



**TECHNOLOGY  
EXECUTIVE  
COMMITTEE**

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**Innovative approaches to  
accelerating and scaling up  
implementation of mature  
climate technologies**





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## Why this TEC Brief?

**In order to meet the goals of the Paris Agreement we require a wide range of technical solutions, which either exist already or are being developed.**

Yet, to what extent this technical potential will be economically feasible and socially acceptable is highly uncertain. How can we replicate successfully applied climate solutions in multiple countries? Why is a climate technology widely accepted in one society, but not well received in another? What can we learn from success stories of blending funding sources for lower investment risk?

This TEC Brief looks at innovative ways of scaling up promising climate solutions in developing country markets for achieving national and international climate ambitions, highlighting good practice examples from around the world. It focuses on innovations in planning climate action, engaging stakeholders in that process, attracting funding, and collaboration between private and public sector parties. This is part of a long-running series of policy briefs on innovation produced by the Technology Executive Committee.



# Highlights

**1. Successful entry of technologies for climate change mitigation and adaptation into developing country markets is supported by a range of innovations.**

Innovations take place not only in relation to the technicalities of climate solutions, but also in how we plan actions, how market actors collaborate and how we attract funding. These innovations enable markets to ‘pull’ technologies alongside government actions for ‘pushing’ them, especially in the least developed countries.

**2. For scaling up technology implementation, it is imperative that the technologies are co-designed.**

Through participatory co-design processes, stakeholders have a key role in ensuring that technologies not only deliver climate benefits but also help to meet countries’ national sustainable development objectives. Technology implementation is further supported by technology ‘champions’, including youth, who drive the development of prioritized technologies and support policies already in place for technology diffusion. They also support technology-neutral and demand-driven decision-making, both in the least developed and higher-income developing countries.

**3. Important innovations in attracting private sector funding for mature climate technologies in developing country markets have taken place in terms of both increasing revenue and reducing investment risk.** Green or climate bonds, as well as climate-related investment criteria,

have increased opportunities for climate-friendly investment. One innovative approach to risk sharing is the blending of private and public funds: the latter include capital provided by national or international funds, such as the Green Climate Fund, which unlocks access to private funding under more favourable conditions.

**4. Public–private partnerships make technology diffusion more effective** as governments can focus on their key roles, such as providing financial instruments, enforcing policies and measures, and enhancing access to international climate funding programmes, while private entities are leveraging public funding and readying technologies for market.

**5. International institutions, including multilateral development organizations, support this process through incubation and acceleration of proven climate technologies by:**

- a. Establishing efficient links** between complementary institutions and stakeholders in different countries;
- b. Enhancing access** (especially for the least developed countries) to international funding programmes through provision of technical assistance or resources;
- c. Facilitating alliances and partnerships** to leverage resources for scaled-up projects and foster the development of start-ups through global incubation and acceleration programmes.



# 1

# What do we mean by innovative approaches?

**When choosing technologies for climate change mitigation and adaptation, it is crucial to know how effective they will be in helping to meet the goals of the Paris Agreement.**

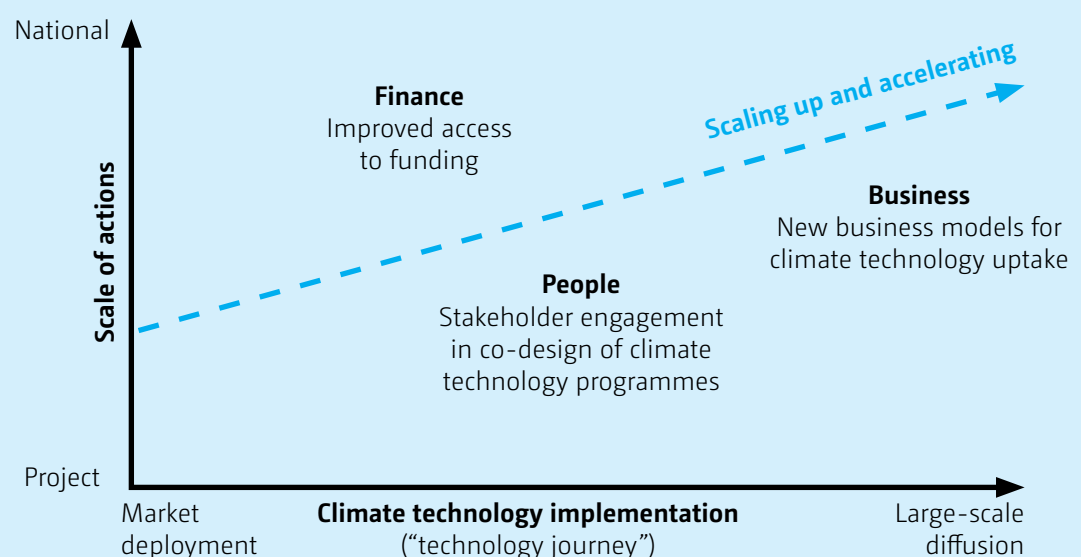
However, processes such as technology needs assessments (TNAs), nationally appropriate mitigation actions (NAMAs) and national adaptation plans (NAPs) have shown that climate technologies must also fit in to countries' sustainable development agendas. This is why nationally determined contributions (NDCs) were called for under the Paris Agreement.

To realize this potential for 'social acceptability', countries must provide sufficiently enabling conditions for implementation (Waisman, Coninck and Rogelj, 2019). Building on insights from Grubb et al. (2017), Bergek et al. (2008) and Bößner et al. (2018), this Brief describes innovations in engaging stakeholders in climate decisions, attracting private sector climate funding and public-private collaboration for accelerating and scaling up implementation of mature climate technologies in developing country markets (see figure 1).

While innovation often refers to developing something new, it can also mean adapting something existing to improve or make it more efficient so that it will be more widely adopted (Ockwell and Byrne, 2016). In that context, this Brief focuses on how new ideas and approaches can support the market uptake of mature technologies in developing countries.

**Figure 1**

Scope for innovative approaches in scaling up and accelerating climate technology implementation



## Innovative ways of supporting stakeholder ownership of climate solutions

Processes under the Convention, such as NAMAs, NAPs and TNAs, have demonstrated the value of engaging stakeholders in prioritizing technologies for climate and sustainable development. They provide the local perspective and ensure equity, efficiency, effectiveness and sustainability (Williges, Gaast and Tuerk, 2018; Bößner and Coninck, 2018). It is also helpful to look at informal rules in societies, as these may be applicable in specific country situations such as informal settlements (Kaika, 2017; McGranahan, Schensul and Singh, 2016; Simone and Pieterse, 2017). As noted in Spiesberger, Gomez Prieto and Seigneur (2018), engagement of stakeholders can be seen as a good example of social innovation.

In research projects such as LANDMARC,<sup>1</sup> with case studies in Burkina Faso, Indonesia, Kenya, Nepal, South Africa, Venezuela and Viet Nam, country stakeholders are involved in co-designing scenarios for land-based mitigation options for inclusion in countries' NDCs. Enabling stakeholders to actively engage in co-designing a technology project or programme increases its social acceptance (Coninck et al., 2018).

An example of this is Plantwise, a programme led by CABI,<sup>2</sup> which helps smallholder farmers in developing countries to improve their production yield: not by 'confronting' them with new solutions for sustainable farming, but by facilitating knowledge exchange at the community level. Ultimately, the farmers decide whether or not to change their practices.

Technology 'champions' particularly demonstrate the role of stakeholders as drivers for change, helping to accelerate climate technology implementation in developing countries (TEC, 2019). For example, in 2018, Lebanon introduced a tax incentive for purchasing hybrid and electric vehicles, which was championed by an 'informal transport group' that resulted from the Lebanese TNA project.

Finally, youth offer potential as actors for change. For example, in 2021, the Global Center on Adaptation, in partnership with the African Development Bank, will launch a Youth Adaptation Solutions Challenge and Youth Adaptation Incubator Fund to promote the innovation and entrepreneurial capacity of 1,000 youth businesses across Africa (GCA, 2021).

<sup>1</sup> See <https://www.landmarc2020.eu/>

<sup>2</sup> An intergovernmental not-for-profit organization, with 49 member countries, aimed at improving people's lives worldwide by providing information and applying scientific expertise to solve problems in agriculture and the environment.

# Empowering farmers in Bangladesh through dissemination of information

(Rajendran and Islam, 2017)

**Agriculture accounts for nearly one third of Bangladesh's gross domestic product. The country's major crop is rice, planted on 75 per cent of the farmland, with the remainder including high-value vegetables, fruit and spices. Pests destroy 10–25 per cent of the harvest, despite the estimated 49,000 tonnes of pesticide used by farmers every year.**

The aim of the Plantwise programme led by CAB International (CABI) is to contribute to minimizing crop losses, increasing food security and alleviating poverty. It works closely with national agricultural advisory services and has established a global network of plant clinics, run by trained plant doctors, where farmers can find practical plant health advice and solutions. Currently in 10 of Bangladesh's 64 districts, plant clinics help farmers to identify and manage crop problems as well as increase crop yield and profitability. With increased knowledge of improved farm practices, those farmers can rely less on chemical fertilizers for managing pests and diseases.

Information on crop health is disseminated via the plant clinics. A survey of users and non-users of the plant clinics revealed that the farmers' ability to identify and address crop problems had improved significantly (83 per cent of users compared with 13 per cent of non-users). They also showed greater ability to apply a range of good farm management practices.

The concept of plant clinics has proven appealing to smallholder farmers as it disregards the approach of imposing new farming practices or techniques over their traditional knowledge. Instead, it provides the farmers with the right to engage with the plant clinics and puts the onus on them to approach the clinics, making the process of achieving resilience more inclusive (stakeholder oriented) and promoting good entrepreneurship. These innovative approaches have raised the interest of the country's Ministry of Agriculture in mainstreaming the plant clinics in the national extension operations to cover the entire country.







## Actions

In order to enhance stakeholder ownership of climate technology planning and implementation, it is recommended that:

- a. National governments and international cooperation programmes encourage social and economic actors to actively engage in identifying and prioritizing climate technologies, so that climate planning results from co-design rather than theoretical assessment of technical and economic potential;
- b. Technology champions, including youth, be motivated to inspire and inform other stakeholders in support of wider-scale climate technology implementation;
- c. National research groups, non-governmental organizations and other private entities be encouraged to participate in international research programmes for enhancing skills, and knowledge-gathering and case study research within developing countries on the technical and economic potential of climate technologies and how acceptable, and therefore realistic, they are from a social perspective.

## Innovative ways of mobilizing climate funding

While technology research, development and demonstration are generally ‘pushed’ by public capital and action (Grubb, McDowall and Drummond, 2017), the private sector plays a key role in ‘pulling’ technology to market. It is thus crucial to manage and utilize local private resources in developing countries in parallel with public financial support for climate technologies.

A key condition for mobilizing private capital is risk management. A good practice in that regard is blending private and public funds. For instance, the blending of public and private funding streams unlocked debt capital for the Indian off-grid energy sector (GGGI, 2016); and when XacBank developed a USD 60 million loan programme for revitalizing the energy sector in Mongolia (TEC, 2019), the Green Climate Fund’s contribution of USD 20 million enabled XacBank to negotiate more favourable loan conditions from other funding providers.

In addition, innovations have emerged for increasing the yield of climate investments. Climate bonds issued since 2014, for example, have attracted USD 150 billion in investment capital worldwide (Jones, 2020). Climate bonds support ‘late stage’ finance as they help to (re)finance mature climate technology projects. The Inter-American Development Bank developed a green bond facility to provide capital for energy efficiency projects (Humphreys, 2019). Specifically for adaptation solutions, catastrophe bonds have emerged on the market, which offer a high yield to build in-house resilience for insurance companies in the event of natural disasters.

Furthermore, there are recent examples of ‘institutional’ interventions in financial systems via benchmarks for financial products that incorporate climate change considerations. These help institutional investors with sustainability mandates to allocate capital to climate-friendly economic activities. For example, in November 2019 the European Union adopted a regulation on creating harmonized, minimum standards for “Paris-aligned benchmarks” (more ambitious) and “climate transition benchmarks” (less ambitious) (European Commission, 2019).



In a similar vein, classification schemes are being created by regulators or private standardization organizations for classifying investments as climate friendly. For example, the Climate Bonds Standard and Certification Scheme applies criteria to ensure that climate bond investments support emission reductions and implementation of the Paris Agreement (Climate Bond Standard, 2021).

It is noted that, beyond finance, benchmarking is similarly used for classifying appliances, buildings, services or even municipalities as green, environmentally friendly or energy save. For example, as highlighted by Vyas and Jha (2017) benchmarking helps to develop a more integrated vision (with environmental, social and economic impacts) on buildings while remaining cost-effective.



# Fiji's sovereign green bond to secure a greener future

(Government of Fiji, 2017)

**As one of the small island developing States in the Pacific, Fiji is on the front line of combating climate change. The damage caused by Tropical Cyclone Winston in 2016, which caused economic losses that amounted to almost one third of the country's gross domestic product, hinted at the potential for even greater damage and displacement in the future. Close to 20 per cent of the region's 10 million people is projected to be displaced due to climate change by 2050.**

To safeguard its 900,000 citizens and their livelihoods, Fiji has developed and launched a sovereign green bond, making it the first developing nation to do so. The effort was supported by the International Finance Corporation (IFC) and the World Bank. The first tranche, which floated 40 million Fijian dollars (about USD 20 million), drew unprecedented demand from investors and was oversubscribed by more than double that amount. The bond helped Fiji create a new way of mobilizing finance for development and a market for private sector capital seeking investment opportunities that support climate resilience and adaptation.

Projects likely to be financed with proceeds from the green bond include investments in crop resilience, flood management in

sugarcane fields, reforestation, and rebuilding schools to better withstand challenging weather conditions. They will all follow the internationally developed green bond principles. Fiji also aims to use bond proceeds for projects supporting its commitment to achieve 100 per cent renewable energy use and reduce its carbon emissions in the energy sector by 30 per cent by 2030.

Fiji's sovereign green bond is the first with a special emphasis on adaptation, aimed at building the country's resilience to climate change. To become sovereign green bond issuers, countries must have a green bond policy framework in place that follows international guidelines on use of proceeds, disclosure and reporting.

At the request of the Reserve Bank of Fiji, IFC and the World Bank provided technical assistance to the Government for developing the sovereign green bond in just four months. This collaboration took place under the broader three-year Capital Markets Development Project supported by the Australian Government. Through this partnership, Australia and IFC are helping to stimulate private sector investment, promote sustainable economic growth and reduce poverty in the Pacific.







## Actions

Developing countries' access to (international) private sector funding can be enhanced through:

- a. Risk sharing, such as by blending private with public capital, including multilateral funds, so that private investors can negotiate favourable financial conditions;
- b. Predictable yields on climate investments by labelling them as 'climate' or 'green', such as climate bonds, so that investors can clearly distinguish between climate-beneficial and other investments. This is supported by national and international classification schemes and benchmarks for financial products that incorporate climate change considerations;
- c. Training market actors in developing countries to formulate funding proposals according to investors' requirements for risk management and in line with (inter)national funding criteria for 'green' or 'climate' recognition.

## Innovative approaches to private sector engagement and accelerators

Technology development towards market diffusion brings an increasing role for the private sector (Grubb, McDowall and Drummond, 2017), in terms of not only finance but also other aspects of technology implementation. A range of initiatives is supporting the private sector in building a business case for climate technology investment in developing countries.

Often, these initiatives focus on local actors, such as small and medium-sized enterprises (SMEs), by helping them to build a business case for climate technology investment. For example, the United Nations Development Programme (2021), through its “3 Cs” framework of convening, catalysing and capitalizing, is aiming to work with the private sector on business solutions for adaptation.

Momentum for private sector engagement is growing thanks to the establishment of multi-stakeholder partnerships and initiatives. For instance, the Farm to Market Alliance (GrowAfrica, 2021), established by the United Nations World Food Programme (2015), is creating efficient value chains to enhance farmers’ income. It has forged partnerships with Bayer, Syngenta and Yara International (international fertilizer and agribusiness companies), the Alliance for a Green Revolution in Africa, the International Finance Corporation and local members of value chains in Kenya, Rwanda, the United Republic of Tanzania and Zambia (Farm to Market Alliance, 2021). An important success factor is that the partnerships allow the partners to align their interests, share risk and combine their resources and competencies to maximize value.

The Global Innovation Lab for Climate Finance (2021) enables a dialogue between public and private sector representatives for a shared understanding of goals and perspectives. Participants jointly identify barriers to and solutions for mobilizing investment and the Lab can serve as an incubator for identified solutions. The launch of the Youth Adaptation Solutions Challenge and Youth Adaptation Incubator Fund was already highlighted above (GCA, 2021).



Similarly, accelerators (TEC, 2018), such as the Climate Innovation Centers (CICs), support private sector engagement for accelerated development and transfer of locally relevant climate technologies. CICs are currently active or planned in Brazil, Ethiopia, Ghana, Kenya, Morocco, South Africa, Viet Nam and the Caribbean. For example, the Caribbean CIC offers entrepreneurs intense ‘boot camp’ sessions for generating ideas and turning them into business plans, followed by a six-month programme for accelerating identified solutions.

The private sector is increasingly taking corporate social responsibility. Rather than only looking at short-term profit, shareholders are increasingly demanding better performance on environmental, social and governance (ESG) criteria (Boston Consultancy Group, 2021). This has led companies like BlackRock (investment manager) to commit to net zero emissions by 2050 and call for similar actions, driven by ESG metrics, by other companies and their clients (Fink, 2021). However, progress is needed in standardizing ESG assessment methodologies for a better comparison of ESG scores (Dye, McKinnon and Byl, 2021).





# Digitalization of agriculture for smallholder farmers in Zimbabwe

(FAO, 2018)

**There has been significant growth in digitalization for agriculture in Africa over the last 10 years. In 2019, both the report by the European Union–Africa Task Force Rural Africa and the communiqué from the Global Forum for Food and Agriculture highlighted the power of digitalization in transforming agriculture. The solutions offered through digitalization include advisory services, market linkages, financial access, supply chain management and macro agricultural intelligence. Private sector companies have been the pioneers in the movement towards digitalization in Africa.**

For example, AgriFin Mobile, a programme implemented by Mercy Corps, facilitated the partnership between Econet, the largest mobile network operator in Zimbabwe, and the Zimbabwe Farmers' Union (ZFU) to develop a bundled product for smallholder farmers. Currently, farmers who are signed up to Econet can contact a call centre free of charge to learn more about agricultural inputs and market prices. They can also subscribe to EcoFarmer,

a service set up by Econet, to receive agronomic information by text message, and eventually access additional mobile-based financial services. Building on these services, a bundled product of a subscription to the farmers' union and the services provided by Econet (ZFU Combo) has led to an increase in both paying users of EcoFarmer and ZFU members.

The innovation in Zimbabwe is a business model built on the commercial agreement between Econet and ZFU. The partnership succeeded because the partners' financial and social goals were aligned and the organizations complemented each other: ZFU providing on-the-ground access and coaching to farmers, and Econet providing farmers access to a series of services needed to improve their activities.

The ZFU Combo model is an example of a farmer's organization and the private sector partnering successfully. It departs from traditional approaches where large companies often try to reach farmers through their existing network of agents with high costs and low returns.







## Actions

- a. Mobilizing local resources is a key component of supporting climate-friendly economic activities. In that respect, support for SMEs to build small- and medium-scale businesses remains important, including vocational training of SMEs and the young workforce to work with climate-friendly technologies and develop solid business models for them;
- b. This support can be solicited from multi-stakeholder partnership and initiatives in developing countries, which help to leverage resources for climate technology programmes, with local private sector engagement;
- c. Furthermore, climate innovation centres, in their role as national or regional knowledge hubs, support entrepreneurs in exploring the market potential of climate technologies in their countries as well as identifying solutions for accessing markets. Incubation and acceleration programmes foster the development of start-ups and young entrepreneurs for better utilization of local resources for climate technology implementation;
- d. Further progress is needed in standardizing ESG assessment criteria for a better comparison of ESG scores. This will enable investors to target their funds to ESG-responsible investments, including climate technologies.

# 5

## Balancing public–private engagement for scaling up implementation of mature climate technologies

**Climate technologies are crucial for meeting the goals of the Paris Agreement as they represent solutions for climate change mitigation and adaptation (TEC, 2018). This Brief has highlighted innovative approaches to scaling up implementation of mature climate technologies in developing countries in support of countries’ NDCs and implementation of the Paris Agreement. A key focus has been on the role of the public and private sectors in this process.**

Usually, in the case of a mature technology (i.e. once research, development and demonstration have been successfully completed), the private sector takes the lead in pulling the technology into the market (Grubb, McDowall and Drummond, 2017). At that stage of development, the role of governments, usually the key driver for technology research, development and demonstration, decreases. However, while this may be true for industrialized and higher-income developing countries, in the least developed countries mature climate technologies often rely strongly on governments taking the lead, which is illustrated in figure 2.

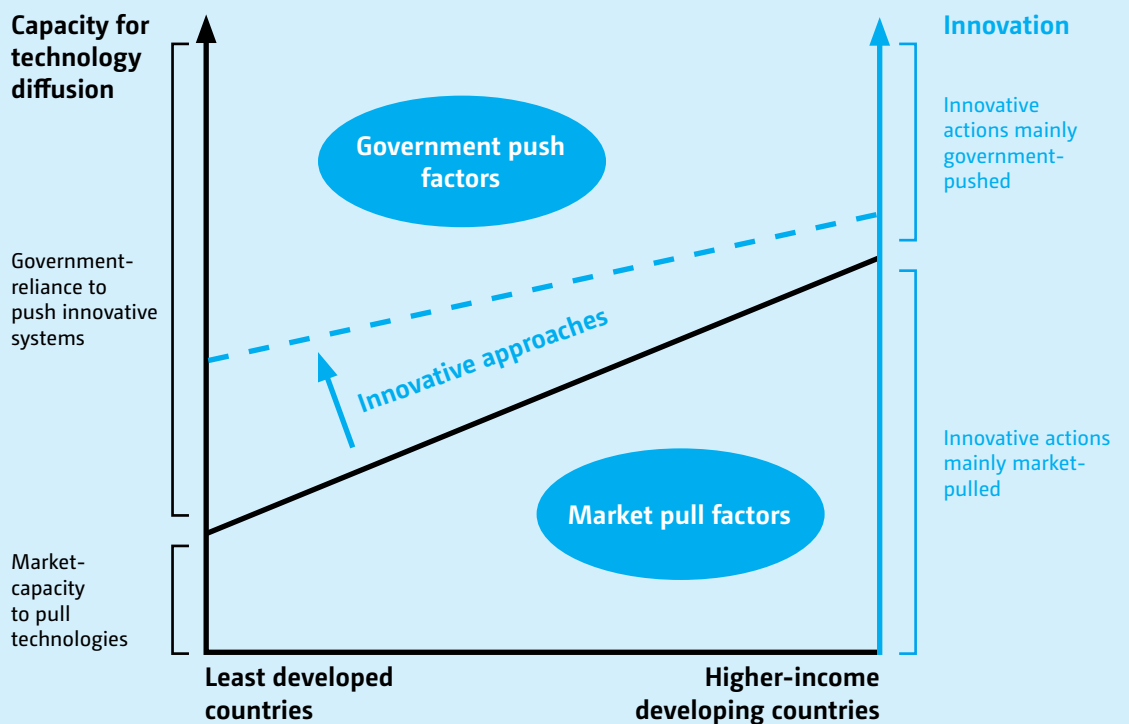
For example, while unlocking debt capital for India’s off-grid energy sector was based on balanced involvement of public and private sector companies, the sovereign bonds in Fiji rely fully on government action. Hence, it is presumed that a country with a relatively highly developed capacity for technology diffusion can benefit more from market-based ‘pull’ conditions.

With innovations in planning, funding and public–private partnerships, developing countries can strengthen their capacity for private sector engagement alongside the public sector’s role in ‘pushing’ climate technologies. As shown in figure 2, this supports developing countries, especially the least developed countries, in mobilizing and leveraging resources for investment in mature climate technologies that contribute to national development objectives and implementation of the Paris Agreement.



**Figure 2**

Public and private sector roles in scaling up mature technologies in the least developed and higher-income developing countries



Countries in which innovation relies mainly on government action would benefit more from government-to-government collaboration and receiving capacity-building support from multilateral (financial) organizations and United Nations bodies, such as the Climate Technology Centre and Network. Developing countries with more mature and efficient market systems for climate technology uptake would benefit more from multi-stakeholder partnerships, such as multinational enterprise collaboration through which an existing mature technology in one country is transferred to another.

## References

- Bergek, A., Jacobsson, S., Carlsson, B., Lindmark, S., and Rickne, A. (2008). Analyzing the Functional Dynamics of Technological Innovation Systems: A Scheme of Analysis. *Research Policy*, 37(3), 407-429.
- Böβner, S., and Coninck, H. d. (2018). Addressing social implications of climate change mitigation: lessons from three novel technologies. Nijmegen, the Netherlands: CARISMA project (Horizon 2020) Deliverable 4.4.
- Böβner, S., Johnson, F., and Taylor, R. (2018). Innovation Dynamics in Transition Pathways. [www.transrisk-project.eu](http://www.transrisk-project.eu): TRANSrisk (Horizon 2020).
- Boston Consultancy Group. (2021, March 10). How Sustainable Finance is Shifting the Future of Investing. Retrieved from BCG: <https://www.bcg.com/capabilities/social-impact-sustainability/how-sustainable-finance-is-shifting-future-of-investing>
- Climate Bond Standard. (2021, March 23). Sector Criteria. Retrieved from Climate Bonds Standard: <https://www.climatebonds.net/standard/sector-criteria>
- Climate Finance Lab. (2021, March 10 ). Six new ideas for a sustainable economic recovery. Retrieved from The Lab: <https://www.climatefinancelab.org>
- Coninck, H. d., Revi, A., Babiker, M., Bertoldi, P., Buckeridge, J., Cartwright, A., . . . Sugiyama, T. (2018). Strengthening and Implementing the Global Response. In V. MassonDelmotte, P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P. Shukla, . . . T. Waterfields (Eds.), *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change.*. Intergovernmental Panel on Climate Change.
- Dye, J., McKinnon, M., and Byl, C. v. (2021). Green Gaps: Firm ESG Disclosure and Financial Institutions' Reporting Requirements. *Journal of Sustainability Research*, <https://doi.org/10.20900/jsr20210006>.
- European Commission. (2019, November 27). Regulation (EU) 2019/2089 of the European Parliament and of the Council of 27 November 2019 amending Regulation (EU) 2016/1011 as regards EU Climate Transition Benchmarks, EU Paris-aligned Benchmarks and sustainability-related disclosures for benchmarks. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32019R2089>
- FAO. (2018). How AgriFin Mobile is assisting smallholder farmers in Zimbabwe. Retrieved March 13, 2020, from <http://www.fao.org/e-agriculture/blog/how-agrifin-mobile-assisting-smallholder-farmers-zimbabwe>
- Farm to Market Alliance. (2021, March 10). Where we work. Retrieved from Farm to Market Alliance - Making markets work better for farmers: <https://ftma.org/where-we-work/>
- Fink, L. (2021, March 10 ). Larry Fink's 2021 Letter to CEOs. Retrieved from BlackRock: <https://www.blackrock.com/us/individual/2021-larry-fink-ceo-letter>
- GCA. (2021, January 22). Young people call on world leaders to "adapt for our future". Retrieved from Act&Adapt: <https://klimaatadaptatiegroningen.nl/young-people-call-on-world-leaders-to-adapt-for-the-future>
- GGGI. (2016). *Mind the Gap: Bridging the Climate Financing Gap with Innovative Financial Mechanisms*. Seoul, South Korea: Global Green Growth Institute.
- Government of Fiji. (2017). Fiji Launches First Emerging Market Green Bond and Third in World. Retrieved March 10, 2020, from <https://cop23.com.fj/fiji-launches-first-emerging-market-green-bond-third-world/>
- GrowAfrica. (2021, January). Patient Procurement Platform. Retrieved from <https://www.growafrica.com/news/international-organisations-sign-mou-support-patient-procurement-platform>



- Grubb, M., McDowall, W., and Drummond, P. (2017). On order and complexity in innovations systems: Conceptual frameworks for policy mixes in sustainability transitions. *Energy Research and Social Science*, 33, 21-34.
- Humphreys, A. (2019). *The Role of Green Bonds in Financing Climate Change Adaptation in the Chilean Electricity System*. Groningen, the Netherlands: Master thesis at Hanze University of Applied Sciences.
- Jones, L. (2020, December 15). \$1Trillion Mark Reached in Global Cumulative Green Issuance: Climate Bonds Data Intelligence Reports: Latest Figures. Retrieved from Climate Bonds Initiative: <https://www.climatebonds.net/2020/12/1trillion-mark-reached-global-cumulative-green-issuance-climate-bonds-data-intelligence>
- Kaika, M. (2017). Don't call me resilient again!' The New Urban Agenda as immunology ... or ... what happens when communities refuse to be vaccinated with "smart cities" and indicators. *Environment & Urbanization*, 29, 89-102.
- McGranahan, G., Schensul, D., and Singh, G. (2016). Inclusive urbanization: Can the 2030 Agenda be delivered without it? *Environment and Urbanization*, 28, 13-34.
- Ockwell, D., and Byrne, R. (2016). Improving technology transfer through national systems of innovation: climate relevant innovation-system builders (CRIBs). *Climate Policy*, 16(7), 836-854.
- Rajendran, G., and Islam, R. (2017). Plant clinics in Bangladesh: are farmers losing less. DOI: <https://dx.doi.org/10.1079/CABICOMM-25-8072>: CABI case study 19.
- Simone, A., and Pieterse, E. (2017). *New urban worlds: inhabiting dissonant times*. Cheltenham, UK: Edgar Alger.
- Spiesberger, M., Gomez Prieto, J., and Seigneur, I. (2018). Smart specialisation and social innovation: from policy relations to opportunities and challenges. S3 Policy Briefs Series, Number 2.
- TEC. (2018). *Climate Technology Incubators and Accelerators*. Retrieved from TT:CLEAR: <https://unfccc.int/ttclear/incubators/>
- TEC. (2019). *Draft paper on experiences, lessons learned and good practices in conducting TNAs and implementing their results*. Bonn, Germany: TEC/2019/19/5.
- UNDP. (2021, March 10). THE '3C'S' FRAMEWORK. Retrieved March 10, 2020, from Engaging the private sector: <https://www.adaptation-undp.org/privatesector/>
- Vyas, G., and Jha, K. (2017). Benchmarking green building attributes to achieve cost effectiveness using a data development analysis. *Sustainable Cities and Society*, vol. 28, pp. 127-134.
- Waisman, H., Coninck, H. d., and Rogelj, J. (2019). Key technological enablers for ambitious climate goals: insights from the IPCC special report on global warming of 1.5 °C. *Environmental Research Letters*, volume 14, number 11.
- Williges, K., Gaast, W. v., and Tuerk, A. (2018). *Scaling up Mitigation Technologies in Integrated National Energy and Climate Plans*. Graz, Austria: CARISMA project (Horizon 2020), Deliverable 4.5.

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## About the Technology Executive Committee

The Technology Executive Committee is the policy component of the Technology Mechanism, which was established by the Conference of the Parties in 2010 to facilitate the implementation of enhanced action on climate technology development and transfer. Along with the other component of the Technology Mechanism, the Climate Technology Centre and Network, the committee is mandated to facilitate the effective implementation of the Technology Mechanism.

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