GEF-6 REQUEST FOR PROJECT ENDORSEMENT/APPROVAL

PROJECT TYPE: MEDIUM-SIZED PROJECT
TYPE OF TRUST FUND:GEF TRUST FUND

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PART I: PROJECT INFORMATION

Project Title: Increasing Investments in District Energy Systems in Cities – a SE4All Energy Efficiency Accelerator			
Country(ies):	Global	GEF Project ID:[1]	9320
GEF Agency(ies):	UNEP	GEF Agency Project ID:	1388
Other Executing Partner(s):	UNEP	Resubmission Date:	December 20, 2016
GEF Focal Area (s):	Climate Change Mitigation	Project Duration (Months)	36 Months
Integrated Approach Pilot	IAP-Cities ☐ IAP-Commodities ☐ IAP-Food Security ☐	Corporate Program: SGP ☐	
Name of Parent Program	N/A	Agency Fee ($)	US$ 190,000

A. FOCAL AREA STRATEGY FRAMEWORK AND OTHER PROGRAM STRATEGIES[2]

Focal Area Objectives/Programs	Focal Area Outcomes	Trust Fund	(in $)	
			GEF Project Financing	Co-financing
CCM-1 Program 2	Develop and demonstrate innovative policy packages and market initiatives to foster a new range of mitigation actions	GEFTF	2,000,000	9,711,774
	Total project costs		2,000,000	9,711,774

B. PROJECT DESCRIPTION SUMMARY

Project Objective: The objective of this project is to assist developing countries and selected cities to accelerate their transition to lower-carbon and climate resilient societies through promoting modern District Energy Systems (DES).

Project Components/ Programs	Financing Type[3]	Project Outcomes	Project Outputs	Trust Fund	(in $)	
					GEF Projec Financing	Confirmed Co-financing
1. Assessments and technical assistance for DES actions in cities ("Light touch")	TA	1. City officials have increased knowledge of the benefits of District Energy Systems (DES) to promote modern DES **Indicator**: Number of DES rapid	1.1. 16 cities join the DES Initiative through an extensive consultation process 1.2. 16 city DES rapid assessments completed and fact sheets developed 1.3. 4 multi-	GEF TF	349,240	2,432,942

[1] Project ID number remains the same as the assigned PIF number.
[2] When completing Table A, refer to the excerpts on *GEF 6 Results Frameworks for GETF, LDCF and SCCF*.
[3] Financing type can be either investment or technical assistance.

		assessments completed **Target:** 16 DES rapid assessments **Indicator:** Number of cities with new actions new projects, or new policies related to DES drafted, planned, developed, or adopted **Target:** 13 cities	stakeholder workshops on DES undertaken to validate the selection of the 'deep dive' pilot cities and to establish interest in other countries in each region 1.4. Partnerships with international mentor cities and partners established and training programs delivered			
2. District Energy Demonstrations and city-wide plans ("Deep dive")	TA	2. The viability of DES is demonstrated and DES city-wide plans, policies and investments are integrated into the city planning cycle in 4 cities **Indicator:** Number of 'Expressions of Interest' (EOI) for demonstration project investment issued by the city Target: 4 EOIs **Indicator:** Number of shortlists of investor bids approved by the cities **Target:** 4 investor bid shortlists	2.1. Multi-stakeholder coordination structure is strengthened or established through which technical training programs and planning support is delivered in the 4 "deep dive" cities. 2.2. Deep DES Assessments including short and long-term technical and economic potential, including 2 financial project estimates per city, of DES are developed for the 4 "deep dive" cities 2.3. DES pilot demonstrations projects have been selected and investment is committed 2.4. DES City-wide	GEF TF	925,740	4,503,574

			plans (policy & investment) are developed with the 4 "deep dive" cities 2.5. Synthesis reports on policy recommendations for city and national officials are developed, including "train the trainer" package, to address barriers and accelerate the uptake of DES and delivered at regional validation workshops			
3. Monitoring Framework	TA	3. Deep-dive cities and national governments can track and better understand the costs and benefits of modern DES laying the foundation for evidence based decision-making and policy action in the future. **Indicator:** Number of cities agreeing to implement a monitoring protocol **Target:** 4 cities	3.1. Monitoring framework put in place in 4 'deep-dive' cities embedded into existing frameworks and data collection structures 3.2. 4 national workshops providing training on monitoring delivered and national monitoring indicators developed	GEF TF	272,520	812,710

4. Outreach, tools and training on DES Initiative	TA	4. DES in cities is scaled up and replicated nationally and internationally by cities and national governments signed up to the Initiative **Indicator:** Number of cities joining the initiative and committing to assess DES using the regionally tailored rapid assessment methodology and/or implementing a policy action **Target:** 15 cities **Indicator:** Number of national and international counterparts hosting DES Initiative methodology, tools or publications . **Target:** 5	4.1. Awareness raising campaigns delivered 4.2. DES Virtual Platform is enhanced and delivers outreach actions and training programs 4.3. Tailored training sessions are developed and advice delivered through 12 training webinars for 15 newly signed up cities including on the regionally tailored rapid assessment methodology 4.4. 6 fundraising and matchmaking sessions tailored and delivered for new signed up cities (5 cities per session)	GEF TF	212,500	1,481,498
			Evaluation(s)		60,000	0
			Subtotal		1,820,000	9,230,724
			Project Management Cost (PMC)[4]		180,000	481,050
			Total project costs		2,000,000	9,711,774

[4] For GEF Project Financing up to $2 million, PMC could be up to 10% of the subtotal; above $2 million, PMC could be up to 5% of the subtotal. PMC should be charged proportionately to focal areas based on focal area project financing amount in Table D below.

C. CONFIRMED SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE

Please include evidence for co-financing for the project with this form.

Sources of Co-financing	Name of Co-financier	Type of Cofinancing	Amount ($)
Private sector	DANIDA – Danish Ministry of Foreign Affairs	Cash	850,531
Government	Italian Ministry of Environment, Land and Sea	Cash	229,383
International Organization	UNEP	In-kind	160,000
Private sector	Danfoss	In-kind	1,400,000
Private sector	Empower	In-kind	2,000,000
Private sector	Dalkia	In-kind	450,000
Private sector	DBDH	In-kind	502,500
International Organization	Cophenhagen Centre for Energy Efficiency	In-kind	1,750,000
Private sector	ENGIE	In-kind	500,000
International Organization	CTCN	In-kind	250,000
Private sector	Thermaflex	In-kind	184,000
Private sector	SSG	In-kind	45,360
Private sector	The Carbon Trust	In-kind	520,000
Private sector	Solar Turbines	In-kind	120,000
Private sector	King & Spalding LLP	In-kind	750,000
Total Co-financing			9,711,774

D. TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country Name/Global	Focal Area	Programming of Funds	(in $)		
					GEF Project Financing (a)	Agency Fee [a)] (b)[2]	Total (c)=a+b
UNEP	GEFTF	Global	Climate Change	(select as applicable)	2,000,000	190,000	2,190,000
Total Grant Resources					2,000,000	190,000	2,190,000

a) Refer to the Fee Policy for GEF Partner Agencies

E. PROJECT'S TARGET CONTRIBUTIONS TO GLOBAL ENVIRONMENTAL BENEFITS[5]

Provide the expected project targets as appropriate.

Corporate Results	Replenishment Targets	Project Targets
1. Maintain globally significant biodiversity and the ecosystem goods and services that it provides to society	Improved management of landscapes and seascapes covering 300 million hectares	*hectares*
2. Sustainable land management in production systems (agriculture, rangelands, and forest landscapes)	120 million hectares under sustainable land management	*hectares*
3. Promotion of collective management of transboundary water systems and implementation of the full range of policy, legal, and institutional reforms and investments contributing to sustainable use and maintenance of ecosystem services	Water-food-ecosystems security and conjunctive management of surface and groundwater in at least 10 freshwater basins;	*Number of freshwater basins*
	20% of globally over-exploited fisheries (by volume) moved to more sustainable levels	*Percent of fisheries, by volume*
4. Support to transformational shifts towards a low-emission and resilient development path	750 million tons of CO_{2e} mitigated (include both direct and indirect)	***Direct: 2,523,140 tCO_{2e}*** ***Indirect: 823,050 tCO_{2e}***
5. Increase in phase-out, disposal and reduction of releases of POPs, ODS, mercury and other chemicals of global concern	Disposal of 80,000 tons of POPs (PCB, obsolete pesticides)	*metric tons*
	Reduction of 1000 tons of Mercury	*metric tons*
	Phase-out of 303.44 tons of ODP (HCFC)	*ODP tons*
6. Enhance capacity of countries to implement MEAs (multilateral environmental agreements) and mainstream into national and sub-national policy, planning financial and legal frameworks	Development and sectoral planning frameworks integrate measurable targets drawn from the MEAs in at least 10 countries	*Number of Countries:*
	Functional environmental information systems are established to support decision-making in at least 10 countries	*Number of Countries:*

F. DOES THE PROJECT INCLUDE A "NON-GRANT" INSTRUMENT? NO

(If non-grant instruments are used, provide an indicative calendar of expected reflows to your Agency and to the GEF/LDCF/SCCF Trust Fund) in Annex D.

N/A

[5] Update the applicable indicators provided at PIF stage. Progress in programming against these targets for the projects per the *Corporate Results Framework* in the *GEF-6 Programming Directions*, will be aggregated and reported during mid-term and at the conclusion of the replenishment period.

PART II: PROJECT JUSTIFICATION

A.0. Describe any changes in alignment with the project design with the original PIF

No significant changes in the project design have been made as compared to the original PIF. Since there is only one outcome per component in this project, the outcomes and outputs numbering have been simplified (i.e. "Outcome 1", "Outcome 2" instead of "Outcome 1.1", "Outcome 2.1", and "Output 1.1", "Output 1.2" instead of "Output 1.1.1", "Output 1.1.2", etc.).

A change has been introduced in Component 2 to reflect technical assessments, city consultations as well as expert advice received during the PPG phase of the project. Further, a slight increase in scope of Component 3 has been introduced to reflect expert advice received during the PPG phase of the project. Finally, a change in Component 4 indicator was made to reflect the recent shift of international partners incorporating DES on their agenda, partly due to the activities of the DES Initiative. These changes are described below.

Changes related to Component 2:

Outcome 2 indicator as written in the PIF	**Outcome 2 indicators revised after PPG consultations**	**Justification**
Indicator: Number of DES demonstrations tendered by project cities leading to investment Target: 4 tenders	Indicator: Number of 'Expressions of Interest' (EOI) for demonstration project investment issued by the city Target: 4 EOIs Indicator: number of shortlists of investor bids approved by the cities Target: 4 investor bid shortlists	Based on rapid assessments as well as city and investor consultations it emerged that not all projects investments will be realized as a result of a tender process. For example, some cities would like to directly invest and create an special purpose vehicle outside of a tender process.

In order to reflect the new outcome indicator, an updated output has been developed, described below:

Output 2.3 as written in the PIF	**Output 2.3 revised after PPG consultations**	**Justification**
2.3. DES pilot demonstrations tendered for the 4 "deep dive" cities	2.3. DES pilot demonstrations projects have been selected and investment is commited	In order to evaluate the stage of investment in the development of the demonstration project, investor commitment letters will be requested.

Output 2.1 as written in the PIF	**Output 2.1 revised after PPG consultations**	**Justification**
2.1 Multi-stakeholder coordination structure is strengthened or established through which technical training programs and planning support on heating and cooling DES strategies, energy mapping, and DES policy are delivered in the 4 "deep dive" cities	2.1. Multi-stakeholder coordination structure is strengthened or established through which technical training programs and planning support is delivered in the 4 "deep dive" cities.	The wording of the output has been simplified, however, the scope remains the same.

Changes related to Component 3:

Component 3 as written in the PIF	Component 3 revised after PPG consultations	Justification
3.Monitoring, Reporting, and Verification (MRV)	3. Monitoring Framework	During consultations, countries emphasized that they would prefer to use the term monitoring framework. The use of the term MRV was seen as highly political due to the fact that MRVs are linked to INDCs/UNFCCC.

Outcome 3 as written in the PIF	Outcome 3 revised after PPG consultations	Justification
3.1. Deep-dive cities better understand the costs and benefits of modern DES laying the foundation for evidence based decision-making and policy action in the future. **Indicator:** Number of cities implementing MRV protocol **Target:** 4 cities	3. Deep-dive cities and national governments can track and better understand the costs and benefits of modern DES laying the foundation for evidence based decision-making and policy action in the future. **Indicator:** Number of cities implementing a monitoring protocol **Target:** 4 cities	During the PPG process an external expert on monitoring was consulted. He recommended that such frameworks should be implemented at the city-level but that also capacity building at the national level is needed to track the effectiveness of district energy policies and measures in meeting national sustainable development goals and to track the contribution of DES to meeting global challenges. The Initiative will aim to include new indicators at the national level based upon aggregation of city data on DES.

In order to reflect the increased scope of Component 3, an additional Output has been developed, described below:

Output 3.2 as written in the PIF	Output 3.2 revised after PPG consultations	Justification
No Output 3.2. existed in the PIF	3.2. 4 national workshops providing capacity building on district energy monitoring framework and national monitoring indicators delivered	In order to provide the necessary capacity building to national governments, workshops will be provided to relevant stakeholders and ministries.

Changes related to Component 4:

Outcome 4 indicator as written in the PIF	Outcome 4 indicator revised after PPG consultations	Justification
Indicator: Number of international project partners including DES in their agenda after project end Target: 4 partners	Indicator has been deleted	Since the DES Initiative publication and its growing activities, several majors partners who we would have targeted to include DES have now done so (e.g. G20, IPEEC, KfW, IRENA) and we cannot now show this as an output of GEF because it was before this project started

Changes in funding levels are reflected in the Request for CEO Approval for both the GEF funding and co-financing as noted and explained in the following tables.

Project Component	GEF Project Financing in original PIF	GEF Project Financing in Request for CEO Approval	Comments
1. Assessments and technical assistance for DES actions in cities ("Light touch")	520,000	349,240	Costs initially attributed to Component 1 have been reallocated under Components 2, 3 and 4 reflecting an improved understanding of co-finance support from partners as well as an improved understanding of the true costs of activities.
2. District Energy Demonstrations and city-wide plans ("Deep dive")	950,000	925,740	
3. Monitoring Framework	150,000	272,520	
4. Outreach, tools and training on DES Initiative	200,000	212,500	

The reapportioning of GEF project financing to different project components reflects a more in-depth costing of project activities during the development of the Request for CEO Approval and also a deeper understanding of the specific activities that partners will co-finance. In particular, more funds have been apportioned to Component 2 from Component 1.

The indicative co-financing in the PIF totaled US$ 9,100,000 from 17 co-financiers from international organisations, national governments, civil society organizations and the private sector. This estimate was made based on discussions with co-financiers at the time the PIF was formulated.

The indicative co-financing figures were re-assessed during the preparation of the Request for CEO Approval. Co-financing commitments from several of the partners of the DES Initiative have changed from the time period of development of the PIF. These changes have reflected the increased consultation of partners, changing partner priorities and the refining of activities and geographies of the project. Since development of the PIF, partners have increased the amount of co-finance they are willing to provide to Component 1. As a result of these consultations, and as reflected in co-financing letters, the co-financing now totals US$ 9,711,774.

Project Component	Co-financing in original PIF	Co-financing in Request for CEO Approval
1. Assessments and technical assistance for DES actions in cities ("Light touch")	2,000,000	2,432,942
2. District Energy Demonstrations and city-wide plans ("Deep dive")	4,445,000	4,503,574
3. Monitoring Framework	900,000	812,710
4. Outreach, tools and training on DES Initiative	1,455,000	1,481,498
PMC	300,000	481,050
Total Costs	**9,100,000**	**9,711,774**

A.1. Project Description

In 2014, the UN Environment Programme (UNEP) launched the District Energy in Cities Initiative (DES Initiative) to accelerate the scale-up of modern district energy globally. This DES Initiative, led by UNEP, was launched as a public-private partnership including international organisations, private sector, academics, NGOs, cities and countries. The DES Initiative is one of six energy efficiency accelerators under the Sustainable Energy for All initiative. The Secretariat of the DES Initiative is hosted within the Policy Unit of the Energy, Climate and Technology Branch of the Economy Division at UNEP. This GEF project, "Increasing Investments in District Energy Systems in Cities – a SE4All Energy Efficiency Accelerator" will be hosted and implemented by the DES Initiative – more details on this can be found in Annex H.

1) Global environmental and/or adaptation problems, root causes and barriers that need to be addressed

Globally, heating, cooling and hot water represent 60 per cent of the energy demand in buildings. Measures to reduce demand and shift to supply sources and means that are consistent with our global climate and energy ambitions are urgently required. Reducing the energy demand of heating and cooling through building and appliance efficiency improvements will be crucial to achieving decarbonisation. However, even with demand side reductions in buildings, cities will still have significant demands for heating and cooling from the buildings sector and other sectors which will need to be supplied from low-carbon and efficient sources.

Modern district energy systems can reduce primary energy consumption for heating and cooling of urban buildings by up to 50%. Such systems create synergies between the production and supply of heat, cooling, domestic hot water and electricity and can be integrated with municipal systems such as power, sanitation, sewage treatment, transport and waste, and this means heating and cooling can be low-carbon and efficient and maximise 'free', renewable resources. Modern DES provide the only means to use of low-quality thermal energy (waste heat) to provide heating, cooling and hot water services in buildings. Modern DES allow for high levels of affordable renewable energy supply through economies of scale, diversity of supply, and balancing and storage making modern DES a key measure for cities/countries that aim to achieve 100% renewable energy or carbon neutral targets. If DES is compared with competitive technologies on an even playing field, it is frequently more cost effective – by up to 50% - than individual heat or cooling production if the energy demand density of a neighborhood is sufficient enough.

Identifying the right business model, that is replicable and scalable both technically and financially at the neighbourhood, city and national levels is key to the acceleration of district energy. Showcasing innovative approaches from cities around the world can help planners make better informed decisions on how to develop and financially structure a district energy project. Categorization of such approaches can help planners identify similarities that may apply to their own cities and specific circumtances. Business models for district energy systems can be categorized into three main groups:

- The "wholly public" business model is the most common globally. The public sector in its role as local authority or public utility, has full ownership of the system, which allows it to have complete control of the project and makes it possible to deliver broader social objectives, such as environmental outcomes and the alleviation of fuel poverty through tariff control. Vancouver is an example of "wholly public" model, where lacking of private financial support, the city decided to develop a publicly owned district heating system for the 2010 Winter Olympics to showcase new models of heating and to prove their commercial viability. The project was 100 per cent financed by debt raised through the citie's strong access to credit; however the rates on the debt were structured as if the project was privately financed to demonstrate commercial viability. Because the network is publicly owned, connection costs and energy tariffs are transparent, enabling the city to provide building owners with tariff cost comparisons and evidence of savings. This encouraged new connections, including from private developers. The total cost of the project was CAD$ 32 million (US$ 31

million) in 2010, with the costs fully covered through utility customer rates, and a payback of 10-12 years. This model is likely to be similar to DES business models promoted in China.

- "Hybrid public and private" business models have a rate of return that will attract the private sector, but the public sector is still willing to invest in the project and retain some control. These business models can include i) a public and private joint venture, ii) a concession contract, iii) a community-owned not-for-profit or cooperative business model.
  The i) *joint-venture model* typically involves the creation of an (special purpose vehicle) SPV, with ownership split between the public and private sector. Risk can be shared between partners, each of which may have a skillset related to that risk. The public sector (i.e., local authority) can underwrite the sales risk, guaranteeing to commit to long-term heat/cool off-take contracts, and can deal with regulatory barriers to project development. The private sector party, meanwhile, can take on the design, construction and operation risk, transferring this risk away from city taxpayers and on to private sector equity holders. The private party can also benefit from connecting to the network, providing the project with guaranteed demand and potentially granting itself preferential rates. An example of "hybrid model" is Anshan, China (split assets – skillsets split into different functions of the district energy system), where the local government catalysed the use of waste heat from a local steel plant through the development of a new transmission line to capture excess heat. This transmission line is owned 60 percent by the municipally district heating company and 40 per cent by a private company. A short payback period of three years highlights the significant financial benefits that the project will bring as Anshan closes the loop on waste heat and simultaneously reduces the city's coal consumption by a projected 1,2 million tons. The project represents a US$ 64 million investment in a more efficient system that aims to lower carbon intensity and improve local air quality.
  The ii) *concession contract model* typically involves a tender by the city of a concession zone to a utility (private or public-private) that is allowed to develop and operate district energy for a specific time period, the concession provides the option of the city buying back the district energy project. London's Olympic park is an example of a tender by the city of a concession zone. After a competitive procurement process the city awarded Engie a 40-year concession contract to finance, design, build and operate the heating and cooling network and associated energy centres. Because district energy is not regulated in London, the city had to include standards for connection, supply and service levels in the concession contract. Public land and guaranteed connections enabled the financial viability of the project, which cost over £100 million (US$160 million) and was fully financed by ENGIE. Most consumers are expected to save 5–10 per cent on their overall energy bills. Although the project investment was fully private, the local government still played an important role by putting the project to tender and developing a regulatory framework that encouraged connections.
  The iii) *community-owned not-for-profit model* is popular in specific countries like Denmark, where utilities are typically governed via representatives elected by the members of the cooperative/community in addition to city representatives on the board. The business model is usually supported by the local government through underwriting of loans for the cooperative to secure lower-rate finance.

- "Private" business models are pursued where there is a high rate of return (IRR) for the private sector (12 to 20%), and require limited public sector support. They are developed as a wholly privately owned Special Purpose Vehicle but may benefit from guaranteed demand from the public sector or a subsidy or local incentives. Mauritius is initiating a district cooling system that would use sea water for air-conditioning (SWAC) purposes. The SWAC system is being developed by a local company, Sotravic Ltd., at an estimated cost of MUR4 billion (US$130 million) and will be financed mainly through private funding from local banks and international fi nancial institutions. The role of the government of Mauritius is to promote the scheme to attract concessional finance from development banks. Already, the African Development Bank's Sustainable Energy Fund for Africa (SEFA) has given a project preparation grant of US$1 million to finance the initial

development stage of the SWAC system in Port Louis (Ah Sue, 2014; Capital, 2014; AfDB, 2014). The system is expected to provide cooling, through 5.5 km of pipes, to some 60 high-density buildings (both public and private) in the city. The project will allow Mauritius to reduce its power supply, provided mostly through fossil fuel-based plants, by about 26 MW. This represents 6 per cent of the country's forecast peak electricity demand in 2014.

The business model for a district energy system is very project-specific and will vary depending on the market type, specific project conditions and the degree to which the public sector wishes to be involved. Some cities and countries are more inclined to have energy services provided by public utilities, while others are more open to private sector participation. However a common characteristic to greater deployment of modern DES is the support provided by the public sector, either as full developer, owner and operator or under a role focused mainly on project coordination, local planning and policy.

Critical to a viable business model is to ensure that customers are incentivized to connect and those that are connected are to remain connected. Some countries use regulation, justified by environmental benefits, that mean alternative heat/cool sources are more expensive (e.g. Nordic CO_2 taxes) or banned (e.g. bans on use of electric heating or indoor coal or wood). Other countries allow free market mechanisms to decide on the heat/cool mix. In such countries, district energy systems can be designed that reduce risk of alternatives becoming more desirable, for example, district cooling systems with some electric chillers often remain cheaper than individual building chillers under varying electricity prices. Furthermore, structuring tariffs to remain competitive with alternative technologies is a key best practice, for example in London, where the majority of heating is delivered by individual gas boilers, district heat tariffs are recommended to track the gas price and this is clearly defined in contracts consumers sign, helping them understand that district heat will likely always remain cheaper. Consumer protection policies which create confidence in the pricing structures and savings also incentivize connection (example Singapore, Denmark).

Although shares of DES are expanding and several national and local governments aware of their important role are setting policies and targets that establish a favourable policy and regulatory framework for the development of successful business models, there are still long-standing barriers to greater deployment of modern DES, some of which stem from a misperception of the benefits and opportunities of DES and lack of regulatory frameworks for the implementation of the technology . Project activities have been structured to ensure barriers common to all market types are addressed as well as country-specific barriers. These common barriers and the activities structured to overcome them are:

1. Lack of awareness. The specific opportunities and benefits of improving efficiency in the building sector through district energy, including its diverse technology applications and savings are not well-known. Further, misperception associated to district energy persists, such as: it being only relevant for heating in cold climates; that it is a technology of the past suitable only to highly centralised, top-down regimes; and that district energy will not be needed in the future due to the transition to energy efficient or plus-energy buildings. A lack of awareness-raising on the opportunities of district energy can mean low public and investor confidence/interest, increasing risk, and reducing the bankability of projects and effectiveness of policy implementation.

Awareness of district energy and its benefits at different levels of government, local private sector and utilities, the general public, media organisations and finance institutions will be improved-upon through the project activities. Awareness campaigns delivered within Component 4 using the results from the deep-dive cities, and synthesis reports will improve awareness of DES potential and benefits. Furthermore, significant awareness raising will be achieved through dissemination of rapid assessment reports (Component 1), pilot city training workshops (Component 2) and regional workshops and the Virtual Platform (Component 4).

2. Lack of local and institutional capacity. The integrated approach offered by district energy is the very opportunity it presents to accelerate the energy transition, but it is also the key challenge because it requires

significant local capacity for planning and implementing projects and coordination at multiple levels of governance and across multiple city systems. The challenges relate to a lack of capacity for coordination, new practices, policies, institutions, business models, finance, aggregation, and cross-sectoral linkages, along with changes in professional practices, education and training.

Building local and institutional capacity to develop projects from concept to tender, holistic policies and regulations will be overcome by: assessing local barriers and capacity building needs through DES Rapid Assessments (Component 1); developing replicable local coordination frameworks of multiple stakeholders in each 'deep dive' city and providing in-depth capacity building in pilot cities (Component 2); providing direct support and capacity building to cities through each stage of project development including project identification, project pre-feasibility, investor identification, procurement plan development and analysis of bids (Component 2); training institutions to deliver capacity building to cities and other countries (Component 4); and providing tools, methodologies and capacity building to replication cities (Component 4).

3. Lack of holistic planning policies, harmonized incentives and regulations. Cities are not considering the potential benefits of DES in urban planning and therefore not integrating infrastructure planning and land-use planning to match heating/cooling supply with demand. Further, policy across sectors are not consistent, such as agreed accounting methods to develop efficiency ratings, labels and standards for buildings and recognition of benefits by some green building certification programs. Existing power regulations can mean cogeneration is not always given favorable grid access or a sufficient power price to reflect the benefits of local generation. Local and national governments are not setting appropriate tariff regulations that incorporate DES multiple benefits, create a level playing field, provide customer protection and ensure a sustainable business model for DES.

By developing city-wide district energy plans and providing tailored policy and regulatory advice (Component 2) the DES Initiative will help pilot cities put in place the policies required to scale up investment in DES. Learning cities and replication cities will receive policy recommendations through rapid assessments (Components 1 and 4) and access to a Virtual Platform containing regionally tailored training materials, best practices and case studies as well as partner and champion city support (Component 4) to realize these policy changes. Furthermore, national regulatory frameworks can hinder district energy development significantly and will be assessed in detail in Component 2 with local and national recommendations developed.

4. Prohibitive finance costs. In many markets where the commercial viability of modern DES has not been proven, rates on debt can be prohibitively high, reducing the viability of projects. In such markets, demonstration projects will be critical to leveraging lower cost finance to DES and measures such as soft loans, guarantees or grants, or pre-construction offtake contracts from local government or large consumers can also help support DES in the short to medium-term. Furthermore, high project development costs can stifle development in new markets and may require grants, provision of technical expertise or innovative financing mechanisms such as a revolving fund. Many local governments are not attracting finance to DES due to a lack of capacity in structuring projects and putting projects to tender that attract the investments as well as a lack of awareness of business model options for DES that include private sector participation.

Commercially viable modern DES demonstration projects that are part of a longer term city-wide plan may be put to tender in pilot cities, dependent on the selected Procurement Plan (Component 2), coupled with training on business models, supportive local policies, private sector engagement and stakeholder coordination. The long-term policy and investment plan that the city develops will create market security to financiers (component 2). Through the project expert team (deployment team) and the city multistakeholder team, financiers will be engaged from the outset as reviewers and advisors, thereby gaining capacity and familiarity with the technology over the three year process of project development. This model used to mitigate risk and thereby lower financing costs and deliver bankable projects will be replicated within the country and regionally through light-touch city trainings (Component

1), train-the-trainer modules, city access to the Virtual Platform, and the awareness raising campaign (Component 4). Potential demonstration projects can be identified in numerous cities using DES Rapid assessments that include simple cost-benefit analysis of projects and identification of funding sources for feasibility studies (Components1 and 4).

5. Data/information. Political decision makers may not know the energy demand for heating (which can be mixed with hot water, power and cooking) or cooling from air conditioning and electric chillers (which is hidden in a building's total electricity bill). This may lead policymakers to underestimate the potential role of district heating or cooling in achieving objectives such as energy access, affordability or reliability, and to overlook the need to regulate, or support it.

A heating and cooling assessment is key to understanding heating and cooling demand and can provide important data that can aid in strategy development at both the city and national levels. The DES Initiative is developing a global methodology for collecting heating and cooling data which will be verified and improved in Component 2 and promoted through Component 4. By developing city-wide district energy plans in Component 2 and through policy advice provided in Component 1 and 4, the DES Initiative will help cities put in place the policies required to scale up investment in DES.

2) Baseline scenario and any associated baseline projects

District energy is a proven energy solution that has been deployed for many years in a growing number of cities worldwide. The ability of district energy systems to combine energy efficiency improvements with renewable energy integration has brought new relevance to these technologies. For example, district heating meets 12% of heat demand in Europe and 30% in China while in Russia, district heating meets 50% of heat demand in buildings. The USA has the largest district cooling capacity at 16 gigawatts-thermal (GWth), followed by the United Arab Emirates (10 GWth) and Japan (4 GWth). In South Korea, district cooling has grown more than three times between 2009 and 2011. At least 20 countries in Europe use renewables in their district heat systems, with at least 20% of EU-wide district heat generated by renewable sources.

However, the pace of progress in expanding DES, making DES more efficient and switching heat sources to renewables and waste heat, is currently too slow and largely limited to developed country cities. In the EU for example, enough waste heat is produced to heat the EU's entire building stock; in China, the presence of heavy industry near to cities provides an opportunity to connect industrial waste heat to buildings; in Eastern Europe cities have a large potential to transition away from boilers to capturing waste heat from power generation in CHPs; and in South America and Asia, cooling demand is expected to grow at least 625% across by 2050, and delivering half of this 2050 cooling demand through district cooling would reduce CO_2 emissions by 35 $MtCO_{2eq}$ (if the carbon intensity of the power sector remains the same as today).

Development of DES in developing countries will require the demonstration of technology applications, policies and business models and project development methodologies in 'new' markets (district cooling across Asia and district heating and cooling across Latin America), expansion markets (existing district heating in China, Central Asia, specific countries in Eastern Europe) and refurbishment markets (existing district heating in Russia and Eastern Europe). Further, country/regional specific capacity building tools and methodologies need to be developed to ensure replication of best practices from city level projects to the country/regional and global levels.

Within this global context, the DES Initiative's Steering Committee has selected four countries which cover the three development stages of the DES market: "new" countries represented by Chile and India, "expansion" countries represented by China, and "refurbishment" countries represented by Serbia. Furthermore these four

countries have been selected following the country selection criteria detailed in section 3) which takes into consideration potential CO_2 reductions, alignment with national priorities or existing support programmes, local and national political will, geographic and technological diversity or potential for replication at the regional level among others.

The following paragraphs describe the baseline scenario for each of the selected implementation countries: Chile, China, India and Serbia.

Baseline scenario for Chile

Chile imports 60% of its primary energy, most of which comes from Argentina in the form of natural gas. This heavy reliance on energy imports puts the country at risk of global energy market trends and uncontrollable climate events. Due to low regional electricity network interconnectivity, Chile is unable to import or export much electricity, and instead relies on fossil fuel imports and domestic generation.

Compared to other countries in Latin America, Chile is the fifth-largest consumer and its residential and industrial energy prices are among the highest in Latin America. According to the Ministry of Energy, 42% of the residential energy consumption is covered by wood, being its primary use heating and cooking. 96% of the households in regions of central and southern Chile, which account for over 50% of the total Chilean population, use woodstoves for heating and cooking, which generates major air pollution problems due to PM 2.5 emissions coming from wood combustion, having caused over 30 episodes of pre-emergency and emergency during 2013 in cities like Coyhaique, Chillán and Temuco. The plan for atmospheric decontamination regulates the utilization of wood stoves and prohibits their use during high pollution episodes. The application of this plan resulted in 50 days of wood stoves prohibition in Temuco during the winter in 2016. The alternative technology used by households in these cases are electric heaters.

The country has also experienced an increase in the demand for hot domestic water, going from 52% in 2002 to 81% in 2010 according to a national study "Residential sector energy conservation curve". This figure is expected to raise due to the population growth and a greater accessibility, contributing to and increase of the total thermal energy consumption. The most common technology used for hot water supply are individual gas boilers. Gas prices in Chile are among the highest in South America, the gas bill during winter months for a 100 m^2 appartment in Santiago amounts to approximately 200 €/month (including hot water and heating), in a country where the average salary is around 700 €/month.

Both, the problems raised due to air pollution coming from wood combustion, and the increase in energy consumption for space and water heating as a result of a higher urban density, require of the implementation of solutions capable of improving air quality at the same time as meeting a growing thermal energy demand.

The Government of Chile has communicated to UNEP that it would like to implement district heating as a key solution to mitigate air pollution and meet growing thermal energy demand; district heating has been identified as a technically feasible alternative to individual woodstoves as well as gas and water heating with benefits for communities and users. The private sector (private utility companies and real state developers) is starting to identify district heating as a new business opportunity and some small-scale fully private pilot projects are being initiated. Furthermore, the Ministry of Energy and the Ministry of Environment, together with the DES Initiative, are currently defining a roadmap for the development of district heating for the period 2017-2025. The roadmap will provide a national framework to guide the development and implementation of district heating in the country, and outlining specific national lines of action agreed to by the main stakeholders. The aim is to publish the national district heating roadmap by December 2016. The Government has also indicated that it would like the DES Initiative to translate this roadmap into a national strategy including a binding framework for action to implement district heat. Several pre-feasibility studies on district heating have already been undertaken in cities like Coyhaique,

Temuco and Chillán during the last years. These studies show that district heating is a technically and commercially feasible solution which could have a payback period of 8-10 years and offering numerous benefits to community and users, such as reduced emissions and concentration of PM 2.5 by 90%, savings in total energy consumption , security of supply and decreased dependency on fossil fuel imports. The studies undertaken in Temuco show that in areas with high energy density, district heating can be cheaper than using individual heating systems run on gas and/or pellets plus a gas boiler for hot water supply. Further to the 2,500 tCO_2/year emission reductions achieved by substituting gas hot water boilers by district heating, with the introduction of biomass[6] CHP the city will benefit from carbon neutral electricity generation that would otherwise be produced through imported fossil fuels, reducing CO_2 emission in an estimated amount of 60,000 tCO_{2eq} per year, and district heating systems would enable local renewable electricity production. However, these studies have also shown that there are numerous challenges and barriers to the implementation of district heating on a large scale in Chile.

A first consultation with the local stakeholders in Chile on the district heating roadmap confirmed diverse challenges that remain to larger scale deployment of DES. In addition to the typical barriers to district energy projects globally which are described above, specific to district heating in Chile are :

- **high investment costs** of district heating relative to individual wood stoves. This barrier has been highlighted by Aguas Araucanía, the Water Utility Company from Temuco that has recently build a pilot project on district heating. Aguas Araucania delivers water to 220,000 clients and has identified district heating as a potential new business opportunity. The company invested 48,000 € in a pilot project to build a district heating network and connect 5 buildings in Temuco. With this pilot project, Aguas Araucanía aimed at testing a business model for district heating, getting the know how to build and operate a district heating network, identify the main market barriers and positioned themselves as reference to provide district heating in the region of Araucanía. To implement the pilot project, Aguas Araucanía undertook a technical and financial assessment and organized a meeting with the building's owners to proceed with the implementation works that took place in September 2015. Once the owners agreed, they started the detailed engineering phase and proceed with the construction works who finished in April 2016. Consumers are already paying according to their consumption on a monthly basis, the tariff is split in two: a fixed part that amounts up to 45€ /month and a variable amount of 10c€/KWh that depends on consumption. The amount set for the fixed part is equivalent to the amount consumers were paying for their gas consumption for water heating before district heating was installed. This is the tariff strategy that Aguas Araucania has decided to follow to make sure that their tariff is competitive in the market. This pilot is going to be expanded to 224 houses which would benefit from the same tariffs. The project's payback period is 12 years and the IRR is 12%. After the pilot experience, the company expressed its willingness to extend, invest and operate the external distribution networks and aims at supplying heat to 10,000 households in Temuco as long as financial support is provided to make buildings ready for connection. They affirm that district heating projects in existing residential buildings can be

[6] The use of sustainable biomass will be guaranteed through the two main certification systems already in place in the Chilean forestry sector that regulate most of the forest activity: PEFC certification (Programme for the Endorsement of Forest Certifications Schemes), which has its national counterpart, CERTFOR, and FSC (Forest Stewardship Council). In 2013 Chile was assigned a USD 3,8million donation from the Forest Carbon Partnership Facility (FCPF) to fund a large part of the participatory and consultation activities for the formulation and validation of the a National Strategy for Climate Change and Plant Resources (ENCCRV), together with a number of essential technical works based on the requirements set out by REDD+, both within the context of the UNFCCC as well as voluntary bodies such as the FCPF itself.. In November 2015 the country was assigned and additional amount for the 2016–2019 period, which will be used for key actions in the preparation and early implementation phase of REDD+ in the country. Examples of these actions include the development of all the elements and systems for the correct accounting of carbon and valuation of environmental services, the strengthening of the National Forestry Corporation's (CONAF) institutional capacities, the establishment of new learning areas (pilot projects) that deal with the causes of deforestation and forestry degradation in an operational and concrete manner, as well as the conduct of activities required for compliance with the requirements established in the social and environmental safeguards. Chile has recently submitted the REDD+ Preparation Package. The implementation of the REDD+ mechanisms will guarantee the sustainable management of forestry resources.

commercially viable if financial support is provided to cover expenses for the installation of required equipment inside the building (heat exchangers and radiators). The costs of making each pilot household ready for district heating connections was approximately 5,500€. However, in a project with new buildings ready for connection or existing buildings with a central heating, installation would be much easier to implement and building readiness costs would me much lower. Aguas Araucanía is already discussing with a building developer in Temuco about the possibility of building a district heating network for a new development area in which the building developer will be in charge of making each building ready for connection.

The Ministry of Environment is currently searching for financial mechanisms in form of soft loans to help overcome the initial financial barrier. Currently the Ministry of Environment provides a 1,000 USD average subsidy as part of the national plan for stove exchange. To assist the country overcome this financial barrier, the DES Initiative will work under component 2 with Chilean financial institutions such as: Banco BICE, Banco del Estado de Chile and ABIF (Association of Banks and Financial Institutions), already part of the National Steering Committee, to define a viable financial mechanism and make recommendations on financial support schemes and tariff settings that will ensure district heating is commercially viable where appropriate. Financial support to district heating can involve providing financial assistance to new connections, by partially paying the cost to connect (e.g. as has been done in Brest, France) or paying the full cost (e.g. the private operator in Seattle paying for profitable connections due to savings in floor space and in tariffs) or the government can implement an incentive through for example green building rating systems.

- **lack of a regulatory framework** for the installation and operation of large district heating networks to interconnect and supply private and public buildings. Deep-dive support (Component 2) will include local and national regulatory analysis. In particular, Chile has a Green Building Council that uses Leadership in Energy and Environmental Design (LEED) certification for energy efficient buildings. The initiative will seek to update this certification system to enable buildings connecting to district energy to earn credits for district energy connection (e.g. through system-wide efficiency improvements and/or renewable energy through district heat supply). This has been done in the US Green Building Council, which issued a special guideline on district energy in 2014. Such incorporation of a clear credit towards green building requirements, whereby local green building standards account for district energy in their certification schemes, can encourage building owners and developers to connect (other e.g., Frankfurt, Sonderborg, Vancouver etc) . Consultations also show that one of the barriers to further scaling the Temuco case is the lack of regulations for the digging of roads to expand and interconnect more buildings. Component 2 will also make urban planning recommendations to incentivize connection such as: a building code that requires buildings over a certain size to implement centralized heating; land-use policies that use ‘connect-unless’ policy meaning new building developments must connect to district heating unless is not technically or economically feasible; and zoning policies that promote mixed use and dense development. The interconnection of different building types (private and public) will be encouraged by the implementation of a multi-stakeholder committee (component 2) to guide the project development process.

- **lack of a viable and replicable business model.** Up to date no big scale district energy projects having been developed or implemented in the country. Component 2 will assess a wide-range of business models with a focus on privately-owned models that can be scaled to multiple cities in the country such as the Temuco case. The business model pursued by Aguas Araucanía is similar to their existing model for water supply in which they are given the exclusivity to operate a specific zone or city and a regulated tariff is negotiated between the Utility company and the Ministry of Public Works. London promoted a similar model as the Temuco case through long-term private concession contracts in which financial viability is guaranteed by signing connection agreements with for example new developments. Taking the business approach from DES

Initiative's champion cities, such as London, and linking their experience to Chilean cities (Component 4) such as Temuco, will serve as reference in terms of contract conditions, connection agreements established, regulations in place , and will ensure long-term sharing of best practice.

Baseline scenario for China

China is the largest energy consumer in the world predominantly using coal, which accounts for approximately 70% of primary energy consumption. This results in significant national CO_2 emissions, 85 % of which come from the energy sector. In 2014, China announced a target to peak greenhouse gas emissions by approximately 2030 and increase the share of non-fossil fuels in primary energy consumption to approximately 20 % by 2030 compared to 9.8 % in 2013. China is also a global leader in renewable energy particularly in renewable power as well as heating of buildings using solar hot water and geothermal energy. The country is aiming to reduce the share of coal in the energy mix through further improved energy efficiency and higher shares of renewables, and the 13th Five-Year Plan (FYP) aims to reduce energy intensity by 15 % and carbon intensity by 18 % by 2020. The 13th FYP includes specific targets on particulate matter – a major cause of air pollution. China's cities are now expected to be rated 'good' or better for air quality at least 80 % of the time by 2020, up from 76.7 % in 2015. This will be achieved by reducing emissions of PM2.5 by 25 %. These key drivers underpin the focus of China on expanding and modernizing district energy, as indicated in the 13th year FYP, which promotes the utilisation of low-grade excess heat in district heating systems. This FYP includes an ambitious target of reducing the need for more than 50 million tonnes of coal by 2020, equivalent to the heating needed for 2 billion m^2 of building floor area or 16 % of the current total district heating in China. This plan aims to promote the pilot programme in 150 cities across northern China. Through consultation with NDRC (National Development and Reform Commission of China), the Chinese government has indicated that it also prioritises the integration of other renewables and district cooling in order to achieve its policy objectives.

In China, district heating has been promoted since the 1980s and this promotion, as well as rapid development of urbanisation, means the building floor space served by district heating increased from 277 million m^2 in 1991 to 4.4 billion m^2 in 2010, an average annual growth rate of 15 %. By 2010, district heating supplied more than 80% of the total urban floor space in northern China, and in recent years, district heating and district cooling has also spread to include urban areas located in Southern China. Because of the shortage and high price of natural gas, China's district heating networks predominantly run on coal and in 2010, large coal boilers supplied 54.2 % of heat, CHP supplied 43.4 % and gas boilers supplied 10.8 %.

Due to low boiler efficiency and a lack of advanced pollution filter systems, coal boilers on district heating networks are considered to be one of the main sources of PM 2.5 during the heating period, particularly in big Northern Chinese cities. Inefficient networks and operation, and an overreliance on coal, meant China's district heating systems were responsible for approximately 300 million tCO_2 in 2012 or 3.4% of Chinese CO_2 emissions. In China, industry accounts for 70.8% of energy consumption (in 2010), and as such industrial waste heat could be a significant heat supply to existing district heating systems. The total industrial waste heat that could be connected to district heating in China could reach 545.2 TWh in 2020 and 731.5 TWh in 2030 (for context district heat supply in 2010 was approximately 800 TWh).

The energy efficiency, share of renewables, cost and emissions of district heat production and distribution can be significantly improved in China. Ongoing projects and initiatives are slowly modernising some networks, however **holistic and replicable solutions** that have been ground-tested and have **national and provincial level support** are still needed. Modern DES technologies need to be **deployed in conjunction** with improvements to energy strategy development, urban energy planning, tariff setting and waste heat mapping as well as capacity building and technical training.

In September 2016, the IEA, UNEP DES Initiative and Tsinghua University held a workshop on district heating which discussed key barriers in China's district heat market that the DES Initiative will aim to address. The stakeholder included the NDRC, local and international private sector operators, local banks, esco's and academia. The main barriers discussed include:

- First, **split incentives** exist at both supply and demand sides of district heating systems that prevent the scale-up of using low-grade temperature excess heat.
- Second, **no standardized approaches** exist to evaluate how to optimize existing district heating systems or study energy system costs and benefits from interaction of excess heat, renewable energy resources and CHP (i.e. cost-benefit analysis of heat solutions) to help guide development and investment choices. The **methodologies and cost-benefit tools developed through component 2** will allow the initiative to provide standardized approaches for decision making in Chinese cities. The DES Initiative is working with the Chinese National Institute for Standardization to implement such methodologies for China.
- Third, local authorities do not have a guideline to assess and report the potential for district heating; effectively map renewable and excess heat sources and existing district heating networks; and develop this into long term heat plans. **This lack of long-term energy planning and mapping** means district heating networks in cities are often isolated, not-optimized and inefficient. **The rapid assessment methodology (component 1) and monitoring and evaluation (component 3) will support cities in being able to assess and report on this potential.** Improved energy planning as well as energy mapping (Component 2), will allow cities to identify and plan interconnections and transmission lines that enable connection of large scale waste heat and renewables..

Furthermore, industrial waste heat connection requires **improved stakeholder coordination** and **innovative, replicable business models**. An example of such a business model in Anshan is presented on page 11 and also for Tangshan city in the box below. Demonstrating waste heat connection, and testing the coordination frameworks and business models needed to deliver it, will be a significant output of Component 2 and can be scaled-up through Component 4.

Finally, operation of district heating can be improved in many cities, with barriers including technical experience and knowledge, lack of international best practice sharing, access to finance, and small district heating companies. Deep assessments of existing systems (Components 1 and 2) will also identify crucial network upgrades and operational improvements, such as improved metering, switching from inefficient boilers to waste heat sources, substation and network reconstruction and hot water connections.

Case study 1: Business model of Qianxi County, Tangshan city

Qianxi county is an administrative district of roughly 390,000 people in the eastern part of Tangshan city. District heat fuelled by coal-fired boilers has historically been the main source for space heating. Rapid growth of buildings floor area and expected growth in district heat demand pose a central challenge to meeting energy and environment objectives in Qianxi, including restrictions on future coal consumption.

A demonstration project has been developed to connect 217.5 MW of waste heat from nearby steel plants. Using this heat recovery, the heating power potential could serve baseload district heat for the district through 2030.

A local ESCO has created a joint venture district heating company with the local government. This company has concluded a concession agreement with the local government and a long term contract of using excess heat with local steel plants. The district heating company rents the franchise rights to service the district heat network from the local government.

The project has three phases. When complete, the project is expected to reduce annual district heat production cost by nearly 30 million yuan in 2016 (4.4. million USD) and 63 million yuan in 2030 (8.9 million USD). The whole project's payback period is roughly 7 years across the three phases.

Source: IEA ETP (2016)

Baseline scenario for India

Cities in India are experiencing huge growth in cooling demand which significantly affects some Indian utilities ability to provide stable power and also increases the investment need in generating capacity to meet peak demand and power transmission network development. India will require 83GW of additional power capacity from 2016 to 2022 in order to meet demand. Cooling accounts for a large portion of this required capacity. In some cities up to 40% of electricity demand and up to 60% of peak electricity demand is for cooling (LBNL 2015, UNEP 2015). The stress on the Indian power grid is significant with some cities unable to deliver sufficient electricity to meet growing demand, particularly during periods with high cooling demand. Unless efficiency of cooling at the residential scale and also larger commercial and industrial scale is improved, this unsustainable growth of electricity demand for cooling will continue, requiring additional, unnecessary coal power stations in India. According to the IEA, India's cooling demand will grow 18 times by 2050, highlighting the need to deliver this efficiently and with alternatives to electricity from coal. Through consultations with the Indian Ministry of New and Renewable Energy, Ministry of Power, and Ministry of Urban Development (see section A.3), local governments and stakeholders, it is evident that energy efficiency in cooling is a key priority for the government, and district cooling is an important solution .

The DES Initiative is currently working with the Commissioner and Municipal Coorporation of five 'light touch' cities - Bhopal, Coimbatoire, Thane, Pune, and Rajkot – to unlock investment in modern district cooling. These cities were selected using the city selection criteria described in component 1 and based on input from expert local stakeholders such as ICLEI South Asia Secretariat, UNEP Region of Asia Pacific (UNEP RoAP), the National Project Steering Committee in India, private sector partners that are particularly active in India and/or district cooling development. More information on the city selection process is included under component 1.

UNEP together with Danfoss, Empower, IDEA, and ICLEI have begun rapid assessments on district cooling potential with these five cities. The initial results of the rapid assessments estimate the proportion of electricity demand in these five cities for cooling varies between: 25%-40%, the contribution to peak load is currently: 30% - 45%, and the total CO2 from cooling for all cities: 3.2 – 5.2 million tons of CO2 per year. The growth of the commercial sectors and industry in these cities will significantly increase these figures, as will the increased uptake of air conditioning in the residential sector. Initial results also find a high potential for district cooling in all five cities.

Perhaps the most important factor in creating a financially viable district cooling project is finding an initial customer base with a large and steady demand[7]. Three key characteristics of such projects are:

1) The majority of the development is **new**: district cooling can be retrofitted to buildings, but the first projects in a city are likely to focus on new development. This new development needs to be **sufficiently dense**[8] to ensure that network costs are not too high.
2) The development is **mixed use,** aggregates diverse end-users, creating a smoother load profile and improved business case. Mixed use is a good practice in general in city planning, but is crucial for district energy
3) The development has **anchor loads**, these are buildings that consume a high level, and relatively constant amount of cooling that are ideally influenced by the local government through ownership or otherwise. Anchor loads literally anchor the initial development of district cooling, securing a strong business case that

[7] The household level demand varies with activities of the occupants. Publically owned or regulated buildings are used 24hr a day or have steadier demand due to schedules/activities of occupants.

[8] Minimum density is difficult to define, and will generally **depend on the type of buildings in a development**. As an approximate, for a commercial development in India a floor space index of 3 or higher would likely create a good business case. If there is residential being connected this FSI may need to be higher.

can allow initial investments to be realized at lower risk. Moving forward, these initial networks around anchor loads can be expanded and interconnected with other systems.

In conducting the rapid assessments it became clear that all five cities have a large number of anchor loads across the city that could be used to kick-start new district cooling networks and significant new developments (new townships, special economic zones, IT Parks, commercial districts and smart city areas) that can be interconnected. For example Rajkot has an industrial zone with significant waste heat from the foundry industry right next to huge cooling demands from the refrigeration industry. Bhopal will have 8.7 square kilometres of commercial development coming online by 2031 – this could be designed to be conducive to district cooling development, with mixed use zoning and anchor loads. Thane is the hottest of the five cities and has a fast growing IT sector that are huge consumers of cooling. Pune is in the top 6 retail estate markets in India and new additions of offices and retail space could incorporate district cooling. Coimbatore has 5 special economic zones planned each of which could be designed for district cooling.All 5 cities have shown leadership in smart cities through their energy and climate strategies, plans and policies which through the project can be upgraded to integrate DES.

Based on city visits, rapid assessments, consultations with the with the Indian Ministry of New and Renewable Energy, Ministry of Power, and Ministry of Urban Development (see section A.3) and two multi-stakeholder workshops – with the city of Rajkot and the city of Thane) some of the key barriers to deploying district cooling include:

- **Lack of experience with district cooling in India:** Transparent demonstration of district cooling technology and business model is a priority in order to convince building developers, local governments and national governments of district cooling's potential in the country Without such demonstrations with significant local government support, the district cooling market will remain stagnant and confined to small private developments..A demonstration project will be a key output of the Component 2 activities, with lessons transferred to other cities through training and the Virtual Platform (Component 4) to be applied to projects identified through rapid assessments (Components 1 and 4).

- **Existing buildings are not district cooling ready (centralized cooling):** Currently many buildings in Indian cities are not developed to be district cooling ready . Although centralized cooling of hospitals, malls and offices is increasingly common, it is not always standard practice and when it is applied, chillers can be over-sized and poorly maintained. Further, neighborhoods are not necessarily mixed-use or sufficiently dense, making it difficult for any new district cooling networks to expand in the long-term. Component 2 in India will make wide urban planning recommendations including policies that can ensure that buildings are district cooling ready, such as requiring centralized cooling for buildings over a certain size and also encouraging mixed use and dense development. These requirements can be applied to specific priority or opportunity zones in the city, such as already identified smart city areas.

- **Currently no smart city proposals include district cooling.** All five of the DES Inititiave pilot cities in India have been shortlisted from the initial list of 100 'smart cities' under the Smart Cities Mission of India.[9] Each smart city challenge will include an area-based development plan which aims to transform an existing city area by demonstrating a 'smart city concept', creating an example for other areas in the city, or across the country, to follow.[10] Cities can chose one of three approaches: retrofitting, redevelopment, or greenfield

[9] 100 smart cities are planned with the objective to develop new generation cities, providing core infrastructure and a decent quality of life to its citizens by building a clean and sustainable environment.
[10] The other two components of smart city proposals are: i) vision, ii) pan-city initiative that integrates technology, information and data to improve city services

development. The shortlisted cities are in the process of refining their smart city proposals/concepts which will not be completed during the life of the GEF project. The DES Initiative has assessed the district cooling potential of the green field area developments in the five cities (Component 1) and will work with the local governments to include the assessed high opportunity projects within the smart city area plans (in Component 2). Further the DES Initiative will develop planning policies to be included through the smart city area-based development plan to ensure that the buildings are **district cooling ready** (e.g. building codes) in component 1 and to further integrate this into the larger city-wide district energy plan in the pilot city (in Component 2). This will create the conditionsfor the scale up of district cooling in these areas of the city. The Central Government of India is to provide INR 100 million (15 million USD) per smart city per annum for 3-5 years and the same matching amount is to be provided by the state government and private sector. As discussed with the government, the greenfield area-based development plans are most sutiable for district cooling as they are required to be planned as mixed-use, compact developments.

- **Lack of awareness:** Working with building developers is seen as crucial in India, where building developers work in multiple cities and can quickly scale-up replicable models nationally. Stakeholder coordination frameworks, trainings and site analysis (Component 1 and 2) will all include significant consultation of these building developers to create buy-in and long-term interest in the project.

District cooling in India will likely develop under a number of different business models. Initial consultations with private sector building developers and city authorities in Thane reveal interest for a utility-model (public or private) that is not owned by one single building developer to reduce risk at this early stage of the market. Similar consultations in Rajkot showed interest for a publicly owned utility. City authorities in both cities have indicated they are willing to support district cooling through financial incentives and possible direct financing. Furthermore both cities are willing to assess and implement planning policies that will enable district cooling and want to be directly involved in design and development of the demonstration of district cooling in their cities. The activities of the Initiative will ensure that multiple business model options are discussed with the cities.

Case study: Demonstrating district cooling in GIFT City

One model district cooling project is the Gujarat International Finance Tec-City (GIFT City), a public-private partnership model through which the city benefits from lower operation and maintenance cost, reduced carbon emissions, 20 per cent reductions in water consumption and cuts in peak power demand of 44 per cent achieved during the first phase. The system will connect different types of buildings (residential, commercial, retail and convention centres) demonstrating the importance of mixed use zoning a viable business case. Carbon reductions from the higher system efficiency are expected to count towards green building ratings in the city. The system becomes commercially viable once 3500 TR (10 MW) of demand is developed, which is 2 per cent of the toal city demand. Typical district cooling project have 7 to 10 years pay-back period. This project is replicable in new, dense and mixed use greenfield area developments in the light-touch cities, which the initiative is promoting. Best practices from GIFT City will be transferred to the light touch and deep dive cities in Components 1 and 2.

Baseline scenario for Serbia

The bulk of gross final energy consumption in Serbia is related to the heating and cooling sector, which is projected to increase to the share of 45.5 % in 2020. As such, improving energy efficiency in the heating and cooling sector is a national priority for Serbia.

District heating exists in 59 cities in Serbia, heating residential and office space the equivalent of 450,000 apartments. The projections of GHG emissions within the First Biennial Update Report, show emission reduction

will be 11 % compared to "business as usual" by 2020 if basic measures are applied, and 18 % if additional mitigation measures are applied. The energy sector and in turn heating companies would be responsible for a significant share of this reduction, however significant financial resources and international experience sharing will be required to undertake these measures.

The energy policy of the Republic of Serbia focuses on increased use of renewable energy through development and expansion of DH systems based on renewables and Combined Heat and Power (CHP). Specific measures include introduction of heat metering systems and consumption based tariffs in DH systems and an increase in renewables such as biomass geothermal and solar.

The DH system in Belgrade is the largest in Serbia and one of the largest in Europe with a total network length of 1,420 km and a capacity of over 2,800 MW, almost half the total capacity in the country, supplying heat to approximately 50 % of households in Belgrade as well as non-residential customers. Drivers for modernization of the system include: security of supply (natural gas and fuel oil are imported); expansion of the network to reduce air pollution; improved efficiency of DH and buildings; reduced CO_2 emissions from the DH network; and improved quality of heat supply to consumers.

The city lacks an integrated plan for heating in the city that accounts for both building efficiency and district heating through harmonized strategy, policy and investments. As such the DES Initiative and the Building Acelerator GEF funded project are jointly developing Belgrade as a deep-dive city.

The district heating system requires significant investment and expansion. The majority of the network is run on imported natural gas in boilers with no waste heat from cogeneration or other sources used and very little renewables. The operator has identified the need for fuel substitution to improve energy security and reduce CO_2 emissions. One third of buildings in Belgrade that are not connected to the DH system use electricity for heating, and the remaining two thirds use solid (coal and firewood), liquid or gaseous fuels. This leads to significant air pollution in the heating season and so expansion of district heating is a priority.

Furthermore, network rehabilitation to improve efficiency and operation is expected to cost approximately EUR 380 million. In addition, energy efficiency of the building stock is quite low, and the intensity of energy consumption is high. The city needs harmonised approaches to efficiency.

While numerous options have been assessed including biomass, geothermal, cogeneration, solar thermal and district cooling, the city lacks a clear strategy for prioritizing these investments in the context of investments in building efficiency, network expansion and network rehabilitation.

Specific barriers to modern DES that have been identified in Belgrade include: lack of technical expertise regarding large scale modern DES installations (e.g. solar thermal, integration of district heating with new district cooling development); misaligned programmes and policies relating to heat metering, district heating expansions, building efficiency measures and heat tariffs; lack of independent technical and financial review of district heating network in relation to long-term city objectives such as air pollution reduction; lack of capacity to assess new business models with private sector participation; and insufficient harmonized planning for network rehabilitation, network expansion and fuel-switching.

The city has detailed priority measures and actions for development of district heating in the 'City of Belgrade Development Strategy[11]':

- reconstruction and expansion of the main heating network
- interconnection of separate district heating networks

[11] Available from: http://www.palgo.org/files/knjige/strategy%20low%20english.pdf:

- connection of waste heat from a local power plant development of cogeneration
- development of new energy sources and new technical and technologic solutions in the district heating system

Drivers for this network modernization, expansion and fuel switching include: security of supply (natural gas and fuel oil are imported); expansion of the network to reduce air pollution; improved efficiency of DH and buildings; reduced CO2 emissions from the DH network; and improved quality of heat supply to consumers.

The rapid assessment (Component 1) will identify high-level options for rehabilitation, expansion and fuel switching which will then be prioritized in the deep-assessment and developed into a DES city-wide plan of policies and investments that is aligned with the city's strategy and priorities (Component 2). This is especially important given the city's interest in expanding district heating as a solution to local air pollution whilst also trying to increase the efficiency and the fuel diversity of the existing network. Furthermore, a lack of demonstration of renewables in the city, means technical experience in the utility on renewables is lacking and will be improved through development of a demonstration project procurement plan (Component 2) and also international city tours and city-twinning (Component 4).

The need of such high-levels of investments to rehabilitate the network has attracted bids from atlesat two major international district energy operators to own, operate, and /or manage the publicly owned city network. However the lack of capacity at the city-level, in combination with a lack of strategy and plan for district heating, meant that the city was not able to fully assess such offers in line with their long-term city objectives, stalling investment either publicly or privately. The city has therefore specifically asked UNEP, as a neutral body, to analyse the various business model options in line with their long-term social and environmental objectives, so they can decide on such bids in the future. Capacity building, business model analysis and development of a city-wide plan (Component 2) will improve this impasse and release much needed investment. Furthermore, multilateral development banks have expressed interest to invest in the modernization of Belgrade district heating.

Belgrade and Serbia can become models for the region, which has many cities under similar situations to Belgrade. Lessons learned, methodologies, trainings and tools that are regionally appropriate will be expanded through Component 4 to other cities in the region. The technical assistance can support the Republic of Serbia through analysis of national regulations and policies and assessments of Belgrade being made available to other cities in the country.

3) Proposed alternative scenario, GEF focal area strategies, with an objective description of expected outcomes outputs, and activities of the project

The DES Initiative is a multi-stakeholder partnership coordinated by UNEP. **As an accelerator of the SE4All Energy Efficiency Accelerator Platform, the DES Initiative will support market transformation efforts to shift the heating and cooling sector to low-carbon, energy efficient solutions that include DES with an aim to double the rate of energy efficiency improvements for heating and cooling in buildings by 2030 and quantify the corresponding decrease in greenhouse gas emissions.**

The DES Initiative has already begun **global activities** designed to: raise awareness of DES and the DES Initiative, establish global methodologies and tools, and deliver technical training. The DES Initiative has carried out five regional launches of the DES Publication, participated and delivered 7 webinars, provided training through 17 workshops reaching 111 cities across 22 countries, provided city to city exchange and study tours including that of the district cooling system in Paris to Rajkot, India, and of the district heating system in Copenhagen and Sonderburg to Belgrade, Serbia.

The DES Initiative has also created a Virtual Platform to be launched in December 2016 that will direct cities signed up to the DES Initiative to tools, methodologies, trainings and best practices, as well as providing a communication link between learning cities and mentor partners of the DES Initiative such as champion cities and private sector partners. The DES Initiative is in the process of developing global methodologies, global tools and global best practices to populate this Virtual Platform, examples of which can be found in Table 1.

Table 1: Examples of global methodologies, tools and best practices developed/under-development by the DES Initiative

Global methodologies	• 10-step DES Action Modules for accelerating DES in cities (see Figure 1) • Global methodology for a DES rapid assessment of a city to understand DES potential and barriers • Steps to delivering a deep assessment of a city to determine a DES plan of future policies and projects • Process of demonstration project development • Establishing data collection for heating and cooling in a city
Global tools	• Decision tool for local and national policymakers to identify policy interventions • DES cost-benefit analysis tool • Software and support for establishing energy mapping in a city.
Global best practice	• DES publication • Case studies of policy, finance and technology best practice in champion cities • Best practice national frameworks for promoting DES development in cities

Country Selection Criteria

The DES Initiative has selected four countries for pilot city work over the next three years with a high degree of variation in geography and technical scope between countries in order to maximise global replication. As district energy is a local technology application, new tools, methodologies and best practice must be demonstrated at the city level within particular countries and then scaled-up nationally and regionally through awareness raising, regional capacity building and wider support to multiple countries. The DES Initiative activities in the four countries will have significant regional and global replication value. The pilot country selection has been reviewed and approved by the DES Initiative Steering Committee on 14 June 2016. The list of selected pilot countries had been developed through outreach and engagement activities as well as DES Initiative partner recommendations. From the broader list of countries, China, India, Chile, and Serbia were selected together with partners. The selection criteria for these initial countries aimed to cover a broad range of applications of DES and to cover the three main country types defined by the DES Initiative:

- ‘new’ district heating/cooling countries: in this countries district heating/cooling has a very low market share (0 – 15 %). Chile and India are included under this group.
- ‘expansion’ district heating systems: district heating and cooling systems appear in some areas, but the total market share remains low (15–50 %). These countries are looking to expand systems and connect local renewable and waste heat sources. China is included under this group.
- ‘refurbishment’ district heating systems: district heat has high market shares, but the systems need some refurbishment in order to increase customer confidence, energy efficiency and profitability. Serbia is an example of refurbishment country. Serbia is included in this group.

Further, initial country selection criteria included:

- high potential for CO_2 reductions and air quality improvement;
- high potential for replication particularly at the regional level;
- alignment of DES with national priorities or existing support programmes;
- presence of lead partners to the DES Initiative in the country;
- geographic diversity;
- technological diversity;
- opportunity to partner with the Building Efficiency Accelerator to deliver integrated - supply and demand side - efficiency solutions in the building sector and optimize delivery through pooled resources; and
- local and national political will.

Building political will has been a significant activity of the DES Initiative to date, obtaining the approval and support of national, provincial and local government for the DES Initiative's activities is therefore one of the main country selection criteria. In this context, national country support has been obtained by all four countries (see letter from Ministry of Energy in Chile in Annex K and stakeholder consultations described in section A.3). Such national support will also help ensure project sustainability, scale up and replication.

Additionally, in many countries, smart city or eco-city programmes have been used to demonstrate and promote innovative technologies and policy approaches. The DES Initiative can build on such programmes where they exist as structures for replication of the incorporation of DES into city planning. These programmes are particularly important in developing coutnries experiencing rapid urbanisation and the resulting development of new cities, combined with a need to make existing cities more sustainable, provides a strong opportunity to integrate energy into urban design. The DES Initiative has accounted for the existence of such programmes in selecting countries, for example, China's New Energy Cities Program which already includes incentives for the use of waste heat and India's 100 Smart Cities Program which already incorporates area based planning which can be used to promote the zonal development of district energy in a city.

Project Approach

Effective implementation of DES requires a tailored policy and investment response that accounts for vertical integration (multiple levels of government engagement) and horizontal integration (across multiple sectors i.e., waste, water, buildings, power, heating/cooling, industry, finance). The 10 DES action modules described in Figure 1 summarise the DES Initiative's global methodology for facilitating development of modern DES. The modules can be taken individually or packaged to meet specific city conditions and needs, based on each city's current stage of DES development, and the aims of the project developer.[12] The 10 DES action modules, are intended to be pursued in a chronological manner, but may not all be necessary dependent on the level of action(s) which have already been taken in the city/country. Under the 'deep-dive' component (Component 2) the DES Initiative will adapt the ten DES action modules to the city context in the four selected countries (Chile, China, India and Serbia). This will mean regionally adapted methodologies are developed that can be applied to other countries in the region through outreach and training activities.

[12] Project developers can include: local governments; communities, other public sector developers; institutions; property developers, landowners, building operators; private sector developers.

Figure 1: 10-step DES action modules

Component 1: Assessments and technical assistance for DES actions in cities ("Light touch")

Expected Outcome: *City officials have increased knowledge of the benefits of District Energy Systems (DES) to promote modern DES*

This component will provide light touch support to 5 cities respectively in China, Chile and India as well as to one city in Serbia[13]. As such, 16 cities will be provided with light touch support which will include 16 rapid assessments. DES rapid assessments are a key part of the DES Initiative's methodology of evaluating the best city in a country in which to develop a demonstration project (deep dive).

The key objectives of the light-touch support are two-fold: firstly, through the DES rapid assessments, the DES Initiative will identify one high opportunity pilot city per country for 'deep-dive' support (described in Component 2) and secondly, create a pipeline of cities in each country that will commit to developing DES, providing a critical mass for market transformation. As such, selection of cities to receive light touch support requires prior knowledge of the viability of DES in different cities within a country and an understanding of cities' willingness to commit to developing DES. The 16 selected cities are required to officially join the DES Initiative and to commit to assess and implement a policy action or commit to the Initiative's "10-step DES action modules" (Figure 1) and track and report progress, dependent on technical and economic viability of DES as per the rapid assessments. To identify these cities. the DES Initiative has developed the following city selection criteria for light touch support to ensure both these objectives can be achieved:

1. Location in a Non-Annex 1 Party to the UNFCCC and a GEF eligible country;
2. Feasible energy and emissions savings;

[13] Serbia is a refurbishment country and therefore it is not necessary to use a rapid assessment to identify which city in the country has the most DES potential or is best suited for a demonstration project.

3. Large DES market potential;
4. Alignment of DES with national priorities and programmes;
5. Political commitment by the local government leadership to support a DES demonstration project, including political stability over the project cycle;
6. DES Initiative partner presence in the city/region;
7. Pre-existing assessments of the opportunities and challenges for district energy;
8. DES Initiative partner or local private stakeholder interest to: contribute towards city assessments (e.g. finance feasibility studies or provide technical experts to a Deployable Project Work Team in the city); provide finance to develop modern district energy; bid on future tenders released by the city relating to district energy;
9. City strategy, plan, targets or programmes that relate to district energy;
10. Opportunities to leverage in-kind or existing program resources or local government administrative staff;
11. Geographic and city size diversity ensuring replicability in other cities in the country;
12. Diversity of market types for district energy across the different market types: new district heating, new district cooling, expansion and refurbishment;
13. Opportunities to expand and integrate benefits of the Accelerator platform including by partnering with the Building Efficiency Accelerator (BEA) to demonstrate how district energy solutions and building efficiency measures combined offer strong sustainability outcomes.
14. City commitment to invest or co-finance a DES demonstration project if shown to be techno-economically feasible

The process for city-selection is at various stages in each country:

- **China and Chile:** At the request of the National Project Steering Committees (see governance structure explanation in Annex H), the Initiative has developed two 'Calls for Pilot Cities' from cities to participate in Light Touch activities (one for China, one for Chile). This will enable selection of cities against the above criteria through a transparent weighting process. This weighting process places significant emphasis on the potential emissions savings, replicability potential, commitment from the city government to co-finance DES development in the city and make changes to local policies and partner and investor interest as an indicator of potential of modern district energy development. Cities will be selected in March to April 2017 by the National Project Steering Committee and DES Initiative with exact timing unavailable due to national review of the 'Call for Pilot Cities' in China and Chile. In China, the 'Call for Pilot Cities' has been structured to attract cities that have pre-existing district heating systems that can be interconnected and switched to renewables or waste heat. In Chile, the 'Call for Pilot Cities' has been structured to attract cities that have no district energy systems but have significant heating demand that can be made more energy efficient and cleaner through district energy. No cities in Chile have been selected although several cities have been identified already by the Ministry of Environment in Chile. In both countries, these district energy applications have been selected through consultations with the National Project Steering Committees and will be highly replicable in the countries. It is envisioned that other district energy applications in different cities in China and Chile can be supported through the work of the DES Initiative, but this will be conditional to sufficient co-financing from cities or national government to cover additional project activities. This could include trigeneration or district cooling applications in both countries.

- **India:** The DES Initiative has selected 5 cities in India for light touch support (Thane, Coimbatore, Rajkot, Pune, and Bhopal). This selection was based upon input from expert local stakeholders such as ICLEI South Asia Secretariat, UNEP Region of Asia Pacific (UNEP RoAP), the National Project Steering Committee in India and private sector partners that are particularly active in India and/or district cooling development. To

ensure long-term replicability, the DES Initiative has ensured that several of these cities are part of India's Smart Cities Mission and at least one is part of the GEF's Sustainable Cities Integrated Approach Pilot program. Rapid assessments are being finalized in these five cities for publication in December 2016. The DES Initiative is now developing Memoranda of Understanding (MoUs) between UNEP and each city to detail activities with 4 of the 5 cities on light touch activities based on the results of the rapid assessments. The DES Initiative has engaged multiple national ministries in India which now form part of the National Project Steering Committee (Ministry of Power, Ministry of New and Renewable Energy and Ministry of Housing and Urban Development). These ministries welcome the Initiative's work in the selected cities and have also suggested possible additional cities in the country, for which the Initiative will support rapid assessments. The five City Commissioners have committed to support development of DES either through investment in projects or local policy changes that create the enabling environment for DES.

- **Serbia:** Belgrade has provided an official letter of participation and has been selected as both the light touch and deep dive city in Serbia. UNEP is developing an MoU with the city to detail activities under Light Touch and Deep Dive.

The DES rapid assessments contain analysis based on data obtained from short city visits and partners of the DES Initiative, meetings with stakeholders and online research. The analysis is undertaken by a team of experts compiled by the Initiative that ensures international expertise on district energy is successfully combined with country-level expertise on city development and the energy sector. Within each city that will receive light touch support, a multi-stakeholder working group will be established to provide input into the rapid assessment process. Dependent on each city's requirements and potential for district energy, this multi-stakeholder working group will then be structured and formalized into a multi-stakeholder coordination structure through a training workshop in the deep-dive city.

The DES Initiative has developed through extensive partner consultations a 'Global Methodology for Rapid Assessments' which will be tested, improved-upon and regionally tailored through Component 1 and promoted and further refined through Component 4.

This methodology includes the various data and information required to complete a rapid assessment and the process for collecting and analyzing data. The methodology describes DES rapid assessments as providing analyses of the following:

- Estimations for current and projected impact of heating/cooling demand locally;
- Identify potential modern district energy demonstration projects[14] in the city and complete simple cost-benefit analysis, including range of consumer groups;
- Non-quantitative analysis of long-term district heating/cooling growth potential;
- Simple analysis of long-term benefits of district energy to the city;
- Potential to connect as part of the demonstration project a renewable source (e.g. free cooling, biomass, geothermal) or waste heat source;
- Whether city has the coordination and willingness to develop a demonstration project, in particular, the commitment to change local policy;
- Barrier analysis (including: financial, political, capacity, regulatory, planning, etc.); and
- Interest for private sector participation in district heating/cooling development in the city.

[14] Refers to definition set-out in Section A.1. Project Description

While undertaking data collection for rapid assessments, whenever it is possible and/or relevant, the DES Initiative will aim to include sex-disaggregated data to understand the different impacts of relevant policy changes on men and women.

The DES Initiative has already applied a regionally adapted version of this methodology in the 5 Indian cities selected for Light Touch support. An increased need to raise awareness of district energy in India, limited access to data relating to cooling demand and a focus only on projects within new building developments has meant significant lessons have been learnt on how to apply the methodology in India, which will now be adapted and finalized for use in other cities in India and the region.

Through analysis of the 5 DES Rapid Assessments per country the 'deep dive' pilot city in each country will be selected based on:

- Local political will for supporting a DES demonstration project, including political stability over the project cycle;
- Readiness of the pilot city for DES development (i.e. barriers identified through the rapid assessment can be overcome within a two year process);
- Availability of city and partner (co-)finance for deep-dive process
- Investment interest for the demonstration project;
- Technical and economic potential for DES in specific areas of the city and long-term potential of DES in the city; and
- Environmental benefits including CO_2 mitigation potential that can be realized through DES development and demonstration project.

The DES Initiative will develop 16 city fact sheets on the potential for DES in the 16 cities rapidly assessed. A workshop will be held in each country that will disseminate results of the 5 DES Rapid Assessments and invite regional, national and provincial governments, numerous other cities and national and international industry actors to discuss the results and select the 'deep dive' pilot city. In particular, cities and governments from similar countries in the region will be invited and engaged with to begin the replication process beyond China, Chile, India and Serbia[15].

These workshops will also provide feedback and potential next steps to cities that underwent the DES Rapid Assessment. These next steps would include: capacity building and policy initiatives, specific priority DES projects to be developed and required stakeholder relations that would impact development of DES.

The DES Initiative will also seek commitments from at least 13 of the 16 cities to develop DES in their cities. These commitments will be specific to the cities' short-term potential for district energy action, their level of capacity to deliver on this potential and interest to invest by city or investors. As a minimum cities will be asked to:

- Identify a focal point(s) within the local government for future coordination with the DES Initiative future support of the DES Initiative;
- Identify a champion (senior person or department) within the city government responsible for advancing efforts to develop initial district energy projects (Chile and India);
- Identify sources for investment either from the city directly or known investors such as local banks and private sector.

[15] Similar countries as per defined city/country types and climate.

Further, cities will be asked to commit to drafting, planning, developing or adopting one or more of the following which would be detailed through the next steps:

- A new local policy or programme supporting the business case for district energy (e.g. a local planning policy requiring new developments to assess district energy, new tariff methodologies, heat metering programmes etc.);
- A demonstration project related to modern district energy (e.g. fuel switch, starter network, network rehabilitation);
- A new energy strategy, plan or target that incorporates heating and cooling and specifically modern district energy development.

To help achieve this, the cities will be provided with:

- Expert advice on next steps to developing DES in their cities;
- Capacity building, training and technical support through the DES Initiative's Virtual Platform[16] including links to champion cities and private sector partners; and
- An invitation to a national workshop to disseminate results of the DES Rapid Assessments and to meet national and international industry.

Component 1 Outputs and activities:

1.1. 16 cities join the DES Initiative through an extensive consultation process

1.1.1 Defining the criteria and process for selection of the cities for the Rapid Assessments in each country

1.1.2 National consultations and "Call for Pilot Cities" to select the 5 cities in each country that will join the DES Initiative - China and Chile

1.1.3 Shortlisting applications through weighted criteria and through consultation with the local government and partners on the interest to invest in district energy in the city

1.1.4 Commitment letters and/or MoUs prepared for each of the cities that will join the DES Initiative

1.1.5 Initial visit to the shortlisted cities, **if necessary** for political endorsement, to explain the planned project, elaborate MoU, and enable future data collection for the rapid assessment.

Deliverable: Initial scoping and recommendation of 5 light touch cities in each country (Chile and China)

Deliverable: Commitment letters and/or MoUs received from each of the cities that will join the DES Initiative

1.2. 16 city DES rapid assessments completed and fact sheets developed

1.2.1 Establishment of a Deployable Project Work Team (DPWT) in each pilot country and definition of roles in Rapid Assessments (completed in 2016)

1.2.2 Establishment of a multi-stakeholder working group within each light-touch city to provide input into the rapid assessment process

[16] The Virtual Platform will provide access to tools, methodologies and best practices developed by the DES Initiative (see examples in Table 1) that have been tested, improved-upon and regionally tailored through Components 1 and 2 and disseminated for scale-up alongside training, webinars and publications though Component 3. Further the Virtual Platform, will provide a communication link between learning cities and mentor partners of the DES Initiative such as champion cities and private sector partners.

1.2.3 Local partners to review and comment on the Secretariat's existing Rapid Assessment (RA) Methodology and provide an updated version of the RA methodology that is more tailored and effective for use in each country (India completed in 2016)

1.2.4 Stakeholder mapping and desk based gathering of preliminary data and information from city stakeholders and review of preliminary information and planning of city-visit with technical experts from UNEP-DTU

1.2.5 City visits and stakeholder consultation, (India/Serbia completed in 2016)

1.2.6 Data collection for rapid assessments analysis, (India/Serbia completed in 2016)

1.2.7 Prepare one DES rapid assessment report on each city assessed. (India/Serbia started in 2016)

1.2.8 Prepare one fact sheet on the potential of DES in each city assessed (India/Serbia started in 2016)

1.2.9 DPWT review the DES rapid assessment report.

Deliverable: 4 Updated Rapid Assessment methodologies tailored to each country context

Deliverable: 4 multistakeholder working groups established

Deliverable: All fact sheets and rapid assessments reports published online

1.3. 4 multi-stakeholder workshops on DES undertaken to validate the selection of the 'deep dive' pilot cities and to establish interest in other countries in each region

1.3.1 Preparation of the workshop structure, list of stakeholders that will be invited to the workshop and workshop logistics (India completed in 2016)

Deliverable: 4 National workshops held with multi-stakeholder consultation and selection of "deep-dive" pilot city

1.4. Partnerships with international mentor cities established and training programs delivered

1.4.1 Consultations with potential mentor cities, private sector partners and learning cities to define areas of support to the learning cities and training needs (not including Serbia, India started in 2016)

1.4.2 Learning cities participate at deep-dive training workshops (not including Serbia)

Deliverable: Partnerships established and learning cities trained through Virtual Platform

Component 2: District Energy Demonstrations and city-wide plans ("Deep-dive")

Expected Outcome: *The viability of DES is demonstrated and DES city-wide plans, policies and investments are integrated into the city planning cycle in 4 cities*

The DES Initiative will provide 'deep-dive' support to four cities in China, Chile, India and Serbia under this component with direct staffing and coordination support from the DES Initiative. The objective of this 'deep-dive' support will be to demonstrate the costs and benefits of applying a DES approach in each city and to ground-truth and adapt policy best practice to the country/regional context. This will be achieved through:

- multi-stakeholder workshops and trainings;
- the establishment of a DES city-wide plan for the city that sets out needed policy changes and project development potential in the city; and

- support each pilot city to attract and identify investment for a DES demonstration project including through development of a Procurement Plan, the issuing of an Expression of Interest (EoI) interest and support in shortlisting of investors

- where relevant provide capacity building and support to the pilot cities through the Procurement Plan of the DES demonstration project

'Deep-dive' support will involve the DES Initiative providing tailored support to each pilot city using the ten DES action modules (defined above in Figure 1) through provision of capacity building, training, tools and methodologies. Pilot cities will be guided through specific modules which are identified as a priority together with the city. The Initiative will strengthen or develop a multi-stakeholder coordination structure in each pilot city to provide input to, and support, the planned activities described above. Organisations contracted as per the Small-Scale Funding Agreements (SSFAs) set out in Appendix 7 will deliver activities in the 'deep-dive' cities with support from a Deployable Project Work Team (DPWT) made up of district energy consultants, experts from DES Initiative partners and finance institutions in coordination with the multi-stakeholder coordination structure (see description in the Governance Structure in Annex H).

Strengthening or developing a multi-stakeholder coordination structure: The DES Initiative will assess and recommend a tailored structure for multi-stakeholder coordination that delivers the coordination of stakeholders needed for successful delivery of specific projects and to support the design and implementation of a long-term development plan and strategy for district energy in the pilot city. This structure could take many forms such as a dedicated city unit or an external public private partnership and will be determined in consultation with the city authorities. This structure will formalize stakeholder engagement and provide a platform and focal point for collaboration, training and for leveraging the most knowledgeable experts in the local market to help design effective strategies for the acceleration of district energy. Further the multi-stakeholder coordination structure can ensure methodologies such as on data collection, project development, energy mapping, etc., are incorporated into the activities of numerous stakeholders in a city, such as local utilities providing heat/cool demand data and major building developers.

The multi-stakeholder coordination structure will be led by a local stakeholder and/or city staff under Terms of Reference (ToR) drafted by the DES Initiative and approved by the city. Stakeholders within this structure will include representatives from: local authority departments (planning, transport, waste, and water), local utilities, consumer groups, waste heat providers, housing associations and building**,** developers. The roles of these different stakeholders in district energy development will be articulated and benefits of district energy and strong coordination defined for each.

Training and capacity building: As a basis of the DES Initiative's approach each pilot city will be offered early training and support on the first four DES action modules: i) incorporating DES into a heating/cooling strategy, ii) importance of multi-stakeholder coordination for development of DES, iii) integrating DES into local planning policy and iv) energy mapping of the city to identify long-term opportunities for DES. In addition, each city will receive training and support on business models and project financing (7^{th} and 9^{th} DES action modules).

Training modules and workshops will be provided that combine theoretical concepts and practical implementation to ensure that by the end of the training, participants will be able to follow simple and systematic processes in the design and implementation of DES projects. The trainings will be made relevant and targeted through an assessment of training needs in the deep-dive city as well as consultation and articulation of each deep-dive city's district energy-related goals and drivers (e.g. energy efficiency, renewables, climate, pollution or development goals).

Contracted organisations as well as the DPWT will organise the trainings and provide specific case studies and training materials. This training material will be adapted to the local context and developed into five modules to be disseminated on the Virtual Platform and through 'train the trainer' institutions. The training workshop on energy

mapping will identify a focal point for energy mapping in the city, identify suitable energy mapping software and establish a data collection process for populating the energy map with data. The training workshop on incorporating DES into a heating/cooling strategy will gain multi-stakeholder consensus on a qualitative or quantitative city goal on district energy.

Feedback on workshops will be achieved through an evaluation questionnaire filled out by workshop participants, the results of which will be developed into a post-training workshop report.

In case relevant gender-related findings and sex-disaggregated data has been brought to light under component 1, these gender implications on district heating will be considered for the 4 deep dive cities in the assessment of training needs and the preparation and delivery of training workshops.

Deep DES Assessment: The DES Initiative, together with each pilot city, will carry out a deep DES assessment of the city consisting of both city-wide and project specific analysis:

- Metering assessment and installation:
    - Assessment on the requirement for installation and monitoring of heating/cooling meters to establish the heating/cooling demands of potential anchor loads, specific building archetypes and sources of high-temperature and low-temperature waste heat;
    - Installation of meter if recommended by the assessment. Data from meters will provide input to city-wide assessment, project pre-feasibilities and a city-level monitoring framework (see Component 3)
- City-wide assessment:
    - The long-term technical and economic potential of DES (15-20 years), and corresponding investment levels, based on least cost analysis and ranking methodology according to best applicable technology, availability of other heating/cooling sources such as renewables and waste heat, and other fuels;
    - The benefits at the local and national level of achieving this DES potential including economic, environmental and social benefits and how this can fit into existing environmental and energy strategies in the city;
    - Long-term project identification including identification of priority and opportunity zones for new DES development or expansion, new heat/cool sources, priority network investments (rehabilitation, substations, metering, etc.);
    - Long-term network design options including network expansion, network rehabilitation, network interconnections, transmission lines and waste heat connections;
    - The potential policy and regulatory options available to the city in order to accelerate DES deployment;
    - Existing and potential barriers to the development of DES including institutional, financial, regulatory and capacity barriers;
    - Analysis of the potential business models, funding sources and financing instruments that could be used in the city, and their benefits and limitations in accelerating DES;
    - Assessment on requirement of specific studies such as air pollution studies or analysis of biomass sustainability.
- Project specific pre-feasibility studies of at least two potential modern district energy demonstration projects per city[17] conducted in consultation with the city, multi-stakeholder coordination structure, DPWT and potential investors:

[17] Potential demonstration projects for pre-feasibility analysis will be identified during rapid assessmentsassessment andand will identify renewable and waste heat sources as per the definition of modern district energy in Section A.1. Project Description

- Technical analysis: preliminary project designs including network layout, heating/cooling load curves, analysis of connections, rapid Environmental and Social Impact Analysis (ESIA);
- Financial analysis: development of Base Case Financial Model (BCFM), CAPEX and OPEX evaluation, structuring of heating/cooling tariffs, payback periods, simple sensitivity and risk analysis, assessment of finance sources and site-specific business models; and
- Legal analysis: project specific regulatory, risks and responsibilities of stakeholders, commercial structuring analysis, business model and financing options, and procurement plan

This deep assessment will be far more detailed than the 'rapid assessments' carried out in Component 1 and will take between 3 and 6 months, although this will depend on the country, availability of data, requirement for installation and monitoring of heating/cooling meters, city size and the extent of any pre-existing district energy systems to be assessed. The deep assessments of the pilot cities will enable the selection of a high potential DES demonstration project and will form the basis of development of each pilot city's DES Plan.

The deep assessment report will also reflect gender specific benefits where relevant and make gender related recommendations for the city wide plan if found relevant.

The DES Initiative will standardize the methodology and tool used to develop the long-term DES potential of the deep-dive cities in consultation with the city, multi-stakeholder coordination structure, DPWT and respective national government entities for dissemination to other cities.

The Deep DES Assessments will be finalized into a report made available for the city and the city and multi-stakeholder coordination structure will be trained on findings.

Development of DES demonstration project: Based on the results of the deep assessment, in particular the pre-feasibility studies, the DES Initiative, in consultation with the pilot city, the city's legal team, the DPWT and investors will select a DES demonstration project from the specific projects assessed under the deep DES assessment. The DES Initiative will support the city to develop a comprehensive district energy procurement plan including identifying steps in project development that match a preferred business model, identifying resource within the city to support the procurement process and set out a timescale for procurement.

The DES Initiative will design a market sounding questionnaire to increase bidder interest in the demonstration project. This questionnaire will feed into a city Call for Expression of Interest (EoI), designed by the DES Initiative with the city. The city will issue this EoI and the DES Initiative will support investor shortlisting through development of an investor evaluation checklist and neutral support in bid analysis.

The DES Initiative will provide capacity building on future aspects of the Procurement Plan where required by the city and extract lessons for replication. Partners including legal experts and operators have informed the DES Initiative that the below Procurement Plan is will likely to be the process in the pilot countries but this will vary dependent on the pilot cities and projects:

- Preparation and issue of Expression of Interest (EOI) document with market sounding[18];

[18] An EOI is published by a Procurer to generate prospective bidders to register their interest in participating in the district energy project. It is usually anywhere from 3 to 10 pages in length. No pricing is required from bidders at this stage; rather, responses to the EOI helps procurers determine if prospective bidders have the technical capacity to deliver the project, should they be invited to bid. Broad publication ensures that Procurers are aware of the market potential. This is especially relevant for those Procurers with minimal experience in delivering district energy projects. It is also relevant for private sector bidders who have been encouraged through the growth in the global district energy market and who are seeking to expand their operations or establish themselves. Conducting a market sounding exercise and an EOI exercise will allow a Procurer to sense check that the opportunity is attractive to bidders. It will also ensure there is sufficient interest in the district energy

- Review of EOI bid responses;
- Selection of shortlisted bidders;
- Preparation and issue of Request for Proposal (RFP) document, including template project agreements;
- Evaluation of RFP responses and development of tender report;
- Selection of preferred bidder(s);
- Negotiation with preferred bidder(s) to finalise project agreements;
- Signing of project agreements;
- Satisfaction of Conditions Precedent (including completion of financing);
- Financial close.

Furthermore, the DES Initiative will help the city identify funding opportunities to develop a full feasibility study of the demonstration project, such as from multilateral development banks (MDB). Whether the city or potential investors should develop such a feasibility study will depend on the Procurement Plan. If a feasibility study is to be developed by the city or a multilateral development bank (MDB), the DES Initiative will provide necessary support to ensure that data and information from the deep assessment and pre-feasibility stage is made available. Furthermore, the DES Initiative will support development of the Terms of Reference for the feasibility study.

Through each stage of the demonstration project development the DES Initiative and DPWT will be working in coordination with the city stakeholders and will be providing appropriate capacity building, tools and training to city engineers, planners and policy-makers such as on optimal DES design, coordination with building owners, masterplanners and real estate developers, business plan options and potential policy requirements. Demonstration projects will aim to be new application of modern DES in the pilot cities (e.g. starter networks, innovative heat sources etc.). Such demonstration projects typically have a high degree of local authority support[19], the form of which can vary significantly dependent on willingness to invest in the project. Such high shares of public support can increase the ability of the project to demonstrate the technology, by having transparency around costs, tariffs and project development which is more feasible with public influence. Even demonstrations that are developed by the private sector will likely still have government influence through initial concept development, local policies or anchor loads, concession zone designation and tender development (see London Olympic example in section A.1).

The DES Initiative will hold dialogues with the city on project structuring analysis and business models findings in order to support the city to select a preferred business model.

DES Plan and Policies: Drawing on lessons, results and policy requirements of the Deep DES Assessment of the city and the development of the DES demonstration project, the DES Initiative will work with multiple stakeholders to develop a roadmap of viable projects, policies and investments to deliver the full potential of DES in the city over the next 10 years. This will be a DES city-wide plan and the DES Initiative will work with the city through tailored policy dialogues to ensure its adoption and integration into city planning processes which will lead to steady and planned growth of modern DES in each city.

Based on needs assessments conducted within the training workshop on energy mapping, the DES Initiative will install a GIS system for energy mapping and populate this software with data from the deep DES assessment. The city and multi-stakeholder coordination structure will be provided with training on this software.

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project to justify the procurement process, which can be long and costly. It also allows bidders to start planning before a formal request for proposals is issued.

[19] See section 2.3.3 of UNEP, 2015: http://districtenergyinitiative.org//report/DistrictEnergyReportBook.pdf

The DES city-wide plan will be developed with significant city consultation to ensure its acceptance and future adoption. Furthermore, inputs will be sought from the DPWT and the multi-stakeholder coordination structure. The areas of analysis will include:

- City consultation and finalization of priority and opportunity zones for district energy development, that consider projects to be developed in the short-term and medium-term and opportunities for district energy development in the longer-term, including new projects, extensions and interconnections;
- Zonal land-use policy recommendations such as: connection policies for district energy, rezoning, exclusive franchising, requiring new building developments to assess district energy system construction, policies that ensure new building developments are district energy ready, building standards and certificates, density bonuses, etc.;
- Detailed assessment on specific priority zones and new connection policies to be applied to them such as mandatory connection (as in Vancouver's Service Area Bylaw for district energy demonstration) or obligations to assess connection (as is the case in the 80 franchise zones in Tokyo).
- Specific policy dialogues with the city planning department regarding zoning, density allowances, compact land-use design and the creation of mixed-use developments that will ensure the feasibility of district energy in new city areas in the long-term; and
- Wider city-level policy and regulatory recommendations to ensure long-term district energy expansion, including relating to building standards, building certifications, heating/cooling tariff methodologies, consumer protection, financial incentives, approval processes and standards for district energy infrastructure.

This analysis will be developed into a roadmap of viable projects, investments and the policy framework required to deliver the full potential of district energy in the city over the next ten years. The DES Initiative through policy dialogues will support the city to adopt and publish the DES city-wide plan.

Synthesis reports: The DES Initiative will prepare synthesis reports with targeted policy and regulatory recommendations for the city, provincial and national officials that will address barriers documented in the deep assessment while also referencing similar barriers in other countries in the region. These reports will be designed to accelerate the uptake of DES in multiple countries in the wider region by providing regionally tailored best practices policies through dissemination workshops and the Virtual Platform developed in Component 4.

'Train the trainers' modules: The DES Initiative will develop 'train the trainer' modules which will build capacity in the relevant institutions in the pilot countries (e.g. a national government entity, municipal government entity university unit, association of engineers etc.) on the specific training modules developed in the deep-dive city. These institutions would then be supported by the DES Initiative to go on to scale-up and replicate these modules through delivering training programmes in the city and to other cities and countries in the region. The DES Initiative will finalize the five training modules developed in the deep-dive city and also recommend how these training modules should be designed and delivered. The five training modules will be: i) incorporating DES into a heating/cooling strategy, ii) importance of multi-stakeholder coordination for development of DES, iii) integrating DES into local planning policy iv) energy mapping v) business models, project financing and procurement.

Component 2 Outputs and activities:

2.1. Multi-stakeholder coordination structure is strengthened or established through which technical training programs and planning support is delivered in the 4 "deep dive" cities

- 2.1.1 Assessment of status of existing stakeholder coordination structures in relation to DES through consultations
- 2.1.2 Identify and articulate the role of stakeholders in relation to DES through consultations

- 2.1.3 Decide the structure of coordination in consultation with the city: separate PPP, separate agency, unit within city department
- 2.1.4 Preparation of stakeholder coordination training module based on global best practice, task force consultation and champion cities and design of workshop on this module
- 2.1.5 Assessment of training needs in district energy mapping, district heating and cooling strategy development, district energy business models and planning policies
- 2.1.6 Development of evaluation questionnaire for training workshops on mapping, strategy, policy and business models
- 2.1.7 Consult the city to articulate district energy-related goals that help meet the cities broader energy efficiency, renewables, climate or development goals.
- 2.1.8 Preparation of a training module on developing a heating and cooling strategy that incorporates district energy and design of workshop on this module
- 2.1.9 Preparation of a training module on energy mapping and data collection methodologies in specific city areas based on deep assessment analysis and design workshop on this module
- 2.1.10 Preparation of a training module on the local planning policies based on deep assessment analysis to address the priority policy barriers, and design of workshop on this module
- 2.1.11 Preparation of a training module on business models and project financing based on deep assessment and design workshop on this module

  Deliverable: Multi-stakeholder coordination structures strengthened/established in pilot city

  Deliverable: 5 Training workshops

  Deliverable: 5 draft training modules (to be adopted in output 2.5)

  Deliverable: Focal point for mapping selected and data collection process to populate map established

  Deliverable: Qualitative or quantitative city goal established for district energy

  Deliverable: Post-training workshop report on lessons learned and questionnaire results

2.2. Deep DES Assessments including short and long-term technical and economic potential, including 2 financial project estimates per city, of DES are developed for the 4 “deep dive” cities

- 2.2.1 Finalize ToR for consultant(s) who will undertake the city-wide assessment
- 2.2.2 Finalize ToR for consultant(s) who will deliver the two project pre-feasibility assessments, including business model design, selection of pilot and call for expression of interest
- 2.2.3 In coordination with the monitoring framework consultant, assess the requirement for installation and monitoring of meters and if required, recommend locations for meters and install and monitor meters
- 2.2.4 Undertake a city-wide assessment that includes the following areas of analysis: a long-term technical and economic potential and benefits of DES (15-20 years); required corresponding investment; required network design; future project identification; barrier analysis; policy/regulatory options; analysis of business model options and financing instruments, in consultation with the city, multi-stakeholder coordination structure, DPWT and investors

- 2.2.5 Preparing of project pre-feasibility assessments in consultation with the city, multi-stakeholder coordination structure, DPWT and investors
- 2.2.6 Develop business model and financing options for the pilot project in consultation with the city, multi-stakeholder coordination structure, DPWT and investors
- 2.2.7 Develop business model and financing options for long-term project pipeline in consultation with the city, multi-stakeholder coordination structure, DPWT and investors
- 2.2.8 Prepare draft city-wide assessment report in consultation with the city, multi-stakeholder coordination structure and DPWT
- 2.2.9 Standardization of city-wide potentials assessment methodology and tool in consultation with the city, multi-stakeholder coordination structure and DPWT
- 2.2.10 Standardization of project pre-feasibility methodology and tool (excel) in consultation with the city, multi-stakeholder coordination structure, DPWT and investors

  Deliverable: DES deep assessments completed, city consulted and trained on findings, DES deep assessments published

  Deliverable: Standardized methodology to assess city-wide potential and associated mapping tool established

  Deliverable: Metered energy consumption made available and waste heat/free cool resource potential established in the deep assessment to allow city to begin populating the energy map

  Deliverable: DES pilot project pre-feasibility report completed, city consulted and report published

  Deliverable: Standardized methodology for project pre-feasibility and associated excel tool

2.3. DES pilot demonstrations projects have been selected and investment is committed

- 2.3.1 Consultations with the city, DPWT and investors on demonstration project selection and prepare procurement plan
- 2.3.2 Prepare and disseminate market-sounding questionnaire
- 2.3.3. If required by the procurement plan, develop ToR for feasibility study of the demonstration project
- 2.3.4 Preparation and issue of formal Expression of Interest Document with the city
- 2.3.5 Prepare investor evaluation checklist
- 2.3.6 Support on shortlisting of investors
- 2.3.7 Capacity building to the city officials on implementation of procurement plan

  Deliverable: City issues call for Expression of Interest and investors shortlisted

  Deliverable: Procurement plan

2.4. DES City-wide plans (policy & investment) are developed with the 4 “deep dive” cities

- 2.4.1 Installation and training on the use of GIS Software for energy mapping based on needs assessment in 2.1 and data from city-wide and prefeasibility assessments
- 2.4.2 Using city-wide assessment report select priority zones for district energy development and opportunity zones for future expansion

- 2.4.3 Prepare and consult the city, DPWT, and multi-stakeholder coordination structure on best practice policies for priority zones including exclusive franchise areas, connection policies, building standards and certificates, financial incentives, and consumer protection and tariff methodology
- 2.4.4 Prepare and consult the city, DPWT, and multi-stakeholder coordination structure on best practice policies for opportunity zones including mixed-use and compact design
- 2.4.5 develop a roadmap of viable projects, investments and the policy framework required to deliver the full potential of district energy in the city over the next 10 years
- 2.4.6 Prepare policy dialogue with the city on adoption of city-wide plan

  Deliverable: 4 DES City-wide plans published

2.5. Synthesis reports on policy recommendations for city and national officials are developed, including "train the trainer" package, to address barriers and accelerate the uptake of DES and delivered at regional validation workshops

- 2.5.1 ToR finalized with 'train the trainer' institution and invited to training workshops
- 2.5.2 Finalize the 5 training modules prepared in 2.1 based on lessons learned from 2.2-2.4
- 2.5.3 Preparation of a synthesis report on policy recommendations
- 2.5.4 Prepare regional validation workshop

  Deliverable: 4 Regional validation workshops held presenting synthesis reports

  Deliverable: 5 training modules

  Deliverable: Synthesis report

Component 3: Monitoring Framework

Expected Outcome: *Deep-dive cities and national governments can track and better understand the costs and benefits of modern DES laying the foundation for evidence based decision-making and policy action in the future.*

This component aims to support the deep dive cities to implement monitoring provisions that would be used to track and validate GHG emission reductions that result from improvement in primary energy efficiency and fuel switch, and to track other local benefits that result from the implementation of the district energy plans and projects developed in Components 1 and 2, relative to the baseline. The monitoring aspect of the project aims to increase confidence in data, the process and the results by defining methodologies for data collection and analysis as well as ensuring cities put systems in place to collect data and periodically publish results with high levels of transparency throughout the whole process and external verification. Further, it should empower consumers to compare technology options, lead to evidence based policy making with the benefits of DES quantified, leverage other projects and investment in the city and ultimately feedback into building certification schemes. Finally, the monitoring system will enable the DES Initiative to monitor the progress of the implementation of activities and identify corrective actions to increase effectiveness of implementation.

The monitoring framework will enable deep-dive cities to explicitly track progress on the city-wide district energy plans (developed in Component 2) and the DES Initiative will develop a set of metrics associated with these plans to enable this tracking. These metrics will be both quantitative and qualitative in nature, and both outcome and process based, including: projects developed; policies established; investment in systems; continued use of DES Initiative tools and methodologies; and proportion of city connected to DES.

The DES Initiative will work with 'deep-dive' cities to define reporting requirements including content and periodicity. Furthermore, verification procedures will be put in place to ensure the monitoring framework is being implemented appropriately, including the cross checking of data, review of data collection and analysis and possibly national government verification and assessment of implementation (site assessment and spot checks leading to an examination report).

Gender equality and gender implications on district heating will be considered in the design, training and implementation of the monitoring framework by including gender-related questions in the monitoring questionnaires(s). Based on the data obtained, gender-related findings and recommendations will be included in the monitoring reporting and monitoring plan.

The DES Initiative will contract monitoring experts to develop a global generic methodology and guideline for city-level, district energy monitoring systems that includes benefit quantification and tracking of city-wide district energy plans. This will be in consultation with DES Initiative partners and through expert review of existing systems, including Clean Development Mechanism (CDM) and Verified Carbon Standard (VCS) district energy methodologies. This methodology and guideline for monitoring will be published by the DES Initiative. The generic methodology would then be adapted by the monitoring experts to each deep-dive city, in consultation with each DPWT and city. The monitoring experts will deliver training to each deep-dive city and multi-stakeholder coordination framework on the implementation of the monitoring system. A generic, national-level tracking system will be designed for district energy establishing national-level indicators at that are developed from aggregations of city-level information which will be refined and made homogenous across cities through application of the city-level monitoring system described above. This generic system will be tailored to the needs and interests of each pilot country.

National governments will be presented with this new tracking system and provided with training and capacity building by the monitoring experts on its implementation, incorporation and adaption into their existing monitory systems. This will be through a national workshop with relevant ministries responsible for the monitoring framework in the city, energy and environment sectors.

The monitoring experts will prepare an international best practice report on city-level and national monitoring fr for DES and a step-by-step implementation guide and training material on national monitoring framework for DES.

Table 2 below describes some of the national level tracking systems already in place and initial analysis on how the DES Initiative can build or draw upon these.

Table 2: Country monitoring framework baselines

Country monitoring framework baseline	**Chile**	**China**	**India**	**Serbia**
Institutional (Decision-taking and or operationalizing)	Ministry of Environment and Foreign Affairs, main focus on the MRV of NAMAs	Decision on national level, through NDRC and other ministries	Depending on the MRV	Agency for Environmental Protection of the Republic of Serbia (SEPA) preparing the national GHG inventory

Country monitoring framework baseline	**Chile**	**China**	**India**	**Serbia**
Tracking System Design/ Structure	Goals are to improve transparency, comparability and quality of the data, design common technical requirements for MRV systems, processes and institutional coordination	Statistics Indicators, Monitoring, and Examination (SME) system of energy statistics	Part of the MRV framework developed by the UNFCCC	Part of the MRV framework developed by the UNFCCC, GHG inventory for the Republic of Serbia was prepared according to the Tier 1 approach of the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines
Indicators/ variables (current situation)	Specific sectors: energy (renewable energy and energy efficiency), forestry, agriculture and transportation, Indicators on GHG and non-GHG emissions, allowing the transparency of the GHG mitigation activities developed in the country, through mechanisms which allow tracking the compliance of its goals	Energy conservation (progress), energy consumption (e.g. total energy use, or growth rate of energy consumed by the primary, secondary, and tertiary sectors respectively and the corresponding growth rate of each sector's value-added), environmental protection, balanced development of GDP and energy use, GHG emissions, inter-regional energy circulation, statistics on different energy products and types	MRVs for different sectors: energy efficiency (focussing on different industries: power, iron and steel, fertilizer, cement, aluminium, pulp and paper, textile and chlor-alkali), renewable purchase obligation, forest sector and a MRV for Low Carbon Actions for Local Governments	GHG emissions, and on policies, measures, and projections of GHG emissions and mitigation measures, as well as information relevant for planning adaptation to climate change, establishing energy passports for energy efficiency of buildings
Levels	So far nationally	On regional (provinces), enterprise, depending on indicator	National, state-level, depending on projects	National
Interval	Not defined yet	Quarterly to annually, depending on indicator	At least biennial	At least biennial
How can DES Initiative build on that?	Support Chile's goal for a consolidated, integrated MRV system capable of following up on individual mitigation actions, on public policies designed to lower GHG emissions and on reduction commitments acquired in international climate change agreements	Use valuable already existing survey structure on regional level to improve statistical information/ reports on city level	Support of the Low Carbon Actions for Local Governments Initiative because city governments are not yet monitoring and reporting the performance of LCAPs, also not verifying the resulting reductions and are therefore not able to report emission reductions at national and international level	Establishing a structure for measurement of other variables linked to energy production and consumption on a city-level with the possibility to use the combined data from cities (collected and produce according to the same methodology) to produce also reports reflecting the national scale.

Component 3 Outputs and activities:

3.1. Monitoring framework put in place in 4 'deep-dive' cities embedded into existing frameworks and data collection structures

- 3.1.1 ToR finalised for development of monitoring provisions that would be used in the pilot cities and at national level (delivered in 2016)
- 3.1.2 Prepare system of information to aggregate city level data for tracking GHG impacts and progress
- 3.1.3 Identify key sustainable benefit indicators and develop generic approaches for estimating benefits and data requirements
- 3.1.4 Work with city teams to adapt generic methodology to their specific circumstance including demonstration projects and train relevant stakeholders.

Deliverable: One generic city-level monitoring framework for DES activities developed

Deliverable: Monitoring frameworks in place in four pilot cities and monitoring plans for each demonstration

3.2. 4 national workshops providing training on implementing a monitoring and national monitoring indicators developed

- 3.2.1: Review the existing work on district heating and district cooling methodologies on GHG tracking
- 3.2.2: Prepare a generic GHG monitoring methodology for District Energy Projects
- 3.2.3: Design methodology and guidelines on how to set a national level tracking system for DES based on city level data collection and monitoring.
- 3.2.4: Prepare international best practice report on implementing city-level and national monitoring frameworks for DES
- 3.2.5: Prepare step-by-step implementation guide and training material on implementing a national monitoring framework for DES
- 3.2.6: Prepare national trainings workshops on implementing a monitoring framework for DES

Deliverable: 4 National workshops held on implementing monitoring framework for DES

Deliverable: Report on city-level and national DES tracking systems

Deliverable: Step-by-step guidebook on implementing a monitoring framework for DES

Component 4: Outreach, tools and training on DES Initiative

Expected Outcome: *DES in cities is scaled up and replicated nationally and internationally by cities and national governments signed up to the Initiative*

This component will focus on collecting and disseminating best practice and project results to recruit new 'learning cities' into the DES Initiative, and will ensure that signed-up learning cities are sufficiently supported to develop DES. This will ensure that the DES Initiative's methodology for establishing DES in a city is scaled up and national and global replication is achieved.

Raising global awareness and recruitment of new 'learning cities'

A global awareness raising campaign will be designed to disseminate benefits and best practices of district energy to reach potential replication cities and bring to the attention of the decision-makers the importance of DES in meeting multiple energy policy and environmental objectives. This global campaign will include:

- dissemination and outreach material in the languages of the four pilot countries (English, Serbian, Spanish and Mandarin);
- attending global and regional forums, organization of workshops, webinars and events to convene major stakeholders for a policy dialogue on DES. These awareness raising events will not be organised as standalone activities but will build upon partner outreach activities and existing conferences;
- presentation of both existing global research and best practice, methodologies and tools developed by the DES Initiative, as well as project results from Component 1 and Component 2 in order to encourage local governments to join the DES Initiative and make political commitments to unlock investments;
- tailored awareness raising activities for each pilot country.
- The awareness raising campaign will be designed and targeted taking into account gender sensitiveness to assess and evaluate potential impact and related policy integration of specific gender considerations.

Refining and building-upon the Virtual Platform: support to new 'learning cities'

Learning cities signing up to the DES Initiative will be supported through the Virtual Platform through tools, methodologies, best practices, training webinars and modules, publications and fundraising-matchmaking webinars. The Virtual Platform will also provide a communication link between learning cities and mentor partners of the DES Initiative such as champion cities and private sector partners. Linking cities and partners will help strengthen the scale-up of project methods and tools and also provide a community for exchange with private sector actors. In particular, learning cities will be provided with a regionally tailored rapid assessment methodology to enable local decision makers to evaluate the impact of heating and cooling and the potential for DES to meet their climate, energy and development policy objectives. These regionally tailored rapid assessments methodologies will be included in training sessions on the use of the rapid assessment tool.

The DES Initiative will develop best practice global training modules based on the DES Publication, the country-specific training modules developed under Component 2 (DES strategy, energy mapping, local planning policies, business models and financing) and further inputs and review from partners and champion cities. These training modules will take signed-up cities through the Initiative's "10-step DES action modules" (Figure 1) with supportive methodologies, case studies and tools.

The DES Initiative will also develop a Decision tool for local and national policymakers to guide them through the different options for developing district energy, utilizing the policy tools available to cities and national governments. This Decision tool will be based upon the best practice identified in the DES Publication and further inputs and review from partners and champion cities. This Decision tool will be made available on the Virtual Platform and link cities to training modules on the Virtual Platform.

Further to the training modules and webinars, the Initiative will provide six 'fundraising and matchmaking sessions' where groups of newly signed up cities outside of the pilot countries (5 per session) will be brought together with partners of the DES Initiative to explore opportunities for rapid assessments and deep dives through city and private sector co-finance. Once the initiative has reached a threshold of 15 cities, only cities who have made co-finance commitments as a result of these sessions will be prioritized for further support services in the programme. Such support service would include significant efforts from the DES Initiative to mobilize continued partner cofinance or international finance (e.g. from development banks), inviting cities to international and regional workshops, engaging champion cities to provide study tours and to direct resources to the cities for training and knowledge transfer. This will ensure that support services are provided to local governments that are committed to translate the trainings into practice, while also providing a duration of time for the cities to first learn about the benefits of committing to such an approach.

Development of new knowledge products and tools

Following the guidance of the capacity building taskforce and communications and outreach tasks force, with the support of strategic partners and/or in collaboration with other initiatives, new knowledge products and tools are planned to be developed. Some examples of the areas that these new products and tools could cover are:

- Smart Buildings Policy – District Level Strategies for Energy Efficient Buildings: Cities at the forefront of the sustainable energy transition are starting to shape building policy to incentivise planning and reward energy performance at district level rather than exclusively for individual buildings. The combination of district energy and building-level efficiency is helping cities around the world realize cost-effective decarbonization of heating and cooling demand in buildings. This publication could provide insight into how building policy is being shaped in to address both heating/cooling supply and demand in champion cities and countries, and how they have overcome barriers to the integration of district energy and buildings;
- Impact of cooling demand at the city and national level, and the comparative benefits of district cooling against national power system upgrades and developments;
- Elaborating national energy policies and market structures that enable the national benefits of district cooling to be captured in the business model;
- Developing cost data and guidelines to enable cities to compare district energy against competitive technologies.

Component 4 Outputs and activities:

4.1. Awareness raising campaigns delivered

- 4.1.1 Preparation of the campaign outline and a ToR for communication consultants (started in 2016)
- 4.1.2 Consultation with partners on their involvement in raising awareness campaign and their participation in the Communications Taskforce (delivered in 2016)
- 4.1.3 Presentation of initiative to replication countries and consultations with additional 15 cities on joining the DES initiative (started in 2016)
- 4.1.4 Awareness raising at global and regional forums, events, workshops, webinars etc. and presenting of project results
- 4.1.5 Assessment of priority stakeholder groups in each pilot country and their awareness raising needs
- 4.1.6 Design targeted pilot country awareness raising campaign and mobilize partner engagement

  Deliverable: 15 cities join the Initiative

  Deliverable: Awareness raising campaigns delivered in each pilot country

  Deliverable: Global awareness raising campaign delivered

4.2. DES Virtual Platform is enhanced and delivers outreach actions and training programs

- 4.2.1 Define additional content and tools for the Virtual Platform
- 4.2.2 Design best practice training modules based upon the DES Publication, 10-key steps for developing district energy and modules developed in Component 2 and 3
- 4.2.3 Incorporate country-specific training modules and guidelines from Component 2 and 3 into Virtual Platform

- 4.2.4 Development of new knowledge products and tools including decision tool for local policymakers

Deliverable: DES Virtual Platform is enhanced and delivers outreach actions and training programs

4.3. Tailored training sessions are developed and advice delivered through 12 training webinars for 15 newly signed up cities including on the regionally tailored rapid assessment methodology

- 4.3.1 Development of training session concept in consultation with Partners as new cities in replication countries sign up
- 4.3.2 Preparation of regionally tailored rapid Assessment methodology based on Component 1 results and tailoring of pre-existing models and tools
- 4.3.3 12 training webinars organized
- 4.3.4 Dialogues with national governments to adopt and make available rapid assessment methodologies

Deliverable: 5 National or regional counterparts make rapid assessment methodology available

4.4. 6 fundraising and matchmaking sessions tailored and delivered for new signed up cities (5 cities per session)

- 4.4.1 Preparation of a concept note for fundraising and matchmaking sessions (delivered in 2016)
- 4.4.2 6 fundraising and matchmaking sessions organized
- 4.4.3 Fundraising for DES assessments in replication countries (started in 2016)

Deliverable: 6 fundraising and matchmaking sessions delivered

Deliverable: 15 newly signed up cities commit to assess using the regionally tailored rapid assessment methodology and/or implement a new policy action

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

DES are more energy efficient than building level or apartment level boilers and air conditioners. The scale of DES allows for co-generation or trigeneration which raises the efficiency of DES over these other systems. However because of the piping and district infrastructure required for DES, DES has high upfront costs, with long payback periods. Cities interested in DES need to create the conditions for investment, including access to city energy demand data, evidence based energy savings, financial estimates of potential projects, policy recommendations based on bottom-up, multi-stakeholder analysis, city wide DES plans and pre-investment support among other incentives to encourage investment in DES. The project aims to help cities create these conditions and demonstrate a replicable approach for developing DES that can be scaled up by other cities with similar conditions. The GEF will finance costs to help cities create these conditions and remove barriers to DES investments, and is therefore incremental.

GEF global funding is required to establish (and validate) global tools and methodologies, pilot new integrated planning policies, as well as to illustrate the feasibility and the commercial viability of modern DES and showcase socio-economic benefits, to enable local governments to upscale and replicate DES, national governments to support and further enable cities in DES development, and regional actors to promote DES regionally and to provide implementation support to cities across the region. This funding will encourage national governments and development agencies (e.g. MDBs) to prioritize DES in national low-carbon development strategies (e.g. INDCs,

sustainable heating and cooling strategies, V-NAMAs and eco-city/smart city programs) in combination with national regulations to lower barriers to DES (e.g. harmonized building codes/labels and devolved authority on energy planning). Only by providing the evidence of the socio-economic benefits and cost savings of this low carbon development strategy, together with a proven methodology, will national governments in developing countries be persuaded to take action on DES. Therefore, phase 2 of this initiative could envision working with the national governments of the pilot cities through national STAR allocation, and future city initiatives.

Furthermore, DES is quite a new technology for the GEF portfolio. However, if this project is effective, then modern DES technology applications can have wide scale impact on GHG emissions reductions and a wide scale potential for replication and scale up. Moreover, this type of project works more with cities that countries, in that, many of the interventions and policy options need to be initiated and sustained by cities and not national governments. As such, it complements the city approach the GEF is taking and if proven effective could be folded into the second round of cities programmes starting in GEF 7.

5) Global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF)

The Project's goal is to support market transformation efforts around the world to demonstrate the power of public-private engagement to double the rate of energy efficiency improvements in heating and cooling of buildings by 2030 and quantify the corresponding decrease in GHG emissions.

The following paragraphs describe the methodology used in the calculations.

The Project will work with 16 cities selected for the light touch activities, out of which 4 cities will be selected for deep-dive assessment that will deliver at least 1 demonstration project to tender and develop a DES city-wide plan of policies and investments to be adopted by the city. In addition, the Project will also closely work with 15 learning cities in similar replication countries, delivering rapid assessments and providing trainings to the cities to develop DES.

Only Component 2 contributes to Direct GHG Emission Savings, i.e. emission savings due to DES units that are commissioned after the project implementation period. For each 'deep dive' pilot city, Direct GHG Emission Savings have been calculated (refer to details in Annex J-2) as the cumulative emission reductions of 1 modern DES demonstration project attracting investment bids (1 unit of analysis) and a conservative estimate of 2 additional modern DES projects of a similar size and type (2 units of analysis) developed as a direct result of the 10 year DES city-wide plan. Direct GHG Emission Savings per city/country were calculated assuming that the demonstration projects will be commissioned 3 years after the Project completion, whilst for the 2 DES units that will be commissioned as a results of the adoption of the city-wide plans, calculations for the reduction of the GHG were based on the assumption that the 2 units would be commissioned respectively 6 years and 10 years after the Project completion. A period of influence of 20 years following the Project's completion has been considered to calculate GHG Emission savings. The units of analysis chosen vary by each pilot city reflecting the different city types and projects envisioned including establishment of small starter district energy networks in Chile and India and the modernization and expansion of cities' networks in China and Serbia, with a particular focus on fuel switching from fossil fuels e.g. coal or fuel oil.

Based on the above, the Project results in an estimated **"Direct GHG emissions savings" of 2,523,140 tCO_{2eq}** over the 20 years following Project completion (refer to details in Annex J-2).

During project implementation, more precise calculations of the Direct GHG Emission Savings will be done once the pilot cities are identified, including identification of the sizes of the systems, area coverage, number of users as well as consumptions amounts. The emission reductions will be tracked through the monitoring framework developed in Component 2. The Direct GHG emissions savings estimated here are assessed based on assumptions regarding the technologies and the sizes of potential projects which could be implemented in the cities of countries encompassed by the project. The choice of technologies and scale of demonstration project's scale could be subject to adjustements/changes based on the results of the pre-feasibility studies conducted as part of Component 2 .

Considering these Direct GHG emission savings, the project's **cost-effectiveness is US$ 0.79 per ton of CO_{2eq} mitigated**.

Furthermore, the Project results in an estimated **Indirect GHG Emission Savings of 823,050 tCO_{2eq},** also considering a 20-year period of influence (refer to details in Annex J-2). The long-term support from the DES Initiative provided to cities in Component 1 that were not selected as pilot cities (12 cities in India, China and Chile) is envisaged to lead to development of district energy systems in 9 cities, based on lesson learned and experience of the pilot cities, potentially leading to significant GHG emission savings in the future. However, a conservative assumption has been considered for the sake of calculating the Indirect GHG savings induced by this project: it is envisioned that, out of the 9 earlier mentioned cities, only 3 (1 in India, 1 in China and 1 in Chile) will actually end up developing DES units. Each of these 3 cities will develop the equivalent of 2 modern DES projects (i.e. 2 units of analysis) of similar size and type as the ones developed in the demonstration projects. It is assumed that these DES units will be commissioned respectively 10 years and 15 years after Project completion, and their effects will be accounted for over the same period of influence as for the demonstration projects (i.e. 20 years after Project completion).

China

Single unit: Coal saving from connection to existing district heating network of 50 MW of industrial waste heat.
Explanation: Based on partner experience in China significant waste heat potential exists in numerous cities and is often the lowest-cost carbon reduction for district heating however local capacity, strategy and coordination remain significant barriers, all of which the Initiative will address. The conservative estimate is that in a 'deep-dive' city $50MW_{th}$ of waste heat connection could be developed/put to tender within the project implementation period.
Investment proxy: CAPEX of 50 MW_{th} waste heat connection would be between US$ 10.4 million and US$ 13.0 million (US$ 0.2-0.26 million per MW_{th})

Implementation of the demonstration Project in one city in China is expecting to result in the reduced use of coal in the amount of 35,740 tons per year due to change of a fuel source (excess heat). Estimated Direct GHG emissions savings for the next 20 years are 681,020 tCO_{2eq} in total, or 40,060 tCO_{2eq} per year.

In addition, it is expected that additional 2 projects of the similar size and type will be implemented in the city as a result of the adoption of the city-wide plan, respectively commissioned year 6 and year 10 after the Project Completion. These projects will contribute to additional Direct GHG Emissions Savings of 961,440 tCO_{2eq} over the 20 years following Project completion.

Chile

Single unit: Replacement of inefficient and polluting individual biomass stoves and gas boilers in various buildings including households, commercial buildings, government institutions through development of a 25 MW_{th} district heat network run on biomass CHP (producing 2 MW of electrical power).

Explanation: Based on baseline analysis significant potential for biomass based district heating systems exists in numerous cities in the south of Chile.
Investment proxy: CAPEX of 25 MW_{th} of district heating would be between US$ 10 million and US$ 20 million (US$ 0.4-0.8 million per MW_{th})

Implementation of the demonstration Project in one city in Chile will result in Direct GHG Emissions Savings for the next 20 years in amount of 81,260 tCO_{2eq} in total, or 4,780 tCO_{2eq} per year. Direct GHG Emission Savings will be achieved through reduced use of coal (1,320 tons of coal saved per year) thanks to the electricity produced by the biomass CHP boiler, and reduced use of gas in individual boilers (1,277,970 m3 of gas saved per year) thanks to the hot water produced by the biomass boiler feeding the district heating network.

Furthermore, it is expected that additional 2 projects of the similar size and type will be implemented in the city as a result of the adoption of the city-wide plan, respectively commissioned year 6 and year 10 after the Project Completion. These projects will contribute to additional Direct GHG Emissions Savings of 114,720 tCO_{2eq} in total over the 20 years following Project completion.

India
Single unit: Electricity saving from district cooling starter network established with 35 MW_{cool} of industrial electric chiller capacity (10,000 refrigeration tons).
Explanation: Discussion with partners including ICLEI South Asia, Empower, Danfoss, UNEP Region of Asia Pacific, IDEA has concluded that an initial demonstration project of 10,000 refrigeration tons (35 MW_{cool}) could be achieved in each 'deep-dive' city within the project implementation period.
Investment proxy: CAPEX of 35 MW_{cool} district cooling installation would be between US$ 17 million and US$ 22 million (US$ 0.68-0.88 million per MW_{th})

Implementation of the demonstration Project in India will result in Direct GHG Emissions Savings for the next 20 years in amount of 170,510 tCO_{2eq} in total or 10,030 tCO_{2eq} per year. Contribution of the project to the Direct GHG Emission Savings is a result of the reduced use of coal for production of the electricity due to development of more energy efficient system for cooling (approximately 40% more efficient than split A/C units).

Additionally, it is expected that additional 2 projects of the similar size and type will be implemented in the city as a result of the adoption of the city-wide plan, respectively commissioned year 6 and year 10 after the Project Completion. These projects will contribute to additional Direct GHG Emissions Savings of 240,720 tCO_{2eq} in total over the 20 years following Project completion.

Apart from the expected GHG Emissions Savings, the implementation of the Project in India will result in reduction of ODS in the amount of 12.300 tons. This calculation is based on the assumptions that the installed cooling power will be 10.000 refrigeration tons, or 35 MW_{cool}, with 41,000 t of CFC (based on average technical data). With this installed capacity, 11,666 individual cooling systems, that can cool approximately 209,000 m2, will be replaced.

Serbia
Single unit: Connection of 25 MW_{th} of biomass boilers to existing district heating network.
Explanation: The most important project for Serbia will be the replacement of gas boilers, which represent the majority of Belgrade's district heating fuel supply, with low-carbon alternatives. Replacement with biomass boilers is most likely and its GHG emission reductions will be similar to other available technology applications such as geothermal and waste heat connection which have been identified as lower priority. 25 MW_{th} would replace some of the gas boilers in Belgrade.

Investment proxy: CAPEX of connection of 25 MW_{th} of biomass boilers to existing district heating network would be between US$ 15.0 million and US$ 20.0 million ($0.6-0.8 million per MW_{th}).

Implementation of the demonstration Project in Serbia is envisaging a fuel switch from gas to biomass, resulting in Direct GHG Emissions Savings for the next 20 years in amount of 113,390 tCO_{2eq} in total, or 6,670 tCO_{2eq} per year.

Also, it is expected that additional 2 projects of the similar size and type will be implemented in the city as a result of the adoption of the city-wide plan, respectively commissioned year 6 and year 10 after the Project Completion. These projects will contribute to additional Direct GHG Emissions Savings of 160,080 tCO_{2eq} in total over the 20 years following Project completion.

6) Innovativeness, sustainability and potential for scaling up

The project features innovation in applying a 'systems approach' in energy planning, governance, business model development and technology applications through **modern** district energy systems. District energy creates synergies between the production and supply of heating, cooling, domestic hot water and electricity and can be integrated with municipal systems such as waste, wastewater, transport, public buildings and industry.

At the planning and governance level innovation is reflected in component 2 whereby integrated energy planning and mapping, supported by a multi-stakeholder governance structure, form the basis of the resulting DES plan and policy development. The projects use of 10 district energy action modules also offers an integrated approach vertically (levels of governance) and horizontally (across sectors – e.g. integration DES with power, sanitation, sewage treatment, transport and waste) for holistic policy, planning, finance and technology solutions.

Modern DES is a proven technology approach but is confined to relatively few countries. District heating projects that use renewables, and district cooling projects in general, are innovative in the developing country context and DES projects using waste heat are innovative worldwide. The demonstration of innovative technology applications (district cooling, district heating with renewables and use of waste heat) as well as policies in the developing country context is crucial to global scale-up. Demonstration projects are a common and successful tool used by local governments to facilitate market development, raise awareness of potential investors and accelerate private sector engagement in a district energy project. Awareness-raising on the opportunities of district energy, through demonstration projects, is crucial to lowering perceived risk, improving the bankability of projects and facilitating effective policy implementation at the local, national and regional level. Further, local governments are the most effective actors in addressing the associated risks and costs of district energy systems and thereby catalyzing investment, making them the main proponent of global acceleration of district energy (UNEP 2015). However, demonstration projects are a significant investment, which without proof of commercial viability in the region and evidence of multiple benefits, are difficult to justify within tight city budgets. Furthermore, there remains a significant gap in standard and accessible global tools and methodologies to assess at one level the impact of heating and cooling in a city and also to understand the full range of technology options available, including DES (see earlier section A.1.1. on barriers including awareness, data collection and finance). In addition, local and institutional capacity in developing DES needs to be addressed through regionally adapted and technology specific training tools that need to be tested through the different city types, which necessitates a global approach. Component 2 will develop standardized methodologies and tools for city-wide DES potentials and a standardized project pre-feasibility methodology and tool to be disseminated through Component 4.

On a technical level, the project features innovation in its definition of modern district energy as "heat and cool networks that combine many technologies and approaches, such as combined heat and power (CHP), thermal

storage, heat pumps and decentralized energy, to supply affordable and climate resilient (i.e. low carbon and energy efficient) heating and cooling services." Such integrated technology applications are new and this project will contribute to demonstrating these different applications in new markets, provide new data after implementation of the projects (e.g. on the multiple benefits of these approaches) and innovations (e.g. the use of new sources of low-grade waste heat for district heating and cooling).

Sustainability/Scaling up: policy work that leads to sustainability, demonstrations lead to successful examples in a country help build the momentum for further investment, city wide plans identify investments additional to pilots and define a path for subsequent investments in district heating city wide, the accelerator and alliance (bringing together different groups in the DES space and help them work effectively together promoting DES in cities).

Replication countries:

In addition to the 4 countries selected for 'deep-dive' support, further countries can be supported dependent on additional co-financing being identified. These potential replication countries are:

- Morocco: The Initiative has attracted funding from the government of Italy to carry out activities in Marrakesh similar to a deep-dive and identify a demonstration project for district cooling in the city. Other cities like El-Yadida have also been identified as suitable to develop a district cooling network;
- Mexico: Mexico City sustainability director and SENA (Ministry of Energy) are interested to deploy DES in some cities. The Iniative is looking to develop Climate Technology Centre and Network (CTCN) proposals for selected cities to mobilize funds. The government has also indicated that they want a national strategy on district cooling;
- Colombia: The Ozone department in the Ministry of Environment, has engaged the DES Initiative to support their existing work on district cooling in cities. The Ministry of Environment are developing a national District Cooling Strategy. Private sector partners have indicated several cities that have signfiicant interest in developing DC. Swiss government are undertaking mapping and pre-feasibilities of a DC project in a city and raising awareness in four other cities as part of a Ozone Depleting Substances (ODS) phase out strategy;
- Bosnia & Herzegovina: The DES Initiative has undertaken a pre-feasibility identifying a priority investment plan of Banja Luka's district heating system using funds from the CTCN. This has already led to interest from development banks, notably the European Bank for Reconstruction and Development. The DES Initiative also wants to work with Sarajevo under a similar methodology;
- El Salvador: National centre for energy efficiency has shown interest in the DES Initiative and are discussing with ministry of energy. Next steps are still being identified;
- Pakistan: A PIF is being developed with support from the Government of Pakistan to use STAR allocation for GEF 6 cycle on a district energy focused project.
- Malaysia: Iskandar Regional Development Authority has signed up Iskandar region to the Initiative and has a large 200 MW data centre under development that they want teh DES Initiative's support to be run on district cooling with the associated township also under development. Coutnry already has DC incorporated into national smart city framework and has some successful DC projects;
- Mongolia: Ministry of Environment and Ministry of Energy have expressed interest in engaging with the Initiative.

A.2. Child Project? **If this is a child project under a program, describe how the components contribute to the overall program impact.**

Not applicable.

A.3. Stakeholders. **Identify key stakeholders and elaborate on how the key stakeholders engagement is incorporated in the preparation and implementation of the project. Do they include civil society organizations (yes X /no☐)? and indigenous peoples (yes ☐ /no X)?[20]**

The DES Initiative will draw on its multi-stakeholder partners to deliver capacity building, training, tools and methodologies. Building on UNEPs technical, finance and policy database of knowledge from the 45 champion cities studied for the DES Publication as well as its partnership with 16 private sector partners, 7 industry associations, 2 NGOs, 9 IGOs, 2 city networks and the 28 cities that have signed up to the DES Initiative, as well as its place on the SE4All Advisory Board and the G20 taskforce on district energy , UNEP is well placed to leverage its network and in-house knowledge to cost effectively address the implementation gap, provide access to the best methodologies and tools, disseminate global best practice, and provide trainings to cities on policy, coordination and technology options.

National level consultations

Country	**Overview of consultations**
China	On 8 June 2016, UNEP and Danfoss met with the National Development and Reform Commission (NDRC) of the People's Republic of China in Beijing to discuss the activities of the project in China. NDRC indicated that they remain very positive about the prospects of the GEF project in China to increase energy efficiency in China and to identify financial mechanisms and business models for third-party district energy services to cities and will fully support this cooperation. NDRC and UNEP agreed to a project implementation structure in China that will establish the following bodies: • National Project Steering Committee to comprise UNEP and NDRC staff at the director level; • Country Office to comprise UNEP and NDRC staff at the working level; • Deployable Project Work Team (DPWT) to comprises a Chinese and a international multi-stakeholder team, led respectively by a Chinese expert and international expert; NDRC's feedback on the proposed activities: - **Light Touch:** eight, instead of five, cities should receive rapid assessments, and these cities should be selected through an online application process. - **Deep Dive:** four demonstration cities, rather than one, should receive

[20] As per the GEF-6 Corporate Results Framework in the GEF Programming Directions and GEF-6 Gender Core Indicators in the Gender Equality Action Plan, provide information on these specific indicators on stakeholders (including civil society organization and indigenous peoples) and gender.

	support on energy mapping and planning, policy development, and the implementation of district energy. - **MRV:** NDRC asked this component to be renamed from MRV NDRC are particularly interested in the global knowledge exchange that the project provides. NDRC put forward two potential solutions to leverage co-finance for an expanded number of demonstration cities: - Select demonstration cities that commit financial resources for project activities. - Open a bidding process where qualified enterprises that win the bid finance the deep dive activities and are reimbursed once the district energy system that is developed, etc.
Chile	Telephone consultations with the Ministry of Energy and the sustainable heating unit in Ministry of Environment and a country visit. Both Ministries have stated that one of their main concerns is the strong air pollution caused by massive utilization of old and inefficient wood stoves for space heating. Ministry of Environment financial support to replace old wood stoves is not sustainable and is therefore looking for a long term sustainable heating solution. District heating had already been identified as a feasible solution and since 2012 the Ministry of Environment together with the Ministry of Energy had been financing several pre-feasibility studies. Ministry of Environment is developing a roadmap on District Heating. The roadmap will provide a national framework all along the process of development and implementation of district heating in the country, capable of enabling the definition of specific national lines of action agreed by the main stakeholders. The aim is to publish the national district heating roadmap by December 2016. The DES Initiative is co-developer of this roadmap, which could become a national strategy. In the context of development this roadmap, a workshop on district heating was organized on the 28th of September with the support from the DES Initiative.
India	UNEP has held meetings with the following national stakeholders: - GoI Ministry of Power (MoP) Joint Secretary, Dr. Arun Kumar Verma - GoI Ministry of Urban Development (MoUD), Joint Secretary, Dr. Neeraj Mandloi - GoI Ministry of New and Renewable Energy (MNRE), Advisor, Dr. Arun K. Tripathi - TERI, Director General, Dr. Ajay Mathur and Amit Kumar, - International Finance Corporation (IFC), Rajesh Miglani and Shruty Narayan - KfW Stefan Hediger and Usha Rao - PricewaterhouseCoopers (PwC) Rajeev Ralhan and Tarun Garg Furthermore UNEP has hosted a workshop and gained feedback from 4 light-touch cities: Pune, Coimbatore, Rajkot and Thane, as well as Gujarat state government, and other interested cities. **MoP consultation:** On the topic of city selection, recommended to work with cities like Varanasi, where there is a dense pattern of development, and Amravati, where the potential for green field development is huge. Suggestion that cities in the planning stage are ideal for DES. Dr. Verma expressed his interest in participating in the project steering committee. **MNRE consultation:** On the topic of city selection, Dr. Tripahi mentioned that the

	selection criteria should also include (a) availability of water (near to lakes) (b) demand for cooling load throughout the year (at least for maximum period of the year). Dr. Tripathi confirmed his participation in the steering committee and asked for the offical request letter to be (re)sent to him for formal consent. He offered to organize a meeting with the Secretary and Joint Secretary of MNRE for UNEP's next visit to India. **MoUD consultation**: DES project is relevant for the GoI's Smart Cities programme and Atal Mission for Rejuvenation and Urban Transformation (AMRUT). The main project focus should be to demonstrate the local business models, preferably in one of the short-listed smart cities. MoUD should be involved once the cities are at the point of district cooling development – when, for example, they are determining the tariffs and other policies. Dr. Mandloi suggested keeping MoUD informed of the policy needs and lessons learned that emerge from the demonstration project. GoI can come forward to endorse the technology after seeing how it performs in cities. For example, once the technology is proven in India, the Bureau of Energy Efficiency (BEE) could include DC as one of the components in the green rating systems of building designs. He recommended the Mumbai Bandra Kurla Complex as good site for the DC demonstration due to the continuous cooling demand. **TERI consultation:** Dr. Mathur suggested to demonstrate the technology/concept and establish the business model(s). Based on the lessons learned and good practices from the pilot(s), up-scaling strategies can be developed. He suggested exploring the following options: (a) the Bandra Kurla Complex; (b) a similar complex being built by major (style) developers in Thane; (c) a site near the BRT corridor; or (d) a similar potential site in one of the smart cities. He felt that we should start with natural gas chillers and phase in the other energy sources as they become cost-effective. Dr. Mathur was keen to see DES implementation in India and expressed his and TERI's full support for such an endeavour.
Serbia	**National consultations with** the Government of Serbia have been led by UNEP. The government of Serbia supports the project with the key ministry focal point being the Ministry of Agriculture and Environmental Protection**.** A national and city-level consultation meeting was held in Belgrade 17th February 2016. Ms Stana Bozovic, State Secretary for Environment of Republic of Serbia: the government of Serbia welcomes the GEF SE4ALL project and welcomes that Belgrade will be one of the four pilot cities. Belgrade consultations: City and existing district heating utility welcome the project and appreciate ethat the work plan reflects consultations with the city since 2015 and expressed commitment to replicate lessons learned and activities in the whole of Serbia and the region.

Table 3 below describes the global and regional partners of the DES Initiative and their anticipated activities, content and expertise that could be leveraged for the DES Initaitive's global and country level activities and the areas of activity that these partners currently plan to support.

Table 3: Anticipated Partner Content, Contributions and Roles

Stakeholder group	Agencies/ organisations	Existing activities with potential to be leveraged and role as relates to the DES Initiative	Content engagement, contribution to the DES Initiative
IGO	UNEP	UNEP DES Initiative is hosted in the Energy, Climate and Technology Branch of UNEP's Division of Technology, Industry and Economics and will lead the execution of the project. The DES Initiative Secretariat will be hosted by UNEP-DTIE office in Paris, and UNEP regional offices will be part of the National Project Steering Committee and Project Management Office in each country. The DES Initiative Secretariat, UNEP-DTIE, Policy Unit, will act as the Executing Agency of the project. UNEP Climate Change Mitigation GEF Unit will be the Implementing Agency of the project.	UNEP's extensive experience in building, coordinating and guiding energy efficiency and climate mitigation projects provides essential ground for the work of the DES Initiative's Secretariat, as such UNEP will be contributing to all project components.
	IEA	IEA hosts an international hub for district energy research and has and Implementing Agreement on District Heating and Cooling including Combined Heat and Power. The Agreement deals with the design, performance and operation of distribution systems and consumer installations and it is dedicated to helping to make district heating and cooling and combined heat and power powerful tools for energy conservation and the reduction of environmental impacts of supplying heat. The IEA is developing a national scorecards for China's district heating system and has also developed a project to define best practice waste heat business models in China.	IEA provides analytical support and will make use of its modelling tools and data (e.g. modelling of flexibility benefits of district heating to the national grid etc.). The IEA is interested in supporting the technical task force and activities within China. IEA will contribute to Components 1 , 2 and 4.
NGO	ICLEI- Local Governments for Sustainability	ICLEI World Secretariat (ICLEI WS) has collaborated with UNEP since 2013 to develop the "Global District Energy in Cities Initiative" (DES Initiative) and its flagship publication "District Energy in Cities: Unlocking the Potential of Energy Efficiency and Renewable Energy." ICLEI WS supports the DES Initiative in its capacity building task force and training activities with these local governments as well as global communication activities. ICLEI WS is a co-chair of the capacity building task force.	ICLEI South Asia Secretariat (ICLEI SAS) will support with technical assistance and capacity building activities with local government and stakeholders in South Asian countries such as India to develop a replicable modern district energy approach that can be scaled up in the country/region. Similarly, ICLEI South America Secretariat (ICLEI SAMS) will be engaged for the implementation of capacity building activities in Chile. ICLEI WS and the DES Initiative are developing joint district energy solutions on ICLEI's 'solutions gateway'. ICLEI will be contributing to components 1, 2 and 4.

Stakeholder group	Agencies/ organisations	Existing activities with potential to be leveraged and role as relates to the DES Initiative	Content engagement, contribution to the DES Initiative
	C40	C40 is a network of the world's megacities committed to addressing climate change. It has been created and is led by cities, and focusses on tackling climate change and driving urban action that reduces greenhouse gas emissions and climate risks, while increasing the health, wellbeing and economic opportunities of urban citizens. C40 will be engaged to participate in the capacity building as well as outreach and communications tasks force.	Specifically, C40 will provide webinars and trainings on local planning policies and best practice technologies and support dissemination activities. C40 will also support at Outreach events and conferences. The DES Initiative has developed a joint publication on best practices in district energy within its network of cities. C40 will contribute to component 4.
	Copenhagen Center on Energy Efficiency (C2E2)	C2E2 has extensive experience in supporting the delivery of district energy projects in diverse regions, as well as hosting the Secretariat of the SE4All Global Energy Efficiency Accelerator Platform. They host the Deployable Experts Team that will report to and be co-located with the Accelerator Platform Secretariat at the UNEP-DTU Partnership in Copenhagen, support through the Technical Support Team (analysis of technical and economic rationale, structure feasibility studies, provide best practice engagement, and other). C2E2 is a co-chair of the capacity building task force.	C2E2 will support institutional engagement with city governments and provide analysis of the technical and economic rationale for city energy-efficiency engagements, including identified areas where city-level decision making is most influential, i.e. buildings and district energy. They will engage in selected feasibility studies, plus contribute to the Terms of Reference and the contracting of consultants where they will need to be brought on board. Provide analysis of experiences, best practice engagement and compile or develop guidance material based on a wide range of city experiences. Finally, C2E2 will support the development of concrete project ideas and linkages to sources of finance. C2E2 will contribute to all components.
	World Resources Institute (WRI)	The WRI has long-term experience in energy efficiency in buildings and is engaged in the SE4ALL Global Energy Efficiency Accelerator. It hosts furthermore the WRI Ross Center for Sustainable Cities working with cities all over the world. It will be engaged to participate in the capacity building task force. The WRI are one of the coordinating partners of the Building Efficiency Accelerator (BEA) of which UNEP is also a lead partner. Both the BEA and the DES Initiative are members of the Global Alliance for Buildings and Construction.	The DES Initiative and the BEA under WRI's direction will develop one deep-dive city together; Belgrade, to jointly assess the role of district energy and building efficiency in the city and make holistic policy recommendations. The WRI will therefore contribute to component 2.
	Climate Technology Center and Network (CTCN)	The CTCN promotes the accelerated transfer of environmentally sound technologies for low carbon and climate resilient development, providing technology solutions, capacity building and advice on policy, legal and regulatory frameworks. CTCN is supporting the delivery of a number of technical assessments in the energy sector. CTCN can engage to participate in the technical task force.	The DES Initiative was the implementing partner for a CTCN funded pre-feasibility of the district heating system in Banja Luka, Bosnia & Herzegovina. This is helping to leverage finance for the refurbishment and modernisation of the DH system in Banja Luka.

Stakeholder group	Agencies/ organisations	Existing activities with potential to be leveraged and role as relates to the DES Initiative	Content engagement, contribution to the DES Initiative
Finance	World Bank Group (IFC)	IFC and UNEP have been closely coordinating its efforts aimed at promoting sustainable district energy practices and identifying investment opportunities. As part of these efforts, IFC delivered a study on Private Sector Participation in District Heating, which identified specific cities and DH utilities interested in pursuing advisory and investment support from IFC and UNEP. IFC has provided technical assessment for the identification of viable investment opportunities for DH in the cities of Belgrade and Banja Luka. IFC will be further involved in the business development activities outlined in this document by providing quality assurance of final outputs to the clients as well as by providing expertise on developing investment projects. IFC are interested in particular in developing district cooling systems in Latin America and refurbishing district heating systems in Eastern Europe and Central Asia.	IFC will be further involved in the business development activities outlined in this document by providing quality assurance of final outputs to the clients as well as its expertise in the development of investment projects. IFC will contribute to component 2 and 4.
	Regional development banks, commercial banks	Linkages with regional development banks as well as commercial banks will be made, e.g. through country feasibility studies available through the World Bank Group (WBG). They will also support the scale-up of project results.	International financial partners will provide quality control and funding to support policy development and demonstration project implementation in the cities.
	Global Environment Facility (GEF)	The GEF is funding the DES Initiative. It serves as a financial mechanism for several conventions, such as for example the United Nations Framework Convention on Climate Change (UNFCCC).	GEF will, besides its financial support, provide quality control and funding to support policy development and demonstration project implementation in the cities.
	KfW	The KfW has long-term experience in financing international development projects, as for example of municipal infrastructure and energy-efficiency measures. KfW have initiated a district cooling work stream interested in the Indian market.	International financial partners will provide quality control and funding to support policy development and demonstration project implementation in the cities. KfW will finance feasibility studies in the Indian market proposed by the DES Initiative.
	European Bank for Reconstruction and Development (EBRD)	The EBRD does provide financial support as well as policy reform and advisory services on a variety of sectors, with municipal infrastructure and energy amongst them. One of their key topics is the Green Economy Transition investing in sustainable projects that mitigate and/or build resilience to the effects of climate change and other forms of environmental degradation.	EBRD are working with the DES Initiative in Banja Luka to help realise investment in the district heating system. The EBRD also provides technical input to the DES Initiatives activities.

Stakeholder group	Agencies/ organisations	Existing activities with potential to be leveraged and role as relates to the DES Initiative	Content engagement, contribution to the DES Initiative
National	Danish Energy Agency	The DEA has decades of Danish authorities' regulatory experiences and know-how on RE, energy efficiency and consumption side solutions throughout the whole chain of district energy from fuel sources to generation, distribution and building side aspects. They will be engaged to participate in the capacity building task force.	DEA can share experience of introducing district heating in China.
	DK Embassy	The Energy Attaché at the embassy provides a key link in coordinating the project activities between Chinese and Danish energy authorities. Furthermore the embassy has contact with Danish companies that can provide world-leading technical and consultancy solutions within district energy. They will be engaged to participate in the capacity building task force.	The Energy Attaché can support and leverage communication and promotion work of the DES Initiative (component 4).
Private sector operators	Empower	Emirates Central Cooling Systems Corporation (EMPOWER) was established in 2003 with an objective to enable the real estate sector to efficiently utilize energy resources through District Cooling Services (DCS). Empower's mission is to promote sustainable and optimized use of energy resources by delivering reliable, cost-effective and environmentally friendly world-class district cooling services to achieve customer satisfaction, thereby creating long-term shareholder value. Empower will be engaged to participate in the technical task force, capacity building task force and outreach & communications task force.	EMPOWER will provide a model for financial analysis of district cooling project to DES Initiative to be adapted to local contexts and made public. Furthermore, they will send three experts to a 'new' district cooling market to carry out rapid assessments and support deep assessments (Components 1, 2 and 4)
	Dalkia	Dalkia has translated the DES Publication into French and have shared methodology for rapid assessment and pre-feasibility of DES. Dalkia will be engaged in the technical task force.	Dalkia will provide experts to rapid assessments (Component 1) and deep assessments (Component 2) in Eastern Europe and China.
	Veolia	Veolia will be engaged to participate in the technical task force and capacity building task force.	Veolia can provide training and capacity building and will invite 'deep-dive' city stakeholders (Component 2) to Veolia training camps. Veolia furthermore supports the development of policy and governance best practice in the pilot countries.
	ENGIE (Cofely, Climespace, CPCU)	ENGIE has extensive experience in supporting the delivery of district energy projects in France and Europe. ENGIE will be engaged to participate in the technical task force, capacity building task force and outreach & communications task force.	ENGIE will review assessment methodologies, provide specific technology guidance and give feedback on the adaptation of models and tools in country contexts (Components 1 and 2). They will develop policy guidance (e.g. for the G20 working group on district cooling); and participate as speaker in international conferences and workshops on district energy (at least three times a year) (Component 4)

Stakeholder group	Agencies/ organisations	Existing activities with potential to be leveraged and role as relates to the DES Initiative	Content engagement, contribution to the DES Initiative
			As part of the awareness raising activities, ENGIE invites city actors of at least one city per country of interest to site visits of district energy networks operated by ENGIE. Furthermore, ENGIE will provide co-brand /co-develop tools, communication material, animation videos, represent the work of the Initiative at global events and provide public relations support. ENGIE co-chairs a working group on district cooling as part of the ASEAN Plan of Action for Energy Cooperation 2016-2025. For the underlying 4 topics, ENGIE supports 2 projects a year for a total of 6 projects for the period.
Private sector technology providers	Danfoss	Experience of supporting the delivery of district energy projects in China, Eastern and Central Europe. Danfoss will be engaged to participate in the technical task force, capacity building task force and communications & outreach task force.	Danfoss' global level activities are to contribute to development and adaptation of district energy simulation models and tools, and provide technology guidance as well as input to review methodologies for example on assessments and trainings. Danfoss designs and delivers at least one training workshops and two webinars per year, invite city actors to study tours and respond to signed-up cities' technical queries and support fund-raising with donors, mobilize new partners and publish DES tools/guidance. They represent the work of the Initiative at global events and provide public relations support. Country level activities are to undertake city-level assessments during the light-touch phase, participate in the data collection process and adapt the rapid assessment methodology to the local context. Furthermore to participate at the country inception workshop and agree on a long-term partnership with at least one city. Danfoss will provide training support to light-touch cities e.g. on working with building developers, mapping of waste heat and renewables, and heating/cooling demand mapping. They will support deep-dive cities with the development of city-wide mapping of heating/cooling demand and contribute to the design of their long-term heating and cooling strategies. Therefore, Danfoss provides experts and metering technologies to undertake heating/cooling demand mapping and district energy potential studies in deep-dive cities, designs and delivers trainings in deep-dive cities on: heating/cooling strategies, master-planning and energy mapping.
	Thermaflex	Experience of supporting the delivery of district energy projects in diverse regions (Europe, Russia, Asia, Latin America). Thermaflex will be engaged to participate in the technical task force.	Global level activities are development and adaptation of district energy simulation models and tools, support of conferences and workshops, support of promotion of district energy in cities (Component 4) Thermaflex' country activities are support from the feasibility stage on, development of pilot city activities, and improving stakeholder awareness.(Components 1 and 2)
International Consultants	Sustainability Solutions Group (SSG) and GGLO	SSG and GGLO provide consultancy services on sustainability solutions including urban planning and design and energy and emissions modelling and planning. SSG and GGLO will be engaged to participate in the technical task force.	SSG's global level activities are providing a district energy model for the Initiative's Virtual Platform establishing a direct link between SSG and the cities for technical queries, training material, online webinars, and the support of global promotion of the Initiative on high-level events (Component 4) Country activities are light-touch and long-term partnership for 6 cities, deep-dive mapping and planning for 2 cities (Components 1 and 2)

Stakeholder group	Agencies/ organisations	Existing activities with potential to be leveraged and role as relates to the DES Initiative	Content engagement, contribution to the DES Initiative
	King & Spalding LPP	Legal advisor to proponents, cities, governments, sponsors: Long-term expertise in District Energy law, having structured, documented and negotiated more than 45 district energy projects. King & Spalding will be engaged to participate in the technical task force.	Global activities are to provide templates, risk matrices, term sheets and other material, delivering workshops and webinars, providing best practice case studies, and other. Country activities in China, Chile, India are to support deep-dive cities to bring projects to tender, training for city officials, review draft rapid assessments.(Components 1 and 2).
Industry associations	IDEA	The International District Energy Association (IDEA) is a non-profit trade association created to facilitate the exchange of information among district energy professionals. IDEA works actively to foster the success of its Members as leaders in providing reliable, economical, efficient and environmentally sound district heating, district cooling and cogeneration services. In addition to holding conferences and workshops, publishing *District Energy* magazine, and the IDEA Industry News blog, IDEA actively lobbies on behalf of its Members to secure favourable legislation and funding opportunities for the district energy/CHP industry. IDEA will be engaged to participate in the capacity building task force and outreach & communications task force. IDEA is a co-chair for the outreach & communications task force	Global level activities are to host the "train the trainer" global workshop in U.S annually and include study tours, to contribute to the project's communications campaign by providing at least four animated videos: one on waste heat, one on solar thermal and at least two based on demand. IDEA will design and deliver at least two webinars per year, mobilize new partners and liaise with actors to publish DES tools/guidance. They will contribute to the global awareness raising campaign by developing co-branded tools and by supporting the project's communication strategy on international media, liaise with U.S Universities, engage students to contribute with their technical expertise in the form of master thesis, final projects (Component 4). IDEA's country level activities are to organize one country based workshop annually in at least one country (India or China), to draft/review rapid assessments and develop city-wide mapping of heating/cooling demand, waste heat and renewables. IDEA supports deep dive cities of India and China with the development of their master-planning for district energy, provide policy recommendations and support on defining suitable business models (Components 1 and 2)
	EHP	Euroheat & Power is a network of district energy organisations and professionals, connecting industry players, decision-makers and academia in a joint effort to drive forward sustainable heating and cooling. EHP will be engaged to participate in the capacity building task force and outreach & communications task force. EHP is a co-chair for the outreach & communications task force	Dissemination activities and matchmaking with private sector partners for trainings, webinars and financing sessions (Component 4).
Academia and research	Aalborg University, 4DH Research Center,	• Aalborg University is a Danish University with a strong research group dedicated to sustainable energy planning which includes strategies for the development and integration of district energy as well as combined heat and power and renewable energy. Aalborg University is regularly involved in the design of the Danish energy policy and	Aalborg University, 4DH Research Center will provide existing data and modelling tools (e.g. Euroheat Roadmap in China developed by 4DH), support the development of assessment indicators, and support the development of proxies for energy consumption of different building types (Components 1, 2 and 3)

Stakeholder group	Agencies/ organisations	Existing activities with potential to be leveraged and role as relates to the DES Initiative	Content engagement, contribution to the DES Initiative
		its implementation • The 4DH Research Center is a collaboration between industry, universities and the public sector to investigate the potential for and develop 4th Generation District Heating (4GDH). 4DH has created focus on and knowledge about the future 4GDH potential within the district heating industry. Among other results, the Heat Roadmap Europe studies have developed the most advanced knowledge about energy planning currently available for analysing the heating sector in Europe and have demonstrated how a simultaneous expansion of heat savings, district heating, and heat pumps will result in the cheapest low-carbon heating sector for Europe. Both Aalborg University and the 4DH Research Center will be part of the DES Initiative's technical task force.	
Champion Cities	45 champion cities from development of the DES publication	All 45 cities have developed or are developing district energy systems	Many of the 45 cities have indicated a willingness to support learning cities through study tours, participations at workshops, provision of data, case studies and models and as part of city-to-city exchanges, as part of the Virtual Platform. Vancouver, Gothenburg and Rajkot have all joined the Capacity Building Taskforce

The below describes the **key entities with regards to district energy in the pilot countries**

The below Figures 2-5 summarize the stakeholder analysis of key entities at the national and state level in each pilot country and their relevance to the work of the project with regards to data provision and policy development. Each figure provides a better insight on the influence of different stakeholders on policy developments and on data needed for implementation of project activities:

- Stakeholders listed in the upper right box are considered to be the most influential both in terms of policy development and data collection. These stakeholders are considered as a top priority during the implementation of activities in each country.

Stakeholders listed in the bottom right box are given a second priority considering their importance on the data collection process; however they are not considered as influential on policy development as the stakeholders in the upper right box.

Figure 2: Matrix of stakeholder analysis of key entities at the national and state level in Chile

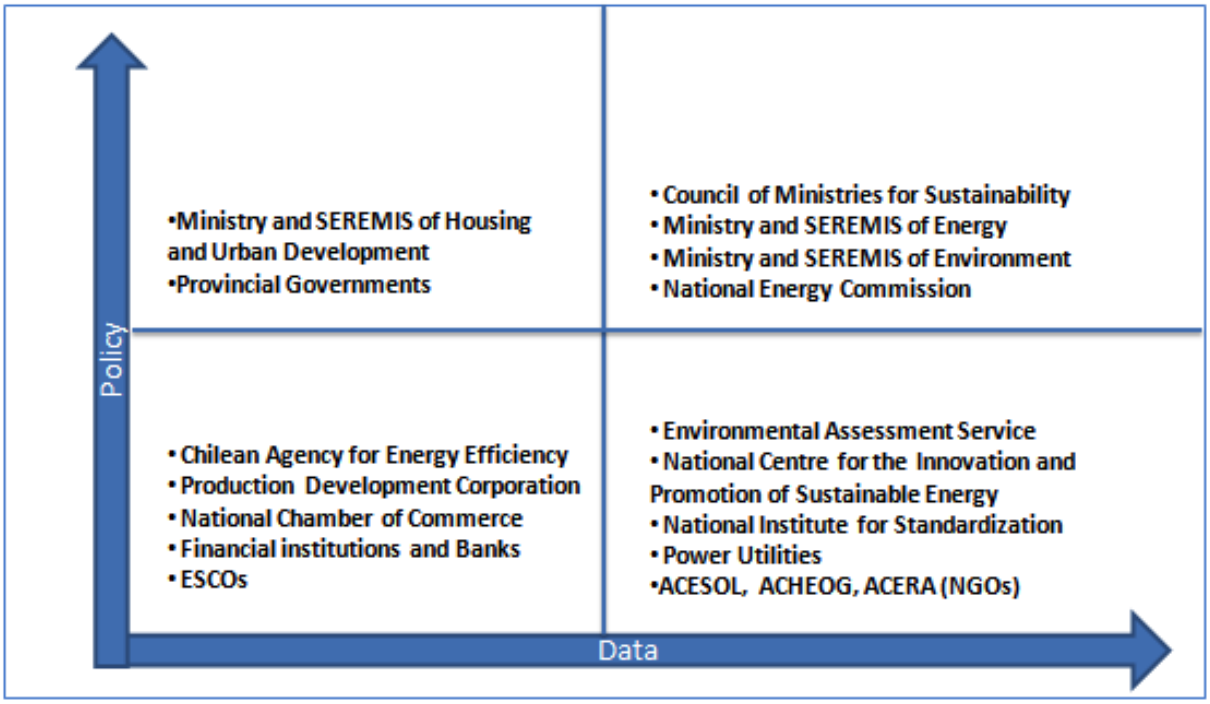


Figure 3: Matrix of stakeholder analysis of key entities at the national and state level in China

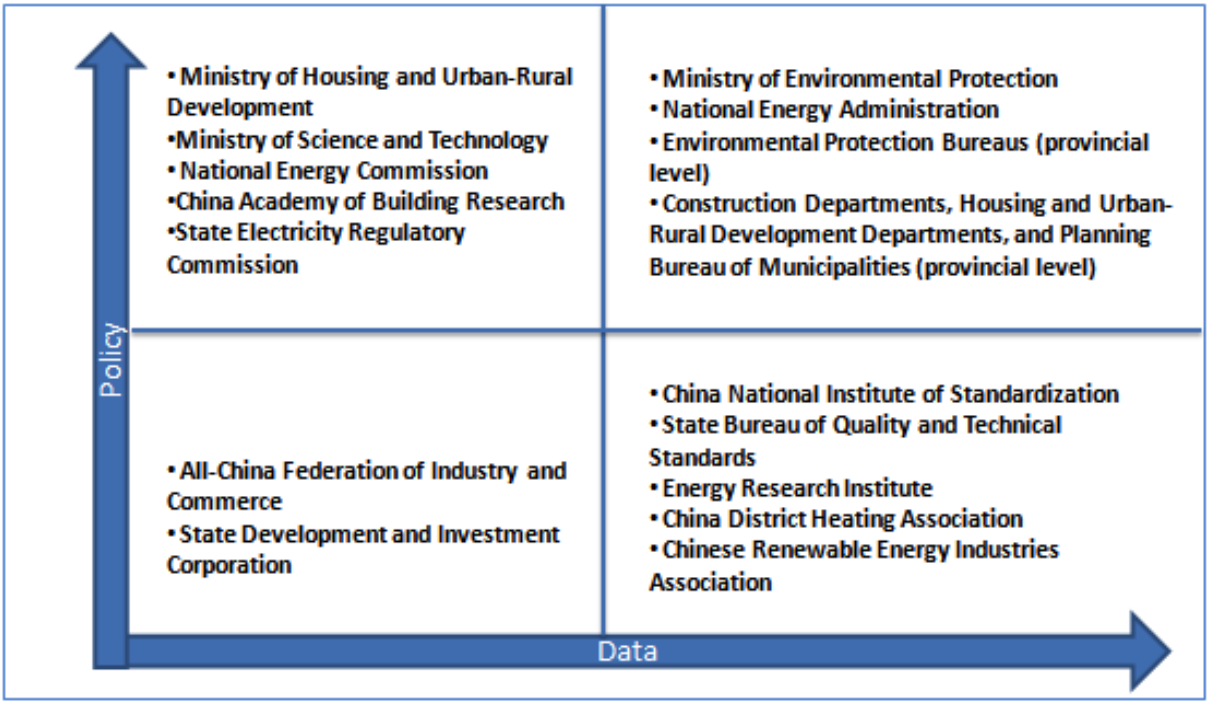


Figure 4: Matrix of stakeholder analysis of key entities at the national and state level in India

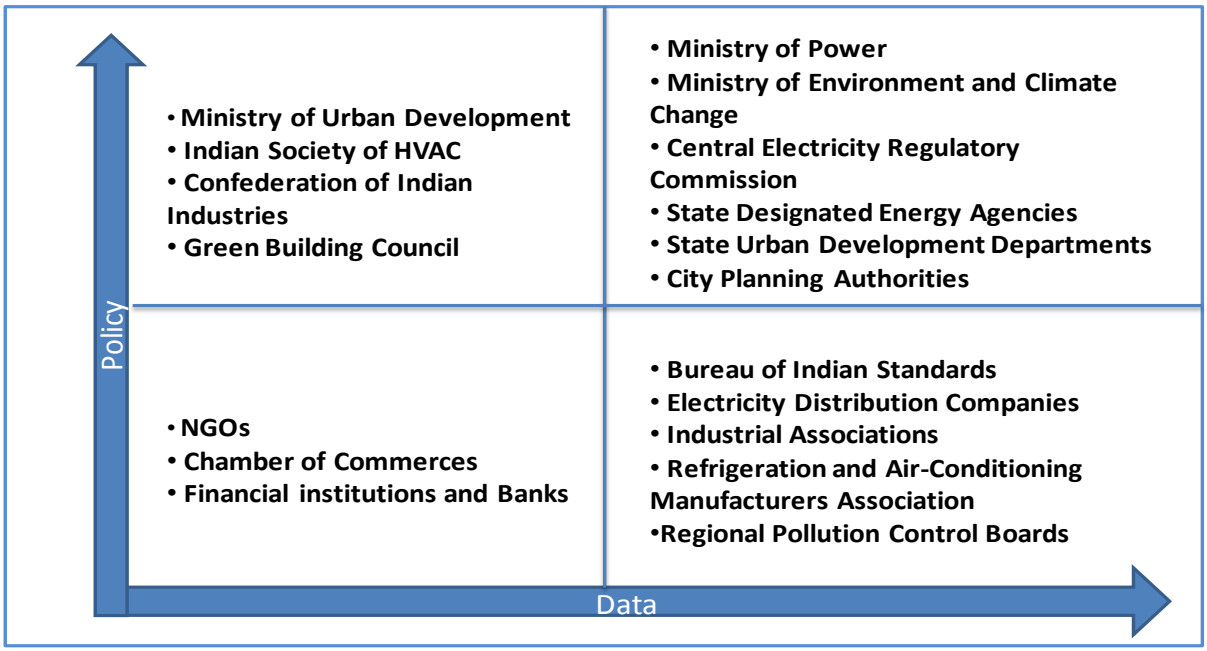
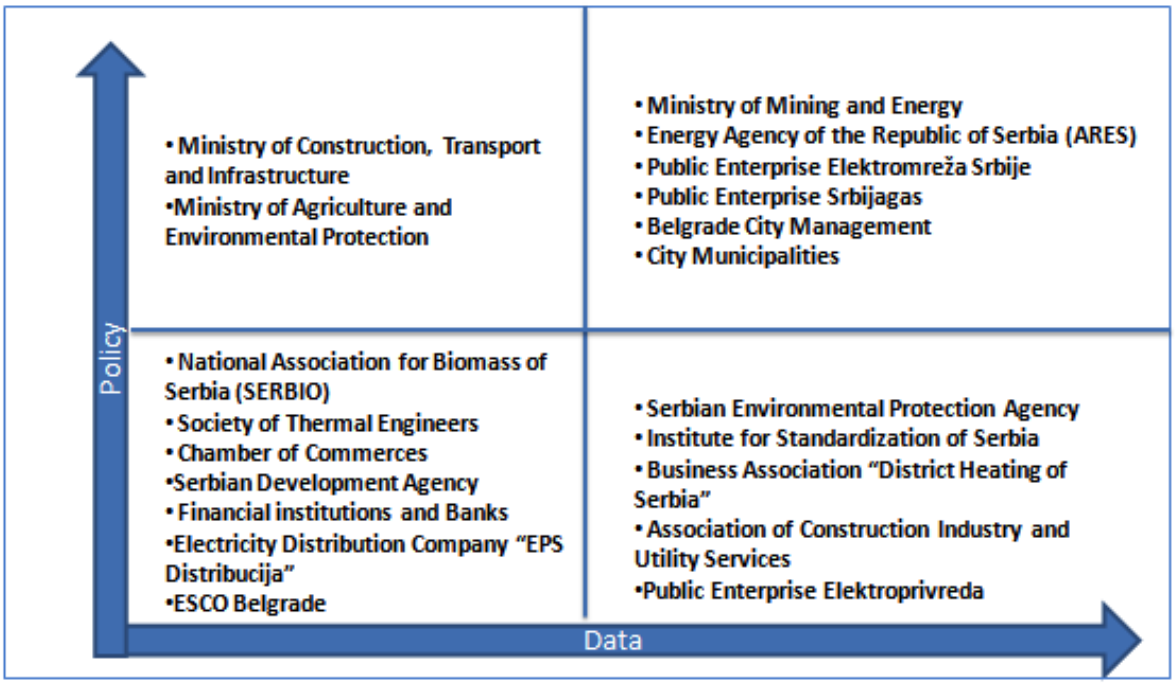


Figure 5: Matrix of stakeholder analysis of key entities at the national and state level in Serbia



A.4. Gender Equality and Women's Empowerment. **Elaborate on how gender equality and women's empowerment issues are mainstreamed into the project implementation and monitoring, taking into account the differences, needs, roles and priorities of women and men. In addition, 1) did the project conduct a gender analysis during project preparation (yes ☐ /no☒)?; 2) did the project incorporate a gender responsive project results framework, including sex-disaggregated indicators (yes ☐ /no☒)?; and 3) what is the share of women and men direct beneficiaries (women %, men %)?[21]**

Gender mainstreaming in energy projects has recognized the roles and responsibilities of women both as beneficiaries of electric power in their communities and as users of energy for domestic, production and community use. Whereas several studies exist on the links between energy access and welfare, and gender implications in general, focusing more on access to wood fuels, improved cooking technologies and access to electricity, little has been said on the gender implications of district energy. In fact, only a few studies seem to be available on gender implications and district heating:

1) A gender assessment funded by the Clean Technology Fund identified gender aspects and priorities in the use of district heating in the city of Lutsk, Ukraine. The study highlighted that decision making on the use of heating services appeared to be jointly made by men and women. However, the quality of district heating services seemed to affect women more than men, resulting in women being more active in submitting inquiries and complaints to the local district heating provider. Generally insufficient access to heating services and the length of the heating season affected women more than men, as women often spent more time at home looking after children, elder people and doing housework. Furthermore, the provision of quality hot water and heat supply to households, and an improved heating system in municipal hospitals with maternity care is specially valued by women.

2) Another example is the Asian Development Bank's (ADB) effort to mainstreaming gender aspects into district heating scheme investment in Heilonjiang, China – a project under implementation in 2013-2017. The project gender action plan was prepared to maximize the project benefits for women, safeguard poor households headed by women, increase the participation of women in the district heating sector and monitor the project's impact on women.

To better understand gender implications of district energy and to make sure that, if existent, they will be considered in the development of district energy projects, the DES Initiative will perform the following activities under each component:

- Component 1 "Light Touch": while undertaking data collection for rapid assessments, whenever it is possible and/or relevant, the DES Initiative will aim to include sex-disaggregated data to understand the different impacts of relevant policy changes on men and women. If relevant data is found, such as disparity between men

[21] *As per the GEF-6 Corporate Results Framework in the GEF Programming Directions and GEF-6 Gender Core Indicators in the Gender Equality Action Plan, provide information on these specific indicators on stakeholders (including civil society organization and indigenous peoples) and gender.*

and women with regards to the baseline situation on cooling/heating in a given country/city, a gender section will be included in the cities' fact sheets.

- Component 2 "Deep Dive": in case relevant gender-related findings and sex-disaggregated data has been brought to light under component 1, these gender implications on district heating will be considered for the 4 deep dive cities in the assessment of training needs and the preparation and delivery of training workshops. The deep assessment report will also reflect gender specific benefits where relevant and make gender related recommendations for the city wide plan if found relevant.
- Component 3 "Monitoring Framework": gender equality and gender implications on district heating will be considered in the design, training and implementation of the monitoring framework by including gender-related questions in the monitoring questionnaires(s). Based on the data obtained, gender-related findings and recommendations will be included in the monitoring framework reporting and monitoring plan.
- Component 4 "Outreach and Communication": The awareness raising campaigns will be designed and targeted taking into account gender sensitiveness to assess and evaluate potential impact and related policy integration of specific gender considerations.

Research made on the four countries selected for project implementation indicates that the gender gap is very different in each one of them:

- In Serbia the level of women participation in the legislature and enforcement is below acceptable standards; and the difference in pay for the same job for a women and man, is equivalent of a woman working 40 days a year without a pay. Female representation in the national politics is low, with a 9.5% share of women in the Government of Republic of Serbia and 28.6% women members of the municipal assemblies. According the Gender Gap report the country has a very good equality rates in education and health, and rates over the average on economic participation. However, the country is making big steps towards gender equality. Over the past decade, many local institutions for gender equality were established at the level of local governments. According to the evidence of the Standing Conference of Towns and Municipalities 129 local self-governments have established mechanisms for gender equality, 38 municipalities have signed the European Charter on Gender Equality at Local Level and 43 local communities have implemented projects for the improvement of gender equality.

- Chile has experienced major progress in reducing the gender gap, however, there is still ample scope for improvement. Young women have higher enrolment rates in secondary education and higher graduation rates from tertiary education. However, girls are less likely to choose fields of study as science, technology or engineering, and even when they do, they are less likely to pursue a career in these areas, perpetuating this way the gender segregation in the labour market. Female labour force participation in Chile has increased significantly since the mid-1990s, but in international comparison it is still low compared with an OECD average. As in many other OECD countries, one of the major obstacles Chilean women face to participate more fully is the traditional gender roles towards work and care. Gender gaps in employment outcomes are also reflected in other domains: Chilean women earn less than men; they are under-represented in senior management positions; they are less likely to own a business; and, they hold few seats in parliament. Chile has introduced several measures to reduce gender inequalities, the most important one is the creation of the Ministry of women and gender equality in 2015. This Ministry is in charge of the design, coordination and evaluation of policies, plans and programs aimed to promote gender equality.

- In China the representation of women in higher education has steadily increased in the past decade. Women represented over half (50.7%) of tertiary graduates in 2013. Women participation in the labor force is relatively high (64%), but it is significantly below the participation of men (78%). A gender pay gap persists in Chinese labor force. Women's average annual income lags behind men's. Women earn just over two-thirds (67.3%) of men's income in urban areas, and just over half (56%) of men's income in rural areas. In a 2010 survey, more than 72% of women stated they were not hired or promoted due to gender discrimination. Despite a high labor force participation, there are few women in leadership roles. In 2015, women were just 17% of all legislators, senior officials, and managers in China. Only 18% of firms in China have women as top managers. In 2014, women represented 10.7% of boards and 3.2% of CEOs of companies in China and are also underrepresented in political offices with only 12% of ministerial positions in China's government are held by women.

- India is ranked among the most gender unequal countries in the world according to the latest Global Gender Gap Report, rating even worst that is over the average in political empowerment but has a very low score in economic participation. The only parameter in which the country performs well is in political empowerment, and the reason for this is the increase in the percentage of women in ministerial positions reaching 22% in 2016. In economic participation and opportunity, which considers labour force participation and wage equality, India ranks a 139 out of 145 countries. In educational attainment the country is ranked 125 and in health and survival, India ranks in the bottom three.

The DES Initiative will take into consideration the gender gap in each country and will implement gender a cross-cutting strategy to guarantee that gender equality is considered and promoted throughout the implementation project. This cross-cutting strategy will consist on the following:

- Project stakeholders will be sensitized regarding gender equality. Particular efforts will be made to promote balance between male and female participation.
- Gender inclusion will be encouraged by balancing gender representation in all working teams of the organizational chart, from the Global Steering Committee, the Secretariat, the Task Forces, the Country offices, the Deployable Project Work Teams and the Multi-Stakeholder Coordination Structure.
- Gender equality will be promoted during all project's recruitment of personnel/consultants. All advertised positions will be equally opened to both genders and the text on ToRs will be carefully checked to avoid any gender stereo-types.
- Significant women representation will be promoted in all capacity building workshops and trainings, as speakers on panels and among invitees/participants.
- Equal training opportunities and transfer of skills will be available for men and women.
- All training materials, technology and methodology of dissemination are to be women friendly (e.g. avoiding gender stereo-types and using appropriate illustrations).

A.5. Risk. **Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, the proposed measures that address these risks at the time of project implementation:**

	Risk Description	Category	Impact Severity	Likeli-hood	Risk Management Strategy & Safeguards	By When/ Whom?
General: National government engagement and project governance						
1	National Government ministries remove their support for the project	*Political*	*High*	*Low*	• The Project has been given permission to be executed in each country and focal national ministries have been invited to the National Project Steering Committee in each country to provide overall guidance and strategic direction to the project. This level of engagement from national ministries will help ensure the project remains aligned with national priorities. • UNEP has a strong history of engagement with the key ministries in the four pilot countries. Building upon this history, the DES Initiative Secretariat, has been engaging national government ministries in the four pilot countries on the subject of district energy since 2014 through meetings and workshops. • The four pilot countries have been selected based on their high potential for modern DES to meet country-specific drivers. • UNEP is expanding the ministries it is engaging in each pilot country to have broad national ministry support for the project as it provides benefits under multiple ministries' mandates (Environment, Energy, Cities, etc.). This engagement will include targeted outreach on the benefits of DES to each relevant national ministry. • **China:** UNEP and the national government are already preparing a Memorandum of Understanding that includes joint activities on district energy that would be implemented with support from UNEP's District Energy in Cities Initiative. • **Serbia and Chile:** UNEP has received letters of endorsement from National Ministries for the project activities. • **India:** UNEP has engaged both the Ministry of Power and Ministry of New and Renewable Energy to participate on the National Project Steering Committee.	Throughout the project. UNEP C2E2 Country Coordinator
2	The DES Initiative involves several stakeholders on different levels (national, local) and different backgrounds which might cause coordination challenges	*Political and organizational*	*Medium*	*High*	• The DES Initiative has established a governance structure that ensures coordination between different vertical levels of government and activity. • Terms of Reference for National Technical Experts include management of on-the-ground activities that will deliver coordination needed between different local stakeholders, partners, government-levels and the Secretariat.	Throughout the project UNEP ICLEI C2E2 National Technical Experts

Risk Description		Category	Impact Severity	Likeli-hood	Risk Management Strategy & Safeguards	By When/ Whom?
3	Co-finance partners remove support for the Initiative	*Political and organiza-tional*	*High*	*Low*	• Obtaining signed co-finance letters. • Partners have shown commitment to Initiative through press releases and in engagement with cities and countries	Throughout the project. UNEP Partners
Project Component 1: Assessments and technical assistance for DES actions in cities ("Light touch")						
4	Local Governments of 'light touch' cities remove support for the project (by change of government or changing priorities)	*Political*	*High impact on outputs 1.2-1.4*	*Medium*	• A removal of support from one 'light touch' city per country would still allow the project to meet its deliverables of Component 1. • A removal of support from more than one 'light touch' city's local governments would require additional cities to be signed up within the country to receive support in order to meet the deliverables of Component 1 (in China, Chile and India). The significant size of the countries, number of cities, and partner interest in financially supporting more light-touch cities means more cities could be signed up for light-touch support. - **China and Chile:** During the city selection process for 'light touch' cities, cities will register their interest based on a 'call for Pilot Cities'. This will create a pipeline of other cities that could be selected if local government support is lost in more than one city in China or Chile. - **India:** The Initiative has already identified co-finance sources for three additional cities to receive rapid assessments and light touch support in India. • To avoid loss of local support the Initiative is seeking to formalise light-touch city engagement in the activities: - **China and Chile:** 'Light touch' cities are selected based on: the ability for DES to meet local strategy and drivers, city interest to provide co-finance and make local policy changes for district energy. Cities will provide an official letter confirming the engagement of the city in the activities, confirming co-finance and commitments to implement a policy, programme, or action related to DES. - **India:** Cities have been selected based on their interest in district cooling, interest in providing cofinance, high potential for district cooling and strong local relationships with ICLEI South Asia Secretariat. Furthermore, cities in India for light-touch are being requested to enter into a Memorandum of Understanding (MoU) with UNEP that will provide long-term political engagement on the activities under the 'Light touch support. • Assessments, quantification of benefits, well documented results and evidence based policy will further strengthen the case for district energy, should there be a new government in place.	Throughout the project. UNEP C2E2 National Technical Experts

Risk Description		Category	Impact Severity	Likeli-hood	Risk Management Strategy & Safeguards	By When/ Whom?
5	District energy not appropriate in 'light touch' cities	*Technical*	*High impact on outputs 1.2-1.4*	*Low*	• The four pilot countries have been selected based on their high potential for modern DES to meet country-specific drivers. • City selection process for 'light touch' support includes high-level analysis of suitability for district energy ensuring that basic requirements for district energy (thermal demand in buildings, density of building design, etc.) are present. • Additional light touch city or cities could be assessed if rapid assessment shows district energy is unsuitable.	First year of project UNEP National technical experts.
6	'Light touch' cities not willing to commit to drafting or adopting new action, policy or project relating to DES	*Political*	*Medium impact on outputs 1.3-1.4*	*Medium*	• Adopt a participatory and consultative approach to ensure strong ownership, which will involve the conduct of workshops and consultations to seek inputs/views of stakeholders. • Rapid assessment will make socioeconomic and environmental case for district energy in each city justifying DES action by the city. • Through city consultations, 'light touch' cities are made aware of the importance of their role as local governments in delivering modern DES, making the case for their activity in DES. • 'Light touch' cities provided with detailed priority next steps that will justify commitment. • Long-term training and support programme for 'light touch' cities outlined and communicated to local governments to show long-term support in meeting commitment (training in deep-dive city, virtual platform, city twinning etc.) • **Chile and China:** City selection process requires that cities are willing to commit to developing new action, policy or project. • **India:** City engagements and ongoing rapid assessment process has revealed significant interest in 'light touch' cities to develop district cooling systems, develop/tailor policies to encourage district cooling and to incorporate district cooling into local strategies. MoUs between cities and UNEP will include development of action, policy or project.	First 2 years of project UNEP National technical experts.
7	Partners and champion cities not interested in supporting 'Light touch' city	*Organiza-tional*	*Medium impact on Output 1.4*	*Low*	• Selection of pilot countries has been approved by the partners of the DES Initiative and partner co-finance has already been committed to these countries. • If there is a need for additional partners/champion cities to properly support specific light-touch cities then the Initiative will engage new partners/champion cities that are active in the region and/or global experts in a specific areas of district energy development as required. • **Chile and China:** City selection process will be with oversight from partners to ensure partner interest in supporting cities. • **India:** Partners have reviewed city selection in India and indicated interest to support and/or are already supporting the cities.	First 2 years of project UNEP National technical experts. Private sector partners

Project Component 2: District Energy Demonstrations and city-wide plans ("Deep dive")						
8	Local Governments of 'deep-dive' cities remove support for the project (by change of government or changing priorities)	*Political*	*High impact on all Outputs*	*Low*	• Selection of pilot cities based upon significant consultations with cities about planned activities and official letters from cities expressing co-finance and support for the project. • UNEP will enter into MoUs with each pilot city detailing planned joint activities. • Political stability over the project cycle is one of the selection criteria for pilot cities • National government support for the project and national overview of pilot city selection.	Throughout the project. UNEP C2E2 National Technical Experts Deployable Project Work Team
9	No viable demonstration projects identified in the deep-dive city	*Technical*	*High impact on Outputs 2.2-2.3*	*Low*	• Deep-dive city selection includes requirement for existence of viable demonstration projects. • **India, China and Chile:** Rapid assessments identify pipeline of viable projects and deep-dive selection based upon: sufficient technical and economic potential for DES in specific areas of the city; presence of potential demonstration project providing significant CO2 mitigation; and investment interest in a specific demonstration project. • **Serbia:** Consultations with city, partners and international financial organisations has identified potential demonstration projects in Belgrade that will be assessed as part of the deep assessment.	Throughout the project. UNEP C2E2 National Technical Experts Deployable Project Work Team
10	Viable demonstration projects do not match the technologies that have been identified in the project document (refer to subsection A.1.5)	*Technical*	*Low*	*Low*	• Light-touch activities in India, China, and Chile will identify cities that have the project types specified in Section 5 (new DES networks in Chile/India; waste heat connection in China). Deep-dive selection in India, China and Chile will ensure that the city selected has the relevant project type. • **Serbia:** Consultations with Belgrade and partners have indicated a range of possible demonstration projects. A new biomass supply source developed under an innovative business model has been identified as the most likely. The deep assessment in Belgrade will identify the demonstration project that will have the most demonstration impact in the city and region; be the most innovative technically or relating to business models; and be in keeping with long-term district energy plan being developed for the city. As such it is possible the demonstration project is not a new biomass supply source developed under innovative business model, but instead another innovative renewable or demonstration of business model options.	Throughout the project. UNEP C2E2 National Technical Experts Deployable Project Work Team

11	City does not want to tender demonstration project and no Expression Of Interest is issued	*Political*	*Low*	*Medium*	• A pilot city may decide to develop the demonstration project 'in-house' using the technical experience of existing utilities and not to issue a Call for Expression of Interest or may opt for a single investor without taking the project through the tender process. If this happens the demonstration project will still be delivered to investment, and Expressions of Interest will likely still be required for Engineering, Procurement and Construction (EPC) contractors. • UNEP has engaged expert partners on the likely development process of the demonstration projects in the four countries and have been informed that it is very likely an Expression of Interest will be issued. • UNEP will provide neutral advice to the city on the best tendering strategy for the demonstration project given local drivers and capacity. • If the demonstration project is developed 'in-house' by the city, UNEP and partners will provide ad-hoc advice and training to the utility at different stages of the demonstration project development.	Throughout the project. UNEP C2E2 National Technical Experts Deployable Project Work Team
12	No investor bids attracted for demonstration projects	*Financial*	*High*	*Low*	• Selection of pilot countries has been approved by the partners of the DES Initiative and partner co-finance has already been committed to these countries. • Selection of pilot cities contingent on presence of investor interest. • UNEP's partners include development banks, law firms and DES operators that can provide advice on the bankability and commercial viability of the demonstration project. • UNEP will provide training on local planning policies that create the enabling environment for investment in DES and also provide policy and regulatory advice through the development of the city-wide plan that can help to unlock investment.	Throughout the project. UNEP C2E2 National Technical Experts Deployable Project Work Team International partners and financiers
13	City does not want to adopt city-wide plan of policies and investments	*Political*	*High*	*Medium*	• UNEP will contract an organisation to be responsible for delivery of the city-wide plan but will ensure that its development is in deep consultations with the local government and multi-stakeholder coordination structure. • UNEP will consult the city on the drivers and goals of the pilot city and calculate and present the benefits of implementing the plan in relation to these and against other technology options. • The city-wide plan will be reviewed at multiple stages with significant input from the pilot city. • UNEP will present international best practice of the importance of having a long-term plan for district energy in-terms of reducing costs and maximising environmental benefits.	Throughout the project. UNEP C2E2 National Technical Experts Deployable Project Work Team
14	Inadequate support/will from local stakeholders to commit to project development, policies and regulations	*Political and organiza-tional*	*High impact on all Outputs*	*Medium*	• Establishment and training upon local stakeholder coordination ensures a participatory and consultative approach to ensure strong ownership, which will involve the conduct of workshops and consultations to seek inputs/ views of stakeholders. • Selection of deep-dive city includes local stakeholder interest in DES established through consultations in 'light touch' activities (China, Chile, India) and consultations of local stakeholders through a workshop (Serbia)	Throughout the project. UNEP C2E2 National Technical Experts Deployable Project Work Team

15	Lack of data on heating or cooling to undertake project pre-feasibility and assess city-wide potential for district energy	*Technical*	*Medium*	*High*	• UNEP will contract an organisation to carry out an assessment on the need for metering in the city that will assess current data collection relating to heating and cooling. • This metering assessment will indicate whether meters need to be installed on existing buildings to provide the heat/cool data for the project pre-feasibility and city-wide potential. Above mentioned organisation will liaise with the organisation responsible for delivering the monitoring framework to ensure installed meters also support implementation of monitoring framework provisions.	Throughout the project. UNEP C2E2 National Technical Experts Deployable Project Work Team
Project Component 3: Monitoring Framework						
16	Lack of data on heating or cooling to develop and implement a monitoring framework	*Technical*	*Medium*	*High*	• As part of the development of the Deep Assessment UNEP will contract an organisation to carry out an assessment on the need for metering in the city that will assess current data collection relating to heating and cooling. • This metering assessment will indicate whether meters need to be installed on existing buildings to provide the heat/cool data needed for design and implementation of monitoring framework provisions.	Throughout the project. UNEP C2E2 National Technical Experts monitoring organisation
17	Pilot city governments do not have the capacity to implement monitoring framework provisions	*Political and organiza-tional*	*High impact on Output 3.1*	*Medium*	• Design of the monitoring framework will account for current data monitoring and evaluation in the city and build upon existing city processes and methodologies. • UNEP will provide training and capacity building on the new monitoring framework in each city to ensure its adoption and long-term use.	Throughout the project. UNEP C2E2 National Technical Experts monitoring organisation
18	National governments do not incorporate tracking system into existing monitoring systems	*Political and organiza-tional*	*High impact on Output 3.2*	*Medium*	• City level monitoring frameworks developed with national government verification. • Tracking system developed through national consultations with the National Project Steering Committee, agencies/organisations in the country and existing ministries responsible for monitoring of the energy and environment sector. • Current tracking systems analysed and barriers presented to national government. • National workshop on monitoring builds support for the tracking system.	Throughout the project. UNEP C2E2 National Technical Experts monitoring organisation
Project Component 4: Outreach, tools and training on DES Initiative						
19	Learning cities not attracted to the Initiative	*Political*	*High*	*Low*	• UNEP has already attracted significant learning city interest in the project through ongoing outreach activities • UNEP has partnered with city network organisations to raise the profile of the Initiative across cities worldwide. • UNEP's global awareness programme will demonstrate the benefits of cities joining the programme and the reach of this programme will be supported by partner organisations.	Throughout the project. UNEP C2E2 Taskforces International partners

20	Insufficient technology diversity across the four countries for global scale-up	*Technical*	*High*	*Low*	• Country selection has ensured that the widest variety of DES applications is covered as possible and selection has been approved by partners working on diverse technology applications and from diverse regions.	First year. UNEP
21	Virtual Platform not used by Learning Cities	*Organisa-tional*	*Medium impact on Output 4.2*	*Medium*	• UNEP has sought advice on the design of the Virtual Platform from international city networks and partners that provide training to cities on district energy. • UNEP will undertake Outreach activities using the Virtual Platform to ensure that it is used by cities and that cities are aware of this tool. • The Virtual Platform will include opportunities to have direct contact with expert partners and champion cities increasing the use of the platform by learning cities.	Throughout the project. UNEP C2E2 Taskforces International partners
22	Partners not interested in supporting replication countries	*Organisa-tional and Technical*	*Medium impact on Output 4.4*	*Low*	• In selecting replication countries, UNEP will place high significance on the interest of partners in providing support to replication cities. • Replication countries will be selected based on their high potential for district energy.	Throughout the project. UNEP International partners
23	Learning cities do not use the tailored rapid assessment or implement a new policy action	*Political*	*High impact on Output 4.4*	*Medium*	• Replication cities that sign up to the Initiative commit to using the rapid assessment methodology. • Rapid assessment methodology presented as best practice and supported by relevant analysis tools and training to ensure its use. • Partners will support cities to use the methodology and adopt and design new policy based on interest developed during matchmaking sessions with learning cities.	Throughout the project. UNEP International partners

A.6. Institutional Arrangement and Coordination. **Describe the institutional arrangement for project implementation. Elaborate on the planned coordination with other relevant GEF-financed projects and other initiatives.**

Institutional Arrangements (detailed arrangements are on Annex H)

On May 2015 the governance structure for the DES Initiative was adopted by its partners and is shown in Figure 6. The governance structure provides an inclusive structure for multi-stakeholder oversight, and early stage input to, the DES Initiative's activities. The Steering Committee of the DES Initiative includes several key partners from the private sector, industry, city-networks, NGOs, and international organizations.

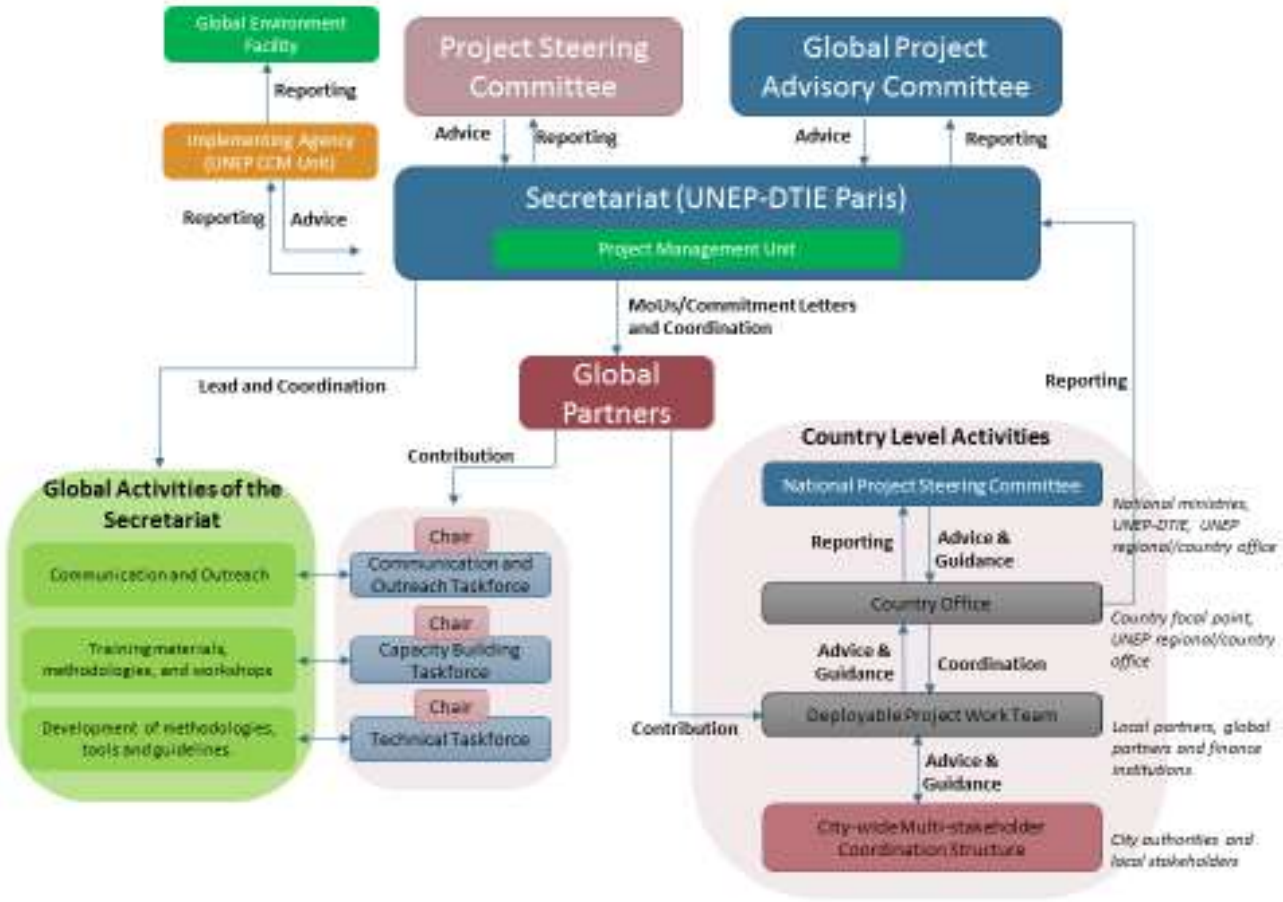
The governance structure helps direct partner contributions within activities, through the three taskforces which can be understood as working groups, and a deployable project team in each country:

- A *Technical taskforce* that supports the development of, and provides access to, technical information, tools, methodologies and guidelines. The chair of this task force is Danfoss.

- A *Capacity Building and Workshops taskforce* that develops and delivers appropriate training and capacity building activities to cities and countries, including pilot cities. The co-chairs of this task force are ICLEI World Secretariat and the Copenhagen Centre for Energy Efficiency (C2E2)
- A *Communication and Outreach taskforce* that aims to bring to the attention of decision-makers the importance of modern DES and the need to make political commitments. The co-chairs of this task force are Euroheat and Power (EHP) and the International District Energy Agency (IDEA).
- A *Deployable Project Work Team* is to be composed of experts from partners according to the needs on the ground and will advise local and national governments face-to-face as need arises during project development and implementation.

Partners will work with the chair to carry out the Terms of Reference of the taskforce and will also be able to support on-the-ground activities in pilot cities. The Deployable Project Team is to be composed of experts from participating organisations /companies in the taskforces according to the needs on the ground and will advise local and national governments face-to-face as need arises during project development and implementation. The Secretariat is to coordinate its composition and deployment.

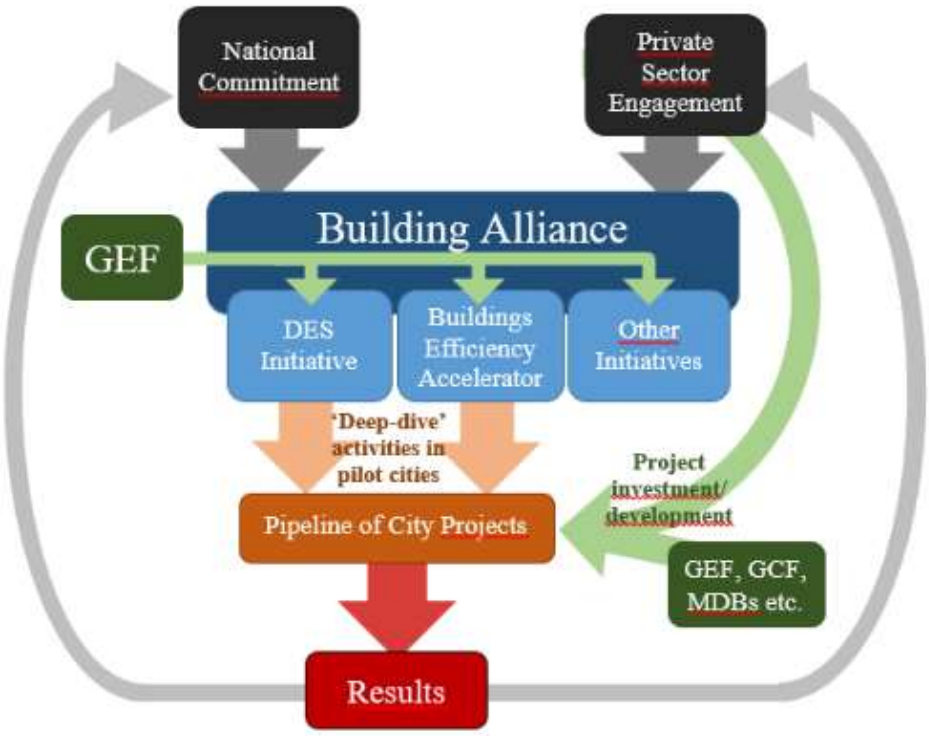
Figure 6: Governance Structure for the DES Initiative



Coordination with other GEF-financed projects or initiatives

The DES Initiative is one of the initiating organizations of a new global Alliance on Buildings and Construction. The Alliance was announced in Paris at COP-21 and is a coordinating platform for activities within the buildings sector. The DES Initiative and the Building Efficiency Accelerator (BEA) are the complementary SE4ALL entry points to the Alliance for countries and cities to look at energy efficiency in the building sector through both heating/cooling supply and demand.

Figure 7: Global Alliance for Buildings and Construction



Four SE4All Energy Efficiency Accelerators (Transport and Motor Vehicle Fuel Efficiency, District Energy, Lighting and Appliances/Equipment) are led or co-led by UNEP ensuring coordination between the accelerators and shared expertise. Further to internal UNEP coordination, the DES Initiative regularly interacts with theSE4All Energy Efficiency Accelerators through global Accelerator Platform calls, meetings, and public events, and many DES Initiative partner organizations are also partners to other Accelerators.

The DES Initiative is focused on delivering efficient heating and cooling in cities, as is the Building Efficiency Accelerator (BEA). The BEA and DES Initiative are already coordinating on outreach and assistance to cities through joint events and webinars. Further, World Resource Institute which leads the BEA is part of the DES Initiative's steering committee. Selection of 'light-touch' cities (Component 1) and 'deep-dive' cities (Component 2) will be done in coordination with BEA, and where improved efficiency in buildings is identified as a vital area of intervention in the city, the DES Initiative will seek to enable BEA support in the city as well. The DES Initiative and the BEA have selected Serbia, and in particular the city of Belgrade, to provide joint support which will include joint assessments of building and district energy policy, technology, business models, strategy and financing and will lead to recommended

policies and actions that are aligned between the two accelerators, enabling the city to improve energy efficiency the building sector at least cost and with maximum emission reductions. As a first step in Belgrade the DES Initiative and the BEA are planning a joint workshop on 1st November 2016 which will invite local stakeholders relevant to both building efficiency and district energy to discuss detailed six month plans for activities and possible joint deliverables between the two Initiatives. UNEP's regional office is supporting both the BEA and DES Initiative activities in Belgrade ensuring strong coordination.

The DES Initiative will also seek to align activities with the appliances/equipment accelerator to ensure coordinated support to cities/countries, in particular relating to air-conditioning/chiller efficiency and refrigerant[22] switching. Potential coordinated activities include joint data collection methodologies and models related to cooling equipment use, sharing data; joint communications regarding cooling; joint workshops aimed at national governments regarding energy efficient cooling.

DES Initiative also aims to coordinate with other GEF-funded projects relating to district energy, including recent projects on: promoting energy efficiency in industrial heat systems in China; improving energy efficiency and reducing emissions in Hebei, China and an urban-scale building energy efficiency program in China; improving energy efficiency in social housing in Argentina; efficient air conditioning in Algeria; improving the energy efficiency of large enterprises in Indonesia; and improved energy efficiency in Vietnam's high-rise buildings. Coordinating with the implementing and executing agencies of these projects could entail sharing of lessons learned, sharing of data, and policy recommendations aligned between the two projects.

The governance structure of the Initiative is shown in Figure 6, and the coordination of various partner organizations' reinputs under this structure is described in Annex H on Project Implementation Arrangements. Furthermore in Section A.3 on Stakeholders, the contributions and relevance of different partners is described

Bhopal is part of the GEF Sustainable cities programme. The DES Initiative will coordinate with the Cities GEF IAP in Bhopal to ensure synergies, to utilize the city planning tools developed by the GEF and where applicable to integrate DES into these tools.

[22] All district cooling projects promoted by the DES Initiative will only consider the use of natural refrigerants such as ammonia, with no or negligible impact on climate. Example of already existing district cooling projects running with ammonia can be found in the city of Medellin in Colombia. The utilisation of ammonia as refrigerant will require a risk assessment and safety management strategy to be developed during the feasibility study of the pilot project.

A.7. Benefits. **Describe the socioeconomic benefits to be delivered by the project at the national and local levels. How do these benefits translate in supporting the achievement of global environment benefits (GEF Trust Fund) or adaptation benefits (LDCF/SCCF)?**

The Project aims to achieve the following socioeconomic benefits:

Economic development through:

- Local job creation related to setting up of new district energy utilities, expansion of existing district heating systems and increased use of local resources (local forest residues, landfill gas, renewables);
- Additional income opportunities for cities as interconnecting systems allows for sharing of excess heating/cooling production capacity by sharing with neighbouring district energy systems;
- Local wealth retention from greater use of local resources, reduced fossil fuel imports, reduced electricity consumption and more-efficient primary energy consumption as well as improved resilience and energy security at the city level and national level;
- Improvements in air quality that could reduce spending on health costs or environmental penalties;
- Reduced consumption of fresh water in district cooling compared with conventional cooling systems; and
- Significant dividends to the local government via the city ownership model of district energy

Environment and health improvements through:

- Substantial contribution to meeting city-wide greenhouse gas reduction targets;
- Huge potential to improve city-wide air quality through reduced burning of fossil fuels that produce sulphur dioxide (SO2), nitrogen oxides (NOx) and particulates and associated heat benefits;
- Health benefits from greater utilization of the heating system by fuel-poor populations, due to more affordable provision of heat;
- Improved safety as individual boilers and stoves are removed from buildings, reduced fire risk as fuels (gas, wood, coal) are centrally managed, reduced legionella disease risk through central operation of cooling building;
- Decreased heat loss into the atmosphere, minimizing the heat-island effect in cities; and
- Delivery of district energy alongside energy efficiency programmes through transition to fourth generation systems, which in turn allow more waste heat and renewables in the energy system and enable the balancing of variable renewables such as solar and wind.

Social development through:

- More sustainable urbanization patterns including increases in compact urban form and mixed use developments, improving urban livelihoods;
- More knowledgeable city governance including on tender development, city strategy development and planning;
- Improved delivery, access, quality and affordability of urban energy services; and
- Improved consideration of gender in the development of city energy strategy

A.8. Knowledge Management. **Elaborate on the knowledge management approach for the project, including, if any, plans for the project to learn from other relevant projects and initiatives (e.g. participate in trainings, conferences, stakeholder exchanges, virtual networks, project twinning) and plans for the project to assess and document in a user-friendly form (e.g. lessons learned briefs, engaging websites, guidebooks based on experience) and share these experiences and expertise (e.g. participate in community of practices, organize seminars, trainings and conferences) with relevant stakeholders.**

A) External knowledge management will be undertaken through 4 key approaches: i) a "virtual platform" for the DES Initiative ii) ICLEI's solutions gateway, iii) Alliance on buildings and construction iv) DES partners

Virtual Platform: The DES Initiative is creating a "Virtual Platform" online through which project results and knowledge products will be organized and disseminated. This platform will be interactive and organized into the following sections:

- ***Decision Tree****:* through a series of yes/no questions cities will be presented with detailed examples of policy best practice options drawing on the knowledge gained through the light-touch and deep-dive exercise. The decision tree has been developed based on the DES in cities publication, but will be strengthened by capturing and disseminating the lessons learned in the project.
- ***Training modules:*** detailed training modules aligned with the 10 DES Action modules (Figure 1) developed using international best practices and modules developed during deep-dive support to cities.
- ***Webinars:*** Training and outreach will also be achieved through a series of webinars targeting specific training subjects important to local stakeholders, cities and/or national governments in a particular region or globally.
- ***'Around the World'***: detailed case studies and fact sheets from the 16 cities, in addition to the 45 existing case studies from the DES publication will be presented and organized based on best practice highlights. The case studies will link to the decision tree.
- ***Resources/Live-Lab***: reports, summaries, recordings and live-stream from the multi-stakeholder workshops conducted as part of the light touch and deep dive engagements and those of partners, as well as methodologies, tools and infographics will be available for download.
- ***News/Media and Event Calendar:*** blog posts, news updates, partner events as well as media tool kits with tailored communication for the different regions of work
- ***Matchmaking/Expert Roster:*** Mentor cities and expert partners available for consultation. A process for city to city exchange will be developed and facilitated through the phone calls, meetings, study tours and email exchanges. ICLEI will track the main elements of information sharing between cities including summaries of learning city requests, minutes of meetings, and study tour summaries.

Solutions Gateway (www.solutions-gateway.org): a free online platform for Local Governments hosted by ICLEI, which offers guidance on Low Emission Development solutions for their communities, will be used to collect and disseminate knowledge products and outputs from the project. A District Heating and a District Cooling Solutions Package will be added to the online Solutions Gateway. This will be part of a wider 'Sustainable Heating and Cooling' package. Different district heating and cooling solutions will be provided within the package to contribute to

dissemination and replication of good practice[23]. The solutions will cover the multiple roles a local government can play (as planner and regulator; enabler of finance; advocate and coordinator and consumer and producer using the framework provided by the DES Report) in planning, implementing, expanding or retrofitting a DES for heating and cooling within its jurisdiction. The solutions will draw on research, analysis and compilation of policy examples from the cities in light-touch and deep dive. UNEP will provide guidance, review, and input and ICLEI will distill as well as compliment the data with internal case studies and research, and input from the DES Initiative task forces.

Buildings Alliance: The DES Initiative and the Building Efficiency Accelerator (BEA), will be the complementary SE4ALL entry points to the Buildings Alliance for countries and cities to look at energy efficiency in the building sector through both heating/cooling supply and demand. As such, the Buildings Alliance will provide a vital dissemination channel for the DES Initiative as a coordinating platform for activities within the buildings sector.

DES Initiative partners: Partners will support the outputs and materials delivered by providing access to their existing technical work and analysis as part of their in-kind contributions, as well as working to adapt and adopt their existing knowledge products to provide supplemental targeted materials for the DES Initiative. Partners will also support trainings for local stakeholders in on local policy options, energy strategy development, local coordination, and on technical tools and methodologies such as cost-benefit analysis tools, energy mapping and data collection, and measurement and verification approaches as needs are identified through the city and stakeholder engagement process. These trainings, technical tools and methodologies will be further disseminated through the Virtual Platform.

B) Internal knowledge management will be undertaken through monthly global partner coordination calls with all partners of the DES Initiative, bi-annual meetings of the DES Initiative's steering committee, coordination calls with partners working in 'deep-dive' cities, as well as 'deep-dive' city partners. The DES Initiative will also establish guidance for partners to use to track their activities, knowledge developed, and the impacts of their work.

[23] Examples of topics of interest to potentially be addressed in this Solutions Package: CHPs (various fuels including: biomass, gas, biogas), large scale boilers (various fuels including: biomass, gas, biogas, electricity), geothermal, large-scale solar thermal, waste-to-energy, waste heat sources, tri-generation, heat pumps (ground-source, wastewater, sewage), transmission/distribution of heat (including high and low temperature networks, building level heat exchangers, building metering) and thermal storage.

B. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

B.1 *Consistency with National Priorities.* Describe the consistency of the project with national strategies and plans or reports and assessments under relevant conventions such as NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, etc.:

The DES Initiative will support cities in countries that are non-annex I parties to the United Nations Framework Convention on Climate Change (UNFCCC). A key criteria for country selection is the alignment of the project objective with national government's priorities, strategies, and programmes on energy efficiency, renewable energy, CO_2 emission reduction, and sustainable cities.

Below is a summary of indicators that show a strong alignment between the project objectives and country priorities, programmes and strategies in Chile, China, India and Serbia.

Chile

- *National Energy Strategy 2012-2030:* Chile's National Energy Commission (CNE) has adopted a policy document, "National Energy Strategy: 2012–2030," which outlines its commitment to expand the sector capacity by supporting the use of non-conventional renewable sources. The Strategy contains six main pillars, among which:
  - Increase the use of non-conventional renewable sources,
  - Promotion of energy efficiency.

- *Energy 2050 (Chile's Energy Policy):* The Energy Policy defines a vision of Chile's energy sector by the year 2050 as reliable, inclusive, competitive and sustainable. The Energy Policy is based on four pillars: Quality and Security of Supply, Energy as a Driver of Development, Environmentally-friendly Energy, and Energy Efficiency and Energy Education. The principle energy targets for 2050 are:

  - The GHG emissions of Chile's energy sector are in line with the thresholds defined by international guidelines and with the corresponding national emissions reduction goal, making an important contribution to a low carbon economy,
  - Regional and local territorial planning and land-use instruments are in line with the guidelines of the Energy Policy,
  - At least 70% of the electricity generated in Chile will come from renewable energy sources (60% by 2035),
  - 100% of new buildings meet OECD standards for efficient construction, and are fitted with intelligent energy control and management systems,
  - Improvement of energy producers, distributors, consumers and users behaviours.

- *Intended Nationally Determined Contribution:* On September 29, 2014, The Chilean government submitted its Intended Nationally Determined Contribution (INDC). The unconditional target is a 30% reduction of GHG emissions-intensity of GDP below 2007 levels by 2030. The conditional target is a 35–45% reduction of GHG emissions-intensity of GDP compared to 2007 by 2030.

- *National Climate Change Adaptation Plan*: Chile's National Climate Change Adaptation Plan was adopted in 2015 and provides the overall framework for the coordination of adaptation activities of different sectors and

different territorial administrative levels. Climate Change Adaptation Plan for Energy Sector is based on measures related to energy efficiency on demand side and use of non-conventional renewable energy on energy generation side. According to this Plan, in order to increase the energy efficiency it is necessary to introduce measures to popularize the development of energy efficiency projects and develop massive campaigns and educational programs in energy efficiency; while in order to increase the use of non-conventional sources it is necessary to encourage the integration of non-conventional sources of energy in line with Renewable Energy Law and the use of solar energy in residential sector.

- *UNDAF:* Chile's UNDAF programme for the period 2015-2018 includes cooperation on environmental sustainability and risk management; This area of cooperation comprises the promotion of renewable energy and energy efficiency measures, and encourages holistic urban planning to resolve urban climate challenges.

China

- 13th Five Year Plan 2016-2020: Extends the government's commitments on energy and carbon intensity as set in the 12th Five Year Plan 2011-2015:
  - A 15 % reduction in energy intensity by 2020 (energy demand per unit of GDP);
  - A 18 % reduction in carbon intensity by 2020 (carbon emissions per unit of GDP);
  - Increasing non-fossil energy to 15 % of total energy use;
  - Reducing emissions of PM2.5 by 25 %.

- General environmental targets set in the 13th Five Year Plan 2016-2020:
  - encouraging low-carbon production and "green" lifestyle;
  - raising energy efficiency;
  - reducing pollution.

- National Action Plan on Climate Change (2014-2020): The plan's targets includes:
  - By 2020, to cut carbon emissions per unit of GDP by 40-45% from 2005 levels;
  - To increase the percentage of non-fossil fuels in primary energy consumption to 15%;

- Action Plan on Upgrading and Transforming the Energy Conservation and Emission Reduction of Coal-Fired Power (2014-2020): The plan's objectives includes:
  - To promote innovative technologies of energy saving and emission reduction, and upgrade existing power plants with these technologies;
  - To promote cogeneration of industrial boilers and the construction of distributed clean coal-fired thermoelectric energy centers.

- Action Plan on Prevention and Control of Air Pollution: In order to improve air quality and protect the public health, the government has adopted the Action Plan of Air Pollution Prevention and Control (in September 2013), the strictest air pollution control measures ever adopted in China. Air quality in key cities should achieve the ambient air quality standard for PM 2.5 (i.e., annual limit of 35 μg/m3) by 2030. On the basis of 2012 emissions, SO2, NOX, PM2.5 and VOC emissions nationwide should be reduced by at least 52%, 65%, 57%, and 39%, respectively, by 2030, and NH3 should decrease slightly.

Incentives policies of green building:

- Subsidy: ¥45/(7 USD) per square meter for two-star green building;
- ¥80/ (13 USD) per square meter for three-star green building (large city as Beijing and Shanghai have city-level subsidy besides the central government subsidy);
- Subsidy for the green ecological district meets the necessary requirements. The subsidy benchmark is ¥50,000,000. (8,000,000 USD).

- Energy Development Strategy Action Plan (2014-2020)
  The targets include a cap on annual primary energy consumption set at 4.8bn tonnes of the standard coal equivalent until 2020, with a need to limit the annual growth rate of primary energy consumption to 3.5% for the next six years. The annual coal consumption should be held below 4.2bn tonnes until 2020, with the main coal consumption reduction to be achieved in regions around Beijing, the Yangtze River Delta and the Pearl River Delta – the three biggest city clusters in China. The share of non-fossil fuels in the total primary energy mix is to rise to from 9.8% in 2013 to 15% by 2020. The share of natural gas is to rise to above 10%, while that of coal will be reduced below 62%. In addition, installed nuclear power capacity is to reach 58GW by 2020. Installed capacity of hydro, wind and solar power in 2020 is expected to reach 350GW, 200GW and 100GW, respectively. Energy self-sufficiency should reach around 85%.

- China's UNDAF programme for the period 2016-2020 includes the priority area of "Improved and Sustainable Environment". This area comprises among others the promotion of energy efficiency measures and the reduction of emissions to mitigate the effects of disasters and climate change and strengthen the country's overall resilience.

India

- *12th Five Year Plan 2016-2020 :*India's current Five-Year Plan (2012-2017), which guides overall economic policy, includes goals to:
  - Reduce emissions intensity in line with India's Copenhagen pledge (to reduce emissions intensity of its GDP by 20-25 % in 2020 compared to 2005 levels);
  - Add 300,000 MW of renewable energy capacity.

- National Action Plan on Climate Change: India's first National Action Plan on Climate Change was produced in 2008 and set out existing and future policies and programs addressing climate mitigation and adaptation. The plan identifies eight core "national missions" running through 2017, that included:
  - National Mission for Enhanced Energy Efficiency; this mission focuses on enhancing energy efficiency measures in the country through four initiatives: industry, appliances, DSM and fiscal instruments to promote energy efficiency;
  - National Mission on Strategic Knowledge of Climate Change;
  - National Mission on Sustainable Habitat: Focused on promoting energy efficiency as a core component of urban planning.

  The National Action Plan on Climate Change recommends a minimum share of renewable energy in the national grid of 5% in 2010, subsequently to be increased by 1% every year to reach 15% by 2020. Energy Supply is dealt with through the National Solar Mission, which aims to make solar electricity cost-competitive

with coal power and increase the share of solar energy in the energy mix by developing new solar technologies, both photovoltaic and solar thermal. The Mission recommends implementation in three stages, leading to an installed capacity of 20,000 MW by the end of the 13th Five-Year Plan in 2022.

Key targets of the National Solar Mission relating to district energy:

- To achieve 15 million m2 solar thermal collector area by 2017 and 20 million m2 by 2022;

- *Developing climate resilient urban centers:* Government of India in recent times has launched a number of schemes for transformation and rejuvenation of urban areas including Smart Cities Mission, Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and National Heritage City Development and Augmentation Yojana (HRIDAY):
  - Under the Smart Cities Mission, 100 smart cities are planned with the objective to develop new generation cities, which will provide core infrastructure and a decent quality of life to its citizens by building a clean and sustainable environment. Smart solutions like recycling and reuse of waste, use of renewables, protection of sensitive natural environment will be incorporated to make these cities climate resilient.
  - AMRUT, a new urban renewal mission has been launched by Government of India for 500 cities with focus on ensuring basic infrastructure services such as water supply, sewerage, storm water drains, transport and development of green spaces and parks by adopting climate resilient and energy efficient policies and regulations.

- Intended Nationally Determined Contribution: On 1 October 2015, India submitted its INDC, including the targets to lower the emissions intensity of GDP by 33% to 35% by 2030 below 2005 levels, to increase the share of non-fossil based power generation capacity to 40% of installed electric power capacity by 2030, and to create an additional (cumulative) carbon sink of 2.5–3 $GtCO_{2eq}$ through additional forest and tree cover by 2030. For 2020, India has earlier put forward a pledge to reduce the emissions intensity of GDP by 20% to 25% by 2020 below 2005 levels.

  India's INDC includes the following:
  - To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation;
  - To adopt a climate friendly and a cleaner path than the one followed hitherto by others at corresponding level of economic development;
  - To reduce the emissions intensity of its GDP by 33 to 35 % by 2030 from 2005 level.
  - To mobilize domestic and new & additional funds from developed countries to implement the above mitigation and adaptation actions in view of the resource required and the resource gap.
  - To build capacities, create domestic framework and international architecture for quick diffusion of cutting edge climate technology in India and for joint collaborative R&D for such future technologies.

Serbia

- *Energy Development Strategy of the Republic of Serbia until 2025 with projections to 2030 (Official Gazette of Republic of Serbia, No. 101/2015):* The Strategy includes a section on district heating, while a 6 year implementation programme is still in the adoption phase. Specific actions identified include:

- Establishment and application of an unique tariff systems for heat production, distribution and supply,
- Continuous modernization and extension of existing DH systems including increased energy efficiency and increased use of sanitary hot water,
- Fuel change (reducing share of liquid fuel and coal, increasing use of biomass, use of municipal waste, CHP),
- Capacity increase of local self-governments regarding market regulation.

- *National Renewable Energy Action Plan of Republic of Serbia (Official Gazette of Republic of Serbia, No. 53/2013):* In June 2013, the Government adopted the National Renewable Energy Action Plan (NREAP) which describes the policies and measures to achieve a 27.3% share, thus going beyond the binding 27% target for 2020. It envisages increases of renewable energy shares in electricity to 36.6% from 28.7%, for heating and cooling to 30% from 28.7% and for the transport sector to 10% from 0% in 2009.

- *Energy Efficiency Action Plans of the Republic of Serbia:* In October 2013, the *Second Energy Efficiency Action Plan of the Republic of Serbia* (Official Gazette of Republic of Serbia, No. 98/2013) was adopted by the Government. The Second EEAP covers the period from 2013 to 2015, with projections to 2018. The average indicative target was defined at the level of 3.5% of the final domestic energy consumption in 2008 (0.2952 Mtoe), so that in the period from 2010 to 2015 the overall savings of 0.3975 Mtoe (4.7%) are achieved. Among the horizontal measures, the second EEAP foresees the billing based on actual (measured) consumption of thermal energy to the consumers connected to district heating system.

- *National Strategy for Sustainable Development (2008-2017):* The National Strategy for Sustainable Development contains goals for the energy sector related to renewable sources of energy. The following goals have been defined:

  - extensive research on potential of sustainable energy sources,
  - determination of the technology for which the introduction of incentive measures and mechanisms is justified,
  - adoption of regulations (tax deductions, incentive prices, etc.) for stimulation of the use of renewable sources of energy,
  - increasing the scope of use of renewable sources of energy,
  - education and awareness raising as an incentive for the inclusion in the production and the use of renewable sources of energy.

- *Serbia's UNDAF* programme for the period 2016-2020 includes as pillar IV the area of Environement, Climate Change and Resilient Communities. This area comprises among others the provision of support for the implementation of the Strategy for Energy Development until 2025 and the Action Plan for Energy Efficiency.

C. DESCRIBE THE BUDGETED M&E PLAN:

The project will comply with the UNEP standard monitoring, reporting and evaluation procedures. Reporting requirements and templates are an integral part of the UNEP legal instrument to be signed by the executing agency and UNEP. The project M&E plan is consistent with the GEF Monitoring and Evaluation policy. The Project Results Framework presented in Annex A includes SMART indicators for each expected outcome as well as mid-term and end-of-project targets. These indicators along with the key deliverables and benchmarks included in Annex I will be the main tools for assessing project implementation progress and whether project results are being achieved. The means of verification and the costs associated with obtaining the information to track the indicators are summarized in Annex A. Other M&E related costs are also presented in the Costed M&E plan and are fully integrated in the overall project budget.

The M&E plan will be reviewed and revised as necessary during the Inception Workshop (IW) to ensure project stakeholders understand their roles and responsibilities vis-à-vis project monitoring and evaluation. Indicators and their means of verification may also be fine-tuned at the IW. General project monitoring is the responsibility of the project management team but other project partners will have responsibilities to collect specific information to track the indicators. It is the responsibility of the Project Manager to inform UNEP of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely fashion.

The project Steering Committee will receive periodic reports on progress and will make recommendations to UNEP concerning the need to revise any aspects of the Results Framework or the M&E Plan. Project oversight to ensure that the project meets UNEP and GEF policies and procedures is the responsibility of the Task Manager in UNEP-GEF. The Task Manager will also review the quality of draft project outputs, provide feedback to the project partners, and establish peer review procedures to ensure adequate quality of scientific and technical outputs and publications.

Project supervision will take an adaptive management approach. The Task Manager will develop a project supervision plan at the inception of the project, which will be communicated to the project partners during the IW. The emphasis of the Task Manager supervision will be on outcome monitoring but without neglecting project financial management and implementation monitoring.

Progress vis-à-vis delivering the agreed project global environmental benefits will be assessed with the Steering Committee at agreed intervals. Project risks and assumptions will be regularly monitored both by project partners and UNEP. Risk assessment and rating is an integral part of the Project Implementation Review (PIR). The quality of project monitoring and evaluation will also be reviewed and rated as part of the PIR. Key financial parameters will be monitored quarterly to ensure cost-effective use of financial resources.

In-line with UNEP Evaluation Policy and the GEF's Monitoring and Evaluation Policy the project will be subject to a Terminal Evaluation. If the project is rated as being at risk or if deemed needed by the Task Manager, he/she will initiate a Mid-Term Review or Evaluation. The latter will be conducted by the UNEP Evaluation Office (EOU).

Resources will be set aside for an optional Mid-Term management Review (MTR) or Mid-Term Evaluation (MTE), which could take place 13 months after the project's start as indicated in the project milestones. The Task Manager will decide whether such MTR/MTE is required. The review will include all parameters recommended by the GEF Evaluation Office for Terminal Evaluations (TE) and will verify information gathered through the GEF tracking tools,

as relevant. The review will be carried out using a participatory approach whereby parties that may benefit or be affected by the project will be consulted. Such parties were identified during the stakeholder analysis (see previous section A.3 and Annex H). Members of the project Steering Committee could be interviewed as part of the MTR/MTE process and the Project Management team will develop a management response to the evaluation recommendations along with an implementation plan. Results of the MTR/MTE will be presented to the Project Steering Committee. It is the responsibility of the UNEP Task Manager to monitor whether the agreed recommendations are being implemented.

An independent Terminal Evaluation (TE) will take place at the end of project implementation. The EOU will be responsible for the Terminal Evaluation and will liaise with the Task Manager and Executing Agency(ies) throughout the process. The TE will provide an independent assessment of project performance (in terms of relevance, effectiveness and efficiency), and determine the likelihood of impact and sustainability. It will have two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote learning, feedback, and knowledge sharing through results and lessons learned among UNEP, the GEF, executing partners and other stakeholders. The direct costs of the evaluation will be charged against the project evaluation budget. The Terminal Evaluation will be initiated no earlier than 6 months prior to the operational completion of project activities and, if a follow-on phase of the project is envisaged, should be completed prior to completion of the project and the submission of the follow-on proposal. Terminal Evaluations must be initiated no later than 6 months after operational completion.

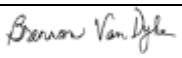
The draft TE report will be sent by the Evaluation Office to project stakeholders for comments. Formal comments on the report will be shared by the Evaluation Office in an open and transparent manner. The project performance will be assessed against standard evaluation criteria using a six point rating scheme. The final determination of project ratings will be made by the Evaluation Office when the report is finalised and further reviewed by the GEF Independent Evaluation Office upon submission. The evaluation report will be publicly disclosed and may be followed by a recommendation compliance process. A review of the quality of the evaluation report will be done by EOU and submitted along with the report to the GEF Evaluation Office not later than 6 months after the completion of the evaluation.

The GEF tracking tools are attached as Annex J. These will be updated at mid-term and at the end of the project and will be made available to the GEF Secretariat along with the project PIR report. As mentioned above the mid-term and terminal evaluation will verify the information of the tracking tool.

PART III: CERTIFICATION BY GEF PARTNER AGENCY(IES)

A. GEF Agency(ies) certification

This request has been prepared in accordance with GEF policies[24] and procedures and meets the GEF criteria for CEO endorsement under GEF-6.

Agency Coordinator, Agency Name	Signature	Date (MM/dd/yyyy)	Project Contact Person	Telephone	Email Address
Brennan Van Dyke Director, GEF Coordination Office, UN Environment		December 20, 2016	Ruth Coutto Task Manager	+33 1 44 37 16 34	ruth.coutto@unep.org

[24] GEF policies encompass all managed trust funds, namely: GEFTF, LDCF, and SCCF

ANNEX A: PROJECT RESULTS FRAMEWORK

Project Objective	Objective level Indicators	Baseline	Targets and Monitoring Milestones	Means of Verification	Assumptions & Risks	UNEP MTS reference*
Assist developing countries and selected cities to accelerate their transition to lower-carbon and climate resilient societies through promoting modern District Energy Systems (DES)	**Indicator:** Number of city-wide plans (policy-investment roadmap) developed and integrated into city-wide planning cycle	**Baseline:** 0	**End of project Target:** 4	Through project monitoring and evaluation structure City plan approval letter	Local decision makers supportive and responsive to implementation of project activities Long-term DES potential exists Bankable project will be identified and can be tendered within three years City planning cycle will match with project timelines	Climate Change

Project Outcome	Outcome Indicators	Baseline	Targets and Monitoring Milestones	Means of Verification	Assumptions & Risks	MTS Expected Accomplishment
1. City officials have increased knowledge of the benefits of District Energy Systems (DES) to promote modern DES	**Indicator 1**: Number of DES rapid assessments completed **Indicator 2:** Number of cities with new actions, new projects, or new policies related to DES drafted, planned, developed, or adopted	**Baseline 1:** 0 **Baseline 2:** 0	**End of project Target 1:** 16 **End of project Target 2:** 13	Rapid assessments reports City commitment letters	Cities officials willing to participate in project activities, provide data and necessary information for rapid assessments. District energy is suitable in 13 cities Limited short-term potential for DES at a scale that interests partners or financiers	Expected Accomplishment (b)[25], Output 3[26],
2. The viability of DES is demonstrated and DES city wide plans, policies and investments are integrated into the city planning cycle in 4 cities	**Indicator 1:** Number of 'Expressions of Interest' (EOI) for demonstration project investment issued by the city **Indicator 2:** Number of shortlists of investor bids approved by the cities	**Baseline 1**: 0 **Baseline 2:** 0	**End of project Target 1:** 4 **End of project Target 2:** 4	Project documents, city public records, press release City documents, planning documents Online Calls for Expression of Interest Letters expressing intention to invest from investors Letter of exchange with development bank(s) outlining investments in project feasibility studies	City officials willing to participate in project activities, provide data and necessary information for deep dives assessments Long-term DES potential exists Bankable project will be identified and investment interest secured within three years Sufficient funds are mobilized for the implementation of the "pilot" projects	Expected Accomplishment (b), and Output 3.

[25] Expected Accomplishment (b): "Energy efficiency is improved and the use of renewable energy is increased in partner countries to help reduce greenhouse gas emissions and other pollutants as part of their low emission development pathways" .

[26] Output 3: "Tools and approaches designed and piloted in countries to develop mitigation plans, policies, measures, and low emission development strategies, and spur sector investment and innovation within and across selected sectors"

Project Outcome	Outcome Indicators	Baseline	Targets and Monitoring Milestones	Means of Verification	Assumptions & Risks	MTS Expected Accomplishment
3. Deep-dive cities and national governments can track and better understand the costs and benefits of modern DES laying the foundation for evidence based decision-making and policy action in the future.	**Indicator 1:** Number of cities agreeing to implement a monitoring protocol	**Baseline 1:** 0	**End of project Target 1:** 4	Data collected through the implementation of the monitoring protocol DES monitoring framework integrated into existing monitoring frameworks in the country	Data collection/exchange system is developed in the city Institutional capacities are built within the local government structure to ensure the monitoring framework is being implemented appropriately	Expected Accomplishment (b), and Output 3
4. DES in cities is scaled up and replicated nationally and internationally by cities and national governments signed up to the Initiative	**Indicator 1:** number of cities joining the initiative and committing to assess DES using the regionally tailored rapid assessment methodology and/or implementing a policy action **Indicator 2:** number of national and international counterparts hosting DES Initiative methodology, tools or publications.	**Baseline 1:** 0 **Baseline 2:** 0	**End of project Target 1:** 15 **End of project Target 2:** 5	Project monitoring and evaluation structure, documented outputs: campaign materials, virtual platform, meeting minutes and results from fundraising and match making sessions	Cities officials willing to participate in project activities in additional 15 cities Low public awareness of the environmental and financial benefits of the DES and its importance in meeting multiple energy policy objectives .	Expected Accomplishment (b), and Output 3

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

GEF-6 GEF SECRETARIAT REVIEW FOR FULL-SIZED/MEDIUM SIZED PROJECTS THE GEF/LDCF/SCCF TRUST FUNDS

GEF ID:	**9320**		
Country/Region:	**Global**		
Program Title:	**Increasing Investments in District Energy Systems in Cities - a SE4All Energy Efficiency Accelerator**		
GEF Agency:	**UNEP**	GEF Agency Project ID:	
Type of Trust Fund:	**GEF Trust Fund**	GEF Focal Area (s):	**Climate Change**
GEF-6 Focal Area/ LDCF/SCCF Objective (s):		**CCM-1 Program 1;**	
Anticipated Financing PPG:	**$50,000**	Program Grant:	**$2,000,000**
Co-financing:	**$9,100,000**	Total Program Cost:	**$11,100,000**
PIF Approval:		Council Approval/Expected:	
CEO Endorsement/Approval		Expected Project Start Date:	
Program Manager:	**David Elrie Rodgers**	Agency Contact Person:	**Ruth Zugman Do Coutto**

PIF Review			
Review Criteria	Questions	Secretariat Comment	Agency Response
Program Consistency	1. Is the program aligned with the relevant GEF strategic objectives and results framework?[1]	DER, October 14, 2015. Yes. The project proposes alignment with CCM Program 1. However, the project is aligned with CCM Program 2, Develop and demonstrate innovative policy packages and market initiatives to foster a new range of mitigation actions. Please revise and resubmit.	RC-UNEP. This is fine. We have adjusted this in the PIF.

PIF Review			
Review Criteria	Questions	Secretariat Comment	Agency Response
	2. Is the project consistent with the recipient country's national strategies and plans or reports and assessments under relevant conventions?	DER, October 14, 2015. Yes. This is a global project that will provide support to countries and local jurisdictions that have an expressed commitment to the SE4All goal of doubling rate of improvement in energy efficiency.	
Project Design	3. Does the PIF sufficiently indicate the drivers[2] of global environmental degradation, issues of sustainability, market transformation, scaling, and innovation?	DER, October 14, 2015. Yes. The project will address key barriers to more rapid deployment of district energy systems including lack of: awareness of technology options; local and institutional capacity; holistic planning; access to finance; and data.	
	4. Is the project designed with sound incremental reasoning?	DER, October 14, 2015. Yes. As an accelerator of the SE4All Energy Efficiency Accelerator Platform, the DES Initiative will support market transformation efforts to shift the heating and cooling sector to low-carbon, energy efficient solutions that include DES with an aim to double the rate of energy efficiency improvements for heating and cooling in buildings by 2030 and quantify the corresponding decrease in greenhouse gas emissions.	
	5. Are the components in Table B sound and sufficiently clear and appropriate to achieve project objectives and the GEBs?	DER, October 14, 2015. Yes. The DES Initiative will select four countries for pilot city work over the next three years with a high degree of variation between countries in order to maximise global replication. The selection criteria are clearly noted in the project document.	

PIF Review			
Review Criteria	Questions	Secretariat Comment	Agency Response
		Candidates for potential countries include: China, India, Colombia, Serbia, Bosnia and Herzegovina, Morocco, Indonesia and the Philippines; representing a diversity in size, needs, and potential applications. The project consists of the following components: 1. Assessments and technical assistance for DES actions in cities ("Light touch") 2. District Energy Demonstrations and city-wide plans ("Deep-dive") 3. Monitoring, Reporting and Verification (MRV) 4. Outreach	
	6. Are socio-economic aspects, including relevant gender elements, indigenous people, and CSOs considered?	DER, October 14, 2015. Yes.	
Availability of Resources	7. Is the proposed Grant (including the Agency fee) within the resources available from (mark all that apply):		
	• The STAR allocation?	DER, October 14, 2015. This project requests funding from the CCM set-aside.	
	• The focal area allocation?	DER, October 14, 2015. NA	
	• The LDCF under the principle of equitable access?	NA	
	• The SCCF (Adaptation or Technology Transfer)?	NA	
	• Focal area set-aside?	DER, October 14, 2015. Yes.	

PIF Review			
Review Criteria	Questions	Secretariat Comment	Agency Response
Recommendations	8. Is the PIF being recommended for clearance and PPG (if additional amount beyond the norm) justified?	DER, October 14, 2015. This request is for a two-step MSP. Please respond to the comment in box 1. At the time of CEO endorsement, please address the following comments: a) Please refine the emissions benefit estimate to include additional analysis on the representative direct emissions benefits and develop an estimate for indirect benefits resulting from the project activities.	RC-UNEP. Comment in box 1 is adressed. a)We will refine the emissions calculations during the project development phase as suggested.
Review Date	Review	October 14, 2015	
	Additional Review (as necessary)		
	Additional Review (as necessary)		

Question 8 *(refer to here above Secretariat Comment)***:**
The GHG emissions calculations have been refined during the project development phase, as suggested by the GEF Secretariat. These calculations can be found in Annex J-2 of this CEO Endorsement Document.

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS[27]

Provide detailed funding amount of the PPG activities financing status in the table below:

PPG Grant Approved at PIF: **US$ 50,000**			
Project Preparation Activities Implemented	***GEF/LDCF/SCCF Amount ($)***		
	Budgeted Amount	***Amount Spent To date***	***Amount Committed***
Consultants	20 000	32 600	
Meetings and Conferences Brussels SC	20 000	5 600	
Travel on official Business India Lily & Parimita China Lily Panama Celia Brussels DS Brussels Lily St Paul Lily	10 000	11 800	
Total	50 000	50 000	0

[27] If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue to undertake the activities up to one year of project start. No later than one year from start of project implementation, Agencies should report this table to the GEF Secretariat on the completion of PPG activities and the amount spent for the activities. Agencies should also report closing of PPG to Trustee in its Quarterly Report.

ANNEX D: CALENDAR OF EXPECTED REFLOWS (if non-grant instrument is used**)**

Provide a calendar of expected reflows to the GEF/LDCF/SCCF Trust Funds or to your Agency (and/or revolving fund that will be set up)

Does not apply.

ANNEX E: CONSULTANTS TO BE HIRED FOR THE PROJECT USING GEF/LDCF/SCCF RESOURCES

Position Titles	***$/ Person Week****	***Estimated Person Weeks*** **	***Tasks To Be Performed***
For Technical Assistance			
Local			
National Technical Expert India	US$ 263	156	Tasks will be similar across all four pilot countries. These experts must have a strong expertise in the energy sector of the countries with detailed understanding of country level energy strategy and planning. • Collect information and assess national, provincial and local regulatory barriers to development of modern district energy including: devolution of planning authority; fair accounting of district energy in building codes, standards and energy efficiency labels; taxation; CHP FiTs; tariff methodologies and tariff setting authority. This will provide data/information and analysis to rapid assessments and the deep assessment and also feed into solutions to barriers proposed in the DES plans and synthesis reports; • If relevant, collect sex-disaggregated data to understand the different impacts of relevant policy changes on men and women. • Analyse and provide technical overview of any new regulations, policies, funds, projects, strategies developed in the country or near-region that are relevant to the project; • Provide a detailed overview of all existing and planned monitoring frameworks and methodologies in the country relevant to DES and provide input to a technical assessment of the suitability of these monitoring frameworks in relation to international best practice; • Provide technical input to, and support delivery of, technical monitoring framework training workshops to national and city-level stakeholders; • Develop and manage strong relationships with the city government and key stakeholders and partners in the community; • Provide technical inputs to the Project Manager on adapting rapid assessment and deep assessment methodologies and tools to the regional context including: availability and collection of existing data, relevant institutions collecting data, typical heat/cool consumptions habits and technologies across region; • Manage activities of the DPWT in the pilot city including supporting ; • Support UNEP-DTIE's mobilization of increased co-finance by providing inputs to funding applications (local DES potentials, benefits, barriers, institutional frameworks etc.), partner meetings and attending regional events; • Provide technical review and quality control of the reports prepared by the consultants and DPWT; • Ensure that all project activities are completed in accordance with the Project timeline; • Provide necessary assistance for organization of workshops and trainings and provide training to international stakeholders on local DES market; • Maintain appropriate bi-directional communication and information flow with UNEP DTIE to ensure the organizations' capabilities are fully leveraged on the ground; • Manage UNEP DTIE's, efforts with stakeholders and partners at the local and national level, as needed; • Ensure appropriate reporting to UNEP DTIE; and • Conduct administrative tasks such as taking meeting minutes and drafting
National Technical Expert China	US$ 378	156	
National Technical Expert Chile	US$ 417	156	
National Technical Expert Serbia	US$ 417	156	

			summary reports.
International			
International Expert – Finance	US$ 1,271	156	This consultant will report to DES Initiative Secretariat. The tasks will include: • Develop a generic financial model and assessment tool for district energy projects for regional adaptation; • Support development of training modules on business models, together with partners, drawing from the UNEP District Energy in Cities publication • Support research for and drafting of knowledge products (e.g. fact. sheets, case studies, technology briefs and policy-finance briefs) • Develop guidance on collecting and analyzing data on cooling demand in cities and assessing impacts; • Draft guidance on business model options and the financing of DES within a decision tool for local policymakers; • Develop, implement and monitor implementation of legal agreements for sub-contracting activities; • Support identification of relevant potential partners on finance and dissemination action; • Prepare and service coordination calls with working groups, lead partners, and management team; • Organize and support the DES Initiative's meetings and events; • Liaise with lead partners to attract co-finance; • Provide input and coordination on work plan activities, working group organization, partner selection and partner engagement for the Technical Task Force members; • Coordinate with regional offices and Project Management Offices to ensure compliance with the DES Initiative's work plan and to provide support on Finance and Technical aspects of activities; • Liaise with partners on finance-related issues; • Provide technical review and quality control of the initiatives' knowledge products; • Assist in researching and drafting (with input from Technical Task Force and Champion Cities) global and regional knowledge products relating to financing of DES systems, DES business models, local/national financial incentives, local and national economic benefits of DES and DES project development (e.g. fact. sheets, case studies, policy-finance briefs); • Interface with the UNEP DTIE Energy Branch's Finance Unit and with UNEP-FI;
International Consultant - Policy	US$ 1,271	156	This consultant will report to the DES Initiative Secretariat. The tasks will include: • Draft content for multi-stakeholder training and dissemination workshops and webinars in selected countries and cities including subjects such as: local planning policies for DES promotion, tariff regulations, connection policies, energy mapping, strategy development, target setting. • Assess and review climate, energy and development plans of selected countries and cities to identify training priority areas and matchmaking opportunities; • Provide expert input to the design and content of a decision tool for local

			policymakers to identify policies and actions that will support the business case for district energy within their city's specific mandate and jurisdiction; • Undertake stakeholder mapping in selected countries and cities to determine stakeholder roles within the framework of the initiative's activities; • Assist with matching potential donors and future geographical areas of action • Synthesize international best practice on stakeholder coordination frameworks and design consultations and trainings of cities on this topic; • Review, compile, and adapt existing tools and develop new tools • Research and review existing and available tools (online and with partners) • Support development of training modules with partners, drawing from the UNEP District Energy in Cities publication • Provide input and coordination on work plan activities, working group organisation, partner selection and partner engagement for the capacity Building Task Force members; • Provide technical input to, design and develop 'train the trainer' training material and guidance particularly targeting project countries and cities • Draft content for the UNEP district energy website including policy case studies and best practices; • Encourage and balace gender representation in all training sessions and working teams. • Assist in the review of available outreach materials relevant for the initiative • Assist liaison with the new Global Alliance on Buildings and Construction
International Consultant – Communications	US$ 883	17	This consultant will report to the DES Initiative Secretariat. The tasks will include: • Graphic design of new knowledge products (including publications, case studies, newsletters, banners, training material etc.) and graphic translation of existing knowledge products (e.g. DES Publication); • Drafting and refining of press releases with support from task forces as part of global outreach campaign • Website support including simple design changes, content updating and links to social media. • Ensure that all training materials, technology and methodology of dissemination are to be women friendly.
Justification for travel, if any: Local consultants will be required to travel within the respective country visiting cities and supporting the DPWT undertake assessments. The local consultants may need to travel to attend Steering Committee Meetings of the DES Initiative and also to regional conferences and events to present the findings of the country activities. International consultants will need to travel to pilot countries and replication countries to provide training on international best practices and to build partner interest in co-financing activities. The international consultants will also travel to international conferences and workshops where necessary for capacity building, outreach and to support logistics.			

ANNEX F1: DETAILED GEF BUDGET (GEF FUNDS ONLY, US$)

Provided in separate file: Annex F-1 & F-2 - Detail GEF and Co-Finance Budget.xls

ANNEX F2: DETAILED COFINANCE BUDGET (US$)

Provided in separate file: Annex F-1 & F-2 - Detail GEF and Co-Finance Budget.xls

ANNEX G: M&E BUDGET AND WORK PLAN

M&E Activity	Description	Responsible Parties	GEF budget (USD)	Co-finance budget	Timeframe
Inception Workshop (IW) and Report	Report prepared immediately following the IW; it includes: Detailed Work Plan and budget for the first year, as well as an overview of AWPs for subsequent years, divided per output and inputs (budget lines). A more detailed narrative of roles of UNEP, Country Offices and PSC: institutional responsibilities, coordinating actions and feedback mechanisms Detailed Project Supervision and a Monitoring Framework Plan	Execution: Project Manager (PM) Support: Task Manager (TM) Country Offices, C2E2	Costs included in the budget for PM and for travel expenses	3,000	Immediately following, within 2 months of project start-up
Measurement of project indicators (outcome, progress and performance indicators, GEF tracking tools) at national and global level		Execution: PM Support: C2E2 Country Offices	Costs included in the budget for PM	10,000	Outcome indicators: start, mid and end of project. Project/performance indicators annually
Half-yearly progress report	Part of UNEP procedures for project monitoring. Analyses project performance over the reporting period UNEP; Describes constraints experienced in the progress towards results and the reasons Describes Work Plan for the next period in an Annex and the detailed budget divided per output and inputs (budget lines)	Execution: PM Support: C2E2 Country Office, TM	Costs included in the budget for PM	6,000	Two (2) bi-annual reports for any given year (July 31 and January 31);
Quarterly expenditure reports	Detailed financial reports (in Excel), with justification of any change;	Execution: PM Support: FMO in Policy Unit	Costs included in the budget for PM	6,000	Four (4) quarterly expenditure reports for any given year (January 31, April 30, July 31, October 31) Final financial Report within 60 days of project completion

M&E Activity	Description	Responsible Parties	GEF budget (USD)	Co-finance budget	Timeframe
Project Steering Committee Meetings and National Steering Committee meetings	Meeting of partners directly involved in the project implementation and reporting recap the PSC meeting and actions made	Execution: PM Support: C2E2, Country Offices TM	Costs included in budget for PM and for travel expenses	3,000	Twice a year for PSC and at least once a year for national PSC
Technical and thematic Reports; Communication of lessons learnt	Technical and thematic periodic reports could also be prepared to focus on specific issues or areas of activity covered by the project	Execution: PM Support: C2E2, Country Offices	Costs included in the budget for PM and for travel expenses	3,000	As necessary for the thematic reports
Project Implementation Review (PIR)	Building on the measured performance indicators, the PIR analyses project performance over the reporting period UNEP; describes constraints experienced in the progress towards results and the reasons; and draws lessons and makes clear recommendations for future orientation in addressing the key problems in the lack of progress. The PIR can be discussed at PSC meetings	Execution: PM / TM Support: C2E2, Country Offices FMOs (Climate change Mitigation Unit and Policy Unit)	Costs included in the budget for PM	10,000	Yearly, by 31 July latest
Medium-Term Evaluation / Review	The purpose of the Mid-Term Evaluation (MTE) or Mid-Term Review (MTR) is to provide an independent assessment of project performance at mid-term, to analyze whether the project is on track, what problems and challenges the project is encountering, and which corrective actions are required so that the project can achieve its intended outcomes by project completion in the most efficient and sustainable way. In addition, it will verify information gathered through the GEF tracking tools. Since for a short duration project, PIR can serve as the project MTR, the need of a MTE or MTR for this project will be assessed according to the progress of the project by the Task Manager	Execution: Independent evaluator Support: PM TM UNEP EOU C2E2	20,000	40,000	At mid-point of project implementation if deemed needed by the Task Manager

M&E Activity	Description	Responsible Parties	GEF budget (USD)	Co-finance budget	Timeframe
Final Report	Building on the measured project indicators and the PIR, the project team will draft and submit a Final Report, with other docs (such as last PIR) can serve as Project Final Report to the UNEP, at least two weeks before the PSC meeting for their review and comments; this meeting decides whether any action is needed to achieve the sustainability of project results; and draws lessons to be captured into other projects; Comprehensive report summarizing all activities, achievements, lessons learned, objectives met or not achieved structures and systems implemented, etc. Lays out recommendations for any further steps that may need to be taken to ensure the sustainability and replication of project activities.	Execution: PM Support: C2E2 Country Offices TM	Costs included in the budget for PM	20,000	Final report no later than two (2) months of the project technical completion date
Terminal Evaluation	Further review the topics covered in the mid-term evaluation. Looks at the impacts and sustainability of the results, including the contribution to capacity development and the achievement of global environmental goals (refer to section C, page 85-86).	Execution: Independent evaluator Support: PM TM FMOs C2E2 UNEP EOU Project partners	40,000	40,000	Within six (6) months prior to the end of the project (technical completion date)
Co-financing Report	Report on co-financing (cash and/or in-kind) fulfilled contributions from all project partners that provided co-finance letters.	Execution: PM Support: C2E2, Country Offices, Partners FMO Policy Unit	Costs included in the budget for PM		Annually, within one (1) month of the PIR reporting period, i.e. on or before 31 July
Publication of Lessons Learnt and other project documents	Lessons learned and other project documents are published for the benefit of on-going and future projects	Execution: PM Support: C2E2 Country Offices, Partners	Costs included in the budget for PM and for travel expenses	10,000	Annually, part of half-yearly progress reports and Project Final Report
TOTAL M&E COST			**US$ 60,000**	**US$ 85,000**	

ANNEX H: PROJECT IMPLEMENTATION ARRANGEMENTS

The following outlines the DES Initiative's implementation arrangements at the global and country level.

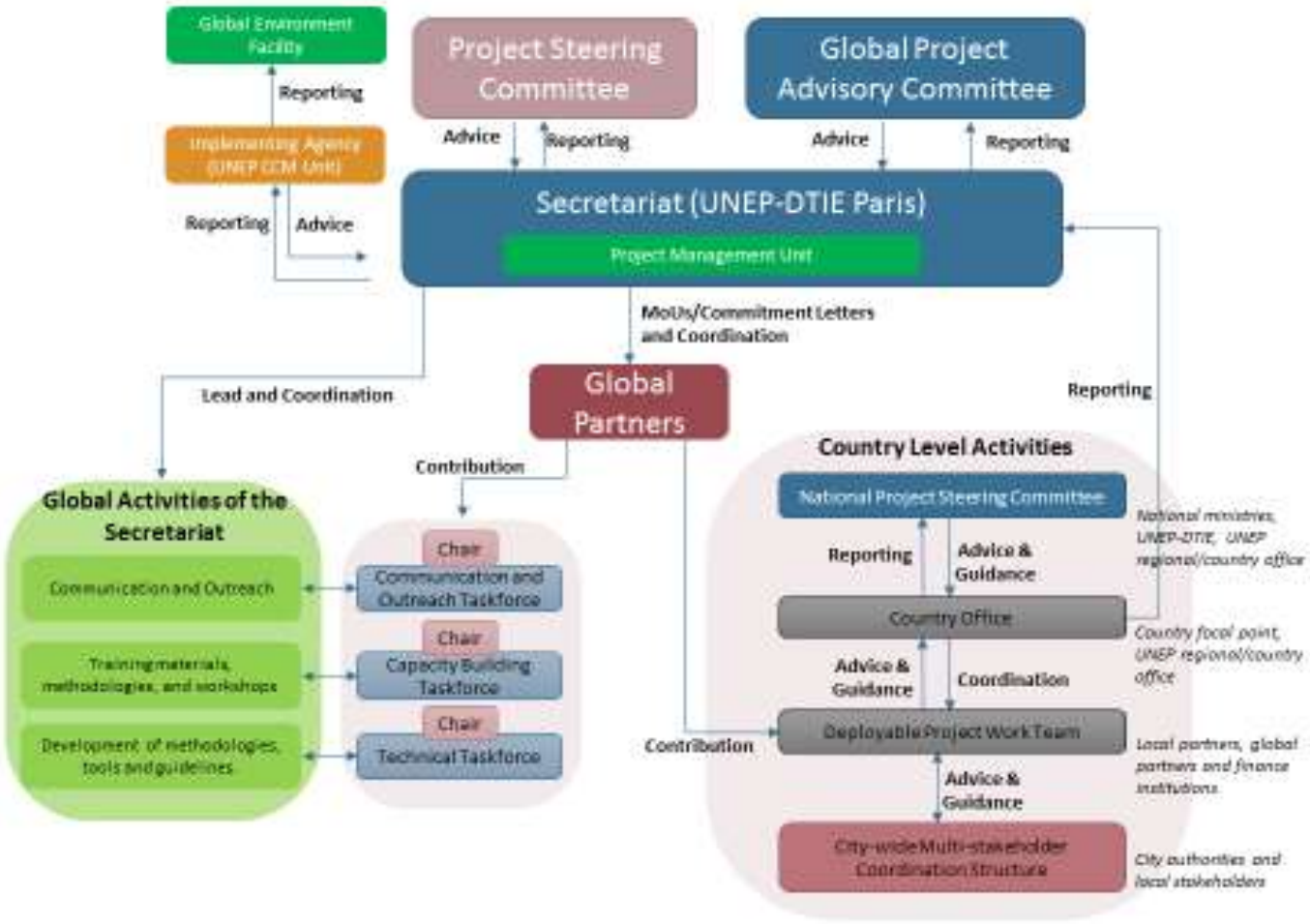
At the global level a Global Project Steering Committee comprised of partners to the DES Initiative, UNEP, and SE4All has been formed to provide guidance and approval of the overarching strategy of the DES Initiative, its country and regional focuses and work plan.

Throughout the duration of the project the Secretariat, based in UNEP-DTIE, will lead the coordination of the global activities which are grouped around three expert task forces: i) communications and outreach; ii) capacity building; and iii) technical task forces, as described in section A3. The Secretariat will define the activities under each task force and will ensure these activities are implemented by coordinating with the Chair(s) of each task force. The Secretariat will also contribute its time to the development of various global activities including publications, case studies, training material, methodologies etc. The global activities will be disseminated through the Virtual Platform and the websites of the DES Initiative and partners, as well as at training workshops, webinars and outreach events.

The Secretariat is also responsible for leveraging partner support for the global and country-level activities as well as attracting new partners, champion cities and learning cities to the Initiative. Furthermore, the Secretariat as well as UNEP country/regional offices will be responsible for applying for and attracting additional fundraising opportunities.

At the country level a project governance structure will be put in place to ensure that decision-making, management and implementation arrangements are appropriate and operate effectively. The country governance structure will consist of a National Project Steering Committee, a Project Management Office, a Project Deployable Working Team and a City-wide multi-stakeholder coordination structure. This governance structure at the country level is shown within the global governance structure in Figure 8 below.

Figure 8: Governance Structure for the DES Initiative



The respective roles of are outlined in the table 4 below.

Table 4 – Project Governance Structure

Body	Composition	Role	Frequency of meetings
Global Project Advisory Committee	UNEP-DTIE, UNEP CCM Unit, UNEP Regional/Country offices, SE4All, cofinanciers, DES Initiative Partners DES Initiative Partners include representatives from the private sector (DES operators and utilities, technology providers, industry associations (e.g. IDEA and EHP), consultancies, law firms), NGOs (e.g. WRI),	• Provide guidance and approval of the overarching strategy of the DES Initiative Provides strategic advice on the annual programme of work. • Provide advice to the DES Initiative's Secretariat • Members facilitate resource mobilisation by suggesting/providing high-level contacts to possible funding sources. • Members dedicate in-kind resources for achievement of the work plan.	Quarterly (twice remotely, twice in-person)

Body	Composition	Role	Frequency of meetings
	IGOs (e.g. C2E2, UN-Habitat, IEA), city networks, academic institutions and banks (e.g. EBRD, ADB, IFC, KfW)		
Project Steering Committee	UNEP DTIE and UNEP CCM Unit, one city representative from each deep dive city and one nominated representive of the national project steering committees,	• The main functions of the PSC will be to review project progress, approve annual workplans and budget and provide strategic guidance to the project, and approve management decisions to ensure timely delivery of quality outputs.	Once a year
Implementing Agency	UNEP CCM Unit	• Ensure timely disbursement/sub-allotment to executing agency, based on agreed legal document and in accordance with UNEP and GEF fiduciary standards • Follow-up with Executing agency for progress, equipment, financial and audit reports • Provide consistent and regular oversight on project execution and conduct project supervisory missions as per Supervision Plans and in doing so ensures that all UNEP and GEF criteria, rules and regulations are adhered to by project partners; • Technically assess and oversee quality of project outputs, products and deliverables – including formal publications • Provide on-objection to main TORs and subcontracts issued by the project, including selection of project manager or equivalent • Attend and facilitate inception workshops, field visits where relevant, and selected steering committee meetings • Asses project risks, and monitor and enforce a risk management plan • Regularly monitors project progress and performance and rates progress towards meeting project objectives, project execution progress, quality of project monitoring and evaluation, and risk; • Monitor reporting by project executing partners and provides prompt feedback on the contents of the report; • Promptly informs management of any significant risks or project problems and takes action and follows up on decisions made; • Apply adaptive management principles to the supervision of the project • Review of reporting, checking for consistency between execution activities and expenditures, ensuring that it respects GEF rules, • Clearance of cash requests, and authorization of disbursements once reporting found to be complete • Approve budget revision, certify fund availability and transfer funds • Ensure that GEF and UNEP quality standards are applied consistently to all projects, including branding and safeguards • Certify project operational completion	

Body	Composition	Role	Frequency of meetings
		• Link the project partners to any events organised by GEF and UNEP to disseminate information on project results and lessons • Manage relations with GEF	
DES Initiative's Secretariat (Executing Agency)	UNEP-DTIE	• UNEP-DTIE will host the Secretariat which will lead and coordinate the global activities of the initiative, such as communication and outreach, capacity building, and technical task force. • Day-to-day project management • Ensure that the project meets its objectives and achieves expected outcomes; • • Develop SSFAs with implementing partners • Follow-up with, or progress, procurement, financial and audit reports; • Plan and host/chair the Steering Committee meetings; • Appoint the National Technical Experts for each pilot country • Report to and receive advice from the Global Project Steering Committee. • Identify and secure partner support for the global and country-level activities • Identify funding sources from donor countries, banks and other financing institutions • Develop applications for fundraising opportunities. • Manage and update the Virtual Platform	Internal weekly meetings
Taskforces (Technical, Capacity Building, Communica-tions and Outreach)	Led by a chair or co-chair o Technical taskforce (C2E2 and Danfoss) o Capacity building taskforce (C2E2 and ICLEI) o Outreach and Communication taskforce (IDEA and EHP) Experts contributed from DES Initiative partners, with each partner contributing to at least one of the three task forces. Within task forces, working groups are set up for specific activities	• Taskforces support the development of knowledge products, trainings and tools to be published in the Virtual Platform, organize capacity building trainings and support and organize communications and outreach events. • **Technical Taskforce:** Advise and support the Initiative and the secretariat with the development of, and access to, technical information, tools, methodologies and guidelines necessary to: o build the case for local and national governments to commit to initiative's goal of scaling up modern district energy; o identify opportunities/address barriers to market development and; o support implementation in pilot cities • **Capacity building taskforce:** Advise and support the Initiative and the secretariat to develop and deliver appropriate training and capacity building activities to cities and countries, including pilot cities, such as through: o methodology for training and capacity building; o transfer of best practices into capacity building and training material and activities; and o strengthening of national governments' capacity to facilitate replication. • **Communications and Outreach taskforce:** At global, regional and national levels, to bring to the attention of decision-makers the importance of modern district energy	Monthly coordination calls

Body	Composition	Role	Frequency of meetings
		systems and the need to make political commitments: o Global and regional forums and events will be held to convene all major stakeholders for a dialogue on district energy systems; and o Aim to have stakeholder forums agree to specific action plans for district energy promotion.	
National Project Steering Committee (NPSC)	There will be one NPSC in each of the four pilot countries. The NPSC will include representatives of Governmental ministries, GEF Operational Focal Points from each country, UNEP-DTIE and UNEP regional/country office, where relevant regional development banks. The following ministries are currently on the NPSC in each country: • Chile: Ministry of Energy, Ministry of Environment • China: National Development and Reform Commission • India: Ministry of Power, Ministry of New and Renewable Energy • Serbia: Ministry of Agriculture and Environmental Protection	• Oversight of the project activities in each of the 4 pilot countries. • Provide overall guidance and strategic direction and oversight to each Country Office • Mobilize national stakeholders to support project implementation (e.g. data sampling and analysis), as well as provide synergies with other complementing initiatives and ongoing projects. • The NPSC will be multi-disciplinary and multi-sectoral in fields related to district heating, sustainable development, climate change, and energy use and planning • Address logistical issues, e.g. through organization of meetings and provision of relevant facilities; • Validate the National Technical Experts proposed by the Secretariat in each country. • Provide insight on national policy barriers and proposed stages of national policy development	At least twice a year
Country Office	A Country office will be established for each pilot country which will consist of a National Technical Expert The Country Office will receive support from the NPSC, UNEP regional offices and partner focal points in the pilot country. The country office will be based in either the UNEP office, the national ministry or the deep-dive city's government's premises. The National Technical Expert will provide their own computer but other office equipment e.g. phone, paper, etc. will be provided by the hosting organization.	• Provide technical input to national and city level assessments, trainings, methodologies, barrier analyses, policy and regulatory recommendations and Monitoring Framework. • Coordinate the deployable project work team • Undertake field visits • Report to the NPSC on project progress. • Ensure technical quality of products, outputs and deliverables; • Address and rectify any issues or inconsistencies raised by the Secretariat; • Support compilation and submission of progress, financial and audit reporting to the Secretariat; • Take responsibility for the execution of the project in accordance with the project objectives, activities and budget; • Deliver the outputs and demonstrate its best efforts in achieving the project outcomes; • Notify the Secretariat in writing if there is need for modification to the agreed implementation plan and budget, and to seek approval; • Address and rectify any issues raised by the Secretariat with respect to project execution in a timely manner;	Regular meetings with the deployable working team (at least every two weeks)/ participate in the national project steering committee meetings

Body	Composition	Role	Frequency of meetings
		• Managing the financial resources and processing all financial transaction relating to sub-allotments; • Preparing sub-project documents using appropriate legal instruments; • Preparing all annual/year-end project revisions; • Attending and facilitating inception workshops and national steering committee meetings; • Assessing project risks in the field, monitoring a risk management plan; • Coordinate project execution and liaison with national counterparts in the four countries (relevant ministries and cities authorities, national private sector, NGOs etc.). • Prepare synthesis reports on policy recommendations for city and national officials	
Deployable Project Work Team (DPWT)	A DPWT will be established in each pilot country. It will consist of co-financed district energy consultants, experts from DES Initiative partners and finance institutions	• Perform consultation process, rapid assessments, complete city fact sheets • Provide expert advice to local governments on next steps to developing DES in their cities • Provide input and participate in workshops and training sessions in the country, • Provide input on the selection of the "deep-dive" city and the demonstration project. • Undertake deep assessments including business model design • Provide support to develop city-wide policy-plan of policies and investments • Provide support to take a DES demonstration project to tender • Provide advice and report to the project management office; • Ensure that international expertise on district energy is successfully combined with country-level expertise on city development and the energy sector; • Support the creation of a city-wide multi-stakeholder coordination structure in each city and contribute to the strengthening and formalization of a tailored multi-stakeholder coordination structure in the "deep-dive" cities;	At least three times a year/regular meetings with Country Office (at least every two weeks)
City-wide Multi-stakeholder coordination structure	City authorities and local stakeholders. A multi-stakeholder working group will be initiated in every "light-touch" city. One city-wide multi-stakeholder coordination structure will be formalized in every "deep-dive" city. The final structure will be determined in consultation with the city authorities	• Focal point in each city for collaboration, training and for leveraging the most knowledgeable experts in the local market to help design effective strategies for the acceleration of district energy • Support the design and implementation of a long-term development plan and strategy for district energy in the pilot city • Ensure methodologies such as on data collection, project development, energy mapping etc. are incorporated into the activities of numerous stakeholders in the city, such as major building developers. • Ensure the sustainability of the project	Will vary dependent on city and a structure designed by the city and DPWT

ANNEX I: PROJECT WORKPLAN AND DELIVERABLES

Provided in separate file: Annex I Project Workplan and Deliverables

ANNEX J-1: Tracking Tool for GEF-6 CCM Projects

Tracking Tool for GEF 6 Climate Change Mitigation Projects (At CEO Endorsement)

Special Notes: Projects need to report on all indicators that are included in their results framework

Reporting on lifetime emissions avoided
Lifetime direct GHG emissions avoided: Lifetime direct GHG emissions avoided are the emissions reductions attributable to the investments made during the project's supervised implementation period, totaled over the respective lifetime of the investments.
Lifetime direct post-project emissions avoided: Lifetime direct post-project emissions avoided are the emissions reductions attributable to the investments made outside the project's supervised implementation period, but supported by financial facilities put in place by the GEF project, totaled over the respective lifetime of the investments. These financial facilities will still be operational after the project ends, such as partial credit guarantee facilities, risk mitigation facilities, or revolving funds.
Lifetime indirect GHG emissions avoided (top-down and bottom-up): indirect emissions reductions are those attributable to the long-term outcomes of the GEF activities that remove barriers, such as capacity building, innovation, catalytic action for replication.
Please refer to the following references for Calculating GHG Benefits of GEF Projects.

Manual for Energy Efficiency and Renewable Energy Projects
Revised Methodology for Calculating Greenhouse Gas Benefits of GEF Energy Efficiency Projects (Version 1.0)
Manual for Transportation Projects

For LULUCF projects, the definitions of "lifetime direct and indirect" apply. Lifetime length is defined to be 20 years, unless a different number of years is deemed appropriate. For emission or removal factors (tonnes of CO_2eq per hectare per year), use IPCC defaults or country specific factors.

Section A. General Data

	At CEO Endorsement	
Project Title	Increasing Investments in District Energy Systems in Cities - a SE4All Energy Efficiency Accelerator	
GEF ID	9320	
GEF Agency	UNEP	
Agency Project ID	1388	
Country	Global	
Region		
Date of Council/CEO Approval		Month DD, YYYY (e.g., May 13, 2014)
GEF Grant (US$)	2 000 000	
Date of submission of the tracking tool		Month DD, YYYY (e.g., May 13, 2014)
Is the project consistent with the priorities identified in National Communications, Technology Needs Assessment, or other Enabling Activities (such as Technology Action Plans, Nationally Appropriate Mitigation Actions (NAMA) under the UNFCCC?	1	

Section B. Quantitative Outcome Indicators

	Target At CEO Endorsement	
Indicator 1: Total Lifetime Direct and Indirect GHG Emissions Avoided (Tons CO_2eq)		Indentify Sectors, Sources and Technologies. Provide disaggregated information if possible. see Special Notes above
Lifetime direct GHG emissions avoided	2 523 140	
Lifetime indirect GHG emissions avoided	823 050	
Indicator 2: Lifetime Energy Saved (Million Joules)		IEA unit converter: http://www.iea.org/stats/unit.asp) Fuel savings should be converted to energy savings by using the net calorific value of the specific fuel. End-use electricity savings should be converted to energy savings by using the conversion factor for the specific supply and distribution system. These energy savings are then totaled over the respective lifetime of the investments.
Direct Electricity savings (GJ)	18 057 350	
Indicator 3: Increase in Renewable Energy Capacity and Production		Disaggregate by type (Wind, Biomass, Geothermal, Hydro, solar, Photovoltaic, Marine power etc)
Increase in Installed RE capacity per technology (MW)		*no RE capacity installed during the project period*
Lifetime RE production per technology (MWh)		(IEA unit converter: http://www.iea.org/stats/unit.asp)
Indicator 4: Number of Users of low GHG systems (Number, of which female)		Identify Sector, describe the low GHG system and technologies and explain methodology for estimation
Indicator 5: Number of Hectares under Low GHG Management Practices (Ha.)		Identify source (conservation, avoided deforestation, afforestation/reforestation), type of low GHG Management Practice and describe methodology used for estimation
Indicator 6: Time Saved in adoption of low GHG technology (Percentage)		For technologies and practices to be supported under the project (i) estimate baseline time to deployment (without project support), (ii) estimate expected time to deployment with project suport and (iii) calculate % of time saved.
Indicator 7: Volume of investment mobilized and leveraged by GEF for low GHG development (co-financing and additional financing) of which		Expected additional resources implies resources beyond co-financing committed at CEO endorsement.
Public		
Private		
Domestic		
External		
Indicator 8: Identify specific GHG reduction target (percent), if any, under any national, sectoral, local plans		Specify plan, area/sector (if subnational), and baseline from which reduction is expected

Tracking Tool for GEF 6 Climate Change Mitigation Projects
(At CEO Endorsement)

Special Notes: Projects need to report on all indicators that are included in their results framework

Reporting on lifetime emissions avoided
Lifetime direct GHG emissions avoided: Lifetime direct GHG emissions avoided are the emissions reductions attributable to the investments made during the project's supervised implementation period, totaled over the respective lifetime of the investments.
Lifetime direct post-project emissions avoided: Lifetime direct post-project emissions avoided are the emissions reductions attributable to the investments made outside the project's supervised implementation period, but supported by financial facilities put in place by the GEF project, totaled over the respective lifetime of the investments. These financial facilities will still be operational after the project ends, such as partial credit guarantee facilities, risk mitigation facilities, or revolving funds.
Lifetime indirect GHG emissions avoided (top-down and bottom-up): indirect emissions reductions are those attributable to the long-term outcomes of the GEF activities that remove barriers, such as capacity building, innovation, catalytic action for replication.
Please refer to the following references for Calculating GHG Benefits of GEF Projects.

Manual for Energy Efficiency and Renewable Energy Projects
Revised Methodology for Calculating Greenhouse Gas Benefits of GEF Energy Efficiency Projects (Version 1.0)
Manual for Transportation Projects

For LULUCF projects, the definitions of "lifetime direct and indirect" apply. Lifetime length is defined to be 20 years, unless a different number of years is deemed appropriate. For emission or removal factors (tonnes of CO_2eq per hectare per year), use IPCC defaults or country specific factors.

Section C. Qualitative Indicators

Indicator 9: Degree of support for low GHG development in policy, planning and regulations	Baseline Rating (1-10)	Target Rating (1-10)	Identify the policy/regulations (national, sectoral, City) relevant to and supported by the project and provide rating. Baseline indicates current status (pre-project), Target is the rating level that is expected to be achieved due to project support.For guidance for qualitative ratings (in comment) move cursor over box or right click to show comment.
National/Regional/Sectoral/City Plan			
Indicator 10: Quality of MRV Systems	**Baseline Rating (1-10)**	**Target Rating (1-10)**	**Provide details of coverage of MRV systems - area, type of activity for which MRV is done, and of Reporting and Verification processes. Baseline indicates current status (pre-project), Target is the rating level that is expected to be achieved due to project support. For guidance for qualitative ratings (in comment) move cursor over box or right click to show comment.**
Activity			
Activity			
Indicator 11: Degree of strength of financial and market mechanisms for low GHG development	**Baseline Rating (1-10)**	**Target Rating (1-10)**	**Provide details of the financial mechanisms and identify the sector and the type of low GHG technology or development activity it supports. Baseline indicates current status (pre-project), Target is the rating level that is expected to be achieved due to project support. For guidance for qualitative ratings (in comment) move cursor over box or right click to show comment.**

ANNEX J-2: Estimates of Direct and Indirect GHG emission reduction

Estimation of Direct GHG emission reductions

Demonstration projects

China

Demonstration unit rationale:	Connection of 50 MW of industrial waste heat to the existing district heating network	
Benefits:	Reduced use of coal to feed the existing district heating network thanks to the waste heat recovery	
Capacity:	50	MW
Energy generated:	72 800 000	kWh per year
Coal saved:	35 740	tons per year
GHG savings:	40 060	tons of CO_{2eq} per year
Unit commissioning date:	3	years after project completion
Period of influence:	20	years
Total GHG savings:	**681 020**	**tons of CO_{2eq}**

Chile

Demonstration unit rationale:	Development of a 25 MW_{th} district heating network run on biomass CHP (also producing 2 MW of electricty) to replace individual inefficient biomass stoves (for space heating) and individual gas boilers (for hot water) in households	
Benefits:	Reduced use of coal thanks to the electricity produced by the biomass CHP boiler Reduced use of gas in individual boilers thanks to the hot water produced by the biomass boiler feeding the district heating network	
Electrical capacity:	2	MW
Electrical energy generated:	2 678 400	kWh per year
Coal saved:	1 320	tons per year
GHG savings from coal savings:	2 350	tons of CO_{2eq} per year
Heating capacity:	25	MW_{th}
Gas saved:	1 277 970	m3 of gas
GHG savings from gas savings:	2 430	tons of CO_{2eq} per year
Combined GHG savings:	4 780	tons of CO_{2eq} per year
Unit commissioning date:	3	years after project completion
Period of influence:	20	years
Total GHG savings:	**81 260**	**tons of CO_{2eq}**

India

Demonstration unit rationale:	Establisment of a district cooling network with a 35 MW_{cool} industrial electric chiller capacity (10,000 refigeration tons)	
Benefits:	Reduced use of coal to produce the electricity required for cooling due to improved efficiency of the district cooling system compared to split cooling	
Cooling capacity:	35	MW_{cool}
GHG emissions for split cooling:	250 070	tons of CO_{2eq} per year
Efficiency rate:	40	%
GHG emissions for district cooling:	150 040	tons of CO_{2eq} per year
GHG savings:	100 030	tons of CO_{2eq} per year
Unit commissioning date:	3	years after project completion
Period of influence:	20	years
Total GHG savings:	**170 510**	**tons of CO_{2eq}**

Estimation of Direct GHG Emission Reductions

Demonstration projects

Serbia

Demonstration unit rationale:	Connection of a 25 MW_{th} biomass boiler to the existing district heating network to replace traditional gas boilers	
Benefits:	Reduced use of natural gas for electricty production	
Capacity:	25	MW
Energy generated:	28 221 050	kWh per year
Natural gas saved:	3 507 630	m3 per year
GHG savings:	6 670	tons of CO_{2eq} per year
Unit commissioning date:	3	years after project completion
Period of influence:	20	years
Total GHG savings:	**113 390**	**tons of CO_{2eq}**

Total GHG emission reductions as a result from the demonstration projects: **1 046 180 tons of CO_{2eq}**

Results of the adoption of city-wide plans

China

Result of the city-wide plan:	2 additional units of identical capacity commissioned in the same city	
Benefits:	Reduced use of coal to feed the existing district heating network thanks to the waste heat recovery	
GHG savings:	40 060	tons of CO_{2eq} per year per unit
Unit 1 commissioning date:	6	years after project completion
Unit 2 commissioning date:	10	years after project completion
Period of influence:	20	years
Total GHG savings:	**961 440**	**tons of CO_{2eq}**

Chile

Result of the city-wide plan:	2 additional units of identical capacity commissioned in the same city	
Benefits:	Reduced use of coal thanks to the electricity produced by the biomass CHP boiler Reduced use of gas in individual boilers thanks to the hot water produced by the biomass boiler feeding the district heating network	
GHG savings:	4 780	tons of CO_{2eq} per year per unit
Unit 1 commissioning date:	6	years after project completion
Unit 2 commissioning date:	10	years after project completion
Period of influence:	20	years
Total GHG savings:	**114 720**	**tons of CO_{2eq}**

Estimation of Direct GHG Emission Reductions

Results of the adoption of city-wide plans

India

Result of the city-wide plan:	2 additional units of identical capacity commissioned in the same city	
Benefits:	Reduced use of coal to produce the electricity required for cooling due to improved efficiency of the district cooling system compared to split units	
GHG savings:	10 030	tons of CO_{2eq} per year per unit
Unit 1 commissioning date:	6	years after project completion
Unit 2 commissioning date:	10	years after project completion
Period of influence:	20	years
Total GHG savings:	**240 720**	**tons of CO_{2eq}**

Serbia

Result of the city-wide plan:	2 additional units of identical capacity commissioned in the same city	
Benefits:	Reduced use of natural gas for electricty production	
GHG savings:	6 670	tons of CO_{2eq} per year per unit
Unit 1 commissioning date:	6	years after project completion
Unit 2 commissioning date:	10	years after project completion
Period of influence:	20	years
Total GHG savings:	**160 080**	**tons of CO_{2eq}**

Total GHG emission reductions as a result from the adopted city-wide plans: **1 476 960 tons of CO_{2eq}**

Total Direct GHG emission reductions: **2 523 140 tons of CO_{2eq}**

Project cost effectiveness: **0.79 US$ per ton of CO_{2eq}**

Total Direct energy savings **18 057 850 GJ**

Estimation of Indirect GHG Emission Reductions

Replications in light touch cities

China

Result of the replication:	2 additional units of identical capacity commissioned in 10 of the 30 other light touch cities in China **(excluding the deep dive city)**	
Benefits:	Reduced use of coal to feed the existing district heating network thanks to the waste heat recovery	
GHG savings:	40 060	tons of CO_{2eq} per year per unit
Unit 1 commissioning date:	10	years after project completion
Unit 2 commissioning date:	15	years after project completion
Period of influence:	20	years
Total GHG savings:	**600 900**	**tons of CO_{2eq}**

Estimation of Indirect GHG Emission Reductions

Replications in light touch cities

Chile

Result of the replication:	2 additional units of identical capacity commissioned in 1 of the 3 other light touch cities in Chile (excluding the deep dive city)	
Benefits:	Reduced use of coal thanks to the electricity produced by the biomass CHP boiler Reduced use of gas in individual boilers thanks to the hot water produced by the biomass boiler feeding the district heating network	
GHG savings:	4 780	tons of CO_{2eq} per year per unit
Unit 1 commissioning date:	10	years after project completion
Unit 2 commissioning date:	15	years after project completion
Period of influence:	20	years
Total GHG savings:	**71 700**	**tons of CO_{2eq}**

India

Result of the replication:	2 additional units of identical capacity commissioned in 1 of the 3 other light touch cities in India (excluding the deep dive city)	
Benefits:	Reduced use of coal to produce the electricity required for cooling due to improved efficiency of the district cooling system compared to split units	
GHG savings:	10 030	tons of CO_{2eq} per year per unit
Unit 1 commissioning date:	10	years after project completion
Unit 2 commissioning date:	15	years after project completion
Period of influence:	20	years
Total GHG savings:	**150 450**	**tons of CO_{2eq}**

Serbia *Not applicable: no long term support (provided in Component 1) for other cities in Serbia.*

Total GHG emission reductions as a result from replications in 3 light-touch cities: **823 050 tons of CO_{2eq}**

Total Indirect GHG emission reductions: **823 050 tons of CO_{2eq}**

ANNEX K: OFP ENDORSEMENT LETTERS

Chile: Endorsement letter Ministry of Energy

Ministerio de
Energía

CARTA MINENERGIA N° 664 /

SANTIAGO, 28 JUN 2016

Ms. Brennan Van Dyke
GEF Executive Coordinator
United Nations Environment Programme
Nairobi 00100, Kenya

Dear Ms. Van Dyke,

This letter is regarding the GEF project "Increasing Investments in District Energy System in Cities – A SE4All Energy Efficiency Accelerator". The associated Project Identification Form was approved by GEF's Chief Executive Officer on 24th November, 2015.

In my capacity as Minister of Energy of the Chilean Government, I confirm that the above stated project proposal is in accordance with our national priorities and commitments within the United Nations Framework Convention on Climate Change. Furthermore, the Chilean Ministry of Energy is in full support of the project's implementation.

Given the technical capacities of UNEP, I kindly request that this project be executed and implemented by the Division of Technology, Industry and Economics, while the Ministry of Energy will be an active member of the Project Steering Committee, ensuring the achievement of the project outcomes at the national level.

Sincerely,

Máximo Pacheco M.
Minister of Energy

PEW/HMB/MZC/CP/MPV/FMM/cmn

Distribución:
- Destinatario
- Gabinete Sr. Ministro
- División Jurídica, Ministerio de Energía
- Departamento Internacional, Ministerio de Energía
- Archivo División Eficiencia Energética, Ministerio de Energía
- Oficina de Partes, Ministerio de Energía

Gobierno de Chile

ENERGY EFFICIENCY

ACCELERATE THE TRANSITION TO MODERN DISTRICT ENERGY SYSTEMS

DISTRICT ENERGY IN CITIES INITIATIVE

EUROHEAT & POWER

COPENHAGEN CENTRE ON ENERGY EFFICIENCY

ICLEI

INTERNATIONAL DISTRICT ENERGY ASSOCIATION

UN-HABITAT FOR A BETTER URBAN FUTURE

UNEP

SUSTAINABLE ENERGY FOR ALL

Global District Energy in Cities Initiative

United Nations Environment Programme
Division of Technology, Industry and Economics
1 rue Miollis, Building VII - 75015 - France

This is to confirm that the City of Belgrade has joined the Global District Energy in Cities Initiative of Sustainable Energy for All (SE4ALL) and will promote the transition to low-carbon modern district energy systems as a (select as appropriate):

Champion City [X] Emerging Champion City [ ] Learning City [ ]

As a member of the Global District Energy in Cities Initiative the City of Belgrade will share, where appropriate, its technical expertise and experience, and will receive technical support and information on low-carbon and modern district energy systems.

The following person is designated as the focal point of the Global District Energy in Cities Initiative.

Name: Mr. Miodrag Grujić – Operational focal point

Title: PhD, ME

Position: Secretariat for Env. Protection – Head of Department for CC, EE and RES

Address: Belgrade, 27. marta 43-45

E-mail: miodrag.grujic@beograd.gov.rs

Name of legal representative (authorized Signatory) Mr. Siniša Mali, PhD, CFA, the Mayor of Belgrade	Mark Radka Chief, Energy, Climate, and Technology Branch United Nations Environment Programme
Signature Date	Signature Date

ANNEX L: CO-FINANCING LETTERS FROM PROJECT PARTNERS

GEF Co-financing letter template

Dr. Naoko Ishii
CEO & Chairperson
Global Environment Facility
1818 H Street, NW, Mail Stop P4-400
Washington, DC 20433

Dear Dr. Ishii,

I have the pleasure to confirm Danfoss's support of the project "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" which we believe will catalyze action to improve energy efficiency in cities, harness local renewable energy sources, improve air quality and reduce greenhouse gas emissions. Danfoss has a track record that is well aligned to the project aims having worked for more than 30 years supporting the delivery of district energy projects in diverse regions such as China, Eastern and Central Europe. Our team is prepared to support this project with our core strengths as a district energy application and know-how provider. Our core strength stems from having a part in all parts of the district energy value chain, Thinking across energy supply and demand and providing technologies for district energy and buildings energy efficiency.

In line with this commitment, Danfoss affirms its desire to be a project partner to the "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" and support its activities as part of the Global District Energy in Cities Initiative. Danfoss will make an in-kind contribution valued at US$ 1.4 Mio over the 36 months of the project (starting January 2017). In particular, our in-kind contribution will provide the following project activities:

- Global level activities, such as:
  - contribute to development and adaptation of district energy simulation models and tools, and provide technology guidance;
  - provide input and review to methodologies for example on assessments and trainings;
  - design and deliver at least one training workshops and two webinars per year, invite city actors to study tours and respond to signed-up cities' technical queries;
  - support fund-raising with donors, mobilize new partners and publish DES tools/guidance;
  - represent the work of the Initiative at global events and provide public relations support.
- Country activities in China, Chile, India, Serbia such as:
  - undertake city-level assessments during the light-touch phase, participate in the data collection process and adapt the rapid assessment methodology to the local context.
  - Participate at the country inception workshop and agree on a long-term partnership with at least one city;
  - Provide training support to light-touch cities e.g. on working with building developers, mapping of waste heat and renewables, and heat/cool demand mapping;
  - Support deep-dive cities with the development of city-wide mapping of heating/cooling demand and contribute to the design of their long-term heating and cooling strategies;
  - Provide experts and metering technologies to undertake heat/cool demand mapping and district energy potential studies in deep-dive cities;

- Design and deliver trainings in deep-dive cities on: heat/cool strategies, master-planning and energy mapping.

Furthermore, Danfoss will support the Initiative's activities in replication countries such as Colombia, Mexico, Mongolia and Bosnia and Herzegovina. This support would include at a minimum provision of expert time to deliver rapid assessments and trainings but may include wider support dependent on market potential in these countries.

The contribution will take the form of staff time in the provision of technical expertise and market insights, for example, at high level and expert discussions, training workshops, documentation review, deep assessments in cities. Furthermore, our contribution will include financing of three training workshop in (Eastern Europe, China, India), study tours and provision of adapted in-house models for district energy.

Danfoss welcomes this important initiative of the GEF and UNEP, and is pleased to be a part of it. Our team looks forward to working with UNEP and its partners to accelerate the deployment of district energy.

Yours sincerely,

Lars Tveen, President Danfoss Heating Segment

KING & SPALDING

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12 July 2016

Dr. Naoko Ishii
CEO & Chairperson
Global Environment Facility
1818 H Street, NW, Mail Stop P4-400
Washington, DC 20433

Subject: Global District Energy in Cities Initiative – King & Spalding LLP

Dear Dr. Ishii,

I have the pleasure of writing to you to confirm the support of King & Spalding LLP ("King & Spalding" or "the Firm") of the project "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" which we believe will catalyze action to improve energy efficiency in cities, harness local renewable energy sources, improve air quality and reduce greenhouse gas emissions.

Celebrating more than 130 years of service, King & Spalding is an international law firm that represents a broad array of clients, including half of the Fortune Global 100, with 900 lawyers in 18 offices in Abu Dhabi, Atlanta, Austin, Charlotte, Dubai, Frankfurt, Geneva, Houston, London, Moscow, New York, Paris, Riyadh (affiliated office), San Francisco, Silicon Valley, Singapore, Tokyo and Washington, D.C.

King & Spalding has a track record that is well aligned to the project aims. The Firm has handled matters in over 160 countries on six continents and is consistently recognized for the results it obtains, its uncompromising commitment to quality and its dedication to understanding the business and culture of its clients. These include countries of focus for the project, including India, China and Chile and replication countries including Mexico, Argentina, El Salvador, Colombia, Morocco, Turkey, Malaysia, Indonesia, Philippines, Mongolia, Singapore, Vietnam and Australia.

The Firm's dedicated Global District Energy Practice, which is a subset of our Global Energy Practice, is one of the largest, most experienced and most extensive in the world. More than 250 lawyers across a wide range of practice areas tied to the energy industry make up our integrated team. Our District Energy lawyers have extensive experience in all aspects of the district energy supply chain. We have structured, documented and negotiated more than 45 district energy projects in diverse regions including in some of those countries those mentioned above. These 45 district energy projects have been successfully delivered in just the last 8 years, more projects than any other law firm. We have drafted and/or advised on district energy laws and regulations for Governments, as they seek to establish this critical new sector for their countries and states, on tendering forms, development and operation agreements and financing agreements.

Our team is prepared to support this project with our core strengths as a legal adviser to proponents, cities, governments and sponsors of district energy projects. In line with this commitment, King & Spalding LLP affirms its desire to be a project partner to the "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" and support its activities as part of the Global District Energy in Cities Initiative. King & Spalding LLP

will make an in-kind contribution valued at US$750,000 over the 36 months of the project (starting January 2017). In particular, our in-kind contribution will provide the following project activities:

- Global level activities, such as:
  - provide selected precedents and templates as may be agreed with cities including checklists for district energy projects, risk matrices, memoranda of understanding, term sheets for project/PPP agreements, KPI regimes and tendering precedents;
  - contribute to development and adaptation of district energy simulation models and tools;
  - design and deliver training workshops and webinars, and invite city actors to training campus;
  - support development of district energy policy and regulatory guidance;
  - provide best practice case studies

- Country activities in China, Chile, India (and potentially also Morocco and Latin American countries) such as:
  - provide support to deep-dive cities to bring projects to tender and support development of legal agreements with successful bidders;
  - provide training to city officials on policy development and negotiations and contracting with district energy providers;
  - work with deep-dive cities to design policies and regulations for district energy and analyze business model options;
  - undertake light-touch city visits and local data collection and support project-level and city-level analysis of district energy in these cities;
  - review draft rapid assessments and support their launch at country level inception workshops;
  - enter into long-term partnership with light-touch cities to provide long-term legal support on agreed terms;
  - in deep-dive cities provide legal experts to support the delivery of market barrier analyses and pre-feasibility and feasibility studies.

- Training topics we will deliver at city and national level:
  - Key considerations for structuring district energy projects: legal, commercial, technical, financing issues;
  - Key Business Models and Legal Structures for District Energy Projects;
  - How to develop regulatory frameworks for district energy: laws and regulations;
  - Designing the tender process;
  - Financing issues in District Energy Projects.

The contribution will take the form of staff time in the provision of experts to light-touch and deep-dive cities to undertake trainings and provide direct assistance to city officials. Further, the development of templates and precedents for use by sign-up cities to the Initiative constitutes a major contribution to this Initiative. King & Spalding LLP will also provide staff time at international events and forums to promote the Initiative and its activities.

King & Spalding LLP welcomes this important initiative of the GEF and UNEP, and is pleased to be a part of it. Our team looks forward to working with UNEP and its partners to accelerate the deployment of district energy.

Yours sincerely,

Tim M. Burbury
Partner

thermaflex

Technical Insulation
Pre-Insulated Pipes
Thermal Energy Networks

Dr. Naoko Ishii
CEO & Chairperson
Global Environment Facility
1818 H Street, NW, Mail Stop P4-400
Washington, DC 20433

GEF Co-financing letter **2016-07-13**

Dear Dr. Ishii,

I have the pleasure to confirm Thermaflex International Holding bv 's support of the project "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" which we believe will catalyze action to improve energy efficiency in cities, harness local renewable energy sources, improve air quality and reduce greenhouse gas emissions. Thermaflex International Holding bv has a track record that is well aligned to the project aims having worked for 34 years supporting the delivery of district energy projects in diverse regions (Europe, Russia, Asia, LatAm). Our team is prepared to support this project with our core strengths as a co-developer of smart and sustainable solutions for efficient distribution of heat and cool as well as hot and cold water for district energy in cities.

In line with this commitment, Thermaflex International Holding bv affirms its desire to be a project partner to the "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" and support its activities as part of the Global District Energy in Cities Initiative. Thermaflex International Holding bv will make an in-kind contribution valued at EUR 165.000/US$ 184.000 over the 36 months of the project (starting January 2017). In particular, our in-kind contribution will provide the following project activities:

- Global level activities, such as Sharing best practices of DE projects realized in the last 34 years :
  - contribute to development and adaptation of district energy simulation models and tools;
  - Supporting at national and international conferences/workshops
  - Support global action campaign to promote district energy in cities.
- Country activities (in Chile, India, Serbia, Bosnia, Columbia, Mexico or other), such as:
  - Bringing in our expertise in design and realization of DE projects (starting from feasibility stage)
  - supporting the development of pilot city activities with our local and international specialists especially in the target countries Serbia and Columbia
  - Helping to improve the awareness of key stakeholder groups on sustainability aspects related to District Energy

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Commercial register
Tilburg HR 18042937
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taking care of energy and the environment

thermaflex

Technical Insulation
Pre-insulated Pipes
Thermal Energy Networks

The contribution will take different forms such as person-days, technical expertise and market insights to be provided, for instance, to meetings of the global multi-stakeholder platform, technical task forces, and high-level and expert discussions in support to actions of cities in developing countries and emerging economies.

Thermaflex International Holding bv welcomes this important initiative of the GEF and UNEP, and is pleased to be a part of it. Our team looks forward to working with UNEP and its partners to accelerate the deployment of district energy.

Yours sincerely,

Gerrit-Jan Baars, CEO

SSG
SUSTAINABILITY SOLUTIONS GROUP

GEF Co-financing letter template

Dr. Naoko Ishii
CEO & Chairperson
Global Environment Facility
1818 H Street, NW, Mail Stop P4-400
Washington, DC 20433

Dear Dr. Ishii,

I have the pleasure to confirm Sustainability Solutions Group's (SSG) support of the project "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" which we believe will catalyze action to improve energy efficiency in cities, harness local renewable energy sources, improve air quality and reduce greenhouse gas emissions. SSG has a track record that is well aligned to the project aims having worked for 8 years supporting the delivery of district energy projects and energy and emissions planning in North America. Our team is prepared to support this project with our core strengths in city planning and pre-feasibility assessments.

In line with this commitment, SSG affirms its desire to be a project partner to the "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" and support its activities as part of the Global District Energy in Cities Initiative. SSG will make an in-kind contribution valued at US$45,360 over the 36 months of the project (starting January 2017). In particular, our in-kind contribution will provide the following project activities:

- Global level activities, such as:
  - Providing a district energy assessment model for the Initiative's Virtual Platform to help city planners optimize the built environment to support district energy;
  - Support the design of training materials for cities on the use of the district energy assessment model;
  - Support in compiling relevant data to ensure that the model is appropriate for different country contexts;
  - Provide 4 online webinars annually for training on district energy on the topic of city planning and district energy and pre-feasibility;
  - Contribute to the Initiative's development of a global MRV framework and support its application through training and country adaption;
  - Jointly develop the Initiative's guidance, tools and training on heat/cool mapping in cities and urban planning for district energy;
  - Provide input to, and support development of, an online decision tool for local policymakers;
  - Linking SSG directly with 6 cities through the Initiative's Virtual Platform for in-kind responses to technical queries;

SSG
SUSTAINABILITY SOLUTIONS GROUP

- Support the Initiative's global action campaign to promote district energy in cities through promoting the Initiative and district energy at workshops and high-level events (e.g. COP 22, Habitat III, Canadian Institute of Planners, American Planning Association).

- Country activities in Chile, Colombia, Mexico, India, China, Serbia, such as:
  - Supporting light touch activities in 6 cities including providing experts for city visits and data collection, undertaking and synthesizing rapid assessments of district energy potential;
  - Entering into an in-kind long-term partnership with 6 cities to support policymaking and district energy development;
  - In 2 deep-dive cities support development of a heat/cool demand mapping and project specific pre-feasibility study;
  - In 2 deep-dive cities support development of a long-term city-wide plan for district energy;
  - Design and deliver training workshops to city officials and experts through workshops including: heat/cool demand mapping, mapping of waste heat and renewables, data collection and reporting, district energy master planning, local policies for district energy and stakeholder coordination
  - Support local barrier analysis and contribute policy and regulatory recommendations

The contribution will take different forms such as person-days, co-branded tools, technical expertise, and market insights to be provided, for instance, to stakeholder meetings, workshops, global and local technical task force, and high-level and expert discussions in support to actions of cities in developing countries and emerging economies to accelerate the deployment of modern district energy systems.

SSG welcomes this important initiative of the GEF and UNEP, and is pleased to be a part of it. Our team looks forward to working with UNEP and its partners to accelerate the deployment of district energy.

Yours sincerely,

Yuill Herbert
Director, SSG

Dr. Naoko Ishii
CEO & Chairperson
Global Environment Facility
1818 H Street, NW, Mail Stop P4-400
Washington, DC 20433

Paris on the 3rd of August 2016

Dear Dr. Ishii,

I have the pleasure to confirm ENGIE's support of the project "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" which we believe will catalyze action to improve energy efficiency in cities, harness local renewable energy sources, improve air quality and reduce greenhouse gas emissions. ENGIE has a track record that is well aligned to the project aims having worked since the beginning of the 20th century supporting the delivery of district energy projects originally in France and Europe. Our regional teams are prepared to support this project under the coordination of my District Heating and Cooling and Cogenerations department in the Decentralized Solutions for Cities and Territories Business Line.

In line with this confirmation, ENGIE affirms its desire to be a project partner to the "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" and support its activities. ENGIE intends to make an in-kind contribution valued at 500.000 US $ over the 36 months of the project (starting January 2017). ENGIE anticipates that its in-kind contribution could provide the following project activities (it being understood that no direct financial payments in support of such activities will be provided):

- Global level activities, such as:
  - review of assessment methodologies, provide specific technology guidance and give feedback on the adaptation of models and tools to country contexts;
  - develop policy guidance (e.g. for the G20 working group on district cooling);
  - participate as speaker in international conferences and workshops on district energy (at least three times a year);
  - as part of the awareness raising activities, invite city actors of at least one city per country of interest to site visits of district energy networks operated by ENGIE;
  - co-brand /co-develop tools, communication material, animation videos and generic training sessions on DES;
  - as a member of Efficacity (and if it's Board agrees to it), contribute to giving access to UNEP to insights and publicly sharable results from the Efficacity Programs; this could include some joint publications or communication;
  - Represent the work of the Initiative at global events and provide public relations support.

- Country activities in Serbia, Morocco, Chile, Colombia, Brazil, Malaysia, Philippines, Thailand, Indonesia, such as:
  - co-chair a working group on district cooling as part of the ASEAN Plan of Action for Energy Cooperation 2016-2025
  - for the underlaying 4 topics, support 2 projects a year for a total of 6 projects for the period:
    - undertake city-visits and participate in the data collection process for rapid assessments;
    - and/or review and draft rapid assessment, participate in the selection of deep-dive cities and provide long-term partnerships with at least one city;

- and/or during the deep-dive phase support pre-feasibility studies and contribute to the definition of city-wide planning, mapping and heating/cooling strategy development (master-planning);
- support project specific feasibility studies;

Furthermore, ENGIE intends to support the Initiative's activities in replication countries such as Colombia or Malaysia. This support could include provision of expert time to deliver rapid assessments and trainings.

The contribution may take the form of staff time during city visits, the undertaking of assessments, trainings, design of policy and regulations, public relations support, and presence of ENGIE at workshops. Further, ENGIE intends to co-host training workshops (e.g. at ENGIE centers of excellence), associated printing, and study tours of district heating and cooling networks owned/operated by ENGIE.

ENGIE welcomes this important initiative of the GEF and UNEP, and is pleased to be a part of it. Our team looks forward to working with UNEP and its partners to accelerate the deployment of district energy.

Yours sincerely,

Dr-Ing. Michael Schack
Director Heating and Cooling Networks and Cogenerations
Decentralized Solutions for Cities and Territories
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92930 Paris La Défense Cedex

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GEF Co-financing letter template

Dr. Naoko Ishii
CEO & Chairperson
Global Environment Facility
1818 H Street, NW, Mail Stop P4-400
Washington, DC 20433

Dear Dr. Ishii,

I have the pleasure to confirm the Carbon Trust's support of the project "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" which we believe will catalyze action to improve energy efficiency in cities, harness local renewable energy sources, improve air quality and reduce greenhouse gas emissions. The Carbon Trust has a track record that is well aligned to these project aims having worked for 15 years supporting the delivery of district energy projects in diverse regions including within the UK, Europe, China, Malaysia and Mexico.

The Carbon Trust is an independent, not for profit with a mission to accelerate the move to a sustainable low carbon economy. We provide expert, impartial, technology-neutral advice to public bodies across the globe to support them to develop district energy projects from concept through to implementation. Our team is prepared to support this project with our core strengths as experts in financial and commercial modelling, stakeholder management, national and local policy for district energy, monitoring and verification of carbon savings and technical advice in the procurement and delivery of district energy projects.

In line with this commitment, the Carbon Trust affirms its desire to be a project partner to the "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" and support its activities as part of the Global District Energy in Cities Initiative. The Carbon Trust will make an in-kind contribution valued at US$520,000 over the 36 months of the project (starting January 2017). In particular, our in-kind contribution will support the following project activities:

- Global level activities, such as:
  - contribute to the development of district energy simulation models and tools and provide specific technology, policy and regulatory guidance;
  - design and deliver training workshops and webinars;
  - support fund-raising with donors, mobilize new partners and publish DES tools/guidance;
  - global action campaign to promote district energy in cities.
- Country level activities in e.g. China, Mexico, Chile, Malaysia, India, such as:
  - participate in training workshops.

The contribution will take the form of staff time, across a team of 10 UK-based district energy experts and a further 10 country-based staff. Our contribution will include the following:

- The Carbon Trust can leverage existing programmes in order to secure commitment from cities to join the DES Initiative. This is of particular relevance in Mexico, where we have recently begun work on Phase II of a UK Foreign & Commonwealth Office Prosperity Funded Programme, continuing existing work completed with the state governments of Jalisco and of Tabasco and extending the support to a further three state governments. In addition, we have strong links with cities in Malaysia through our Low Carbon Cities Malaysia Programme.
- The Carbon Trust will attend two multi stakeholder workshops per year in up to three countries where we have a local office (i.e. China and Mexico, for a total of six workshops a year). We could potentially extend this to the attendance of workshops in Chile, Malaysia, India and Colombia if they take place at a time when our team are working from within these countries.
- The Carbon Trust will deliver up to six webinars over the 36 month course of the project, suggested topics for these webinars include financial and commercial modelling, stakeholder management, tender development, use of planning policy to enable district energy, heating and cooling strategies and the socio-economic benefits of district energy. We would be pleased to tailor these webinars to suit the requirements of the DES Initiative.
- The Carbon Trust will support UNEP in fundraising discussions with UK-based funders such as the UK Department of Energy and Climate Change and the UK Foreign & Commonwealth Office.
- The Carbon Trust will support in the provision of a suite of information sharing guides to partners and cities partaking in the DES Initiative. This includes guides on technology areas such as CHP and Energy Storage, and on procurement and business model options.
- The Carbon Trust will support the DES Initiative outreach activities through promotion in the media and at events. The Carbon Trust brand is highly regarded; we have 54,000 twitter followers, 11,000 LinkedIn followers, 190,000 newsletter opt-in subscribers and 450,000 unique visitors to our website each year. We also regularly host and present at high profile events across the globe and would be pleased to promote the initiative at these events where appropriate.
- The Carbon Trust has developed suite of best practice tools and models for use in district energy:
    1. **Stakeholder Management:** The Carbon Trust has developed a unique, proprietary Stakeholder Engagement Tool (SET) for district energy which can be used to establish an engagement strategy, capture and report on engagement outcomes using a refined 5-step approach to stakeholder management. This model has been tested and modified across a portfolio of more than 17 district energy projects.
    2. **Financial and Commercial Modelling:** The Carbon Trust has developed best practice cash flow and financial models for use at the Energy Masterplanning, detailed techno-economic feasibility study and commercialisation stages of district energy projects. These have been signed off by the UK investor community and UK Department of Energy and Climate Change.
    3. **Low Carbon Planning:** The Carbon Trust has developed Enplanner, a low carbon planning toolkit which enables developers to demonstrate compliance with local planning policies for onsite renewables or carbon reduction. The tool is capable of producing energy statements to support planning applications, obtaining high level feasibility and cost/benefit analysis on suitable renewable technologies and estimating energy and carbon savings.

We will provide the development time for these tools, valued in excess of $270,000 as an in-kind contribution. These models are accompanied by user guides and online training, to ensure that the models can be embedded in local practice and used independently. We would be open to discussions on the co-branding of our tools with the DES Initiative, subject to further discussion and agreement of terms with UNEP.

The sum of the value of the district energy projects we are developing is more than $150m, we will be more than happy to leverage this activity with additional GEF funding to further the goals of the DES Initiative.

The Carbon Trust welcomes this important initiative of the GEF and UNEP, and is pleased to be a part of it. Our team looks forward to working with UNEP and its partners to accelerate the deployment of district energy.

Yours sincerely,

Tim Pryce, Head of Public Sector, Carbon Trust

GEF Co-financing letter template

Dr. Naoko Ishii
CEO & Chairperson
Global Environment Facility
1818 H Street, NW, Mail Stop P4-400
Washington, DC 20433

Dear Dr. Ishii,

I have the pleasure to confirm Danish Board of District Heating's (DBDH) support of the project "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" which we believe will catalyze action to improve energy efficiency in cities, harness local renewable energy sources, improve air quality and reduce greenhouse gas emissions.

DBDH has a track record that is well aligned to the project aims having worked since 1978 to supporting the delivery of district energy projects in diverse regions. DBDH have had many activities, conferences, seminars and knowledge sharing events in China, Russia, East Europe, North America and Western Europe. Furthermore, we facilitate many visits to Denmark, where our guests have exchanges with counterparts in Denmark, at a political and business levels. DBDHs vison is to "Promote District Energy for a Sustainable City Transformation". Our team is prepared to support this project with our core strengths as a facilitator of providing experts, that have knowledge of developing district energy project, from the initial phase by motivating cities to engage in district energy all the way through project development, financing and building the district energy systems in cities. DBDH affirms its desire to be a project partner to the "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" and support its activities as part of the Global District Energy in Cities Initiative. DBDH will make an in-kind contribution valued at US$ 502.500 over the 36 months of the project (starting January 2017). In particular, our in-kind contribution will provide the following project active ties:

- Global level activities, such as:
  - design and delivery of at least 1 training workshop and two webinars pr. year and invite city actors to study tours in Denmark
  - global action campaign to promote district energy in cities through our magazine Hot Cool and in seminars
- Country activities in China, Serbia, Poland and Ukraine, such as
  - DES outreach actions and training programs – 3 locally and 3 in Denmark pr. year
  - Tailored training webinar sessions are developed and advice delivered to cities – 1 per year
  - Fundraising and tailored matchmaking sessions – 3 per year

The contribution will take the form of staff time in the provision of setting up the program and arranging the seminars in cooperation with cities and other local organizations. Provide suited technical expertise and market insights, for example, at high level and expert discussions, training workshops,

DBDH

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documentation review, deep assessments in cities, by involving Danish district energy experts from Danish utilities.

DBDH welcomes this important initiative of the GEF and UNEP, and is pleased to be a part of it. Our team looks forward to working with UNEP and its partners to accelerate the deployment of district energy.

Yours sincerely,
Lars Hummelmose, Managing Director'
DBDH – Danish Board of District Heating

24/8- 2016, COPENHAGEN

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Dr. Naoko Ishii
CEO & Chairperson
Global Environment Facility
1818 H Street, NW, Mail Stop P4-400
Washington, DC 20433
Paris, 09th September 2016

Dear Dr. Ishii,

I have the pleasure to confirm Dalkia's support to the project "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" which we believe will catalyze action to improve energy efficiency in cities, harness local renewable energy sources, improve air quality and reduce greenhouse gas emissions. Dalkia has developed knowhow and skills in the implementation and operation of energy projects and district energy schemes across Northern, Central and Eastern Europe, Middle East and China for over 40 years. These skills are well aligned to the project aims. Our team is prepared to support UNEP and this project with our expertise and our in house capability to provide training.

In line with this commitment, Dalkia affirms its desire to be a project partner to the "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" and support its activities as part of the Global District Energy in Cities Initiative. Dalkia will make an in-kind contribution valued at US$ 450 000 over the 36 months of the project (starting January 2017). In particular, our in-kind contribution will provide the following project activities:

- Global level activities, such as:
  - contribute to the development and adaptation of district energy assessment methodologies and MRV frameworks;
  - assist development of technical guidance and support their translation and dissemination;
  - support fund-raising with donors, mobilize new partners, promote DES Initiative tools/guidance;
  - represent the Initiative at selected events and provide communication resources in support of a global awareness raising campaign to promote district energy in cities;

- Country activities in selected Eastern Europe countries, Morocco and China, such as:
  - draw on country expertise to advise the Initiative on scope of activities, assessment methodologies, training needs and engagement process with cities and utilities;
  - provide review, input and expertise to rapid assessments;
  - participate to awareness and training workshops at the country level (national and/or city);
  - provide experts to participate in project and city-level district energy pre-feasibility studies in selected markets upon rapid assessments;
  - support the analysis of local barriers, contribute to issuing policy and regulatory recommendations and support UNEP and the local authorities in the design of medium term and long term cooling and heating strategy.

- Training on district energy issues & benefits.
  - Organize and provide training in Dalkia's training facilities in France to stakeholders on understanding the application of tools, on assessment of district energy benefits and issues, on the immediate use of live technical parameters ...;
  - organize study tours of district schemes operated by Dalkia.

The contribution will take the form of staff time in the provision of technical expertise and market insights, for example, at high level and at expert level, input to tailor the district energy assessment tools to the country/ city's needs, preparation of training workshops, documentation review, deep assessments in selected cities and responses to their technical queries.
Our contribution will include the transportation and accommodation costs for our own staff, organization and hosting of 6 training sessions in Dalkia's facilities with 6 study tours.

We see this important initiative of the GEF and UNEP as a positive continuation of the excellent document recently produced by UNEP ("District Energy in Cities"), and Dalkia is pleased to be a Partner. Our team looks forward to accelerate the deployment of district energy and improve energy efficiency in cities through working with UNEP and its other partners.

Yours sincerely,

Jérome Ladrière
International Managing Director

Dalkia
Société anonyme au capital de 220 047 504 euros
37 Avenue du Maréchal de Lattre de Tassigny
BP 38 – 59350 Saint-André-Lez-Lille

Solar Turbines

A Caterpillar Company

Solar Turbines Incorporated

Chris Lyons
9330 Sky Park Court SP4B
San Diego, CA 92123
Tel: (858) 694-6586 Direct

Dr. Naoko Ishii
CEO & Chairperson
Global Environment Facility
1818 H Street, NW, Mail Stop P4-400
Washington, DC 20433

Dear Dr. Ishii,

I have the pleasure to confirm Solar Turbine Incorporated support of the project "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" which we believe will catalyze action to improve energy efficiency in cities, harness local renewable energy sources, improve air quality and reduce greenhouse gas emissions. Solar Turbines has been working in district energy area for many years with many case examples of very successful projects that is well aligned to the project aims having worked for supporting the delivery of district energy projects with operating plants in over 90 different countries. Our team is prepared to support this project with our core strengths as a manufacturer and supplier of efficient, environmentally sound and fuel diverse combustion turbine generators.

In line with this commitment, Solar Turbines affirms its desire to be a project partner to the "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" and support its activities as part of the Global District Energy in Cities Initiative. Solar Turbines will make an in-kind contribution valued at approximately $120,000 USD over the 36 months of the project (starting January 2017). In particular, our in-kind contribution will provide the following project activities:

- Global level activities
  - contribute to development and adaptation of district energy simulation models and tools through budgets and life cycle cost related to district energy and combined heat and power (CHP) including cooling systems using turbine exhaust heat
  - design and deliver training workshops;
  - mobilize new partners and publish DES tools/guidance as appropriate;
  - support global action campaigns to promote district energy in cities.
- Country activities specifically in your focus areas such as China, Chile, India, Serbia or others as required,
  - Support city-level assessments and provide power , heating and cooling solutions;
  - support local barrier analysis and support ways to encourage policy and regulatory recommendations

Our contributions will be in the form of local and knowledgeable personnel including engineering hours and specific visits from our home office staff. This would include

Solar® Turbines

A Caterpillar Company

Solar Turbines Incorporated

Chris Lyons
9330 Sky Park Court SP4B
San Diego, CA 92123
Tel: (858) 694-6586 Direct

preliminary drawings, design details and tools that will help cities understand air emission impacts, capital cost, operating cost for these district energy facilities.

Solar Turbines welcomes this important initiative of the GEF and UNEP, and is pleased to be a part of it. Our team looks forward to working with UNEP and its partners to accelerate the deployment of district energy.

Yours sincerely,

Chris Lyons

August 29, 2016

Office of the Executive Director
United Nations Environment Program (UNEP)
P.O Box 30552
Nairobi 00100
KENYA
Via Email: executiveoffice@unep.org

Attention: Mr. Erik Solheim

Subject: Global District Energy in Cities Initiative – IFC Participation in India

Dear Mr. Solheim,

I have the pleasure to confirm IFC's support under its *Eco-cities India Program* to the UNEP-led Global District Energy in Cities Initiative, which we believe will catalyze action to improve energy efficiency, improve air quality, and reduce greenhouse gas emissions.

The objective of IFC's multi-year Eco-cities Program (majority funded by the European Union) is to promote energy efficiency and clean technology interventions in five selected cities (Bengaluru, Bhubaneshwar, Chennai, Jamshedpur, and Mumbai). Specifically, IFC is looking to identify, develop, and finance targeted climate-smart interventions in urban infrastructure and buildings and directly contribute to the Government of India's goals for Smart Cities and climate change mitigation.

Consistent with the World Bank Group's climate change goals and our ongoing activities under the Eco-Cities India Program, IFC is keen to be a project partner under UNEP's Global District Energy in Cities Initiative. We affirm our intent to support related technical activities in two project cities – Thane (Mumbai) and Bhubaneswar, which are already covered by the Eco-Cities Program. Under this partnership, IFC proposes to support UNEP in key activities, including the following:

- UNEP and IFC will jointly develop Terms of Reference(s) for district cooling experts to conduct pre-feasibility and feasibility studies to assess district cooling potential in the two project cities based on consultations with stakeholders and other inputs. This will include design and implementation of demonstration projects in Thane and Bhubaneswar to facilitate scale-up and replicability to other Indian cities based on the rapid assessment work already completed by the UNEP team. All consultants directly appointed by IFC will follow WBG procurement guidelines.

- UNEP and IFC will organize targeted training for city officials and other stakeholders in Thane and Bhubaneswar based on the results of feasibility studies, business model and policy analysis, and outline actionable recommendations. UNEP and IFC will also organize other webinars, national

and regional workshops, and targeted public outreach events to promote district cooling interventions, including training on international best practices and learnings.

- IFC will co-finance project activities (via appropriate cost sharing with UNEP and partners) that are designed to directly scale-up district cooling in India. This could include recruitment of experts to prepare tender documents, training and capacity building, bidder analysis and negotiations, development of project agreements, and techno-commercial pre-feasibility and feasibility studies for district cooling projects in Thane and Bhubaneshwar.

- IFC will contribute staff time and travel for various activities in Thane and Bhubaneshwar including coordination with government counterparts, design and implementation of demonstration projects, participation in team meetings and training workshops, report reviews, and raising local awareness and visibility for the UNEP-led district cooling initiative.

IFC strongly welcomes this important initiative of UNEP and is pleased to be a part of it. We look forward to working with UNEP and its local partners in India to accelerate the deployment of modern district energy, and making it a success.

Yours sincerely,

Navneet Chadha
Program Manager
Eco-Cities India Program
Nchadha@ifc.org

October 11, 2016

Mrs. Naoko Ishii
CEO and Chairperson
Global Environment Facility
1818 H Street, NW, Mail Stop P4-400
Washington, DC 20433

Support for the 'District Energy Systems in Cities' Initiative

I have the pleasure to confirm the Copenhagen Centre on Energy Efficiency's support of the project "Increasing Investments in District Energy Systems in Cities - a SE4All Energy Efficiency Accelerator" which we believe will catalyze action to improve energy efficiency in cities, harness local renewable energy sources, improve air quality and reduce greenhouse gas emissions.

The Copenhagen Centre on Energy Efficiency ("C2E2") was established by the UNEP-DTU Partnership to help UNEP accelerate the uptake of energy efficiency policies and programmes at country, regional and global levels with the prime responsibility to support action towards the United Nations Secretary General's Sustainable Energy for All (SE4All) energy efficiency target of doubling the global rate of improvement in energy efficiency by 2030. The C2E2 has a track record that is well aligned to the project aims and is directly engaged in supporting the delivery of district energy projects in diverse regions, as well as hosting the Secretariat of the SE4All Global Energy Efficiency Accelerator Platform.

In line with its commitments and overall mandate, C2E2 affirms its desire to be a project partner to the "Increasing Investments in District Energy Systems in Cities - a SE4All Energy Efficiency Accelerator" project, and to support its activities as part of the Global District Energy in Cities Initiative. Based on our planned and ongoing activities, C2E2 will make an in-kind contribution with an estimated value of USD 1,750,000 over the 36 months of the project (starting January 2017).

In particular, C2E2 will host a funded Deployable Experts Team that will report to and be co-located with the Accelerator Platform Secretariat at the UNEP-DTU Partnership in Copenhagen. This team will provide direct input to cities in their heat or cool planning; build up city capacity; and conduct pre-assessment and pre-feasibility studies in order to start developing investible district energy projects.

DTU
UNEP DTU Partnership
Department of Management Engineering
Technical University of Denmark – DTU
UN City, Marmorvej 51
DK-2100 Copenhagen Ø, DENMARK

Phone +45 4533 5250
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www.unepdtu.org

This technical resource will form a key component of the DES initiative and its contribution to sustainable city development. The Technical Support Team will provide support in the areas listed below, but should not be limited to these areas if needs or opportunities for other types of engagement arise.

- Support institutional engagement with city governments
- Provide analysis of the technical and economic rationale for city energy-efficiency engagements. This would include on identified areas where city-level decision making is most influential, i.e. buildings and district energy
- Structure and engage in selected feasibility studies, plus contribute to Terms of Reference and contracting where consultants will need to be brought on board.
- Provide analysis of experiences, best practice engagement
- Compile or develop guidance material based on a wide range of city experiences
- Support development of concrete project ideas and linkages to sources of finance

All members of the Team will have strong technical knowledge and solid experience in undertaking techno-economic analysis within the field of district energy and will be independently deployable as neutral partner to the cities and will have the expertise to work on-site in order to deliver on the requested support by cities. The Team will be supported by other energy efficiency experts in the Accelerator Platform Secretariat and C2E2, and can draw on the finance facilitation expertise in other parts of UNEP-DTU Partnership and the Danish Technical University. The Platform Secretariat will also contribute substantial resources in communications, promotion, coordination and tracking progress of the DES initiative.

The Copenhagen Centre on Energy Efficiency and UNEP-DTU Partnership welcomes this important initiative of the GEF and UNEP, and is pleased to be a part of it. Our team looks forward to working with UNEP and its partners to accelerate the deployment of district energy and to make the District Energy in Cities initiative a success.

Yours sincerely,

Peter Skotner
Deputy Director
UNEP-DTU Partnership

UNEP DTU Partnership
Department of Management Engineering
Technical University of Denmark - DTU
UN City, Marmorvej 51
DK 2100 Copenhagen Ø, DENMARK

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UNITED NATIONS ENVIRONMENT PROGRAMME

UNEP

08 November, 2016

Subject: **UN Environment co-finance for "Increasing Investments in District Energy Systems in Cities – a SEforALL Energy Efficiency Accelerator"**

Dear Dr. Ishii,

I have the pleasure to confirm the support of the UN Environment to the project "Increasing Investments in District Energy Systems in Cities - a SEforALL Energy Efficiency Accelerator."

The UN Environment affirms its desire to support the implementation of this project through an in-kind contribution with an estimated value of USD 160, 000 over the 36 months of the project (starting January 2017).

UN Environment's contribution will comprise staff time and travel during three years from the UN Environment Energy, Climate, Technology Branch, including the Chief of the Branch (D-1), the Head of the Policy Unit (P-4), the branch communications officer (P-3), as well as staff from the Asia Pacific Office, the China Office in Beijing, the Europe office, and the Latin America Office. In particular, these officials will coordinate strategic and liaison activities in the four pilot countries (China, India, Serbia and Chile).

The UN Environment welcomes this important initiative and is pleased to be a part of it.

Yours sincerely,

Mark Radka
Chief, Energy, Climate, and Technology Branch

Dr. Naoko Ishii
CEO and Chairperson
Global Environment Facility
1818 H Street, NW, Mail Stop P4-400
Washington, DC 20433

ECONOMY DIVISION
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Paris office: 1 rue Miollis, Building VII, 75015 Paris, France • Tel.: +33 (0)1 44 37 14 50 • Fax: +33 (0)1 44 37 14 74
E-mail: unep.dtie@unep.org • Website: www.unep.org/dtie

CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

03/11/2016

Dr. Naoko Ishii
CEO & Chairperson
Global Environment Facility
1818 H Street, NW, Mail Stop P4-400
Washington, DC 20433

GEF Co-financing letter

Dear Dr. Ishii,

I have the pleasure to confirm the Climate Technology Centre and Network's (CTCN) support of the project "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" which we believe will catalyze action to improve energy efficiency in cities, harness local renewable energy sources, improve air quality and reduce greenhouse gas emissions.

The CTCN is the operational arm of the UNFCCC Technology Mechanism, hosted by the UN Environment Programme (UNEP) and the UN Industrial Development Organization (UNIDO). The Centre promotes the accelerated transfer of environmentally sound technologies for low carbon and climate resilient development at the request of developing countries. We provide technology solutions, capacity building and advice on policy, legal and regulatory frameworks tailored to the needs of individual countries.

The CTCN has a track record of providing technical assistance to numerous cities and countries, including technical assessments, technical support for policy and planning documents, trainings, design of tools and methodologies and development of implementation plans. These activities are well aligned to the project aims and include supporting the delivery of energy projects such as efficient air conditioning and district energy in diverse regions. Our network is prepared to support this project through the numerous core strengths of network members which includes international organisations, financiers, academics, private sector, public sector and consultancies.

In line with this commitment, the CTCN affirms its desire to be a project partner to the "Increasing Investments in District Energy Systems in Cities- a SE4All Energy Efficiency Accelerator" and support its activities as part of the Global District Energy in Cities Initiative. CTCN will make an in-kind contribution valued at US$250,000 over the 36 months of the project (starting January 2017). In particular, our in-kind contribution will provide the following project activities:

- Global level activities, such as:

Climate Technology Centre and Network
UN City, Marmorvej 51, 2100 Copenhagen, Denmark
Email: ctcn@unep.org Web: http://www.ctc-n.org

- promotion of project results at international and regional conferences with the aim to increase country interest in district energy projects, including requests for technical assistance to the CTCN;
- global promotion of the Initiative's online Virtual Platform of district energy trainings, tools and methodologies to multiple stakeholders including cities, national governments and academics.

- Provide finance and technical assistance for country activities such as in Bosnia & Herzegovina and Serbia:
  - light-touch city visits, local data collection and rapid assessment analysis of district energy;
  - development of neutral priority and long-term investment plans for cities in rehabilitation markets for district heating;
  - review draft rapid assessments and support their launch at country level inception workshops;
  - support city and UNEP engagement of investors for critical district energy investments;
  - support feasibility studies of district energy projects;
  - work with cities to design policies for district energy and analyze business model options; and
  - provide training to city officials on city assessments of district energy, project development and policy design.

The contribution will take the form of staff time for the regional and global outreach of the project's activities and specific finance for technical assistance to light-touch, deep-dive and replication cities if submitted as a national priority by the CTCN National Designated Entity.

The CTCN welcomes this important initiative of the GEF and UNEP, and is pleased to be a part of it. Our team looks forward to working with UNEP and its partners to accelerate the deployment of district energy.

Yours sincerely,

Jukka Uosukainen
Director

UNEP

Climate Technology Centre and Network
UN City, Marmorvej 51, 2100 Copenhagen, Denmark
Email: ctcn@unep.org Web : http://www.ctc-n.org

Ministero dell'Ambiente
e della Tutela del Territorio
e del Mare

DIREZIONE GENERALE PER LO SVILUPPO SOSTENIBILE, PER
IL DANNO AMBIENTALE E PER I RAPPORTI CON L'UNIONE EUROPEA
E GLI ORGANISMI INTERNAZIONALI

DIVISIONE I - INTERVENTI PER LO SVILUPPO SOSTENIBILE,
DANNO AMBIENTALE ED ASPETTI LEGALI E GESTIONALI

Dr Ligia Noronha
Director
Economy Division
UNEP
Paris

Cc Mrs Djaheeza Subratty
Head, Policy Unit
Energy, Climate, Technology Branch
Economy Division
UNEP
Paris

Subject: Signature of the Donor Agreement between IMELS and UNEP on District Energy

Dear Director,

I acknowledge the receipt of the Donor Agreement. Please find attached the document countersigned.
Allow me to express all our appreciation for the intense work done in order to finalize this agreement.
The District Energy Project has great importance for us. It will allow IMELS to concretely contribute in the spread of renewable energy and energy efficiency in cities and municipalities while ensuring social and economic progress. This project is a concrete example of how sustainable development can be implemented at local level we are very happy to be a partner in this endeavor.

Looking forward to working with you closely,
Sincerely,

Giovanni Brunelli

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[28] Please notice that this is an extract of the full donor agreement signed between UNEP and the IMELs.

DONOR AGREEMENT
BETWEEN
THE ITALIAN MINISTRY FOR ENVIRONMENT, LAND, AND SEA (IMELS)
AND
UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)

WHEREAS the Italian Ministry for Environment, Land, and Sea (hereinafter referred to as the "Donor") has decided to make a **contribution of EURO 204,623.67** (two hundred and four thousand and six hundred twenty three euros and sixty seven cents), (hereinafter referred to as the "Contribution") to support district energy project activities in the Morocco (hereinafter referred to as the "Project"), under the framework project "Global District Energy in Cities Initiative", to the United Nations Environment Programme (hereinafter referred to as "UNEP").

WHEREAS UNEP is prepared to receive and administer the contribution for the project, as defined in the attached Project Concept Note (Annex 1).

NOW THEREFORE, UNEP and the Donor hereby agree as follows:

Article I. The Contribution

1. The Donor shall, in accordance with the schedule of payments set out below, contribute to UNEP the amount of **204,623.67 EUROS** covering the **planned period from upon counter-signature of the Donor Agreement through 31 March 2019** inclusive (the "Support Period").

The contribution shall be deposited in the following bank account:

Account Name:	UNEP EURO Account
Account Number:	6161603755
IBAN:	DE56501108006161603755
Bank name:	J.P. Morgan AG
Bank Address:	PO Box 60284 Junghofstrasse 14 60311 Frankfurt/Main Germany
Wire transfers:	Bank Code number = 501 108 00 SWIFT number = CHASDEFX.

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[29] Please notice that this is an extract of the full donor agreement signed between UNEP and the IMELs.

IN WITNESS WHEREOF, the undersigned, being duly authorized thereto, have signed the present Agreement in the English language in two copies.

For the Italian Ministry for Environment, Land, and Sea:

Mr. Giovanni Brancili
Head of Division for Sustainable Development, Environmental Damage, European Union and International Affairs

Date: 24 October 2016

For United Nations Environment Programme:

Ligia Noronha
Director, Economy Division

Date: 20 October 2016

Annex 1: Project Concept Note

[30] Please notice that this is an extract of the full donor agreement signed between UNEP and the IMELs.

UNITED NATIONS ENVIRONMENT PROGRAMME

UNEP

PROJECT AGREEMENT

Regarding:

Support to the Global District Energy in Cities Initiative

Duration: 01 January 2015 – 30 June 2017
Amount: DKK 5,000,000

1. Parties to the project/activity

UNEP
Division for Technology, Industry and Economics
15, rue de Milan
75009 Paris
France

Contact Person: Mark Radka, Chief, Energy Branch

and

Ministry of Foreign Affairs
Green Growth Office
Copenhagen Denmark

Contact person: Jakob Rogild Jakobsen

2. Background

Accelerating the uptake of energy efficiency and renewable energy in the global energy mix is the single biggest contribution to keep global temperature rise under 2 degrees Celsius (°C) and to reap the multiple benefits of an inclusive green economy. Cities account for over 70 per cent of global energy use and for 40 to 50 per cent of greenhouse gas emissions worldwide (IPCC, 2014). Systemic inefficiencies in the energy consumption of cities have economic and social costs for both cities and countries, and are a major barrier to universal access to modern energy.

Currently, half of the energy consumption of cities is for heating and cooling. Any solution for the climate and energy transition therefore must explicitly address urban heating and cooling, as well as their interaction with electricity consumption and production. Tackling the urban energy challenge will require the intelligent use of synergies, flexibility in demand, and short- and longer-term energy storage solutions across the different economic sectors.

One of the least-cost and most-efficient solutions in reducing emissions and primary energy demand is the development of modern (energy-efficient and climate-resilient) and affordable district energy systems in cities.

District energy systems pipe hot or cold water around a city for use in buildings for heating or cooling, and can be integrated with and possibly raise the total efficiency of local electricity production by up to 90 per cent. Shifting to modern district energy systems could avoid over 35 GT of CO2 emissions at low

31

[31] Please notice that this is an extract of the full donor agreement signed between UNEP and the DANIDA

UNEP shall ensure that no one under 14 years of age or the age of the end of compulsory schooling in that area, whichever is lower, is engaged by the authority, organization and/or consultant or anyone working or acting under the authority of the authority, organization and/or consultant.

On behalf of UNEP

Place and Date: Paris France, 3 December 2014

Signature:

On behalf of the Danish Ministry of Foreign Affairs

Place and Date: Copenhagen, 4 December 2014

Signature:

Implementation timeline: 24 months (January 2015 - Dec 2016)

Completion date: six months after implementation timeline: 30 June 2017

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[32] Please notice that this is an extract of the full donor agreement signed between UNEP and the DANIDA

Please notice that the following email was sent by the Danish Ministry of Foreign Affairs to confirm the extension of the donor agreement until the 30th June 2018.

From: "Marie Højgaard Berg" <mahobe@um.dk>
Date: November 4, 2016 at 13:01:47 GMT
To: "Mark.Radka@unep.org" <Mark.Radka@unep.org>
Cc: "Niels Hedegaard Jørgensen" <niejor@um.dk>
Subject: SV: Global District Energy in Cities project

Dear Mark Radka,

With this email I confirm that the Danish Ministry of Foreign Affairs accepts the request to extend the UNEP project "Global District Energy in Cities" until 30 June 2018.

Thank you for your continued work on this project.

Best regards,

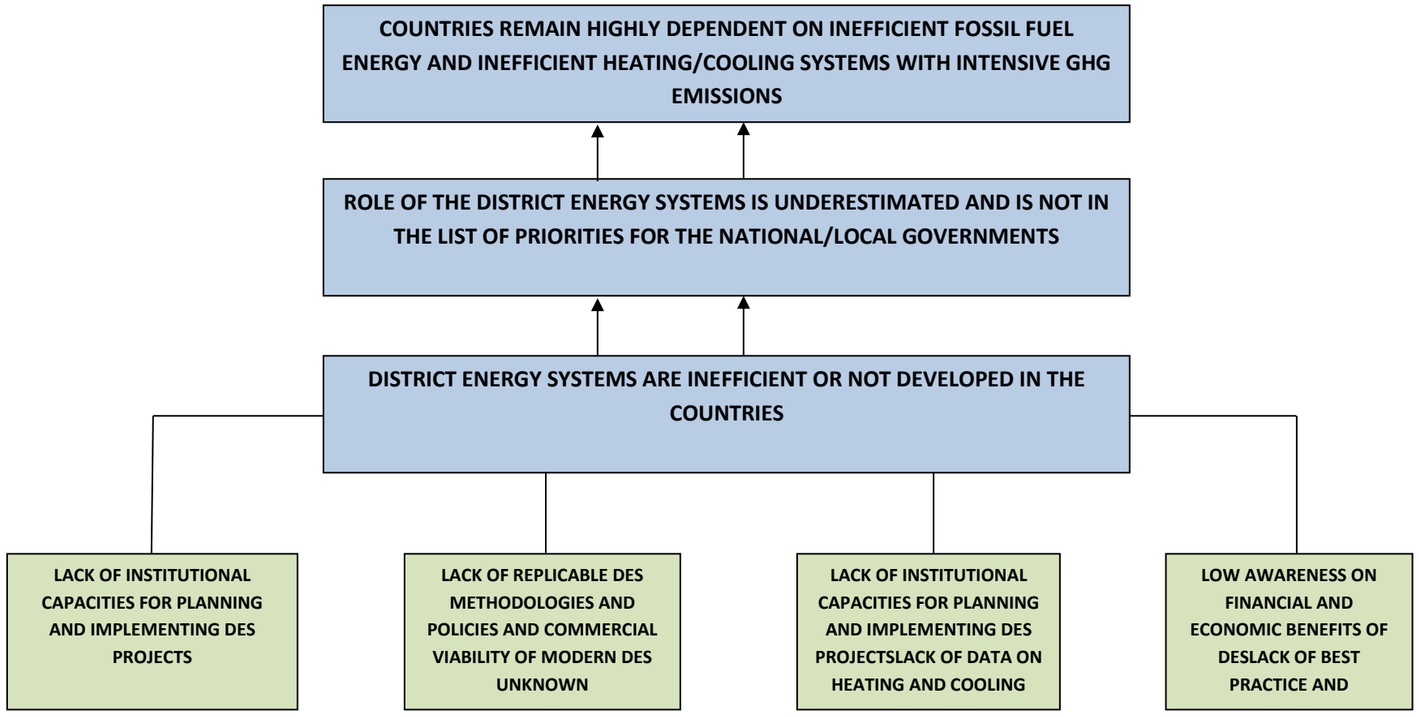
Niels Hedegaard Jørgensen

NIELS HEDEGAARD JØRGENSEN / NIEJOR@UM.DK
CHIEF ADVISOR / MULTILATERAL AFFAIRS, CLIMATE AND GENDER
MOBILE +45 41865978

MINISTRY OF FOREIGN AFFAIRS
ASIATISK PLADS 2 / 1448 KØBENHAVN K
PHONE +4533920000 / WWW.UM.DK

ANNEX M: PROBLEM TREE AND THEORY OF CHANGE

Problem Tree diagram



Theory of Change

ANNEX N: ENVIRONMENTAL AND SOCIAL SAFEGUARDS CHECKLIST

Project Title:	**Increasing Investments in District Energy Systems in Cities – a SE4All Energy Efficiency Accelerator**		
GEF project ID	***9320***	***Version of checklist***	***2***
Project status (preparation, implementation, MTE/MTR, TE)	***PPG***	***Date of this version:***	***October 14th, 2016***
Checklist prepared by (Name, Title, and Institution)			

In completing the checklist both short- and long-term impact shall be considered.

Section A: Project location:
If negative impact is identified or anticipated the Comment/Explanation field needs to include: Project stage for addressing the issue; Responsibility for addressing the issue; Budget implications, and other comments.

	Yes/No/N.A.	*Comment/explanation*
- Is the project area in or close to -		
- densely populated area	Yes	The project will be implemented in cities of four countries: Chile, China, India and Serbia. No negative impacts are anticipated. Implementation of the projects will have positive impact on densely populated areas.
- cultural heritage site	N/A	At this stage it is difficult to foresee if the project will be implemented close to cultural heritage sites. In case of the vicinity of any cultural heritage site, adequate mitigation measures will be foreseen.
- protected area	No	The project will not be implemented in protected areas, but in urban areas without any negative impact on protected areas.
- wetland	N/A	
- mangrove	N/A	
- estuarine	N/A	
- buffer zone of protected area	No	The project will be implemented in urban areas and not close to any buffer zone of protected area and without negative impact on these zones.
- special area for protection of biodiversity	N/A	
- Will project require temporary or permanent support facilities?	Yes	Project offices (one project office in each project country: Chile, China, India and Serbia).
If the project is anticipated to impact any of the above areas an Environmental Survey will be needed to determine if the project is in conflict with the protection of the area or if it will cause significant disturbance to the area.		

Section B: Environmental impacts, i.e.

If negative impact is identified or anticipated the Comment/Explanation field needs to include: Project stage for addressing the issue; Responsibility for addressing the issue; Budget implications, and other comments.

	Yes/No/N.A.	*Comment/explanation*
- Are ecosystems related to project fragile or degraded?	No	
- Will project cause any loss of precious ecology, ecological, and economic functions due to construction of infrastructure?	No	
- Will project cause impairment of ecological opportunities?	No	
- Will project cause increase in peak and flood flows? (including from temporary or permanent waste waters)	No	
- Will project cause air, soil or water pollution?	No	Positive impact on air pollution: reduction of air pollution expected.
- Will project cause soil erosion and siltation?	No	
- Will project cause increased waste production?	No	
- Will project cause Hazardous Waste production?	No	
- Will project cause threat to local ecosystems due to invasive species?	No	
- Will project cause Greenhouse Gas Emissions?	No	Implementation of the Project will reduce GHG emissions.
- Other environmental issues, e.g. noise and traffic	No	
Only if it can be carefully justified that any negative impact from the project can be avoided or mitigated satisfactorily both in the short and long-term, can the project go ahead.		

Section C: Social impacts

If negative impact is identified or anticipated the Comment/Explanation field needs to include: Project stage for addressing the issue; Responsibility for addressing the issue; Budget implications, and other comments.

	Yes/No/N.A.	*Comment/explanation*
- Does the project respect internationally proclaimed human rights including dignity, cultural property and uniqueness and rights of indigenous people?	Yes	
- Are property rights on resources such as land tenure recognized by the existing laws in affected countries?	Yes	Local laws regulating property rights on resources and expropriation exist in all project countries.
- Will the project cause social problems and conflicts related to land tenure and access to resources?	No	
- Does the project incorporate measures to allow affected stakeholders' information and consultation?	Yes	All project outputs will be discussed with all relevant stakeholders from the four countries, including the affected populations, ethnic and religious minorities.

	Yes/No/N.A.	*Comment/explanation*
- Will the project affect the state of the targeted country's (-ies') institutional context?	Possible	The policies review and development of DES in the cities may recommend different institutional framework for the development of DES in the cities/countries. However, if this will happen, it will only have positive impact on the institutional framework in the city/country.
- Will the project cause change to beneficial uses of land or resources? (incl. loss of downstream beneficial uses (water supply or fisheries)?	No	
- Will the project cause technology or land use modification that may change present social and economic activities?	Yes	Upgrade to more advanced technology and to Renewable Energy technologies.
- Will the project cause dislocation or involuntary resettlement of people?	No	However, implementation of the demonstration projects could potentially require some minor resettlement of people (e.g. for construction of the new plant) in which case adequate measures will be undertaken to fully compensate the people affected with the implementation of the project.
- Will the project cause uncontrolled in-migration (short- and long-term) with opening of roads to areas and possible overloading of social infrastructure?	No	
- Will the project cause increased local or regional unemployment?	No	On the contrary, the project is expected to increase the employment rates in the countries (for example in biomass industry).
- Does the project include measures to avoid forced or child labour?	Yes	These measures will be included in the agreement with the governments.
- Does the project include measures to ensure a safe and healthy working environment for workers employed as part of the project?	Yes	These measures will be included in the agreement with the governments.
- Will the project cause impairment of recreational opportunities?	No	
- Will the project cause impairment of indigenous people's livelihoods or belief systems?	No	
- Will the project cause disproportionate impact to women or other disadvantaged or vulnerable groups?	No	
- Will the project involve and or be complicit in the alteration, damage or removal of any critical cultural heritage?	No	
- Does the project include measures to avoid corruption?	Yes	These measures will be included in the agreement with the governments.
Only if it can be carefully justified that any negative impact from the project can be avoided or mitigated satisfactorily both in the short and long-term, can the project go ahead.		

Section D: Other considerations

If negative impact is identified or anticipated the Comment/Explanation field needs to include: Project stage for addressing the issue; Responsibility for addressing the issue; Budget implications, and other comments.

	Yes/No/N.A.	*Comment/explanation*
- Does national regulation in affected country (-ies) require EIA and/or ESIA for this type of activity?	Yes	It depends on the installed capacity of the DH and district cooling systems.
- Is there national capacity to ensure a sound implementation of EIA and/or SIA requirements present in affected country (-ies)?	Yes	There is sufficient capacity to implement ESIA requirements. In each of the four countries there is adequate institutional capacity in the ministries responsible for ESIAs and issuance of Environmental Permits.
- Is the project addressing issues, which are already addressed by other alternative approaches and projects?	No.	
- Will the project components generate or contribute to cumulative or long-term environmental or social impacts?	Yes	It will contribute to long term positive environmental and social impacts. The implementation of the project is expected to reduce GHG, to improve significantly air quality in the cities, which will have impact on health of the local population.
- Is it possible to isolate the impact from this project to monitor E&S impact?	Yes	Establishment of a city Monitoring Framework in each pilot city will enable tracking of E & S benefits and impacts such as air pollution, local jobs, GHG, ODS emissions, etc. .

ANNEX O: ACRONYMS AND ABBREVIATIONS:

ADB	Asian Development Bank
BCFM	Base Case Financial Model
BEA	Buildings Efficiency Accelerator
BEE	Bureau of Energy Efficiency (India)
C2E2	Cophenhagen Centre for Energy Efficiency
CAPEX	Capital Expenditure
CCHP	Combined Cooling Heat and Power
CCM	Climate Change Mitigation
CDM	Clean Development Mechanism
CHP	Combined Heat and Power
CO_2	Carbon dioxide
CTCN	Climate Technology Centre and Network
DBDH	Danish Board of District Heating
DES	District Energy Systems
DC	District Cooling
DH	District Heating
DPWT	Deployable Project Work Team
DTIE	Division of Technology, Industry, and Economics (UNEP)
EBRD	European Bank for Reconstruction and Development
EHP	Euroheat and Power
EOI	Expression of Interest
EOU	UNEP Evaluation Office
ESCO	Energy Service Company
ESIA	Environmental and Social Impact Analysis
EU	European Union
FYP	Five Year Plan
GDP	Gross Domestic Product
GCF	Green Climate Fund
GEF	Global Environment Facility
GEFTF	Global Environment Facility Trust Fund
GHG	Greenhouse Gas
GIFT	Gujarat International Finance Tec-City (India)
GIS	Geographic Information System
GJ	Giga-Joules
GW	Gigawatt
GWh	Gigawatt-hour
GWth	Gigawatt-thermal
HCFC	Hydrochlorofluorocarbon
ICLEI	International Council for Local Environmental Initiatives
IDEA	International District Energy Association
IEA	International Energy Agency
IGO	Inter-Governmental Organisation
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
IW	Inception Workshop
KWh	Kilowatt-hour
LCAP	Low Carbon Action Plan
LDCF	Least Developed Countries Fund
MDB	Multilateral Development Bank
MoU	Memorandum of Understanding
MRV	Monitoring Reporting and Verification
Mt	Mega-tons
MTE	Mid Term Evaluation
MTR	Mid Term Review

MW	Megawatt
MWel	Megawatt-electric
MWh	Megawatt-hour
MWth	Megawatt-thermal
N/A	Not Applicable
NAMA	Nationally Appropriate Mitigation Actions
NDRC	National Development and Reform Commission of China
NGO	Non Governmental Organisation
NOx	Nitrogen oxide
NREAP	National Renewable Energy Action Plan (Serbia)
ODP	Ozone Depletion Potential
OPEX	Operational Expenditure
PIR	Project Implementation Review
PPG	Project Preparation Grant
POP	Persistent Organic Pollutant
PM	Particulate Matter
PMC	Project Management Cost
RFP	Request for Proposal
ROAP	UNEP's Regional Office Asia Pacific
ROLAC	UNEP's Regional Office Latin America and Caribbean
ROI	Return on Investment
SCCF	Special Climate Change Fund
SE4ALL	Sustainable Energy for All
SMART	Specific, Measurable , Assignable, Realistic and Time-related
SO_2	Sulphur dioxide
SPV	Special Purpose vehicle
STAR	System for Transparent Allocation of Resources
TA	Technical Assistance
TE	Terminal Evaluation
TR	Refrigeration Tons
TOR	Terms of Reference
TWh	Terawatt-hour
UNDAF	United Nations Development Assitance Framework
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
V-NAMA	Vertically Integraged Nationally Appropriate Mitigation Action
VCS	Verified Carbon Standard
WRI	World Resources Institute

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