



**MISSION  
INNOVATION**

NET-ZERO COMPATIBLE  
INNOVATIONS  
INITIATIVE



# Megatonnes of Climate Innovations from India



**Towards  
>60 Gigatonnes  
of potential CO<sub>2</sub>  
reductions**

## The first eight solution providers with a combined reduction potential of >90 million tonnes per year by 2030 presented at MI4

IPCC's Special Report on Global Warming of 1.5 °C, released in October 2018 found that limiting global warming to 1.5 °C will require 'rapid and far-reaching' transitions in land, energy, industry, buildings, transport and cities. Further, it stated that global net human-caused emissions of carbon dioxide (CO<sub>2</sub>) would need to fall by about 45 percent from 2010 levels by 2030, reaching 'net zero' around 2050. These radical reductions require a focus on new innovative solutions that can scale fast.

India is one of the countries, leading from the front in acknowledging and supporting the role that new innovative technologies can play in offsetting the current GHG emissions globally – to achieve the targets set by IPCC and all nations together.

India's commitment can be seen in the following paragraph from page one of India's National Action Plan on Climate Change (NAPCC):

Recognizing that climate change is a global challenge, India will engage actively in multilateral negotiations in the UN Framework Convention on Climate Change, in a positive, constructive and forward-looking manner. **Our objective will be to establish an effective, cooperative and equitable global approach based on the principle of common but differentiated responsibilities and respective capabilities, enshrined in the United Nations Framework Convention on Climate Change (UNFCCC). Such an approach must be based on a global vision inspired by Mahatma Gandhi's wise dictum – The earth has enough resources to meet people's needs, but will never have enough to satisfy people's greed. Thus we must not only promote sustainable production processes, but equally, sustainable lifestyles across the globe. Finally, our approach must also be compatible with our role as a responsible and enlightened member of the international community, ready to make our contribution to the solution of a global challenge, which impacts on humanity as a whole.**

The Net-Zero Compatible Innovations Initiative (NCI) and the Clean Energy International Incubation Centre (CEIIC) collaboration builds on the urgent need for solutions highlighted by the IPCC; as well as the ability to unleash creative energy in combination with responsibility for present and future generations noted in India's NAPCC.

By 2020 the goal for this collaboration is to present 1.5 °C compatible solution providers directly supported by CEIIC, with a potential of more than 500 million tonnes GHG reductions per year by 2030. By 2020, MI5 CEIIC and the NCI together with relevant stakeholders, will also present a strategy for how India can support 1.5 °C compatible solution providers with a potential

to reduce more than 3.5 gigatonnes of GHG emissions (more than India's total emissions). This is an ambitious goal, but a goal in line with what is needed to avoid dangerous climate change; and an approach that embraces accelerated uptake of disruptive innovations in a way that supports India's goal to become a leading innovation and climate solution country.

Further, keeping in view its development agenda, particularly the eradication of poverty coupled with its commitment to following the low carbon path to progress; while also being sanguine about the unencumbered availability of clean technologies and financial resource from around the world, India communicates its Intended Nationally Determined Contribution (INDC) in response to COP decisions 1/CP.19 and 1/CP.20 for the period 2021 to 2030.

In line with India's commitment to Mission Innovation, Government of India has also jointly set up the Clean Energy International Incubation Centre (CEIIC) in public-private partnership with Tata Trusts.

The CEIIC has initiated a partnership with the Net-Zero Compatible Innovations Initiative (NCI) to explore the avoided emissions framework. Both initiatives were launched at the 3rd Mission Innovation Ministerial in Malmo in 2018. The NCI is an extension of the Avoided Emissions Framework (AEF) to incorporate the latest IPCC report.

The NCI and CEIIC collaboration builds on the urgent need for curating and supporting solutions in response to the global challenge and the ability to unleash creative energy in combination with responsibility for present and future generations.

Over the last few months, the two initiatives have been collaborating to identify and support a new generation of solutions providers. As the first step, twelve start-ups were selected for initial estimations. After an initial vetting, process assessment was conducted on eight clean energy technology start-ups being incubated by CEIIC in India. These eight start-ups alone have the potential to avoid more than 90 million tonnes of GHG emissions per year by 2030.

Name	Description	Avoided emissions in 2030
Takachar	Takachar developed technology at the Massachusetts Institute of Technology (MIT) for small-scale, low-cost, portable biomass treatment systems. In remote areas, these systems can take small pockets of biomass residues and process them onsite into a chemically densified form that is moisture-resistant and volumetrically dense. This reduces farmers' costs by about 75% compared to alternatives such as baling and pelleting. Takachar therefore provides farmers with a cost-effective way to clear crop residues rapidly after harvest.	41
Delectrik Systems	Delectrik Systems has developed energy storage products based on vanadium redox flow battery technology. Unlike solid-state batteries such as lead/lithium, a flow battery has a very long cycle and shelf life with potential to match the 25-year lifetime of renewables. Delectrik has lowered the cost to make it competitive on upfront capex even at low manufacturing volumes compared to other solid-state batteries. The lifecycle cost should also be significantly lower than other competing technologies.	17
BatteryPool	BatteryPool offers a battery swapping service for users of two-wheeler electric vehicles (EVs). Using this app-enabled swapping service, users can charge their EV in under one minute, compared to a 4-hour plug-in charge. The EV is 30% cheaper than its petrol counterpart and enabled by patent pending swap station hardware, product design, a small business model and an Internet-of-Things layer. BatteryPool is setting out to drive the mass adoption of electric mobility among two-wheelers.	10
SOLShare	SOLshare claims to have developed the world's first peer-to-peer solar electricity trading platform that leverages existing solar home systems (SHS) in an off-grid context to create a bottom-up smart grid. SOLshare's SOLbox is a DC bi-directional power meter, solar charge controller and end-user device that functions as an individual node of the electricity trading network. SOLbox allows the trading network to grow dynamically from the 'bottom-up' as more users connect over time. SOLshare facilitates secure peer-to-peer electricity trading between users; integrating mobile money payment, data analytics and grid management services. As a SOLshare network grows, it can connect with the national grid, operating in island mode or drawing power from the grid.	9
SustLabs	SustLabs uses automated metering and big-data analytics to 'decode' real-time electricity consumption data at residential level up to heavy appliance level by analysing smart meter data. This unlocks a wealth of information that electricity supply carries, generating insights for utilities, appliance manufacturers, market research companies, etc., which creates data driven revenue opportunities. SustLabs predicts this will transform compulsive electricity consumers to informed users.	6
DrivAmp	DrivAmp provides solutions for smart electric vehicle charging infrastructure to enable the transition to global electric mobility through products and software services. DrivAmp has developed a range of level-2 AC charging stations ranging in capacity from 3.3 kW to 43 kW power outputs which they claim are capable of charging all types of electric vehicles. This includes a protocol to ensure maximum safety of users and at the same time the ability to cater to most vehicles in the Indian electric vehicle market. DrivAmp helps enterprises to set up a network of electric vehicle charging stations with a focus on safety, security and energy access.	7
Alto Precision	ALTO precision's aim is to develop a range of solar-powered small-scale decentralised machinery for remote small holding agri-processing needs in India. Current developments include a range of small-scale rice processing machines. Their solar rice huller is almost 50% more efficient than any other comparable machine in the world, at a low price. They give farmers access to a sustainable energy source as well as food security and the opportunity for additional income.	4
National Physical Laboratory	India's National Physical Laboratory has developed a portable, solid state cooling technology that does not require the compressor or refrigerant found in conventional refrigerators. It can therefore be operated at a low-power supply of only 75 Watts DC, e.g. directly from solar photovoltaic cells and batteries. The cooler was developed for two main applications: <b>1.</b> As a low-cost refrigerator for rural populations to store food and provide affordable comfort <b>2.</b> To compliment India's immunization program for rural populations of children by storing vaccines at low temperatures for a long time. With a long lifespan and needing little maintenance, the solid state cooler maintains 5 °C at an ambient temperature of 40 °C but can cool to -2 °C if required.	4
2019 cohort	Total magnitude estimates of the avoided emissions potential from CEIIC 2019 cohort preliminary selection	107
<b>TOTAL</b> (million tonnes CO <sub>2e</sub> reduction potential per year)		<b>205*</b>

\* The calculated avoided emissions are estimations subject to change during the development of the methodology

By 2020 the goal for this collaboration is to present 1.5 °C compatible solution providers directly supported by CEIIC, with multiple times the impact compared to the first round. At the 2020 MI5 summit, CEIIC and the NCI, together with relevant stakeholders, will also present a strategy and proposal for how India can support 1.5 °C

compatible solution providers with a potential to reduce GHG emissions on a scale needed for a 1.5 °C compatible development. The NCI believes that India's approach and vision can contribute in a significant way to building the ecosystem for innovation globally geared towards combating climate change.

**The NCI and CEIC collaboration focus on ensuring that high-impact clean energy technologies scale-up globally to deliver 1.5 °C compatible solutions. The collaboration has four key elements:**

**1 Improved identification of potential solution providers**

The NCI is advising CEIC on selection criteria for emission reduction/avoidance potential of start-ups to identify the most impactful solutions and enterprises. This includes both early filtering and active targeting of entrepreneurs with solutions that have a significant potential to deliver important contributions in society. The NCI has assessed 48 start-ups in the final pipeline of CEIC's 2019 cohort for the evaluation of start-ups geared towards the clean energy mandate.

**2 Support in early impact articulation**

It has been noticed that early stage entrepreneurs struggle to articulate their impact narratives, especially with respect to their environmental contributions. CEIC and NCI are working together to support these early stage innovative entrepreneurs in identifying, calculating and articulating their pathways of change and potential impacts in a better structured and credible manner.

**3 Cluster encouragement**

CEIC will work with NCI to identify potential collaborating partners that can allow the solutions provided by the entrepreneur to deliver more significant results by increasing the probability of success, increased market shares for the new offering, accelerated speed of innovation, etc. Collaborating in clusters increase the possibility of allowing the solutions to move beyond incremental changes in existing system to become part of a necessary transformative system change.

**4 Strengthened links to investors and markets**

CEIC and NCI will also work together to establish links for the entrepreneurs to investors and markets, by providing quantified assessments of the potential for avoided emissions in society, based on transparent assumptions and credible methodology; and connecting them to like-minded investors with an alignment of vision for emission reduction.

**Background**

**Mission Innovation (MI)** is a global initiative of 23 countries and the European Commission (on behalf of the European Union) working to reinvigorate and accelerate global clean energy innovation with the objective to make clean energy widely affordable. MI was announced at COP21 on November 30, 2015, as world leaders came together in Paris to commit to ambitious efforts to combat climate change.

The **NCI** is designed to explore the opportunities for solution providers, cities, and investors to focus on new ways of delivering solutions and investing in solution providers. The current revision builds on the IPCC's 1.5 °C special report, and especially the Low-Energy Demand (LED) pathway. One of the main objectives is to shift focus from reductions of emissions by existing big emitters, to support solutions providers

with the potential to deliver the solutions society needs to stay below 1.5 °C.

**The Clean Energy International Incubation Centre (CEIC)**, is the joint initiative of Government of India and Tata Trusts, one of the largest global philanthropies. CEIC is managed by Social Alpha, a three-tier architecture platform supported by Tata Trusts and Government of India to promote innovations and entrepreneurship with a mission to create large-scale sustainable social, economic and environmental impact and nurturing start-ups through their lab to market journey, helping them create high quality, commercially viable, accessible and affordable solutions. CEIC is focused on catalysing entrepreneurship in the clean energy ecosystem for impact and scale, and provide critical technology and business incubation support to the mission driven clean-energy start-ups.

With the vision to incubate and accelerate impactful solutions, while keeping in mind the cornerstones of accessibility, affordability and user experience, CEIC will ensure that upcoming innovations are validated on both product-market fit and high social and environmental impact, which is the point of synergy with NCI.

The clean energy incubator will also forge international collaboration for supporting innovators from other countries that plan to provide solutions for India's energy needs; and in curating and handholding Indian energy innovators that aim to create impact by scaling their solutions globally.

This collaborative work builds on important work by other stakeholders, including:

1. Criteria for 1.5 °C compatible solutions (e.g. by IPCC)
2. Identified innovation gaps (e.g. by IEA)

3. Solutions with significant reduction potential (e.g. by Project drawdown)
4. Current market preferences (e.g. by cities and investors)
5. SDG synergies and status (e.g. UNDP)

This collaboration is also supporting the Sweden-India Innovation Partnership for a Sustainable Future.

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Core team and partners

