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POLICY BRIEF

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Summary

Today's diverse emerging technologies environment-- from renewable energy initiatives to infrastructure projects such as seawalls to AI-enabled agriculture and resource management software—offers hope that we have real solutions to pressing climate issues. For these innovations to disrupt the status quo and succeed, we require an enabling environment comprising favorable social, economic, and governance factors—such as a ripe consumer base, business-friendly policies, and ample climate investing—that allow opportunities and new ways of thinking regarding climate tech's social, economic, and environmental potential to flourish. In this ecosystem, the responsibility for safeguarding against the potential risks of these innovations has been disproportionately laid on public actors, such as governments and regulatory bodies, yet the private sector is the primary catalyst of climate technology innovation, and as such, the private sector's power and influence compels it to play a more significant role in safeguarding against the risks. How do policy makers get the private sector to get involved creating technologies that are climate friendly?

Innovation and Climate Technology

Mark Esposito, Raed Awamleh, Melodena Stephens

What the current discourse gets wrong

The current discourse on tech deployments in any field tends to lean towards one of two poles. This discourse either over-emphasizes the benefits of technologies to propel society into its next evolutionary stage or exaggerates its potential to destroy our global system's social, environemntal and economic fabric. This polarized discourse ignores two critical facets —the implications for different populations and the practical concerns of technology uptake in organizations.

Safeguarding against risk is not merely a technical challenge for organizations, but a complicated issue that requires rigorous governance, interdisciplinary strategies, and an agile mindset. To succeed in this area, organizations that deploy climate tech cannot focus solely on regulatory measures and compliance. They must also adopt a holistic approach to risk mitigation that involves considering how the technology, the conditions of its development, the organization, and its stakeholders in the value chain play a role in its potential effects.

Climate tech runs the risk of creating another inequality chasm

The potential of emerging technologies to exacerbate existing social divides and biases is often referenced in

academic literature and policy debates. Climate tech is no exception. Access to emerging climate tech requires resources on the individual and societal level, leaving those without the necessary capital unable to access these technologies. This barrier can disadvantage developing economies and their citizens, who are already bearing the brunt of the consequences of climate change. Economically disadvantaged persons worldwide are also at risk of being potentially excluded by emerging climate tech. Private sector organizations rarely delve deep into such ethical considerations. Facing ethical considerations head-on presents an opportunity for these organizations to play a vital role in closing digital and social divides. One player who has made considerable efforts in this realm is the International Telecommunications Union (ITU), a subsidiary of the United Nations consisting of private telecommunications organizations, NGOs, and universities. Since COP27 in March 2023, the ITU has been focusing on how digital technologies can create climate-resilient societies, particularly considering how to mitigate the digital divide. One such initiative in flight is implementing natural disaster warning systems in developing countries, which requires working with telecommunications companies to increase the uptake of mobile phones and other communications devices. Of course on the other policy tradeoff side, as we increase the distribution of silicon based equipment, we also increase the challenge of recycling and circular economy.

An informed consumer base is a key driver of safe and equitable tech

A lack of transparency regarding how emerging tech really works is another salient issue that is often overlooked. Further, the average user's lack of understanding of how new technologies, such as AI, are used in everyday interactions with public and private entities increases the power differential between tech producers and users. This lack of knowledge leaves users vulnerable to being victimized by conspiracy theories that fill the void, biased systems, and manipulated by power- or profit-driven systems. While tech literacy is often left to public entities, private organizations can play a crucial role in enhancing literacy, the more transparent they are with their consumers about the tech they use.

Some tech companies are already leading the way by prioritizing ethics and tech literacy. One notable example in this area is DuckDuckGo, a search engine that does not collect or share user data and is designed to show all users the same results for a given search. The platform provides users with information about why specific results appear at the top of search lists, a privacy policy that is easy to understand for the average user, and other resources about protecting personal information online. Moreover, this model is still profitable, with the company earning money from ads based on search terms rather than user data. In terms of climate, another successful method for weather warnings (in the case of cyclones) was to use analogue. India uses this method of broadcasting radio signals via satellites. This is more inclusive for the people living across 8000 kilometers of coastline.

Hedging against practical concerns requires forethought

Along with ethical considerations, private sector organizations often ignore practical implications and risks as they rush to develop and deploy new technologies. Cybersecurity is a central concern—every new piece of tech has unique vulnerabilities to cyberattacks, hacking, data breaches, bugs, technical malfunctions, and systems failures. Responding to these vulnerabilities take time and resources but are sometimes deprioritized in the rush to market. What are the implications for a company becoming too dependent on one particular technology to perform specific tasks? What will organizations do when the technology in question quickly becomes outdated or disused, as is the case with the growing obsolescence of technology?
Obsolescence has been widely discussed regarding mobile devices, where new generations of smartphones are purposefully designed to not last beyond two years of use. The increasing obsolescence of technology, however, has implications beyond just the realm of consumer electronics. For example, the average lifecycle of a semiconductor was about 30 years in 1970; by 2014, it had decreased to 10 years. This also increase the cost of tech debt and cybersecurity and has implications on the business model. This means climate tech could have a negative impact close to end-of-life cycle. Solar cells have a lifecycle of 25 years and are not easily recyclable. It is estimated the number of obsolete solar cells

will be 8 million metric tons by the year 2023. Wind propellor turbine, which also live for about 25 years, can be recycled but it took awareness and an industry shift to make that possible. Aside from the obvious detrimental impact to the environment, this growing obsolescence can become a big problem in climate tech and other fields such as defense, automotive, and aerospace, where using even slightly different parts than initially intended will require resource-intensive testing procedures.

A call to action for the private sector

Public policies struggle to keep up with the rate at which technologies advance. Thus, private organizations play a crucial role in setting an example for responsible technology use that can reverberate to other parts of the ecosystem. Here are our recommendations for how private organizations deploying climate tech can contribute to a positive digital future:

Collaboration: Firstly, the private sector must collaborate with independent regulatory bodies, governments, and other public entities in the ecosystem, not just in one-off projects but as part of a long-term strategy to work collaboratively to mitigate the risks of emerging technologies. Public-private partnerships are growing in many areas of tech governance, where private organizations provide funding and facilitate the development, deployment, and scaling-up of tech for public projects. Organizations need to be willing to open up the "black box" of emerging tech so public entities can develop effective policies. They should then willinglycomply with laws and regulations and undergo regular audits and reviews.

Transparency: Organizations who have begun deploying new climate tech, especially that which requires the extensive use of AI, should also seriously consider the issue of transparency with their stakeholders, whether they be investors or average consumers/users. This transparency can be as simple as informing stakeholders on how the tech affects their interests and being open about issues such as data privacy or about the value chain carbon footprint and human in the loop. Collaborating with public entities in the ecosystem is vital to this effort. For example, public and independent regulatory entities may advise private organizations on how to inform their consumers about the tech they use and may even help private organizations develop plans for managing issues such as private data usage.

Risk Assessment: Organizations deploying climate tech must also set an example by practically and safely managing how the deployment affects their internal environments. To safeguard against the risks of new tech, organizations must do a thorough risk assessment taking the time to identify potential vulnerabilities, threats, and consequences to both internal and external stakeholders. These risks should be quantified using scales or metrics to measure each risk's potential likelihood and impact. In one common example, Internet of Things (IoT) sensors are an emerging technology used in precision agriculture and water quality management. However, they have unique vulnerabilities to cyberattacks due to their distributed nature and lack of physical barriers.

Monitoring and Analysis: During the deployment phase, organizations must carefully monitor the uptake and use of the tech, gathering evidence on any problems or bugs in the system while also noting any areas where the tech excels. This data can be gathered and analyzed to give a complete, real-time picture of how the deployment has affected external and internal stakeholders on the macro and micro levels. Problems should be addressed as they arise, allowing the organization to refine the use of the tech in real-time. **To be even more transparent**, organizations can upload this data to an open-source platforms for stakeholders, the public, and/or developers to view and analyze.

Cybersecurity: Cybersecurity is a crucial element of this agile deployment process. Before deployment, organizations should begin with a clear, detailed incident response plan for handling tech failures or security breaches. The priority should be the user safety over reputation. Monitoring tools should be used to track the system's health and detect suspicious activities such as unauthorized access attempts. Finally, the organization should remember to keep its operations distributed across different kinds of technologies—if one piece of tech becomes obsolete or hacked, the organization needs to be able to continue functioning and turning over profits. In the case of IoT, experts recommend that

organizations invest in mechanisms for access control, authentication, and strong encryption while basing IoT solutions on horizontally scaling architectures to mitigate the risk of obsolescence.
As data shows that global warming is creeping uncomfortably close to the irreversible 1.5 degree Celsius threshold, climate tech is more important now than ever to aid in the global effort towards reversing climate change. The wealth and power of private sector organizations that deploy climate tech should not come without a fair share of responsibility. Stepping up to the plate as premier examples of responsible governance, private climate tech organizations can set the stage and lead the global effort to reverse climate change and protect society and the environment for future generations.

An informed consumer base is a key driver of safe and equitable tech

Policymakers that are grappling with Net Zero challenges and assume private sector can provide. Here are a few point they nee to consider.

1. Identfy the problem domain: The strating point of any policy solution is a strong understanding of the policy problem. What is the purpose of the technology and how does it help the policy maker meet the public value mandate. Hence an early warning system maybe to save citizen lives but if we switch dependency to say the technology (mobile updates), what is the backup option if it fails? Sometimes the movement ot new tech means generation knowledge is lost and this may lead to a problem of incusiveness, skill redundancy or even employability.

2. Spillovers: A government has stewardship of resources and needs to be accountable for them, One way to ensure there is maximum returns on investment is to thing of climate etchnology clusters. Here you take an ecosystem approach and a national competitiveness mondset.

3. Unintended Impacts: Look at how short-term solutions can have long-term unintended impacts. Policy makers and private sector have different mandate – one is public value and one is profits. One is inter-gernational and the others ones key focus is shareholders. This can create some tensions. For example, the swtich over to battery cars, imapcts supply chains, creates a recycling problem and most importantly may destroy existing industries. Hence incentivizing industry in one sector may have serious trade-offs in another.

4. Tradeoffs & Course Correction: Make a difference between short-term incentives and long-term beahvioural changes. Commitment to climate may not only be a technology solution, it may need a shift in lifestyle. Hence it may mean extending lifecycle of a product, introducing right to repair, and just consuming less. Farmers in Germany rose in protest against the removal of incentive for diesel used in farming and agriculture as the country tried to go green without understanding the comman man's problems. These lessons on what is working and not working is part of experimentation with new tech and governments must not get stuck in the "Too Big To Fail Syndrome."

5. Evidence-based Policy: Separate the media narratves from the truth: Climate requires deep long term commitment, and acurrently policy fads seem to aboud. Like Chat GPT which may be great on educating on climate yet behind the scene consumes huge amounts of energy and water (besides the copyright and privacy issues). Policy makers need to educate themselves and ensure that there is transperancy of decisions and accountability for the same.

Another fad is offsetting, and offsetting has challenges itself. For example, trees tahta are protected were already removing carbon hence do not decrease the levels of carbon, just ensure the current state is maintained. Trees and mangroves seedlings could take up to 10-15 years for maturity before they can remove carbon from the atmosphere (till then they are net positive contributors).

6. Funding Basic Reesarch: Basic research is the beating heart of new technologies but it requires funding that is predictable, and an environment open to discourse. Most funding now is being earmarked for applied research in scinces which is a challenge as basic research is the start of the pipeline and often even applied research benefits from a multidiscipline point of view.

7. Agile Governance: Agile governance is crucial during the deployment process of any technology. The original concept of agile governance is that the institutions, incentives, and rules that guide the behavior of individuals and organizations should focus on what matters—ethics, security, privacy--and be more adaptable, nimble, and fluid to form

regulations that can meet the challenges of our rapidly changing world. This agile approach involves careful scenario planning before deployment to prepare for any problems that may arise, from security breaches to ethical quandaries. Agile governance also provides a unique opportunity for private-public collaboration through regulatory sandboxes—initiatives in which organizations test and experiment with new technologies under a regulator's supervision. These initiatives thrive in climate tech and sustainability, such as the JenErgieReal sandbox in Germany and the Sustainability Sandbox in Greece.

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