfer and address climate challenges.

5 INFORMATION AND RESPONSIVENESS CHALLENGES

Limited Awareness and Understanding: Insufficient knowledge and awareness about available climate technologies can impede their adoption.
A lack of information regarding the benefits, technical specifications, and implementation processes may lead to hesitance in investing in and utilizing these technologies. In remote rural areas, farmers may lack knowledge about climate-resilient agricultural practices and technologies due to limited access to information services.

[26] https://www.iea.org/data-and-statistics/data-tools/ccus-projects-explorer

Knowledge Gaps: Inadequate understanding of the advantages, technical specifications, and implementation processes of climate technologies can hinder their adoption. For instance, some individuals may be unaware that renewable energy technologies can result in long-term cost savings on energy bills.

6 CAPACITY AND CAPABILITY CHALLENGES

Technical Limitations: Developing the required technical capacity and expertise to deploy and operate climate technologies can present challenges, particularly for developing countries and smaller organizations. This can hinder the effective utilization of these technologies, as specialized knowledge and skills are often necessary for tasks such as installation, maintenance, and monitoring.

Specialized Skills Required: The installation, maintenance, and monitoring of climate technologies often require specialized knowledge and skills. For instance, an organization aiming to implement wind turbines for renewable energy generation may encounter challenges due to a shortage of technicians knowledgeable in wind turbine maintenance and repair. Without the necessary expertise, the organization may struggle to keep the turbines operating at peak performance and face higher downtime and maintenance costs.

Challenges Within Intermediaries: Capacity and capability challenges are prevalent even within intermediary enabling entities. For instance, when dealing with solar assets in India, bank managers at the branch level may lack sufficient understanding of solar assets, leading to hurdles in deploying global finance channels. As a result, the last mile of implementation faces disruptions due to this capacity gap. Unfortunately, both Indian partners and international financing institutions/Foundations often overlook the importance of capacity development for these implementing organizations, exacerbating the challenges in scaling and effectively. utilizing climate technologies.

7 MARKETPLACE CHALLENGES

Insufficient Competition: In climate technology markets, the lack of sufficient competition can impede innovation and hinder cost reductions. For instance, if only a few companies dominate the energy storage systems market, such as batteries, they may have the ability to maintain higher prices for their products, limiting affordability and accessibility.

Fragmented and Immature Supply Chains: The absence of standardized products and fragmented supply chains creates barriers to accessing climate technologies. For example, with numerous variations of solar panels available in the market, businesses may face difficulties in identification and procurement and hinder the widespread adoption and effective implementation of advanced solar panels.

Trade and Policy Barriers: Tariffs and trade restrictions on imported renewable energy components can raise the costs of renewable energy projects, hindering their access and financing.

8 UNCERTAINTY AND RISK CHALLENGES

Future Uncertainty: Uncertainties surrounding the future of climate change and carbon emissions create challenges in making investments in climate technologies. For instance, the unpredictable nature of future carbon pricing, carbon taxes, and emission regulations makes it difficult to accurately assess the financial returns on investments in climate technologies.

Market Adoption and Integration Risks: Intermittent renewable energy technologies face challenges in integrating with existing grids, which poses risks to their market adoption. For example, integrating a large-scale wind farm into an existing power grid poses challenges for a utility company due to the intermittent nature of wind energy, requiring careful planning to ensure reliable power supply.

Furthermore, and perhaps more crucially, the success of initiatives is essential for obtaining funding for climate solutions since badly executed projects with subpar results might turn away lenders and investors. Access to and funding of climate technologies are further hampered by complex bureaucratic processes, a lack of government efforts and lack of financial assistance for the adoption of these technologies. Furthermore, governments may prioritise investments in basic infrastructure above programmes for climate mitigation and adaptation in areas where basic development is an urgent issue, taking funds away from finance and access to climate technologies.

Catalyzing Global Net-Zero Transition in the Global South

In addition to the commonly emphasized recommendations for more climate funding, technology transfer, and international collaboration, our proposed solutions center around the strength found in cooperation within the Global South, a heightened role for the private sector, and the establishment of a platform to consolidate demand and leverage the power of collective bargaining. We emphasize these approaches as they present an opportunity for the Global South to shift the dynamics of climate discussions and view the pursuit of transformation and resilience as both an opportunity and a transformative endeavour, rather than solely a burden.

1 SOUTH-SOUTH COLLABORATION

Promote South-South collaboration, in which developing countries exchange knowledge, resources, and experiences. Encourage partnerships and cooperation amongst developing nations to tackle climate concerns together, share climate innovations, and assist one another in moving towards a net-zero economy.

This grand alliance can be a powerful tool which can provide advantages related to cost-effectiveness, sustainability, local context, and greater ownership and control over their projects. It enables countries facing similar challenges and circumstances to share best practices and lessons learned, reducing the need for independent innovation and facilitating the adoption of successful techniques, policies, and technologies, stimulates the growth of new sectors, job opportunities, and economic development, and provides a venue for combining funds and splitting the expense of sustainable energy efforts, thus easing the load on individual nations.

2 PRIVATE SECTOR SUPPORT

Private sector can play a significant role in the global transition to net-zero emissions by way of driving innovation and investment. Governments can support the private sector by providing right policy framework, tax breaks, subsidies, and other incentives to encourage them as they work towards job creation, embedding sustainability into supply chains, invest in research and development, invest in renewable energy, develop and deploy other clean technologies, and adopt sustainable business practices. While competitiveness cannot be built on subsidies alone, subsidies have a role to play as targeted support to unlock the scale of investment needed for low carbon solutions.
The private sector can also provide entrepreneurship, mentoring and start-up support to ventures and start-ups focused on renewable energy, sustainable agriculture, circular economy solutions, and other climate-related themes.

3 CONTEXTUALIZED CLIMATE REPORTING

In a pivotal and dramatic move, the private sector of the Global South can collaborate and create reporting and disclosure methods that reflect their specific exposure to climate crisis through a lens uniquely attuned to their local climate and context. Global standard reporting practices fall short in capturing the true essence of their distinct climate realities. Through the most relevant KPIs, they can challenge the world to acknowledge the distinctive struggles and triumphs faced by the Global South, instigating a paradigm shift in climate discourse and action. This can become the basis for bringing the attention to the much needed climate finance and climate technology transfer.

4 ELEVATING THE POTENTIAL OF GLOBAL SOUTH'S RESOURCES

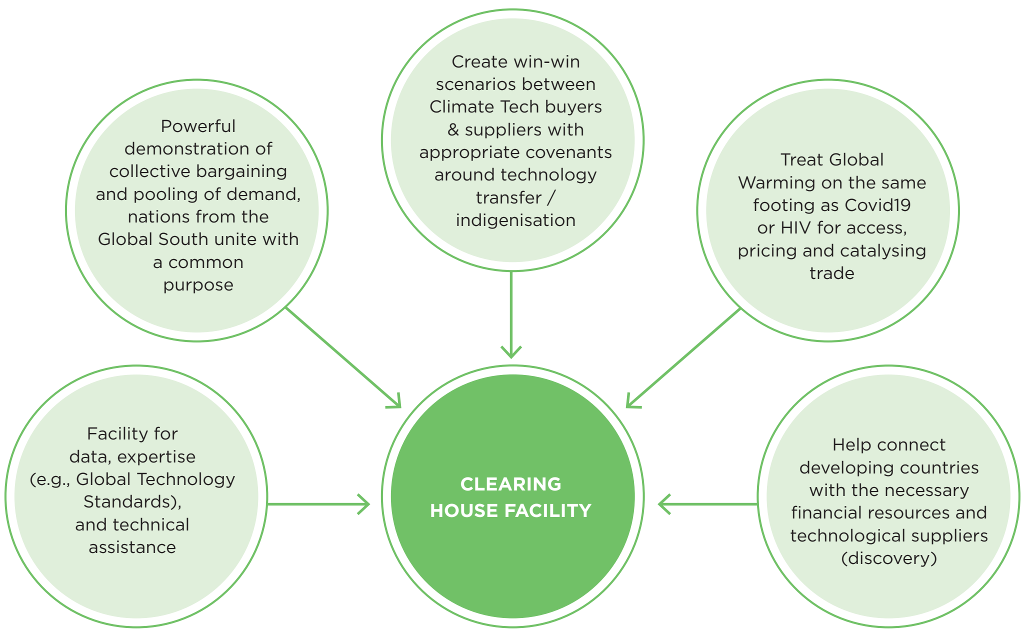
The large markets within the Global South, characterized by their diverse and burgeoning economies, possess the potential to drive transformative change. Leveraging indigenous knowledge on climate, deeply rooted in centuries of sustainable practices, provides invaluable insights for crafting solutions tailored to local contexts. Enriched by abundant raw materials, including rare earth elements, a burgeoning, educated youth population, and a thriving entrepreneurial ethos, the Global South can not only champion its own sustainable development but also emerge as a pivotal force in redefining the global narrative on climate action.

5 CLEARING HOUSE FACILITY

Create a CTCH in one of the countries in the Global South, that acts as a nexus for data, expertise, and technical assistance with climate technology and financing. This facility can help connect developing countries with the necessary financial resources and technological suppliers by offering advice, capacity-building programmes, and matchmaking services. In turn, the exporting countries benefit from newer markets, commercialization benefits, etc.

3 Climate Technologies Clearing House: A Silver Bullet

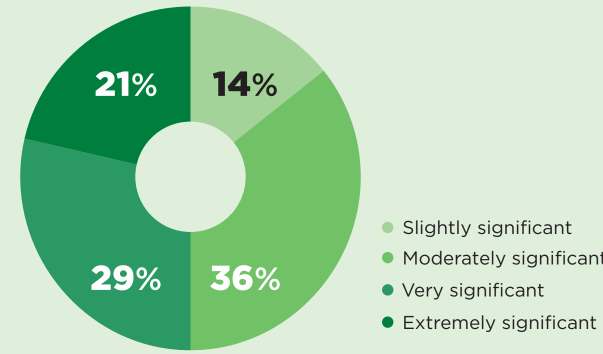
The CTCH clearing house facility can be a hub where nations from the Global South can converge in a powerful display of collective bargaining and pooling of demand, driven by a shared purpose to amplify their voices and seize opportunities. It should provide a platform for nations to negotiate with strength, advocating for their unique needs and priorities. Through strategic collaborations and partnerships, they can leverage their combined demand that would be challenging to attain individually. This can also attract the attention of suppliers and investors who may have been previously inaccessible.



The Time is Now

The need to establish a CTCH for technology transfer has never been more pressing. As companies worldwide recognize the imperative of addressing climate change, many are allocating substantial budgets to support their ambitious climate goals. The time is ripe to create a dedicated platform. Such a facility would enable efficient exchange and transfer of climate technologies. As per the expert opinion poll, 50% of the companies are now allocating extremely significant or very significant proportions of their budgets for climate technologies.

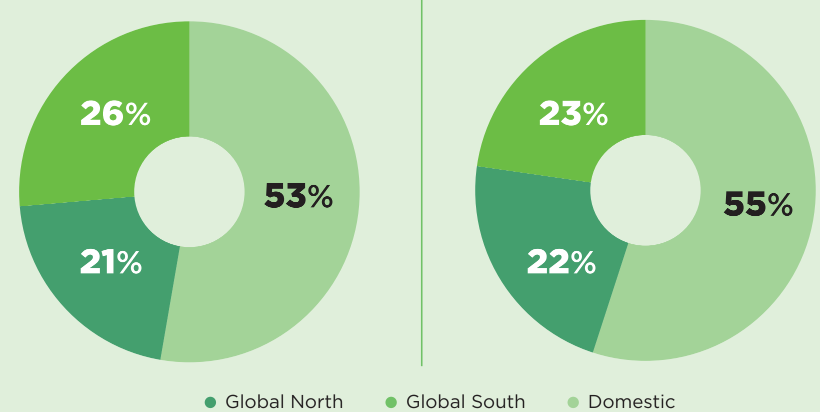
Budget allocations for climate technologies in relation to the size of participant's company, portfolio companies, or assets managed/advised in the last 3 years



Source: Survey of Experts' Working Group

Another important factor to push for the establishment of such a facility is the finding, through expert poll opinion, that a significant portion of the technology transfer is currently focused domestically. While this approach is essential for addressing local climate challenges, it also highlights the need for promoting trade and technology transfer between the Global North and Global South. By facilitating this exchange, the Global North can seize the opportunity to find potential buyers. This symbiotic relationship benefits both parties, fostering collaborative efforts in combating climate change on a global scale.

Recent Climate Tech Acquisitions | **Future Climate Tech Acquisitions**



Source: Survey of Experts' Working Group

However, the equitable distribution and widespread adoption of climate technologies are hindered by a complex web of factors, including international trade dynamics and IPRs. There is an intricate relationship between IPRs, international trade, and climate technologies. It is important to understand the disparities in patent ownership, the contentious debate surrounding intellectual property laws, and the barriers they impose on technology access. Thus, there is a need to examine potential avenues for cooperation, such as collective bargaining, technology transfer, and the establishment of a CTCH to facilitate fair trade. The concepts of indigenization, open standards, and a pooled R&D fund are also considered as means to promote innovation and democratize climate technologies. It is an interesting interplay of challenges and opportunities that arise at the intersection of IPRs, international trade, and the global fight against climate change.

Intellectual Property Rights, Patents, & International Trade in Climate Technologies

The irony of climate change and its solutions lies in the fact that the problem itself is global, transcending geographical boundaries and affecting the entire planet, however, the solutions and actions required to address climate change often rest in the hands of a few individual countries and governments. There is enough research that suggests that climate change solutions exist and the path to action is seemingly clear, but in a trade-driven and profit-focused world, the reality is different and presents considerable obstacles. Sharing the information, tools, and resources required for all-encompassing action becomes a challenging undertaking. The equal distribution and propagation of climate solutions are frequently hampered by IPRs, trade regulations, and market dynamics. Monopolies and restrictive business practices confine access to and increase the cost of key technologies, making it more difficult for communities and nations to put their climate change initiatives into action.

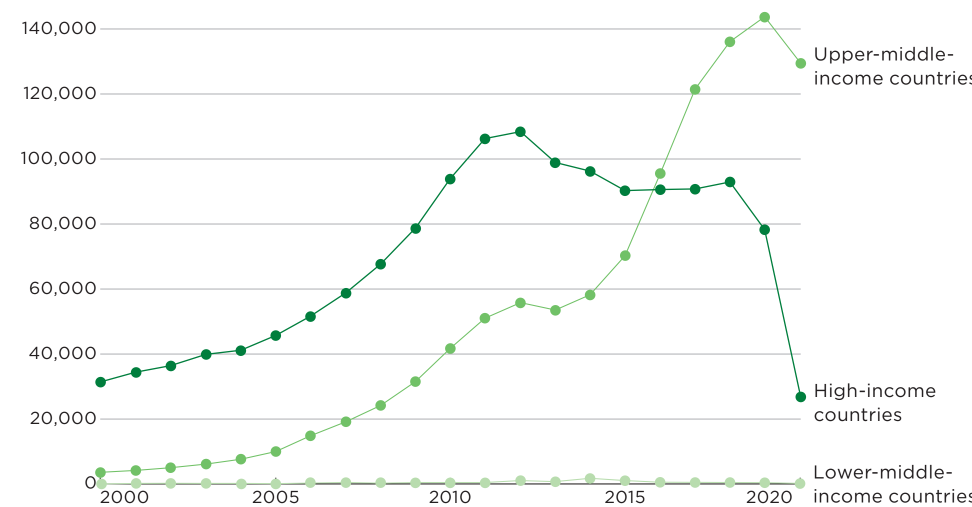
Unequal Distribution of Patents

A great bulk of patents are with companies from North America, United Kingdom, Europe, Japan, Korea, China, and Germany and only 13% of the world patents are owned by inventors in all other countries put together[27]. The share of the developing nations will be further low in this thirteen percent. The trend can be fairly assumed to extend to climate technologies as well. For instance, Japan and the USA dominate energy-efficient technologies and key sectors like steel, iron and cement; their large companies control a significant number of the patents for all targeted technologies[28]. When checked for sustainable energy patents across high-income, upper-middle-income and low-income countries, numbers are self-telling of the unequal distribution. The pace of global diffusion of these technologies, as required by international agreements and climate warnings, falls short of expectations. Intellectual property laws, acting as a significant impediment to efficient and swift technology transfer, bear partial responsibility for this lack of progress.

[27] https://www.visualcapitalist.com/cp/countries-new-patents/

[28] https://link.springer.com/article/10.1007/s10784-018-09427-2

Annual Patents Filed in Sustainable Energy



Source: https://ourworldindata.org/grapher/patents-for-renewables-by-country?tab=chart&facet=none&country=Lower-middle-income+countries-Upper-middle-income+countries-High-income+countries

Intellectual Property Laws Debate

However, the industry still remains steadfast in its belief that stricter and consistent laws and regulations related to intellectual property play a vital role in stimulating private investment in climate technology development and innovation. The industry argues that IPRs serve as an inducement for innovation, steering the creation of new technologies and eventually only increasing the availability of such technologies for transfer by establishing reliable avenues and reducing the fear of unauthorized use.

Conversely, it is important to recognize that stringent IPR regimes can pose challenges for developing countries, delaying their access to these technologies. The restricted access to patented technologies, due to high costs, limited licensing options, and multi-year term of protection from patent filing date can hinder the adoption and deployment of climate solutions in regions that may be most in need of them. Thus, concerns have been raised regarding the impact of patent regimes, especially within the Trade-Related Aspects of Intellectual Property Rights (TRIPS) framework, an international agreement administered by the World Trade Organization (WTO) setting minimum standards for intellectual property protection, including patents, copyrights, trademarks, and trade secrets, on access to essential technologies in critical sectors. Despite the presence of several provisions in TRIPs that seemingly support technology transfer, such as Article 7 "The protection and enforcement of IPRs should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations." However, practical reality is opposing. Technology suppliers often do not provide concessions, dodge with complex legal contracts, put opportunistic conditions such as forcing transfers through joint ventures with majority ownership stakes, impose export restrictions on host developing countries, due to which technology transfers prove unsuccessful.

Obstacles in Technology Access

A classic example of all the above mentioned practices is when in the early 1980s and 1990s India, as a developing country, encountered obstacles in accessing and adopting technology for manufacturing chlorofluorocarbon (CFC) alternatives, required as part of the Montreal Protocol, an international agreement aimed at phasing out the production and consumption of ozone-depleting substances, due to the ownership of patents and proprietary knowledge by companies in developed countries. This limited Indian companies' access to essential technologies and increased the cost of technology transfer. Consequently, the transition away from CFCs and the adoption of alternative substances were delayed and financially burdensome for Indian industries.[29.] Thus, largely, IPRs often create an imbalanced situation, favouring the holders of IPRs and potentially resulting in unfair outcomes. Even several years later, the issue is not resolved. It was reported that India will push for waivers on IPRs related to green energy and energy transition across G20 countries during its G20 presidency, citing the fact that it may take additional years to achieve transition without prompt technology share and that there is a need to work as a team, keeping aside the limitations of patents, copyrights, and IPR issues.[30]

Imposing exclusive rights on something vital for the survival of the world contradicts the fundamental necessity of it. In a world that faces potential destruction while possessing the knowledge of a solution to safeguard humanity, such knowledge becomes meaningless unless it is utilized. This was highlighted recently during Covid when timely access to vaccines became a necessity and patents granted to pharmaceutical companies raised concerns about their affordability and availability. India and South Africa, in October 2020, put forth a proposal at the WTO advocating for a comprehensive waiver of the copyright, patent, industrial design, and undisclosed information provisions outlined in the TRIPs Agreement. After 20 long months of deliberations, the results were quoted as disappointing and inadequate[31]. The waiver was approved with narrow conditions such as applicability of the waiver to only Covid 19 vaccines against initial request to apply it to all COVID-19-related health products and technologies, including vaccines, therapeutics, medical devices, and personal protective equipment,

[29] https://www.un.org/en/development/desa/policy/cdp/cdp_news_archive/egm_climatechange/khor.pdf

[30] https://www.livemint.com/news/world/india-to-seek-ipr-waiver-for-green-energy-tech-at-g20-11672158909044.html

[31] https://www.msf.org/lack-real-ip-waiver-covid-19-tools-disappointing-failure-people

limiting the availability of the waiver to only those countries that exported less than 10% of the world's vaccines in 2021, and its applicability for only five years[32] . India and South Africa had rightly demanded a waiver since the statistics for vaccination rates were alarming. As of Jan 2022, in case of Low Income Countries, the vaccination rate was only 10% of the target rate. For High Income Countries the vaccination rate was 1430% more than the target rate, highlighting inequitable access to vaccines[33]. The logic behind this perspective is grounded in the recognition that when it comes to matters of preservation of life, prioritizing profits and ownership becomes secondary.

Another potent illustration of how patents affect access to necessary technology is the HIV/AIDS situation. For many people in poor nations, proprietary antiretroviral medications were out of reach in the 1990s due to their high price. Generic versions become available when patents were not upheld or were legally contested, drastically lowering costs and enabling more people to obtain therapy. The world used Compulsory Licensing and Differential Pricing (e.g., by CIPLA) to overcome patent regime challenges in 1990s / early 2000s. In 2001, Global Pharma majors dropped a lawsuit against South Africa due public pressure. Global initiatives such as the Global Fund to Fight AIDS, Tuberculosis, and Malaria, PEPFAR, and UNITAID have played a crucial role in providing funding and support for HIV/AIDS programs.

Balancing Patents for the Public Interest

In cases, as outlined above, it is more appropriate to consider available solutions protected under IPRs as public goods, relinquishing exclusive control in favour of broader accessibility and societal benefit. Climate technologies can be likened to vaccines against climate change, necessitating the relaxation and waivers of IPRs. Flexibilities within TRIPs, such as waivers, compulsory licensing, and parallel imports, allow governments to safeguard public health interests and ensure access to affordable medicines. Similar flexibilities, and even some innovative ideas, could be explored within the context of climate technologies, enabling the Global South to overcome barriers to access and actively participate in addressing climate change. Patents should balance the rights of inventors with the public interest. The issues with IPRs lies in finding the right balance between providing adequate protection and avoiding excessive restrictions.

Another dimension is added to this debate when we acknowledge passive and indigenous climate technologies within the Global South. It can also help balance the often patent-centric approach. These locally developed solutions, deeply rooted in the knowledge and practices of indigenous communities, often prove to be self-sufficient, culturally relevant, and effective in addressing climate challenges, particularly adaptation.

[32] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9790937/#r16

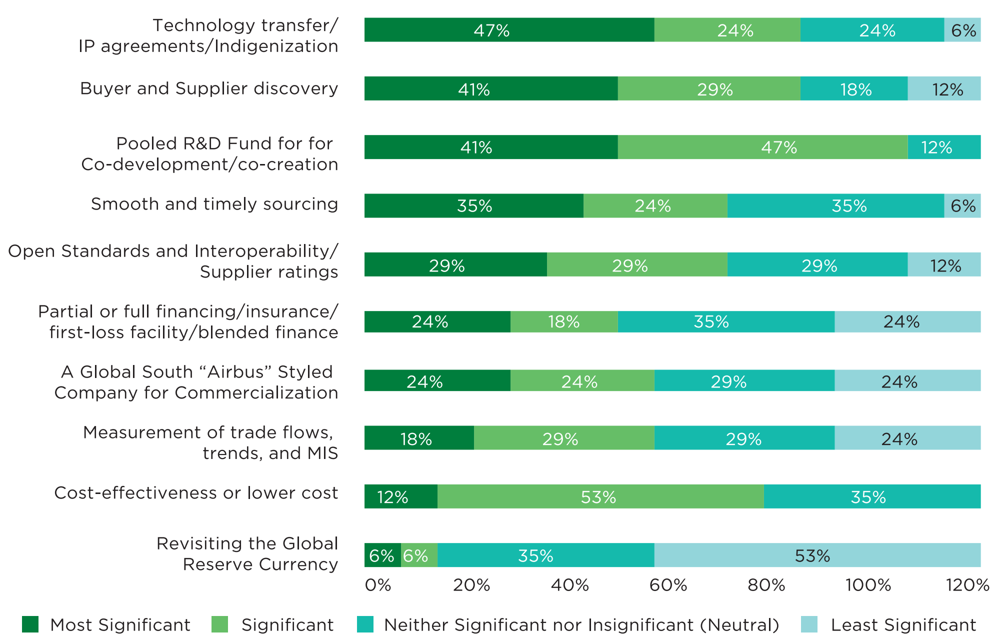
[33] https://blog.forumias.com/covid-19-vaccine-and-trips-ip-waiver/

Transcending Transfer Hurdles: Global Trade/IPR Regulations vs. Democratization

In the context of climate technology transfer, the idea of combining demand to negotiate collectively holds enormous promise for creating a mutually beneficial situation for both the Global North and the Global South. When countries from the Global South pool their demand and negotiate as a bloc, they can unlock various advantages. This strategy enables them to negotiate better prices, gain access to superior technologies, and secure favourable terms collectively.

To achieve this objective, a CTCH can play a pivotal role by undertaking diverse functions. Below is a preliminary overview of the role and crucial functions that such a facility can fulfil to transcend existing transfer hurdles. These functions are arranged according to their importance, as indicated by expert opinions.

Functions of a Clearing House



Source: Survey of Experts' Working Group

Top Functions

1 BUYER AND SUPPLIER DISCOVERY: POOLING & CONSOLIDATING DEMAND FOR ADVANTAGES

The facility should act as a platform for buyers and suppliers to connect, enabling potential users in the Global South to discover suitable climate technologies and solutions offered by suppliers from around the world.

When countries join forces and combine their demand for climate-friendly technologies, they unlock a range of benefits. Firstly, pooling demand allows for larger consolidated orders, leading to economies of scale for the Global North. Manufacturers and technology providers from the Global North can leverage these larger volumes to save costs, improve efficiency, and strengthen their competitive advantage. The increased market access resulting from consolidated demand can drive expansion, job creation, and overall economic growth in the Global North, when some of their economies are also anticipating job cuts and recessions. Simultaneously, the Global South stands to gain from this collaboration by expecting reduced prices, access to better technologies, and more favourable terms.

To facilitate the consolidation of demand, the establishment of a G20-initiated and managed, CTCH becomes crucial for fostering fair trade and climate cooperation.

2 INDIGENIZATION: PROMOTING LOCAL INNOVATION AND DEVELOPMENT WITHOUT INFRINGING ON IP

Indigenization plays a pivotal role in fostering climate change mitigation and adaptation by enabling developing countries to cultivate their own climate-friendly technologies. The Global North can support this process by providing funding for R&D in developing countries and offering technical assistance. By empowering local innovation and facilitating knowledge transfer, indigenization strengthens the capacity of developing nations to effectively address climate challenges as well as promotes self-reliance and reduce dependence on external actors.

Contracts and licensing agreements should be designed in a way that enable technology transfer without compromising intellectual property. By encouraging technology exchange rather than IP compromises, the facility can foster confidence and cooperation between technology suppliers from both the Global North and the Global South.

While indigenizing, the focus should also be on the development of customized solutions that cater to unique climate conditions, ensuring the technology's effectiveness and resilience in different regions. Such an approach removes challenges associated with the universal application of the same product across different climates, promoting more efficient and tailored climate technology adoption worldwide.

3 POOLED R&D FUND FOR CO-DEVELOPMENT AND CO-CREATION OF OPEN-SOURCE CLIMATE TECHNOLOGIES

To strengthen collaboration between the Global South and Global North, a key strategy is promoting co-development and co-creation of climate technologies. This approach involves active participation from stakeholders in both regions, incorporating diverse perspectives and addressing specific regional needs for more effective climate solutions.

Additionally, to accelerate the development of open-source climate technologies, the establishment of a pooled R&D fund is vital. Global North countries, benefiting from technology transfers, can contribute to this fund based on a formula considering their economic capabilities, environmental responsibilities, and profit potential from transfers. The fund would provide crucial financial support for R&D endeavours focused on creating sustainable and impactful climate solutions, considering the unique requirements of the Global South.

Other Desired Functions

1 SMOOTH AND TIMELY SOURCING

CTCH can help streamline the sourcing process, ensuring that buyers can access climate technologies in a timely manner to address their specific needs and challenges efficiently

2 OPEN STANDARDS AND INTEROPERABILITY

Additionally, the facility can support the establishment of open standards and frameworks for interoperability, i.e., development of common guidelines and protocols that allow different climate technologies to work together seamlessly. This means creating a set of standards that enable the integration and compatibility of various systems, devices, and solutions so that climate technologies from various sources can complement and enhance each other's capabilities. These technologies would be freely accessible to both Global South and Global North countries, ensuring equitable access and promoting widespread adoption.

3 INTEGRATING FIRST LOSS GUARANTEES: EMPOWERING CLIMATE TECHNOLOGY TRANSFERS

CTCH can explore the implementation of first loss guarantees as a crucial mechanism. These guarantees, supported by climate justice funding/climate funds from the Global North, aim to mitigate the financial risks associated with investments in climate technology projects. By absorbing initial losses, first loss guarantees provide reassurance to companies from the Global North, incentivizing them to invest in the Global South by taking on the early losses. This mechanism facilitates the transfer of climate technologies establishing a mutually beneficial cooperation framework.

4 A GLOBAL SOUTH "AIRBUS" STYLED COMPANY FOR COMMERCIALIZATION

CTCH facility should draw inspiration from Airbus, a multinational company owned by several European nations. A Global South "Airbus" styled entity, can be established to commercialize the technologies developed through the pooled R&D fund. This company should have representation from multiple Global South countries, ensuring shared ownership and decision-making. The company's structure and design will reflect the diverse perspectives and needs of the Global South, enabling effective utilization of local resources, expertise, and market insights. It can strengthen the collective voice and representation of the Global South in the climate technology landscape, allowing for the pursuit of shared goals.

5 MEASUREMENT OF TRADE FLOWS, TRENDS, AND MIS

CTCH can monitor and evaluate trade flows and trends related to climate technologies, providing valuable Management Information System (MIS) data to identify opportunities and areas for improvement.

6 COST-EFFECTIVENESS OR LOWER COST

By aggregating demand and negotiating bulk purchases, the facility can help achieve economies of scale, resulting in cost-effective acquisition of climate technologies for the Global South.

7 REVISITING THE RESERVE CURRENCY: ENHANCING THE GLOBAL SOUTH'S POSITION

Currently, the US Dollar serves as the global reserve currency due to its perceived stability. However, the recent downgrade of US credit rating by Fitch from AAA (best) to AA+ (high-quality) basis reasons such as fiscal deterioration, high government debt burden, and governance erosion, can also can impact the attractiveness of the US dollar as a reserve currency. If international confidence in the US dollar wanes due to these concerns, it could lead to a reduced preference for holding and trading in US dollars. Reconsidering the reserve currency and transitioning to a basket of currencies that includes currencies from developing countries can reduce volatility. A less volatile reserve currency would facilitate borrowing and investment for developing countries, particularly in the realm of climate-friendly technologies. This revision would contribute to a more inclusive and equitable global economic system.

Implementing the Idea

In envisioning the viability and practicality of this CTCH, several essential aspects have been identified based on polls conducted by an expert group comprising industry leaders and practitioners. These pillars form the foundation of what should underpin such an institution.

Advantages

A CTCH facility for climate technologies can offer numerous advantages that go beyond its primary role. These benefits create a favourable environment for stakeholders involved in climate technology exchange. These advantages are arranged according to their importance, as indicated by expert opinions.

1 LOWER COST FOR BUYERS

By aggregating demand and leveraging economies of scale, CTCH can enable buyers to access climate technologies at reduced costs. This affordability encourages wider adoption and deployment.

2 SMOOTH, HASSLE-FREE SOURCING

By centralizing and streamlining the sourcing process, the facility can ensure hassle-free procurement of climate technologies. This efficiency saves time and resources for both buyers and sellers.

3 ACCESS TO MARKET INTELLIGENCE

Through CTCH, participants can gain access to valuable market intelligence and insights. This information empowers them to make informed decisions about technology adoption, market trends, and potential opportunities.

4 BIGGER LONG-TERM ORDERS FOR SELLERS

Climate technology sellers can benefit from increased order size and consistency in demand, leading to more stable and predictable revenue streams.

5 EASIER NEGOTIATIONS ON TECH TRANSFER AND IP

CTCH can act as a mediator, facilitating smoother negotiations between technology providers and buyers on technology transfer agreements and arrangements. This streamlined process enhances cooperation and reduces complexities.

6 ANCILLARY BENEFITS OF A COLLECTIVE (POOLED R&D, RISK MANAGEMENT, ETC.)

The facility fosters a collective approach, enabling stakeholders to pool resources for R&D, risk management, and other collaborative efforts. This collective effort can lead to shared knowledge, reduced costs, and faster technological advancements.

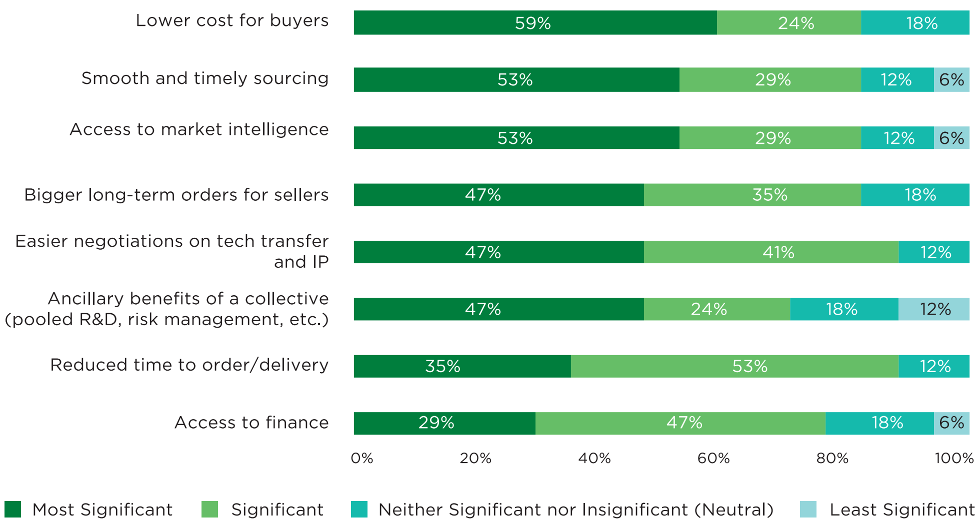
7 ACCESS TO FINANCE

The facility can offer access to various financial instruments, such as partial or full financing, insurance, and first-loss facilities, which can significantly ease the financial burden on buyers, particularly from the Global South.

8 REDUCED TIME TO ORDER/DELIVERY

With the CTCH assistance, the time taken from placing an order to the delivery of climate technologies may be significantly reduced. This efficiency allows for quicker deployment of climate solutions.

Clearing House Advantages



Source: Survey of Experts' Working Group

Prioritization of Technologies

The CTCH should adopt a strategic approach by prioritizing technologies based on multiple criteria, and ensure itself of early success and uptake. The CTCH should focus on technologies that have made significant strides along the maturity curve, indicating higher readiness levels for implementation. By focusing on technologies that have reached advanced stages of development, CTCH can ensure faster deployment and effective utilization of resources.

Moreover, CTCH should consider technologies with high ROI potential (ideally should include Impact ROI - environmental and social - along with financial returns) and existing market demand. Technologies that offer compelling economic benefits and address immediate sustainability challenges are likely to gain quicker acceptance and attract more investments from both public and private sectors.

To comprehensively assess the benefits of various technologies, CTCH should categorize them based on short-term, medium-term, and long-term effects. Some technologies may offer immediate solutions to pressing environmental issues, while others might have transformative, long-term benefits for sustainability goals. By understanding the varying timelines for impact, CTCH can tailor its services and incentives accordingly.

As a crucial platform for estimating demand, the CTCH should also play a vital role in guiding R&D investments. By prioritizing technologies that are still in research labs or early stages of development but show promising potential, the CTCH can accelerate their progress and eventual implementation. This strategic allocation of R&D funding can significantly expedite the delivery of viable solutions to market.

Different prioritization techniques are essential to attract buyers and sellers to the facility. By showcasing technologies that have advanced along the maturity curve and offer a proven track record, the CTCH can instil confidence in potential buyers, as they can see tangible evidence of successful implementations. Moreover, a concentrated focus will ensure that the offerings within the CTCH are economically viable and align with the commercial interests of both buyers and sellers. This dedicated focus on economically beneficial solutions can make the CTCH an attractive platform for businesses looking to invest in sustainable technologies.

Sustainable Procurement

The significance of sustainable sourcing or procurement in climate technologies cannot be overstated. It involves acquiring materials and components for these technologies in a manner that minimizes environmental impact, upholds ethical practices, and promotes social responsibility throughout the supply chain.

The flip side of green growth based on technology necessitates a closer look at material/resource requirements. A pertinent example is the mining of certain minerals used in solar panels, such as rare earth elements like neodymium, dysprosium, and terbium. These elements are vital for producing strong permanent magnets used in solar panel motors to track the sun's movement. However, mining these elements can result in habitat destruction, soil and water contamination, and significant waste generation. Additionally, some regions with rare earth element production may lack robust labour practices and environmental regulations.

To address these challenges, manufacturers can adopt innovative solutions. This includes exploring alternative materials, embracing responsible mining practices, and prioritizing recycling and reusing rare earth elements from discarded products. These measures are pivotal in reducing dependency on new mining, promoting environmental sustainability, and ensuring a more resource-efficient approach to sourcing materials for climate technologies.

Sustainable sourcing not only presents an opportunity for innovation in product and process design but can also act as a catalyst for promoting IPR equality and facilitating two-way technology transfers. When manufacturers prioritize sustainable sourcing, they often need to find alternative materials or processes that have a reduced environmental impact. This pursuit of alternatives can lead to the discovery of novel materials and techniques that are not only environmentally friendly but may also be eligible for intellectual property protection, leading to a more diverse pool of intellectual property rights. In the pursuit of sustainable sourcing and innovative solutions, companies may encounter situations where they need to collaborate with other entities, whether they are research institutions, technology developers, or small and medium-sized enterprises from regions with sustainable practices to engage in technology and knowledge exchanges, fostering a more inclusive and globally connected innovation ecosystem.

Interestingly, the Global South has an opportunity to lead in these areas. By embracing circular economy principles and innovative business models, these regions can establish themselves as hubs for sustainable technology development. Achieving a truly sustainable future requires finding the right balance between advancing green technologies and ensuring their responsible sourcing and utilization.

Greenwashing Check Points

The CTCH must be vigilant in avoiding becoming a greenwashing hub. To maintain its credibility and effectiveness, it is crucial that the listed suppliers and technologies are strictly science and engineering-based, backed by credible data and evidence. Transparency and accountability should be paramount, ensuring that suppliers have a proven track record of successful procurement of technologies.

Buyers should have access to clear information regarding the emissions abatement potential of the technologies offered. To ensure meaningful impact, the CTCH should implement a supplier rating system, evaluating suppliers based on their environmental commitments, performance, and the verifiable results of their technology offerings.

Carbon Credits

The Climate Technologies Clearing House can serve as an excellent platform to promote carbon credits. As companies implement technologies acquired through CTCH and achieve measurable carbon reductions, they can earn carbon credits. The earned carbon credits can be traded and shared within the clearing house marketplace, creating a dynamic ecosystem that rewards environmentally responsible actions. Companies can utilize these credits to gain financial incentives, such as discounts on various transactions, and showcase their commitment to sustainability through improved ratings on the platform. Carbon credits offers a powerful incentive for businesses. However, CTCH will have to ensure standardized carbon accounting by establishing a methodology for calculating carbon credits generated by each technology, ensuring transparency and credibility, and implementing a rigorous verification process to certify the validity of these credits.

Impact Assessments

Impact assessments can play a pivotal role in maintaining the integrity of the CTCH. Detailed assessments of past technology implementations should be readily available, including information about the supplier, buyer, the technology deployed, and the tangible impacts on local communities, biodiversity, environment, etc. This data will enable buyers to make informed decisions and gauge the effectiveness of the technologies they are considering for purchase. Similarly, it can help in improving the seller's credentials.

In addition to aiding fair purchase decisions, impact assessments can also play a crucial role in changing the skew of capital deployment and ensuring a stronger correlation between emissions reductions and funding/capital flow. By scrutinizing the outcomes of previously implemented projects, the CTCH can identify successful technologies with positive environmental and social impacts.

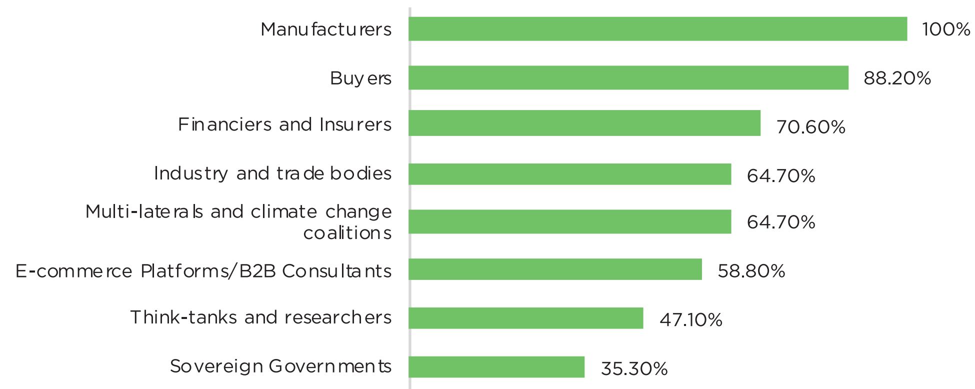
By emphasizing the above, the CTCH can ensure that its offerings are rooted in sound principles and capable of delivering genuine sustainability outcomes. Fostering a transparent and data-driven environment will prevent greenwashing, bolster trust, and facilitate meaningful exchanges. Ultimately, the CTCH commitment to authenticity and impact-driven results will solidify its position as a trusted marketplace.

Key Users

The CTCH facility can serve as a valuable resource for various stakeholders involved in climate technology exchange. The most important users were identified based on polls conducted by an expert group comprising industry leaders and practitioners.

Manufacturers, Buyers, and Financiers & Insurers figure as the primary key users of the facility, affirming the proposal that the mechanism will effectively unite these essential stakeholders.

Key Users of the Clearing House



Source: Survey of Experts' Working Group

THE PIVOTAL ROLE OF SOVEREIGN GOVERNMENTS

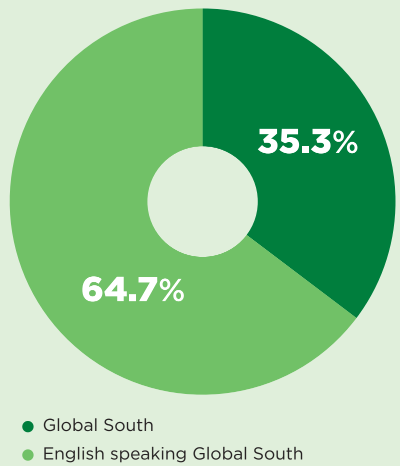
During the survey, Sovereign Governments did not emerge as a top key user, as the CTCH is being considered more as a private initiative, with no direct facilitation through national governments. However, this does not diminish the fact that regimes will play a crucial role in climate technology transfer. As key actors in shaping policies, regulations, and initiatives related to climate action, their involvement is vital for facilitating the smooth exchange and deployment of climate technologies at a macro or national level.

Sovereign governments establish regulatory frameworks that ensure a supportive environment for technology transfers. This includes clear guidelines for IPRs licensing, and technology standards. They also create markets for climate technologies by fostering demand through public procurement, incentives for private sector adoption, and funding support for projects that utilize these technologies. Sovereign governments actively engage in international climate change negotiations and agreements, collaborating with other nations to foster technology transfer and capacity building. Their involvement in these global initiatives is instrumental in promoting climate-friendly solutions and sustainable development across regions.

We expect governments to establish the foundation for technology transfer at a broader level, allowing suppliers and buyers to engage in trade and fulfil their roles efficiently without excessive bureaucracy.

An important point to note is that Multi-laterals and Climate change coalitions and Think-tanks emerged at higher ranks in the survey than Governments. Sovereign governments are frequently accompanied by these two essential stakeholders in the realm of international relations. Multilateral institutions and coalitions play a pivotal role in coordinating joint endeavors among nations to tackle shared challenges. Think tanks and researchers offer analytical perspectives, insights, and specialized knowledge that guide the formulation of policy choices. Together, these entities foster cohesive international action and informed policymaking.

Clearing House Location



Source: Survey of Experts' Working Group

Ideal Location

The survey results suggested that the English-speaking Global South can be an ideal location for establishing a CTCH clearing house for climate technologies.

The English-speaking Global South offers several compelling advantages for establishing a CTCH for climate technologies. Firstly, English being widely spoken and understood facilitates seamless communication and collaboration among stakeholders from diverse regions, promoting effective knowledge sharing and accessibility. Secondly, the region's diverse expertise, with various countries facing unique climatic conditions, environmental challenges, and sustainable development needs, creates a rich pool of knowledge that fosters innovative and context-specific climate technology solutions. Lastly, the Global South's significant and growing market potential for climate technologies, driven by the urgent need to address climate change impacts, makes it an attractive location for a CTCH, drawing international attention and participation from stakeholders seeking market expansion.

A Look at other Similar Existing Institutions

1 INTERNATIONAL SOLAR ALLIANCE (ISA)

ISA, founded In 2015, on the sidelines of COP15, is an action-oriented, member-driven, collaborative platform for increased deployment of solar energy technologies as a means for bringing energy access, ensuring energy security, and driving energy transition in its member countries. It was launched jointly by India and France with the vision of promoting solar energy deployment and reducing the dependence on fossil fuels to combat climate change.

Services

- It serves as a leading global platform for cooperation and collaboration among countries abundant in solar power resources.
- SA mobilizes funding for the deployment of solar infrastructure by collaborating with institutions such as corporations, industries, bilateral and multilateral organizations, and other stakeholders.
- The alliance actively contributes to achieving Sustainable Development Goal 7, which seeks to ensure access to affordable, reliable, sustainable, and modern energy for all.

Example

SENEGAL
ISA sent a 5-member delegation to Senegal to raise awareness among the current authorities about the alliance's efforts and assess the country's specific on-ground requirements for appropriate assistance. They held discussions with relevant ministries and regulatory bodies, focusing on facilitating solar water pumping systems, rooftops, mini-grids, and e-mobility and storage.

As a result, Senegal submitted a demand for 4000 units of solar pumping systems in response to ISA's call for expression of interest. The project aims to be implemented in the Niayes region, covering 8000 hectares. A pilot project of 100 solar pumps has already been initiated by the National Agency of Renewable Energies, showing the progress made in achieving ISA's goals.

2 CLIMATE TECHNOLOGY CENTRE AND NETWORK (CTCN)

UNEP plays host to the CTCN, founded In 2013, serving as the implementation arm of the UNFCCC on Climate Change's Technology Mechanism. The CTCN is dedicated to promoting the accelerated development of clean climate technologies in developing countries, providing essential technology solutions and capacity building to tackle climate challenges. By offering tailored advice and fostering global collaboration, CTCN aims to drive low-carbon, energy-efficient, and climate-resilient development worldwide.

Services

- **Providing Technical Solutions**
CTCN responds to developing countries' requests, channelled through their National Designated Entities (NDEs) or nationally selected focal points. By offering technical solutions, the CTCN enhances the transfer of climate technologies. These solutions create opportunities for developing nations and remove barriers for financial investments from UNFCCC's Finance Mechanism institutions, private sectors, and developmental banks.

- **Sharing Information Relating to Climate Technologies**
To complement the technical solutions, the CTCN facilitates access to valuable climate knowledge through technology webinars and practical insights into climate solutions. Upon request, tailored knowledge exchanges and training are provided to countries seeking specific expertise.

- **Fostering Collaboration and Networking of Stakeholders**
The CTCN organizes annual regional forums, facilitating networking opportunities for key stakeholders, including decision-makers from public and private sectors, climate technology users, investors, and technology providers.

Examples

AFGHANISTAN
Facing water scarcity due to its mountainous terrain and frequent droughts, Afghanistan sought CTCN's assistance in identifying technology needs. The CTCN responded with comprehensive suggestions,

including the analysis of climate technology priorities for the agriculture, energy, and water sectors. The expected results include a catalogue of climate technology options and a roadmap for mainstreaming climate technology priorities.

COLOMBIA
Colombia approached CTCN for support in developing the Mechanical-Biological Treatment (MBT) pilot project of the Waste NAMA in Cali. CTCN provided various recommendations, such as identifying appropriate technology through technical feasibility studies and developing deployment strategies. The expected results encompass enhanced waste management practices, reduced GHG emissions from landfills, job creation, and overall efficiency in the waste sector.

Through its array of services and impactful case studies, CTCN continues to play a crucial role in promoting sustainable development and climate resilience in developing countries.

3 LEADERSHIP GROUP FOR INDUSTRY TRANSITION (LEADIT)

LeadIT, established in September 2019 by the Indian and Swedish governments and backed by the World Economic Forum, is a coalition committed to achieving the objectives outlined in the Paris Agreement. Operating on the belief that energy-intensive industries must transition to low-carbon pathways to achieve net-zero emissions by 2050, LeadIT offers a platform for global dialogues and collaborations between public and private decarbonization experts.

Services

- **Standardizing International Agenda**
LeadIT organizes global dialogues to set standardized international agendas, aligning efforts towards achieving net-zero emissions.

- **Facilitating Collaboration and Expertise**
Regular meetings between decarbonization experts from the public and private sectors allow for knowledge exchange and best practice sharing.

- **Assisting Road mapping Processes**
LeadIT provides workshops and science-based tools to aid companies in developing effective roadmaps for their net-zero journeys.

- **Monitoring Progress**
The coalition tracks and evaluates the progress of roadmap plans and investment resources for decarbonizing heavy industry sectors.

- **Informing Policymaking**
LeadIT analyses current trends and requirements to inform policymaking processes, shaping effective climate policies.

Examples

TATA Steel, one of the world's leading steel producers, has set a formidable target to achieve net-neutrality by 2045. Embracing the commitment to work towards its sustainability goals, TATA Steel joined LeadIT, positioning itself as a global leader in transforming the steel industry. As the first Indian steel company to become a LeadIT member, TATA Steel gains access to invaluable insights, best practices, and innovative ideas related to sustainability in the steel sector.

By leveraging the LeadIT platform, TATA Steel can effectively communicate the challenges and opportunities presented by the Indian steel market. Given the projected significant growth in the steel sector in the coming decades, TATA Steel's expertise in both the Indian and European markets places it at the forefront of driving low-carbon initiatives and advocacy efforts.

With a long-standing commitment to sustainability, TATA Steel's inclusion in LeadIT facilitates collaboration with countries and companies globally, amplifying its efforts to achieve net-neutrality. By aligning with LeadIT's global agenda, TATA Steel strengthens its position as a pioneer in the transformation of heavy industry sectors.

Although each of these organizations plays a pivotal role within the climate sector, they encounter specific challenges or limitations that hinder the complete realization of climate technology transfer goals.

Challenges of Existing Institutions

Institution	Limitations
ISA	• Focus on solar energy solutions • Focus on Least developed countries (LDCs) and Small Island Developing States (SIDS) • No financing currently; Solar Financing Facility coming • No Procurement; Occasionally hosts RFPs • No operating Role • Country-level free advice on a need basis
CTCN	• ~80% of the requests received centered around Technical Assistance • Budget – constraints: only one request per country per year would be funded and implemented. • Eligibility and prioritization criteria for projects • Weak private sector involvement – private sector engagement and market creation are presently less; than 2 % of the total TA portfolio when ~44% of network members are private sector orgs • Prioritizes technical assistance toward LDCs and other vulnerable countries • Lower visibility and awareness of its services
LEADIT	• Limited members, 37 in all including countries and companies • Focus on heavy industries • Limited representation from developing countries • Lack of binding commitments since It Is a voluntary participation • Roadmaps provided lack specific targets and timelines • No operating Role • Country-level free advice on a need basis

CTCH aims to overcome most of it, if not all.

1 Differing from a knowledge hub like CTCN, CTCH will function as a trade and commerce center.

2 In contrast to ISA, CTCH will encompass a diverse spectrum of climate technologies beyond solar, spanning various industries and sectors.

3 Unlike LeadIT, CTCH will avoid a singular focus on heavy industries, striving to offer a comprehensive technology portfolio suited to diverse sectors and geographic regions.

4 CTCH will actively foster private sector engagement, promoting autonomous interactions between buyers and suppliers to address the challenge of weak private sector involvement.

5 CTCH will assume a more dynamic role, encompassing diverse functions including co-creation, co-development, pooled R&D funds, impact assessments, and other initiatives.

Annexure 1

CASE STUDY 1

Industrial Scale Carbon Capture & Utilization (CCUS) -Tata Chemicals

Tata Chemicals Europe's CCUS Breakthrough: Leading the Way in Climate Tech Innovation for Sustainable Sodium Bicarbonate Manufacturing

Tata Chemicals is a science-led company with a portfolio that covers basic and specialty chemistry products. Tata Chemicals Europe (TCE) is one of Europe's leading producers of sodium carbonate, salt and sodium bicarbonate and other products

TCE is manufacturing one of the lowest carbon footprint sodium bicarbonate and sodium carbonate products in the world. TCE is already generating heat and electricity from one of the most efficient combined heat and power plants in the UK

The Game-Changer - Industrial Scale Carbon Capture and Utilisation (CCU) Plant

The carbon footprint of our operations in Northwich further significantly reduced following the commissioning of the UK's only industrial scale carbon capture and utilisation (CCU) plant. This plant will enable more than 10% of carbon dioxide produced by our combined heat and power plant (CHP) to be recycled, purified and used as a key raw material to produce highest food grade standards for use as a key raw material for manufacturing of high purity sodium bicarbonate.

In June 2022, the plant was officially opened, to make the world's first carbon neutral sodium bicarbonate. Supported by a £4.2m grant from the Department for Business, Energy and Industrial Strategy (BEIS), the £20m investment at our Winnington site captures 40,000 tonnes of carbon dioxide each year - the equivalent of taking 20,000 cars off the roads.

Ecokarb® - Patented Process for CO2 Capture & Utilization

For the CCUS, Tata Chemicals Europe was awarded a patent for the novel process of capturing & utilization of CO2 from flue gases of its gas-fired CHP to manufacture 'Net Zero Sodium bicarb'. This process, branded as Ecokarb® offered TCE's sodium bicarb customers low carbon products that will help with their journeys into decarbonization.

Identifying the Right CCU Technology Provider

Critical to this project was identification of a suitable CCU technology provider that enabled reliable and cost effective CCU process, utilizing readily available solvents whilst providing robust guarantees for delivery of high purity CO2 in compliance with EIGA (European Industrial Gases Association) food standards. To support the business case and the ROI criteria set by TATA Chemicals, TCE applied for a grant from the UK government department of Business Innovation and Industrial Strategy (BEIS) that approved a 25% grant.

The CO2 capture process removes diluted CO2 from the mix of gases in the CHP emissions and releases it as a concentrated CO2 gas. The CCU plant will purify and liquefy the captured carbon dioxide, after which it will be stored prior to its use in the manufacture of Sodium bicarb at TCE's facility.

With this project, TCE became the largest single site user of liquid carbon dioxide in the UK. Food grade liquid carbon dioxide, an essential raw material is used to manufacture high-grade Sodium bicarb, which is primarily used in the pharmaceutical and haemodialysis sectors.

Meeting Regulatory Requirements and Environmental Permits

The project required stringent planning and environmental permits to ensure that all the required UK legislative requirements were met. The build programme was concluded successfully with all the safety, environmental and legal requirements delivered in full during the challenging pandemic period. Since the commissioning, all the CO2 requirements for the Sodium bicarb business has been met from the new facility.

Conclusion

The project has been a great success with the benefits far exceeding the original investment plans due to the higher costs of CO2 and Carbon taxes and scarcity of CO2 linked to high natural gas prices in recent times. Aside from high quality CO2 manufactured from fertiliser production, this is now the largest high quality EIGA standard CO2 plant in the UK.

CASE STUDY 2 India's 1st Net Zero Energy Residential Homes – Mahindra Lifespaces

India's rapid urbanization has brought numerous environmental challenges, particularly in cities like Bengaluru. Over the past few decades, Bengaluru witnessed an 88% decline in vegetation cover and a 79% decline in water bodies, coupled with a staggering 1028% rise in urban population between 1973 and 2017. As a consequence, the city experienced a temperature increase of 2-2.5 degrees Celsius over the last decade.

Moreover, the construction and buildings sectors have been major contributors to both direct and indirect CO2 emissions, accounting for nearly 40% of the total. The continuous growth in construction poses an additional burden on the environment, with 70% of the built requirement until 2050 yet to be constructed, amounting to 230 billion sq. ft. of new construction.

In response to these pressing environmental issues, Mahindra launched India's 1st Net Zero Energy Homes to demonstrate that sustainable and eco-friendly housing is both viable and crucial for a greener future. Some of the innovative design and tech solutions employed are as follows:

Climate-Responsive Design (CRD)

The Net Zero Energy Homes employed a climate-responsive design approach, considering factors like building and window orientation, solar radiation analysis, and adequate daylight and ventilation in habitable areas. By integrating features such as sewage treatment plants, rainwater harvesting, and low-flow fixtures, the project achieved 74% self-sufficiency in water. Additionally, biodiversity preservation efforts led to the conservation of 84% of existing biodiversity, including over 100 plant species, 25 bird species, and 25 butterfly species.

Waste Management

A comprehensive waste management system was implemented, involving waste segregation at the source, 100% composting of wet waste, and resource recovery centers for dry waste. The project also addressed the proper management of toxic waste, including electronic and biomedical waste, contributing to a significant reduction in waste sent to landfills.

ACHIEVING NET ZERO ENERGY

The Net Zero Energy Homes aimed to reduce energy demand by 33% through CRD and passive and active design measures. On-site energy generation through rooftop solar PV and wind turbines was utilized to meet 5% of the energy requirement. The remaining 95% was sourced through off-site renewable energy, in collaboration with the Bangalore Electricity Supply Company Limited (BESCOM).

Impact

ENVIRONMENTAL IMPACT

The initiative showcased significant environmental benefits:

- Protection of 173 species.
- Preservation of over 300 existing trees on the project site.
- 33% annual energy savings, equivalent to powering 827 homes.
- 74% reduction in external water dependency, equivalent to saving 10,243 tankers of water.
- Diversion of 90% of waste away from landfills, amounting to averting 381 trucks of waste.

PEOPLE IMPACT

Equitable resource allocation and monetary savings for customers, making sustainable housing more accessible.

Contributing to Sustainable Development Goals

The project aligns with six of the United Nations Sustainable Development Goals,

Challenges and Actions

The project encountered several challenges, including sourcing renewable energy and on-site energy generation. Overcoming these hurdles involved convincing BESCOM to supply renewable energy for residential projects and incorporating solar photovoltaic panels at various points in the development. Energy demand reduction was addressed through measures such as using glazed facades, behavioural interventions, and energy-efficient lifts.

Construction Management for Biodiversity Conservation: The Net Zero Energy Homes demonstrated meticulous construction planning to avoid disturbing existing biodiversity. Specific measures, including cordoning an existing pond and creating an eco-water body, were implemented to protect the natural environment during construction. Regular monitoring of air, water, and noise pollution levels ensured minimal impact during construction.

Tree Transplantation & Site Transformation: To preserve the green cover, around 50+ trees were transplanted, and the project's design was carefully planned to retain over 300 trees on-site.

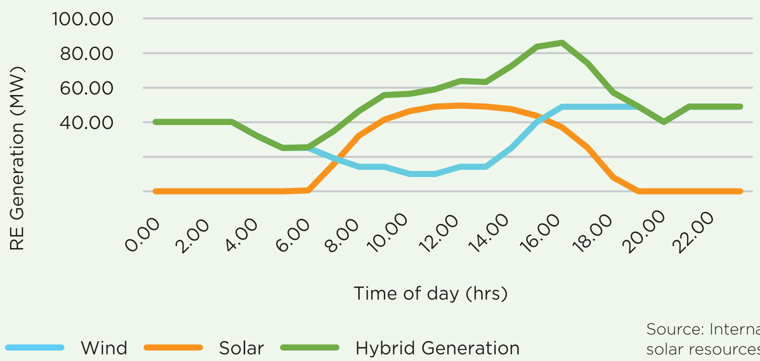
Conclusion

The India's 1st Net Zero Energy Residential Homes project serves as a remarkable case study, showcasing the feasibility and importance of sustainable construction. By integrating climate-responsive design, renewable energy generation, and waste management initiatives, Mahindra's Net Zero Energy Homes exemplify a commitment to a greener and more sustainable future, setting a benchmark for the construction industry in India. The project's comprehensive approach towards environmental conservation and energy efficiency demonstrates how innovative and eco-friendly practices can contribute to a more sustainable urban environment.

CASE STUDY 3 Wind-Solar Hybrid Renewable for Industrial Power Decarbonization– BP

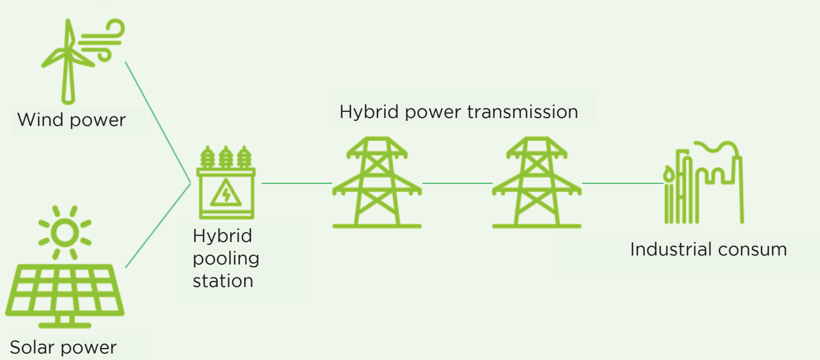
Hybrid renewable power generation system is a combination of two or more renewable energy sources supplying power to consumer(s). Combination of wind and solar power generation for a dedicated power supply is an example of hybrid renewable. Advantage of hybrid renewable is that its generation profile can be altered by mixing optimal capacity of different sources. This is useful for matching demand of an industrial consumer with renewable power. Wind and solar generation profiles are complementary in many renewable rich regions in India. Fig-1 below illustrates it. Hybrid power can offer round-the clock renewable power to industrial consumers operating 24x7.

FIGURE 1
Wind & solar complementarity in Gujarat (50MW wind and 50 MW Solar)



Source: Internal analysis basis wind and solar resources in May 2022.

FIGURE 2
Wind and solar hybrid power scheme



Assumption: co-located wind and solar power plants with hybrid power injection into transmission system

Hybrid power addresses the challenge of adopting round the clock renewable energy by large industrial power consumers that rely on captive coal-based power or grid. It also helps higher level of replacement of brown power compared to pure vanilla wind and solar. Industrial consumers with round-the-clock power consumption are opting for renewable power under open access mechanism with wind and solar generation. Adding energy storage or gas power into the hybrid generation mix with renewable can make it even more firm and dispatchable.

Storage and oversizing renewable power plant has the potential to replace 100% brown power of Industrial consumers. However, gas power with renewable offers higher flexibility of supply at a lower emission compared to coal or grid power.

Firm and dispatchable renewable power offers the following benefits:

1. Lower carbon footprint in energy consumption
2. Lower cost of power from renewable source (high coal and gas price)
3. Lock in power price without volatility (fuel price volatility)

Regulations allows captive scheme which helps lower the cost of delivered renewable power by lower grid charges and lower cost of generation because of equity infusion by consumers in the power generation asset.

A case on industrial customer having captive coal-based power generation transitioning to 100% renewable energy by 2030.

POWER DECARBONIZATION OF A MID-SIZE INDUSTRIAL CONSUMER WITH CAPTIVE COAL-BASED POWER

Key figures:

- Industrial set-up with over 120 MW coal-based captive power generation plant
- Annual power consumption of ~ 650 MUs*

Options of decarbonizing power consumption considering no curtailment and excess RE generation, no power storage and banking:

Option	RE capacity	Coal power replacement
1	70 MW solar	19% of coal-based power replacement
2	70 MW wind	34% of coal-based power replacement
3	Wind – solar hybrid with 48 MW wind and 52 MW solar (Total 100 MW RE capacity)	~40% of coal-based power replacement

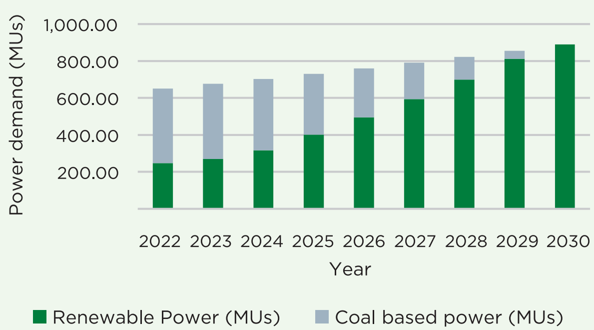
It can be inferred from the above scenarios, that pure renewable sources without storage or balancing power sources cannot replace more that 40% of round-the-clock power requirement of industrial power demand.

Renewable power capacities considering no curtailment, banking, and storage of power.
* MU: Million units (Million kWh)

To further increase share of green power, time-shift of renewable energy is needed either with power banking in grid or with energy storage systems or a dispatchable balancing power source (gas or hydro power). Banking is not sustainable in the longer run with high RE share on grid[34]. Energy storage technologies has improved in performance and cost over time. While lithium-ion batteries have seen grid-scale deployment, pumped hydro storage has promise to lower long-term power storage cost to make renewable energy more dispatchable and available for industrial consumption[35].

Creating a power transition roadmap to 100% renewable, for the industrial consumer in case, the following graphs show – share of renewable (Fig 3), emission abatement and power cost savings (Fig 4) over the years (2023 - 2030).

FIGURE 3
With technology readiness and declining costs of storage, it is possible to switch to 100% RE by 2030h technology readiness and declining costs of storage, it is possible to switch to 100% RE by 2030



Source: Internal analysis basis consumer power generation, projected growth and RE adoption plan till 2030.

The scenario assumes 100% replacement of coal-based power with green power with wind-solar hybrid and energy storage for round- the-clock power.

[34] https://ieefa.org/wp-content/uploads/2021/12/Banking-Restrictions-on-Renewable-Energy-Projects-in-India_December-2021.pdf

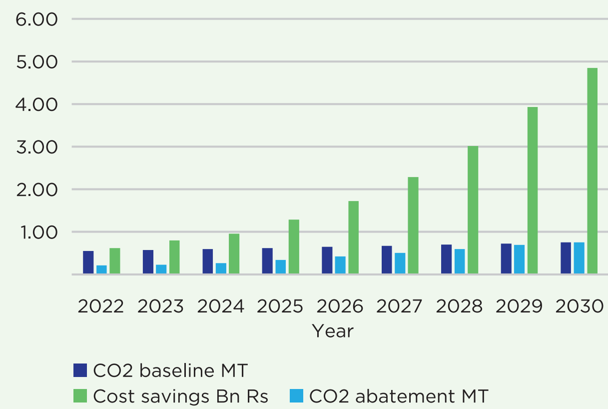
[35] https://www.weforum.org/agenda/2021/04/renewable-energy-storage-pumped-batteries-thermal-mechanical/#:~:text=1%20Europe%20and%20China%20are%20leading%20the%20installation,storage%20harnesses%20motion% 20o r%20gravity%20to%20store%20electricity.

[a] https://www.mckinsey.com/capabilities/sustainability/our-insights/the-new-economics-of-energy-storage

[b] https://wires.onlinelibrary.wiley.com/doi/full/10.1002/wene.431

[c] https://www.nrel.gov/docs/fy19osti/74426.pdf

FIGURE 4
Significant emission abatement and cost savings potential on power procurement with renewable energy and storage



Emission baseline in 2022 considering coal-based power and emission profile of captive power plant.
Emission abatement considering replacement of coal-based power with renewable energy.
~100% abatement of power related emissions by 2030 with complete switchover to RE with storage.

India's industrial power consumption is over 700 BUs[36] and is growing at a rate of ~6 %. Share of green power in the overall mix is 20%. Close to 72 GW of fossil fuel-based power are catering to industrial consumer[37].

Assuming a 5% y-o-y growth in industrial power demand, there is a potential target for 1000 B Us of renewable power supply with over 350 GW greenfield renewable power capacity.

[36] BU: Billion units (Billion kWh)

[37] https://www.iea.org/data-and-statistics/charts/india-total-power-and-renewables-res-generation-vs-share-of-fossil- generation-march-april-2020

[a] https://pib.gov.in/PressReleasePage.aspx?PRID=1885147

[b] https://powermin.gov.in/sites/default/files/uploads/MOP_Annual_Report_Eng_2021-22.pdf

[c] https://powermin.gov.in/en/content/power-sector-glance-all-india

CASE STUDY 4

Overcoming Supply Chain Challenges: Ather Energy

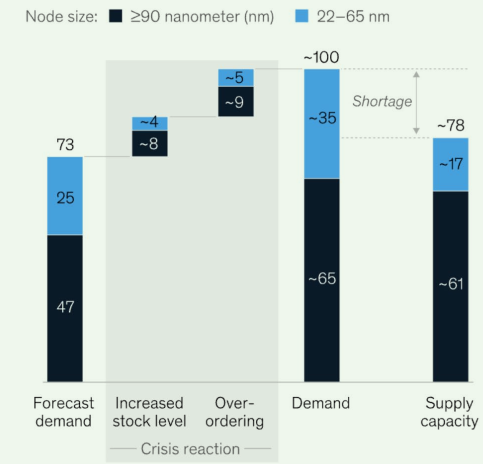
Ather Energy, an India-based product and design-led company, manufactures electric vehicles, specifically connected and durable electric scooters, which have witnessed steady and continuous growth in demand over the last 5 years. Ather has faced challenges in its journey to develop and manufacture high-quality products at a meaningful scale, particularly in relation to its supply chain. As an engineering pioneer, Ather primarily develops its technology in-house at its R&D center. With manufacturing facilities based in India, the company has minimal dependence on the Global North for sourcing technology or components. Ather's leadership in the Indian EV industry is evident as many of its competitors adopt the supply chain, cell, and battery technologies developed by Ather.

Nevertheless, some specific components in the Indian EV industry require patented technologies or advanced manufacturing capabilities sourced from the Global North. These components have faced challenges related to supply de-commitment, extended lead times, limited commercial advantages, and fluctuating prices. Due to restrictions in local manufacturing, domestic expansion, and technology constraints, manufacturing these components locally in India has been difficult. This case study explores instances where the manufacturer and the industry encountered challenges in procuring these components and the strategies implemented to overcome them.

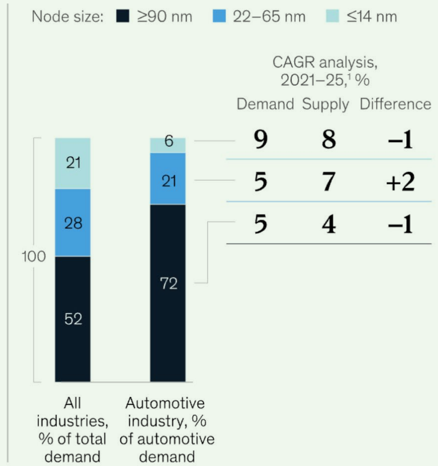
Extended Lead Times and Price Fluctuations

Semiconductor manufacturing demands significant initial capital expenditure, licensed technology, and economies of scale. Ather's semiconductor supply chain is primarily concentrated in a few countries in the Global North. However, the sudden surge in demand for home entertainment, gaming, and computing devices post-COVID caused capacity constraints in the industry. Automotive allocation, which constituted approximately 12% of the total 500 Bn US$ annual sales, was not a priority for manufacturers. Established car manufacturers faced supply issues in 2020-2022, leaving new EV startups in India unnoticed by semiconductor giants. A bidding war for supplies at exorbitant prices further impacted Ather's competitiveness. To address the challenge, Ather built up inventory and sought alternate sources, covering 50-60% of the Bill of Materials (BOM). However, in the short term, costs per vehicle increased by around 30%, affecting production plans and profitability.

Global semiconductor demand and supply, 2022, 300-millimeter equivalent,
millions wafers per year



Share of global semiconductor demand, by node size, 2021, %

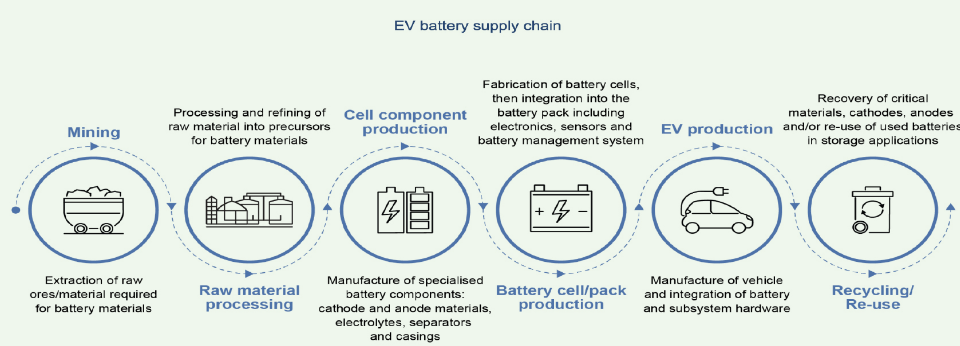


Note: Figures may not sum, because of rounding.
[1]Supply is installed capacity in million 300-millimeter-equivalent wafers; demand foundation is conversion of million square inches into million 300-millimeter-equivalent wafers.
Source: Omdia Semiconductor Silicon Demand Forecast Tool (Q1 2022); SEMI WFF (Mar 2022); McKinsey analysis

Limited Availability of Technology and Suppliers for Cells

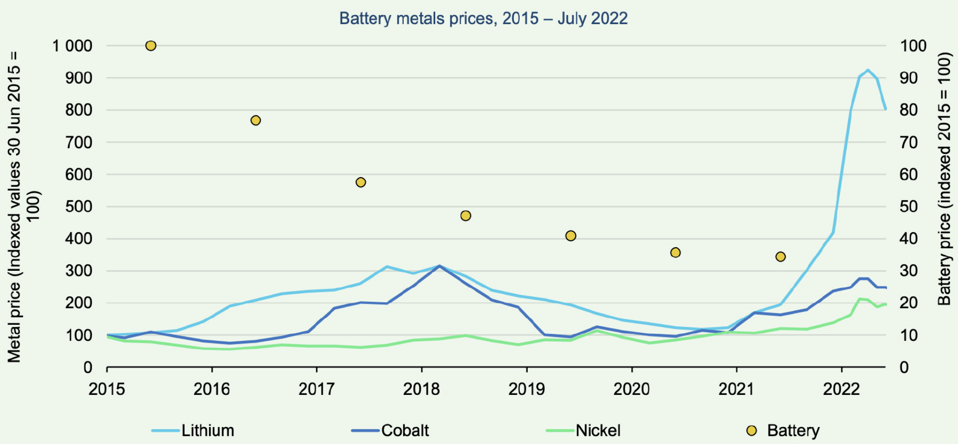
Ather Energy, a pioneer in EV battery pack design and manufacturing, relies on Li-ion cells for its battery packs. Ather manufactures its Battery Packs and Battery Management Systems in-house at its battery manufacturing plant in India, which are widely recognized in the industry for setting benchmarks in engineering design, safety, thermal management, and efficiency. These cells are co-developed with manufacturers or sourced as proprietary off-the-shelf parts.

Making batteries for EVs requires several stages



Prior to the COVID pandemic, Ather depended on a single leading cell manufacturer in the Global North, and cell availability posed no significant issues. However, as EVs gained popularity in India in 2019-20, Ather planned to ramp up production capacity. The primary cell supplier faced capacity commitments from other global EV manufacturers, leading to a capacity crisis. Additionally, soaring prices of raw metals like Lithium, Nickel, Cobalt, and excessive inventory building by EV players further compounded the problem.

Battery metal prices increased dramatically in early 2022, posing a significant challenge to the EV industry



Ather Energy faced tough competition with prominent EV manufacturers, including Tesla and leading OEMs, to secure cell supplies, impacting its production numbers and ramp-up plans. To address this challenge, Ather swiftly adopted a multi-sourcing strategy, developing a 2nd source with a Long-term Agreement and creating Battery Packs compatible with multiple suppliers. Rigorous testing ensured safety and reliability standards were met. Ather now proudly relies on two global sources, utilizing 40 ~ 60% of the marketplace, and aims to add a 3rd source soon.

The experience highlighted the vulnerability of relying on a single supplier for a new-age technology company. Ather's mitigation plan involves additional R&D investments and buffers to absorb supply chain shocks, which might not be feasible for all new companies.

Limited localization and domestic ramp-ups

Limited localization and domestic ramp-ups have been challenging for the nascent Indian EV industry, hindering Ather Energy's sustained growth. Global suppliers for key EV commodities were initially non-existent in India, impacting supply chain capabilities. Although government support through initiatives like Phase Manufacturing Plan and FAME II incentives helped expedite domestic production, critical components still remain unavailable domestically.

Dependence on a global supply chain

Dependence on a global supply chain has led to logistical challenges, with disruptions in sourcing due to complexities in transportation. Despite prior planning, up to 8-10% of the BOM cost has been spent solely on logistics for critical components. Ather has managed these challenges by building inventory, establishing alternate suppliers, and diversifying the supply chain.

In conclusion, Ather Energy addresses supply challenges by enhancing procurement and supply chain resilience. Strategic relationships with major European and North American manufacturers have been established, with agreements on allocation, pricing, and engineering support, supporting the company's growth in the competitive EV market.

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Amit Bhatia (www.amitb.in), Founder of Aspire Impact & Aspire Circle, was formerly Inaugural CEO of G7's Global Steering Group for Impact Investment (2017-20); Founding CEO of India's Impact Investors Council (2014-2017); Founding CEO of WNS Knowledge Services; and, Founder of McKinsey Knowledge Centre.

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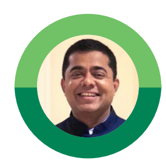

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Anurag Pratap
VP & CSR Leader
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