



Photo: Louis Reed

Technology Snapshot

The development and deployment of new technologies will be critical to enable the global community to shift to low-carbon and climate resilient economies and societies. Renewable energy, carbon abatement and removal systems, new transport solutions and innovations to increase energy and material efficiency have the potential to generate significant emission reductions. Meanwhile, climate-smart solutions will play a key role in adapting to the impacts of climate change. For example, in the agriculture sector, farmers will need to adapt the way they manage land and livestock to changing weather patterns, and modern early warning systems are needed across all regions to allow communities to prepare for extreme weather events. To achieve the scale of changes needed, climate technologies, in the broadest sense, including knowledge, products and services, must be made available globally.

A range of actors is involved in the technology innovation process. Universities and industry research labs build new knowledge and develop innovative products and services. Before commercial deployment, new ideas need to be tested to demonstrate viability. Once ripe for commercial use, project developers, development finance institutions, multilateral funds and other investors contribute to financing technology

diffusion. Intermediary organizations, such as consultancies and NGOs, provide the required expertise, help identify technology needs and build capacity to enable host communities to use technologies most effectively.

Developing and testing ideas for climate technology innovations

Low-carbon solutions are urgently required, specifically across industries which still depend on fossil fuel use. The shipping sector, for example, primarily relies on high-emitting carbon fuels. In 2012, shipping accounted for more than 2 per cent of global greenhouse gas emissions, and by 2050 total CO₂ emissions from international shipping could grow by as much as 50 to 250 per cent.^a In April this year, international consensus was reached to reduce greenhouse gas emissions from shipping,^b but innovative technologies are required to move away from polluting fuels. The Low Carbon Sea Transport project, a joint initiative by the University of the South Pacific and the University of Emden Leer (Germany), will test innovative technologies which can stimulate emission reductions in local and regional sea transport in Small Island States.

a. IMO (2014), Third IMO Greenhouse Gas Study 2014. Available at: <http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Third%20Greenhouse%20Gas%20Study/GHG3%20Executive%20Summary%20and%20Report.pdf>

b. IMO (2018), Resolution MEPC.304(72). Available at: [http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Resolution%20MEPC.304\(72\)_E.pdf](http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Resolution%20MEPC.304(72)_E.pdf)

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Another initiative which aims to build a climate science community across geographic regions is the One Planet Fellowship. Announced in December 2017, the Fellowship will bring together 600 African and European researchers working on climate change adaptation, particularly through agricultural research addressing the needs of small farmers in Africa. Research into critical intervention points include crop improvement, heat- and drought-tolerance, carbon sequestration, and nitrogen use efficiency. The purpose of this philanthropic effort, jointly funded by the Bill & Melinda Gates Foundation and the BNP Paribas Foundation, which will be run by African Women in Agricultural Research and Development (AWARD) in cooperation with the Agropolis Foundation, is to provide additional resources to African research and support the work of the next generation of scientists who will have to deal with a new set of challenges. Over the next five years, African fellows will receive joint mentoring from African and European researchers, go on study trips and work in European research labs. The Fellowship will also provide emerging European and African scientists the opportunity to be trained and mentored at African host research institutions by African scientists, who have unique understanding of the challenges that climate change poses to African smallholder farmers. By building upon AWARD's expertise, the Fellowship – which will target a gender balance in the selection of the researchers – will also build scientists' skill in deploying a gender lens to analyse the potential of their research to bridge the gender gap, especially when it comes to access to new technology.^c

Funding climate technology development and diffusion^d

Compared to incumbent technologies, climate technology innovations generally require large upfront sums of capital and carry higher risks. In addition, misaligned incentives, high transaction costs and the lack of standardised metrics to quantify socio-economic co-benefits hamper finance flows. While after several years of stagnation, government spending for R&D on low-carbon energy technologies is estimated to have risen by 13 per cent in 2017, more private capital is needed to put the world on track to meet the Paris goals.^e

Initiatives are experimenting with innovative approaches to attract private capital to the climate technology space, both in the mitigation and the adaptation context. For example, the Breakthrough Energy Coalition, a partnership of high net-worth individuals, businesses and financial institutions, is funding solutions for future low carbon living. In collaboration with governments in Europe, Canada and Mexico the Coalition is

supporting research and advisory services to match cutting-edge science with investors and collaborate on deals to accelerate these technologies into the market place. Further, the Coalition has launched a USD 1 billion fund which will invest in promising technologies in the areas of energy storage, liquid fuels, off-grid micro-grids, low-carbon building materials and geothermal. In the adaptation context, the Lab, (read more about it in the finance snapshot below) has supported the setting up of the Climate Resilience and Adaptation Finance and Technology Transfer Facility (CRAFT), a commercial investment vehicle dedicated to expanding the availability of technologies and solutions for climate adaptation and resilience. The fund aims to mobilize USD 500 million to support companies that provide climate resilience products and services. In addition, CRAFT will include a USD 20 million Technical Assistance Facility to enable companies in developing countries to receive technical support for the implementation of projects and business operations.^f

Crucially, viable technologies must transition swiftly from one stage of the innovation process to the next to survive the so-called 'valley of death' – the phase between technology testing and deployment at market-scale. The Private Financing Advisory Network (PFAN), a public-private partnership initiated by the Climate Technology Initiative in cooperation with the UNFCCC Expert Group on Technology Transfer in 2006, identifies promising early-stage clean energy projects and assists in the development of business plans, investment pitches and growth strategies to leverage public funding and attract private sector investment. Focusing on low- and middle-income countries, to date, PFAN has worked with more than 500 energy projects. These include biomass and biogas, waste-to-energy, clean transport, wind, solar, small hydro and energy efficiency solutions in Latin America, Asia and Africa and Eastern and Central Europe. One hundred and two projects have achieved financial closure, leveraging USD 1.25 billion. Together, these projects have 802 MW of clean generation capacity and lead to annual CO₂ emissions reductions of 3.3 million tons.^g

Building capacity and markets for climate technologies

Awareness-raising and capacity-building are critical to successfully facilitate the diffusion of climate technologies. The Climate Technology Center and Network (CTCN) provides low income countries with technical support to access technologies. CTCN, hosted by UN Environment and the UN Industrial Development Organization (UNIDO), engages a global network of academic organizations, private sector actors and public research institutions. At the request of developing countries,

c. BNP Paribas (2017), The BNP Paribas Foundation and the Bill & Melinda Gates foundation, under the patronage of the President of the French Republic launch the One Planet Fellowship. Available at: <https://group.bnpparibas/en/press-release/bnp-paribas-foundation-bill-melinda-gates-foundation-patronage-president-french-republic-launch-planetfellowship>

d. See generally: Technology Executive Committee (2015), Enhancing Access to Climate Technology Financing. Available at: https://unfccc.int/ttclear/misc/_StaticFiles/gnwoerk_static_TEC_documents/204f400573e647299c1a7971f6ec7ace/ea65db0ca9264cdbaefeb272dd30b34c.pdf

e. IEA (2018), World Energy Investment 2018 – Executive Summary. Available at: <https://webstore.iea.org/download/summary/1242?fileName=English-WEI-2018-ES.pdf>

f. The Lab (2017), Climate Resilience and Adaptation Finance and Technology Transfer Facility (CRAFT) – Instrument Analysis. Available at: <https://www.climatefinancelab.org/wp-content/uploads/2017/09/Global-Lab-Instrument-Analysis-CRAFT-2.pdf>

g. Private Financing Advisory Network (2018), Progress Report 2018. Available at: http://pfan.net/wp/wp-content/uploads/2018/05/PFAN_ProgressReport2018_ScreensLQ.pdf

Technology Snapshot

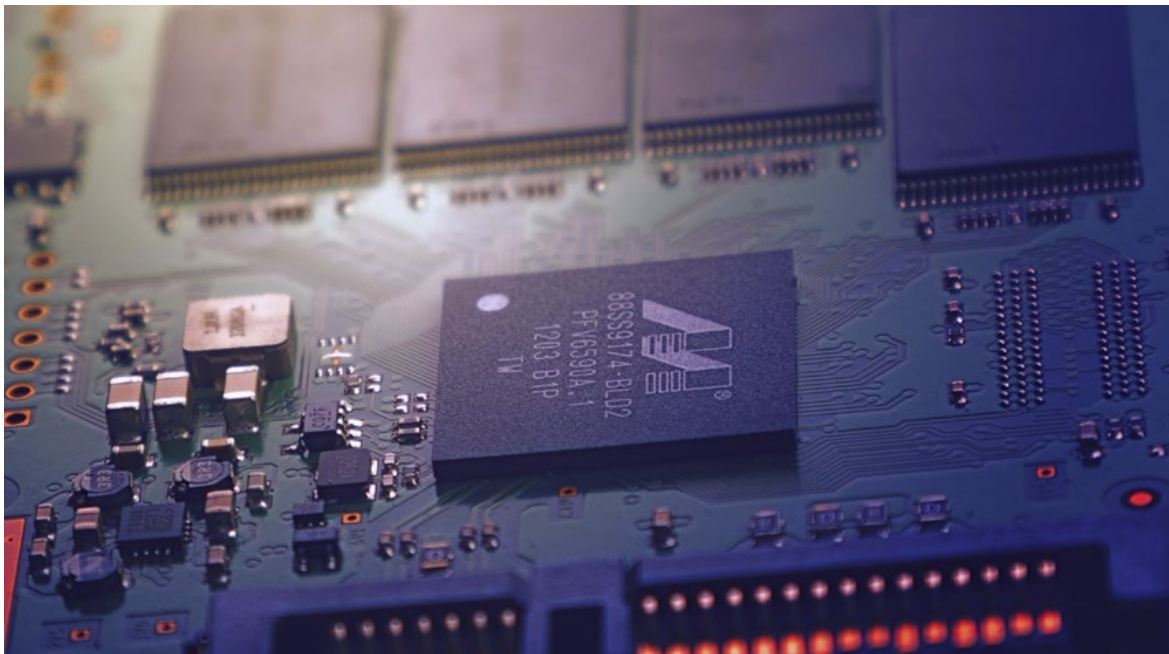


Photo: Johannes Plenio

CTCN provides technical assistance to facilitate access to climate technologies. CTCN also disseminates information and knowledge on climate technologies by delivering training and giving access to tools and methodologies. While in the past, countries primarily requested advice on mitigation technologies, with increased awareness and visibility of climate impacts, interest in adaptation solutions has grown more recently. Crucially, CTCN provides assistance throughout the entire process of project development, from identifying suitable technologies to financing and implementation. Many other initiatives such as the [SE4All Accelerator platforms](#) include a large element of activities to facilitate implementation of specific solutions globally.

In addition to capacity building, technology innovation often leads to the development of new markets. While this allows commercial operators and supply chain providers to tap into new business opportunities, a prime factor to enable this is the setting of adequate legal and regulatory frameworks by governments. In this context, [Below50](#), a global campaign that brings together companies, universities, international agencies and industry associations, aims to grow the global market for cleaner fuels which produce at least 50 per cent less carbon dioxide emissions than conventional fossil fuels. By creating partnering opportunities within supply chains and across sectors and by engaging investors, the campaign builds momentum to advocate for long-term policy frameworks that allow emerging technologies to access mainstream markets.^h

Facilitating the diffusion of climate technologies: ownership, context and incentives

Experience from existing programmes suggests that technology facilitation is most successful when driven by local actors who take account of community needs, cultural contexts and socio-economic and environmental conditions. Moreover, it is vital that programmes seek support and buy-in from stakeholders at all levels, from the local to the national. This may include local communities, farmers and small businesses, NGOs, labour unions, consumer groups and media, industry associations and businesses, relevant R&D and commercial communities, the finance sector and government agencies and regulators. Engagement must take place in a targeted, open, transparent and inclusive manner and the process must provide stakeholders with the opportunity to voice their concerns and suggest solutions. If local context is taken into account, technology transfer has the potential to generate valuable co-benefits, such as reductions of water and air pollution and economic development.ⁱ

Moreover, to ensure that technologies achieve intended effects, it is key to set the right policy incentives. Long-term and robust carbon prices and/or other financial incentives will signal to the markets that investing in climate technologies is economically advantageous. Protection of intellectual property rights is also important to enable technology developers to invest.

h. Source: <https://below50.org/about/>

i. CTCN (not dated), Mapping Climate Technology Stakeholders. Available at: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwjyPyUtbDAhVSCuWKhGcGcQgQFjAAegQIABAC&url=https%3A%2F%2Fwww.ctc-n.org%2Fsites%2Fdefault%2Ffiles%2Fdocuments%2FCTCN%2520Incubator%2520Module%25204_Stakeholders%2520Mapping.docx&usq=AOvVaw2HJ2sDifcuBcJJ2GYX1xKb