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Project Identification Form (PIF) entry – Full Sized Project – GEF - 7

## Accelerating adoption of super-efficient technologies for sustainable thermal comfort in buildings in India

### Part I: Project Information

GEF ID

10370

Project Type

FSP

Type of Trust Fund

GET

CBIT/NGI

☐ CBIT

☐ NGI

Project Title

Accelerating adoption of super-efficient technologies for sustainable thermal comfort in buildings in India

Countries

India

Agency(ies)

UNDP

Other Executing Partner(s)

Bureau of Energy Efficiency, Ministry of Power, Ministry of Environment Forest and Climate Change (MoEFCC)

Executing Partner Type

Government

**GEF Focal Area**

Climate Change

**Taxonomy**

Land Degradation, Sustainable Land Management, Focal Areas, Integrated and Cross-sectoral approach, Climate Change, Chemicals and Waste, Influencing models, Transform policy and regulatory environments, Demonstrate innovative approach, Deploy innovative financial instruments, Stakeholders, Local Communities, Beneficiaries, Type of Engagement, Gender Equality, Gender Mainstreaming, Capacity, Knowledge and Research, Capacity Development, Knowledge Generation, Enabling Activities

**Rio Markers****Climate Change Mitigation**

Climate Change Mitigation 2

**Climate Change Adaptation**

Climate Change Adaptation 0

**Duration**

60 In Months

**Agency Fee(\$)**

419,540

**Submission Date**

3/9/2020

## A. Indicative Focal/Non-Focal Area Elements

Programming Directions	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
CCM-1-3	GET	4,416,210	94,050,000
Total Project Cost (\$)		4,416,210	94,050,000

**B. Indicative Project description summary****Project Objective**

To curb GHG emissions through accelerating the provision of energy efficient thermal comfort in buildings in India and enable market transformation of energy efficient technologies

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
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1. Enhancing the effectiveness of national policy, regulatory and institutional frameworks for energy efficiency in buildings	Technical Assistance	1.1. Energy conservation building codes (ECBC) harmonized with India Cooling Action Plan (ICAP), National Building Code (NBC), Model Building Byelaws at pan-India and state level	<p>1.1.1 Improved coordination structures set up among key Government Agencies like MoEFCC, MoHUA, BIS, Smart Cities, BEE, and ULBs / UDDs in States</p> <p>1.1.2 Developed unified framework/guidelines for thermal comfort in buildings based on energy conservation building codes (ECBC), Residential building codes and the India Cooling Action Plan (ICAP)</p> <p>1.1.3 A roadmap developed for implementation and enforcement for adoption of energy management systems for thermal comfort in buildings at national and subnational/municipal levels</p> <p>1.1.4 A BEP (Building Energy Passport) system/tool developed and operationalised in conjunction with EMIS (Energy Management Information System) based on Building Codes compliance</p> <p>1.1.5. Proof of concept for "Measurement, verification and reporting" procedures in at least one state in each climatic zones of India to enable States' Designated agencies (SDAs) and BEE to monitor overall results of the tools proposed.</p>	GET	1,305,914	9,000,000
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2. Market acceleration and innovation for Super EE technology deployment/diffusion	Technical Assistance	2.1. Enhanced investments and deployment of Super Energy Efficient technologies in buildings	2.1.1. Market incentive structures evolved based on business value chain for accelerated adoption of thermal Comfort interventions in major buildings types (commercial and residential)  2.1.2. Investment de-risking mechanisms developed to enable private sector to adopt and operationalize harmonized codes, and enable diffusion of highly efficient cooling technologies.	GET	1,300,000	3,000,000
2. Market acceleration and innovation for Super EE technology deployment/diffusion	Technical Assistance	2.2. Enhanced evidence for investment in Energy Efficient technologies in buildings	2.2.1 Design of business models/tools for investments in harmonized codes - EE and thermal comfort which may include SDG Impact Investments Bonds, Retrofit pay-as-you models, CSR bonds, Financial de-risking mechanism	GET	1,000,000	80,000,000

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2. Market acceleration and innovation for Super EE technology deployment/diffusion	Investment	2.2. Enhanced evidence for investment in Energy Efficient technologies in buildings	2.2.2 Pilots in 5 representative climatic zones with Harmonized codes, compliant to ESS/ gender aspects,highly-efficiency technologies for a) Existing buildings (pan-India/ Smart Cities) and b) New buildings (pan-India/Smart Cities)	GET
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3. Capacity building and knowledge sharing	Technical Assistance	3.1. Enhanced capacity at national, sub-national and within private sector for identifying, designing, planning, financing and implementing efficiency improvement and thermal comfort systems in buildings	3.1.1. Linkages with accelerator platforms (SE4ALL, SCIP, and Kigali Cooling Efficiency Programme) established through online access to knowledge platform to assimilate tools and financing options for government and private sector stakeholders.  3.1.2. Consumer behavioural inducements through awareness campaign, controlled experimentation with critical stakeholders  3.1.3. Institutional training and awareness for transitioning to ECBC compliance including ESS and gender elements and for the newly adopted Residential building Codes in all types of buildings  3.1.4. Targeted and customised trainings/ new programs' development (energy auditors, policy makers, regulators, public and private agencies) in EE measures/solutions implementation by building types at all levels.	GET	600,000	2,050,000
Sub Total (\$)					4,205,914	94,050,000
Project Management Cost (PMC)						
					GET	210,296
Sub Total(\$)					210,296	0



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Total Project Cost(\$)	4,416,210	94,050,000
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## C. Indicative sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount(\$)
Government	Bureau of Energy Efficiency, Ministry of Power	Grant	Investment mobilized	9,000,000
Government	Multilateral Fund (MLF), Ministry of Environment, Forests and Climate Change	Grant	Investment mobilized	10,000,000
Government	Municipalities	Grant	Recurrent expenditures	2,000,000
Private Sector	Project Developers, other private sector institutions	Equity	Investment mobilized	5,000,000
Government	SBI – KfW line of Credit	Loans	Investment mobilized	68,000,000
GEF Agency	UNDP	Grant	Recurrent expenditures	50,000
<b>Total Project Cost(\$)</b>				<b>94,050,000</b>

## Describe how any "Investment Mobilized" was identified

1. Bureau of Energy Efficiency (USD 9 million): This amount is committed from the expenditure projected by BEE to the 15th Finance Commission during the period 2020-2025. BEE proposes to seek and deploy additional (new) funds for project specific activities including capacity building, training, policy level assessments, creation and supporting accelerator platforms etc. 2. Multilateral Fund (MLF), Ministry of Environment, Forests and Climate Change \$10 million. Under HPMP-II, India has secured \$44.1 million for the implementation of the Montreal Protocol for phasing out 8,190 metric tonnes or 769.49 ODP (Ozone Depleting Potential) tonne of HCFC consumption between 2017 to 2023, in order to meet the compliance targets under Montreal Protocol for 2020. A maximum of USD 12.5 million of this grant is dedicated to support four (4) air conditioner's manufacturers to convert six (6) AC lines to abandon the use of the ozone-depletion and high-GWP refrigerant HCFC-22 (GWP 1,780, IPCC4). In the process of industrial conversion, new product design is expected to improve energy efficiency of the new HCFC-free equipment, which coupled towards zero GWP refrigerant to be phase-in, will be critical as a baseline activity for the GEF Project (PIMS #6323). In this regard, the Government of India, through its MOEF&CC, is securing co-financing of USD 10 million RAC technology conversion to these higher efficiency units. 3. Mobilisation from Municipalities would be through existing schemes or programmes of BEE. This has been considered as "Recurrent Expenditures" since they are aligned with the ongoing collaboration between BEE and them and covered under current expenditures 4. SBI – KfW line of Credit \$68 million. This is being considered out of the EUR 250 million KfW line of credit to State Bank of India for Energy Efficiency in Residential Buildings under the Indo-German Cooperation in the Energy Sector that extends sub loans for new residential housing projects which achieve 25% of Energy Efficiency as compared

to existing building constructions. Additionally, Investment grant of EUR 10 million provision has been made for projects that will achieve a higher level of energy savings and stimulate stronger utilization of energy efficient building technologies in the residential housing sector in India. BEE will seek confirmation of cofinancing from SBI through a separate MOU and/ agreement during the PPG phase as per GEF requirements 5. Private sector contributions (USD 5 million) have been estimated based on consultations held by BEE with the industry and the funding pattern followed in commercial lending and practices for EE investments. Some of the private sectors like Daikin, Haier, Refrigeration and Air-Conditioning Manufacturers Association of India had shown keen interest to collaborate with BEE on the project and invest in technologies/solutions during the consultation. During the PPG phase some private real estate developers (like DLF, Godrej) working on energy efficient buildings will be engaged.

## D. Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
UNDP	GET	India	Climate Change	CC STAR Allocation	4,416,210	419,540	4,835,750
Total GEF Resources(\$)					4,416,210	419,540	4,835,750

## E. Project Preparation Grant (PPG)

PPG Required



PPG Amount (\$)

150,000

PPG Agency Fee (\$)

14,250

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
UNDP	GET	India	Climate Change	CC STAR Allocation	150,000	14,250	<b>164,250</b>
Total Project Costs(\$)					<b>150,000</b>	<b>14,250</b>	<b>164,250</b>

## Core Indicators

### Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO <sub>2</sub> e (direct)	4010000	0	0	0
Expected metric tons of CO <sub>2</sub> e (indirect)	11700000	0	0	0

### Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO <sub>2</sub> e (direct)				
Expected metric tons of CO <sub>2</sub> e (indirect)				
Anticipated start year of accounting				
Duration of accounting				

### Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
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Expected metric tons of CO <sub>2</sub> e (direct)	4,010,000			
Expected metric tons of CO <sub>2</sub> e (indirect)	11,700,000			
Anticipated start year of accounting				
Duration of accounting				

Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
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Target Energy Saved (MJ)	67,214,633			
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Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)
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Indicator 11 Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
<b>Female</b>	7,200			
<b>Male</b>	10,800			
<b>Total</b>	18000	0	0	0



## Part II. Project Justification

### 1a. Project Description

#### *The global environmental and/or adaptation problems*

1. There are growing concerns on the urgency of accelerated climate change mitigation actions at large scale to limit greenhouse gas (GHG) emissions. Rising temperatures, increasing intensity and frequency of heatwaves experienced globally are accompanied by increased socioeconomic vulnerability, as well as losses – physical, environmental and human – owing to the extreme events.
2. In this context, the rise in electricity use caused by increasing demand for space cooling has led to growth in both direct and consequential GHG emissions. In 2016, globally, space cooling alone required a total of 2,000 TWh of electricity, leading to emissions of 1,130 million tonnes (Mt) of CO<sub>2</sub>-eq. Based on the carbon intensity of electricity generation, the use of air conditioners and electric fans already account for about a fifth of the total electricity used in buildings around the world, which is 10% of all global electricity consumption ( OECD/IEA, 2018).
3. The global air conditioning market is expected to grow by almost two and a half times (in number of AC units), and will be valued at USD 400 billion by 2050, departing from 1.6 billion units of room air conditioners installed in 2016 to more than 5.6 billion units by 2050 (IEA, 2018). On the one hand, the global energy use for cooling, in 2018, was estimated at 3,900 Terawatt hours (TWh), and largely from fossil fuel based sources, and it is expected to reach between 7,500 TWh and 9,500 TWh by 2050, as the demand for cooling systems is growing, and the energy consumption of these equipment is largely dependent on the efficiency of their design and cooling technology used, having an immediate impact on the GHG emissions resulted from the energy generation and use<sup>[3]</sup>.
4. On the other hand, the Montreal Protocol on substances that deplete the Ozone Layer deployed critical investment and non-investment actions at the cooling manufacturing sector to phase-out CFC and HCFC refrigerants that, to date, has mitigated an estimated 135 billion tonnes of CO<sub>2</sub> equivalent avoided refrigerant emissions<sup>[4]</sup>. This also required interim technological solutions that had to be put in place in order to allow a safe transition to lower climate impact cooling technologies with minimum penalization on efficiency. In developing countries, the cooling systems tend to be largely based on high-GWP refrigerants. A transition further away from these high-GWP alternatives would hold a key to global warming<sup>[5]</sup>, and for this reason, a global phase-down agreement was achieved under the Kigali Amendment to the Montreal Protocol (2016), which is into force, but still not yet universally ratified by all Parties to the Montreal Protocol<sup>[6]</sup>. This Amendment, when enforced, is expected to achieve up to 80% of reduction of the global production and consumption of high GWP refrigerants by the year 2047, allowing a 20% tail consumption of these substances, after this date, for critical and essential uses.

*Root causes and barriers that need to be addressed*

5. India's share in global GHG emissions is increasing notwithstanding the fact that the per capita emissions are still low and it could play a critical part towards sustainable energy transition. The demand for space cooling in buildings in India is expected to increase eleven times from the current level over the next twenty years (ICAP, 2019). As a consequence, energy (as a share of peak electricity load) for space cooling (comprised of refrigeration and air conditioning applications for residential and commercial buildings), is estimated to grow from currently 10 percent to 45 percent by 2050 (IEA 2018).

6. Rising income and higher average summer temperatures are contributing to the ubiquity of air conditioners (AC) in Indian residences, increasing from 4 percent to close to 10 percent in the last decade (CEEW et al. 2013; Sharma and Shah 2017; Ozone Cell/MoEF&CC 2019). However, India's proliferating Residential AC demand is expected to be met by the most affordable and least energy efficient room ACs available at the market (Miller et al. 2018). Furthermore, when considering an operational life-time of 10 years, and the decay rates, of cooling equipment in different regions (Chaturvedi et al. 2015), proper use and maintenance of these ACs may stretch the energy consumption pattern and GHG emissions footprint of such equipment. For this reason, it may also be critical to deploy Best Available Techniques (BAT) on servicing aiming to increase or maintain the energy efficiency level of the AC's installed base (playing an important role in optimising India's energy demand for cooling in the coming decades); while Best Environmental Practices (BEP) may even improve the scenario of energy consumption in buildings in India.

7. Currently, the share of electricity consumption from the buildings in India stands at 7%, and is largely based from fossil fuels. Given that India's building stock is growing at a higher rate of 8 to 10 % annually, it is likely that will reach to about 10,400 million square meters of built area by 2030 (MoEFCC, 2019). In this regard, the buildings sector cooling demand will result in significant growth, at nearly 11 times as compared to the baseline.

8. The National Building Code of India (2005) defines thermal comfort at temperature ranges of 23°C to 26°C (during summers), and 21°C to 23°C (for winters) (Sarkar and Bose 2015). This standard is derived from an international standard, created for an average group of people and typically for artificially ventilated spaces, thereby making it largely unsuitable for India (Lala 2017). In fact, in the absence of an India-specific thermal comfort standard, most office spaces tend to operate at 22.5°C ( $\pm 1^\circ\text{C}$ ), being well below the comfort range specified even by the National Building Codes (Manu et al. 2016). Excessive cooling, where it is not required, is increasing energy consumption for space cooling substantially (Rawal 2018). The Indian Model for Adaptive Thermal Comfort (IMAC) that has been used to recommend indoor temperature ranges to the Energy Conservation Building Codes (2017) for three types of commercial buildings cooling systems, namely: (a) air-conditioned; (b) naturally ventilate; and (c) mixed mode buildings (both air-conditioned and naturally ventilated) (Rawal 2018). However, it remains limited in scope both in the range of building systems, as well as in its implementation.

9. In this regard, the climate conditioning of buildings - without taking into account the desired thermal comfort levels - can contribute significantly to the increase of GHG emissions as result of higher energy consumption, but also as a result of incoherent technology choice (on the climate and energy consumption impact of refrigerants), as well as inefficient design and installation of AC units. This issue is of particular concern once the high-GWP refrigerant reductions to be promoted under the Kigali Amendment of the Montreal Protocol will begin to be enforced in 2028 in India (Party of the Group 2), so a gap between current emerging needs under the current approved Policies (Indian Cooling Action Plan - ICAP; and the Energy Conservation Building Codes - ECBC) in comparison to technology deployment trends to comply with emerging market demands exist.

10. It is important to highlight that any thermal comfort initiative must be deeply linked to the cooling technologies available for deployment, in order to meet the market demand. Deploying AC units, specially highly efficient ones, require large investments on technology development but also for users, since sophisticated and efficient unit have higher phase-in costs. Therefore, availability and access to funding mechanisms is critical and for this reason this project proposal is conceived to enhance climate change mitigation actions for effective reduction of GHG emissions that, under the Business as Usual (BAU) scenario, are expected to increase as direct result of increased energy consumption from a larger installed base of cooling equipment (in both existing stock and new of buildings) in India.

11. The project proposal also takes into special consideration the context of the growing heat island effect in cities (partially also due to pronounced use of cooling equipment and its heat discharge to the atmosphere), as the global warming impacts due to the rising energy demand for cooling (due to inefficient AC equipment to be deployed in the short to medium term) are currently not considered/agreed under the Kigali Amendment framework. Therefore, these issues need to be tackled in a holistic approach departing from a number of stand-alone initiatives of the baseline scenario.

12. The table 1, below, summarises some of barriers faced to achieve EE goals with respect to institutional challenges, fragmented mandates, knowledge gaps, limited incentives for private sector participation and lack of proven business models for transformational and limited financing access for large scale investments in the sector.

**Table 1: Key barriers to promoting EE in buildings**

Barrier Type/Category	Brief description
Policy, regulatory and institutional  (Fragmentation of mandates and lack of integrated and coordinated framework on energy efficiency regulation, policies, programmes at national and sub national levels)	Buildings' approvals cut across different mandates of different institutions and at national/subnational or local levels. The implementation on-ground is very slow and piecemeal; For example, policies transposition (notification) and implementation at state and municipal levels is slow and delayed. ECBC has been notified at 12 States and 1 Union Territory, but implementation at municipal level is limited. This is putting at risk the achievement of policy targets at national level and requires urgent response. Code enforcement is the responsibility of local governments, where institutional capacity and resources are limited.

	<p>There is a lack of effective implementation of the ECBC at the sub national level. The indication for a temperature setting for thermal comfort standards are further not taken into account during implementation mechanisms. While ICAP has put forward to facilitate thermal comfort and access to cooling for all across India, recommendations made as part of the recently launched ICAP have not been yet integrated with the existing standards - hence, a Government harmonized code/standard for different climate zones will be required in India to facilitate energy efficiency and thermal comfort, in a climate-friendly manner.</p> <p>The States and the Municipalities do not have sector wide coordinated mandates or guidelines for developing and implementing building energy-efficiency programmes in an integrated manner. While the State Designated Agencies (SDAs) are the strategic partners for the promotion of energy efficiency in the State, they have limited focus and resources and lacks overall convergence and coordination at many levels.</p> <p>Linkages between refrigerant transition and energy efficiency of air-conditioning equipment, harmonization of standards, convergence of ECBC, building byelaws, with ICAP have been found to be challenging. The absence of mainstreamed monitoring and enforcement systems have led to poor compliance and optimal impacts despite several EE measures undertaken.</p>
<p>Market development/ acceleration</p> <p>(slow penetration of EE technologies and lower private sector investments due to lack of enabling environment, access to new technologies, pricing, supply chain, financing and fewer business models at scale)</p>	<p>The supply chain for technologies, applications and services are still at nascent stages. Many equipment and materials are imported with high cost mark-ups and duties imposed. This leads to a situation of non-availability of energy-efficient equipment or raw materials in the local marketplace, or they do promote the uptake to inefficient (as less costly) cooling technologies. A lot of the energy efficient equipment and materials are imported with high cost mark-ups and duties imposed on them in India. This leads to a situation of non-availability of energy-efficient equipment or raw materials in the local marketplace. Also, the market for energy-efficient building materials in countries like India, despite several government interventions, lies at the initial stages.</p> <p>Currently, there are several barriers for financing EE projects that range from high transaction costs due to small project size, lack of ability of financial institutions in appraising EE projects, poor financial strength of ESCOs, lack of communication between financiers and project developers etc. Despite its recognition, gaps remain in the sen</p>

sitization of the financial sector to the understanding of the characteristics of these low carbon projects. Moreover, there is a first- costs bias largely across the country, wherein building owners under-invest in energy efficiency during the building design and construction process. To further add, there is a lack of awareness regarding existing opportunities, information and techniques on the energy savings potential in buildings.

Consumer sensitivity to high upfront costs, risk averseness and lack of information can reinforce conventional buying behaviour and influence underinvestment in energy efficiency during the building design and construction process/ during consultations with building owners. Technology options – co-existence of efficient or inefficient systems continues to influence the consumer behaviour. The presence of multi-split and split systems in major buildings can be an impediment to new technologies and to retrofits such as the development of a District Cooling and other large centralized system alternatives. Technologies pose one or more perceived safety-related issues due to sensitive parameters like high toxicity and high flammability, especially for end-users. Also, lack of knowledge or experience in the design and installation phase may also constrain the deployment of highly energy efficient technologies.

There are fewer business models that have been successful and for only segmented markets such as appliances. For example, SIDBI's end-to-end efficiency scheme expanded to cover residential, commercial and public buildings and/or EESL's procurement scheme used for residential developments to accelerate technology deployment have been successful mainly in appliances sector. In the case of climate friendly equipment, local manufacturing is constrained as the Montreal Protocol and its Kigali Amendment are implemented on Stages until the year 2047, a refrigerant conversion priority is being given to small sized room air conditioning sector as commercially and technically viable energy efficient products.

Many of the business models rely on impetus through Governmental mandates programmes or regulations or concessional financing/lower costs of funding sources. Learnings from innovative international and national finance models such as the fiscal instruments, subscribe for cooling, (Pay-as-you-save (PAYS) to address high upfront costs). There is generally lack of innovative financing approaches and schemes to promote EE in building. Need for evidence based approaches to scale up are lacking as most of the energy efficiency measures are pilots or implemented in isolation. These

	<p>most of the energy efficiency measures are pilots or implemented in isolation. These are further influenced by factors such as challenges in obtaining approvals/new permits for new buildings or retrofit measures in existing buildings.</p>
<p>Systemic Capacity, knowledge and information barriers</p> <p>(Lack of knowledge about benefits arising from energy efficiency in buildings among stakeholders and policy makers at all levels)</p>	<p>Limited awareness and technical capacity for dealing with safe handling of refrigerants and need for comprehensive standards or codes to assist in safe handling of equipment's in EE buildings. Major challenges reported in the cities context included insufficient awareness of the importance of energy efficiency and a lack of knowledge of building science or technical expertise. For many cities this knowledge gap—which applies to both code enforcement officials and building industry stakeholder impedes the building energy code enforcement system.</p> <p>Lack of capacity in using refrigerant alternatives integrated with energy efficient buildings and equipment in an integrated manner among different stakeholders. There are few technical experts and consultants providing building energy efficiency related services and hiring international consultants become cost prohibitive.</p> <p>Successful case studies need to be disseminated widely. Awareness creating needs to be supplemented with adequate training and access to markets.</p>

*Baseline scenario and any associated baseline projects;*

13. Climate Change Mitigation (CCM) is a key national priority for India, and is part of its Nationally Determined Contribution (NDC) to the Paris Agreement, India has proposed a reduction in emission intensity of GDP by 33-35%, by 2030 from 2005 levels. Given the high potential for energy efficiency measures in the space cooling segment, this sector is therefore expected to be an important contributor to achieving NDC goals (NITI Aayog, 2017). Within the international Montreal Protocol negotiations and commitments, India has been successfully transitioning away from ozone-depleting substances (ODS) refrigerants. Through the Kigali Amendment to the Montreal Protocol, India will further commit to phase-down the consumption of high GWP refrigerants listed in its Annex F.

14. Incrementally to the refrigerant transition under the Montreal Protocol (and its Kigali Amendment), India has been advocating for achieving higher energy efficiency standards and goals. This is a global dilemma that many countries face, and India continues to grapple with, albeit domestically also attempting to champion this cause. At a civil society/non-governmental level there is growing emphasis on efficient cooling. The Government of India has instituted a new prize (Global Cooling Prize) for innovative cooling technologies that could reduce the climate impact of Residential Air Conditioning (RAC) at least by five times. The prize is supported by Mission Innovation, the Government of India through the Department of Science and Technology and is being administered by a coalition of leading research institutes—Rocky Mountain Institute (RMI), Conservation X Labs, the Alliance for an Energy Efficient Economy (AEEE), and CEPT University. The project will build linkages with such innovative initiatives, in order to adopt new designs for effective and efficient cooling solutions.

15. The projected cooling growth demand in India will lead to a 5 to 8 times increase in the aggregated refrigerant demand by year 2037-38<sup>[1]</sup>. The aggregated nationwide cooling demand, in Tonnage of Refrigeration (TR), is projected to grow around 8 times by 2037-38 as compared to the 2017-18 baseline<sup>[2]</sup>. In the baseline scenario, this nationwide aggregated cooling demand is well below 200 million Tonnes of Refrigeration (million TR). The ICAP reported proportionate growth across key sectors of space cooling, refrigeration, transport air-conditioning and cold-chain between 2017-18 and 2037-38. EE actions to mitigate increasing demand for electricity in buildings sector and associated share to meet cooling requirements was finally recognized as a cross-sectoral issue for India's sustainable development. The need for a comprehensive and synergistic actions with respect to cooling across sectors for a higher impact was thus incorporated into the recently launched India Cooling Action Plan (ICAP) by the Government of India in March 2019. The ICAP's approach particularly aims to harmonize the EE efforts with the GHG reduction efforts with demand and shift to lower climate impact technologies. The ICAP has considered the interdependencies among policy interventions and strives to harmonize energy efficiency with the HCFC phase-out and high-GWP HFC phase-down schedules. The ICAP underscores the importance of the development and use of a robust mix of cooling technologies, including the use of energy-efficient appliances with appropriate environment-friendly refrigerants, for meeting the growing cooling requirement of the country. It also re-emphasizes the principles enshrined in the Country Programme of India for phase-out of Ozone Depleting Substances (ODS), that is, to minimize economic dislocation and obsolescence cost and maximize indigenous production for combined environmental and economic gains. The ICAP takes a holistic and balanced approach by encompassing both passive and active cooling strategies as well as optimization of cooling loads. The ICAP, *inter alia*, encompasses: (a) passively-cooled building design that deploys natural and mechanical ventilation; (b) adoption of adaptive thermal comfort standards to specify pre-setting of temperatures of air conditioning equipment for commercial built spaces; (c) promoting the use of energy-efficient refrigerant-based appliances as well as not-in-kind technologies; (d) policy interventions for market transformation, including public procurement of energy-efficient RAC appliances and equipment; (e) development of energy efficient and renewable energy base cold chain for perishable foods, national skill development programme for training and certification for RAC service technicians to complement transition to energy efficient towards zero-GWP refrigerants, and (f) focused R&D efforts to foster an innovative ecosystem to support development and deployment of zero-GWP refrigerant alternatives.

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[1] ICAP 2019

[2] ICAP 2019

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[1] ICAP 2019

[2] ICAP 2019

16. Over the last two decades, India has intensified energy efficiency initiatives starting from the India's Energy Conservation Act of 2001, and establishing Bureau of Energy Efficiency (BEE) as the nodal agency to implement the provisions of the Act as well as other national missions linked to Climate Change. BEE has thus been spearheading a number of initiatives such as the Energy Conservation Building Codes (ECBC); Standards and Labelling (S&L) programme for appliances; Perform, Achieve and Trade (PAT) for energy intensive industries; and awareness and training programmes. The project would undertake a stocktaking exercise for existing policies and regulations at PPG phase and purpose activities under the project as needed.

17. Subsequently, the Energy Efficiency Services Ltd (EESL) was set up to accelerate the implementation, and act as an extended implementation arm, and to assume a super ESCO role in promoting private ESCO industry to transform EE markets; products and services. As a pilot initiative, the Super- Efficient Air Conditioning Programme of EESL, within the BEE's overall Energy Efficiency Appliance Program, partially supported by GEF<sup>[10]</sup>, was launched in February 2019. It aims to promote energy efficiency in the cooling sector by making super-efficient AC's affordable for the residential and institutional consumers and contribute indirectly to government's vision of phasing out environmentally detrimental refrigerants used in air conditioners as envisioned in the India Cooling Action Plan (ICAP).

18. Additionally, Smart Cities Mission of India has EE as one of its sustainability pillars. For BEE to effectively facilitate implementation and enforcement of the provisions of the Act, as well as those identified in the ICAP, and to link with other flagship initiatives in India, enhanced systemic capacity to coordinate at national and sub-national levels need to be created and/ or improved. A more effective and conducive environment will enable effective implementation of integrated policies, programs, regulations, market instruments, demand creation and awareness in order to realise energy efficiency goals.

*Proposed alternative scenario with a brief description of expected outcomes and components of the project*

19. The proposed project aims to galvanize key areas for ensuring the deployment and access to efficient thermal comfort and cooling in buildings sector in India, by addressing the barriers identified above, and specifically supporting:

- (i) The establishment and roll out of a harmonized building code that can promote energy efficient, and ,cognizant of the ICAP, to encourage thermal comfort in all types of buildings covered under ECBC across representative climate zones in India;
- (ii) The increase in capacities at national as well as subnational/municipalities levels to ensure that codes are implemented and measured;
- (iii) The promotion of low climate impact technologies and test business models to encourage deployment of efficient cooling, unlocking investments;  
and
- (iv) The creation of knowledge, frameworks and capacities to ensure that regulators, consumers and businesses can systematically ensure the above.



20. Given the complementarities between the GEF and MLF funded activities, the project has been designed to take into account a clear distinction with regard to energy efficient aspects of AC equipment under this project that are part of GEF-funded activities and MLF-funded activities address refrigerant management. This logic of the project with regards to AC equipment is set out in the table below for better clarity and reference:

AC equipments under baseline situation	Problem to be addressed	PIF action
<p>India has a large Air Conditioning Manufacturing sector, producing units ranging from room to commercial, industrial and large size air conditioners. The manufacturing sector is composed by 316 Enterprises (comprising 34 large, 28 medium, and 254 small-sized).</p> <p>37 AC manufacturing enterprises produce around 4.5 million AC units per year (77% are room AC units – mostly split types). Six enterprises are multinational companies.</p> <p>Although having a relevant installed base of manufacturers, the market penetration of ACs in the country is still low (10% for domestic applications), and demand is on the rise, which is complemented by offer of imported AC units.</p> <p>The MLF is supporting India to address the phase-out of ozone depleting refrigerants in the Air Conditioning sector by supporting six large-sized national manufacturers of AC equipment to c</p>	<p>The AC demand of India is not fully met by national manufacturers, and a number of AC units are imported into India.</p> <p>On top of that, there is a number of companies based in India that also manufacture AC units but are either (i) not eligible to receive funding from the MLF; or (ii) are not assisted by the MLF (estimated 31 enterprises), but due to Montreal Protocol obligations, they need to convert refrigerants with their own funds by the year 2030.</p> <p>MLF only “drives” the refrigerant transition in a controlled environment for companies being assisted with grants towards Zero GWP refrigerants. MLF thus potentially excludes other multinational (non-eligible) companies that either import or manufacture locally, allowing them freedom to choose the AC technology (that is usually lower in cost but having lower efficiency also). Additionally, considerations on energy efficiency (either through super efficient refrig</p>	<p>The PIF comes to align the national strategies in this regard, by:</p> <p>a) departing from the baseline project, it will support subnational Governments to mainstream Energy Conservation Codes (ECBC), the India Action Cooling Plan (ICAP) and the National Building Codes (NBC).</p> <p>b) along with other TA and Investment activities, it will be promoting the deployment of super efficiency AC equipment and look into financial models to assure scale up and sustainability;</p> <p>*c) looking into ways to leverage the overall energy efficiency of AC equipment either manufactured locally (whether the refrigerant transition was funded by MLF or not) and also the units imported to a same minimum level.</p> <p>*d) drawing from the MLF funded project, which is offering a critical starting point for this intervention, as it will set a basis for the whole market (as t</p>

<p>convert their plants.</p> <p>This conversion is costing USD 10 million (grant) and will phase-out part of the HCFC-22 refrigerant consumption in the country.</p> <p>The new refrigerant technology being phased in is expected to also increase the overall energy efficiency of equipment.</p> <p>This PIF Proposal will not address any parts of the refrigerant conversion at any level.</p>	<p>erants or super efficient equipment design) is not addressed by the MLF.</p> <p>In the BAU scenario, part of the consuming market can uptake AC equipment with rely on efficiency technologies as indirect result of the MLF actions.</p> <p>However, if no incremental action is carried out, India AC market could also deploy high-GWP and less efficient ACs to meet the growing AC demand in the country.</p>	<p>he Government cannot establish different standards to locally produced and imported ones, as these would be seen as unfair competition and would undermine EE efforts).</p>
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*\*Note: 1) Point c and d highlight that the project will leverage the overall energy efficiency whether being addressed by MLF or not. This means the project will focus on RAC equipment's manufactured locally as well as imported ones. Currently, MLF focuses on RAC equipment's manufactured locally only. India has the same standards for both local and international companies; 2) While the MLF project does not consider any aspect of energy efficiency, the new residential air conditioners equipment design are expected to increase up to 10% its overall energy efficiency (TEAP/RTOC 2018), In this regard, although the local standards and MEPS are applicable to locally manufactured and imported AC units, in practice there are discrepancies in terms of incremental EE performance of equipment as both types can achieve the minimum requirement and 3) This GEF Proposal intends to promote the use of the thermal comfort technologies with the highest energy efficiency possible.*

21. The overall goals of the project will be achieved by:

- (a) establishing a strong coordination mechanism that can link the Regulatory and Policy Framework that gravitates around the Cooling Sector, Energy Planning and Energy Use in buildings, so actions can be improved;
- (b) Accelerating the market innovation on cooling by linking energy efficiency technologies and finance for the deployment of market activities and incentives that will allow the growing demand to be met by most efficient cooling technologies. This will allow a reduction of potential GHG emissions from the current baseline scenario. Long term energy efficiency Policies and financing will be assured; and

(c) Promoting actions, sharing knowledge and increasing capacities in stakeholders that will allow that reduced active demand for cooling is placed, under the purview of ECBC compliance, and pairing with Kigali Amendment's activities for refrigerant transition, to increase the capacity building activities by strengthening energy efficiency interventions in the buildings (and cooling equipment) design, installation, maintenance and repair phases.

The three project components are thus designed on: (A) policy and regulations; (B) market acceleration; and (C) knowledge management and capacities that would comprehensively address the barriers in an integrated and transformative mode.

### **Component 1: Enhancing the effectiveness of national policy, regulatory and institutional frameworks for energy efficiency in buildings**

Outcome 1.1 Energy conservation building codes (ECBC) harmonized with India Cooling Action Plan (ICAP), National Building Code (NBC), Model Building Byelaws at pan-India and state level.

*Output 1.1.1. Coordination structures established among key Government Agencies like MoEFCC, MoHUA, BIS, Smart Cities, BEE, and ULBs/ UDDs in States;*

22. At a regulatory level, a review of challenges to comply to ECBC will be assessed for its sustained implementation rollout. Municipalities and states would be provided with modules and guidelines for developing and implementing building energy-efficiency programmes and policies in an integrated and coordinated manner. The project will support streamlined guidelines/codes on all relevant aspects of building bye laws of ULBs (municipalities) in States and its linkages to policies and regulations at the national level. It will set up coordinated institutional frameworks or structures at the national, state and local levels for handling ECBC administration and enforcement with due consultations, provision of tools and methodologies and facilitating informed administrative actions.

23. The State Designated Agencies (SDAs), who are the strategic partners for the promotion of energy efficiency in the State, would be engaged continuously and provided with technical assistance towards enhanced focus and access to technical and financial resources for energy efficiency measures. The need for convergence between the India Cooling Action Plan and ECBC and relevant policies and regulations would be dealt in a cross sectoral and integrated manner. The challenges of recognizing the linkages between refrigerant transition and energy efficiency of air-conditioning equipment would be addressed through review of diverging goals and linked for harmonised and unified frameworks incorporating ECBC and ICAP requirements. This will be attained by designing effective implementation models to move towards enhancing energy efficiency of equipment while lowering GWP of refrigerants through the robust India Cooling Action Plan, which in turn, translated for actions at the sub national levels.

*Output 1.1.2. A unified framework and guidelines developed for enhanced thermal comfort in buildings based on energy building codes (ECBC) for commercial and residential building and the India Cooling Action Plan (ICAP).*

24. Simultaneously, institutional capacity between the BEE and MoEF&CC will be strengthened in the context of interrelated goals of the Bureau of Energy Efficiency and MoEF&CC for combining Energy Efficiency under the GEF proposal to parallel actions of phase-out/phase down of refrigerant gases under the Multilateral Fund for the Montreal Protocol activities. While there are several complements observed in bringing the two together, there are also Urban local bodies under the respective States administrative departments that are aligned with the Ministry of Housing and Urban Affairs at the centre. Energy is dealt at both Centre and State whereas urban issues are dealt by the State. Hence, effective coordinated structures needs to be constituted for demonstrating best practices around accelerated rollout of integrated building norms that promote the reduction of cooling demand, and/or the promotions of technologies that are higher in efficiency. The project would consider coordination and multistakeholders platforms to forge partnerships for optimal impacts and trickle down these arrangement systematically to states, cities and municipalities for effective implementation; as well as extend itself to other key government bodies such as ministries responsible for housing and urban development, smart city nodal agencies, as well as those that have a bearing on technology diffusion.

*Output 1.1.3. A roadmap developed to highlight the strategy and way forward towards implementation and enforcement of energy management systems for thermal comfort in buildings at national and sub-national/municipal levels*

25. A roadmap will be prepared for joint action from BEE and MoEF&CC to calibrate activities of India Cooling Action Plan and ECBC for improved energy performance of AC equipment. India Cooling Action Plan is among the first documents that addresses demand for cooling using a holistic lens of energy efficiency both through technology development and adoption of ECBC for buildings. ECBC is a robust document on energy conservation guidelines that is not only available for commercial and residential building but also for a variety of climate zones. The specific focus will be on ECBC guidelines on thermal comfort both from active and passive cooling perspectives. Assessments on State Government implementation of the ECBC are few and far between, making this a priority for research work. Further, mechanism for coordination between the States and MoEF&CC's agenda to achieve 'cooling for all' needs to be explored. Finally, looking beyond the India Cooling Action Plan, projections on ECBC and India's commitment to the 'Three Percent Club' at the UN Climate Action Summit in September 2019 can further India's sustainable cooling agenda.

*Output 1.1.4. An innovative tool developed that the Bureau of Energy Efficiency intends to apply to account for progress on BEP (Building Energy Passport) system/tool developed in conjunction with EMIS (Energy Management Information System) based on Building Codes compliance*

26. BEE introduced a "Star" labelling programme for existing commercial buildings in 2009, where buildings are given labels based on their actual energy performance. It is applicable to buildings with the connected load of 100 kW or greater, or contract demand of 120 kVA or greater. One to five stars rating are awarded based on the building's specific energy use with five star as the most efficient one. Within this scheme, a standardized format for data collection of the actual energy consumption of the building exist to collect information on built-up area, type of building, conditioned and non-conditioned areas, hours of operation of building in a day, climatic zone, and other information related to facility.

27. As of now, this rating is applicable to office spaces, hospitals, business process outsourcing (BPO) buildings, and shopping malls and soon it would be extended to data centres and hotels, etc. Building Energy Passport (BEP) is a combined compliance check and rating system that will work in coordination with the Energy Monitoring Information System (EMIS) tool. It gives a unified identity performance of a building during the design, construction and operation phase. ECBC is mainly a design code and does not focus much on the actual energy performance of building once they are operational. Hence, concepts like BEP and star rating supplements ECBC for the realisation of energy efficiency in actual energy performance of buildings. For instance, in the BEE star rating scheme the building owner who registers for the program has to furnish building Information and Energy Data on an annual basis and fully adhere to the specifications of the label prescribed by BEE. The documents submitted undergo a rigorous scrutiny before they are given labelling standards and the building is subject to checks with the results even being published on the public domain. Further, non-compliance of such standards can lead to withdrawal of the authority to use the label.

*Output 1.1.5. Proof of concept for “Measurement, verification and reporting” procedures in at least one state in each climatic zones of India to enable States’ Designated agencies (SDAs) and BEE to monitor overall results of the tools proposed.*

28. All measures to be conducted will provide a robust setup of monitoring and verification (M&V) mechanism through checks and compliance and facilitates the stringent implementation of ECBC 2017 and other standards. Along with a strong M&V mechanism, the scheme also showcases a good example of making information transparent on the public domain, thus giving further impetus for building owners to comply with the process. The evaluation of the program impact by a third-party agency on a periodic basis helps the building owners to assess building’s energy efficiency and also track improvements over time. Regular monitoring of the program helps in strict enforcement of the ECBC and other existing standards. Maintaining technical specifications in the building design also demonstrates compliance to ECBC standards. Additionally, these schemes will also lead to creating a market for energy efficient buildings by generating more awareness and education among users and stakeholders thus assisting in adopting and enforcement of these measures. Data collection on a wide variety of parameters as discussed above contributes to knowledge management and transparency measures.

29. The coverage of the rating scheme across commercial spaces (office spaces, hospitals, BPO buildings shopping malls, hotels) will lead to enforcement and operationalization of these stringent measures across crucial stakeholders within the commercial building sector, which is one of the highest growing sectors in the country. To summate, rating schemes and Building Energy Passports (BEPs) are enabling measures and processes for mainstreaming ECBC 2017 implementation into States and Urban Local bodies (ULBs). Technical experts also play an important role in ECBC implementation along with government and state stakeholders. This will also lead to the development of a proof of concept for “Measurement, verification and reporting” procedures in at least one state in each climatic zones of India to enable States' Designated agencies (SDAs) and BEE to monitor overall results of the tools proposed.

30. Finally, the Component 1 will enable the harmonisation of policies through accelerated development of these codes that will be used to account for different climate zones in the country, and will be a first of its kind development: a policy that tackles energy efficiency and cooling demand, cooling technologies and people’s thermal comfort simultaneously. As these structures and levels of harmonisation are recognised between different policies at

multiple levels of governance, as part of enabling a regulatory environment to enhance efficient cooling and lower its demand such that progress may be tracked and enhanced.

## Component 2: Market acceleration and innovation for Super EE technology deployment/diffusion

### Outcome 2.1: Enhanced investments and deployment of Super Energy Efficient technologies in buildings

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*Output 2.1.1. Market incentives evolved based on business value chain for accelerated adoption of thermal comfort interventions in major buildings types.*

31. Technical Assistance (TA) aims at supporting identification and implementation of enhanced energy efficiency in buildings and cooling through technologies and measures that are viable but not widely adopted in India. It aims to bring together technological, financial and the business spectrum to as a first, understand the market incentive structures that need to be evolved based on business value chain to accelerate adoption of thermal comfort interventions in major buildings types (commercial and residential) – including both lowering cooling demand looking at the building envelope (building design, materials, cooling load, and use of more efficient cooling appliances). Given the Kigali Amendment's commitments which will, over time, impose limits on the current refrigerants in the market and will require companies to transition to new refrigerant alternatives, it is critical that technology awareness, investment models and enabled environment are understood before such mandates are imposed on companies; and will help accelerate the transition towards energy efficient technologies.

*Output 2.1.2. Investment de-risking mechanisms developed to enable private sector to adopt and operationalize harmonized codes, and enable diffusion of highly efficient cooling technologies.*

32. This activity will implement the de-risking framework and also incorporate the coordinated policy, regulatory and institutional framework guidelines with BEP as a strategic tool for galvanizing momentum to increase investments into such energy efficient cooling and thermal comfort. This will aide in practically addressing the barriers related to information, skilling, technology availability, first-cost biases, and risk perceptions. It will further encourage new technologies and business models that will be deployed in order to accelerate the uptake of energy efficient technologies in this sector and improve the supply chain aspects noted in the barriers analyses. While there is a tentative list of cities included at this stage, it has been proposed to have a short list during the PPG phase with a predetermined criteria for the ripple effect.

33. In order to enable a technology and market transformation that will facilitate the uptake of efficient cooling appliances and solutions; as well as encourage the implementation of building norms that will lower cooling demand; this activity will address the challenges for private sector stakeholders by proposing a study that enables a clear and transparent understanding of risk perceptions, information barriers related to ECBC compliance that may range

from technology, readiness in terms of skilling and technical knowledge, challenges related to market barriers such as standards etc., as indicated. The project will identify responses to the challenges that need to be addressed across building sector and HVAC sector supply chains to enable a market transformation towards efficient cooling and enabling thermal comfort within commercial and residential buildings. The study would lead to a de-risking investment framework with recommended de-risking mechanisms that will be established to tackle challenges and encourage investments towards both building norms' adoption, as well as technology diffusion. Appropriate market instruments will then be designed to support systematic investments that are required towards comprehensive EE measures for efficient cooling and thermal comfort in buildings.

## Outcome 2.2. Enhanced evidence for investment in Energy Efficient technologies in buildings

*Output 2.2.1. Design of business models/tools for investments in harmonized codes for high-efficiency thermal comfort which may include SDG Impact Investments Bonds, Retrofit pay-as-you models, CSR bonds, Financial de-risking mechanism.*

34. Overall, the project interventions will focus on facilitating suitable business and financing models, implementing procedures and bankable projects at participating states and municipalities. Learnings from innovative international and national finance models<sup>[18]</sup> such as the market instruments, subscribe for cooling, Pay-as-you-save (PAYS) model will be encouraged under the current project component that will address inherent strong first cost bias. Some of the aspects of these business and financing models in the context of this project are briefly described below (indicative only).

- a) **Market Instruments:** Creating an incentive for AC bulk procurement, for leapfrogging the deployment of superefficient air conditioners, as part of a smart city new housing or commercial structures could be convened by the government across different agencies. Impact bonds are another avenue for enabling results-based financing where donor focus will remain on the efficiency outcomes achieved, investors focus on service provision and provide up-front capital. These could be tested in a public-private partnership modes with pooled resources from municipalities, GEF financing, and technology providers. These financial instruments are currently being tested across agencies; and this project could be a viable platform for showcasing these for replication through comprehensive framework.
- b) **Preferential Loans for Efficient Cooling Loads:** Creating a business model for financial institutions to provide preferential loans for the use and deployment of more efficient building materials and cooling equipment would be a key catalyst in enabling a market transformation. The incentive structures and business models for such concessional loans could be tried across different areas wherein locally sourced materials may also benefit.
- c) **Subscribe for Cooling:** As has been demonstrated by leading audio-visual content platforms in the world, which run on the subscription model, it has become easier to not only access content but also improve the overall effectiveness of media outreach through consumer aggregation. A singular platform was created, payments were streamlined, and multiple production studios were brought under a single label. The subscription model has the potential to be applied to the energy-efficiency segment as well. This is particularly useful wherein new technologies such as district cooling are being initiated.

d) Pay-as-you-save (PAYS) model: Under the pay-as-you-save (PAYS) model, initial investments, in terms of the installation cost of energy efficient devices, are made by the company. The tariff contains a fixed charge, which is typically lower than the estimated monthly-bill savings from the energy-efficient device. A subscription model such as PAYS could pave the way for faster deployment and installation, minus the liability for consumers. Possibilities can be explored to incorporate this feature in the AC bulk procurement programme.

e) E-marketplace enabled scale: The Government of India had launched an e-procurement platform (Government e-Marketplace or GeM) for government agencies and departments, listing all important products and materials. This has not been leveraged for the listing of super-efficient ACs. Provisions for showcasing the benefits of adopting energy efficient air conditioners on the main webpage would be explored. These platforms would be marketed on all social media platforms, thereby redirecting more traffic towards the GeM portal. The aggregated demand through the GeM, can be leveraged and bulk procurement model can be used to meet the demand in partnership with agencies or Utilities or other PPP modes. This will enable a localization of energy efficient products and materials' price lowering through a scaled metric.

f) Demand aggregation through E-commerce: This approach will further build on the EESL's experience in the procurement of super-efficient along the lines of demand aggregation models. It was observed that success depended on actionable inputs from key stakeholders, namely, manufacturers, DISCOMs, and policymakers. E-commerce platforms which have gained prominence over the years, especially the ones that conduct large-scale B2B businesses and online marketplaces aid in cutting costs, especially by avoiding expensive paper-based procurement processes would be explored. Data storage, accuracy, security, less redundancy, and streamlining of channels allow for easier business process flow. Since ACs with ISEER 5.0 and above are already in the Indian market through EESL initial interventions, efforts will be made to push energy efficient products into the mainstream in shorter time periods and in the process, transforming the market.

The PPG Phase will assess the alternative models for effectively linking to the Unlocking National Energy Efficiency Potential 2017 to 2031 released for public consultations in February 2019.

*Output 2.2.2 . Pilots implemented in 5 representative climatic zones with Harmonized codes, compliant to ESS/ gender aspects, highly-efficiency technologies for a) Existing buildings (pan-India/ Smart Cities) and b) New buildings (pan-India/Smart Cities).*

35. The Investment package will thrust implementation of norms from the private sector perspectives by systematically steering the pilot projects. These pilot projects will be convened across city types, as well as climatic heat zones in India with the twinned objectives of showcasing efficient technologies, implementation of ECBC and other norms in practice, investment models, and the accruing emissions and cost savings. The PPG Phase will design the scope of pilot programmes for implementing through platform and market transformation framework/and acceleration strategies to advance sustainable cooling adoption in buildings. The PPG phase will further solicit partnerships with other cofinancing institutions for successful implementation of innovative market models.

### Component 3: Systemic Capacity building and knowledge sharing



Outcome 3.1. Enhanced capacity at national, sub-national and within private sector for identifying, designing, planning, financing and implementing efficiency improvement and thermal comfort systems in buildings

*Output 3.1.1. Linkages with accelerator platforms (SE4ALL, SCIP, and Kigali Cooling Efficiency Programme) established through online access to knowledge platform to assimilate tools and financing options for government and private sector stakeholders.*

36. In favouring the implementation of efficient cooling technologies and measures in buildings, the project expects to build capacity and confidence of the building owners, staff on energy efficiency measures, thus enabling the scale up of efficient cooling technologies, as well as the replication of norms on a larger scale. The efforts would be complemented by creating an online knowledge platform to establish linkages with international accelerator platforms such as SE4ALL, Global Programme on Sustainable Cities, and Kigali Cooling Efficiency Programme (K-CEP) to assimilate tools and financing options for government and private sector stakeholders as well as streamline information and funding opportunities at the national and sub national levels. The project would explore collaboration with the Buildings Energy Efficiency Accelerators (4 cities in India have already joined) and others for accessing the tools and knowledge exchanges and experience sharing for further harmonisation during the pilot implementation at the sub national levels. The project will also link with successful technological innovations and approaches like the Global Cooling Prize for designing cooling solution, BEE's energy conservation awards and EESL's new buildings programme targetting 10,000 large government/private buildings. This will ensure efficient and timely access to information on implementation of efficient cooling projects targeting buildings in India for the industry, government agencies and others. This would include details on ongoing pilots and those under plan as per component 2, enabling more stakeholders to be informed or interested in participating in such efforts.

*Output 3.1.2. Consumer behavioural inducements through awareness campaign, controlled experimentation with critical stakeholders*

37. The project will specifically increase capacity, awareness and knowledge of stakeholders across the spectrum: including assimilating existing knowledge in this domain, and targeting an increase in such understanding across consumers, behavioral changes inducements, policy makers, industry players, financiers, and technicians. Enhancing technical capacity and expertise of government stakeholders, local building practitioners and service providers will be addressed in this component.

38. In order to create a demand simultaneously, a consumer-focused campaign would be organized to spread awareness on energy efficient buildings, and efficient and climate friendly cooling technologies; and the need for transitioning towards ECBC compliances. This would be further enhanced by researching key messages, and media, to spread such awareness based on controlled experimentation with critical stakeholders.

*Output 3.1.3. Institutional training and awareness for transitioning to ECBC compliance including ESS and gender elements and for the newly adopted Residential building Codes in all types of buildings*

39. As building energy efficiency is still nascent with varying levels of adoption of the ECBC norms at the sub national/State levels, it is important to create awareness among all stakeholders, However, mere awareness programmes have limited impacts and that needs to be supplemented with adequate training and handholding to showcase performance. These could contribute to series of successful case studies that have also not yet been disseminated widely. The capacity development interventions at national and sub national level comprise identifying, designing, planning, financing and implementing EE actions for operationalizing ECBC and efficiency improvement of RAC systems in buildings. It will support identifying government champions and raising awareness among critical stakeholders for operationalizing ECBCs. Activities conducted such as workshop cum training programme in the presence of stakeholders, builders, architects and concerned government organizations on thermal comfort, its relationship to energy consumption will assist in bridging the information gap.

40. Moreover, as the new codes get implemented, institutional training and awareness for transitioning to ECBC compliance and newly adopted Residential building Codes would be necessitated at a subnational level. This project will address those gaps through increasing technical and implementation capacity enabled through trainings and new programmes' development for energy auditors, service and installation technicians, policy makers, regulators, public and private agencies to implement and measure energy efficiency norms and technical solutions for different building types at all levels

*Output 3.1.4: Targeted and customised trainings/ new programmes' development (energy auditors, policy makers, regulators, public and private agencies) in EE measures/solutions implementation by building types at all levels.*

41. In delivering this output, technical support will be provided to manufacturers, vendors, importers, new entrepreneurs, building owners etc. to upgrade the design, testing and technical characteristics of EE equipment and products, to indigenous entrepreneurs to replicate and produce EE technologies locally and reduce the costs of production. Manufacturers of equipment will receive further guidance regarding the design, production and testing of energy efficient equipment.

42. Within the country, there are very few technical experts and consultants providing building energy efficiency related services which leads to hiring international consultants. Thus, one of the project component aims to enhance technical expertise by building from the actions deployed under the Montreal Protocol for training technicians on RAC servicing systems. While India's HPMP programme is targeting the re-training of certain servicing sector technicians, it does not take into account the energy efficiency spectrum and is solely focussed on creating capacity on refrigerants (as technologies pose one or more safety-related issues due to sensitive parameters like high toxicity and high flammability, especially for end-users.). Even programmes for standards and testing equipment for energy-saving features of building materials and equipment are not in place.

43. Additionally, upstream training/capacities to Architects and Engineers on environmentally friendly cooling technologies, eco-design of equipment and buildings and cooling load impacts are weak or inexistent. Thus, activities like providing technical support to upgrade design, testing and technical characteristics of EE equipment's and products, as well as for building envelope will be included. A requirement for raising awareness and developing

technical expertise, building in-country technical capacity for dealing with super-efficient technologies is necessary. Along with this, developing standards or codes that will assist in safe handling of equipment's in EE buildings will be partaken as part of the project component.

44. In the case of new buildings, the expected harmonization of different policies, incentives and policy directives to lower buildings' for energy utilization for cooling; and implementation at a national and subnational level will lead to a) reducing the energy demand through building norms' implementation, and b) meeting the cooling requirements with low energy passive cooling techniques to the extent possible. Reducing cooling demand in buildings will directly reduce the number of refrigerants used in air-conditioning equipment – and this activity is not tackled by the Montreal Protocol that look purely in the replacement of refrigerant.

45. But more important, a holistic approach over the building envelope can deliver higher energy efficiency gains, thus the GHG emissions associated with the cooling demand will be reduced. Due to improved energy efficiency of equipment design and installation, buildings will overall use less electricity, thereby reducing the projected increase in GHG emissions due to reduced energy requirements. Finally, BAT on maintenance and repair of buildings and associated cooling equipment will reduce decay and maintain energy efficiency during its life time, reducing the overall life cycle impact. Additionally, gender analysis and environment, social safeguard and safety aspects would be integrated in the overall design elements of this component.

*Alignment with GEF focal area and/or Impact Program strategies;*

46. The project is in line with the GEF programming objective of promoting Innovation and Technology Transfer for Climate Change mitigation (CCM) by reducing GHG emissions (CCM 1 -3). It focuses on thermal comfort and cooling in buildings, which constitute a significant share of energy consumption in the total energy demand and contributes to GHG emissions. The proposed project interventions to harmonize different policies, standards are expected to lead to enhanced compliance to building codes that covers both passive and active measures leading to reduced demand for cooling and adapt to thermal comfort requirements with super-efficient technologies. It further supports creating more evidences through adopting comprehensive and coordinated frameworks in pilots for improving energy performance and facilitating replication and promoting global practices towards contributing to EE accelerators

*Incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, and co-financing*

47. The GEF involvement will be essential in removing the barriers that can assure a larger GHG reduction (direct and indirect) in the residential and commercial sectors.. The incrementality of the project is mainly towards addressing the barriers related to a) lack of harmonized building codes towards focus on energy efficiency b) lack of capacities at national as well as subnational/ municipalities levels for regulatory enforcements and policy/plan implementation; c) limited penetration of low climate impact technologies, taking into consideration indigenous sources and imported technologies, with different costs and potential applications; and d) lack of knowledge, frameworks and capacities among different stakeholders. The proposed GEF activity

would enable effective coordination and synergizing of stand-alone baseline initiatives or separate Policies (such as the ECBC, MEPs, Labelling Schemes). The roll out of the ICAP will further take into account the interdependencies among policy interventions and thus, will strive to harmonize energy efficiency with the HCFC phase-out and high-GWP HFC phase-down schedules.

48. The GEF resources will be used to improve standards building codes, in addition to market incentives to support the deployment of energy efficient air conditioners. To meet these standards and codes, the equipment will need to be significantly more energy efficient than is currently available in the market. While the MLF looks into refrigerant conversion only, the refrigerant replacement itself may still not be enough to provide the energy efficiency required, resulting in a lost opportunity to capture additional GHG reductions. Hence, the GEF resources will be critical to align the several stand-alone baseline actions towards the establishment of an integrated environment that can increase GHG reductions by incentivizing end-users to adopt higher energy efficiency equipment. When establishment a robust and coordinated Policy and Regulatory Framework, this GEF proposal will also indirectly push the AC Industry to further optimize the equipment energy performance, departing from the MLF's refrigerant transition, by looking further the refrigerant conversion and adopting better equipment design, parts and components.

49. Finally, the project will be able to establish a proper coordination mechanism for actions under the Montreal Protocol (MP), the ICAP, as well, the policy regulatory framework and the market triggering path required to promoting environmentally sound technologies in the long term, considering an integral governance approach in terms of the appropriate institutional context, the technical capacities and the backstopping to identify the suitable financial mechanisms for hardware's (equipment design, parts and components) technology transfer and its appropriation over the long-term. Thus, the project not only supports the country in meeting its obligations to the UNFCCC and its NDC but allows to scale up through integrated efforts

*Global Environmental Benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF);*

50. This FSP proposal is expected to yield direct emission reduction benefits of 4.01 million tCO<sub>2</sub> –and includes 3.34 million tCO<sub>2</sub> post project emissions) to be confirmed during the PPG phase - (of initiatives directly supported by the FSP). The GHG benefits resulting from the implementation of a more energy-efficient path and conducive environment in the residential and commercial building sectors have an estimated indirect emissions reduction of 11.7 million tons over a 25-year period. The GEF project-based methodology was used for calculating GHG emission reductions from energy efficiency projects<sup>[1]</sup>. This will further entail the execution of end-use best practices and implementation of technological changes to replace inefficient RAC equipment with more efficient systems, such as highly rated Energy Efficiency Ratio (EER) air conditioning and refrigeration systems and large cooling units.

51. As baseline project, the Montreal Protocol, with ODS replacement efforts, will deliver a mitigation potential of GHG emissions on the order of at least 62,500 tCO<sub>2</sub> exists under the current phase II of the HCFCs Phase-out Management Programme (2017-2023); by replacing conventional, super high GWP based refrigerant technologies. As the proposed project delineates the focuses between the GEF and MLF, these 62,500 tCO<sub>2</sub> (contribution) are treated as part of baseline and not included in the core indicator total for this PIF.

52. The GEB provided by the GEFTF could yield the extra gains by reducing the cooling refrigerant charge under the proposed alternative scenario, but also additional GHG reductions after the introduction of more energy efficient cooling equipment, reducing the energy consumption growth project over the long run (20 years), and additional GEBs can be achieved if a full market for low-carbon, more efficient RAC technologies is developed. Finally, these will reduce the

heat islanding effects in cities leading to improved resilience.

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[1] <http://www.stapgef.org/focal-area/climate-change-mitigation>

### *Innovation, sustainability and potential for scaling up*

53. This project is designed to ensure innovation, sustainability and potential scale up. The harmonization of existing building codes to reflect cooling action plan recommendations and offering thermal comfort in building will be a first-of-its-kind effort of policy coordination. The harmonized codes that would be supplemented through stakeholder engagement across government agencies would be part of a coherent policy guideline. Hence, these are expected to ensure its sustainability, and encourages the potential of this code to be applied across the country. Moreover, the implementation of these codes will be measured through the use of building passports and energy management systems- a new concept for India to ensure its viability, check for the validity of such improvements, to ensure long-term sustenance of such interventions.

54. Improving energy efficiency of buildings will be a focal driver which is one of the main objectives of this project intervention. Harmonizing the implementation strategies for energy efficiency with the India Cooling Action Plan by the two-pronged approach described earlier in this project will slowly drive the replacement of existing less efficient room air conditioning units available at the market today. Identifying and assisting in adoption of these super efficient technologies will realize in accomplishing the broad objective of India Cooling Action Plan, while establishing compliance mechanisms will enforce the ECBC standards across the country. Thus, the project will provide multiple benefits of improved energy efficiency aligned to the baseline actions: Montreal Protocol activities under implementation and the country's obligations under the Kigali Amendment.

55. Since it is well established that the demand for refrigerant and energy use is only going to increase mostly from the building sector, targeting this sector becomes obvious for reducing energy demand along with EE measures. This project will make a significant change in the existing use of inefficient technologies for air conditioning, in the commercial and residential sectors. It will also identify those structural barriers that limit the potential for establishing an innovation-friendly, market approach for the adoption of efficient technologies for end-user. Project interventions targeted during this early stage will help India to leapfrog to less efficient cooling systems. The project will test harmonized codes along with these new and/or alternative technologies in existing and new buildings across different climatic zones in India. This is again designed as a key intervention of this project to ensure that such findings of innovations in the efficient cooling and building materials segments can be highlighted publicly. These pilot projects will also showcase innovative business models. The entire premise of this market transformation component is to encourage a scale up across the country. Moreover, the testing of new technical and business innovations across building types, and climatic zones is to ensure qualifiers for their sustainability.

56. Finally, the aim of the component on capacity building and awareness raising is to ensure that all the policy, regulatory, technology, and financial interventions of this project can be sustained, maintained, and scaled up beyond the project dates. Moreover, the creation of a portal to assist companies and others in accessing finance will also assist in sustaining and encouraging scale up of technical interventions around the country, in an ad-hoc manner as may

be necessary in this road of transitions

**1b. Project Map and Coordinates**

**Please provide geo-referenced information and map where the project interventions will take place.**

1b. *Project Map and Coordinates.* Please provide geo-referenced information and map where the project interventions will take place.

**1. Bhubaneshtar**

DMS Lat 20° 17' 45.8124" N

DMS Long 85° 49' 28.3404" E

**2. Hyderabad**

DMS Lat 17° 23' 13.7040" N

DMS Long 78° 29' 30.0624" E

**3. Jaipur**

DMS Lat 26° 55' 19.4520" N

DMS Long 75° 46' 43.9860" E

Apart from these three cities, the project will also provide technical assistance to other cities including Pune, Surat, Chennai and Guwahati which are part of of sustainable cities impact program. Cities that will benefit from the project are listed in (Annex – 1).

## 2. Stakeholders

Select the stakeholders that have participated in consultations during the project identification phase:

Indigenous Peoples and Local Communities

Civil Society Organizations Yes

Private Sector Entities Yes

If none of the above, please explain why:

In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement.

Key Stakeholders	Key Role
<b>Ministry of Environment &amp; Forests and Climate Change (MoEFCC), GoI</b>	MoEFCC is the nodal agency for planning, promotion, coordination and managing the execution of India's environmental/forestry policies & programs. Its Climate Change Division is the nodal body for climate change cooperation and global negotiations. The Ozone Cell at MOEFCC is responsible for the India Cooling Action Plan and phase out of ozone depleting substances (ODS).
<b>Bureau of Energy Efficiency (BEE)</b>	BEE primary objectives are to improve energy efficiency and reduce the energy intensity of the Indian economy by developing policies that focus on self-regulation and market principles for all sectors of the economy. It is the nodal agency for the implementation of the NMEEE.
<b>Ministry of Housing and Urban Affairs (MoHUA)</b>	MoUD is the nodal agency to implement National Mission for Sustainable Habitat and also overlook key urban program Jawaharlal Nehru National Urban Renewal Mission (JNNURM)
<b>Ministry of Power (MoP), GoI</b>	MoP is the key ministry to implement the National Electricity Policy & National Rural Electrification Policy. It is the nodal ministry for the implementation of the Energy Efficiency Mission through the Bureau of Energy Efficiency (BEE). Various sectors work in close coordination with the BEE to implement the mission targets, and implementation is monitored by the Prime Minister's Council on Climate Change.
<b>Ministry of Science &amp; Technology &amp; Department of Science &amp; Technology</b>	Ministry of Science & Technology is the nodal agency for the National Mission on Sustainable Himalayan Eco-systems. Also, Department of Science and Technology coordinates several missions under the National Action Plan on Climate Change (NAPCC).
	In 2001, the EC Act was enacted with the primary objective of providing a necessary legal framework for promoting energy conservation measures. While listing key directives, the Act also mentioned the power of Centre and state to facilitate and enforce the efficient use of energy and its conservation.



<b>State Governments and Municipal Corporations</b>	Section 15 of the Act gives powers to states to enforce certain provisions for efficient use of energy and its conservation such as a) amending ECBC to suit regional and local climatic conditions and may, by rules made by it specify and notify ECBC with respect to use of energy in the buildings; b) creating awareness and disseminate information for efficient use of energy and its conservation; c) organize training of personnel and specialists in the techniques for efficient use of energy and its conservation.[1]
<b>Private companies and private-sector associations</b>	Private sector entities are an active player since they are primary technology providers of efficient cooling products and services, users of these as real estate builders, and providers of finance across both these domains.
<b>Civil Society organisations</b>	CSOs are key stakeholder who provide research, advocacy, and awareness services across the governmental, private-sector, and general population segments; and will be tapped into as a critical driver of this project.

A pre-project consultation meeting was organized to discuss opportunities and challenges on promoting energy efficiency in the buildings sector primarily for maintaining thermal comfort. The primary goal of the stakeholder consultation was to obtain their insights and feedback in designing the proposed PIF.

58. The workshop led by the Bureau of Energy Efficiency enabled experts, representatives from various Ministries, State Departments, bilateral/multilateral institutions and from [Refrigeration & Air-conditioning Manufacturers Association](#) to present their perspectives and proposals leading to a shared understanding and consensus on the project strategy. In line with views expressed in the pre-project stakeholder consultation, an evaluation of the existing regulatory and financial tools/mechanisms in terms of their effectiveness, reach and efficiency will be carried out during the PPG phase and a detailed stakeholder engagement plan will be included in the prodoc.

### 3. Gender Equality and Women's Empowerment

**Briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).**

59. The project is expected to impact gender issues. In India, men and women are employed both in formal and informal sectors. Men and women are key beneficiaries of the project as the project activities would target buildings and environment sector issues. The women workforce is significant in the construction and building sector and mostly requiring skills upgradation. For registering of homes in buyers' name, women get a rebate and is basically to influence higher ownership of homes by women. Commercial and residential buildings are used by women requiring gender sensitive facilities (e.g., access to clean cooking, creche or day care center and other gender sensitive amenities). The building type impacts the health and safety of men and women (e.g. elevators, pollution levels). The location of building could have impacts on accessibility to women's needs. During the PPG, both gender analysis and gender action plan would be developed for the project. The project is expected to ensure women's perspectives are represented through stakeholder interviews, focus group discussions etc. while addressing each of the three components under project overview. This can help in capturing the current landscape of women's participation in the buildings and cooling sector across policy development, private sector and capacity building activities and in turn devise gender mainstreaming strategy for implementation of sector policies, plans and investments towards achieving gender parity.

**Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment? Yes**

closing gender gaps in access to and control over natural resources;

improving women's participation and decision-making; and/or Yes

generating socio-economic benefits or services for women. Yes

**Will the project's results framework or logical framework include gender-sensitive indicators?**

Yes

#### 4. Private sector engagement

**Will there be private sector engagement in the project?**

Yes

**Please briefly explain the rationale behind your answer.**

60. The project proposes to engage private sector in different way:

- a) as a beneficiary of the incentive schemes promoted for increased compliance or building certification;
- b) capacity building across building supply and demand value chain for upgrading technical skills, provision of information and capacity;
- c) leverage investments through de-risking approaches and innovations for potential scale up; and
- d) collaborative partnerships for the environment cause.

61. Companies across the supply chain of the RAC industry as technology providers, as well as end-users - such as the real estate sector and companies financing it - will be key stakeholders within this project. These stakeholders will be engaged actively in the testing and implementation of building norms, piloting new business models, and efficient cooling system in commercial and residential real buildings.

62. The objective behind these engagements is to establish the energy savings, investments' and financial returns, and addressing risk or challenges of implementation for potential scaling up. Specifically, the following private sector entities will be engaged in a systematic manner through the course of this project:

- a) financiers in the real estate segment;
- b) technology providers and developers; training agencies;
- c) and real-estate developers.

63. The private sector plays an important role in supporting green growth in India. The focus of private sector approaches has been, unsurprisingly, mostly in sectors where there is a clear business case and potential for returns, i.e. renewable energy and to a smaller extent energy efficiency. Efforts are needed to build a stronger evidence base of what works and what doesn't. There is a general lack of evidence on the extent to which private sector engagement efforts have resulted in wide-ranging environmental impact and results, beyond the mobilization of private investment.

64. Finally, the project will demonstrate successful, innovative ways to engage the private sector in promoting energy efficiency for thermal comfort in buildings and scale up such approaches and develop bankable projects through engaging industries/private developers as well as industry association like CII, FICCI, CREDAI . The project will engage private sector for demonstration of business models and implement demonstration projects on one hand, while also supporting development of pipeline, on the other hand.

## 5. Risks

Indicate risks, including climate change, potential social and environmental risks that might prevent the Project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the Project design (table format acceptable)

Risks	Risk Category	Mitigation Approach
Lack of coordination among different agencies	Probability: Medium Impact: High	The project facilitates effective enforcement of regulations and harmonization of policies for promoting EE among different agencies. The project will follow structured coordination approaches to align the project activities (Components 1 and 3) and evolve strategies for upscaling the successful initiatives with due consultative processes with all concerned stakeholders.
Limited interest of private sector in the project	Probability: Low Impact: Medium	Indian Construction Industry is value over US\$ 126 billion. Building sector in Indian cities the second largest employer and contributor to economic activity, after agriculture sector. Construction sector also accounts for most inflow of FDI after the services sector and employs more than 35 million people in the country. The pilots proposed (Component 2 and 3) would be designed with private partnerships. Since the Indian Infrastructure and Construction Sectors have moved out of their nascent stages with many low hanging opportunities for private developers, there is substantial opportunity to induce private interests for building new technological competence and efficiency.
Climate Change Risks	Probability: Medium Impact: Medium	This is external risk and the project itself is aimed to mitigate this risk by scaling up efforts to adopt Energy Efficiency and climate friendly technologies. The Technology Needs Assessment (TNA) notes the risk of growing energy demand met through increased imports of fossil fuels (coal, heavy fuel oil, diesel). Given that the reduction of energy imports is a central Government policy objective, an increased focus on energy efficiency measures already occupies a prominent role in energy policy. Further resilience is likely ensured through the building byelaws.
Non achievement of project goals	Probability: low Impact: Medium	The project Components are aligned with the Government of India's ongoing policy initiatives like the implementation of ECBC 2017, implementation of national missions under NAPCC and the implementation of India Cooling Action Plan and also the phase out of high GWP gases from RAC sector.

## 6. Coordination

**Outline the institutional structure of the project including monitoring and evaluation coordination at the project level. Describe possible coordination with other relevant GEF-financed projects and other initiatives.**

65. The Bureau of Energy Efficiency (BEE), Government of India, will be the Implementing Partner for this project. BEE will assume full responsibility and accountability for the effective use of resources and the achievement of the project objectives. At the strategic level, BEE will constitute a Project Steering Committee (PSC) to provide strategic guidance, and Technical Advisory Committee (TAC) to provide the technical support to the project. A Project Management Unit (PMU) at national level will be set up as the core team for implementation of this project. PSC comprises key stakeholders of the project like BEE, MoEFCC, MoHUA, Urban Local Bodies etc. TAC includes representatives of MoEFCC, BEE, Urban Local Bodies, experts, civil society partners and user groups. It will be further detailed in the project document to be prepared during the PPG phase.

66. The project will follow standard UNDP – GEF guidelines for monitoring and evaluation and in addition, the requirements of the implementing agency. UNDP as an implementing agency will provide the quality assurance and oversight function and the cost will be covered from the GEF IA agency fee.

67. At the national as well as subnational levels, the project expects to coordinate with BEE's ongoing programmes and other GEF funded activities in India. Currently, BEE has partnerships with bilateral and multilateral agencies that include USAID, SDC, GIZ, KfW, World Bank, etc. This project will build synergies with other on-going initiatives. Some of these are highlighted below:

- BEE Programmes on Standard and Labelling of Appliances, Energy Conservation Building Codes, Energy Service Companies (ESCOs). Through BEE, the project will also coordinate with bilateral programmes with SDC on energy efficiency in buildings, with GIZ on Indo German Energy Programme and USAID under Market Integration and Transformation for Energy Efficiency (MAITREE) Programme.

- On Montreal Protocol, with the Ministry of Environment, Forests and Climate Change, Government of India to leverage technical support and financing if possible to address the chemical management aspects under this project.
- The EESL's "[India Energy Efficiency Scale-Up Program](#)" to scale up the deployment of energy saving measures in residential and commercial buildings and enhance access to commercial financing. Lessons learnt on financial mechanisms, such as the risk insurance scheme and ESCOs, is vital.

68. There are other non governmental organizations such as Shakti Foundation, WRI, CEEW, TERI, ICLEI and others whose work will complement the project activities. Overall, the coordination would tap potential synergies and complementarities for building and scaling up best practices and lessons.

## 7. Consistency with National Priorities

**Is the Project consistent with the National Strategies and plans or reports and assessments under relevant conventions**

Yes

**If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc**

**National Communications (NC) and Biennial update report under UNFCCC:** The project will contribute to the policies and measures adopted by India in the mitigation chapter of the third BUR and Third NC to reduce the sources of GHGs, and are used to compare and evaluate GHG mitigation policies and measures against the counterfactual situation described in the baseline scenario.

**Nationally Determined Contributions:** The project will help the Government to achieve its NDC target. India has committed to reduce its emission intensity of the economy by 33 to 35% by 2030 from 2005 level and buildings alone account for one third of energy use in India. The project outcomes will support GHG emission reduction in the buildings sector towards zero GWP technologies.

**UNFCCC Technology Needs Assessment:** This project will highlight the scope and challenges for bridging the gap between energy efficiency of buildings and the use of low-GWP technologies for cooling. Lessons and experiences from this project can be further enhanced through a technology needs assessment and scale up efficient cooling technologies in buildings. Moreover, while identifying different technologies relevance for different climatic zones in India, a needs assessment can be undertaken to highlight future funding towards these.

**Others:** The project directly supports the implementation of activities under Smart Cities' mission, India's Cooling Action Plan; as well as the implementation of ECBC 2017 and **SDGs**; would link to SDG platforms and specifically contribute to SDGs 7, 5, 11, 13.



## 8. Knowledge Management

**Outline the Knowledge management approach for the Project, including, if any, plans for the Project to learn from other relevant Projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.**

69. The project proposes different communication strategies to reach the target public, such as materials and information systems, to facilitate the dissemination of the lessons learned, including: reports, manuals, guidelines, website, press, and social media. At the national level in terms of knowledge management, communication and sharing of information with relevant private sector, CSOs and academia stakeholders will be an integrated part of the full project cycle for the envisaged pilot investments, roll out of harmonized codes, to create their buy-in to mainstream efficient building norms and cooling technologies.

70. In collaboration with national project partners and stakeholders including CSOs, businesses, and different government agencies, active communication will be maintained to obtain inputs for defining energy performance criteria and to identify viable business plans and financing models for innovative, low-carbon RAC investments for implementing energy efficiency and climate change policies.

71. All cooling materials and technologies, de-risking instruments and business models that will be a part of component 2 will also be created into case studies for any interested party to learn from. Moreover, these applications will be based on a public study of challenges, risks and investments roadblocks that such technologies face and these again will be publicly available to encourage further innovation to tackle them. The platform envisaged in component 3 will act as a knowledge management tool across relevant platforms that companies and government agencies can access information.

72. All documentation from this project will also inform GEF, and Parties to the Montreal Protocol, on how to mainstream energy efficiency with a refrigerant transition. These lessons will also be helpful as India will embark on its phase-down in the next decade. By design, this project will ensure cross-sectoral exchanges between sectors including buildings, real estate, energy efficient materials, cooling technology providers, and environmental and ozone management agencies and the chemicals sector.

73. UNDP in the past has supported the Government of India, in several initiatives aimed at removal of market barriers to energy efficiency improvements in selected energy intensive sectors, including buildings and is currently implementing state level project for bringing in energy efficiency in energy intensive sectors including public buildings. The experience and lessons from these initiatives will directly feed into the approach envisaged in this project. For instance, the GOI-GEF-UNDP initiative on energy efficiency improvements in the commercial buildings sector helped in removal of barriers for the adoption of the ECBC (energy conservation building codes), the institutional knowledge and experience gained in that project will support implementation of the Thermal Comfort project. This project will also take support from the forums like UN India Business Forum for knowledge and experience to enhance the impact of the project.

**Part III: Approval/Endorsement By GEF Operational Focal Point(S) And Gef Agency(ies)**

**A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter with this template).**

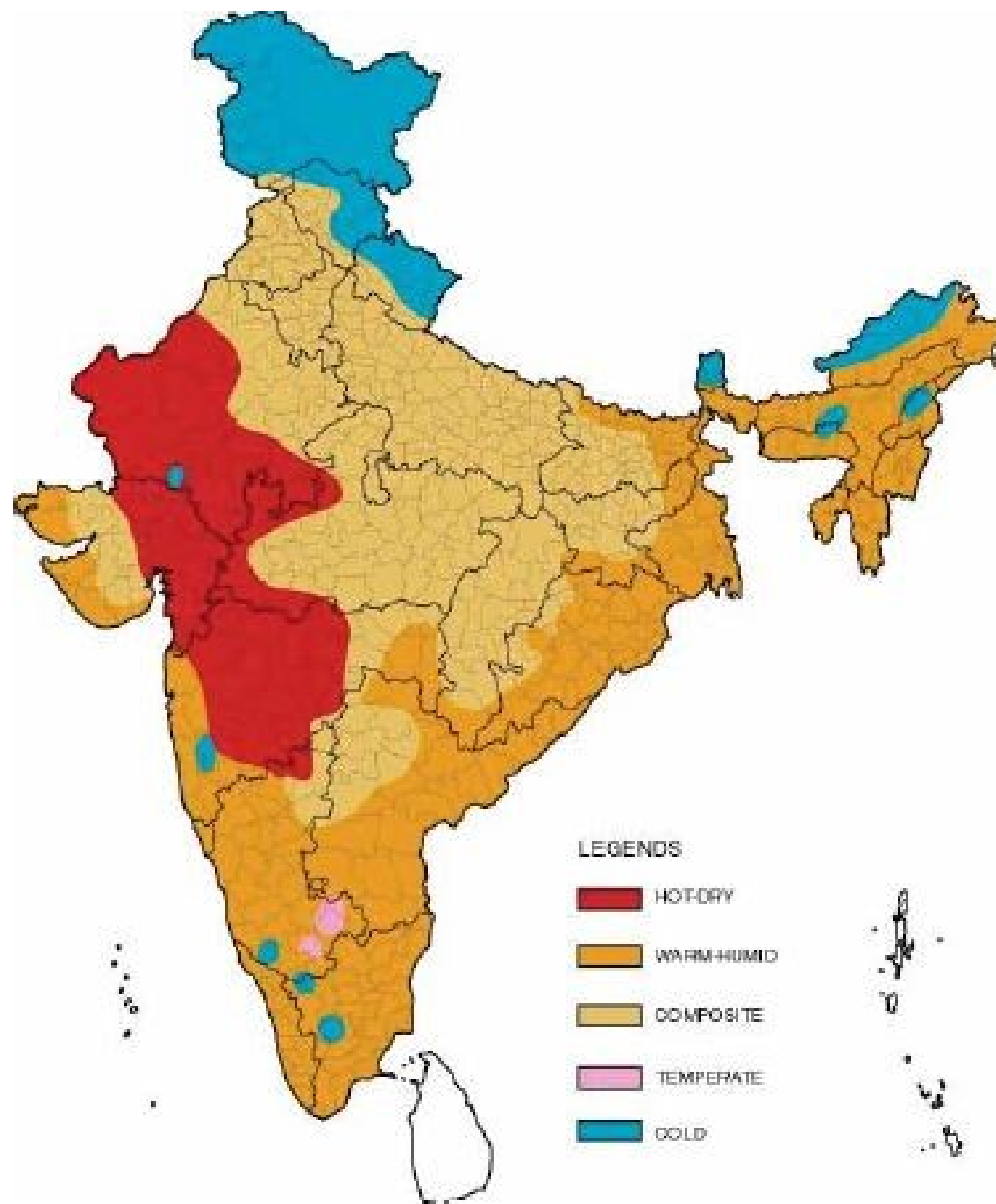
<b>Name</b>	<b>Position</b>	<b>Ministry</b>	<b>Date</b>
Manju Pandey	Joint Secretary and GEF-OFP India	Ministry of Environment, Forest and Climate Change	4/1/2019

## **ANNEX A: Project Map and Geographic Coordinates**

Please provide geo-referenced information and map where the project intervention takes place

**Annex 1**

PROGRAM/PROJECT MAP AND GEOGRAPHIC COORDINATES



City	Climate zone	City	Climate zone
Guwahati	Cold	Bengaluru	Temperate
Sunder Nagar	Cold	Belgaum	Warm & Humid
Allahabad	Composite	Bhagalpur	Warm & Humid
Amritsar	Composite	Bhubaneswar	Warm & Humid
Dehradun	Composite	Chennai	Warm & Humid
Gorakhpur	Composite	Chitradurga	Warm & Humid
Gwalior	Composite	Dibrugarh	Warm & humid
Hisar	Composite	Imphal	Warm & Humid
Hyderabad	Composite	Jagdalpur	Warm & Humid
Indore	Composite	Jamnagar	Warm & Humid
Jabalpur	Composite	Jorhat	Warm & humid
Lucknow	Composite	Kolkata	Warm & Humid
Nagpur	Composite	Kurnool	Warm & Humid
New Delhi	Composite	Mangaluru	Warm & Humid
Patna	Composite	Mumbai	Warm & Humid
Raipur	Composite	Nellore	Warm & Humid
Rajkot	Composite	Panjim	Warm & Humid
Ranchi	Composite	Pune	Warm & Humid
Saharanpur	Composite	Ramgundam	Warm & Humid
Ahmedabad	Hot & Dry	Ratnagiri	Warm & Humid
Aurangabad	Hot & Dry	Raxaul	Warm & Humid
Barmer	Hot & Dry	Shillong	Warm & Humid
Bikaner	Hot & Dry	Tezpur	Warm & Humid

Jodhpur	Hot & Dry	Thiruvananthapuram	Warm & Humid
Sholapur	Hot & Dry	Tiruchirappalli	Warm & Humid
Surat	Hot & Dry		
Kota	Hot& Dry		