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Table of Contents

Acronyms and Abbreviations

Acronym	Definition	Acronym	Definition
ADB	Asian Development Bank	**IEX**	Indian Energy Exchange
AUWSP	Accelerated Urban Water Supply Programme	**IFC**	International Finance Corporation
		IGBC	Indian Green Building Council
bar	1 atmosphere of pressure	**IO**	Investment Officer
BEE	Bureau of Energy Efficiency	**IPP**	Independent Power Producer
BIG	Biomass Integrated Gasification	**ISA**	International Solar Alliance
BJP	Bharatiya Janata Party	**JNNURM**	Jawaharlal Nehru National Urban Renewal Mission
BSPGC	Bihar State Power Generation Company	**KE**	Key Expert
CERC	Central Electricity Regulatory Commission	**kWh**	Kilo Watt hour
		LEED	Leadership in Energy and Environmental Design
CHP	Combined Heat and Power		
CII	Confederation of Indian Industry	**LiDAR**	Light Detection and Ranging
		MNRE	Ministry of New and Renewable Energy
CNRS	National Center for Scientific Research of France	**MOHUA**	Ministry of Housing and Urban Poverty Alleviation
COP	Conference of the Parties (of UNFCCC)	**NAPCC**	National Action Plan on Climate Change
		NGO	Non-Government Organisation
Crore	1,00,00,000 or 10 million or 100 Lakhs	**MEDA**	Maharashtra Energy Development Agency
CSH	Concentrating Solar Heat	**MSMEs**	Micro Small and Medium Enterprises
CSP	Concentrating Solar Power	**MW**	Mega Watt
CSTEP	Center for Study of Science, Technology and Policy (India)	**NEP**	National Energy Plan (India)
		NDC	Nationally Determined Contribution
CUF	Capacity Utilisation Factor	**NIC**	National Informatics Centre (of MNRE)
C3P	PPP Transaction Advisory team (IFC)	**OREDA**	Odissa Energy Development Agency
		PEC	Project Executive Committee
DISCO	Distribution company	**PGCI**	Power Grid Corporation of India
DNV GL	Den Norsk Veritas Germanischer Lloyd	**PMG**	Project Management Group
		POSOCO	Power System Operation Corporation
DPR	Detailed Project Report	**PPA**	Power Purchase Agreement
DTI	Danish Technological Institute	**PPP**	Public Private Partnership
ECBC	Energy Conservation Building Code	**PV**	Photovoltaic
		RE	Renewable Energy
EDGE	Excellence in Design for Greater Efficiencies	**ROM**	Results Oriented Monitoring
		RTS	Rooftop Solar
EE	Energy efficiency	**SBM-U**	Swatchh Bharat Mission - Urban
ECN	Energy Research Centre of the Netherlands	**SCOPE**	Scalable Optimised Power Plant Engineered
EU	European Union	**SDG**	Sustainable Development Goal
EUD	European Delegation	**SHIP**	Solar Heat for Industrial Processes

EUR	Euro (€)
ESCO	Energy Service Company
EPC	Engineering Procurement and Construction
EPI	Energy Performance Index
EQ	Evaluation Question
Exim	Export and Import (bank)
E&S	Environment and Safety
FA	Financing Agreement
FASA	Financial Advisory Service Agreement
FI	Financial Intermediary
FOWIND	Facilitating Offshore Wind in India
FOWPI	First Offshore Wind Project of India
FWC	Framework Contract
GCRT	Grid-connected Rooftop (solar)
GEF	Global Environmental Facility
GENCO	Generation company
GETCO	Gujarat Energy Transmission Corporation
GHG	Greenhouse gas
GoI	Government of India
GRIHA	Green Rating for Integrated Habitat Assessment
GWEC	Global Wind Energy Council
GW	Giga Watt
SIEA	Services for the Implementation of External Aid
SHRIRAM	Shriram Institute for Industrial Research (India)
SME	Small and Medium Enterprises
SNA	State Nodal Agency
SPIN	Single Window Clearance (portal)
SWM	Solid Waste Management
TANGEDCO	Tamil Nadu Generation and Distribution Corporation
TC	Technical Cooperation
TERI	The Energy and Resources Institute (India)
ToC	Theory of Change
TORs	Terms of Reference
TSO	Transmission System Operator
TSR	Transaction Structure Report (IFC)
UIDSSMT	Urban Infrastructure Development Scheme for Small & Medium Towns
ULB	Urban Local Body
UNFCCC	UN Framework Convention on Climate Change
UPNEDA	Uttar Pradesh Energy Development Agency
VGF	Viability Gap Funding
WBG	World Bank Group
WISE	World Institute of Sustainable Energy
WTE	Waste-to-energy

1 Introduction

The overall objective of this assignment was to conduct the Impact Evaluation of the programme, '***Support to Renewable Energy, Clean Technologies and Energy Efficiency in India*** (the **Programme**)'. The financing agreement was signed by the EU and India in December 2010 (DCI-ASIE/2010/022-349)). Implementation began in 2013. The Terms of Reference (ToR) in **Annex 10**, set out the general scope for this evaluation.

This impact evaluation provides an independent assessment of the use of resources along with the outputs and results delivered during implementation of the five (5) constituent projects of the Programme.

This assignment was implemented by SUEZ Consulting as part of the Consortium SAFEGE 201 Framework Contractor Beneficiary for Lot 2 using a team of four key experts (KEs) (see Annex 8). Evaluation work began on March 16th, 2020. The field phase took place between July and October 2020. The Draft Final Report was submitted on December 9th, 2020. A virtual presentation will follow in Delhi. Attendees are to be the EUD, and as appropriate, the Evaluation Reference Group and key stakeholders, end-users, and beneficiaries.

This introduction is followed by an analytical presentation of findings as per the evaluation criterion and questions (Section 2). This leads to the identification of conclusions per evaluation criterion and overall recommendations (see Section 4). Besides the annexes already mentioned, there are several more, mentioned at the relevant points in this report.

1.1 Summary Description of the Programme and its Projects

The EU signed the Financing Agreement (FA) for the "Support to Renewable Energy, Clean Technologies and Energy Efficiency in India" programme with the Government of India in December 2010. The programme has three main elements: first, policy improvements, training and capacity building for central, state and local government officials; second, exchange of best practices with the EU; third pilot projects in renewable energy (RE), energy efficiency (EE) and greenhouse gas (GHG) mitigation across India. The programme consists of five (5) separately conceived and separately implemented projects, listed below in Table 1 with their implementation dates and budgets:

Table 1 : The Five Projects' Titles, Contractors, Dates and Budgets

#	Project	Consultant	Dates	EU Budget	Actual Spent
1	SCOPE BIG- Scalable CSP Optimized Power Plant Engineered with Biomass Integrated Gasification	Center for Study of Science, Technology and Policy Limited (CSTEP), India	2013-2017	€3.2[1] M	€1[2] M

[1] The EU grant amount was stated as being €8.0 M in the project's EU-CSTEP Consortium signed contract signed on 27 September 2013.
[2] An additional €2 M of claims are still apparently disputed/unpaid with the CSTEP-led consortium partners Thermax, ECN and CNRS.

#	Project	Consultant	Dates	EU Budget	Actual Spent
2	FOWIND - Facilitating Offshore Wind in India	Global Wind Energy Council (GWEC) incl. CSTEP, DNV-GL, WISE with MNRE, GPCL, NIWE, ReNew Power	2013-2018	€3.2 M	€3.2 M
3	TA Environment-Technical Cooperation for Clean Energy in India	Svenska Miljoinstitutet AB (Sweden) with DTI (Denmark) and Sriram Institute of Industrial Research (India)	2014-2018	€1.03 M	€1.03 M[3]
4	TA Clean Energy-Technical Cooperation for Clean Energy in India	IDOM Consulting (Spain)	2014-2020	€2.02 M	€2.02 M[4]
5	Eco-Cities- EU India Cooperation on Clean Technologies and Energy Efficiency for Eco-cities	International Finance Corporation (IFC) - World Bank Group (WBG)	2014-2020	€9 M	€5 M[5]
			Total:	**€17.95 M**	**€12.25**

The five projects were implemented by separate consulting teams which were procured in accordance with EU procedures for grants and services. The Scope BIG project was terminated in June 2017[6]. The FOWIND and TA Environment projects have been completed. The TA Clean Energy and Eco Cities projects have been extended to 30 September 2020, and are in the process of being extended for an additional four months, due to Covid-19 pandemic delays, to 31 January 2021.

1.2 Overall Programme and Projects Intervention Logic

The rationale for the overall intervention can be found in the programme-wide EU-India Financing Agreement (dated December 2010), in the five projects' grant applications, and in the contracts with the contractors responsible for the implementation of individual projects. The intervention logics have been summarised in the programme's and in the five project-level Theories of Change (ToCs) (see Annex 7). The ToCs are directly derived from the programme and project Logical Frameworks (LogFrames) at the relevant design, grant application or contract signing stages.

The intervention logics of the projects were primarily capacity building focussed, while the Eco Cities project's objective was improved regulation and use of clean technologies and energy efficiencies in municipal services, the building market and SMEs, and the SCOPE BIG project was focussed on the design, installation and successful operation of a pilot solar/biomass hybrid pilot plant. The planned outputs were then expected to lead to greenhouse gas (GHG) mitigation and RE MW and MWh

[3] To Be Confirmed
[4] To Be Confirmed
[5] By July 2019, €6.3 million had been disbursed and €5 million was spent. In addition, other bilateral donors contributed approximately €2 million of which €1.7 million was spent.

additions through indirect mechanisms, including replications that would not be directly controlled by the projects.

In addition to the specific outcomes, the indirect expected GHG mitigation and the RE/EE MW/MWh impacts generally did not have specific indicators and target values or independent means of verification stipulated in their LogFrames. The outcome and impact level monitoring was specified to be done from national power generation and energy data statistics. However, given the very large size of India's energy sector, national or even state statistics cannot be expected to show any measurable change as a result of the implementation of programme supported RE plants or EE gains. There were also no emission factors stipulated to be used to translate RE/EE MW/MWh gains into GHG emission reductions at the programme or individual project level.

Four of the five projects (except for SCOPE BIG that was terminated) delivered their numerical capacity building and other outputs successfully. However, linking these particular outputs to tangible and measurable GHG mitigation and enhanced RE capacity/EE gains specific outcomes and impacts is not possible.

One of the feasibility studies prepared as part of the FOWIND project is being used to develop an offshore wind farm in Gujarat, so a link between outputs and outcomes is clear and direct for part of the FOWIND project's outputs.

Half the programme's funding went to the Eco-Cities project. The Eco Cities project has claimed various GHG mitigation and energy reduction/RE power generation impacts, but independently verifying these figures is not possible for several reasons: in some cases, the impacts are based upon estimates and, in others, IFC insists that project documentation is confidential and cannot be shared with reviewers. Further, Eco Cities was supposed to be focussed on municipal projects. Because the sought-for mandates did not materialise and existing projects in the portfolio were delayed or cancelled, IFC sought to implement transactions in other sectors. The result was that targeted impacts were not met, even if IFC's claims of GHG emission reductions are taken at face value.

The TA Energy and TA Environment projects involved capacity building and therefore links to specific GHG mitigation and energy savings/RE generation outcomes and impacts cannot be established in a numerical or specific sense.

Since the programme's Financial Agreement was signed 10 years ago in December 2010, India's economy has doubled in PPP (purchasing power parity) constant currency value terms[7]. Since 2010, there has been a steady increase in private sector driven industrial and commercial economic activities in India. India now has the 3rd largest economy in the world in PPP terms[8], up from 4th in the world since it overtook Japan in 2014[9]. Hence, there is a rapidly growing demand for electricity generation, transmission and distribution capacity in India. The heavy dependence of electricity supply upon coal fired generation is reaching limits of existing indigenous Indian coal supply, along with a growing focus on reducing air pollution levels, and on GHG emissions control to meet India's NDC Paris Agreement

[7] https://www.livemint.com/news/india/the-great-indian-growth-miracle-11595178662295.html
[8] https://en.wikipedia.org/wiki/Economy_of_India
[9] https://economictimes.indiatimes.com/news/economy/indicators/india-displaces-japan-to-become-third-largest-world-economy-in-terms-of-ppp-world-bank/articleshow/34392694.cms?from=mdr

UNFCCC commitments. There is therefore a very strong focus on both increasing RE supply and managing demand through energy efficiency (EE).

India had a total of 369 GW of generation capacity as of January 2020, of which 86 GW was from renewables. India has very ambitious RE targets of 175 GW of RE by 2022[10], and 450 GW of RE by 2030[11].

The ECO Cities and TA Environment projects were intended to improve sanitation and municipal services, which were generally in a poor state owing to lack of both investment, and operational and maintenance funding. The value of any sanitation or municipal services RE based generation, or the value of any avoided disposal fees were well known to be insufficient on their own to fix this widespread problem. However, sanitation and municipal services were not of a sufficiently high Union or state government priority that the necessary tangible extra implementation funding was likely to be provided.

Another issue was that in 2010 the international price of oil was USD150/barrel (bbl) and was expected to stay at high levels for the foreseeable future. But then in 2014 the price of oil dropped to USD40/bbl, primarily from the rapid development of shale oil by fracking in the USA. This unexpected and dramatic drop in the price of oil meant that any electricity supply from RE to displace diesel generator supplied electricity dropped in value, which was relevant to any replication of the solar concentrator + biomass SCOPE BIG concept. In addition, the cost of new solar PV and onshore wind capacity dropped dramatically, thereby reducing the competitiveness of RE alternatives such as offshore wind from the FOWIND project's or the TA Environment project's proposed sewage or municipal solid waste climate change mitigation and RE projects.

India has a complex political system, where Union/Central level policies, objectives and plans generally need to be accompanied by significant Union level funding to lead to actual projects on the ground at the state and municipality level.

India has a vibrant, technically capable, financially capable, and highly competitive private sector that can identify, plan, design, finance, implement, construct and maintain RE and EE projects using Indian manufactured equipment when suitable policy, regulatory and financial conditions are in place. The public sector can propose, plan and subsidise to create conducive conditions for private sector investment, but the private sector now delivers the actual working RE and EE projects in India.

There was also a major change from the 2014 general election when the current BJP-led Union government took over from the previous Congress-led Union government. The new BJP-led Union government had a stronger private sector orientation, a stronger focus on large scale RE deployment, and less focus on small scale and proof-of-concept RE demonstration projects that may not lead to mass replication or significant impacts[12].

[10] https://sustainabledevelopment.un.org/partnership/?p=34566
[11] https://economictimes.indiatimes.com/industry/energy/power/clean-energy-capacity-india-to-have-60-renewable-energy-by-2030-says-power-minister/articleshow/77092644.cms?from=mdr
[12] As per interview with DNV GL.

1.3 Evaluation Methodology

This evaluation is based on the 5 standard evaluation criteria introduced by the Development Assistance Committee (DAC) of the Organisation for Economic Cooperation and Development (OECD) – see below with their relevant agreed (as per the approved Inception Report) evaluation questions:

1. Relevance – 1.1 Alignment with India's Priorities, 1.2 Alignment with India's Priorities and 1.3 Private Sector Implementation Focus
2. Effectiveness – 2.1 Achievement of Planned Results and 2.2 Adaptive Management for Results
3. Efficiency – 3.1 Turning Inputs into Outputs, and 3.2 Addressing Delays, Extensions, Terminations
4. Impacts – 4. Tangible Outputs/Results
5. Sustainability – 5.1 Likely Post-Programme Results, and 5.2 Project Exit/Continuation Strategies

These are supplemented by 2 further specific EU evaluation criteria:

6. EU Added Value – 6. EU versus EU Member State or Private Sector's Added Value
7. Coherence with EU Strategy – 7. EU Alignment?

For each of these evaluation criteria, as stipulated in this Impact Evaluation's ToR, evaluation questions (EGs) were formulated, totalling 12 EQs (See Annex 1 for a more detailed elaboration of the EQs and their judgement indicators),

Each project was evaluated for each EQ on a 5 point scale where: (5) Excellent ; (4) Very Good ; (3) Adequate ; (2) Poor, and 1 Very Poor.

1.3.1 Data Gaps and Evaluation Hypotheses

The hypotheses to be tested for the overall programme and its five distinct projects were:

- The focus on capacity building and on policy development and elaboration through administrative guidelines
- The failure to address well-known bottlenecks to RE adoption and EE/GHG mitigation such as distribution company (DISCO) solvency and "circular debt"
- The individual RE generation projects did not reflect the priorities of the National Electricity Plan (NEP). SCOPE BIG and the solar PV projects under Eco Cities were too small to register in the NEP. A possible exception is the 275MW solar PV project supported under the Eco Cities project.
- The lack of focus on post-programme/project sustainability with the exception of FOWIND and the rooftop solar PV activities in the Eco Cities project.
- The absence of connection between the envisaged outputs and the desired outcomes and impacts, as well as a confusion between inputs and outputs in some of the projects (as detailed in the ROM report of May 2017 covering all five projects)
- The lack of focus on tangible projects, for example, FOWIND produced generic feasibility studies instead of site-specific documentation for a suitable utility scale (e.g., 1 GW) offshore wind development.
- Some projects described as PPPs are not really PPPs - such as the Bengaluru e-waste project under the Eco Cities project, and SCOPE BIG[13]. SCOPE BIG used novel technology combinations and

[13] See 2nd para, Section 1.7, Annex 1 of SCOPE BIG EU-CSTEP Contract of 27 September 2013 where the project is described as a PPP

applications and as such increased the technical and commercial risk for any private partner, making the project less attractive to private investors, if it had indeed been a real PPP project. Private investors want simple de-risked projects, not first-of-a-kind small 3 MW RE projects integrating three separate RE technologies.

- That it is arguable that the Bengaluru Street Lighting PPP project was really novel, an internet search shows that a similar street lighting infrastructure PPP was closed by IFC in October 2013 with funding support from Devco. So, the EU funding of the Bengaluru Street Lighting PPP project under the Eco Cities project appears to have been essentially to subsidise the cost of the PPP transaction advisory services for a follow-on IFC project of the same nature.

1.4 Field Visit/Interviews Approach and Limitations

Due to international travel restrictions imposed as a result of the global Covid-19 pandemic, international consultants (Frank Pool from New Zealand and Joseph Mik from Germany) were unable to travel to India. In addition, the two Indian consultants (Mr Dinesh Aggarwal based in Noida near Delhi and Dr Balasankari Palghat Krishnan (Bala) based in Chennai) were unable to meet stakeholders in person, let alone visit project sites elsewhere in India. The field stage was therefore conducted remotely by video conference call or by telephone. The EUD provided emails of introduction for the evaluation team. Suspending the evaluation for a few months was judged to have been unlikely to have led to a more favourable environment in which to conduct the field phase. The evaluation team believes that a suitable impact evaluation has instead been prepared with virtual meetings (see Annex 4) and with the extensive documentation (see Annex 5) obtained from the EUD, project partners, contractors and implementation teams, and from public sources.

2 Findings

2.1 Relevance

2.1.1 Alignment with India's Priorities

The Programme's specific objectives were:

1. to provide support to the implementation of India's national policies and programmes that promote the development of new and RE sources and related economic and employment activities, in particular for solar generation.

2. to support the government's efforts, at the central and local levels, in promoting energy efficiency and green energy sources, technologies and solutions in India and its effective take-up by public and private sectors.

The EU-India project should be seen within the broader context of ongoing energy sector reform in India, the need for significant reform was well known, when the Financial Agreement for the EU-India

programme was developed[14]. The EU-India programme could have helped transfer knowledge of how various EU countries met such energy sector reform challenges, but this does not appear to have been done; rather Indian authorities, particularly the regulator CERC seems to have used its own initiative to inform itself of lessons learned from the EU experience with unbundling, independent regulators, integration of variable supply in the grid.

India is a federation of states, and the constitution divides responsibility for the power sector between the Union (national) government and the States (sub-sovereign/provincial governments). As with other federal countries, in India, Union policies generally need to be accompanied by significant Union level funding to lead to actual implementation at the State and municipality levels.

During Prime Minister Modi's first term (2014-19), the focus was on electrification, that is, upon expanding access so that approximately 400 million Indians could be connected to the distribution network. The principal target was to deploy 175 GW of new RE capacity (mainly from solar and wind) by 2022. A secondary target of reform was the cash-strapped state-owned distribution companies (DISCOs). The DISCOs customers are the sole source of cash entering into the power system, so it made eminent commercial sense for the government to focus its attention there first. Until this problem is solved, it is difficult to see how any new generation capacity would be financially "sustainable": Generation Companies (GENCOs) - whether renewable or conventional - need to get paid for the energy they inject into the grid. In addition, DISCOs will prioritize lower-cost, baseload plants with whom they have existing PPAs (in Indian context, usually coal-fired) over new PPAs with higher-cost, variable suppliers (solar, wind) or buying such variable RE via Indian Energy Exchange (IEX).

During Mr. Modi's second term (2019-present), the focus has shifted to structural change, namely, improving market design. A 100-day action plan created a "power sector council" to improve coordination between the union and state governments with respect to the long standing and well known issues of tariff-setting, technical and commercial losses, and RE purchase obligations (feed-in tariff).

India had a total of 369 GW of generation capacity as of January 2020, of which 86 GW was from renewables. India has very ambitious RE targets of 175 GW of RE by 2022[15], and 450 GW of RE by 2030[16].

There are several motives for the adoption of renewables and energy efficiency measures. The first is the very poor air quality in much of India. The second is the need to reduce GHG emissions to meet India's NDC Paris Agreement UNFCCC commitments. The third is a desire to reduce fuel imports, which weigh heavily on India's balance of payments. Renewables supplement conventional generation from domestic coal, but they are not expected to displace it within the foreseeable future. Indeed, the bulk of new investment in generation, as documented in the NEP, is for new super-critical coal-fired power plants. Indeed, the volatility of oil prices and falling feed-in tariffs for new solar PV and wind projects has weakened the financial case for renewables, impacting the SCOPE BIG and FOWIND pilot projects and the expected later large scale replications.

To have been fully relevant, the EU-India project would also have needed to address one or several of the following long-standing overarching structural challenges facing the Indian power sector:

[14] https://www.worldbank.org/en/news/feature/2010/04/19/india-power-sector
[15] https://sustainabledevelopment.un.org/partnership/?p=34566
[16] https://economictimes.indiatimes.com/industry/energy/power/clean-energy-capacity-india-to-have-60-renewable-energy-by-2030-says-power-minister/articleshow/77092644.cms?from=mdr

- Inefficient market design. 25-year bilateral power purchase agreements (PPAs) between GENCOs and DISCOs account for approx. 87% of wholesale power trading. The IEX handles less than 1% of transactions. The lack of transparency on pricing means that DISCOs may be over-paying GENCOs and passing excess costs on to consumers. In addition, long-dated PPAs favour mostly coal-fired incumbents at the expense of new, RE-based market entrants. In recent years, the wholesale market has been over-supplied with generation capacity, making it especially difficult for new RE projects to "break in." This is the type of regulatory challenge which EU technical assistance could have addressed. Instead, the central electricity regulatory authority (CERC) (Indian electricity sector regulator) working paper indicates it is dealing with the issue of market design on its own.

- Curtailment. There are also inefficiencies in dispatch, which hamper the adoption of renewables. In 2017, PGCI transferred the national five regional dispatch centres to a newly formed entity, Power System Operation Corporation (POSOCO). To meet the majority of their daily power needs, DISCOs "self-schedule" generation from the portfolio of GENCOs with whom they have signed PPAs. Variable generation sources like renewables are often curtailed due to congestion on the transmission network (excess demand) or low loads or unstable voltage (insufficient demand). RE curtailment has been as high as 50% in states such as Tamil Nadu (where one of the FOWIND projects was planned) in the past, and other states' utilities also struggle to manage the variability of RE and their energy demand. The problem will only be compounded in the coming years as the government believes it has the capacity to integrate a total of 500 GW of RE into the country's grid by 2030. The FOWIND Tamil Nadu feasibility study report mentions this issue in passing but does not propose any solution either to the underlying problem nor propose any way to bypass the problem's impact on the project.

- Circular debt. DISCOs owe nearly €5 billion to GENCOs. This long standing build-up in receivables impairs the ability of GENCOs to pay their fuel suppliers and financiers, such as the lenders and equity investors. There are approximately 66 GW of distressed GENCOs, equivalent to €40 billion in assets. These stressed assets burden the balance sheets of banks and investors, raising the cost of capital for new projects. EU financing could have "filled the gap" for new RE projects when banks or investors are over-leveraged.

The regulator, CERC, proposed creating a national, day-ahead market. This would help least-cost GENCOs to sell their power across state lines to DISCOs who could source unmet power needs from outside their existing PPAs. In theory, this ought to lower costs for end-users provided grid congestion can be reduced. A collateral, technical benefit would be to incentivize improvements in schedule and forecasting. Other reforms such as tariff rationalization are required to rectify distortions hampering the growth of the sector.

The case for donor intervention at the project-level is weak. India has a technically capable and highly competitive private sector that can identify, plan, design, finance, implement, build and operate RE and EE projects when suitable policy, regulatory and financial conditions are in place.

2.1.1.1 SCOPE BIG

India produces large amounts of agricultural biomass wastes which are still largely burned in the fields in some part of India for disposal and to recycling of minerals to enable the next crop. Not only are the agricultural wastes a large unutilised RE source, but the open burning of agricultural wastes in the fields also produces massive smoke and particulate pollution. Agricultural wastes are already used for self and export power generation and self-heat use, in particular using sugar cane bagasse in combined heat and power (CHP) cogeneration steam plants for sugar cane processing, rice husks in gasifier power

generation for rice husking mills, multiple-source agricultural wastes in industrial cogeneration thermal plants, and in the emerging use of cofiring of agricultural wastes in thermal (coal) fired steam power plants. However, the availability of agricultural wastes is very locational and seasonally focussed, so identifying and mobilising suitable biomass supply chains is critical in any biomass to energy developments. However, high quality and suitably concentrated agricultural wastes such as rice husks (as proposed to be the core biomass fuel in the SCOPE BIG project) are not a free energy source. Rice husks already have a significant established value for furnace and brickmaking fuel, generating process steam for industries, as a source of ash for industries, and as a fuel for rice husking plant gasifiers fuelling modified diesel engines. Hence there would be a significant ongoing cost for the reliable supply of biomass to the solar thermal+biomass plant in SCOPE BIG.

Before of the SCOPE BIG project started, India already had a world leading deployment of concentrating solar heat (CSH) technologies deployed in low-medium temperature industrial process heat applications[17], using indigenous Indian low cost solar thermal technologies. An off-grid 250 kWe Concentrating Solar Power (CSP) + Biomass combustion power generation plant implemented under a PPP model by Thermax (a large established Indian solar, biomass, power and thermal energy company) with funding by DST (the Union Department of Science and Technology) had been commissioned in December 2011 at Shive village near Pune. The Shive village solar thermal plant produced heat at 200°C[18] from Thermax's own established low-cost design of single axis tracking mirrored aluminium parabolic trough solar concentrators using glass insulated steel solar receiver tubes developed for low cost Concentrating Solar Heat[19] (CSH) applications. The Shive village concentrating solar power plant also apparently used thermal storage, and a backup biomass boiler. It was known[20] at the start of the SCOPE BIG project that using glass mirror linear Fresnel solar concentrators would cost around twice per MWth[21] compared to the mirror aluminium Thermax solar thermal parabolic trough technology.

In addition, also prior to the SCOPE BIG project, a UNDP-MNRE/GEF Biomass Power Project had identified the potential for 1-12 MWe hybrid CSH and biomass combustion steam power generating systems[22]. The proposed solar biomass hybrid power plants identified in 2014 in the UNDP-MNRE/GEF project (by Steag Energy Systems India Ltd) were based on Linear Fresnel elastically curved (curved mirrors are needed for small solar systems) glass coated steel backed mirrors (that were claimed to be readily available on the market but were probably not actually available at an affordable cost in India) using steel tubes to produce steam at 253℃ (for a solar thermal capacity of 10%) and for a biomass boiler to then raise this solar steam to 420℃ and 45 bar steam for the steam turbine. At a 70/30 debt-to-equity ratio, a 1 MW power output hybrid solar thermal plant was estimated to have a levelised cost of generation of Rs 4.32/kWh (€6 cents/kWh), and hence to be primarily relevant to local (unelectrified) village grids (assuming that suitable subsidies were available, or that there was a suitable local willingness to pay an unavoidably high generation plus local distribution cost tariff). Note that this proposed UNDP-GEF project tariff appears to be very optimistic, as large Linear Fresnel power

[17] See the UNDP-GEF Market Development and Promotion of Solar Concentrator-based Process Heat Applications in India (India CSH Project) approved in December 2011. Also, the new UNDP-GEF SHIP project, see https://www.solar-payback.com/wp-content/uploads/2020/06/SHIP-india-26-06-20.pdf. In 2011 India was, and still is, a major player internationally in the deployment of concentrating solar heat for mainly industrial low-medium temperature process heat applications.

[18] https://assets.publishing.service.gov.uk/media/57a08a15e5274a31e00003f8/Small_scale_concentrated_solar_power.pdf
[19] https://www.undp.org/content/dam/india/docs/market_development_and_promotion_of_solar_concentrators_based_project_document.pdf
[20] http://www.unipune.ac.in/snc/school_of_energy_studies/es_webfiles/pdf/conference_summary/it/Kiran_Deshpande.pdf
[21] As was found later when the SCOPE BIG project re-tendered for the use of the MNRE specified high temperature solar thermal alternatives to the use of the Thermax medium temperature parabolic trough solar thermal technology.
[22] https://www.undp.org/content/dam/india/docs/EnE/BioPower-Apr-Jun-14.pdf

plants (like the 125 MW Dhursar plant built in 2014 in Rajasthan) were estimated to need PPA tariffs of between 13 and 20 c€/kWh to be financially viable[23]. It was therefore already well known at the start of the SCOPE BIG project that affordable CSP plants using indigenous Indian solar thermal linear concentrators would produce steam of (at best) 253℃ with a solar thermal capacity of (at best) 10%.

Hence, solar thermal hybrid power plants had already been successfully demonstrated in India at the commencement of the SCOPE BIG project and were already known to be mainly applicable for off-grid village applications and not in the grid connected mode envisaged in SCOPE BIG - unless they could access much higher tariffs than were needed for solar PV or onshore wind RE options. For on-grid applications as envisaged in SCOPE BIG and its replications, ongoing high preferential tariffs would be required to attract the necessary large scale replication projects without significant ongoing grant support.

It is not clear why a more complex (and hence more expensive) solar+gasifier+2 boilers arrangement was initially envisaged in SCOPE BIG instead of the simpler concentrating solar+biomass boiler design envisaged in the UNDP project operating at the same time.

It was very clear in the SCOPE BIG project design that the chosen technology provider's (Thermax) proposed solar thermal indigenous technology used low cost mirror coated aluminium solar reflectors - which would be more cost effective per unit of useful solar heat provided[24] - but would require a large solar field area[25] and would produce medium temperature steam – rather than if more expensive elastically curved glass backed steel mirrors were used to produce high temperature steam as MNRE later insisted on.

The specification that the solar part of the project provides 50% of the energy of a 24/7 operation power plant was highly questionable at the initial design stage - with the solar field only providing 212° C steam at 20 bar to be superheated by a biomass gasifier to 350 ℃ and 18 bar for intermediate injection into a 450℃ and 45 bar steam (provided by two separate biomass fired steam boilers) steam turbine.

The relevance of the solar thermal hybrid demonstration project was therefore highly questionable on multiple grounds at the project's inception.

Rating 2 out of 5

2.1.1.2 FOWIND

Given the very ambitious RE targets in place for India, solar power and onshore wind will almost certainly run into constraints of land availability by 2030, even if rooftop solar continues to be strongly supported.

[23] http://www.stelaworld.org/linear-fresnel-reflectors/

[24] The HMBD (Heat and Mass Balance Diagram) and technical specifications in the EU-CSTEP consortium agreement and all project literature to DPR finalisation in January 2016 clearly showed the solar boiler producing medium temperature 212 C and 20 bar steam using steel tubes and not using the high temperature mirror glass high temperature solar collectors and vacuum tubes using thermal oil as later demanded by MNRE.

[25] It was stated in the SCOPE BIG contract between the consortium and the EU that CSP plants require around 7.5 acres of land per (peak) MWe, more if a 24/7 50% solar contribution was required as per the overall initial project parameters. Hence it was known that more than 22.5 acres of land would be needed for a 24/7 operation 3 MWe solar-thermal plant with a 50% solar thermal contribution. The original land area specification was for 10 acres for the solar field in the EU-CSTEP led consortium agreement of September 2013. This was not compatible with a 24/7 50% solar contribution for a 3 MWe solar-biomass power plant.

India has a coastline of 7,516 km, and has significant offshore ocean shallow water areas of less than 30m depth available close to the coast.

Offshore wind is now a mature technology in Europe, and is now expanding rapidly in Asia and the United States (US)[26]. Offshore wind tariffs are rapidly reducing at good wind resource sites where the extra cost of offshore platforms for turbines and their erection, maintenance and for evacuating the power are compensated by larger wind turbine sizes and by higher wind speeds at higher turbine hub heights.

At the start of the FOWIND project in 2014, there was no policy for offshore wind, there were no port and logistics studies, the grid integration issues had not been studied, the two most promising offshore wind sites had been identified in principle in Gujarat and Tamil Nadu but had not been investigated in detail, and no actual monitored offshore wind speed data was available. To 2014, the GoI, had been prioritising other lower cost RE electricity generation options, initially onshore wind, and then solar PV. However, onshore wind started to reach some limits, hence the interest in offshore wind.

By the end of the FOWIND project in 2018, specific promising offshore wind power sites had been investigated in detail in Gujarat and Tamil Nadu, suitable local ports to support the potential offshore wind power sites had been identified and investigated, static grid integration studies had been completed, and 18 months of specific wind speed data was being provided by the FOWIND project provided LiDAR installation in the most promising location in the Gulf of Khambhat off the coast in Gujarat. Offshore wind is now ready to go ahead in India with the first 1 GW full scale project when the Government of India is able to provide the necessary around E €1 billion of Viability Gap Funding (VFG) or similar financial support.

Hence, as above, the FOWIND project was highly relevant to India at its inception.

Rating 5 out of 5

2.1.1.3 TA Environment

The TA Environment component of the overall program was designed to carry out interventions targeted at increasing the uptake of cleaner technologies in the management of solid waste and wastewater/sewage. As per the project design, the activities and actions were targeted at capacity building and knowledge enhancement of the government officials by way of workshops, seminars and a study tour.

In 2008 the government of India announced the “National Action Plan on Climate Change”, outlining existing and future policies and programs addressing climate change mitigation and adaptation. The National Plan identified eight core "national missions", to address the global issue of climate change. One of these eight missions was the ‘National Mission for Sustainable Habitat’. The objective was to mitigate GHG emissions through various measures including, through adoption of EE and RE measures in municipal services, and reductions in methane emissions due to the proper management of municipal solid waste and wastewater. The ‘National Mission for Sustainable Habitat, apart from promoting EE in municipal services was to address the issues relating to the ‘Management of Solid Waste” and the ‘Management of Water (including management of sewage/wastewater)’.

The solid waste management (SWM) systems and technologies used in Indian cities/towns were inefficient and outdated, and lacked public participation. The collection, transportation and disposal

[26] GWEC Global Offshore Wind Report 2020

of solid waste is unhygienic. The methods used led to avoidable emissions of GHG (Methane and CO_2). The leachate from dumpsites contaminates the groundwater, further impacting the already depleted water resources. The majority of towns and cities have no formal sewerage and sewage treatment services and in many smaller towns sewage either directly gets dumped into water bodies/streams or in the open. In the absence of treatment, sewage is flushed into water bodies/streams or spread across open fields, contaminating ground water and surface water resources. This in turn produces insanitary conditions for the local populations which produced the waste. Wastewater bodies lead to the emission of GHG (largely methane) to the atmosphere due to the decay of organic matter under anaerobic conditions.

In India, management of municipal solid waste and wastewater is the responsibility of the Urban Local Bodies (ULBs). More often than not the financial position of the ULBs is poor. They depend on state government and the central government support. The ULBs find it difficult to manage even the revenue expenditure for operations of the waste management services, let alone provide the necessary capital expenditure for creation/upgradation of waste treatment facilities. At the time of the Financial Agreement's signature, the management of solid waste and the management of sewage was one of the priorities of the GoI. At that time the union government had been regularly providing funding to the ULBs, specifically for the management of the waste under the 'Jawaharlal Nehru National Urban Renewal Mission (JNNURM)' which was launched in the year 2005. JNNURM was a city-modernisation scheme with the envisaged total investment of over EUR18 billion over seven years. The programme was targeted to improve the quality of life and infrastructure in the cities. The tenure of the program was extended by two years. JNNURM aimed at upgrading the social and economic infrastructure in cities, and the provision of basic services to the urban poor. JNNURM had two sub-missions in its program. The first Sub-Mission for Urban Infrastructure and Governance was focused on water supply and sanitation, solid waste management, road networks, urban transport and redevelopment of old city areas. The second Sub-Mission was for Basic Services to the Urban Poor and was administered by the Ministry of Housing and Urban Poverty Alleviation (MOHUA), with a focus on integrated development of slums. Apart from the two sub-missions, JNNURM had two further components. The Sub-Mission for Urban Infrastructure Development Scheme for Small & Medium Towns (UIDSSMT) administered by the Ministry, with a focus on subsuming the schemes of Integrated Development of Small and Medium Towns and Accelerated Urban Water Supply Programme (AUWSP) which aimed at planned urban infrastructural improvement in towns and cities. The funds were channelled through state-level agencies, where grants from the central and state governments were pooled and passed on as grants or soft loans to cities provided that they had prepared development strategies and that the investments identified fitted within these strategies. The program supported PPP and cost recovery to make service providers financially self-sustaining. The share of grant funding by the central government varied from 35% in the largest cities to up to 90% in cities in the Northeast. Most cities received grants covering 50% or 80% of costs depending on size.

Presently, the union government is supporting the creation of waste management infrastructure under its 'Swatchh Bharat Mission – Urban (SBM-U)' program. The scheme is being administered by MOHUA. The program is for the management of solid waste and the wastewater. The government is also supporting management of waste under its 'Smart City' project.

The programme and project objectives as were set under the FA were aligned with the development priorities of the government. Further, there was no change in the situation during implementation of the project.

Based on the above assessment, from the viewpoint of the priorities of the GoI the TA Environment Project is considered as highly relevant during the inception and during the implementation of the project.

Rating 5 out of 5

2.1.1.4 TA Clean Energy

The India National Action Plan on Climate Change (NAPCC) was launched in 2008 with 8 national missions. The EU TA program was developed to contribute to the two out of the eight national missions, namely the National Mission for Enhanced Energy Efficiency (NMEEE) and the National Mission on Sustainable Habitat (NMSH).

The main objective of the project was to encourage adoption of RE and energy efficiency (EE) technologies by the exchange of best practices and the implementation and enforcement of existing regulations/policies through seminars, training, studies and awareness raising[27].

The project was expected to: (i) enhance technical and institutional capacity to create an enabling environment promoting RE framework; (ii) enhance human capacity through transfer of skills and technical know-how of use and development of clean technologies in local context; and (iii) increase awareness among public and private actors[28].

To carry out the above tasks, *IDOM Consulting, Engineering, Architecture SA* (IDOM) was contracted in 2014 by the EU. In consultation with the Ministry of New and Renewable Energy (MNRE), the Bureau of Energy Efficiency (BEE) started their work in establishing an Energy Conservation Building Code (ECBC) cell in the prescribed Indian States (i.e., in Bihar, Odisha, Maharashtra and Madhya Pradesh) to curb energy consumption in buildings. The objective of the ECBC cells was to facilitate legal and policy support to the development and implementation of energy efficiency legislation for the building sector. The TA Energy project provided support in these four states via enabling activities comprising workshops, meetings and missions. However, no major activities on ECBC were carried out beyond these enabling activities. The Energy and Resources Institute (TERI), a major Indian energy sector NGO and which is a partner of the ECBC program, has stated that the ECBC component under the EU TA Energy project has created a positive impact in the above mentioned four States[29]. The necessity for similar ECBC cells has been realised and is being initiated in the other states with the help of their nodal agencies, though this is happening at a slower pace than in the states supported under the EU TA Energy project.

The Rooftop Solar (RTS) implementation assistance under the TA Energy project started as an integral component of the ECBC work. However, the focus of MNRE shifted to RTS due to the major uptake underway in the Indian RTS solar market. Also, the GoI has targeted to reach 100 GW of solar capacity by 2022. Thus, little activity has been carried out on ECBC by the project after that.

The Grid-connected Rooftop (GCRT) Programme is one of the most ambitious programmes launched by the GoI with a target of deploying 40 GW of roof top solar (RTS) in the country by 2022. The programme (Phase -I) was initiated by MNRE in 2015 with a target of 4.4 GW of RTS plants by 2019–20. However, based on the learnings from the Phase-I and to accelerate the RTS implementation, MNRE launched Phase-II of the GCRT Programme with a target of 38 GW by making the DISCOs (Distribution Companies) as the principal drivers for the RTS implementation[30].

[27] As per the Technical offer, Technical cooperation for energy and environment in India (Lot 1), 2014
[28] As per the Technical offer, Technical cooperation for energy and environment in India (Lot 1), 2014
[29] As per the meeting with TERI on 08/09/2020
[30] EU-India technical cooperation project: Energy, completion of 6 successful years, 2020

In line with this, a RTS cell was established under MNRE with the support of IDOM to carry out the activities in implementing RTS. Since then, IDOM has carried out more activities related to solar power development in India. MNRE had initiated the creation of a database for RTS into 2014. However, it was not making much progress and thus MNRE requested IDOM to support the work on the database development in 2016. At the end of 2017, IDOM completed the database with the data for around 1 GW of RTS. They also provided training on the database's management to the MNRE[31].

Since the inception of the RTS cell, RTS solar power development has accelerated. In consultation with MNRE, IDOM has supported the development of a Single Window Clearance (SWC) Portal for solar roof top applications in various states of India. Later, the SWC portals were integrated with MNRE's SPIN portal[32], an online application to manage and monitor the installation of solar rooftop systems. The National Informatics Centre (NIC) of MNRE is providing the information technology (IT) infrastructure support to the development of SWC and its integration with the SPIN portal[33].

The SPIN portal has facilitated the administration and increased the RTS businesses sales owing to the increased level of confidence and transparency[34]. Efficiency and transparency have been assured. Around 33 DISCOs in 15 states have been integrated with the SPIN portal so far[35].

In parallel, IDOM designed the logo of the International Solar Alliance (ISA), which was launched by the GoI at COP 21 (2015). The EU is a key strategic partner for the development of the ISA. Though IDOM did not directly support the development of solar parks under ISA, IDOM provided capacity building to the related officials. The Investors' Guidebook and the Financial Model for solar parks were prepared as part of the project which intended to provide a comprehensive guide towards the solar parks programme in India for potential investors and for other interested stakeholders[36].

IDOM also supported the development of Atal Rooftop solar User Navigator (ARUN), an Android mobile application which provides detailed information about the RTS schemes, basics about solar rooftop applications, the methods of installation, etc[37][38]. A solar PV design and simulation software was also developed for a selective group to enhance the knowledge on solar PV design and related activities.

Through the project, a study tour to Europe was conducted in 2016. 12 out of 14 participants were from various Indian organizations, and one from IDOM and one from EUD India[39]. The aim of the mission was to highlight the European solar technology aspects and provide knowledge transfer to India.

Following a request from MNRE, IDOM also provided support to the Waste to Energy (WTE) development in India. Since agricultural straw/biomass wastes are often burnt in the open, the impact on air quality and resulting pollution is a major problem in some parts of India including the Punjab, New Delhi, nearby states, etc. Thus, IDOM suggested the use of waste agricultural biomass in power plants to the EU. However, EU policy does not allow biomass burning in power plants. Considering the difference in the concepts/regulations between Europe and India, and by understanding the situation in India, the EUD has come forward to assist the biomass co-firing in Indian power plants. IDOM expects

[31] As per the meeting with IDOM, 17/08/2020
[32] https://solarrooftop.gov.in/
[33] As per the meeting with NIC, 21/10/2020
[34] As per the meeting with Uttar Pradesh New & Renewable Energy Development Agency, 16/10/2020
[35] As per the meeting with NIC, 21/10/2020
[36] EU-India technical cooperation project: Energy, completion of 6 successful years, 2020
[37] https://solarrooftop.gov.in/notification/Notification-01022017.pdf
[38] As per the meeting with Uttar Pradesh New & Renewable Energy Development Agency, 16/10/2020
[39] EU Mission Report, Ver. 1, 27/02/2016

that many biomass co-firing projects will materialize in India in the future[40]. In support to the development of WTE projects, a Bio-Energy Application Portal has been developed to provide service to all bio-energy project proponents to smoothly proceed through the various administrative procedures required. The service manages projects related to WTE, biomass gasifiers, and biomass cogeneration[41].

IDOM was also asked to provide training to the state electricity DISCOs on the implementation of RTS. Thus, IDOM has conducted a number of 2-day trainings for various DISCOs. More than 2,500 officials from DISCOs have benefited through the training and this also helps them towards achieving their targets[42].

All these activities are highly focused on the development of technical, institutional and human capacity in solar technology which aligns and contributes to the national missions of India. Thus, the TA Energy project is highly relevant to achieve the RE targets of GoI.

Rating 5 out of 5

2.1.1.5 Eco-Cities

Eco-Cities consisted of three sub-projects – PPPs, Green Buildings and SME Energy Efficiency – which are sufficiently different from each other that they will be evaluated separately.

The PPPs consist of several, unrelated municipal projects for which a public body has contracted with and paid for IFC's services as a transaction advisor. A PPP is a fixed-term contract pursuant to which a private sector investor may, depending on the project requirements, design, build, equip, finance, operate and maintain public infrastructure in return for revenues, which may be collected from end-users and/or from the public grantor.[43] IFC served as a transaction advisor to State and municipal governments. These governments generally depend upon specialist financial expertise, which IFC has, to prepare projects for market. Activities led by IFC would include, amongst others, identifying suitable projects, preparing feasibility studies, financial structuring, promoting projects to potential investors, and evaluating bids received from those investors. In addition to the costs incurred by IFC personnel, principally overheads and travel, IFC subcontracts some of this work to technical and legal experts, who are paid fees out of the EUD trust fund monies. Each PPP necessitates a year or more of full-time preparatory effort.

Overall, the PPP program is relevant even if some individual projects in the IFC portfolio are less-than-relevant or not relevant.

Table 2 : The Eco Cities PPP Projects' Relevance

Project name	Description	Relevance
Bhubaneswar e-waste management	To establish a citywide e-waste management system in the capital city of the State of Odisha. IFC reports that, from 2017 to 2018, a total of 11,227 kgs of e-waste was	Not relevant. This project may comply with the EUD Trust Fund Agreement with IFC which has a broader mandate to promote resource conservation – but it does

[40] As per the meeting with IDOM, 17/08/2020
[41] EU-India technical cooperation project: Energy, completion of 6 successful years, 2020
[42] As per the meeting with IDOM, 17/08/2020
[43] According to the PPIAF database, over five hundred such projects have been implemented in India's energy sector since 1996 (https://ppi.worldbank.org/en/customquery).

Project name	Description	Relevance
	collected from schools and bulk consumers.	not comply with EU-India Programme, which only includes EE, RE and climate change mitigation.
Chennai Waste-to-Energy PPP	Remediation of two existing municipal dumps and construction of a waste-to-energy plant. IFC completed its feasibility work but the Tamil Nadu Investment Board put the project on hold while it examined alternative options.	Low relevance. WTE is notoriously a complex and costly form of energy generation.[44] Normally, such projects are pursued only in cash-rich, land-constrained countries such as Singapore and Japan. Output of WTE plants is typically low (the capacity was not disclosed) and thus, from the outset, it should have been apparent that the project would not have a great impact on the overall energy mix.
Odisha grid connected rooftop solar replication PPP and Odisha solar park PPP	(a) Odisha grid connected rooftop solar PPP has been delayed by the change in the commercial model from net to gross metering. (b) Odisha solar park PPP – This is a utility-scale project, which has been reduced from 1,000 MW across 7x sites to 275 MW on 2x sites. The project is on hold due to delays in transferring land from one state-owned entity to another.	Highly relevant. Odisha solar park PPP is the only project of sufficient size to enable the Eco Cities project to meet its scale (MW) and investment mobilization ($) targets under the Eco Cities EUD Trust Fund Agreement.
Pune grid connected rooftop solar replication	IFC is advising Maharashtra Energy Development Agency (MEDA) for grid connected rooftop solar PV in eight cities. Over 1,000 government buildings will be connected, with a generation capacity of 51.5 MW. MEDA will initiate bidding of the first 8-10 MW capacity RTS projects based on the findings.	Highly relevant. The project contributes to renewable energy generation.
Bhubaneswar proliferation of grid connected rooftop solar (OREDA)	IFC built a web-based IT platform and mobile app, which guides homeowners through the installation of rooftop solar PVs. It also speeds disbursement of subsidies to homeowners. Over 1,000 vendors/channel partners were registered. The platform was integrated with SPIN, the national platform for rooftop PV projects of	Highly relevant. The project facilitates private sector investment in renewable energy generation capacity.

[44] Problems with WTE include (a) composition of waste in India, which is largely organic and therefore poorly suited for use as fuel; (b) presence of rag-pickers, giving rise to displacement issues; (c) difficulties in enforcing tipping upon collection companies; (d) the low feed-in tariff received for the energy produced.

Project name	Description	Relevance
	the Ministry of New and Renewable Energy.	
Bengaluru Street Lighting PPP	A private investor/operator replace 200,000 halogens with LEDs and install 50,000 security cameras. IFC estimates the project will reduce energy consumption by 85.5% resulting in cost-savings of $1.5m per year.	Highly relevant. The project contributes to energy conservation.
Bihar Green Affordable Housing PPP	This is a state-wide green affordable housing program. The housing is to comply with green building standards. The Urban Development & Housing Department will develop six sites of about 60 acres each in five cities. The project is on hold because the new State Secretary prefers public procurement to a PPP.	Relevant. The project contributes to energy conservation.
Electric vehicle charging stations	Municipal governments in Thane and Bhubaneshwar wish to deploy electric vehicle charging stations. In Thane, engineering drawings for infrastructure and grid connection, and an escrow payment mechanism have been delivered. Elections have delayed this project.	Highly relevant. Smog is a major problem in India's cities. In addition, the fuel import bill weighs heavily on India's trade balance.

The objective of the Eco Cities' "Catalyse Green Buildings Market" project is to promote the adoption of IFC's building EE standards, known as EDGE. This had two components: advice to governments on the introduction of technical standards and financial incentives, and second, advice to private contractors wishing to erect buildings compliant with the EDGE standards. This project is relevant but is duplicative of other rating schemes. Several competing ratings schemes are better implanted in India than EDGE: Green Rating for Integrated Habitat Assessment (GRIHA), India Green Building Council (IGBC), and Bureau of Energy Efficiency (BEE). GRIHA was developed by The Energy and Resources Institute (TERI) and the national Ministry of New and Renewable Energy (MNRE). Builders submit their designs via an online portal to experts at the GRIHA Secretariat. GRIHA's rating system consists of 34 criteria categorised in four different sections. They are (1) site selection and site planning, (2) conservation and efficient utilization of resources, (3) building operation and maintenance, and (4) innovation. In addition, the Confederation of Indian Industry (CII) formed the IGBC in 2001. IGBC has licensed the Leadership in Energy and Environmental Design (LEED) rating system developed the US Green Building Council. IGBC has also developed indigenous ratings systems for: (a) new construction, (b) core and shell, (c) green homes, (d) factory buildings, and (e) special economic zones, and (f) townships. Finally, BEE has developed the Energy Performance Index (EPI). The EPI uses the unit of kilowatt/hours per square meter per year to rate building on a one-to-five-star scale. The higher the star rating, the greater the EE.

The Eco Cities' "SME Energy Efficiency" activity is duplicative of national government and donor efforts. The Energy Conservation Act, 2001, defines an 'energy audit' as "the verification monitoring and analysis of use of energy including submission of technical report containing recommendations for

improving energy efficiency with cost-benefit analysis and an action plan to reduce energy consumption." The BEE is the national agency charged with encouraging EE throughout the economy. To that end, the BEE trained and licensed (private sector) auditors and developed a ten-step methodology for auditors to follow in conducting audits. In addition, BEE raises public awareness through the Energy Conservation Awareness Scheme in the Twelfth Five Year Plan. Therefore, before the Eco Cities project started, there was already a regulatory and human infrastructure in place. The Energy Conservation Act made energy audits compulsory for "designated consumers," such as thermal power plants, smelters, cement plants, railways and so on. Seeing an apparent gap[45] in the market for energy audits, the Eco Cities project focussed on SMEs. Collectively SMEs might have a great impact on energy demand (despite the service-orientation of the Indian economy) but improving the efficiency of individual firms would yield a minimal impact on overall energy demand. In addition, many donors were already promoting EE in India. Some of these programs have been running for fifteen (15) years. For instance, the State Bank of India and KfW have signed a €250 million agreement for energy-efficient housing. Under the programme, both builders and home buyers will be financed for developing and purchasing energy-efficient residential projects that achieve at least 25 per cent energy savings in comparison to standard reference buildings.[46] Separately, the World Bank, the Government of India and EESL have signed a €270 agreement to scale up India's energy efficiency program.[47] In addition, the World Bank lent €53 million for a programme called the Financing Energy Efficiency at Micro Small and Medium Enterprises (MSMEs) Project for India.[48]

Rating 4 out of 5

2.1.2 Linkage with SDGs et al

The Sustainable Development Goals relevant to the programme are SDG 3 ("Good Health and Well-being"), SDG 4 ("Quality Education"), SDG 6 ("Clean Water and Sanitation"), SDG 7 ("Affordable and Clean Energy"), SDG 9 ("Industry Innovation and Infrastructure"), SDG 11 ("Sustainable Cities and Communities"), and SDG 13 ("Climate Action").

2.1.2.1 SCOPE BIG

The objective of the SCOPE BIG project was to promote the enhanced uptake of distributed RE through demonstration of a 3MW combined solar thermal and biomass hybrid power plant in the State of Bihar using indigenous Indian solar thermal reflectors, boilers, gasifiers and balance of thermal plant. The SCOPE BIG project was aligned with SDG 7 ("Affordable and Clean Energy"), SDG 9 ("Industry Innovation and Infrastructure"), SDG 11 ("Sustainable Cities and Communities") as it was to supply reliable electricity to villages with an unreliable supply using low value local biomass, and SDG 13 ("Climate Action") through GHG reductions. Although the project design was highly questionable and the project was terminated in 2017, in principle the project was aligned with the SDGs.

Rating as 4 out of 5

[45] It can be argued that there was no gap in the support for EE in the SME sector. Since 2008 BEE has run an EE program for SME sector with support from the WB and other donor agencies. This program uses a SME industry cluster based approach.
[46] Business Standard, "SBI, KfW sign $277 million agreement for energy-efficient housing programme" (December 16, 2019), retrieved online. https://www.business-standard.com/article/news-ani/sbi-kfw-sign-277-million-agreement-for-energy-efficient-housing-programme-in-india-119121600948_1.html
[47] https://www.worldbank.org/en/news/press-release/2018/08/28/agreement-scale-up-indias-energy-efficiency-program
[48] https://projects.worldbank.org/en/projects-operations/project-detail/P100530?lang=en84A

2.1.2.2 FOWIND

The FOWIND project aimed to establish a platform for knowledge sharing on offshore wind technology, policy, regulation and human resource development. The project has published two technical feasibility studies, an Offshore Wind Outlook and a comprehensive grid integration report for the states of Gujarat and Tamil Nadu. Also, a LiDAR wind energy monitoring device has been installed at the Gulf of Khambhat which provides the real time offshore wind information/data. These cutting-edges and invaluable technical input helped MNRE and NIWE to roll out a call for an expression of interest for 1 GW of offshore wind capacity in the FOWIND project identified zones.

The project will contribute towards India achieving its long-term low carbon development goals through an increase in clean energy generation. Thus, the FOWIND project contributes to "SDG 7: Affordable and Clean Energy". Similarly, the development of offshore wind also supports the reduction of grid power/fossil fuel usage for generating the power and thus, the project contributes to "SDG 13: Climate change".

Rating as 4 out of 5

2.1.2.3 TA Environment

In the FA, the TA Environment part of the overall program was not explicitly linked or implicitly linked to the SDGs, as the FA predated the SDGs. However, it is apparent that the TA Environment project was aligned with SDG 3 (Good Health and Well-being), SDG 6 (Clean Water and Sanitation), SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action). In terms of gender, the project is more or less gender neutral as the issues relating to waste management, more or less equally impact all sections of society. However, considering that there is significant presence of women and children amongst the waste rag pickers, any efforts to improve the situation of solid waste management will have positive impacts on these vulnerable sections of society. The project design as provided in the FA and the 'Inception Report' for the project had not made any specific provisions to address gender issues. Similarly, for social development, there were no specific provisions in the project design. The project objectives were also in line with the India-EU Summits and Joint Declarations on cooperation.

Rating 4 out of 5

2.1.2.4 TA Clean Energy

The EU TA Energy project provides support to the development of solar power technologies, energy efficiency in buildings and waste to energy technologies. These activities support an increase in clean power generation and in the reduction of dependence on fossil fuel consumption for energy needs. Thus, the TA Energy project work contributes to "SDG 7: Affordable and Clean Energy".

Similarly, the project promotes grid connected solar rooftop projects which reduce household energy consumption in urban cities and the project increases the capacity of urban households to meet their own energy needs and also the reduction of their energy costs. The concept of ECBC as well as WTE also contribute to a cleaner environment by lowering emissions. Thus, the project would result in lower carbon emissions which contributes to the "SDG 11: Sustainable cities and communities".

The project also provided support to mitigate the open burning of waste agricultural biomass which results in severe air pollution in India. Through the introduction of co-firing technologies, biomass would be burned in power plants which generates power, reduces the fuel cost associated with the operation of power plants and reduces the harmful emissions from the open burning of the biomass.

Similarly, the RTS also reduces the use of grid power/fossil fuel usage for power and thus, the project contributes to "SDG 13: Climate change".

Though the project conceptualization was on three major technologies, the activities happened mainly in RTS.

Rating 4 out of 5

2.1.2.5 Eco-Cities

The Eco-Cities project[49] addresses development challenges through investments and consultancy in infrastructure and the financial sector – aligned with SDG 3 ("Good Health and Well-being"), SDG 4 ("Quality Education"), SDG 6 ("Clean Water and Sanitation"), SDG 7 ("Affordable and Clean Energy"), SDG 9 ("Industry Innovation and Infrastructure"), SDG 11 ("Sustainable Cities and Communities"), and SDG 13 ("Climate Action").

Table 3 : The Eco Cities Project's SDG Linkages

Project name	Description	Sustainable Development Goal
Bhubaneswar e-waste management	To establish a citywide e-waste management system in the capital city of the State of Odisha.	SDG 3 ("Good Health and Well-being"), SDG 4 ("Quality Education"), SDG 6 ("Clean Water and Sanitation"), SDG 13 ("Climate Action")
Chennai Waste-to-Energy PPP	Remediation of two existing municipal dumps and construction of a waste-to-energy plant.	SDG 6 ("Clean Water and Sanitation"), SDG 7 ("Affordable and Clean Energy"), SDG 9 ("Industry Innovation and Infrastructure"), SDG 11 ("Sustainable Cities and Communities")
Odisha grid connected rooftop solar replication PPP and Odisha solar park PPP	Solar PVs are being used to generate electricity at the retail (rooftop) scale and at the wholesale scale. Both projects are on hold.	SDG 7 ("Affordable and Clean Energy"), SDG 9 ("Industry Innovation and Infrastructure")
Pune grid connected rooftop solar replication	IFC is advising Maharashtra Energy Development Agency (MEDA) for grid connected rooftop solar PV in eight cities. Over 1,000 government buildings will be connected, with a generation capacity of 51.5 MW. MEDA will initiate bidding of the first 8-10 MW capacity RTS projects based on the findings.	SDG 7 ("Affordable and Clean Energy"), and SDG 9 ("Industry Innovation and Infrastructure")

[49] The World Bank Group – of which IFC is a member – was a contributor to the Sustainable Development Goals (SDGs).[49] IFC views its activities as in "strategic alignment" with the SDGs.[49] IFC has two overarching goals: ending extreme poverty by 2030 and boosting shared prosperity. The first, "ending extreme poverty by 2030," is aligned with SDG 1 "No poverty" and the second, "boosting shared prosperity" is aligned with SDG 10 "Reduced inequality."

Project name	Description	Sustainable Development Goal
Bhubaneswar proliferation of grid connected rooftop solar (OREDA)	A web-based IT platform and mobile app, which guides homeowners through the installation of rooftop solar PVs. It also speeds disbursement of subsidies to homeowners.	SDG 7 ("Affordable and Clean Energy"), and SDG 9 ("Industry Innovation and Infrastructure")
Bengaluru Street Lighting PPP	A private investor/operator replace 200,000 halogens with LEDs and install 50,000 security cameras.	SDG 7 ("Affordable and Clean Energy"), SDG 9 ("Industry Innovation and Infrastructure"), and SDG 11 ("Sustainable Cities and Communities")
Bihar Green Affordable Housing PPP	Green, affordable housing program, which is being developed on six sites of about 60 acres each in five cities.	SDG 7 ("Affordable and Clean Energy"), SDG 9 ("Industry Innovation and Infrastructure") and SDG 11 ("Sustainable Cities and Communities")
Electric vehicle charging stations	Municipal governments in Thane and Bhubaneshwar wish to deploy electric vehicle charging stations.	SDG 9 ("Industry Innovation and Infrastructure") and SDG 11 ("Sustainable Cities and Communities")
Catalyse Green Buildings Market	Promote the adoption of IFC's energy efficiency standards, known as EDGE. This had two components: advice to governments on the introduction of technical standards and financial incentives, and second, advice to private contractors wishing to erect buildings compliant with the EDGE standards.	SDG 9 ("Industry Innovation and Infrastructure") and SDG 11 ("Sustainable Cities and Communities")
SME Energy Efficiency	Energy audits for SMEs, with a view to identifying lending opportunities for Indian banks or IFC itself to finance upgrades in plant and equipment.	SDG 9 ("Industry Innovation and Infrastructure")

Rating 4 out of 5

2.1.3 Private Sector Implementation Focus

2.1.3.1 SCOPE BIG

The SCOPE BIG project was conceived as a government-led proof-of-concept technology demonstration project for creating a conducive policy environment, to be implemented for government bodies (MNRE at the Union level and Bihar State Government at the state level), and to provide its export electricity to a government power generation company (Bihar State Power

Generation Co Ltd). The project partnered with an India private sector company (Thermax[50]) as the designated EPC contractor.

However, when Thermax presented their DPR (Detailed Project Report), MNRE as the lead government counterpart (through CSTEP as the project coordinator) insisted that Thermax change the core project technical parameters of the project to produce a new DPR for a new power plant design using (imported) more expensive glass lined steel curved mirrors in the solar concentrators, use evacuated absorber tubes instead of steel tubes, use synthetic oil as a heat transfer fluid instead of water/steam, and operate the steam plant at 40 bar and 450°C instead of 18 bar and 365°C as proposed by Thermax[51]. Thermax demurred, presumably on the basis that the MNRE changes sought could not be achieved within the available budget and that the concentrating solar system changes sought were a major change from the original project concept as detailed in the foundational EU-CSTEP led consortium project contract. Thermax were subsequently proven correct when the only technically compliant bidder in a subsequent open tender with the new MNRE specifications was found to require more than double the available budget.

Therefore, the private sector EPC developer involved (Thermax) was ignored, there was no established preferential tariff in place for any subsequent replications of the system that was being demonstrated, the original plant concept was a complex mix of four different thermal sources of (1) solar thermal, (2) biomass gasifier for superheating the steam from the solar concentrators, and (3) two biomass boilers. In addition, the 3 MWe output would have been too small for the Bihar State Power Generation Co Ltd to be really interested in subsequent replications of that scale compared to its own 3000 MW of generating capacity.

Hence the SCOPE BIG project did not have the private sector focus required for the demonstration plant to be relevant, nor for any realistic subsequent large scale private sector led replication even if it had been successfully implemented.

Rating 2 out of 5

2.1.3.2 FOWIND

From its final grant application of September 2013 to the end of its implementation in March 2018, all the FOWIND project documentation envisaged that offshore wind developments in India would be implemented by the private sector with some form of preferential tariff or Viability Gap Funding (VGF) or similar government financial support mechanism.

The lead consortium partner, GWEC, was a membership-based and strongly private sector implementation oriented offshore wind organisation, and not a public good oriented NGO or governmental oriented body. The FOWIND project also had strong and active industry partners in Garrad Hassan India Private Limited as part of the DNV GL Group (later relabelled just as DNV GL) which

[50] Thermax was a well-established solar thermal technology provider of low cost medium temperature mirrored aluminium concentrating solar panels, along with being a provider of biomass boilers and associated thermal power plants ranging from small to medium outputs.

[51] The Thermax DPR's HMBD showed the use of simplified steam systems with a biomass boiler operating al lower temperature and pressure than originally envisaged, and that the solar thermal+gasifier steam would feed the steam turbine directly at the same steam conditions, and not at an intermediate point as originally envisaged. This appears to have been a sensible option to reduce the cost and operational complexity in what is a small (3MWe) steam turbine. 450C and 40 bar steam supply as demanded by MNRE, and a completely separate intermediate steam injection from the solar thermal+ gasifier steam supply would be more applicable to much larger steam turbines, as Thermax later pointed out.

is the leading international certification and technical support and advisory offshore wind company and in ReNew Power which is the largest renewable energy IPP in India.

The FOWIND project led to the FOWPI project, which was also funded by the EUD to India, which then focused on the more detailed examination of a specific pilot private sector offshore wind project concept in Zone B of the Gulf of Khambat in Gujarat.

The FOWIND project also led to an EOI for a 1 GW wind farm in the specific most promising offshore wind locations and zones identified by the FOWIND project. This EOI attracted 32 responses from leading international and Indian renewable energy developers in 2018, thus showing the strong private sector interest in developing commercial offshore wind energy farms in India.

However, the FOWIND project's primary focus, as set by its MNRE government counterpart, was on the priorities and capacity building of GoI via MNRE, rather than directly on working with the private sector to directly facilitate the first commercial offshore wind farm in India.

Rating 3.5 out of 5

2.1.3.3 TA Environment

The TA Environment component of the overall program was focused on the capacity building of government officials to increase their awareness, capacity and knowledge. The participation of the private sector from India in the activities (training, workshops, capacity building, study tours, etc.) of the project was non-existent. The only involvement of the non-state actors in the project was that of a few NGOs, in the two cities of Delhi and Mumbai, in the activities pertaining to awareness creation amongst the public and government officials regarding the environment friendly development activities.

Rating 1 out of 5

2.1.3.4 TA Clean Energy

The main objective of the EU TA Energy project was to increase the awareness, capacity and knowledge of the responsible government entities. Thus, the project activities involved mainly training, workshops, capacity building and study tours. The private sector participation from India in these project activities was minimal. There were no pilot projects or facilitation activities for actual implementation of the projects on the ground and thus, no direct contribution by the project towards increased private sector participation[52]. The Uttar Pradesh New and Renewable Energy Development Agency (UPNEDA) has started including the private sector in trainings along with the DISCOs as it helps the private participants to continue their business with RTS[53].

The actual benefits in terms of increased uptake of RE technologies (such as Solar roof top, etc.,) have been accelerating in India due to various reasons after the start of the project. It would be difficult to ascribe a measurable contribution towards the enormous transformation in India towards renewable energy and energy efficiency to the TA Energy project. However, it could be said that this project was a part of that transformation[54].

[52] Based on the stakeholder meetings with IDOM, MNRE and TERI.
[53] As per the stakeholder meeting with the Uttar Pradesh New and Renewable Energy Development Agency, 16/10/2020
[54] Based on the stakeholder meetings with IDOM, MNRE and TERI

One of the main initiatives of the project that would need support to be implemented is in the waste to energy area. Appropriate waste collection, waste recycling, disposal and WTE technologies are largely private sector led activities that need technical assistance and financial support from donors such as from the EU. The private sector needs to be encouraged to participate in these activities appropriately in future activities through suitable policies and waste dumping fees, support for comprehensive collection and sorting, and suitable WTE electricity export tariffs[55]. This private sector involvement in WTE activities was not a focus of the TA Energy project.

Rating 1 out 5

2.1.3.5 Eco-Cities

A private sector focus was a core design feature of the Eco-Cities programme. Engagement with private investors took place both directly and indirectly. Examples of direct private sector engagement are:

- PPPs: IFC's transaction advisory team is responsible for managing procurement ("tenders"), pursuant to which private investor-operators are selected to build, finance, operate and/or maintain public infrastructure. In the project preparatory stage, feasibility work is designed to ensure that the project is technically and commercially suitable as a PPP and that the procurement process will be competitive (i.e., that the project will be attractive to private investors). In contrast to public procurement processes, where contact with bidders is limited, PPPs get actively promoted to investors through soundings or roadshows. By implication, IFC and its client would have a direct relationship with prospective investors.

- Catalyse Green Buildings Market: Through the Eco Cities project, IFC gave advice to private contractors wishing to erect buildings compliant with the EDGE energy efficiency standards. The IFC team leader gave three examples. The Maharashtra Housing Board referred IFC to a developer, which made use of the EDGE tool and adopted it on the Vasai Taluka Cooperative. Another developer, IndoSpace, which builds and operates warehouses, committed to implementing EDGE. IFC got a Shapoorji-based contractor Joyville and another Gurgaon based contractor Signature Global to commit to "going green." A lender, Piramal Capital & Housing Finance, received an IFC loan of €54 million, part of which was dedicated to "green" mortgages.[56]

- SME Energy Efficiency: IFC engaged seven consulting firms to map opportunities, to training lending officers at banks and ESCO personnel, and to conduct the energy audits.[57] There was one firm for each of the four Eco-Cities.[58] The target in the TORs for each consulting firm was to meet 150-200 MSME per cluster and undertake at least 90 walk-through audits per consulting firm. These targets were not met. A total of 345 walk-throughs and 190 detailed audits were conducted.

Examples of indirect engagement would be IFC's efforts to catalyse markets or improve the business enabling environment through policy interventions. These efforts are 'indirect' because the beneficiaries do not have any direct contact with IFC.

[55] As per the meeting with IDOM, 17/08/2020
[56] The challenge was to convince Piramal management that there would be sufficient demand from borrowers so that Piramal wouldn't get stuck with funding costs on monies that weren't going to be disbursed.
[57] Another consultant conducted twenty (20x) training programs for banks, so that their lending officers would be able to identify and evaluate energy efficiency financing opportunities, and for four (4x) ESCOs.
[58] One of the Eco-Cities dropped out of the project (or was dropped) for reasons unknown.

- Catalyse Green Buildings Market: Here the Eco Cities project through IFC helped state governments in Maharashtra and Karnataka to develop incentive policies to encourage further private investment in energy efficient buildings. However, neither policy had been officially adopted as of the most recent IFC Semi-Annual Report. Separately, IFC established a "partnership" with the (the Building Materials and Technology Promotion Council. The Council asked for IFC's support in establishing criteria for identification of sustainable materials in India. IFC was invited to be on the BEE steering committee for Eco-Niwas Samhita Part II (Residential Building Energy Code).

- PPPs: IFC argues that in small projects where its costs vastly exceed client fees it serves a role as a "market catalyst." The rationale is that when IFC successfully implements a "proof of concept" project, other market participants will implement similar projects as a follow-on without IFC support. In effect, a single project has the potential to create a new market. The "catalyst" argument is weak in the Indian context where there is already substantial investment in renewables and excellent private-sector advisors. Given the results obtained by IFC's efforts, a key question is whether EUD funding would have had a greater impact if channelled directly towards building renewable energy capacity using a public procurement modality.

The PPP Transaction Advisory (C3P) team follows a standardized project cycle, which largely mirrors that in the private sector (from which many of its staff are drawn). The one key difference is that C3P advises only public sector clients (i.e., national, provincial or municipal governments). The project cycle begins with a "pitch" to a prospective client. Normally this takes the form of about 20 PowerPoint slides, which explain an idea for a transaction to a prospective client (i.e., how IFC plans to attract private investment to build and/or operate infrastructure that the public sector client cannot afford). Only rarely does a public sector client approach IFC: Orissa is a case-in-point. This small state in the northeast of India has done a series of projects with IFC C3P.

Once there is a political decision to hire IFC and IFC has obtained management approvals to engage with the client, a contract known as a Financial Advisory Services Agreement (FASA) is agreed (also known as a "mandate"). Typically, only one in ten to twenty "pitches" will result in a mandate. Business development is conducted by the Investment Officers (IOs), who are financial professionals with 8+ years of experience, and who have the personal maturity to manage teams both within and without the organization. (The outside team consists of engineers and lawyers who are subcontracted on a project-by-project basis.) By implication, a large percentage of any IOs time is spent on preparing pitch documentation and on travelling to meet various prospective clients. In addition, from pitch to signed contract, usually one-year lapses: much of this time is taken up by the public sector client obtaining internal approvals.

Once a FASA is signed, the team will obtain a budget, enabling it to launch the procurement process for expert consultants. These expert consultants include engineers, lawyers (international-local), and potentially E&S consultants. Procurement of these consultants takes a minimum of two months, largely because IFC must adhere to minimum notice periods. Once consultants have been retained, IFC introduces the consultants to the client during a kick-off meeting. Over the next several months, the consultants produce a feasibility study, which includes technical inputs for IFC's financial model. IFC will combine all findings into a single Transaction Structure Report (TSR), which sets out its vision of the project. The TSR addresses basic contractual parameters (esp., how much subsidies the public sector client will have to pay) and the procurement process. Normally, the public sector client needs several months to reflect upon IFC's recommendations. At this point, only a minority of projects proceed to market. The rest are abandoned for want of client commitment (generally because the government cannot afford the proposed commitments or does not want to enter into such

commitments or has found alternative, less expensive sources of financing). It is noteworthy that the log-frame in Annex 3 of the Trust Fund agreement gives an indicator of TSRs and not of successfully completed projects: the odds are against closing any individual project and the timeline from FASA to commercial close is typically 18 months (add another 12 months for business development).

Procurement is the final stage, at least for IFC. IFC wants to manage the process according to its own standards instead of public procurement rules. Normally, public procurement law includes a provision exempting donor projects: some countries interpret this narrowly to apply to donor financed projects and not to technical assistance. It is also noteworthy that, (a) IFC finances only about ten per cent (10%) of the transactions upon which IFC advises. This is because the private sector investor does not need or want IFC's funds; (b) IFC Investment is rarely competitive with commercial lenders, especially with respect to the time required for lender due diligence (9 months on average for IFC versus 3-6 weeks for private sector lenders).

Experience demonstrates that donors have very much oversold PPPs as a solution to the "infrastructure deficit." There is a surfeit of investment capital in the market ("dry powder") but an insufficient number of properly structured projects reaching the investment stage. The conditions contributing to the early success of PPP programs in developed economies were: (a) stable and trustworthy legal systems, (b) ready availability of *domestic* financing via banks or capital markets, (c) private sector companies capable of managing large-scale, long-term projects, and (d) in politics, "free market" rhetoric coupled with judicious state intervention (guarantees, subsidies). As its economy has grown, India's business climate has improved steadily on *all* of these metrics. The motives for adopting PPPs in India were: (i) to facilitate technology transfer (esp., telecoms and renewables); (ii) to tap into private savings and/or foreign direct investment. This has been partially successful but, owing to the weakness of many of India's largest banks, a public lender, the India Infrastructure Finance Company Limited has to co-finance or guarantee many projects and, in addition, donors and Exim lenders such as Germany's KfW remain critical sources of credit to power projects. (iii) PPPs have also been a tool of sector reform, namely, to introduce competition to sclerotic public-sector utilities, who over many decades have failed to connect or reliably supply a large percentage of India's population. Here the results have been decidedly mixed. Market design is very much a work in progress in India. (iv) Finally, governments have also turned to PPPs in the expectation that in doing so they would realize budget savings. Such savings have seldom if ever been realized in practice because PPPs depend for commercial viability upon public guarantees and subsidies (take-or-pay, feed-in contracts, lifeline tariffs, etc.). Infrastructure provision cannot be divorced from political-social commitments, such as universal access and affordability.

There is rising political opposition to PPPs. Some opposition is self-interested – bureaucrats defending their budgets or workers at SOEs whose sinecures are threatened by private sector competition – but much of the criticism of PPPs is well-founded. There is a perception (not entirely justified) that some PPP contracts were "sweetheart deals" for cronies (esp., in India's telecom sector). Other critics point to the failure of PPPs to deliver promised efficiencies (esp., IT, health, education) and the mounting cost of public subsidies (esp., power). Investor are disappointed with frequent renegotiations of "sacrosanct" contracts and with collateral attacks on their interests, such as adverse regulatory rulings, tax audits, and so on. Tightening credit conditions since the 2007-09 financial crisis has forced governments to fill the financing gap with more public money, which in turn has sharpened the focus on value-for-money. Finally, changes in public accounting rules reclassified the promises made to support PPPs as government debt, reducing bureaucratic incentives to use PPPs as a means of bypassing budget caps.

Rating: 4 out of 5

2.2 Effectiveness

2.2.1 Achievement of Planned Results

2.2.1.1 SCOPE BIG

The SCOPE BIG project utilised a solar-biomass thermal power project design by a very experienced EPC concentrating solar thermal and biomass boiler technology provider (Thermax) that should have been able to produce its expected 3 MWe power output within the set project budget and timescale, and which would have had a high chance of ongoing viable technical operation. The Thermax original concept design and the updated DPR design were based on Thermax's proven low cost indigenous solar parabolic trough concentrator technology that had already been successfully deployed at the prior Shive village 250 kWe solar-thermal power plant.

There were ongoing delays with procurement of sufficient land for the solar concentrators that were eventually successfully resolved, and with the shape of the land provided, but in the event these issues were not the primary cause of why the SCOPE BIG project's 3 MWe solar-biomass plant was not actually built.

Thermax had already started to manufacture the necessary 2,400 solar parabolic trough concentrator unis at the time of DPR finalisation. This early manufacturing of the parabolic trough units was necessary to facilitate the project being built on time by Thermax as the EPC contractor under very tight project design and erection timelines. When the DPR (Detailed Project Report) was submitted by Thermax, MNRE then fundamentally changed the solar thermal parabolic trough concentrator unit core operating parameters from those clearly stated in the EU-CSTEP led consortium contract and in all project literature to that point.

The 2,400 solar parabolic trough concentrator units are still apparently being stored by Thermax at an ongoing cost to Thermax, pending finalisation of a suitable agreement as to their ownership and (some partial negotiated) payment. It appears that Thermax still has not been paid by the project for their design work for the DPR nor for any part of the solar parabolic trough concentrator units that they had already manufactured for the project when the specifications were changed by MNRE for Thermax mid-project. Thermax are still apparently owed 89% of their invoices for their work on the project. The project's international partner organisations have also apparently not been paid for their work either.

The Thermax designed project was not implemented due to MNRE insisting on completely different technology high temperature solar concentrator mirrors, collectors and heat transfer fluid than the medium temperature solar design that had been specified to that point. The higher MNRE specifications for the solar thermal and biomass thermal aspects of the powerplant were subsequently found to not be able to be procured and built within the project budget.

There was also no apparent work on, or realisation of, the necessary preferential tariff for viable replication small scale solar-biomass thermal power plants to be built based at the desired rural village level.

It could be argued that a positive factor in the SCOPE BIG project's effectiveness was that the project's implementation was abandoned once it became clear that it could not be built for the available budget under MNRE's new solar and thermal conditions. In the event, only €951,334 out of the EU budget of

€8 million has been expended to date. However, if the €2,105,780 of outstanding claims were fully paid, then €3,057,114 would be spent on the project, with no tangible impact. It could be argued that it would have made more sense to have continued with the project and at least have a working 3 MWe solar and biomass power plant for its €8 million EU budget, than have over €3 million spent by the EU and Thermax and international partners and have no tangible working power plant.

Rating 1 out of 5

2.2.1.2 FOWIND

The FOWIND project achieved its stated intended objectives within its €3.2 million budget (as confirmed in the final project independent audit report) and in its planned 51 months implementation timescale of 13 December 2013 to 12 March 2018.

A negative efficiency factor for the FOWIND project was that the project paid for the key LiDAR equipment to measure actual offshore wind speeds, but apparently did not specify who would own the LiDAR equipment and assumed that a tower or platform would be available in the required location and hence did budget for the new platform that was actually required for the LiDAR (Light Detection and Ranging) equipment to be installed on or for the LiDAR equipment's calibration and maintenance. There were also apparently issues with a lack of clarity in the scope of work and activities and outputs expected in the TORs for some of the international and Indian consultants engaged under the FOWIND project.

Rating 4 out of 5

2.2.1.3 TA Environment

As per the inception report of the project, the overall objective of the project was to increase the use of green energy sources, energy efficiency and clean technologies, based on the local experience of both India and the EU. The objective was to be achieved through:

- Enhanced technical & institutional capacity of Indian authorities to create an enabling environment promoting clean technologies.
- Enhanced human capacity through the transfer of required skills and technical know-how for the use and development of clean technology in the local context.
- Increased awareness amongst public and private actors and the public at large on environmentally friendly development activities.

The above results were to be achieved through exchange of best practices, through seminars, training courses, studies, awareness raising, visibility activities and study tours. The actions were carried out at two mega cities in India namely, Delhi and Mumbai. The two focus themes for the project were solid waste management and wastewater management. The two corresponding planned outcomes were:

- Outcome 1: Improved Solid Waste Management with an aim to achieve efficiency in the conversion of waste-to-energy and waste-to-compost and thereby facilitate the reduction of Carbon Emissions
- Outcome 2: Improvement in the efficiency of Sewage Treatment by adopting Best Practices and Best Available Technologies.

The planned activities comprising the seminars, training workshops, awareness creation and the study tour as mentioned in the project log-frame (at the time of project inception) were carried out. The actions comprised of training, seminars and study tours for the government officials involved in the activities of solid waste management and wastewater management of the ULBs in Mumbai and Delhi. A couple of NGOs were taken on board for the activities pertaining to awareness creation amongst the public and government officials regarding the environment friendly development activities.

The work was carried out in close co-operation with the officials of the two (Delhi and Mumbai) ULBs. The project was implemented by a consortium comprising of IVL Swedish Environmental Research Institute, Stockholm, Sweden, Danish Technological Institute, Taastrup, Denmark, and Shriram Institute for Industrial Research, Delhi, India. Thus, the project implementation had the benefit regarding the waste management practices in India and to the advanced technologies in use in Europe.

When it comes to achievement of the planned Outcomes and the Objectives, one of the issues is that in the case of the TA Environment project the activities/outputs were only weakly related to the desired outcomes. The activities/outputs were focused on capacity building with no direct links to the required Outcomes of the enhanced conversion of waste-to-energy, waste-to-compost, improvement of sewage treatment, etc., leading to reductions in GHG emissions. It is argued that one of the main reasons for the generally very poor state of waste management in India is not the lack of knowledge and awareness regarding the best practices and technology, but the lack of financing. The government (including the ULBs) had already been making efforts to lure private sector investment for management of waste. However, not much success could be achieved to date due to a lack of suitable revenue models and business models which are acceptable and attractive enough to the prospective private sector investors (there is a component for making suitable financing models for attracting private sector investment in the municipal services, in the ECO Cities component of the overall program).

The situation, conditions and the waste management challenges for most of the medium and smaller cities in the country is much different than those in the mega cities like Delhi and Mumbai. Thus, the technologies and solutions suited for the mega cities may not be appropriate for other cities, mainly due to the scale of the problem and the situation regarding availability of land etc.

One of the issues with the initial project design is that there is a significant difference in the situation (in terms of waste composition and volumes, climatic conditions, population density, availability of funds etc) in India and the European countries/cites, due to which the advanced waste management technologies being used in the European cities may not be suitable for the Indian conditions. The two selected cities in India (Delhi and Mumbai) are the megacities, with a dense population, limited land area, hot and humid climate, habits, etc. This has been one of the main challenges right from the beginning of the implementation of the project. Due to this reason at the time of project inception, the emphasis was laid on sharing the way things are being managed and operations carried out in EU cities using a combination of management techniques and technologies. The project focused on sharing experiences and best practices, noting that the differences between India and the EU require a differentiated management approach, by filtering the EU information to be consistent with the Indian scenario.

The project did achieve the intended outputs of increasing the knowledge of the government officials on the EU technologies for the management of wastewater and solid waste as well as on creating the path for the use of green energy/clean technologies. However, it fell short of achieving the desired Outcomes in terms of increasing the uptake of WTE technologies, green technologies for wastewater management, leading to reduction in the emissions of GHGs. One of the stated Outcomes of the project was to support (by increasing the capacity of government officials) implementation of the eight

missions under India's 'NAPCC'. Although, in future, the increased knowledge and awareness of the government officials may lead to higher uptake of the technologies which leads to reduction in the emissions of GHGs, there are more uncertainties than certainties in this regard.

Rating 2 out of 5

2.2.1.4 TA Clean Energy

The project achieved its intended objective of increasing technical, institutional and human capacity for the development of clean technologies in local context and awareness among the public and private sectors. The online meetings with stakeholders confirmed that the activities undertaken by IDOM under the TA Energy project were carried out as per MNRE priorities. Key achievements from the TA Energy project activities were:

ECBC[59]

The ECBC implementation was in a nascent stage during the design of the project. Thus, the project design was relevant at that point of time and the GoI was also in need of knowledge and technology transfer from international organization such as EU.

The pilot establishment of ECBC cell in four states increased the capacity and coordination between the central and state governments for the effective implementation of the ECBC. The project also helped in understanding the need of ECBC cells in each state. Currently, ECBC cells are also being established in other states. The lessons learnt from the project have helped in the revision of ECBC building codes. The TA Energy project ECBC Support was very relevant and was aligned with the development goals and priorities of the government when it was designed. However, only limited ECBC related activities were actually carried out by the project due to the change in focus of the GoI via MNRE towards rooftop solar (RTS).

Given the present condition, more support is still needed to establish and carry out ECBC cells and related activity in other states of India.

RTS development[60]

RTS development was at a preliminary stage during the inception of the TA Energy project. The project design was very relevant at the time of project design and the GoI was in need of knowledge and technology support from international organization.

The Phase I of the GCRT was tasked with providing reliable and consolidated information of RTS development. To overcome these challenges, a comprehensive information guide on the GCRT program was developed by IDOM in coordination with MNRE, after a detailed study and analysis of the scheme documents and guidelines. This was the only comprehensive information guide available on Phase-I PV Rooftop Programme - which was launched by MNRE in January 2017.

The SPIN portal was developed for MNRE to manage implementation of the GCRT program across India. IDOM in association with the NIC developed a modified user interface capable of streamlining project completion reports, formats, generating standard templates based on feedback received and monitoring consultation activities undertaken with installers, state nodal agencies and MNRE. IDOM also worked with MNRE to develop a monitoring module in the SPIN Portal for the public sector RTS implementation scheme. A portal for the RTS was developed and integrated with the SPIN portal.

[59] As per the stakeholder meeting with TERI on 08/09/2020
[60] EU-India technical cooperation project: Energy, completion of 6 successful years, 2020

Around 33 DISCOs from 15 states have been integrated with the SPIN so far[61]. Similarly, the installations and fund flow have been streamlined because of the portal, which is considered very important for the RTS development. Without EU support, the portal development and corresponding momentum could not have happened[62]. If at all happened, the project would have been delayed and would not have reached a status where it is now.

Various workshops for state nodal agencies (SNAs), RTS installers, DISCOs and MNRE on technologies, challenges, recommendations and optimized implementation frameworks on RTS implementation was provided. Around 31 trainings have been conducted and more than 2,500 officers have benefitted from the trainings[63].

A mobile app ARUN was developed to provide information and to create awareness about the RTS to electricity consumers/RTS customers. IDOM supported the development of suitable information on RTS for the app.

Seeing the evidence of transformation through the support of IDOM, the MNRE requested to extend the on-going activities. Thus, the EU extended the project to until 2020 with the same contract amount for the project.

Study tour

A study tour was successfully conducted in 2016 with 14 delegates from various Indian organization. The tour had been designed to transfer the knowledge and technology on solar power development[64]. However, in practice the government officials involved will be transferred frequently to other roles, in which case the knowledge dissemination to the subsequent officer(s) may not be transferred effectively. Thus, the effectiveness of the dissemination of knowledge gain/conversion of knowledge to action obtained from the study tour is difficult to track and is questionable.

Solar parks

IDOM supported the ISA right from start with logo design and capacity building to the relevant officials in India. MNRE has stated that the ISA is very successful. The Investors' Guidebook and the Financial Model for solar parks were prepared as part of the project to provide a comprehensive guide towards the solar parks program in India for potential investors and for other interested stakeholders. IDOM also provided useful support in developing the feasibility analysis on the introduction of PV waste management in India[65].

KUSUM

A call centre facility for RTS was developed which recognizes voice questions and provides suitable answers. This was an ad-hoc activity requested through the Prime Minister's Office of India. The content for the call centre was developed by IDOM and the Prime Minister of India launched it[66]. This was not in the plan but is an excellent example of adaptive project management to meet evolving country priorities as per a request from the GoI.

Waste to Energy

Biomass from agriculture residues is frequently burnt in an open environment in the fields, which results in severe air pollution. Thus, MNRE requested support from IDOM in resolving the issue. With the aim to resolve the issue, IDOM explored various technologies implemented in countries of the European Union. IDOM had engaged experts from the Institute for Chemical Processing of Coal, a

[61] As per the meeting with NIC, 21/10/2020
[62] As per the meeting with UPNEDA 16/20/2020
[63] EU-India technical cooperation project: Energy, completion of 6 successful years, 2020
[64] EU Mission Report, Ver. 1, 27/02/2016
[65] EU-India technical cooperation project: Energy, completion of 6 successful years, 2020
[66] As per the meeting with IDOM, 17/08/2020

Polish R&D institute, supervised by the Polish Ministry of the National Assets, to provide training to the Indian stakeholders on co-firing the biomass in power plants. In some of the other capacity building activities, experts from other European countries were also engaged to share their expertise and experience. Together with MNRE, IDOM has partnered to strategically build a model of organizational and technical solution that converts biomass into clean energy and to create a value-chain for biomass[67].

Given the present condition, support may not be needed for solar related technology. However, support for appropriate streamlining of policy aspects, technology etc., for WTE aspects may still be needed from international organization like EU.

Thus, the project has achieved its planned activities, or alternative activities requested by MNRE, which has resulted in significant development and positive impact.

Rating 5 out of 5

2.2.1.5 Eco-Cities

Evaluating the effectiveness of the Eco Cities project is challenging because IFC does not disclose:

- Project-level documentation. IFC views such documentation as confidential to the beneficiary (IFC's client, not donors such as EUD). As a result, the evaluation team was entirely reliant upon IFC's semi-annual progress reports, press releases and telephone interviews with IFC staff. Normally, such an evaluation ought to be based both upon the consultant's actual work product and upon independent sources of information. As a result, the evaluation team has been evaluating IFC's evaluation of its own results (a conflict-of-interest situation).

- Internal work products such as detailed calculations of emissions savings (GHG), beneficiaries reached, investment received, which are essential to evaluating individual project impact. IFC does produce such calculations at project approval ("Quality at Entry") and at project completion but has not disclosed them to the EUD or to the evaluation team. Many of the indicators, such as GHG savings, are based upon estimates, rules of thumb or internal modelling, and they are not measured directly at the plant-level. Accordingly, the figures cited by IFC are not reliable indicators of project impact.

- Internal budgets. How much IFC spent on feasibility studies/consultants, travel costs, staff salaries, etc., has not been disclosed at the individual project level. All figures have been shown at the Eco Cities level, so that the efficiencies are concealed by the law of averages. Other donors, such as the Asian Development Bank (ADB) will generally provide such details to external evaluators, along with relevant internal supporting documentation.

The following are the results reported in the June 2019 semi-annual report.
Table 4 : The Eco Cities Project's Numerical Output Results

Specific Objectives	Project	Target	Claimed Result
R1.1: PPPs - number of reports completed	PPPs	8	25
R2.1: Number of laws/regulations drafted	Green Buildings	5	16
R2.2: Procedures eliminated or improved	Green Buildings	5	0

[67] EU-India technical cooperation project: Energy, completion of 6 successful years, 2020

R2.3: New financial products designed	SMEs	2	2[68]
R3.1: Entities receiving in-depth advisory services	SMEs	10	1
R3.2: New financial products designed	SMEs	2	2

These targets create a mis-leading impression that the Eco Cities project interventions have exceeded expectations and therefore that the impact must be great. It is only digging into the detail that one realises that the effort expended is disproportionate to the results obtained. Take for example indicator R1.1 "PPPs – number of reports completed" and "R2.1 "Number of law/regulations drafted." These are outputs, not outcomes. Reports produced and laws/regulations drafted are not an outcome that can lead to any tangible impact unless the draft legislation/regulation is enacted and enforced, or the PPPs make tangible progress and eventually reach financial close.

The case for effectiveness rests upon the successful closing of three PPPs: (i) Bhubaneswar e-waste management; (ii) Bhubaneswar proliferation of grid connected rooftop solar (OREDA); and (iii) Bengaluru street lighting PPP. But only one of these three projects could properly qualify as a PPP (Bengaluru Street Lighting PPP). One of the remaining two, Bhubaneswar E-waste Management, does not have a direct connection to renewable energy or energy efficiency. The OREDA project is software (an App) rather than infrastructure and is not a standalone project. Therefore, the PPP effectiveness of the Eco Cities project is less than is advertised.

Table 5 : The Eco Cities PPP Projects' Effectiveness

Project name	Description	Effectiveness
Bhubaneswar e-waste management	To establish a citywide e-waste management system in the capital city of the State of Odisha.	IFC counts this as a successful PPP but the evaluation team does not view it as a PPP. Unclear whether this project is being carried forward in IFC's absence.
Chennai Waste-to-Energy PPP	Remediation of two existing municipal dumps and construction of a waste-to-energy plant.	Project has been put on hold. No effectiveness as yet.
Odisha grid connected rooftop solar replication PPP and Odisha solar park PPP	Solar PVs are being used to generate electricity at the retail (rooftop) scale and at the wholesale scale.	Both projects are on hold. No effectiveness as yet.
Pune grid connected rooftop solar replication	IFC is advising Maharashtra Energy Development Agency (MEDA) for grid connected rooftop solar PV in eight cities. Over 1,000 government buildings will be connected, with a generation capacity of 51.5 MW.	Project is still in progress. Too early to evaluate for any effectiveness.

[68] There was no evidence in project documentation regarding what, if any, new financial products were designed, similarly for R3.2

Project name	Description	Effectiveness
Bhubaneswar proliferation of grid connected rooftop solar (OREDA)	A web-based IT platform and mobile app, which guides homeowners through the installation of rooftop solar PVs. It also speeds disbursement of subsidies to homeowners.	IFC counts this as a successful PPP but the evaluation team does not view it as a PPP. It is rather a facilitation style output.
Bengaluru Street Lighting PPP	A private investor/operator replace 200,000 halogen lamps with LEDs and install 50,000 security cameras.	Project has been successfully closed.
Bihar Green Affordable Housing PPP	Green, affordable housing program, which is being developed on six sites of about 60 acres each in five cities.	Government is likely to implement the project using public procurement instead of a PPP. No effectiveness as yet.
Electric vehicle charging stations	Municipal governments in Thane and Bhubaneshwar wish to deploy electric vehicle charging stations.	In progress. Too early to tell whether these efforts will lead to success.

Factors that commonly contribute to the success (effectiveness) of a PPP in the energy sector are:

- **Conditions of connection.** Unless the new RE capacity is being used exclusively for own consumption ("auto-consumption") then, to be of any use to end-users, it must be connected first to a transformer and then to the transmission network ("the grid"). The Transmission System Operator (TSO) has detailed requirements for connection of new generation capacity, which are sometimes embodied in a grid code. It is critically important that the project promoter be familiar with conditions of connection and organize the project in such a manner as to meet these minimum requirements. The feasibility study should explain how the requirements are being met in the project design. Major issues to address: (a) final mile - who is responsible for paying for the extension of the transmission line to the new plant; (b) commissioning - what steps need to be taken jointly with the TSO to test the new RE capacity and bring it into service; and (c) balancing - the impact of connecting renewables (solar, wind) on grid stability.

- **Who is the off-taker?** These projects under Eco Cities were being structured as PPPs, which means that the operator of the RE capacity (seller) is a different entity from the distribution company (buyer). Sometimes, in jurisdictions with developed wholesale markets, these sales take place bilaterally (directly from seller to buyer) but elsewhere, there is a single buyer, which acts as an intermediary between generators and distribution companies. Since RE generators are wholly dependent upon revenue from sales of electricity, they want to know that their customer(s) is creditworthy. This issue should be addressed in any feasibility study given DISCO problems with circular debt. Solvency of DICOs and circular debt are obstacles to commercial viability in India but were not discussed in the documents that the reviewers received.

- **Tariff structure.** RE energy generally still depends upon some form of subsidy to compete with conventional sources of generation. These subsidies may take many different forms, but here is a synopsis of the main ones: (a) mandatory off-take: the single buyer may be required to accept all RE energy generated by whomsoever; (b) must-run/super-priority: the TSO may be required to give RE priority access to the grid over other dispatch-able sources of generation (fossil fuels); (c) capital cost: the government may pay for some or part of construction costs or provide a guarantee to project lenders; (d) connection: the TSO may be required to pay for

the extension of its transmission network to RE capacity, even if the RE is in a remote/costly location (i.e., offshore wind, solar on mountain tops, etc.); (e) feed-in tariff: the single buyer may be required to buy renewable energy at a fixed price that exceeds wholesale power prices; (f) indexation: the price for RE energy may be indexed to inflation so that it increases over time even if wholesale power prices decline during that same timeframe; and so forth. The feasibility study should be accompanied by a financial model that quantifies the impact of the tariff, i.e., how long does it take for investors to recoup their investment, is the project profitable, what happens if the tariff decreases or capital or maintenance costs increase unexpectedly, etc.? The complexity of various tariffs, and a lack of transparency in wholesale electricity markets were not addressed in the studies sighted by the evaluation team.

- **Capacity and availability.** Solar PV and wind turbines, like almost all other capital equipment, have a minimum efficient scale below which it is uneconomic (i.e., the cost of connecting it to the grid no longer makes financial sense). This is one reason policy makers require the TSO to connect rooftop solar and to provide access to net metering. (The TSO would not connect such small installations voluntarily because doing so is uneconomic.) In addition, since solar PV and wind are variable, availability (of sun/wind) is an important determinant of the technical and financial viability of the project. So, feasibility studies should not quote a single percentage figure but, instead, there should be seasonal figures and high-low ranges.

In the Catalyse Green Buildings Market project, The Eco Cities project through IFC advised private contractors on how to comply with EE standards. IFC registered approximately 34,000 homes for EDGE certification (all in the affordable housing sector), with a total floor area of more than 10 million sq. ft. (929,000 square meters). The Maharashtra Housing Board referred IFC to a developer, which made use of EDGE tool and adopted it on the Vasai Taluka Cooperative. Another developer, IndoSpace, which builds and operates warehouses, committed to implementing EDGE. IndoSpace developers registered almost 1,000,000 sq. ft. (93,000 square meters) of commercial space. IFC got a Shapoorji-based contractor Joyville and another Gurgaon based contractor Signature Global to commit to “going green.” A lender, Piramal Capital & Housing Finance, received an IFC loan of €54 million, part of which was dedicated to “green” mortgages.
In the SME EE activity, IFC set a target for each consulting firm to meet 150-200 MSMEs per cluster and to conduct at least 90 walk-through energy audits per consulting firm. Four energy audit firms were selected to work closely with State Agencies in Bangalore, Pune, Greater Mumbai and Chennai and with SMEs. 790 MSMEs were identified across the four cities. These targets were not met. A total of 345 walk-throughs and 190 detailed audits were conducted. It is not known what impact the energy audits had in having their investment recommendations implemented, but the global experience over many decades suggest it would be low. Essentially there was limited demand for the energy audits. The principal output seems to have been training: IFC’s semi-annual report says that 182 ESCO/SME firms were trained in three sessions and a further eleven (11x) training sessions were conducted for FIs and ESCO, whereby 307 FI and Government/Industry personnel were trained. However, training is not the same thing as actually implementing EE projects. And in any case, India already has a strong capacity to undertake energy audits.

Rating 2 out of 5

2.2.2 Adaptive Management for Results

2.2.2.1 SCOPE BIG

The SCOPE BIG project encountered significant challenges in the acquisition of sufficient land area and from the sub-optimal shape and orientation of the land provided for the solar thermal component. The land issues were eventually largely overcome through suitable adaptive management by GSPCL providing additional land for the solar thermal field to a total of 12 acres as per the original design, and by Thermax adapting its parabolic trough layout to accommodate 2,400 parabolic trough units. Thermax also made some adaptive changes to improve the solar CUF (Capacity Utilisation Factor) from 6.5% in the initial DPR to 13% if 13 acres of land had been provided for the solar field.

However, the positive adaptive management for results success in land acquisition, water supply and solar field layout were countered by MNRE fundamentally changing the solar thermal trough specifications to high temperature units when the EPC contractor partner, Thermax, had already manufactured significant numbers of the 2,400 parabolic trough solar concentrator standard product medium temperature units based on their indigenous (Indian) technology. The EU also apparently insisted on a 50% solar energy contribution, which was not possible with the limited land availability (the project was initially allotted 9 acres instead of 14 acres and out of the allocated 9 acres, the National Highway Authority of India (NHAI) acquired an acre of significant part of land for road widening)[69] and its layout, and is also questionable as being technically possible from the original design, and clearly a 50% solar energy contribution could not be achieved within the project's budget, let alone with the new MNRE high temperature solar thermal units.

So instead of successfully building, commissioning and demonstrating a working 3 MWe solar thermal and biomass plant on time at to the original budget, EUR 951,334 out of the EU budget of EUR 8 million was expended - with a further EUR 2,105,780 of outstanding claims by Thermax, ECN, and CNRS apparently still not paid[70]. And no working solar thermal and biomass plant eventuated for this more than EUR 3 million cost to the EU and to Thermax and ECN and ICARE.

Rating 2 out of 5

2.2.2.2 FOWIND

The FOWIND August 2016 Results-Oriented Monitoring (ROM) review's recommendations and actions from year 2 (2016) stated that the FOWIND project faced issues in fielding adequate technical leadership expertise and in dealing with unplanned collaboration and support requests from project beneficiaries[71]. The project responded that it would give a greater technical leadership role to DNV GL (this is corroborated by the greater budget reallocated to DNV GL in a subsequent budget reallocation exercise) and by the project more actively managing its involvement in out of scope requests. The ROM review also recommended a greater project engagement with the MNRE led National Offshore Wind Energy Policy (NOWEP). This greater involvement in NOWEP was done by GWEC and DNV GL even although this was outside the scope of the FOWIND project workplan.

Project documentation, supported by interviews with key project partners (DNV GL and NIWE) and with the FOWIND project manager, identified that FOWIND also faced a number of significant challenges. The challenges were primarily in obtaining the necessary fine detail for the Gujarat and Tamil Nadu grid integration studies with Gujarat Energy Transmission Corporation (GETCO) and Tamil

[69] Project Closure Report: Activities Undertaken, CSTEP
[70] CSTEP SCOPE BIG – Summary of Expenditure to 31 August 2017
[71] FOWIND ROM Recommendations-Actions Annex 1 and Project Manager Interview

Nadu Generation and Distribution Corporation (TANGEDCO)), and ensuring that a suitable LiDAR platform was erected - which was critical to the project's success, but the erection of a new platform not budgeted for under the project as it was assumed that an existing structure could be used. After major ongoing efforts by the project, the grid integration study challenges were partly addressed after 6-8 months of FOWIND project effort by the grid companies doing the grid stability studies themselves using static rather than dynamic real-time data this led to fairly generic studies and with the detailed grid data that the studies relied on not being transparent. The LiDAR platform erection cost issue, along with the LiDAR equipment O&M cost, were addressed by MNRE through NIWE providing extra co-funding support to undertake this work. The first-time LiDAR platform construction was a failure, but the LiDAR platform construction was successful for the second time in 2016.

There were also other LiDAR related issues in that the equipment had to be purchased from abroad which led to delays that had to be worked around , and in Gujarat, people from foreign countries were not allowed as the area involved was deemed to be a sensitive coastal area so the project hired and trained a person from India to install the LiDAR.

A further adaptive management issue is that the FOWIND project consortium partners had discussed the project's ToR with the then Congress-led government in 2013 and early 2014. After the project had been awarded and had started in Dec 2013, there was a change to a BJP-led government in May 2014. The new BJP-led government had different offshore wind promotion priorities. Their focus was on the development of tangible significant scale RE projects and their ongoing successful operations. Therefore, to cater for this new significant, tangible and operational offshore wind development focus, the EU started the new FOWPI project with the GoI.

Rating 4 out of 5

2.2.2.3 TA Environment

At the time of the project's inception, it was realised that there is a significant difference in the situation (in terms of waste composition and volumes, climatic conditions, population density, availability of funds etc) between India and European countries and cities. Hence, in the project design the emphasis was laid on sharing the way things were being managed and operated in EU cities in terms of a combination of management techniques and a range of SWM technologies. However, there was no attempt made in the project's implementation to focus the study tours to those European cities with the most relevant SWM situation and experiences to India, for example to focus on those EU cities with higher temperatures and a greater proportion of wet organic waste, or those who had more recent experiences in upgrading their SWM systems to EU norms, such as those with the most recent membership of the EU.

The project's independent 'ROM' provided positive comments regarding the progress of the project. As a result of the ROM recommendations, an updating of the TA Environment's project log-frame was carried out during the project's implementation.

Rating 3 out of 5

2.2.2.4 TA Clean Energy

IDOM faced significant challenges in developing and implemented the EU TA Energy project. IDOM faced challenges in a wide range of areas such as suitable internet access, poor quality of furniture, insufficient number of working place, and limited access to MNRE premises, as the IDOM team was

not able to access the MNRE office legally, as the MNRE personnel does. The IDOM team had to apply for visitor's temporary passes every day. In spite of such practical difficulties, IDOM managed to provide significant project outputs[72].

Similarly, at the inception of the project, MNRE did not have tangible and consistent ideas for the project to move forward. This increased the challenges to IDOM further. IDOM stated that the MNRE officials kept on changing, thus getting things done was very difficult. To overcome these challenges, new capacity development activities had to be carried out every 6 months whenever new officials took up their new responsibilities in MNRE. Also, whenever new officials took charge, their requirements varied. For example, MNRE put forth the requirements of implementing street lighting within a period of 2 months. To handle such an emergency situation, IDOM even hired a new expert for this purpose. However, then MNRE said that they had their own expert which was a significant loss for IDOM. However, IDOM provided support to all MNRE requested activities/requirements as quickly as possible to meet the MNRE deadlines. Also, IDOM has supported the DISCOs/SNAs requirements/activities to accelerate the project development.

Thus, the positive adaptive management of the project resulted in significant development in RTS and the project was largely effectiveness in spite of its many challenges.

Rating 3.5 out of 5

2.2.2.5 Eco-Cities

IFC has sought a one-year extension for the Eco Cities project because almost all its projects have experienced delays. The delays are attributable to: (a) slow decision-making on the part of public sector clients and (b) the consensus-driven nature of obtaining regulations and legislation approvals. For the PPPs, the Eco Cities project worked with municipal and state governments, for whom non-commercial considerations are important. Public perception, universal access, affordability of services, timing (esp., with respect to elections) are examples of such other relevant factors. Frequent changes in personnel, as civil servants are rotated from one department to another, elections, which bring to power politicians with ideas that differ from their predecessors, and institutional inertia may contribute to the postponement or cancellation of a commercially viable project. IFC has no control over the pace of work or priorities of its public sector clients. In addition, IFC team leaders are frequently hamstrung by internal politics – such as managerial reluctance to cancel moribund projects – which waste time and effort, which might better be dedicated to pursuing fresh business development opportunities.

Table 6 : The Eco Cities PPP Projects' Implementation Status

Project name	Description	Results
Chennai Waste-to-Energy PPP	Remediation of two existing municipal dumps and construction of a waste-to-energy plant.	The Tamil Nadu Investment Board put the project on hold while it examined alternative options.
Odisha grid connected rooftop solar replication PPP	A grid connected rooftop solar project throughout the State of Odisha	The project was delayed by the need to obtain a regulatory approval for a change from net- to gross metering.
Odisha solar park PPP	This is a utility-scale project, which has been reduced from 1,000 MW across 7x sites to 275 MW on 2x sites.	The project is on hold due to delays in transferring land from one state-owned entity to another.

[72] 6-months Progress Report, Part 1 – Narrative Report (period from 1st of September 2017 to 28th of February 2018)

Project name	Description	Results
Bihar Green Affordable Housing PPP	This is a state-wide green affordable housing program. The housing is to comply with green building standards. The Urban Development & Housing Department will develop six sites of about 60 acres each in five cities.	The project is on hold because the new State Secretary prefers public procurement to a PPP.
Electric vehicle charging stations	Municipal governments in Thane and Bhubaneshwar wish to deploy electric vehicle charging stations. In Thane, engineering drawings for infrastructure and grid connection, and an escrow payment mechanism have been delivered.	Elections have delayed this project.
Catalyse Green Buildings Market	Of the sixteen policies/regulations developed for various municipal and State governments, only one (Pune) has been enacted.	The rest of the draft legislation was either shelved or is awaiting approvals.
SME Energy Efficiency	IFC set a target for each consulting firm to meet 150-200 MSMEs per cluster and to conduct at least 90 walk-through audits per consulting firm. Four audit firms were selected to work closely with State Agencies in Bangalore, Pune, Mumbai and Chennai. 790 MSMEs were identified across the four cities.	These targets were not met. A total of 345 walk-through and 190 detailed audits were conducted. 36 reports were prepared. Essentially there was limited demand for the energy audits. As a result, IFC "pivoted" towards a train-the-trainers approach: IFC's semi-annual report says that 182 ESCO/SME firms were trained in three sessions and a further eleven (11x) training sessions were conducted for FIs and ESCOs.

Rating 2 out of 5

2.3 Efficiency

Efficiency measures whether the results obtained were proportionate to the cost of the intervention. In the case of the EUD Programme, efficiency is measured both at the program level and at the individual project level. To give the EUD programme with its €18 million budget a positive rating the evaluators would want to see direct links to new RE/EE/GHG mitigation infrastructure that is well underway and ideally being built. Almost all projects in the programme are in RE electricity grid connected generation. However, the constraints to new grid connected RE in India are not caused by a lack of RE generation technology demonstration but rather by issues in the cost of new RE generation or constraints in the transmission network to evacuate the RE power - see for example FOWIND. (Noting that net metering can be a useful approach but can leads to problem evacuating the RE in the local distribution network.) Another fundamental question is that of opportunity cost: given the same resources, would the EU intervention have had a greater impact if, instead of engaging in capacity-building of primarily government officials, it had channelled the same monies towards addressing market barriers to RE or in building renewable energy generation capacity using a public procurement modality. The method used to answer this question is known as Value for Money analysis.

2.3.1 Turning Inputs into Outputs

2.3.1.1 SCOPE BIG

In the SCOPE BIG project, €951,334 out of the EU budget of €8 million was expended, with a further €2,105,780 of outstanding claims by Thermax, ECN, and CNRS that have apparently still not been paid[73]. Thermax apparently manufactured 2,400 parabolic trough solar thermal units which apparently remain in storage pending resolution of their unpaid invoices at an ongoing cost to Thermax. Since the SCOPE BIG project was terminated on 31 March 2017 by the EU, Thermax claims that CSTEP has endorsed payment of Thermax's expenses to the date of project termination, but apparently little tangible progress has been made in resolving the issue of unpaid expenses of Thermax, and perhaps still of ECN and CNRS as well. It is not clear why a mutually acceptable partial payment compromise could not have been reached in the 3.5 years since 31 March 2017. As an example, such a compromise could have allowed Thermax to cover some its costs and reuse its manufactured and stored 2400 parabolic trough units in some other tangible solar thermal application, perhaps as solar thermal heat for a suitable industrial application.

Rating 1 out of 5

2.3.1.2 FOWIND

The FOWIND budget was €3.2 million for a 51 month duration project, and the budget was fully spent during the project period. The project appears to have delivered its scheduled outputs to a generally suitable quality and timeframes. The exceptions in terms of quality are the grid integration studies where in-house static grid stability studies were done by the grid companies to unknown levels of quality, rather than stability studies being done by independent specialist consultants. The exceptions in terms of timeliness was the LiDAR installation, where it was assumed that an existing offshore structure could be used, and where the MNRE funded initial offshore structure installation was not successful in January 2017 and a modified structure was only installed in March 2017 at a new location. This meant that real-time LiDAR wind speed data at the most promising offshore wind site was only available after the LiDAR was commissioned in November 2017, and hence the assessment of LiDAR data over a period of 12 months (as per the FOWIND grant application form) was not possible by the project end of March 2018.

Rating 4 out of 5

2.3.1.3 TA Environment

The planned activities comprising the seminars, training workshops, awareness creation and the study tour as mentioned in the project log-frame were carried out in a cost-effective manner and within the provided budget.

The activities carried out led to the achievements of the outputs, but not the desired Outcomes. The project achieved the intended outputs of increasing the knowledge of the government officials on the technologies for the management of wastewater and solid waste. The project fell short of achieving

[73] CSTEP SCOPE BIG – Summary of Expenditure to 31 August 2017

the desired Outcomes in terms of increasing the uptake of waste to energy technologies and green technologies for wastewater management, leading to reduction in the emissions of GHGs. The actual benefits in terms of increased uptake of cleaner technologies for waste management (wastewater and solid waste) may happen on a longer time horizon when the officials with increased awareness participate in a decision-making process to establish more capital facilities for waste management. However, there are more uncertainties than certainties in this regard. The efficiency of the project is rated low considering that the desired Outcomes have not been achieved.

Rating 2 out of 5

2.3.1.4 TA Clean Energy

The EU contracted IDOM for around Euros 1.01 million up to 2018. Then MNRE requested the EU to extend the project to until 2020 with an additional EUR 2 million budget. However, EU extended the project with an additional which was the same amount as per the original contract, i.e., €1.01 million[74]. Thus, the total project cost is around €2.02 million.

IDOM carried out all the defined work plan activities and MNRE requirements with the same cost of contract. It had also assisted MNRE in various ad-hoc activities apart from the defined work plan whenever any assistance was asked. Some of the major activities include formulation of a model power purchase agreement and Engineering Procurement and Construction (EPC) contracts, a compilation study on state-specific rooftop solar policies, metering regulations, organizing technical stakeholder consultation meetings, etc. The meetings with various stakeholders revealed that IDOM addressed the issues/difficulties encountered by the MNRE/SNAs/DISCOs during the project in a generally very timely fashion.

The MNRE/SNAs/DISCOs interviewed also stated that IDOM had transferred in-depth technical knowledge through the seminars, workshops and trainings provided. The stakeholders/beneficiaries provided positive feedback on the seminars, workshops and trainings conducted. Thus, the project efficiently turned inputs (EUR) into useful (to MNRE) throughout the project's implementation period.

Rating 4.5 out 5

2.3.1.5 Eco-Cities

IFC does not disclose activity-level budgets; therefore, only project-level effectiveness can be evaluated for the Eco Cities project. Several metrics that can be employed to measure turning inputs into outputs (value for money) include:

- The disbursement rate is an indication of whether the consultant's (IFC) progress in implementation was sufficient that it needed to draw down the donor's (EU) commitment.
- The "burn" rate is an indication of what percentage of funds disbursed by the donor (EU) were spent by IFC. This is an important indicator when it comes to donor funded projects, especially when the grant is time-bound. But as of Year-End 2019, IFC had managed to spend just over half the funds (56.34%) allocated to it by the EU, which is why IFC sought an extension. The extension was also important for the two TA activities under Eco Cities, which had failed to meet their targets.
- Would the funds allocated to the Eco Cities project have better been spent by procuring renewable energy generation capacity directly or similar other activities? (Opportunity cost)

[74] IDOM Cover Letter for Request for Extension from Oct 2018 to Sept 2020

- A qualitative analysis of the uses to which the funds were put.

The project's semi-annual reports spell out clearly what the Eco Cities project funds were used for and the breakdown in these reports is typical for such projects. Some donors want funds spent only for specific purposes (i.e., a tying arrangement) such as paying for consulting fees but not for overheads (i.e., staff salaries). But for the Eco-Cities project, the EU gave the contractor (IFC) broad discretion to use the monies in the trust fund as it saw fit. For IFC, the largest line-items are its own staff costs, followed by travel, and then consulting costs. IFC procures third-party, private sector experts - typically engineering firms and lawyers - who have the detailed knowledge of technology, preparing sophisticated contracts and/or legislation in force in a particular jurisdiction (i.e., India as a whole or an individual state of India). IFC staff are responsible for managing the experts, building financial models, soliciting investors, and managing the procurement process (usually a two-stage tender with pre-qualification).

The EU allocated €9 million of which, by July 2019, €6.3 million had been disbursed and €5 million was spent. In addition, other bilateral donors contributed approximately €2 million of which €1.7 million was spent.

Table 7 : The Eco Cities Project's Funding

Description	€ Amount (Euros)	Calculation
Funds committed by EU	9,000,0000	(1)
Funds disbursed by EU	6,300,000	(2)
Other income[75]	335,067.19	(3)
Total funds available	6,635,067.19	(4) = (2) + (3)
Total expenditures	5,070,801.35	(5)
Donor funds balance	1,564,265.84	(6) = (4) - (5)
Outstanding EU commitments	2,700,000	(7) = (1) - (2)
Disbursement rate	70.00%	(2) / (1)
Burn rate	56.34%	(5) / (1)

Clients pay IFC a commitment fee when they sign the service agreement (FASA), normally about 10% of IFC's estimate of its service costs and, in addition, a success fee at commercial close. As is evident, the overall program runs at a loss (i.e., IFC does not break even or earn a profit on the services it delivers).

Both the disbursement rate and "burn" rate indicate that IFC was less-than-efficient in making use of the funds that the EU allocated to it. The likely reasons for this were the long delays faced by several of the projects in the portfolio, the small scale of many of the projects, and insufficient business development (i.e., IFC relied heavily on pre-existing relationships with Odisha in particular, instead of actively trying to sell its services across all states).

[75] "Other income" likely represents interest earned on unspent balances and fees received by IFC from clients.

Internal budgets are a critical tool at measuring efficiency; however, IFC has not disclosed activity (individual project) level data on how much it spent on feasibility studies/consultants, travel costs, staff salaries, etc. The project's semi-annual reports spell out clearly what IFC used the monies for, and the breakdown in these reports is typical for such IFC reporting. Some donors want their funds used only for specific purposes (i.e., a tying arrangement) such as paying for consulting fees but not for overheads (i.e., staff salaries). But for the Eco-Cities project, the EU gave IFC broad discretion to use the funds essentially as IFC saw fit. For IFC, the largest line-items are its own staff costs, followed by travel, and then consulting costs. IFC procures third-party, private sector experts - typically engineering firms and lawyers - who have the detailed knowledge of technology, preparing sophisticated contracts and/or legislation in force in a particular jurisdiction (i.e., India as a whole or an individual state of India). IFC staff are responsible for managing the experts, building financial models, soliciting investors, and managing the procurement process (usually a two-stage tender with pre-qualification).

Table 8 : The Eco Cities Project's Funding Budgets and Actual Expenditure

Description	Budget € (Euros)	Actual Jun-19 € (Euros)	Variance	% Spend
Staff costs	[redacted]	[redacted]	88%	32%
Consultants	[redacted]	[redacted]	50%	47%
Travel	[redacted]	[redacted]	42%	8%
Contractual services	[redacted]	[redacted]	28%	4%
Overhead costs	[redacted]	[redacted]	51%	4%
Subtotal	[redacted]	[redacted]	**56%**	**94%**
TF management fee	[redacted]	[redacted]	70%	6%
Total	[redacted]	[redacted]	**56%**	**100%**

The relevant figures from the project's July 2019 semi-annual report indicate:

- The importance of consultants in delivering many of the core inputs of the IFC team, namely, engineering and legal due diligence for which skills are lacking in-house or which are more efficiently delivered by external experts whose skills are not needed at IFC on a day-to-day basis. This is representative of how financial investors work (i.e., a small team of 3-4 bankers supported by a dozen external consultants). Indeed, procurement and management of such experts are the most important functions of an IFC team leader, after business development (obtaining new mandates from public sector clients).
- IFC's management charged an up-front fee of 5%. The 5% represents a dead-weight cost on the project, which goes principally to covering accounting costs. This is essentially a doubling-up in overhead costs because the bilateral donor (EU) has its own management costs and then another layer of management costs are incurred by IFC as implementing agency.

IFC maintains internal records but has not shared them with respect to two metrics, which ought to be evaluated here:

- **Success rate** - how many of the "leads" turn into signed advisory mandates (FASA) and how many signed mandates reach contractual close? In the private sector, ratios of 10:1 or higher are typical in business development, that is, only one out of ten "pitches" to a client materializes into a paying contract. Wastewater engagements in Tamil Nadu and Odisha did not materialize, so IFC developed TORs to conduct a country-wide assessment of the market for reuse of industrial wastewater in India.
- **"On hold"** - many projects in the portfolio are moribund, meaning they are "on hold" because the client government has lost interest due to changes in policy or personnel, or because there is no investor appetite for the often-marginal projects IFC is forced to pursue due to its developmental focus.
- **Time invested** - IFC advisory mandates take on average 18 months to close from the signing of IFC's service contract. This is extraordinarily long by the standards of the private sector, where a project procurement cycle of approximately 3 months was standard.

Rating: 2 out of 5

2.3.2 Addressing Delays, Extensions, Terminations

2.3.2.1 SCOPE BIG

From the EU-CSTEP consortium signed agreement in September 2013, the SCOPE BIG project had a very ambitious timescale for obtaining the necessary land; undertaking site investigations; clearing the land; obtaining a suitable water supply; obtaining the necessary approvals from multiple agencies; identifying the necessary biomass resources; clarifying the relevant biomass combustion and thermal characteristics; finalising the concentrating solar-biomass plant design; and engineering, procuring and constructing (EPC) the solar field and the combined solar concentrator and biomass 3 MW_e powerplant. This would then still give enough time for the designated EPC contractor (Thermax) to optimise the power plants operations, and then ensure a stable and sustainable operational status for the solar-biomass power plant, at which point the project would end and BSPGC would be fully responsible for the ongoing operation of the plant. This ambitious timescale necessitated a strong degree of mutual supportive trust and action orientation, and for many critical timeline processes to be done in parallel, rather than doing things in a completely risk-free fully linear fashion.

No significant issues were reported in the interim narrative reports to December 2015, although only 8 acres of land was being offered, instead of the 14 acres envisaged.

It appears that Thermax advised CSTEP (as the project coordinating body) before it started the early manufacturing of 2,400 of its standard medium temperature parabolic trough collectors for the solar-thermal field. These parabolic trough collectors were similar to the ones used in the Shive solar-thermal plant and would have produced medium temperature steam at the temperature and pressure as described in the EU-CSTEP consortium contract and in all project documentation up to an including 15 January 2016.

On 15 January 2016, Thermax, as the EPC contractor, finalised its DPR. At this point the project was running about a year late but there was still time to construct the plant and get it commissioned and running in a stable and sustainable fashion within the project's scheduled 5 year timeframe.

In April-May 2016 MNRE advised of new specifications for high temperature solar thermal collectors. This would have required glass lined steel parabolic trough solar collectors and evacuated absorber

tubes, and synthetic oil as working fluid from the solar field, which Thermax claimed could not be done within the available budget, as was subsequently confirmed when the best new retendered EPC tender came in at double the available project budget.

Two years later, on 19 June 2017, the EU advised CSTEP that the SCOPE BIG contract was being terminated.

In all the available project literature, only the last Project Executive Committee (PEC) meeting of 22 July 2017 mentions that Thermax still have an unresolved claim for Rs. 100 million (€1.18 million) for equipment (but it was stated that the expenditure incurred by Thermax, on the equipment, was done without a Project Management Group (PMG) approval and a Purchase Order as is required under the agreed governance structure). Thermax in response indicated that they had manufactured the equipment in good faith to meet the project deadlines. The activities undertaken by ECN were also stated to have not been approved by the PMG. The reviewers were advised by Thermax on 20 August 2020 that Rs 10.2 Crores (Rs. 102 million or €1,180,000) were still outstanding, and that CSTEP had submitted a claim for consortium expenses to date, including the Rs. 10.2 million crores outstanding by Thermax, but that this remained unpaid by the EU.

The review finding is that the delays up to Thermax's DPR submission to 15 January 2016 were generally addressed in a timely and effective manner. However, from that point on the delays were not effectively addressed. There is no acknowledgement in any project literature reviewed that MNRE had fundamentally changed the solar field parabolic trough specifications to high temperature design. There is also no recognition that Thermax had then apparently already manufactured 2,400 medium temperature parabolic trough collectors in good faith to enable the project to meet its tight deadlines, to the specification consistently mentioned in all project documentation up to and including in the DPR dated 15 January 2016. According to Thermax on 20 August 2020, an amount of Rs. 10.2 Crores (€1,180,000) is still outstanding. It is not clear if ECN and CNRS have been paid either. Hence the effective termination of Thermax's role was from April-May 2016 when MNRE fundamentally changed the solar thermal field specifications from those consistently mentioned in project literature to that point. The further involvement of Thermax should have been formally suspended from around May-June 2016. A negotiated settlement to Thermax should have been done in the 4 ½ years since then, to enable the equipment in question (understood to be 2400 solar parabolic trough units) to be redeployed by Thermax in some other useful application and the project to be terminated in a clean fashion.

Rating 2 out of 5

2.3.2.2 FOWIND

The FOWIND project was completed on time and to its budget, and delivered its envisaged outputs, although with less comprehensive results than envisaged in some areas. Specifically, the project faced significant delays in completing the Gujarat and Tamil Nadu grid integration studies and in the installation of the LiDAR mast and in its installation and commissioning, and hence in obtaining real-time LiDAR wind speed data at a suitable offshore wind site. The project worked very hard with the grid integration studies where the Gujarat and Tamil Nadu grid companies would not release the data needed for external specialist consultants to undertake a suitable dynamic analysis, and eventually the grid companies did their own static grid integration studies. The LiDAR installation had assumed (as per the LogFrame in the Sept 2013 Grant Application Form) that an existing offshore mast could be used at no cost to the project, and that it would be installed in year 2 (2015) as per the FOWIND Inception Report. MNRE instead had to find the funds and procure and install a new monopole

platform (which took two attempts to be successfully installed) and this needed to be funded by MNRE as there was apparently no EU project funding set aside or able to be reallocated for this task. The LiDAR equipment was actually commissioned in December 2017, and hence the wind resource assessment work under the later parts of the project was unable to utilise the envisaged 12 months of real wind data that was to come from the LiDAR. This had a negative impact on the Gujarat feasibility study produced under the project in January 2018 which then did not have access to real wind speed data provided under the project procured LiDAR.

Rating 4 out of 5

2.3.2.3 TA Environment

Most of the activities were carried out as planned and there were no significant delays for any of the activities.

Rating 4 out of 5

2.3.2.4 TA Clean Energy

The EU contracted IDOM for a project duration of four years in January 2014 to provide TA to MNRE on clean energy development. The project reported no significant delay in activities, however, the project encountered ongoing changes in priorities/requirements from MNRE which resulted in minor delays in delivering outputs but did not significantly affect or impact on the project's overall effectiveness. IDOM made strong efforts to meet the deadline and provide the deliverables as quickly as possible.

Due to the excellent support provided by IDOM with EU support in transforming India's ambitious goals towards action/reality, MNRE requested a project extension of 2 more years, i.e., from August 2018 to September 2020 with an additional €2 million budget. However, the EU extended the project with same contract amount as the original amount (€1.01 million) until 2020[76]. Due to the prevailing COVID 19 pandemic situation/delays, a further extension was been requested by MNRE until January 2021[77].

The project has created a positive impact in India and thus it is still ongoing without any termination. All the stakeholders including the beneficiaries seem to be very happy with the benefits of this project.

Rating 4.5 out of 5

2.3.2.5 Eco-Cities

IFC does not disclose activity-level budgets; therefore, only project-level effectiveness can be evaluated for the Eco Cities project. Several metrics that can be employed to measure turning inputs into outputs (value for money) include:

- The disbursement rate is an indication of whether the consultant's (IFC) progress in implementation was sufficient that it needed to draw down the donor's (EU) commitment.
- The "burn" rate is an indication of what percentage of funds disbursed by the donor (EU) were spent by IFC. This is an important indicator when it comes to donor funded projects, especially

[76] IDOM Cover Letter for Request for Extension from Oct 2018 to Sept 2020
[77] As per the meeting with MNRE, 31/08/2020

when the grant is time-bound. But as of Year-End 2019, IFC had managed to spend just over half the funds (56.34%) allocated to it by the EU, which is why IFC sought an extension. The extension was also important for the two TA activities under Eco Cities, which had failed to meet their targets.

- Would the funds allocated to the Eco Cities project have better been spent by procuring renewable energy generation capacity directly or similar other activities? (Opportunity cost)
- A qualitative analysis of the uses to which the funds were put.

The project's semi-annual reports spell out clearly what the Eco Cities project funds were used for and the breakdown in these reports is typical for such projects. Some donors want funds spent only for specific purposes (i.e., a tying arrangement) such as paying for consulting fees but not for overheads (i.e., staff salaries). But for the Eco-Cities project, the EU gave the contractor (IFC) broad discretion to use the monies in the trust fund as it saw fit. For IFC, the largest line-items are its own staff costs, followed by travel, and then consulting costs. IFC procures third-party, private sector experts - typically engineering firms and lawyers - who have the detailed knowledge of technology, preparing sophisticated contracts and/or legislation in force in a particular jurisdiction (i.e., India as a whole or an individual state of India). IFC staff are responsible for managing the experts, building financial models, soliciting investors, and managing the procurement process (usually a two-stage tender with pre-qualification).

The EU allocated €9 million of which, by July 2019, €6.3 million had been disbursed and €5 million was spent. In addition, other bilateral donors contributed approximately €2 million of which €1.7 million was spent.

Table 9 : The Eco Cities Project's Sources of Funding

Description	Amount € (Euros)	Calculation
Funds committed by EU	9,000,0000	(1)
Funds disbursed by EU	6,300,000	(2)
Other income[78]	335,067.19	(3)
Total funds available	6,635,067.19	(4) = (2) + (3)
Total expenditures	5,070,801.35	(5)
Donor funds balance	1,564,265.84	(6) = (4) - (5)
Outstanding EU commitments	2,700,000	(7) = (1) - (2)
Disbursement rate	70.00%	(2) / (1)
Burn rate	56.34%	(5) / (1)

Clients pay IFC a commitment fee when they sign the service agreement (FASA), normally about 10% of IFC's estimate of its service costs and, in addition, a success fee at commercial close. The overall program runs at a loss (i.e., IFC does not break even or earn a profit on the services it delivers).

[78] "Other income" likely represents interest earned on unspent balances and fees received by IFC from clients.

Both the disbursement rate and "burn" rate indicate that IFC was less-than-efficient in making use of the funds that the EU allocated to it. The likely reasons for this were the long delays faced by several of the projects in the portfolio, the small scale of many of the projects, and insufficient business development (i.e., IFC relied heavily on pre-existing relationships with Odisha in particular, instead of actively trying to sell its services across more states).

Internal budgets are a critical tool at measuring efficiency; however, IFC has not disclosed activity (individual project) level data on how much it spent on feasibility studies/consultants, travel costs, staff salaries, etc. The project's semi-annual reports spell out clearly what IFC used the monies for, and the breakdown in these reports is typical for such IFC reporting. Some donors want their funds used only for specific purposes (i.e., a tying arrangement) such as paying for consulting fees but not for overheads (i.e., staff salaries). But for the Eco-Cities project, the EU gave IFC broad discretion to use the funds essentially as IFC saw fit. For IFC, the largest line-items are its own staff costs, followed by travel, and then consulting costs. IFC procures third-party, private sector experts - typically engineering firms and lawyers - who have the detailed knowledge of technology, preparing sophisticated contracts and/or legislation in force in a particular jurisdiction (i.e., India as a whole or an individual state of India). IFC staff are responsible for managing the experts, building financial models, soliciting investors, and managing the procurement process (usually a two-stage tender with pre-qualification).

Table 10 : The Eco Cities' Project's Budgets and Actual Expenditures by Expenditure Category

Description	Budget € (Euros)	Actual Jun-19 € (Euros)	Variance	% Spend
Staff costs				32%
Consultants				47%
Travel				8%
Contractual services				4%
Overhead costs				4%
Subtotal				**94%**
TF management fee				6%
Total				**100%**

The relevant figures from the project's July 2019 semi-annual report indicate:

- The importance of consultants in delivering many of the core inputs of the IFC team, namely, engineering and legal due diligence for which skills are lacking in-house or which are more efficiently delivered by external experts whose skills are not needed at IFC on a day-to-day basis. This is representative of how financial investors work (i.e., a small team of 3-4 bankers supported by a dozen external consultants). Indeed, procurement and management of such experts are the most important functions of an IFC team leader, after business development (obtaining new mandates from public sector clients).
- IFC's management charged an up-front fee of 5%. The 5% represents a dead-weight cost on the project, which goes principally to covering accounting costs. This is essentially a doubling-up in overhead costs because the bilateral donor (EU) has its own management costs and then another layer of management costs are incurred by IFC as implementing agency.

IFC maintains internal records but has not shared them with respect to two metrics, which ought to be evaluated here:

- **Success rate** - how many of the "leads" turn into signed advisory mandates (FASA) and how many signed mandates reach contractual close? In the private sector, ratios of 10:1 or higher are typical in business development, that is, only one out of ten "pitches" to a client materializes into a paying contract. Wastewater engagements in Tamil Nadu and Odisha did not materialize, so IFC developed TORs to conduct a country-wide assessment of the market for reuse of industrial wastewater in India.
- **"On hold"** - many projects in the portfolio are moribund, meaning they are "on hold" because the client government has lost interest due to changes in policy or personnel, or because there is no investor appetite for the often-marginal projects IFC is forced to pursue due to its developmental focus.
- **Time invested** - IFC advisory mandates take on average 18 months to close from the signing of IFC's service contract. This is extraordinarily long by the standards of the private sector, where a project procurement cycle of approximately 3 months was standard.

Rating: 2 out of 5

2.4 Impacts

2.4.1 SCOPE BIG

No solar thermal-biomass plant has been built, in any configuration or to any specification. The cleared land will presumably be used by BSPGCL for some other purpose. Some useful experience has presumably been gained by Thermax in solar-biomass integrated power plants, but this has to be balanced by the fact that Thermax has devoted considerable effort in the plant design that is yet to be paid for. 2,400 medium temperature parabolic trough solar collectors have been manufactured and are available for use in some other application, once some form of partial payment by the EU to Thermax is sucesfully resolved.

Rating 1 out of 5

2.4.2 FOWIND

The FOWIND project made a significant impact towards the future development of utility scale offshore wind farms in India. The FOWIND project moved the option of offshore wind from a general RE concept that was thought to be applicable in Gujarat and Tamil Nadu[79] to a more specific RE option applicable in specific offshore areas in Gujarat and Tamil Nadu and with real-time wind speed data being gathered from a LiDAR installation in one of the most promising specific areas in the Gulf of Khambat in Gujarat, and with 35[80] Indian and International companies having expressed interest in participating in the development of commercial scale offshore wind farms in India. The FOWIND work was further developed in the FOWPI project (separately funded by the EUD to India). A second LiDAR has been purchased and is in the process of being installed in Tamil Nadu in one of the most promising offshore windfarm locations in Tamil Nadu. The purchase of a further four LIDARs are apparently being

[79] As for example was generally scoped in the September 2014 report on the Status and Prospects of India's Offshore Wind Sector undertaken by IT Power for the British High Commission
[80] https://mnre.gov.in/wind/offshore-wind/

considered by MNRE. The option of offshore wind in India is now a tangible RE option that is sufficiently well understood to be deployed at scale when a EUR 1 billion level VGF (Viability Gap Funding) or similar support level is available for a commercial scale initial 1 GW offshore wind farm goes ahead[81].

Rating 4 out of 5

2.4.3 TA Environment

The intended impact of the TA Environment project was to increase the use of green energy sources, energy efficiency and clean technologies for waste management. The project produced the expected outputs, but the outputs did not contribute towards the achievement of the Outcomes. The project led to an increase in the technical knowledge and awareness levels of the government participants in the workshops, seminars, and study tours. The TA Environment project was confined to training, capacity building, awareness creation, seminars, and study tours. There were no pilot projects or facilitation activities for the actual implementation of the projects on the ground. The actual benefits in terms of increased uptake of cleaner technologies for waste management are unlikely to materialize and, even if they did, they would not be clearly attributable to specific training activities.

Given the project time constraints and the long project preparation times for infrastucture projects, there are no immediate achievements of the project towards the establishment of more efficient facilities etc. However, eventually better environment-friendly technologies may get adopted on a long-term basis.

Rating 2 out of 5

2.4.4 TA Clean Energy

The EU TA Energy project has made a significant impact in India. The pilot establishment of ECBC cells in the four states covered has increased the coordination between the central and state governments and also helped in understanding the need for ECBC cells in each state. With the lessons learnt from the project, the ECBC building codes were revised and new versions were published in 2017.

Similarly, for accelerating the RTS, a reliable and exhaustive information guide on the GCRT program was developed by IDOM in coordination with MNRE after a detailed study and analysis of the scheme documents and guidelines. This was the only comprehensive information guide available on RTS which was published in 2017. The SPIN portal has reduced the registration time for RTS from days to minutes and the application and approvals process time from 30 days to 20 minutes with significantly minimized consumer involvement now being required[82].

The seminars and trainings had made a notable knowledge transfer among the DISCOs. Though RTS and solar parks are under development in various states, the State of UP is the good example for the acceleration of solar development in India. At the beginning of the project, some of the Uttar Pradesh (UP) State DISCO staff did not have a fundamental knowledge of RTS. The TA Energy provided training programs have certainly enhanced the DISCO staff RTS knowledge and understanding which has resulted in installation of more than 6 MW cumulative capacity of RTS by the UP DISCOs, and more than 11 MW cumulative capacity of RTS projects are in the pipeline. During the evaluation meeting,

[81] The timing of suitable VGF or similar funding support becoming available is unclear, at a realistic earliest it would occur 2-4 years after the 2014 Indian General Elections, and/or when India runs out of new onshore wind and repowering of early wind farms with larger and lower O&M cost turbine options.
[82] EU-India technical cooperation project: Energy, completion of 6 successful years, 2020

UPNEDA stated that it would not have been possible to achieve 6 MW of RTS without the MNRE/IDOM/EU support[83]. Similarly, there is a plan to develop 3 solar parks of 600 MW capacity each in the State of UP. Currently planning on the evacuation part is on-going. It is expected that the MNRE will sanction a cumulative area of 12,000 hectares of land for these solar parks' development[84]. The grid has enough capacity to accommodate more RTS in future. The DISCOs keep upgrading the transformer ass and when required[85]. This shows the interest of the state and central governments in establishing solar power at the desired large scale.

Similarly, in the waste to energy project component, the development of biomass co-firing is being planned. IDOM has conducted trainings and webinars with the help of a Polish institute on co-firing technology from which UPNEDA has benefitted. UPNEDA then conducted the training sessions to the generation companies which gained knowledge about co-firing in thermal power plants of paddy/wheat straw in the form of pellets along with paddy husks. The cost saving aspects by avoiding burning of coal was also explained to the generation companies. It is also expected that the use of paddy/wheat straw and rice husk could also generate non-farm employment. As a result of the training, the State government of UP has invited a bid for processing paddy straw as fuel in a 400 MW thermal power generation plant[86].

Thus, the project has created a positive impact in clean energy development in the country.

Rating 3.5 out of 5

2.4.5 Eco-Cities

None of the overall objectives set for the project at the outset have been met. IFC reports that only three small-scale projects have reached commercial close. There has been much less interest in the energy audits and EE financing than anticipated. Several of the specific objectives are outputs rather than outcomes: for instance, preparing reports or drafting regulation is not an outcome and will not subsequently have any impact unless that work is put to some use.

Table 11 : The Eco Cities Project's Targets and Claimed Actual Results

Overall Objectives	Units	Target	Claimed actual At June-19[87]
GHG emissions reduced	MT/year	1,000,000	32,089
Value of investment facilitated	$m	200,000,000	90,000,000
Energy savings/RE produced	MWh/yr	40,000	2,390
Costs avoided	$m	90,000,000	3,325,208
Access to improved services	People	80,000	Nil
Specific objectives			
PPP contracts signed	Number	8	3

[83] As per the meeting with UPNEDA, 16/10/2020
[84] As per the meeting with UPNEDA, 16/10/2020
[85] As per the meeting with UPPCL, 16/10/2020
[86] As per the meeting with UPNEDA, 16/10/2020
[87] These are IFC claimed figures and cannot be independently verified by the evaluation team.

Laws/policies adopted	Number	2	3
Procedures improved	Number	5	3
Loans disbursed for green housing	$ million	50	Nil
Number of entities certified	Building	20	Nil
Entities reached	SMEs	500	39
Loans disbursed for EE/RE	$ million	20	Nil
R1: Municipal PPPs			
Reports completed	Number	8	14
R2: Green building incentives schemes			
R2.1 New laws drafted	Number	5	14
R2.2 Procedures improved	Number	5	0
R2.3 New financial products	Number	2	1
R3. SME energy efficiency			
R3.1 Entities receiving advice	Number	10	1
R3.2 New financial products	Number	2	Nil

Post-transaction monitoring: IFC's service contract (FASA) with its municipal clients includes a provision for post-transaction monitoring for 5 years after commercial close. However, in the evaluators' experience, no one performs this monitoring function in practice and the Investment Officers who were responsible for individual projects lose interest after the project has reached commercial close; indeed, the entire incentive structure for IFC Investment Officers focuses on winning the advisory mandate and upon reaching commercial close with investors. IFC gets paid a success fee at commercial close and provides little support thereafter (assuming some other lender is providing debt), and takes no interest whatsoever during construction and O&M.

Impact on CO_2 emissions, etc.: IFC does not have the skill to implement large-scale projects that could have a major impact on a power system as complex as India's. (In contrast to the World Bank and ADB, which regularly lend in €450 million increments.) IFC is not even competitive with local investment banks and advisory firms. What IFC can do is take on high-risk projects (e.g., those that take more than 3 months to close) with clients who cannot afford or do not wish to pay for professional help (usually the latter). As a result, due to this scale issue, IFC's project portfolio is expected to have a small impact on key energy output (MW) and CO_2 reduction indicators. The impact will also be difficult to measure because DISCOs do not publish plant-wise data identifying where they buy their energy. Arguably such data may be available from the TSO, Power Grid Corporation of India or from POSOCO, the dispatch center, but probably not. (It would be IFC's responsibility to collect such data, but there is no evidence that IFC have done this.) Turning to CO_2 reductions, IFC had an indicative internal spreadsheet for CO_2 emission reductions, but it has very little if any predictive value because it is based upon general rules-of-thumb. A much lesser concern is sustainability: the private investor who bid on the project will have

every incentive to complete construction and operate the infrastructure through to the end of term (usually 15-30 years).

Table 12 : The Eco Cities' Project Level Impacts

Project name	Description	Impacts
Bhubaneswar e-waste management	To establish a citywide e-waste management system in the capital city of the State of Odisha.	Project resulted in the collection of 11,227 kg of electronic waste. Enquiries have been unable to confirm that the collection of e-waste is continuing after the IFC intervention came to an end. If collection has stopped then the impact would be limited.
Chennai Waste-to-Energy PPP	Remediation of two existing municipal dumps and construction of a waste-to-energy plant.	the Tamil Nadu Investment Board has put the project on hold while it explores other options. Accordingly, the project has had no discernible impact apart perhaps from dissuading local authorities from a project which probably is not viable.
Odisha grid connected rooftop solar replication PPP	Solar PVs are being used to generate electricity at the retail (rooftop) scale and at the wholesale scale.	The Odisha Grid Connected Rooftop Solar Replication PPP has been delayed by the change in implementation model from net- to gross metering, which depends upon the approval of the Odisha Electricity Regulatory Commission (OERC).
Odisha solar park PPP	This is a utility-scale project, which has been reduced from 1,000 MW across 7x sites to 275 MW on 2x sites.	The project is on hold due to delays in transferring land from one state-owned entity to another.
Pune grid connected rooftop solar replication	IFC is advising Maharashtra Energy Development Agency (MEDA) for grid connected rooftop solar PV in eight cities. Over 1,000 government buildings will be connected, with a generation capacity of 51.5 MW.	No impact as yet. MEDA will initiate bidding of the first 8-10 MW capacity RTS projects based on the findings.
Bhubaneswar proliferation of grid connected rooftop solar (OREDA)	A web-based IT platform and mobile app, which guides homeowners through the installation of rooftop solar PVs. It also speeds disbursement of subsidies to homeowners.	Over 1,000 vendors/channel partners were registered, and a few rooftop solar installations were implemented. The platform was integrated with SPIN, which is the national platform for rooftop PV projects of the Ministry of New and Renewable Energy (MNRE).
Bengaluru Street Lighting PPP	A private investor/operator replaced 200,000 halogens lamps with LED lamps and installed 50,000 security cameras.	The only clear success in IFC's portfolio of projects. This is claimed to be the largest, most complex municipal street lighting project in

Project name	Description	Impacts
		India. It involves the maintenance of 200,000 lamps (replacing halogen lamps with LED lamps) and 50,000 security cameras. The project is claimed to result in a reduction of 85.5% in energy consumption and "significantly" improved service levels. Costs are claimed to fall from €30 million per year.
Bihar Green Affordable Housing PPP	Green, affordable housing program, which is being developed on six sites of about 60 acres each in five cities.	A presentation is expected to be made to the Chief Minister (Head of Government of Bihar). IFC is expecting the approval of the TSR and a signal to proceed to the preparation of bid documents by October 2020. As yet, there is no impact.
Electric vehicle charging stations	Municipal governments in Thane and Bhubaneshwar wish to deploy electric vehicle charging stations.	Too early to evaluate.
Catalyse Green Buildings Market	• Registered approximately 34,000 homes for EDGE certification (all in the affordable housing sector), with a total floor area of more than 10 million sq. ft. • IndoSpace developers registered almost 1,000,000 sq. ft. of commercial space, becoming one of the first warehousing companies to go green • Supported development of a retail loan (mortgage) for green affordable housing for Piramal Capital Housing Finance Limited	Significant potential impact.
Catalyse Green Buildings Market	Drafted sixteen (16) energy efficiency regulations/policies.	Only one policy has been enacted/implemented; accordingly, the impact is minimal. Changing laws or issuing new regulations involves a substantial investment in time and of legal expertise, owing to the consensus-driven nature of the legislative process (i.e., need to create a majority in favour of amending legislation in the relevant local legislature.
Promote Competitive SMEs		Minimal impact due to low uptake from private sector.

Rating 1 out of 5

2.5 Sustainability

There are two main indicators of RE project sustainability:

- A project is added to the National Electricity Plan (good)
- A project has entered into service (best)

The following are not indicators of sustainability: A feasibility study has been prepared; unless a project has obtained (or is well on the way to obtaining) internal approvals, gone to tender and obtained financing, it may be abandoned before entering into service - resulting in no practical impact.

2.5.1 Likely Post-Programme Results

2.5.1.1 SCOPE BIG

The SCOPE BIG project has provided no tangible outputs beyond Thermax's 2,400 parabolic trough solar collectors that have remained in storage since the project was formally terminated on 31 March 2017. The 2,400 parabolic trough solar collectors will presumably remain unused and in storage, pending a mutually acceptable (partial) payment by the EU for Thermax's manufacturing costs prior to the project being cancelled. As a key solar thermal technology provider in India, Thermax is unlikely to want to work for EU projects again, limiting Thermax's future work on using its indigenous low cost parabolic rough solar collectors for low-medium temperature heat applications. There is no working solar thermal and biomass plant to demonstrate, so there will be no likely post-programme results. The 2,400 parabolic trough solar collectors manufactured by Thermax are available for use in some other solar thermal application, but this would first require the settlement (in some mutually agreed form) Thermax's claim for payment. There is no indication yet of moves to resolve the payment of the 2,400 parabolic troughs and hence enable them to be used elsewhere.

Rating 1 out of 5

2.5.1.2 FOWIND

The FOWIND project's tangible outputs form a key part of the increased and sustainable knowledge of general and specific offshore wind factors that will form the basis of the first utility scale 1 GW utility scale offshore wind development in India that can take place 2-4 years after around €1 billion of VGF or similar offshore wind support becomes available. The FOWIND project's reports and capacity built in GoI and private sector players was in parallel with a British High Commission general offshore wind scoping work completed in September 2014 and the first parts of the separate EU funded FOWPI project implemented from December 2015, hence showing that the offshore wind development support provided by the EU under FOWIND is sustainable.

The FOWIND project's outputs and finding and recommended next steps feature prominently in the MNRE website information on offshore wind and key FOWIND reports are downloadable from the MNRE website[88]. In addition, the first LiDAR equipment to measure actual wind speeds was purchased, installed, commissioned and started providing real-time from November 2017 and this calibrated

[88] https://mnre.gov.in/wind/offshore-wind/

measured wind speed data at various heights data is freely downloadable from the MNRE website[89]. The GoI is now considering the purchase and installation of five additional LiDAR's to measure the offshore wind resource at the most promising sites in Gujarat and Tamil Nadu. In addition, in April 2019 India and Denmark signed a cooperation agreement on RE development, with a focus on offshore wind. Hence, although the first tangible 1GW utility scale offshore wind development in India is not yet underway, the FOWIND project has made a significant impact on the sustainability of offshore wind energy development in India.

Rating 4 out of 5

2.5.1.3 TA Environment

The project led to an increase in the technical knowledge and awareness levels of some relevant Indian government officials through the workshops, seminars, and study tours fielded by the project. Some of the outputs of the projects were reports on the technologies, seminar reports, workshop reports etc.

The project did not institutionalise the process of increasing the relevant Indian government officials' knowledge and awareness. With the inevitable retirement and movement of the government officials across different functional areas, the expected benefits on tangible projects due to the increased knowledge and awareness of a group of past government officials will not be realised. Further, at the level of the EU there is no formal process of preserving the knowledge products out of the projects and sharing it for the benefit of new Indian government officials who could benefit from such knowledge products.

Rating 1 out of 5

2.5.1.4 TA Clean Energy

The implementation of the EU TA Energy project may lead to the possibility of establishment of ECBC cells across all states in India. Currently, various states are in the process of establishing the necessary ECBC cells, however, it is occurring at a slower pace.

Similarly, the RTS would have more pipeline projects and accelerate in future due to the deployment of SWC across all states of India. Because, within the short period of time, the RTS installed capacity in the State of UP alone has increased to 6 MW and more than 11 MW capacity are in pipeline[90]. Thus, the other states would also be expected to increase their capacities which may result in meeting the national target (RTS) of 40 MW by 2022 and also contribute to the national solar missions of India. Currently, the relevant states have started to engage the private sector in trainings along with the DISCOs for the RTS development. Also, three solar parks of 600 MW capacity each are in development in the State of UP alone and more solar parks is expected to be in pipeline in the future[91].

The waste-to-energy initiative requires support from international organizations such as the EU. Appropriate training, knowledge and technology transfer on waste collection, waste recycling, disposal, etc., would help result in significant development of waste to energy technologies in the country. Currently, international organizations such as UNIDO–GEF is actively providing support to the

[89] https://mnre.gov.in/img/documents/uploads/536a7831d34745108c3611d2858ae2db.pdf
[90] As per the meeting with UPNEDA, 16/10/2020
[91] As per the meeting with UPNEDA, 16/10/2020

development of waste to energy projects which may also accelerate the technology development and fosters the private sectors participation[92].

Thus, the post program results will have increased the momentum in the uptake of clean energy technologies.

Rating 3 out of 5

2.5.1.5 Eco-Cities

Only a handful of Eco-Cities projects have reached any form of closure.

Table 13 : The Eco Cities' Project Level Sustainability

Project name	Description	Sustainability
Bhubaneswar e-waste management	To establish a citywide e-waste management system in the capital city of the State of Odisha.	Not sustainable.
Bhubaneswar proliferation of grid connected rooftop solar (OREDA)	A web-based IT platform and mobile app, which guides homeowners through the installation of rooftop solar PVs. It also speeds disbursement of subsidies to homeowners.	Unclear who is managing the platform at the end of IFC's involvement.
Bengaluru Street Lighting PPP	A private investor/operator replace 200,000 halogens with LEDs and install 50,000 security cameras.	Clearly sustainable.
Catalyse Green Buildings Market	• Registered approximately 34,000 homes for EDGE certification (all in the affordable housing sector), with a total floor area of more than 10 million sq. ft. • IndoSpace developers registered almost 1,000,000 sq. ft. of commercial space, becoming one of the first warehousing companies to go green • Supported development of a retail loan (mortgage) for green affordable housing for Piramal Capital Housing Finance Limited	Not sustainable in the absence of ongoing donor support. Noting the competition amongst different Green Building certification systems, it is unlikely that EDGE will be sustainable absent ongoing donor support against locally "owned" green building certification systems such as GRIHA with its ongoing TERI support.
Promote Competitive SMEs		Not sustainable

Rating: 1 out of 5

2.5.2 Project Exit/Continuation Strategies

[92] As per the meeting with MNRE, 31/08/2020

2.5.2.1 SCOPE BIG

The solar thermal and biomass 3 MW_e power plant envisaged in the SCOPE BIG project is no longer financially viable in any conceivable variation as compared to now lower cost solar PV in dedicated solar farms or on rooftops, and also compared to wind power. Indeed, there is no realistic viable continuation strategy possible for concentrating solar power on its own or combined with either storage or biomass, such is the current cost advantage of solar PV or wind power in India.

However, the SCOPE BIG project has not had a clean exit strategy implemented to date either. Although the project was terminated in 31 March 2017 when it was realised that the new MNRE solar thermal project technical requirements could not be met within the project budget, and further expenditure ceased, there are still apparently €2,105,780 of outstanding claims by Thermax, ECN, and CNRS that have not been paid[93].The largest claim still outstanding is by Thermax. And while the claim by Thermax is outstanding, 2,400 parabolic trough solar concentrator units remain in storage, getting slowly outdated and costing Thermax storage fees. It would clearly be preferrable if some arrangement could be reached between the EU and Thermax to cover some of the unrecoverable cost of Thermax in manufacturing the 2,400 parabolic trough solar concentrator units prior to the project being terminated, and to the originally accepted technical specifications. Then the 2,400 parabolic trough solar concentrator units could be redeployed in some suitable industrial or similar operation where their apparent 4.25 MW_{th} of 212˚C output steam[94] could be utilised effectively.

Rating 1 out of 5

2.5.2.2 FOWIND

The FOWIND project's early positive results led to a separate EU funded FOWPI project that was underway from December 2015, and which built on the FOWIND project's early results. The government of Denmark has also launched an offshore wind technical cooperation with India, the Energy Sector Cooperation between India and Denmark (2018-2021).

The FOWIND project ended as scheduled in March 2018 and the MNRE offshore wind website still provides downloadable access to the key FOWIND project reports. Hence the FOWIND project's outputs and capacity built is likely to continue and the project has achieved suitable project exit/continuation modalities.

Rating 5 out of 5

2.5.2.3 TA Environment

The project did not have any exit strategy. As per the requirement, an end of project report was prepared, but it is highly likely that this report will be read by future Indian government officials responsible for solid waste management and wastewater and sewage management. As such the sustainability of the results of the project will be very limited.

Rating 1 out of 5

[93] CSTEP SCOPE BIG – Summary of Expenditure to 31 August 2017
[94] DPR - Annexure IV Heat and Mass Balance Diagram (HMBD) as at 25 June 2015

2.5.2.4 TA Clean Energy

The EU TA Energy project was focussed on training, capacity building, awareness creation, developing standard documentation, seminars and study tours. The project did not work directly on developing pilot projects or facilitation activities for tangible project implementation on the ground.

MNRE has been trained/gained knowledge to a level needed to scale up/accelerate the RTS and solar parks without the further support of IDOM. MNRE has also mentioned that the solar parks are now at a sufficient stage of development that they will be developed, and business models will be replicated without further external assistance being required[95]. The Waste to Energy projects are in ongoing development with the support of other international organizations.

Thus, the RTS, solar parks and waste to energy technologies will almost certainly continue to be developed after the completion of the TA Energy project. Therefore, the project is very likely to result in ongoing positive and tangible impacts in India.

Rating 4 out of 5

2.5.2.5 Eco-Cities

IFC advisory programmes such as the Eco Cities project funded by the EUD are paid for out of evergreen trust funds. Fundraising is the principal focus of IFC management. If EUD funding expires, IFC management will seek monies elsewhere to cover overheads (mainly the salaries and benefits of IFC personnel) and direct costs associated with projects (travels, consultants, and so on). By implication, the withdrawal of EUD funding should have no influence over PPP projects in IFC's pipelines because substitute monies will be found. The other two projects - Catalyse Green Buildings Market and SME Energy Efficiency – have an uncertain future. Historically, IFC has created such smaller-scale projects in response to donor demand and has wound them down when funding lapses (along with the associated personnel).

Rating: 2 out of 5

2.6 EU Added Value

2.6.1 SCOPE BIG

In the SCOPE BIG project, the Energy Research Centre of the Netherlands (ECN), and the National Center for Scientific Research of France (CNRS-ICARE) were designated EU organisation partners to the project.

ECN undertook an analysis of the heating value, chemical analysis, ash content etc for rice husk biomass samples gathered by CSTEP for designing the boiler/gasifiers for the thermal part of the project. However, rice husks had been previously used widely as fuels for boilers and gasifiers in India, so it is not clear if the ECN work on biomass for gasifier and combustion characteristics was not already known or was work that was not able to be done in India.

[95] As per the meeting with MNRE, 31/08/2020

CNRS apparently reviewed the design philosophy of the power plant. However, no reports or visible outputs from CNRS were available to the reviewers.

Hence, it is not clear what significant added value the EU provided to the SCOPE BIG project beyond funding. In addition, the EU requirement for bank guarantees for any funding provided of EUR 1 million or more were accepted and provided by Thermax, but were not acceptable to proposed new EPC contractors when the project was rebid to the new specifications provided by MNRE.

Finally, the EU has been unable or unwilling to negotiate a mutually acceptable solution since the project's termination on 31 March 2017 with Thermax for the cost of the 2,400 parabolic trough solar concentrator units that Thermax had started manufacturing in parallel with the DPR, this parallel process was needed if the tight timeline to project operation was to have been met.

Hence, the EU added value, beyond providing EUR 951,334 out of the budget of EUR 8 million, is not clear.

Rating 2 out of 5

2.6.2 FOWIND

The FOWIND project linked the EU, which had and still has the largest global installed capacity of offshore wind, with India, which is a key future market application focus for offshore wind. Multiple EU member states, namely the UK (in the EU to Jan 2020) with 45%, Germany with 34%, Denmark, with 7%, Belgium with 7%, and the Netherlands with 5% had significant amount of offshore wind installed capacity in December 2019[96]. Other EU member states are also significant players in parts of the offshore wind supply chain. Hence the EU clearly added value by providing a pan-EU approach to the issue of offshore wind technical cooperation with India, compared with individual EU member states having multiple overlapping separate cooperation activities with India.

Rating 5 out of 5

2.6.3 TA Environment

Implementation of the TA Environment project under the EU could have enabled a careful selection of technologies, places for study tours, etc, from a wider area that is aligned with the needs of Indian cities. In comparison, if the TA would have been administered by a single EU member state, the choices of technology demonstrations would have been comparatively restricted. However, there is no evidence that this EU detailed focus comparative advantage was utilised.

Rating 2 out of 5

2.6.4 TA Clean Energy

[96]https://windeurope.org/wp-content/uploads/files/about-wind/statistics/WindEurope-Annual-Offshore-Statistics-2019.pdf

The EU TA Energy project organized a high-level policy/technical mission to Europe to provide information about the best EU PV power generation practices, promote India's Solar Parks Program among EU financial institutions and investors, and establish business networking meetings, etc. These activities would have possible cooperation development in future.

IDOM has not only provided support to the development of clean energy technologies, but also promoted the potential of clean energy development at the global level through relevant conferences. For example, a conference was organized during the 2nd Global RE-Invest 2018 to highlight the rooftop solar PV market trends and practices in Europe and India. The conference was attended by over 100 delegates from the central government, state governments, bilateral agencies, research institutes and financial institutions[97].

In order to provide the necessary knowledge, understanding and provide a solid foundation for biomass co-firing and PV waste management in India, IDOM organized webinars and meetings to discuss the technologies that have been used in Europe and possible cooperation for their technology transfer in India. IDOM engaged suitable experts from the Institute for Chemical Processing of Coal, a Polish R&D institute, supervised by the Polish Ministry of the National Assets, to provide trainings on co-firing the biomass in power plants[98].

This TA Energy project's EU wide focus has provided more value than technical assistance from individual EU member states, because European countries have differing aspects of expertise in the development of relevant clean energy technologies. Hence, the EU-wide support provided under the TA Energy project gave the Indian counterparts valuable exposure to the most advanced relevant energy technologies in the world through its study tours, trainings and webinars. Also, the project provided meetings with key experts of EU member countries will help foster future investments in clean energy technology development in India.

Therefore, all the TA Energy project activities have provided EU-wide added value towards the implementation and replication of ECBC, RTS, and WTE tangible projects in India.

Ratings 4 out of 5

2.6.5 Eco-Cities

In the Eco Cities project, the EU engaged IFC to support the development of new RE projects using PPPs, assisting greater EE through the encouragement of green buildings, and assisting the uptake of EE in SMEs through the support of energy audits. These are all areas where EU institutions, firms and experts have deep expertise that would have been of value to India. However, there is no evidence that the EU promoted the use of such EU expertise, nor that IFC, as the implementing agency of the Eco Cities project, availed itself of EU based expertise in the Eco Cities project's design or implementation.

The main value added of the EU's support of the Eco Cities project was, and still is, in providing implementation funding. However, in providing funding, the EU has not brought any added value compared to any other donor which might have provided funding. The Eco-Cities program has received bilateral funding (which the IFC counts as "its" share in its reports to the EUD), from donors who are Member States of the EU.

[97] EU-India technical cooperation project: Energy, completion of 6 successful years, 2020
[98] EU-India technical cooperation project: Energy, completion of 6 successful years, 2020

Rating 1 out of 5

2.7 Coherence with EU Strategy

The overall aim of the EU Sustainable Development Strategy (2001, revised 2007) was to identify and develop actions to enable the EU to achieve a continuous long-term improvement of quality of life through the creation of sustainable communities able to manage and use resources efficiently, able to tap the ecological and social innovation potential of the economy and in the end able to ensure prosperity, environmental protection and social cohesion. The strategy set overall objectives and concrete actions for seven key priority challenges for the period until 2010, many of which are predominantly environmental:

- Climate change and clean energy
- Sustainable transport
- Sustainable consumption & production
- Conservation and management of natural resources
- Public Health
- Social inclusion, demography and migration
- Global poverty and sustainable development challenge

2.7.1 SCOPE BIG

The SCOPE BIG project was initially coherent with the EU strategy for India and also with the priorities of the GoI when it was conceived in 2010-2013, and also apparently up to around 31 March 2015 when Thermax invoices were still being paid. It appears that some time after 1 April 2015 the project was not seen as being coherent with GoI/EU Strategies, as payments of Thermax invoices then ceased.

The project was eventually terminated when it became clear that the SCOPE BIG project could not meet; (1) The EU expectations of 50% solar contribution[99]; (2) the new MNRE (and hence GoI) technical demands from April 2016 for high temperature thermal oil be produced directly from the solar field (instead of the medium temperature steam mentioned in all project literature to January 2016) within the project budget; (3) any realistic replication potentials. As per points 1 and 2, it would have been simpler and cleaner if the project had been deemed to be no longer coherent with the GoI/EU strategies (possibly as a result of the new priorities of the BJP-led government that won the 2014 Indian general election, rather than the GoI (via MNRE) and the EU insisting on new solar field thermal conditions that could not be met within the project's budget.

Rating 3 out of 5

2.7.2 FOWIND

The FOWIND project was coherent with the EU strategy for EU-India cooperation, both at the programme concept and financing agreement stages, and at the project initiation stage in 2013. The

[99] Even with solar field producing high temperature hot oil, as later demanded by MNRE, a 50% solar contribution would require significant and costly heat storage to achieve 12 hours a day of solar providing 100% of the power for a 24/7 operation solar-biomass plant. Hence, a solar field contribution of 50% of the total generation under optimum design conditions (as per the EU-CSTEP consortium contract was never technically possible without large scale heat storage, which was not a part of the original design or budget.

project was, and still is, coherent with the GoI energy and climate change strategies and the GoI's extremely ambitious strategies for scaling up RE in India's rapidly growing electricity supply ambitions.

Rating 5 out of 5

2.7.3 TA Environment

Improvement in the wastewater treatment and management of solid waste is very much on the agenda of the GoI, both at the central and state levels (e.g., Swachh Bharat Mission, Smart Cities). The project objectives was in line with the India-EU Summits and Joint Declarations on cooperation. There is an ongoing cooperation between India and the EU under the Clean Energy and Climate Partnership. The partnership promotes access to and dissemination of clean energy and climate friendly technologies and encourages research and the development of innovative solutions. Under the India-EU partnership for smart and sustainable urbanisation the EU provides support to Indian cities to develop plans for sustainable development, transport, industry, water and waste management, and more recently established city-to-city cooperation between European and Indian cities.

Rating 5 out of 5

2.7.4 TA Clean Energy

During the design and implementation of the TA Energy project, all the project activities were in coherence with the EU strategy for development, and they are still in coherence. The objective of the ECBC project component was to facilitate establishment of ECBC cells in four states, providing legal and policy support to the development and implementation of energy efficiency legislation for the building sector in India in collaboration with the BEE. This activity is still in coherence with the EU strategy for India.

The RTS development was in a nascent stage during the project design. However, the technology has been developed later on due to increased awareness and focus provided by the GoI. However, this is in line with the EU strategy. Similarly, the Waste to Energy developments are in a preliminary stage and are also in coherence with the National requirements.

Therefore, the TA Energy project has increased the market for clean energy technologies and has contributed towards the necessary low carbon development pathway for India. Thus, the EU TA Energy project is in coherence with the EU strategy for India and also contributes to the ambitious goals of GoI.

Rating 4 out of 5

2.7.5 Eco-Cities

During the design and implementation of the Eco-Cities project, all the project activities comform with the EU Sustainable Development Strategy, in particular to the "key challenges" of (i) climate change and clean energy and (ii) conservation and management of natural resources. The Eco-Cities objectives were in line with the India-EU Summits and Joint Declarations on cooperation. There is an ongoing cooperation between India and the EU under the Clean Energy and Climate Partnership. The partnership promotes access to and dissemination of clean energy and climate friendly technologies and encourages research and the development of innovative solutions.

Rating 4 out of 5

3 Overall Assessment

Evaluation Aspect	Evaluation Questions	Preliminary Answers
Relevance	Alignment with India's Priorities - Were the programme / project objectives / activities aligned with the development goals/priorities/ plans of the GoI and state governments in the energy security/access/EE / RE, environmental, and waste management areas?	The programme objectives were set by the GoI and as such were aligned with the general GoI goals/priorities and plans as set out in the programme's Financing Agreement (FA) of December 2010. However, the electricity generation projects were not specific project oriented national priorities, as they were not included in the NEP, including for FOWIND. The programme priorities were primarily capacity building support activities for RE/clean technologies and EE for Union and State Government officials. Large parts of the TA Environment project (particularly Eco Cities and Green Buildings appear to have been largely designed around IFC's capabilities and staffing.
	Linkage with SDGs et al. – Did the programme/ projects align with, and contribute to, SDG 7 (Affordable and Clean Energy), SDG 11 (Sustainable Cities), Leave No-One Behind and the Rights Based methodology, gender, and other relevant social development goals?	The initial programme in the FA was not explicitly or implicitly linked to SDG 7 and SDG 11 as the FA predated the SDGs. However, it appears that the programme and its projects are suitably aligned with SDG 7 and 11. In terms of gender there is little that specifically aligns the programme and projects to gender issues in any tangible or measurable way. Similarly, for social development, there are no tangible actions in the programme FA or in project work plans, in project implementation or on any monitoring reports with a social development focus.
	Private Sector Implementation Focus – Did the programme /projects contribute to an Increased private sector role in delivering GHG mitigation/ clean energy/ renewable energy / energy efficiency in India?	The overall FA and individual project grant applications and contracts were primarily government policy/regulation/guidelines/plans and capacity building focussed. There was no specific focus on the private sector taking a leading role in the origination, structuring, financing, implementation, operation or replication of specific RE/EE/ GHG mitigation projects. The Eco Cities part of the TA Environment project included the use of private sector investors to implement and finance PPPs, although only one project of significance has reached commercial close and other projects that IFC counted as financially closed projects, such as the electronic waste recycling project are not really PPPs or are not directly energy or GHG mitigation oriented. There is also

Evaluation Aspect	Evaluation Questions	Preliminary Answers
		no evidence that the programme and projects were impact focussed. Rather they consist of activities that were aimed to give intermediate outputs, with few explicit links to direct outcomes or impacts. The programme and some of the project activities were not targeted to the private sector, presumably reflecting the GoI focus at the time of the FA in 2010/2011, yet the private sector is the primary driver of RE/EE/GHG tangible project implementation in India. However, the Eco Cities project operated by IFC (IFC is the private sector arm of the World Bank Group) is largely private sector implementation funding oriented.
Effectiveness	Achievement of Planned Results – Were the planned programme/ project key outputs/ outcomes/impacts achieved?	The programme and several projects (excluding SCOPE BIG) have largely achieved the specific numeric mainly capacity building outputs and targets specified in the FA and in the individual project grants/contracts and in their extensions. However, the project outputs are only weakly related to the outcomes sought as they were intermediate capacity building focused activities, and have no effective direct links to the RE/EE/GHG mitigation impacts sought. The EU programme was not designed to, and in its implementation as well, had no direct impact in terms of new RE/EE/GHG mitigation projects. The three claimed IFC PPPs appear questionable in delivering direct energy efficiency gains and hence in reductions in GHG emissions - the Bengaluru Street Lighting project as the Odisha streetlighting project appears to predate EU funding, the Odisha Rooftop solar project is a facilitation App, and the e-waste project is only very indirectly related to GHG/energy. The cost of achieving these direct gains appears to be disproportionate to the value of the gains themselves (inefficiency of means).
	Adaptive Management for Results - Were project activities adapted (including from the ROM mid-term reviews) to better contribute to GoI's evolving national priorities and/or EU priorities and were outputs/results/ outcomes adapted to more directly lead to tangible GHG mitigation/ enhanced RE generation/EE impacts?	The programme and projects practiced some useful effective adaptive management during their implementation. However, the adaptive management was primarily output focussed, and not tangible project outcomes or impacts focussed. For example, the FOWIND and the TA Environment projects were not adaptively managed to focus on specific tangible offshore wind or SWM plants being originated, tendered, financed and built by India's highly capable private sector and in line with the GoI's strong private sector power sector development government focus.
Efficiency	Turning Inputs into Outputs – Did the EU and other inputs produce outputs/results/	The programme and its projects have been reasonably effective, in timeliness and cost effective terms, turning inputs of EU funding into the specified outputs of a primarily capacity

Evaluation Aspect	Evaluation Questions	Preliminary Answers
	outcomes/ impacts in a timely and cost-effective manner?	building nature. However, €18 million spent directly on RE generation projects would have fully funded around 18 MW of new generation capacity through the Eco Cities if this had been prioritised could have produced such scale of tangible results. There is little evidence that EU funding inputs have directly led to tangible and specific RE/EE/GHG mitigation projects that produce or save measurable MWhs or reduced GHG emissions.
	Addressing Delays, Extensions, Terminations - What caused project delays? Could the consequences of extensions or termination have been mitigated?	The ongoing growth in India's GDP and the need to massively increase power generation capacity was explicitly foreshadowed in the FA. However, the NEP was quite explicit that there were a number of preconditions[100] to successfully incorporate new RE into the grid, and these preconditions were not stated or addressed in any part of the programme or its projects. In addition, the shift to private sector leadership in RE power generation growth through solar and onshore or offshore wind was not foreseen in the FA or individual projects designs, nor was it subsequently identified or addressed under adaptive management. SCOPE BIG is a good example of a power generation demonstration that was government, state owned entities, and research led and that ignored the private sector in terms of using available and affordable private sector solar concentrator and boiler technologies in favour of technologies that were not actually available at affordable costs, with subsequent delays and its eventual termination. Promoting of the free IFC EDGE Green Building scheme, awareness raising that lacks post-project sustainable local counterparts, providing free building and SME energy audits, and ignoring existing private sector led Green Building certification tools has led to outputs that are hard to quantify in terms of impacts, and this work has not been an efficient use of project resources.
Impacts	Tangible Outputs/Results - What are the tangible outputs/results /impacts / outcomes produced by the programme/projects that are related to sustainable energy/EE/RE and environmental improvements	The programme and projects largely produced the expected outputs; however, the outputs generally consisted of reports and intangibles such as capacity building, without tangible links to the desired outcomes and impacts. The FOWIND project has contributed useful knowledge and capacity used in subsequent TA projects, such as the EU supported FOWPI project, that could ultimately lead to specific utility scale (e.g., 1 GW) offshore wind farms projects being

[100] Including but not limited to (a) demand management/loss reduction in distribution; (b) addressing the solvency/circular debt issue in distribution; (c) better connections between the four regional transmission networks; (d) improvements in dispatch, balancing and voltage regulation to facilitate real-time balancing; (e) improvements in market design so that wholesale pricing is more transparent with fewer long-term PPAs and more reliance upon power exchanges

Evaluation Aspect	Evaluation Questions	Preliminary Answers
	/SDGs and related policy and administrative frameworks?	tendered, built and operated by the private sector under PPP structures. The Rooftop Solar PV cell established in MNRE has played a useful role in facilitating the expansion of Solar PV. IFC claims to have mobilised €180 million of private investment under the eco-cities project, however this claim cannot be independently corroborated. If at the outset, the electricity generation projects had been explicitly linked to the National Electricity Plan, they would have been considered 'high priority' for the GoI and public utilities, which would have greatly enhanced the likelihood that new generation capacity could have been built directly as a result of the EU intervention. The policy and administrative frameworks supported by programme/projects do not have direct links to specific and tangible EE/RE/GHG mitigation projects actually being implemented.
Sustainability	Likely Post-Programme Results – Do the projects deliver sustainable results, such as improved human capacity, stakeholder ownership, an environment more conducive to private sector-led growth, or better policies and tangible outcomes/ impacts?	Some of the outputs such as the rooftop solar single window approval portal and other solar support activities have strong enough stakeholder ownership to likely continue in some form. Other programme/project supported activities such as municipal solid waste and sewage to energy, SME energy audits, and EDGE green building certification and other activities lack local ownership versus other initiatives underway by other donors and by local partners and are unlikely to continue in an active form post project end. National, state and municipal government officials' capacity generated by the programme and its projects will dissipate as staff are rotated into new positions. The training provided with EU funding will not translate into EU funded programme/project attributable tangible EE/RE/GHG mitigation projects.
	Project Exit/Continuation Strategies - For the two on-going active projects (TA-Energy and Eco-Cities), what, if any, exit strategies, further extensions or additional funding could lead to enhanced outcomes/impacts ?	The TA Clean Energy Project's outputs are largely reports, capacity building and policy/guidelines. The Single Window PV Clearance Portal is a very useful initiative and has been implemented by some interested municipalities and states, however it is already embedded in MNRE, and so does not seem to need ongoing EU support. If there is to be ongoing EU support for the TA Energy and Eco Cities projects or their activities, the supported activities should be related to enhancing the origination, financing, implementation and successful operation of EE and RE projects without ongoing donor support, primarily in the solar PV area as this is an area that appears to have the most promising post intervention sustainability. In contrast, low carbon/green/affordable/smart

Evaluation Aspect	Evaluation Questions	Preliminary Answers
		city and building planning in the Eco Cities project are only indirectly related to tangible GHG mitigation and RE/EE impacts, and lack strong independent post intervention sustainability prospects.
EU Added Value	EU versus EU Member State or Private Sector's Added Value – Did EU involvement in the programme/projects add value compared to Member State interventions or private sector led approaches in clean energy and climate change mitigation in India?	The added value of the EU appears to be limited to responding to ad hoc GoI requests, providing funding, and managing the projects efficiently in an administrative sense. The EU involvement did not add any specific policy dialog and policy or power sector reforms or inclusion of specific projects in the NEP, or specific technical insights or assistance that could not have been equally well provided directly by individual EU member states. Some EU member state funded development agencies such as KfW or SNV or DFID would have been better at providing technical assistance.
Coherence with EU Strategy	EU Alignment? - Were the project activities aligned with the EU strategy in India as well as for Asia, and with other EU policies and Member State Actions??	The programme/project has been suitably aligned with the EU strategy in India and elsewhere in Asia.

4 Conclusions and Recommendations

4.1 Conclusions

4.1.1 Outputs Largely Achieved but Outcomes and Impacts are Unclear

The project designs were primarily activity and output focussed, as can be seen from the programme and project level reconstructed Theories of Change (ToCs) in Annex 3. There was limited problem analysis or barrier removal elaboration in the project designs, as is a requirement in the well-established GEF project design documents (ProDocs) or CEO Endorsement Request Documents (CERDocs)[101]. So, the EU-India programme and project descriptions/contracts were strong on what they were to do, but very weak on why the activities were being undertaken, what barriers were to be removed, sustainability of interventions, and on how to evaluate any RE/EE/climate change mitigation impacts.

The programme and its projects were then essentially managed by the contractors and monitored by the EUD on the basis of their activities and outputs (e.g., numbers of ECBC policies produced, WTE study tours fielded, FOWIND reports produced, energy audits done, etc), which were numerically largely achieved.

However, there was minimal management or monitoring and evaluation for outcomes such as numbers of ECBC policies implemented, officials' WTE knowledge increased in ways that would likely lead to tangible WTE related development actions, reports leading in a logical way to offshore wind development tangible steps such as the quantification or introduction of a suitable financial mechanism (such as VGF), energy savings identified by energy audits, etc.

There was essentially no programme or project level management for sustainability and impacts such as ECBC policies being followed, WTE plants being built, an offshore wind farm being built, energy audit recommendations being implemented, etc.

The result is that the programme and its project largely achieved their tangible outputs, but it is essentially impossible for the evaluation team to quantify the overarching purpose of this impact evaluation - which is what were the quantifiable extra RE generation capacity in place or energy efficiency gains achieved or GHG mitigation achieved – that is what is the **impact** of the programme's EUR 18 million budget?

4.1.2 Questionable Eco Cities and TA Environment Projects' Impacts and Sustainabilty

The Eco Cities project budget was €9 million from a programme budget of €17.95 million[102]. The Eco Cities contractor (IFC) has sought a one-year extension for the Eco Cities project because almost all its components have experienced significant delays. The Eco Cities project has produced or exceeded the targeted number of outputs. The problem is that the impact indicators, such as GHG savings, are based

[101] Nearly 1000 GEF climate change mitigation programs and projects have been funded by GEF over 25 years in over 160 countries, with 8.4 billion tonnes of direct and indirect CO2 emission reductions. GEF projects have comprehensive design and strong evaluation processes, so are very relevant as a benchmark for EU climate change mitigation programs and projects.

[102] €6.3 million was disbursed and €5.7 million spent by 31 December 2019 in the Eco Cities project

on IFC internal estimates, rules of thumb or internal models, and have not been measured directly at the individual RE facility or EE project plant-level. Accordingly, the Eco Cities figures cited are not reliable indicators of project impact.

Only the Bengaluru Street Lighting PPP - involving 200,000 LED lamps (replacing halogen lamps, and 50,000 security cameras - has clear links to the Eco Cities project. The Bengaluru Street Lighting PPP project is claimed to result in a reduction of 85.5% in energy consumption and "significantly" improved service levels. Costs are claimed to fall from €30 million per year. However, even if true, IFC had previously facilitated a streetlighting PPP upgrade in Bhubaneshwar in 2013 with Devco funding, so if the EU had not funded the IFC Bengaluru streetlighting PPP then it is highly likely that another donor would have funded IFC for this project's advisory work. And replacing halogen streetlights with LED streetlights is now a fairly standard "no brainer" straightforward energy efficiency measure, so it is debateable that moving from halogen to LED street lighting really needs EU supported IFC transaction advisory services to be implemented.

The rest of the outputs under Eco Cities are either on hold with no impact yet, or have no clear links to RE/EE/GHG mitigation (e.g., Bhubaneswar e-waste management) or have only very indirect impact linkages to quantifiable RE/EE/GHG mitigation such as green buildings ratings using the IFC EDGE green rating tool, or SME energy audits performed, or energy auditors trained. There was also no evidence of any EU added value in the Eco Cities project. The Eco Cities project activities are generally not sustainable post project end, unless some other donor provides future funding to IFC for such activities.

The TA Environment project had a budget of €1.03 million from a programme budget of €17.95 million. The TA Environment project has been completed and all the budgeted funds were spent in the project's implementation period of 2014-2018. The TA Environment project focussed on Sewage Treatment and Solid Waste Management, largely in Delhi and Mumbai. The project was capacity building and enabling environment focussed and comprised two study tours in Europe, holding a range of workshops and the production of a number of reports. However, project related outcomes are unclear - such as sewage treatment improvements or solid waste management collection or treatment for more productive uses being planned or new enabling environment funding sources being initiated. In addition, there is no links to any impacts such as sewage treatment or solid waste management plants being rehabilitated or newly built. The TA Environment project has no clear sustainability pathways or clear links to any impacts.

4.1.3 Insufficient Private Sector and Implementation Focus

India has a vibrant, technically and financially capable, and highly competitive private sector that can identify, plan, design, finance, implement, construct and maintain RE and EE projects when there are suitable policy, regulatory and financial conditions in place – including that the project or technology is mentioned in the NEP[103] to ensure that suitable transmission capacity is planned for and put in place to evacuate the RE projects' electricity generated. The public sector can propose, plan and subsidise, but the private sector now delivers nearly all new tangible and sustainable RE and EE projects in India. However, the EU funded programme and its constituents project primarily worked with government counterparts and involved considerable work on the capacity building of government officials, officials who are regularly rotated into other posts as part of general government staff management and promotions. There was very little effort expended under the programme into what the private sector would need so that they could successfully develop, finance and operate the desired RE/EE projects.

[103] India has a highly influential National Electricity Plan that is formulated and published every five years.

4.1.4 PPPs Have Been Oversold

Some projects described as PPPs are not really PPPs - such as the Bengaluru e-waste project under the Eco Cities project, and SCOPE BIG[104]. SCOPE BIG used novel technology combinations and applications and as such increased the technical and commercial risk for any private partner, making the project less attractive to private investors if it had indeed been a real PPP project. Private investors want simple de-risked projects, not first-of-a-kind small 3 MW RE projects integrating three separate RE technologies. A PPP is a fixed-term contract pursuant to which a private sector investor may, depending on the project requirements, design, build, equip, finance, operate and maintain public infrastructure in return for revenues, which may be collected from end-users and/or from the public grantor.[105] PPPs have been oversold as a solution to the "infrastructure deficit." There is a surfeit of investment capital in India, but an insufficient number of properly structured projects where private sector investors can get a reasonable return. Governments have turned to PPPs in the expectation that in doing so they would realize budget savings. Such savings have seldom if ever been realized in practice because PPPs depend for commercial viability upon public guarantees and subsidies (take-or-pay, feed-in contracts, lifeline tariffs, etc.). Infrastructure provision cannot be divorced from political-social commitments, such as universal access and affordability. There is now rising political opposition to PPPs. Tightening credit conditions since the 2007-09 global financial crisis has forced governments to fill the financing gap with more public money, which in turn has sharpened the focus on value-for-money. Finally, changes in public accounting rules reclassified the promises made to support PPPs as government debt, reducing bureaucratic incentives to use PPPs as a means of bypassing budget caps.

4.1.5 Linkages Lacking to Underlying Energy Sector Reforms Needed

To have made significant RE impacts, the EU-India programme and projects would have needed to at least acknowledge some or all of the following long-standing overarching structural challenges facing the integration of additional RE into the five Indian power grids: (1) a preponderance[106] of 25-year bilateral contracts between GENCOs and DISCOs making it especially difficult for new RE generation projects to "break in" and successfully sell their new RE generation to relevant DISCOs; (2) frequent curtailment in the dispatch of variable RE due to low demand, grid instability, or transmission congestion; and (3) the large circular debt of DISCOs to GENCOs, raising the cost of capital for new RE projects as they would be selling to DISCOs with low credit ratings. However, these underlying structural issues hindering the uptake of RE in India were not acknowledged or addressed in the EU-India programme funded projects.

In addition, the above issues are the types of underlying structural challenges in which the EU has considerable expertise and which EU provided technical assistance could have usefully addressed.

[104] See 2nd para, Section 1.7, Annex 1 of SCOPE BIG EU-CSTEP Contract of 27 September 2013 where the project is described as a PPP

[105] According to the PPIAF database, over five hundred such projects have been implemented in India's energy sector since 1996 (https://ppi.worldbank.org/en/customquery).

[106] The Indian Energy Exchange (IEX) handles less than 1% of transactions

4.2 Lessons Learned

4.2.1 Need Overriding Emphasis on Outcomes, Impacts and Sustainability

The EU-India programme's projects largely achieved their expected outputs, but it is unclear to what degree the expected outcomes and impacts were achieved, and also how sustainable the outputs are.

The lesson learned is that the individual tangible projects of a programme need to have a solid basis in clearly articulated Theories of Change (ToCs) with logical and measurable logical chains of activities-outputs-outcomes-impacts. Then in the implementation of the projects within a programme, there needs to be an overriding emphasis on adaptive management for results, where results are clearly understood to be at the outcome, impact and sustainability level. For the EU-India programme this would have been new RE generation sustainably operating or MSW or sewage GHG emissions avoided, and not just the number of activities and outputs such as study tours fielded regardless of their relevance to Indian conditions, or PPPs pursued regardless of whether they are implemented. The FOWIND project partly showed what is required, where the focus was clearly on ultimately leading to a utility scale (e.g., 1 GW) offshore wind farm developed. The SCOPE BIG project clearly showed what not to do, where adaptive management made a bad situation worse when the solar concentrator specifications were tightened mid project and then the EPC contractor was not even partly paid for the 2400 parabolic solar concentrator troughs already manufactured to meet the tight project timeframes.

4.2.2 Need Stronger Focus on Independently Verifiable Outcome/Impact Indicators

Eco Cities, the EU-India programme's project with the largest single budget (comprising 50% of the total budget) had self-reported activity and output indicators, and what minimal outcome or impact level results were claimed could not be independently verified. The lesson learned is that the project designs, the contractor implementation, and the EUD overview function needs to ask for, demand, and link payments to having suitable independently verifiable indicators for programme/project management for results and for impact evaluation purposes at the end of the project. In addition, the EUD needs a stronger Independent project monitoring and evaluation (M&E) function via specialist contracted staff or independent consultancy support so that the current situation of a lack of independently verifiable indicators is avoided in future.

4.3 Recommendations

4.3.1 EUD to Field Additional Project Management Staff for Stronger Results Focus

It is recommended that the EUD reinforces M&E capacity – so that in future programmes and projects - such as in the EU-India programme - either the contractor teams include suitable M&E staff, and/or the EUD add suitable in-house staff or contractors to ensure that the projects firstly have suitable M&E plans, secondly that the M&E plans are followed, and finally that independently verifiable outcome and impact level information is continuously gathered. This would then ensure that the current situation, where the Impact Evaluation Team essentially lack the programme/project design logic and independently verifiable data to answer what the impact of the EU-India programme is at its implementation end point when nearly all funds have been expended. It is recommended that the EU requires IFC to amend its standard-form service agreement (FASA) to permit disclosure of key

documents such as the feasibility study, financial model, project contracts and tender documentation to the EU so that the EU can undertake meaningful independent assessments of IFC projects funded by the EU.

4.3.2 EU to Develop More Cost-Effective Project implementation / Transaction Advisory Models

It is recommended that the EU either (1) establishes its own in-house capacity, or (2) works directly with allied institutions such as EIB or multilateral development banks such as EBRD and ADB, or (3) works with the private sector for project implementation or transaction advisory support, or (4) establishes a framework contact with IFC where it wants IFC to provide project implementation or transaction advisory support.

The EU is a large enough donor at the global level to develop a suitable on-the-ground local capacity to develop projects itself, as is already done by large donors such as KfW.

The EU could alternatively work with allied institutions such as EIB or suitable multilateral development banks such EBRD or ADB where EU grant funding would usefully support public or private sector loans provided by the allied institution. The multilateral institutions/development banks are generally amenable to negotiation on the trust funds to be established, while IFC trust funds follow a template, there is effectively no negotiation: it is a take-it-or-leave-it proposition for donors such as the EU using IFC.

If the EU wishes to utilise IFC in future project implementation or project transaction advisory work, then the deficiencies in the IFC implementation of the Eco Cities project (see Annex 7) should be addressed in a global agreement with IFC that would lower the IFC overhead costs paid by the EU and ensure that independently verifiable M&E data at the outcome and impact level is provided. The EU is a major donor and one of the most important funders of World Bank Group (WBG) projects, the EU should therefore attempt to negotiate fees with the WBG on a global basis. This would increase the impact of EU monies and force IFC to be more efficient (i.e., reduce back-office and managerial personnel costs).

4.3.3 EU to Formulate and Manage Projects for Explict Private Sector Replication

It is recommended that future EUD interventions in India be based on private sector project origination, implementation, and operation – where the role of government would be to establish the overall societal objectives (e.g., a dramatic reduction in GHG emissions and air and water pollution) and ensure that there is a suitable conducive environment for private sector investment, while managing the necessary social, environmental and competitive level playing field aspects.

The EU-India programme Financial Agreement was signed in December 2010, when the GoI was still actively involved in choosing specific RE/EE/GHG mitigation projects, providing substantial subsidies and concessional tariffs, and administratively being involved in market aspects. Since 2010, India has evolved into a far more market orientation, but the administrative state apparatus is still trying to direct development by plans, targets and policies that it lacks the means to enforce or financially support.

Annex 1: Evaluation Matrix

Evaluation Aspect	Evaluation Questions	Judgement indicators	Data collection methods and sources
Relevance	1.1 Alignment with India's Priorities - Were the programme / project objectives / activities aligned with the development goals/priorities/plans of the GoI and state governments in the energy security/access/EE / RE, environmental, and waste management areas?	• Alignment with the development priorities of the GoI and the relevant state governments in India, at the time of FA signature, at the individual project grant/contract signature, and during project implementation • Inclusion of individual projects or programme in National Electricity Plan	• Review of FA • Review of development priorities of the GoI and state governments • Interview with GoI, state governments and private sector stakeholders • National Electricity Plan
	1.2 Linkage with SDGs et al. – Did the programme/ projects align with, and contribute to, SDG 7 (Affordable and Clean Energy), SDG 11 (Sustainable Cities), Leave No-One Behind and the Rights Based methodology, gender, and other relevant social development goals?	• Explicit or implicit provision in the FA and/or project work plans and implementation /monitoring reports • Confirmation that gender and social development indicators (as per SDGs) were considered during project implementation	• Review of programme design as per the FA • Review of SDG indicators for gender, etc. • Review of work plans, Implementation reports • Discussions with GoI, state government and private sector players
	1.3 Private Sector Implementation Focus – Did the programme /projects contribute to an increased private sector role in delivering GHG mitigation/clean energy/ renewable energy/ energy efficiency in India?	• Evidence that the private sector played a leading role in origination, structuring, financing, operation or replication of projects • Evidence in the FA, project work plans, implementation and monitoring reports that the programme/projects were impact focussed • Evidence that the programme/project focus was on private sector led tangible project identification, origination, development, financing and implementation	• Review of programme design as per the FA • Review of work plans • Review of project implementation and monitoring reports • Discussions with GOI and state government stakeholders • Discussions with private sector players active in originating, developing, financing and implementing tangible projects
Effectiveness	2.1 Achievement of Planned Results – Were the planned programme/project key outputs/outcomes/impacts achieved?	• Evaluation of the achievements of the programme and projects compared with the objectives and targets specified in the FA and in the individual project grants/contracts - and also during the projects' implementation	• Review of workplans, performance reports, and monitoring reports • Discussions with the implementing agencies • Discussions with any private sector players who implemented the projects/components • Discussions with national counterparts • Discussions with project beneficiaries
	2.2 Adaptive Management for Results - Were project activities adapted (including from the ROM	• Unforeseen events at the time of design of the programme /projects	• Analysis of programme/project results

Evaluation Aspect	Evaluation Questions	Judgement indicators	Data collection methods and sources
	mid-term reviews) to better contribute towards to GoI's evolving national priorities and/or EU priorities and were outputs /results/outcomes adapted to more directly lead to tangible GHG mitigation/ enhanced RE generation/EE development impacts?	• Corrective actions taken during implementation of the programme/projects, including based on the ROM reviews • Evidence of progress towards the implementation of specific projects that had/have tangible development impacts	• Discussions with implementing agencies • Discussions with national counterparts • Discussions with project beneficiaries
Efficiency	3.1 Turning Inputs into Outputs – Did the EU and other inputs produce outputs/ results/outcomes/ impacts in a timely and cost-effective manner?	• Assessment regarding the contributions of the actions taken • Evidence regarding corrective actions taken based on the ROM reviews	• Review of workplans, performance reports, and monitoring reports • Discussions with the implementing agencies • Discussions with any private sector players who implemented the projects/components • Discussions with national counterparts • Discussions with project / activity beneficiaries
	3.2 Addressing Delays, Extensions, Terminations - What caused project delays? Could the consequences of extensions or termination have been mitigated?	• Unforeseen events at the time of design of the programme /projects • Corrective actions taken during implementation of the programme/projects, up to and including cancellation, including based on the ROM reviews	• Review of workplans, performance reports, and monitoring reports • Discussions with the implementing agencies • Discussions with private sector players • Discussions with national counterparts • Discussions with project / activity beneficiaries
Impacts	4 Tangible Outputs/Results - What are the tangible outputs/results /impacts / outcomes produced by the programme/projects that are related to sustainable energy/EE/RE and environmental improvements /SDGs and related policy and administrative frameworks?	• Evidence regarding the tangible outputs/results /impacts / outcomes of the programme/projects	• Assessment of the tangible outputs/results /impacts / outcomes of the programme/projects • Discussions with the implementing agencies • Discussions with the private sector players who implemented the projects/components • Discussions with national counterparts • Discussions with project / activity beneficiaries
Sustainability	5.1 Likely Post-Programme Results – Do the projects deliver sustainable results, such as improved human capacity, stakeholder ownership, an environment more conducive to private sector-led growth, or better policies and tangible outcomes/ impacts?	• Existence of arrangements for continued efforts towards enhancement of institution capacity and human capacity • Private sector ability to originate, finance, implement and successfully operate EE and RE projects without ongoing donor support	• Discussions with the implementing agencies • Discussions with the private sector players implementation the projects/components • Discussions with national counterparts • Discussions with project / activity beneficiaries

Evaluation Aspect	Evaluation Questions	Judgement indicators	Data collection methods and sources
	5.2 Project Exit/Continuation Strategies - For the two on-going active projects (TA-Energy and Eco-Cities), what, if any, exit strategies, further extensions or additional funding could lead to enhanced outcomes/impacts?	• Status of private sector to originate, finance, implement and successfully operate EE and RE projects without ongoing donor support • Identification of project aspects where the EU and/or other donors can still make a positive contribution • Impact of Covid-19 pandemic on remaining project activities and/or new GoI priorities	• Critical evaluation of the results and the sustainability of the results • Discussions with the project implementation team • Discussions with the stakeholders
EU Added Value	6 EU versus EU Member State or Private Sector's Added Value – Did EU involvement in the programme/projects add value compared to Member State interventions or private sector led approaches in clean energy and climate change mitigation in India?	• Privately initiated, financed and operated projects of similar nature in India • Project documentation from EU Member State and their development agencies (e.g., KfW) for similar, larger, or more effective programmes/projects in the RE/EE space	• Discussions with the project implementation team • Discussions with the stakeholders • Desktop research
Coherence with EU Strategy	7 EU Alignment? - Were the project activities aligned with the EU strategy in India as well as for Asia, and with other EU policies and Member State Actions?	• Programme/project alignment of the general and specific objectives with the EU strategy in India and elsewhere in Asia • Assessment of the enhanced capacity from EU as compared to that of individual EUMS for programme/project implementation • Development priorities of the GoI at the time of project design, at the time of evaluation and in the future	• Review of programme design as per the agreement with the government • Study of EU strategy in India and Asia. • Discussions with the national government stakeholders

Notes: 1. FA - Financing Agreement (of the programme)
2. GoI – Government of India
3. EE and RE – Energy Efficiency and Renewable Energy

Annex 2: Programme Original Logframe

Logical Framework Matrix (Log-frame) – from the December 2010 Programme Financing Agreement

	Intervention logic	Objectively verifiable indicators of achievement	Sources and means of verification	Assumptions
Overall Objective	To contribute to India's sustainable development objectives including efforts to reduce its greenhouse gas emissions and increasing the use of clean technologies.	- Increased use of clean technologies in India Reduced greenhouse gas emissions	- GoI National reports - Country reports prepared by donors such as World Bank, ADB, etc.	- GoI's commitment to promote sustainable development and reduce greenhouse gas emissions. - GoI's commitment to promote clean and green technologies in India.
Specific Objective	The specific objective of the proposed action is to support the implementation of India's national policies and programme that promote the development of new renewable sources in India, in particular solar and support the government's efforts in promoting energy efficiency and cleaner production in India and its effective take-up by the private sector and SMEs in particular.	- Increased volume of energy generated by solar and other renewable sources like wind, biomass, hydro - % increase in the deployment of solar and other renewables across the country - % increase in the research and development for clean and efficient technologies.	- Number of solar power plants installed - GoI introduces solar specific 'Renewable Purchase Obligation' - Number of industries/houses using solar/hybrid technologies for heating, cooling and other applications.	GoI will continue Solar Mission and will continue promoting use of solar energy in all sectors of economy.
Expected Results				
Result I	Increased capacity of India authorities to create an enabling environment promoting renewable energy and energy efficiency.	- Number of GoI officials trained. - No. of seminar and workshops organised - Number of exchange visits organised between EU and India	- GoI National reports - Country reports prepared by donors such as World Bank, ADB, etc - Project reports covering details of the activities	Indian authorities will show greater interest
Result II	Increased deployment of new renewable energy sources in power capacity mix, in particular increased investment in solar technologies. Increased use of clean production and energy efficiency.	- % increase in the deployment of solar and other renewables across the country, in a standardised manner and using safe and environmentally sound practices - % increase in the research and development for clean and efficient technologies - Reduced costs for installation of solar power plants, equipment, promoting use of cleaner technologies	- GoI National reports - Sectoral Reports from Ministry of New Renewable Energy, Ministry of Environment, Ministry of Power and the Bureau of Energy Efficiency - Country reports prepared by donors such as World Bank, ADB, etc. - Project reports covering details of the activities	Indian industries are keen to explore use of solar/ hybrid energy equipment. The government provides incentives such as tax breaks and concessional duties which makes these investments attractive.

Result III	Enhanced human resource skills and new employment opportunities in green sectors of the economy and in particular in less developed regions	- No. of persons trained % increase in the employment opportunities in the Green sector	- List of the persons who attend the training workshops - Human resource development index	- The Indian youth is interested in taking up vocational studies in the clean technology sectors - The GoI promotes this sector in its 5 year plans
Result IV	Increased awareness amongst public and private actors and the public at large on environmentally friendly development activities.	- Number of seminar and workshops organised % increase in the use of energy efficient, solar technologies on a daily basis.	Reports in print media, industry sector reports, solar energy sector reports	The awareness campaign is followed by the media and industry associations etc
Result V	Increased visibility of the EU - India partnership and adoption of best practices on clean technologies and green energy, and increased EU-India technological partnerships.	- Number of regulations adopted inspired by EU best practice - % Increase in the number of EU companies, in particular SMEs, doing business with India.	- EU-India Chambers of Commerce Reports, Reports in print media, - Programme Report Activities	EU organisations interested in collaborating with Indian organisations. Indian organisations are keen to develop trade ties

Area of Intervention	Activities	Type of activities	Costs for Six Year Planned Duration	Assumptions
I	Support the expansion of Renewable sources by supporting: - 1. Pilot projects for the deployment of off-grid/de-centralised applications for rural or semi-urban areas of India. E.g.- Solar Photovoltaic Pumps for irrigation in villages, home lighting systems for remote rural villages, commercial applications to be used in industries to switch from fossil fuels to RE sources etc. 2. Show-case test bed installation and operation of a medium-size solar-power plant that can be connected to the grid including efficient energy storage technologies, smart grid transmission, etc, to test technical and operational conditions (quality, safety, reliability, etc). For example: technical institutes/ universities and/or Development Agencies setting up Solar Parks for technical demonstration activities; 3. Exchanging best practices on technical standards and regulatory incentives for the early take-up of renewable energy sources.	1. Demonstration plants established in rural areas on cluster basis, with high potential for replication 2. New technology standards and operational codes procedures developed, taking account of environmental and safety standards 3. New technologies and skills are developed, taking due account of international/EU standards and best practices 4. Technical and economic assessment of the installed pilot projects applications / systems, and potentials for replication across India	1) Pilots on decentralised applications for any combined sources of Renewable Energy- 4 x € 1.25m = € 5 m 2) Mega-Watt size solar demonstration project(s) grid-connected 1 x € 10 million (EU contribution will be 80%, € 8m via call for proposals)	Ministry of New and Renewable Energy is actively involved through the Programme Advisory Committee. Other stakeholders (Local Authorities and Private sector) are also key partners to the project
II	Support to the development of Eco-Cities in India through the promotion of energy efficiency and adoption of clean technologies: –	1. New policies developed, and best practices adopted by the governments, and industries. Industries grow and export products.	Consortium grant for € 11.25 Million (with EU maximum co-financing of 80%) to implement activities in Selected	Ministry of Environment support the Eco-Cities green development

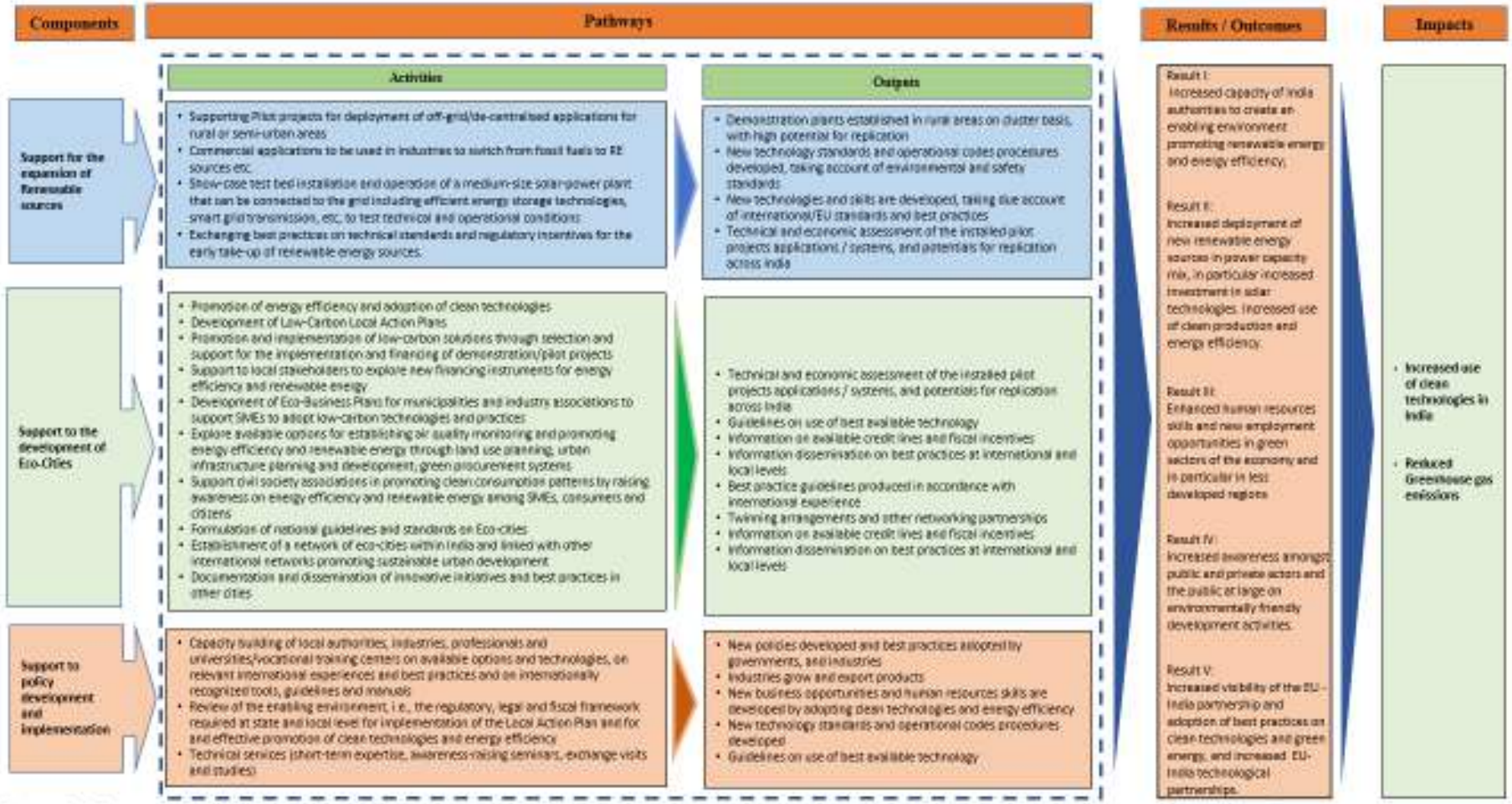
	Development of Low-Carbon Local Action Plans to integrate priorities of the National Action Plan for Climate Change (NAPCC) into local development plans, which will need to include baseline and carbon footprint mapping to establish current energy consumption as well as targets in key priority areas; capacity building of local authorities, industries, professional and universities/vocational training centres on available options and technologies, on relevant EU/international experiences and best practices and on internationally recognised tools, guidelines and manuals;	2. New technology standards and operational codes procedures developed, taking account of environmental and safety standards 3. New technologies and skills are developed, taking due account of international/EU standards and best practices. 4. Technical and economic assessment of the installed pilot projects applications / systems, and potentials for replication across India	Eco-Cities following an open manifestation of interest	activities and actively steers programme activities through the Programme Advisory Committee
	- Review of the enabling environment, i.e., the regulatory, legal and fiscal framework required at state and local level for implementation of the Local Action Plan and for the effective promotion of clean technologies and energy efficiency;	Best practice guidelines produced		
	- Promotion and implementation of low-carbon solutions and technologies within the public, residential and private sector through selection and support for the implementation and financing of demonstration/pilot projects in areas with high potential for energy conservation and renewable energies;	Guidelines on use of best available technology		
	- Support to local stakeholders to explore new financing instruments for energy efficiency and renewable energy investments through the establishment of Private-Public Partnerships and usage of market-based mechanisms by supporting stakeholders in formulating financially viable projects;	Information on available credit lines and fiscal incentives		
	- Development of Eco-Business Plans for municipalities and industry associations to support SMEs in energy intensive industries to adopt low-carbon technologies and practices;	Best practice guidelines produced		
	- Explore available options for establishing air quality monitoring systems (if not already in place in selected cities) and for promoting energy efficiency and renewable energy through land use planning and urban infrastructure planning and development as well as green procurement systems;			
	- Support civil society associations in promoting clean consumption patterns by raising awareness of energy efficiency and renewable	Information dissemination on best practices at international and local level		Active involvement of all stakeholders

	energy among SMEs, consumers and citizens;			
	- Formulation of national guidelines and standards on Eco-cities for the integration of national priorities on low-carbon development at the state and local level by building on past or ongoing initiatives to define standards, indicators and benchmarks on energy usage, EE and RE at city level as well as assessment of available options and technologies for urban areas;	Best practice guidelines produced in accordance with international experience		Active involvement of all stakeholders
	- Establishment of a network of eco-cities within India and linked with other international networks promoting sustainable urban development; documentation and dissemination of innovative initiatives and best practices within other cities in India.	Twinning arrangements and other networking partnerships		Active involvement of all stakeholders
III	Support to policy development and implementation through the capacity building and the exchange of best practice: – Capacity building of local authorities, industries, professionals and universities/vocational training centres on available options and technologies, on relevant international experiences and best practices and on internationally recognised tools, guidelines and manuals;	Technical services (short-term expertise, awareness-raising seminars, exchange visits and studies) aiming at: new policies being developed and best practices adopted by governments and industries. Industries grow and export products; new business opportunities and human resources skills are developed by adopting clean technologies and energy efficiency products and services	€ 2.2 m (service contract based on 250 expert-days/year x 6 yrs plus incidentals for workshops, seminars, visit tours and dissemination/ replicability/ visibility	Involved Ministries are active and steer programme activities through the Programme Advisory Committee
	– Review of the enabling environment, i.e., the regulatory, legal and fiscal framework required at state and local level for implementation of the Local Action Plan and for and effective promotion of clean technologies and energy efficiency;			Active involvement of all stakeholders

Annex 3: Programme and Five Projects Theories of Change

A theory of change (ToC) is a Component-Activity-Output-Outcome-Impact based visual approach for describing the overall logic of an intervention. It explains how the activities were expected to produce a series of results that would contribute to achieving the final intended impacts. The following ToCs are simplified reconstructed high-level strategic plans (theories), which try to capture the overall EU strategy in the overall programme “Support to Renewable Energy, Clean Technologies and Energy Efficiency in India" and in its five constituent projects. The following ToCs represent the intervention logics as they were envisaged at the time of the Financing Agreement (FA) of the programme and at the point of the five projects’ grant applications or implementation contracts – which effectively constitutes the “designs” of the overall programme and its five constituent projects.

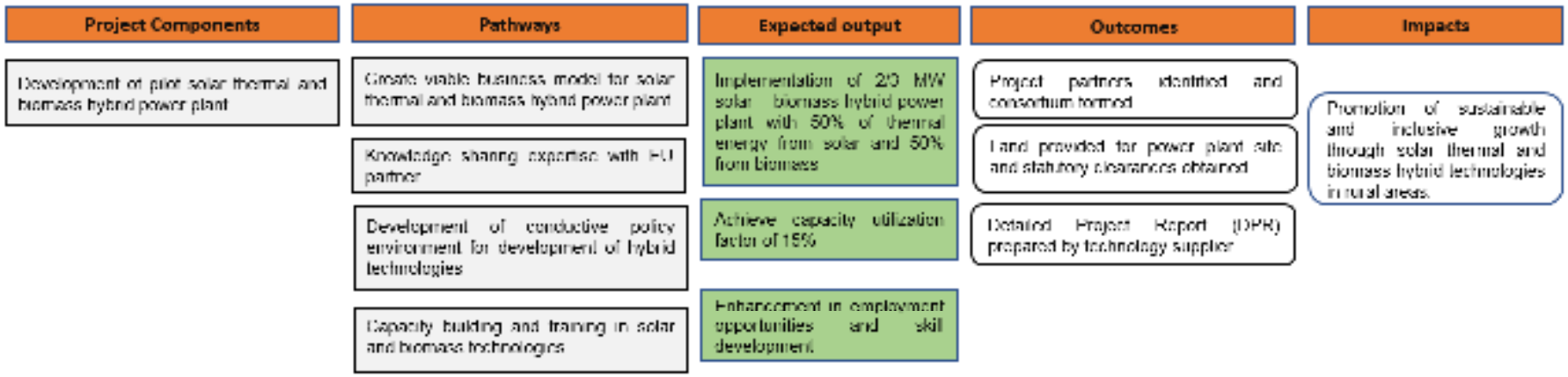
Theory of Change for Programme "Support to Renewable Energy, Clean Technologies and Energy Efficiency in India"



Source: Log-Frame provided in the Dec 2010 GOI-EC Programme Financing Agreement *Note: Only Eco Cities and hybrid solar power plant with storage were defined at Initial Programme stage*

Theory of Change – SCOPE BIG

Sources: ROM Report of 2nd May 2017 and SCOPE BIG Project Closure Final Technical Report of 09 June 2017

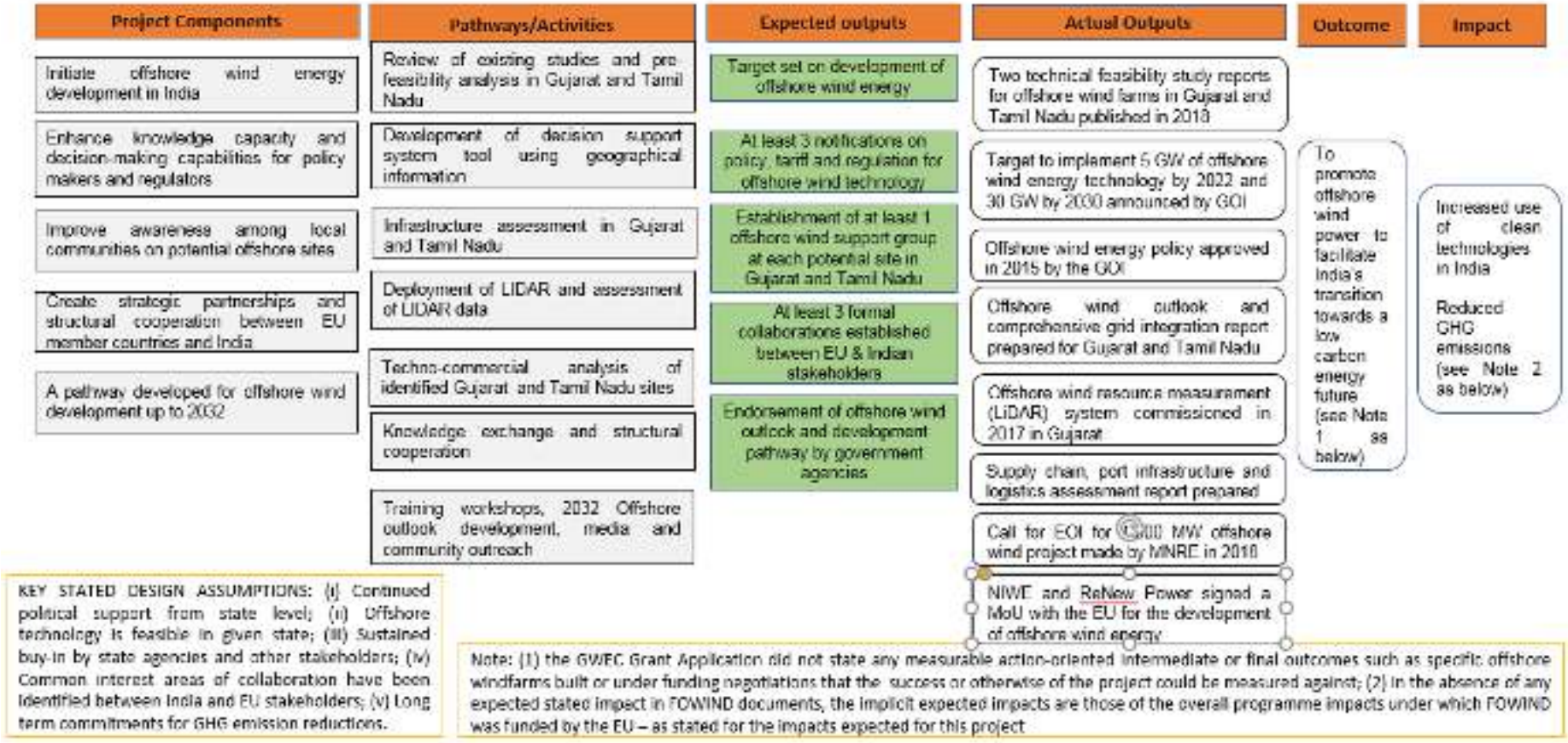


Assumptions: (1) that high temperature CSP (Concentration Solar Power) technology could be provided by a technology provider with experience only in low and low medium temperature CSH (Concentrating Solar Heat) for commercial and industrial thermal processes; (2) that the technology provider could provide high temperature/pressure steam boilers for power generation when their experience was in medium temperature/pressure boilers mainly for industrial process heat provision; (3) that the technology provider could supply biomass gasification technologies in spite of having no apparent relevant experience in this area; (4) that a demonstrated 2/3 MW combined 3 RE technology systems would be replicated post-project end.

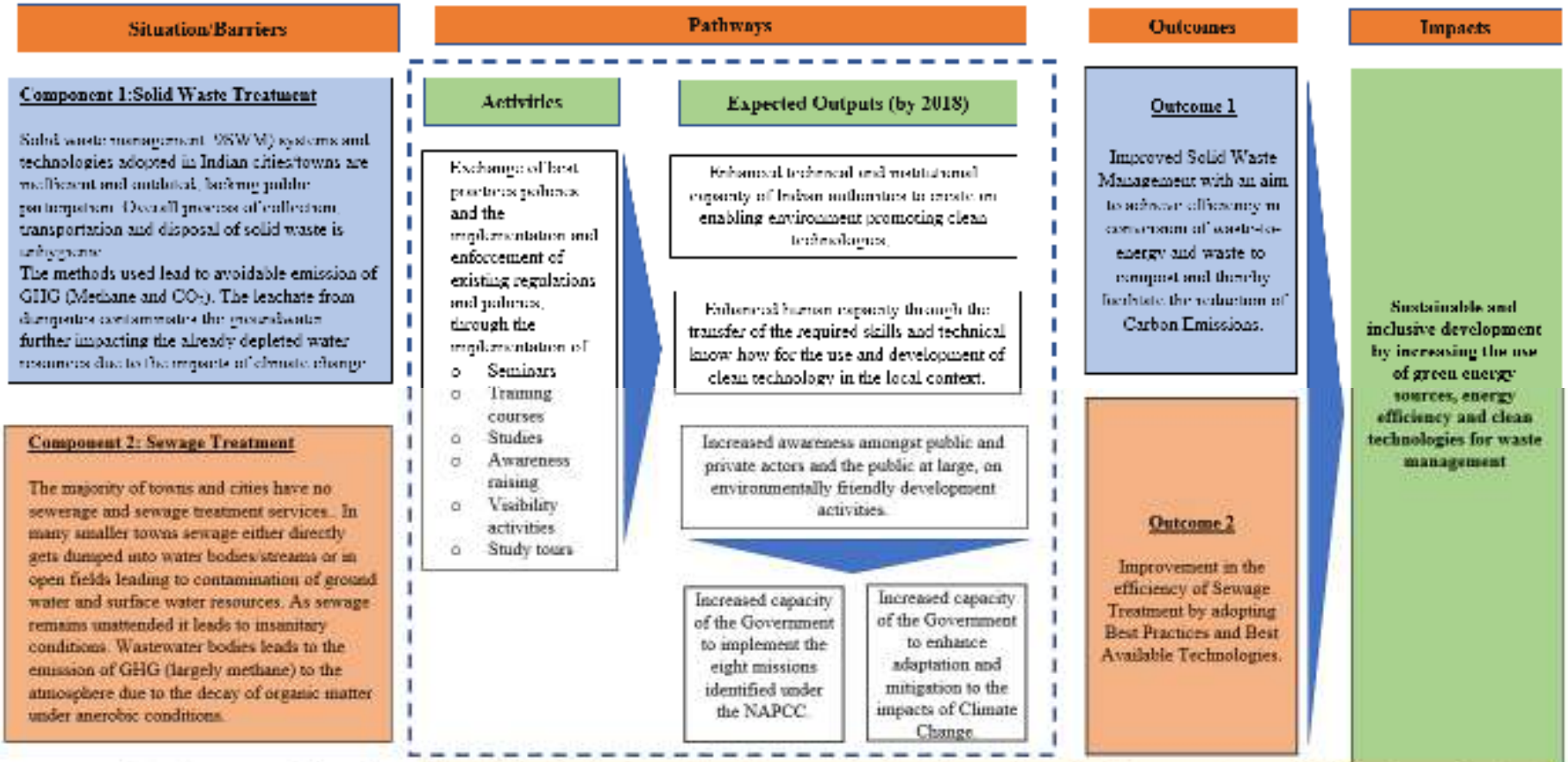
The logical framework of the project in terms of objectives, activities and indicators was poorly formulated and this was noted in the ROM report dated 2017. The project was excessively complex with its combination of 3 RE technologies in a small 2/3 MWe output plant. The technology provider chosen lacked experience in the specific performance levels required in the 3 RE technologies chosen – it is not yet clear if this was known or insufficient due diligence was undertaken when the technology provider was chosen – or if the performance conditions were arbitrarily changed during the project design phase. The project capacity was increased from 2 to 3 MW early in the development phase. Finally, it is not clear why biomass gasification in addition to biomass combustion was chosen, hence effectively 3 technologies were being combined further increasing complexity in a small RE output plant. The project was terminated in 2018. There was no useful impact as the technology mix pursued is not cost effective and hence is a technical and economic dead end.

Theory of Change - FOWIND

Sources: 1); GWEC Revised Grant Application Form @ 09 November 2013 (2); FOWIND Inception Report; (3) Annual Narrative Report 2017-18 @ 13 March 2018; Annex VI FOWIND Final Narrative Report @ February 2019



Theory of Change – Technical Cooperation for Environment in India

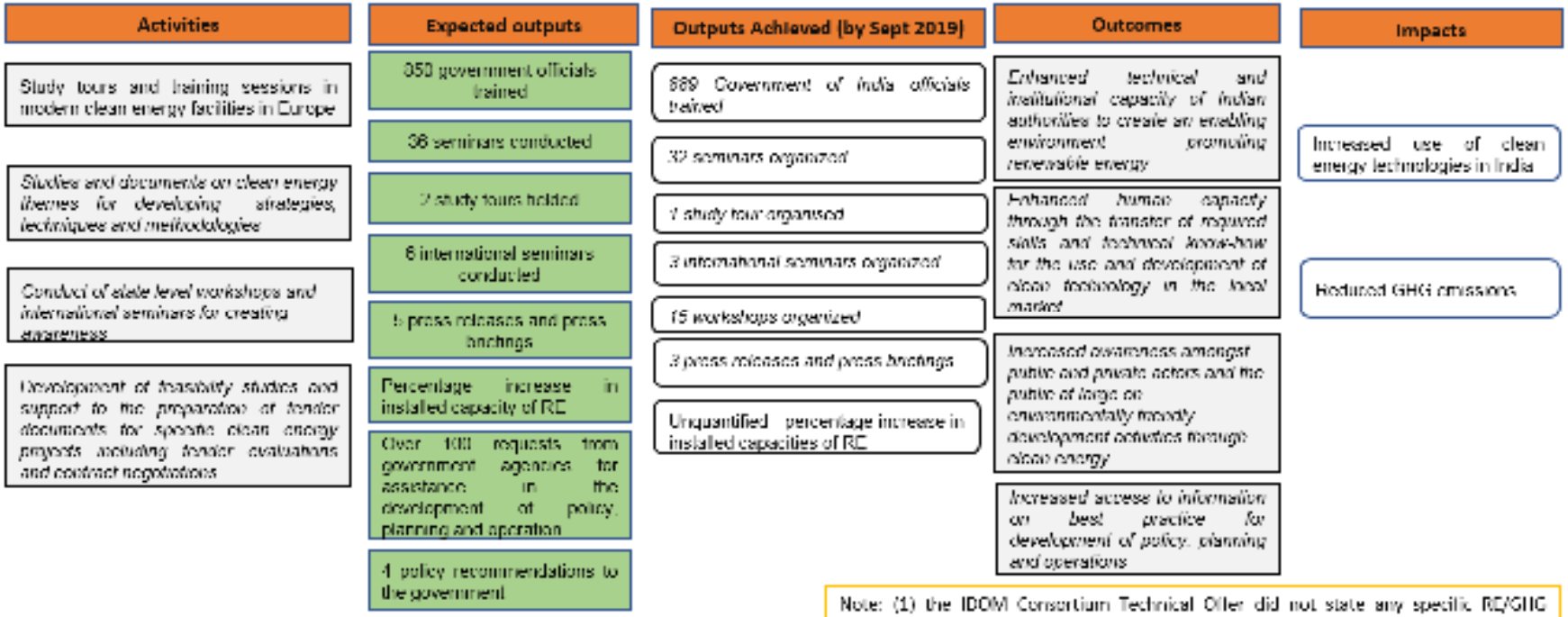


Source: Based on the contents of the April 2015 Inception Report and its Logframe

Note: (1) the Inception Report did not state any action-oriented Intermediate or Final Outcomes such as specific SWM or Sewage Treatment plants built or under funding negotiations that the success or otherwise of the project could be measured against in the 2 target mega-cities of NCT Delhi and Greater Mumbai; (2) the project had a sole focus on stakeholder capacity building and knowledge generation and management.

Theory of Change- TA Energy

(Source: Based on IDOM Consortium Technical Offer Logical framework of April 2014 and on 10th 6-Monthly Progress Report for Apr – Sep 2019

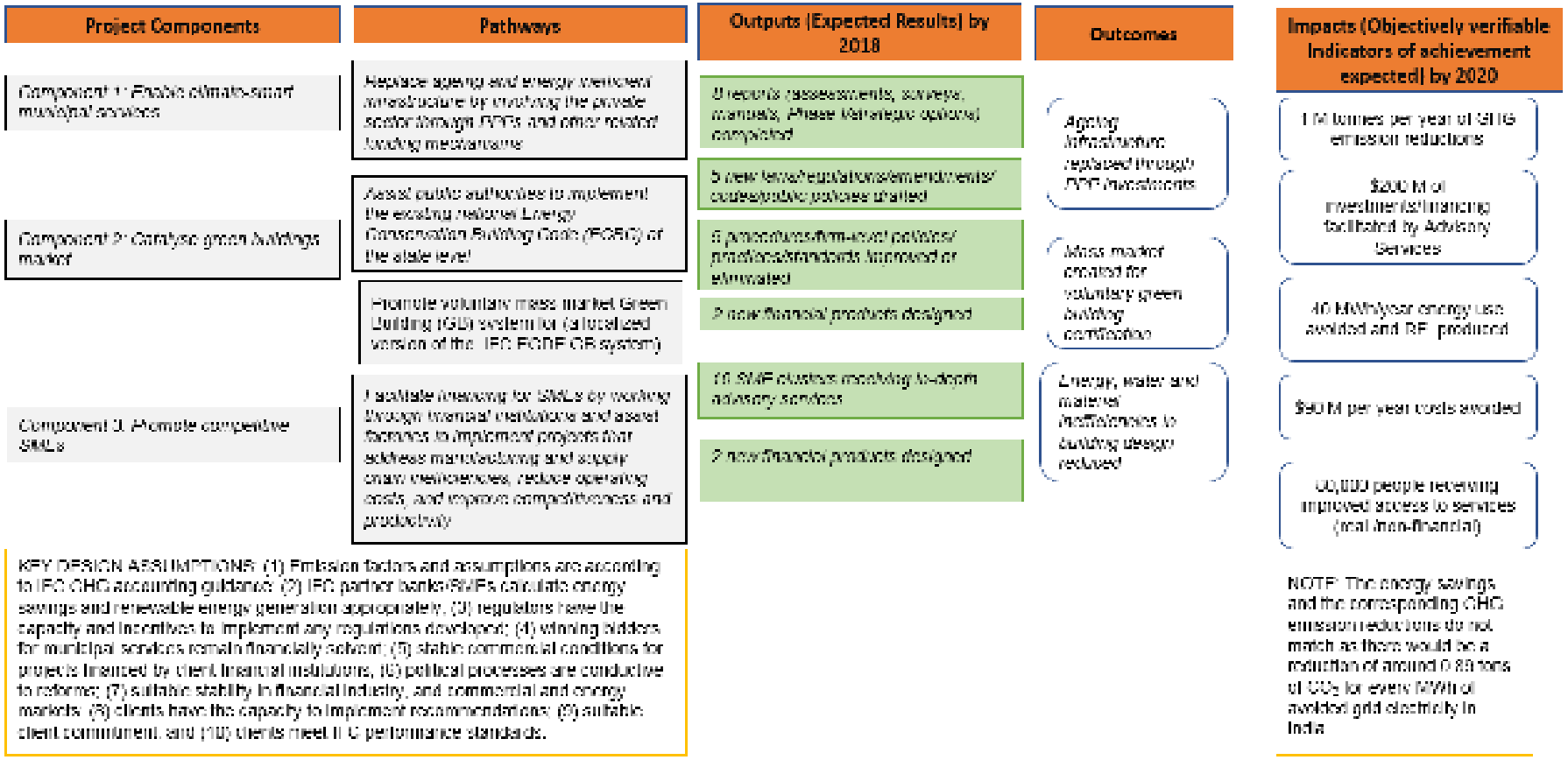


KEY STATED DESIGN ASSUMPTIONS: (1) GoI is committed to promote sustainable development and reduce GHG emissions; (2) GoI is committed to promote clean and green technologies in India; (3) Indian authorities will show increased awareness; (4) Young people will be interested in taking up vocational studies in clean technology sectors; (5) GoI will promote RE sector in its development plans; and (6) Active involvement of all stakeholders.

Note: (1) the IDOM Consortium Technical Offer did not state any specific RE/GHG related outputs or intermediate or final outcomes such as specific Clean Energy projects built or under funding; negotiations that the impact of the project could be measured against; (2) the project had an initial sole focus on stakeholder capacity building; and knowledge generation and management; (3) the project appears to have provided useful inputs to specific Clean Energy project tender processes and developments and to specific Clean Energy implementation policies and streamlined application processes.

Theory of Change - Eco-Cities

(Source: IFC Eco Cities Grant Application to EU of 23 May 2014 and its Log Frame)



Annex 4: Persons and Organisations Consulted

SCOPE BIG
CSTEP – the lead partner for the SCOPE BIG project's implementation consortium
Thermax - the EPC Contractor for the SCOPE BIG project

FOWIND
DNV GL – lead partner for the FOWIND project's implementing consortium
The Project Manager for the FOWIND project
MNRE, Joint Secretary[107]
NIWE, Director General- National Institute of Wind Energy, an autonomous R&D institute under MNRE

TA Clean Energy
MNRE Joint Secretary
IDOM- lead partner for the TA Clean Energy project's implementing consortium
UPNEDA (Uttar Pradesh New and Renewable Energy Agency)
UPPCL (Uttar Pradesh Power Corporation Limited)
NIC – National Informatics Centre, an agency of MNRE

TA Environment
MNRE Joint Secretary
Team Leader for TA Environment project's implementing consortium
Maharashtra Pollution Control Board, Joint Director (Water Pollution Control)
North Delhi Municipal Corporation, Additional Commissioner (retired)
EUD official who oversaw the project

Eco-Cities
IFC – the ECO Cities projects implementing agency. IFC is the private sector arm of the World Bank Group (WBG)

[107] A Joint Secretary is the official responsible for a part of MNRE, the (union) Ministry of New and Renewable Energy

Annex 5: Literature and Documents Reviewed

Combined (Overall) Program Documents
20101210 FA (TA Financing Agreement) – Signed
20120115 Guidelines for Grant Applicants (CfP)
20131223 TOR for Service Contracts for Clean Energy & Environmental Experts & Non-Key Experts - Annex II
20160411 Main Services Delivered to Feb 2016
20160822 MOM for 2nd PAC Meeting
20170407 ROM Monitoring Questions
20170420 Minutes of SC 1st Meeting
20170502 ROM Report w 20180724 CSTEP Highlights
20180227 3rd PAC Meeting Minutes
20180726 Covering OM (Office Memo) re DEA-EU 2 year & EUR 2 M Extension
20180726 DEA letter to EUD Requesting 2yr Extension & 2 M EUR Additional Funding
20180726 MNRE Request to MOF for 2 yr Extension w Addition EUR 2 M for Distributed Energy
20180813 DEA Cover letter to EU re 2 year & EUR 2 Million Extension
20180910 Budget Breakdown Before & After Addendum - Enclosure 1 to FA
20180910 EU Letter to DEA re FA Agreement New Addendum
20190405 Projects' Status Summary EU GoI FA Clean Energy
20190410 4th PAC Meeting Agenda
20190422 General Programme Brochure v2
20190422 Summary of Activities - Energy DEVCO EU
20191219 RFS ToR for Impact Evaluation
20191231 EC Lot2-135-India 01-TOR for Impact Evaluation

Eco Cities (IFC) Project Documents
20131215 IFC PPP Stories - Bhubaneswar Street Lighting – EN
20131224 Guidelines for Grant Applicants
20140523 Final IFC Grant Application to EU
20141212 EU-IFC Administration Agreement -signed 2 - General Conditions
20141219 EU-IFC Agreement Annexes I -II – III
20141229 EU-IFC Administrative Agreement
20150528 Addendum No 1 to IFC-EU Financing Agreement
20150528 EU-IFC Administrative Agreement Addendum No 1
20151020 Sustainable Housing Leadership Consortium
20160204 IFC Media Coverage Report
20160315 Final Progress Report for 01 Aug 2015 to 31 Jan 2016 – IFC
20161017 Final interim Report for 01 Feb to 31 July 2016
20161110 Maharashtra Sustainable Urbanisation - Article for Urban Update without pics
20161219 SRI Delhi Paper for Urban Update
20170215 Implementation Status - Master List of Work Plan Activities 2017-2018
20170701? IFC Interim Progress Report for Jan to June 2017
20170818 Note to File for Approval of Interim Progress Report for 01 Jan- 15 June 2017
20171031 Financial Report for 01 July - 31 Oct 2017

20171115 Brochure on Program Activities – Revised
20171229 Proposed Revisions to Original Logframe Targets with Summary Rationales
20180402 Final Semi-Annual Progress Report for 01 Jul to 31 Dec 2017
20180402 IFC Semi-Annual Progress Report for Jul to Dec 2017 – final
20180806 IFC Workplan for Key Activities for Aug 2018 - Sep 2019
20180915 ECBC for Commercial Buildings in India - Status Overview by BEE Director
20180919 EU & IFC Signed Addendum 2
20181001 IFC Semi-Annual Progress Report for Jan - Jun 2018 – final
20190401 IFC Semi Annual Progress Report for 01 Jul - 31 Dec 2018 – final
20190401 IFC Semi-Annual Progress Report for Jan - Jun 2019 - final
20190415 IFC Progress Presentation to PAC
20190423 IFC Extension Request to MoEFCC for Contract Extension to 30 Sept 2020
20190423 IFC Extension Request to MoEFCC to 30 Sept 2020
20190630 EU & IFC Contributions as at 30 June 2019
20190729 Financial Report for 01 Jan - 30 June 2019
20191009 Semi Annual Progress Report for 01 Jan - 30 June 2019 – final
20191015 IFC Background Note on Progress to Date
20191024 IFC Program Update Presentation for Discussion with MoEFCC

FOWIND Project Documents
20130920 EU-GWEC 2013-2017 Offshore Wind Project Visibility Plan- Final
20131108 GWEC Revised Grant Application Form
20140615 Inception Report
20140615 Interim Narrative Report for 13 Dec 2013 - 12 June 2014 - Clean final
20140627 Forwarding Letter to EC for draft Interim Narrative Report
20140915 Status and Prospects of India's Offshore Wind Sector - IT Power for British High Commission
20141203 Short Article on Hamburg Field Visit & Study Tour
20141215 Global Offshore Wind Market Assessment
20150515 Prefeasibility Study Report for Offshore Wind Farm in Gujarat
20150918 Programme Schedule for 1-Day Meeting @ 05 Sept 2015
20151026 Leaflet for 105x210 for 2015 update - ready to print
20160107 ROM Monitoring Questions
20160315 2015 Annual Narrative Report for Year 2 for 01 Jan 2015 - 31 Dec 2015
20160315 2016 Interim Narrative Report for Year 3 for 01 Jan 2016 - 30 June 2016
20160331 NIWE (National Institute of Wind Energy) Annual Report 2015-2016
20160426 Consolidated ROM Report
20160509 Financial report for Year2 of Jan - Dec 2015
20160515 Audit verification report for Year 2 of Jan -Dec 2015
20160608 Y3 budget forecast - updated
20160615? Supply Chain Study for Ports Infrastructure & Logistics
20160628 Letter to EUD re FOWIND Year 3 Annual Reporting
20160628 Year 3 Forecast Budget
20160629 Supply Chain Study for Ports Infrastructure & Logistics v2
20160824 ROM Recommendations-Actions Annexure 1
20160831 Engineers Training Bangalore Workshop Proceedings
20160909 GWEC Response to External ROM Review of Year 2 Tech Report
20161121 GWEC Letter to EU re Contract Amendment Proposal
20161121 GWEC Submission to EC for Contract Amendment
GWEC Cover Letter to EC for FOWIND Contract Amendment @ 20161121

Annex 1 - Contract Amendment Proposal @ 20161120
Annex 2- Budget Amendment Proposal @ 20161120
Annex 3 - Justification for realignment of costs in various work packages @ 20161120
Annex 4 - MOU with ReNew @ 20160706
Annex 5 - MoU with NIWE @ 20150612
Annex 6 - DNV-GL-Offshore - Capability Statement v1 @ 20140814
Annex 7 - DNV-GL -Offshore Projects' References List
Annex 8 - DNV-GL-Offshore Grid, Ports, Supply Chain References @ 20140818
20161129 Project Overview & Progress Presentation
20170220 Add N 1 Budget -Signed
20170220 Add N 1 Budget Justification – Signed
20170220 Add N 1 Sources of Funding – Signed
20170415 Grid Integration Study for Offshore Wind Farm Development in Gujarat & Tamil Nadu
20170815 Interim Narrative Report for Year 4 for Jan - June 2017
20171015 Grid Integration Study
20171215 Offshore Wind Outlook for Gujarat & Tamil Nadu (2018-2032) - Final Report
20171219 Offshore Wind Outlook for Gujarat & Tamil Nadu (2018-2032)- Press Release
20180115 Gujarat FS V1 A – Report
20180115 Tamil Nadu FS v1 Aa – Report
20180129 Gujarat FS v1 A - PPT
20180129 Tamil Nadu FS v1 A -PPT
20180308 1-Day Conclave in Delhi for Gujarat & Tamil Nadu - Draft Agenda
20180308 1-Day Conclave in Delhi for Gujarat & Tamil Nadu - Final Agenda
20180308 Offshore Wind FS for Gujarat & Tamil Nadu - Final Press Release
20180312? Final Report Annex C - Logical Framework
20180312? GWEC Financial Report
20180315 Annual Narrative Report for 01 Jan 2017 - 13 Mar 2018
20180611 GWEC ToR for Expenditure Verification by Auditor for 2017
20180619 GWEC Invoice 4 Audit report for Jan - Dec 2017
20180619 GWEC Invoice 5 Final Audit report for Jan - Mar 2018
20180627 GWEC Cover Letter to EU re Annual Reports
20181220 First LiDAR Offshore Wind Data Analysis Report - NIWE
20190215 Annex G - Final Narrative Report 2018
20201126 Offshore Wind | MNRE Website
20200805 GWEC Global Offshore Wind Report 2020
List of personnel for LiDAR Installation

SCOPE BIG Project Documents
20091220 Shive Village (Pune) Decentralised 250kW CSP-Biomass Power Project - Thermax Press Release
20100417 Shive Village et all CSP-Biomass Materials technology challenges – Thermax
20111122 UNDP-GEF India Concentrating Solar Heat (CSH) Final Project Document
20121127 Shive Village CSP-Biomass Power Plant Case Study - for National Solar Energy Summit 2012 – Delhi
20130315 Small Scale Concentrated Solar Power Review - Carbon Trust, UK
20130927 EU-CSTEP Contract
20140328 Project Management Group (PMG) MoM of Meeting on 11 March 2014 re Advance incl. for DPR Preparation
20150515 Interim Narrative Report for Oct 2013 - Dec 2014 w Annexes incl. PID

2015 Biomass Resource Survey
20150915 Six-Monthly Progress Report for January-June 2015
20150315 Interim Narrative Report for Jan-Dec 2015
SCOPE BIG 20160115 DPR and Annexures
- Detailed Project Report (DPR) by Thermax @ 15 Jan 2015
- Annexure I and II Project Milestone Schedule
- Annexure III Plant Layout @ 17 June 2015
- Annexure IV Heat and Mass Balance Diagram (HMBD) @ 25 June 2015
- Annexure V Approximate Cost Estimate
- Annexure VI Power Plant Schematic (P&ID) @ 13 Aug 2013
- Annexure VII Gasifier Details @ 06 Jan 2016

20160331 Fixed Assets Register
20160512 Thermax Letter to Secretary MNRE re deadlock re design changes sought by CSTEP
20160518 Letter to Thermax re New CSP Specs
20160525 BSPDCL Letter of No Objection re Additional Land Availability to CSTEP
20160606 PEC 002/16 MoM @ CSTEP
20160628 PEC 03/2016 MoM
20160725 Six-Monthly Progress Report for Jan-June 2016
20170601 CSTEP Communications to MNRE re Tender Results - 05
20170609 EU Termination Letter to CSTEP
20170609 Termination Letter for the Contract
20170609? Project Closure - Summary of Activities Undertaken by the Project
20170609? Project Closure - Final Technical Report
20170609? Project Closure - Lessons Learnt
20170609 Project Closure - Annexes 1-16 - Reports Produced by the Project
20170722 Final Project Executive Committee (PEC) Meeting to Inform Partners About the Projects Termination – 04
20170831 Summary of Expenditure – 06
20180531 Final (Narrative) Report - Annex 6 - Updated from 16 Nov 2017
20200626 India Solar Heat for Industry Project (SHIP) - UNIDO-GEF

TA Clean Energy Project Documents
20140115 Consortium Technical Offer's Budget
20140415 Consortium Offer - Organisation and Methodology- part 1
20140415 Consortium Technical Offer - Organisation and Methodology - part 2
20140415 Consortium Technical Offer - Organisation and Methodology - part 3
20140721 EU-IDOM Consortium Signed Contract
20150909 Letter re EU-BEE Cooperation Work Plan
20150909 MoM for EU-Maharashtra SDA Cooperation Scoping Meeting
20150915 Proposed Implementation Support for ECBC (Energy Conservation Building Code) in 4 States
20151029 2nd 6-Monthly Financial Report for 01 March 2015 - 31 Aug 2015
20151029 2nd 6-Monthly Report Narrative For 01 March 2015 - 31 Aug 2015
20151119 Cover Letter from SECI (Solar Energy Corp of India) re Workplan Approval
20151206 Sustainable Energy Stakeholders Facilitation Meeting @ EUD - Draft Agenda
20160116 IDOM Signed Addendum-1 to Contract
20160117 PPT of Concept of ECBC Cells in Madya Pradesh under Support of EU
20160120 Final Agenda for EU Supported Workshop on Implementation of ECBC in MP – Bhopal

20160127 ISA Solar Power Parks Programme Concept to EUD SEA – Updated
20160214 Solar PV Financial Model
20160215 Solar Parks Guidebook
20160227 EU Study Tour Invitation for 17-24 June 2017
20160227 EU Study Tour Mission Report
20160229 ISA Launch Declaration from Paris COP 21 @ 30 Nov 2015
20160323 Documentation of Solar Farms Financial Model v2
20160410 Proposed EU Support for Biogas in India – PPT
20160411 Proposed Biogas & Solar Parks Scope for Mar 2016 - Feb 2017 – PPT
20160420 3rd 6-Month Report - for 01 Sept 2015 - 29 Feb 2016
20160505 Concept Note for MNRE Rooftop PV Advisory Cell Support for 2 Years
20161010 EUD Approval Letter for Updated Budget rev 2016
20170707 Summary of Main Activities
20170720 PV Rooftop Programme Workplan v5 for Aug 2017 - Aug 2018
20170927 EEAS-IDOM Correspondence re Reallocation of Experts Man-days
20171230 PV Rooftop Support Workplan for 2018-2020 Extension
20180424 IDOM Work Plan for the Extension (2018-2020)
20180518 ADB Letter to MNRE re ADB Support for Rooftop PV Single Window in Goa & Kerala
20180518 Overview of 2014-2018 & Ideas for Rooftop PV Support 6mths extension to April 2019
20180518 PV Rooftop Cell Work Order for Activities to Aug 2018
20180601 Review Meeting PPT for "Demand driven project" incl. Extension
20180703 7th 6-Month Part 1 Narrative Report for 01 Sept 2017 - 28 Feb 2018
20180625 7th 6-Month Part 2 Financial Report v2 - for Oct 2017 - 28 Feb 2018
20180630 7th 6-Month Part 3 Auditors Report - for 01 Sept 2017 - 28 Feb 2018
20180723 Budget Reallocation & Extension Addendum No 1
20180726 MNRE Request Letter to DEA for Extension
20180801 LFA (Logical Framework Analysis Updated Deliverables
20180813 DEA (of MoF) Letter to EU Requesting Extra EUR2M+2 year Extension
20180910 Budget Breakdown Enclosure-1
20180918 Cover Letter for Extension with Additional Budget
20180918 IDOM - Work Plan for the Extension of 2018-2020
20180918 IDOM Cover Letter for Request for Extension from Oct 2018 to Sept 2020
20180924 IDOM Work Plan for the Extension (2018-2020)
20181005 EU-IDOM Service Contract Addendum No 2 – Signed
20190410 Overview of IDOM Service Contract Extension to 28 Sept 2020
20190509 08th Interim 6-Monthly Reports - Rooftop PV Focus
    8th 6-months Financial Report @ 20190530
    8th 6-months Financial Report v6 @ 20190530 – 2
    8th 6-months Invoices (17 Invoices)
    Office Cost Reimbursement Claims (7 Claims)
    8th 6-months Progress Narrative Report @ 20190110
    8th 6-months Report Timesheets (63 Timesheets)
    Budget Reallocation & Extension Addendum No.1 @ 20180726
20190801 6-mthly Progress Report - Part 1 Narrative Report - for 01 Oct 2018 - 31 March 2019
20190808 Updated Logframe
20200212 Draft Press Release for Rooftop Solar App Developed by EU for BSES Delhi Disco

20200326 10th 6-monthly Progress Narrative Report for April-Sept 2019

TA Environment Project Documents
20150430 Inception Report with Overall Work Plan
20160212 Stree Mukhti Proposal for MSW Community Awareness in Mumbai Metro Region
20160615 Manual for LFMC (Landfill Mining & Reclamation) of Plastics
20160630 Learnings from EU Study Tour - Technical Policy Report
20160704 TOR for STE (Short Term Expert) for Technical-Policy Questions from Sweden Study Tours
20160705 MOM from MoUD Follow up Meeting on Sweden Study Tours
20160720 SMS (Solid Waste Mgmt & Sewage) EU Initiative Presentation to MoUD
20160808 Project Status Update for Oct 2014 - July 2016
20160904 Description of Upcoming Sept 2016 Mumbai Mission
20160907 Report of Denmark Sludge Mgmt & Sweden Waste Mgmt Study Workshops
20161029 Smart Cities TC Results for Oct 2014 - Sept 2016 & Tasks for Oct 2016 - Sept 2018
20161106 Description of Upcoming Mumbai Mission in Nov 2016
20170117 Mumbai Solid Waste Technical Training I Concept
20170130 Description of Upcoming Mumbai Mission in Feb 2017
20170202 Report on 1st Consultation Workshop on SWM Processing Technologies
20170306 Concept for Wastewater Management Technical Workshop in Mumbai CWII
20170315 Summary of Sewage Treatment Sludge Management Technologies Workshop 2 in Mumbai
20170328 SMS (Stree Mukti Sanghatana) All 20 SWM Posters
TA ENV 20170329 Description of Mumbai Mission in March-April 2017
20170615 Europe June 2017 SWM & Sewage Mgmt Study Tours' List of Participants
20170706 Description of Upcoming Mumbai Mission in July 2017
20180915 Detailed Project Compendium (Final Report)
20190230 Concept Description for Consultation Workshops in Mumbai & Delhi

Annex 6: Summaries for Each of the Five Projects

6.1 SCOPE BIG

SCOPE BIG - Scalable CSP Optimized Power Plant Engineered with Biomass Integrated Gasification

Contract No[108].	Contracting Party	Start date	End date	EUR	Amount
ACA/2013/317-274 SCOPE BIG – Scalable CSP Optimized Power Plant Engineered with Biomass Integrated Gasification (Status: Terminated)	C-STEP Center for Study of Science, Technology and Policy Limited	27/09/2013	31/05/2018	EUR	2.7 million

The scheduled duration of the implementation period was 56 months however, the project was terminated at 44 months.

Location: Bihar

Stakeholders[109]:

Partners in the Action:

- Main implementer: C-STEP - Center for study of Science, Technology and Policy Limited
- State government of Bihar
- BSPGCL - Bihar State Power Generation Company Limited
- The Indian company, Thermax Limited
- ECN - Energy Research Centre of the Netherland
- CNRS - ICARE – National centre for Scientific Research (Central National de la Recherche Scientifique - Institut de Combustion Aérothermique Réactivité et Environnement), France.

Final beneficiaries/Target groups:

- Target region: Bihar, India
- Target groups: MNRE, CERC, Ministry of Power, BREDA, BERC, IISc (Bangalore), NISE, IIT-Patna, Solar power developers, IPPs[110]
- Fund provider: European Union Delegation (grant covering[111] 75.5% of the eligible cost) and Bihar State Government (24.5% contribution)
- Final beneficiaries: State government of Bihar and solar industry, Local communities in rural areas, Bihar State Power Generation Company Limited (BSPGCL), etc.
- Independent power producers and rice mills

[108] TOR_Renewable Energy
[109] 2018.05.31 Final Report
[110] 2018.05.31 Final Report
[111] 2018.07.24 D_22349_Consolidated_ROM_Report__CSTEP

Objectives:[112]

- The overall objectives of the Action were to:
  - promote sustainable and inclusive growth by developing solar thermal and biomass technologies for application to rural India in collaboration with EU.
  - create a viable business model and realistic policy environment for adoption of these technologies on a large scale.
  - design, develop, implement and operate a 3 MW Solar Thermal - Biomass hybrid power plant in Bihar
  - develop scalable models for wider dissemination
- The specific objectives of the Action were:
  - Capacity building, employment generation and training in solar and biomass technologies
  - Knowledge sharing expertise with the EU partner
  - Working with central and state governments for conducive policy environment

Activities undertaken:

2013

- It was decided to configure the plant with the design capacity of 3 MW and operating capacity of 2 MW with minimum 50% contribution from solar.
- The Consortium Agreement was also finalised and signed by all the partners.
- For overall activities of the project, three main committees were formed: a Project Executive Committee (PEC), a Project Monitoring Group (PMG) and a Project Review Committee (PRC).[113]
- The project grant contract was signed between EUD and CSTEP with an implementation period of 60 months, total accepted cost of 10,732,332 EUR and total eligible cost of 10,597,772 EUR, in which the EU's contribution was limited to 74.54% of the total accepted cost[114].

2014

- The project implementation document was submitted in July 2014.
- The land allotted for the project was around 8 acres, in a skewed shape.[115]
- The land breaking event was formally launched on Thursday, December 4, 2014.[116]
- According to the meeting held on March 11, 2014, the disbursal amount[117] of Rs. 5.81 crores (approx. Euro 716,930) as an advance was approved. Out of which, Rs. 1.5 crores (approx. Euro 185,094) was allotted for the preparation of a DPR (Detailed Project Report).

[112] 2018.07.24 D_22349_Consolidated_ROM_Report__CSTEP
[113] 2018.05.31 Final Report
[114] Contract CSTEP
[115] 2015.05.15 Interim Narrative Report
[116] 2015.05.15 Interim Narrative Report
[117] 2014.03.28 Disbursement Request

- Initial estimates suggested that a connection for a power load of 245 kW and 18 kl per day of water requirement would be needed.

2015[118]

- After shadow analysis, the alignment of plant was considered 30° from South to West.
- The 3 MW plant was approximately required 0.1 million litres of water per day[119]. A canal (Sone river) 1.7 km away from the site was identified during the water resource study.
- The heat mass balance diagram HMBD[120] for the plant design was developed.
- An electro resistivity test of the soil, biomass resource survey[121] and optimization studies were performed with respect to location, topology of the land, resource availability and other related components.
- An open reservoir and rainwater harvesting structure were also designed to supply water to the plant.
- The clearing works of bushes and shrubs in the site were done.
- Rice mills in Aurangabad district were identified[122] and discussions with rice mill owners were held in order to identify suitable biomass resources as a feedstock for the gasifier.
- Geo-coordinate certificate and NOC (No Objection Certificate) receipt from the Pollution Control Board were obtained.
- Shifting work of overhead electricity distribution line was also done.
- The National Highway Authority of India acquired an acre of the allocated land at the site for road widening purposes.
- After biomass resource survey, samples were collected from various potential vendors for test analysis. Thermal and other related properties were analysed for rice husk samples obtained from various rice mills.
- Study on development of biomass supply chain was carried out.
- Letters[123] to electric supply division and water resource department were passed
- The statutory clearances and other approval certificates were obtained and submitted to relevant authorities.
- The design of major equipments were finalised with certain specifications
- The assessment of electricity and water requirement revealed that around 245 kW of power load for construction, 18 kl of water per day during construction phase and 10 kl of water per hour during operation phase were required.
- The finalization[124] of the plant configuration was approved on 15/06/2015 for 3 MW plant with 50% solar and 50% biomass contribution

2016

[118] Interim_Narrative_Report_Jan_2015_DEc_2015
[119] 2015.05.15 Interim Narrative Report
[120] 2015.09.15 Six month progress report
[121] 2015.09.15 Six month progress report
[122] 2015.09.15 Six-month progress report
[123] Reports_produced_by_the_project
[124] Reports_produced_by_the_project

- The 8 acres of land released for the project was identified as not being enough for a 3 MW plant.[125] An additional 6 acres was allotted to C-STEP by BSPGCL[126] and sanctioned on 25.05.2016 to the project (total 14 acres).
- MNRE provided technical suggestions to Thermax to achieve 15% CUF[127]
- PEC meeting was held on 06/06/2016
- Global tender was announced for the Experts to carry EPC works during November 2016
- Biomass and solar resource mapping[128] was completed
- Letter from Chief Conservator of Forests to BSPGCL regarding plantation over the site with the estimation of Rs. 6 lakhs for 3500 hardy tree species and Rs. 6 lakhs for 500 bamboo plantation.
- Letters for the project approval process to various departments were submitted and clearances obtained.

2017[129]

- The project was terminated after May 2017.
- Three options were proposed, and suggestions were demanded by Thermax[130] to MNRE
- Pre bid meeting had been conducted on 10/01/2017 at Bangalore
- The last date of final bid submission was extended from 23/01/2017 to 10/03/2017
- The price bid opening was held on 29/03/2017 at NISE
- ISGEC's contract price for the execution of project was found to be Rs. 141,15,93,586 including all taxes and duties. Later it submitted the revised contract price of Rs.67 crores on 16/05/2017
- TPC meeting was held on 18/05/2017, in which the recommendation to check the financial outlay was given
- PEC meeting[131] on 22/07/2017 regarding termination of the project
- The summary of expenditure[132] till August 2017 was given
- The proposed technology and revised technology after MNRE suggestions were compared[133] in various aspects and mentioned in the project closure report – lessons learnt.
- The final technical report of project closure[134] was submitted.

The risks of projects:[135]

- Technological risk (large problems occurred related to Thermax and their claimed failure to deliver according to requirements)

[125] 2018.07.24 D_22349_Consolidated_ROM_Report__CSTEP
[126] 2016.05.25 NoC_additional_land
[127] Reports_produced_by_the_project
[128] Reports_produced_by_the_project
[129] Actvities_Undertaken_by_the_Project
[130] 05_Communications_to_MNRE
[131] 04_Meeting_with_PEC_to_inform_partners_about_the_project_termination
[132] 06_SCOPEBIG_Summary_Expenditure_pdf_
[133] Lessons Learnt
[134] SCOPEBIG_Project_Closure_Report
[135] 2018.07.24 D_22349_Consolidated_ROM_Report__CSTEP

- Environmental risk (No problems surfaced)
- Political risks (Reasonable risk)
- Economic risk (The rice mills in the area could store and deliver the required amount of rice husk)
- Social risk (No risk)

Reason for the project failure in a nutshell:

- There have been significant delays in the project around 2 years and the project was not able to be completed as planned.
- The first major delay was caused by the acquisition of land in Bihar for the power plant, as a split up of the company in 2014 resulted in the land coming under the transmission company, whereas the power generation company was the project partner.
- The Plant had been designed at 18 bar pressure and 365 ºC.
- The energy estimates provided by Thermax indicated that the CUF was very low (6.1%).
- Hence, CSTEP requested EU and MNRE for advice on the technical aspects of the power plant. In response, MNRE performed a critical appraisal of the power plant and suggested the following minimum specifications while designing the power plant:[136]
  - Use of glass reflectors having a longer lifespan, evacuated absorber tubes and synthetic oil as the heat transfer fluid for the solar field
  - Operate the plant at high pressure and temperature (40 bar and 450 °C)
  - Achieve a CUF of 15%.
- The other parallel issue causing delay was the technology discussion[137] with Thermax, which could only supply Aluminium based reflectors (solar troughs with outside coating) with steam pressure and temperature up to 20 bars and 210°C respectively.
- The Ministry requested use of glass reflectors with inside reflective surface (protected from dust and scratches), which Thermax could not supply.
- The Detailed Project Report (DPR) produced by Thermax was claimed to be of inferior quality and despite pushing from CSTEP, the report was not improved.
- Hence, an open tender[138] was initiated in December 2016, with bids closing in March 2017 for new supplier/contractor.
- The call for tenders to replace Thermax ltd. resulted in an offer that would require more than double the funds allocated to the project.
- It was planned to have a construction period for 1 plus year, test/commissioning period for 2 to 3 months and commercial operation for 2 years.[139]
- With the delay in the project, the commercial operation was impossible, unless time extension was given.

[136] 2016.06.25 Six_M_Progress_Rep_Jan_June_2016
[137] 2016.06.06 Minutes of Meeting
[138] 2016.06.29 Minutes of Meeting
[139] 2018.07.24 D_22349_Consolidated_ROM_Report__CSTEP

- CSTEP found that the plant would generate electricity at a capacity utilization factor (CUF)[140] of 4.84% and cost of generation is Rs.6.13 per kWh, in which the energy generation would be too low, and the cost generation would be too high.
- The original quote provided by ISGEC would increase the total cost of the project to around 22 million EUR. This would be significantly higher than the original estimate of 10.25 million EUR. At this cost, the project would be unviable and would be not be capable of large scale replication as desired, thus defeating the basic objective of the Action[141].

Log Frame:

- The log frame of the project was confusing, with mixed up use of terminology (activities, results and indicators) and poorly formulated indicators.

Project termination:[142]

- The proposed technology for demonstration was not considered to be viable in the long-run given the competitive costs of other renewables like solar photovoltaic.
- Changing the objectives of the contract would compromise the awarding process and therefore was not allowed as per the EU rules and procedures.
- Due to the non-viability of the technology, there was no scope of scaling up or replication.
- The decision to terminate the contract was a mutual decision of MNRE and EU.
- Hence, termination of the contract was agreed upon by both the EU and Government of India (Ministry of New and Renewable Energy) in the Project Advisory Committee on 20 April 2017.
- The Project was closed with a cut-off date 31 May 2017.[143]

Financial details (can be included by members accordingly):[144]

Total amount received by the beneficiary from the contracting party	
716,930 €	As per 11.03.2014 including DPR, etc.
€	As per
€	As per
€	As per
€	**Total received till**

Useful links for project reports/details:

- http://bib.cstep.in/milestones
- http://ngil.cstep.in/uploads/default/files/pressroom/stuff/CSTEP_Hybrid_CSP-Biomass_project_to_be_built_in_India_Oped_2014.pdf
- http://www.eeas.europa.eu/archives/delegations/india/documents/publications/eu_india_update_special_edition.pdf

[140] Activities_Undertaken_by_the_Project
[141] Activities_Undertaken_by_the_Project
[142] 2017.06.09 Termination Letter
[143] 2017.06.09 Termination Letter
[144] 2016.05.20 Audit Verification Report (Year 2)

- https://knnindia.co.in/news/newsdetails/sectors/eu-india-cooperation-in-renewable-energy

6.2 FOWIND

FOWIND - Facilitating India's Transition towards low carbon development by supporting implementation of national policies and programmes for offshore wind

(FOWIND - Facilitating Offshore Wind in India)

Report prepared by Bala, Renewable Energy Expert

Contract No[145].	Contracting Party	Start date	End date	EUR	Amount
ACA/2013/317-281 FOWIND- Facilitating India's Transition towards low carbon development by supporting implementation of national policies and programmes for offshore wind (Status: Ended)	(Grant) Global wind energy council ASBL	12/12/2013	12/03/2018	EUR	3.2 million

Duration of project implementation phase – 51 months

Stakeholders:[146]

Partners in the Action:
- Center for study of Science, Technology & Policy (CSTEP), Bangalore
- Garrad Hassan India Pvt. Ltd., Bangalore, DNV GL
- Gujarat Power Corporation Limited (GPCL)
- World Institute of Sustainable Energy (WISE), Maharashtra

Knowledge partner:
- National Institute of Wind Energy (NIWE), Chennai

Industrial partner:[147]
- ReNew Power Ventures Private Limited (ReNew), New Delhi

[145] TOR renewable energy
[146] 2015.12.31 Annual Narrative Report (Year 2)
[147] 2016 interim narrative report

Final beneficiaries / Target groups:

- Govt. agencies – central (MNRE, NIWE, CERC, MOP) and state (GETCO, TANGEDCO, Energy departments, nodal agencies, electricity regulators)
- Research Institutes (NIWE, INCOIS, NIO, NIOT)
- Business & industry – wind turbine manufacturers, project financers and developers, wind industry associations in Europe and India, Independent power producers etc.
- Civil society – local community and civil society organizations in Gujarat and Tamil Nadu

Objectives:[148]

- The overall objective was to promote offshore wind power development to facilitate India's transition towards a low carbon energy future.
- The Five specific objectives were to:
  1. create an enabling environment through resource mapping, policy guidance and capacity building measures to unlock the offshore potential of India
  2. utilize EU offshore wind learnings to reduce technical barriers and financial risks
  3. undertake techno commercial studies to showcase the potential of offshore wind projects
  4. create strategic partnerships, which would enhance access to and awareness of offshore wind technology
  5. develop an Offshore Wind Outlook and development pathway for India up to 2032

The project consortium developed the following **7 work packages**[149]:

- Review of existing research, studies, gap and pre-feasibility analysis of offshore zones in Gujarat and Tamil Nadu
- Development of a decision support system tool using GIS (Geographical Information System) software
- Infrastructure assessment in the states of Gujarat and Tamil Nadu
- Deployment of LiDAR and assessment of LiDAR data over a period of 12 months
- Techno-commercial analysis of zones identified through LiDAR data analysis
- Knowledge exchange and structural cooperation between EU and India
- Training workshops, 2032 Offshore Wind Outlook development and media and community outreach

Activities done:

2013[150]

- revised grant application form submitted to EU delegation by GWEC Global Wind Energy Council.

[148] TOR renewable energy
[149] inception_report
[150] 2013.09.20 GWEC revised grant application form

- Prepared concept note including the action description and checklist, full application form including general information on applicants, partnership statements, budget of the action, logical framework, co-funding details, consortium memorandum and visibility plan
- The visibility plan budget was approximately 80,000 Euros. An indicative summary for year wise activities was developed.[151]
- The project inception report[152] was submitted, which included the overall framework, baseline assessment, role of offshore wind in low carbon development, and then current status of wind power and analysis

2014[153]

- Finalized overall work plan for inception phase
- Launched project proposal
- Conducted reviewing, identification and detailing of existing studies
- Conducted constraint analysis on various factors for pre-feasibility study
- Reviewed Global and national policies, regulations and incentives for offshore wind power and policy report; Time extended from May to August 2014
- Field visit and study tour to Germany from 21 to 26 September 2014 for knowledge exchange and capacity building[154]
- Study on a global outlook on offshore wind policy and market assessment[155]
- DNV GL submitted their offshore capability statement on 14/08/2014
- DNV GL also submitted their offshore grid, ports and logistics and supply chain project references on 18/08/2014 with several case studies[156]

2015[157]

- Launched Offshore Wind Policy and Market Assessment – A Global Outlook
- Launched Pre-Feasibility Reports (PFRs) for Wind Farm Development in Gujarat and Tamil Nadu
- FOWIND published the 'Offshore Wind Policy and Market Assessment – A Global Outlook' report
- FOWIND published the first pre-feasibility assessments for offshore wind farm development in India – one each for Gujarat and Tamil Nadu.
- FOWIND signed the MoU with NIWE on 15th June 2015
- Activities on Tendering and procurement of Light Detection and Ranging Instrument (LiDAR)
- Suitable sites identified for LiDAR deployment – selected the coastal site of Gujarat
- Site-specific design and construction of a sub-structure for LiDAR placement
- Grid Infrastructure Assessment Studies for Gujarat and Tamil Nadu
- Data acquired for the Grid Infrastructure Assessment Study
- Assessment done on Supply Chain, Ports Infrastructure and Logistics for Gujarat and Tamil Nadu

[151] 2013 – 2017 offshore project visibility plan
[152] inception_report
[153] 2014.06.12 FOWIND_Technical_Narrative_Report_Clean_final
[154] 2014.09.26 Short_Article_on_Hamburg_Field_Visit_1
[155] 2014-12 Offshore Wind Market Assessment
[156] Annex 8 - DNV GL Offshore Grid, Ports, Supply Chain reference
[157] 2015.12.31 Annual Narrative Report (Year 2)

- Published Third and Fourth Edition of FOWIND project newsletter
- One-Day International Workshop on Joint Indo-European Offshore Wind Research and Development (R&D) Platform
- Participated in RE-INVEST
- Participated in international wind industry exhibitions and conference
- MoU with National Institute for Wind Energy (NIWE) signed
- Participated actively in MNRE's efforts to implement the national offshore wind policy
- FOWIND's international open tender was issued
- Pre-feasibility study[158] report for offshore wind farm development in Gujarat was submitted in May
- MOU[159] was signed among GWEC, CSTEP and NIWE on 15/06/2015 with GWEC as leading authority and CSTEP as the main implementer

2016[160]

- Procured LiDAR
- Successfully completed the validation protocol for the LiDAR
- Undertook study on Grid Integration of Offshore Wind in Gujarat and Tamil Nadu
- ReNew Power Ventures Private Limited (ReNew) joined the FOWIND consortium as an Industry Partner
- Follow up on ROM recommendations and comments on the technical report[161]
- NIWE issued the purchase order[162] to Bluefin Marine on 01/02/2016 with the approximate value of € 527,632 regarding offshore development activity in Gulf of Khambat
- FOWIND, through its partner CSTEP, got the LiDAR delivery with requisite customs clearances on 01/03/2016. After technical inspection, it was handed over to NIWE in April 2016.[163]
- Justification[164] for the key budget amendment items – LiDAR and infrastructure studies
- The total eligible cost of the action was € 4,941,502.26 and the total accepted cost of the action was € 5,458,257.06 with budget justification[165]
- Supply chain, port infrastructure and logistics study[166] for offshore wind farm development in Gujarat and Tamil Nadu was submitted in June 2016
- MOU[167] was signed between GWEC and ReNew Power Ventures Pvt. Ltd. on 24/06/2016

[158] Prefeasability Gujarat
[159] Annex 5 - MoU with NIWE
[160] 2016 interim narrative report
[161] 2016.09.09 GWEC_ROM_response_090916
[162] FOWIND_Annex_G_Final_Report_2018_final
[163] FOWIND_Annex_G_Final_Report_2018_final
[164] Annex 3 - Justification for realignment of costs in various work packages_201116
[165] Annex 2- Budget Amendment Proposal_201116
[166] Supply_Chain_Ports
[167] Annex 4 - MOU with ReNew

- As planned, NIWE with the support of FOWIND and the LiDAR supplier successfully carried out the LiDAR validation activities at its Kayathar Wind Turbine Test Station in Tamil Nadu in July 2016.

2017 – 2018[168] [169]

- FOWIND participated in Vibrant Gujarat 8th Global Summit and Consultation and Outreach activity in Gujarat (10th -13th January 2017)
- FOWIND participated in the three-day exhibition and conference "Windergy India" in April 2017
- Published the study on Grid Integration of Offshore Wind in Gujarat and Tamil Nadu Study in October 2017
- Development and construction of Offshore platform (led by NIWE) in the Gulf of Khambhat
- FOWIND commissioned India's 1st Offshore LiDAR in the Gulf of Khambhat in November 2017
- Published Offshore Wind Outlook for Gujarat and Tamil Nadu in December 2017
- One-Day Industry Conclave Held in New Delhi in March 2018
- Published Feasibility Studies for Offshore Wind Development in Gujarat and Tamil Nadu in March 2018
- The wind data sharing policy was introduced by MNRE in 2017[170]
- MNRE organized a meeting on 27/06/2017, where FOWIND experts presented the findings of grid study
- FOWPI project (200 MW), also funded by the European Union Delegation to India, delivering technical assistance to the MNRE on a commercial project in Zone B (as identified by FOWIND) in the Gulf of Khambhat.[171]
- Submitted final narrative report in 2018.

Workshops:

- Stakeholder Engagement Workshops held in Delhi, Ahmedabad and Chennai in 2014
- GWEC conducted a successful workshop on "Growing Your Offshore Wind Business in Asia and North America" during EWEA's Offshore Wind Conference and Exhibition at Bella Centre in Copenhagen (Denmark) on 11.03.2015
- GWEC organised another workshop "Doing Business in Non-European Markets" at the EWEA 2015 Annual Wind Industry Conference held from 17 to 20 November 2015 in Paris, France.
- Engineers' Training Workshop in Bangalore held in September 2015[172]
- GWEC distributed Pre-feasibility Reports for Gujarat and Tamil Nadu and the FOWIND project flyers during the exhibition and conference.
- MNRE organised the first Renewable Energy Global Investors Meet & Expo (RE-INVEST) between 15th and 17th February 2015 in New Delhi.
- Engineers training workshop on offshore wind project development (2016)[173]

[168] 2017.06.30 Interim Narrative Report 2017
[169] 2018.03.13 Annual Narrative Report 2017-18
[170] FOWIND_Annex_G_Final_Report_2018_final
[171] FOWIND_Annex_G_Final_Report_2018_final
[172] 2016.08.31 Engineers Training Workshop202
[173] 2016.08.31 Engineers Training Workshop

Key reports released by FOWIND:[174]

- Inception report (2014)
- Global offshore policy and market assessment (2014)
- Pre-feasibility studies (2015)
- Supply chain, port infrastructure and logistics study (2016)
- Grid integration study (2017)
- From 0 to 5 GW – offshore wind outlook for Gujarat and Tamil Nadu to 2032 (2017) – The five action plans are Clear roadmap, Consenting and permitting clarity, Grid development, Financial support mechanisms and Competence & skill development
- Full feasibility studies (2018)

Draft Feasibility study for the offshore wind farm development in Gujarat (Jan 2018):[175]

(The final reports are available in the link, https://mnre.gov.in/wind/offshore-wind/. Other relevant information is also available in this link)

- A roadmap for developing a sustainable and commercially viable offshore wind industry in India.
- Objective - 150 to 504 MW in Gujarat's most promising offshore wind development area
- Capacity - 150 MW and 504 MW and turbine MW class - 4 MW, 6 MW & 10 MW
- This report was supported by FOWIND's supply chain, port infrastructure and logistics study and the grid integration study
- Wind resource – data collected through LiDAR and mesoscale wind resource map
- Wave and current - 50-year typhoon induced waves are estimated at 12.5m H_{max} and tidal currents at 2.2 m/s
- The areas were divided into 8 Zones (A to H) ranging from 1,414 to 2,924 km^2
- Geotechnical conditions – out of 8 zones, Zone A indicate extensive layers of weak clay persisting for 15 to 40 m below seabed
- Potential wind site selection – 19 subzones within zone A - sub-zone A3 has been identified with the lowest cost of energy potential for a 150 to 504 MW demonstration project. The mean wind speed is estimated at 6.99 m/s (at 120 m Above Ground Level (AGL)), average water depth is 15.5 m below Lowest Astronomical Tide (LAT) and distance to coast is 25.3 km
- Turbine selection and wind farm layout – minimum inter turbine spacing 8 x 7 rotor diameters
- Energy yield – project net capacity factors in the range of 26.9% and 32%
- Electrical concept – 66 kV cable array for 6 & 10 MW turbines and 33 kV for 4 MW turbines
- Foundation concept – comparison study of monopile and jacket foundation was done and monopile foundation was selected for in-situ conditions given the shallow water depth condition
- Installation & Logistics – the preliminary studies identified four major ports with significant potential. Vessel availability in the region was high but not optimized for

[174] 2018.01.29 PPT_GJ_DRAFT_FOWIND_FS_study_v1_A
[175] 2018.01 Draft Feasibility Study for Offshore Wind Farm in Gujarat

offshore wind. The consortium recommend that site specific transportation and installation planning be conducted during the early project development stages.

- Operation & Maintenance – It was assumed that the first offshore wind projects in India would use an O&M strategy based on work boat access.
- Cost of energy (COE) – increasing the wind turbine capacity from 4 MW to 10 MW helped in COE reduction
- Heat map, turbine architect, spatial analysis, wind resource modelling, LiDAR and metaocean study and qualitative assessment with mitigation measures were provided
- Risks – lack of data, uncertainty within the available data and time delay
- Environmental – sensitive marine ecosystems caused recommendation of design envelope approach in EIA permit application to give flexibility.

Draft Feasibility study for offshore wind farm development in Tamil Nadu (Jan 2018):[176]

(The final reports are available in the link, https://mnre.gov.in/wind/offshore-wind/. Other relevant information is also available in this link)

- The aim of this report is to provide a concept design for a demonstration project of 150 to 504 MW in Tamil Nadu's most promising offshore wind development area
- Pre-feasibility study was conducted in 2015
- Different configurations of project capacity: 150-152 MW and 500-504 MW and turbine MW class: 4 MW, 6 MW & 10 MW
- The areas were divided into 8 Zones (A to H) ranging from 810 to 2,116 km^2
- Wind resource - the mesoscale wind resource map modelled during the pre-feasibility study remains the only data source. NIWE have plans to commission a LiDAR in the Gulf of Mannar (2018)
- Wave and current –50-year typhoon induced waves are estimated at 11.0m H_{max} and tidal currents at 1.3 m/s
- Geotechnical study - provided an indicative lower/upper bound design soil profiles for zone-A
- Potential wind site selection - 10 sub zones with zone A have been identified and sub-zone A3 has been identified with the lowest cost of energy potential for a 150-504 MW demonstration project. The mean wind speed is estimated at 8.01 m/s (at 120 m AGL), average water depth is -18.1 m below LAT and distance to coast is 12.4 km
- Turbine selection and wind farm layout – minimum inter turbine spacing 8 x 7 rotor diameters
- Energy yield - Project Net Capacity Factors were estimated in the range of 30.0 % and 38.1 %
- Electrical concept - the close proximity from shore is assumed to facilitate a direct Heating ventilation and Air Conditioning (HVAC) connection of the offshore wind farm to the onshore substation. 66 kV collection system voltage level is assumed for all turbine capacities

[176] Draft FoWind tamil nadu FR report

- Foundation concept – comparison study of monopole and jacket foundation was done. In terms of cost monopiles are more economical compared with jackets. However, pile drivability is a highlighted risk
- Installation & Logistics
- Operation & Maintenance
- Heat map, turbine architect, spatial analysis, wind resource modelling, LiDAR and metaocean study and qualitative assessment with mitigation measures were provided
- Cost of energy (COE) – increasing the wind turbine capacity from 4 MW to 10 MW helped in COE reduction
- Risks – lack of and uncertainty within the available data for the following key areas: offshore wind resource, geotechnical conditions and grid connection
- Environmental – sensitive marine ecosystems caused recommendation of design envelope approach in EIA permit

Result Oriented Monitoring (ROM) Report (Jan 2016):[177]

- By 2022, the Indian Government is targeting the installation of 175 GW of renewable energy capacity. The FOWIND projects could make a significant contribution to achieving this target.
- The target includes 60 GW of wind
- FOWIND partnered with NIWE in 2015 to work on several technical issues including the development of an offshore wind resource assessment platform and offshore wind R&D
- Created significant awareness about the offshore wind segment in the 51 months of its implementation phase
- MNRE - the nodal ministry and the NIWE - the nodal agency. NIWE will be the body responsible for the implementation and monitoring of wind farms in India.
- Tamil Nadu was the best choice for moving the project's office to the site area
- In the final year of its implementation, FOWIND published four leading-edge reports including the two Technical Feasibility Studies, one Offshore Wind Outlook and a comprehensive Grid Integration Report for the states of Gujarat and Tamil Nadu
- Pre-feasibility studies in Gujarat and Tamil Nadu analysed the potential environmental impacts, regulatory mechanisms, and protocols for offshore wind clearances.
- Although the project costs are higher, offshore wind has inherent advantages over onshore wind such as a large wind resources, higher wind speeds and no land tenure challenges.
- NIOT and NIWE had been instrumental in obtaining regulatory clearances for the deployment of Lidar to measure the wind resource in the identified location off the coast of Gujarat.
- Barriers of offshore wind project include:
  - Limitations of existing offshore wind resource studies in terms of reliability, scope and duration
  - Absence of clarity on adequacy of supporting infrastructure
  - Absence of any offshore policy and regulatory mechanism
  - Gap in knowledge and lack of trained professionals

[177] 2016.01.08 C_317281_Cons_ROM_Rep_20160128

- Perceptions of socio-economic and environmental impacts of offshore wind.

- The project implementation consortium worked under three levels of organization including Project Executive Committee (PEC), Project Management Group (PMG) and The Project Manager.
- The main outputs of the Action for the first two years (2013 & 2014) were publications and events
- Funds have been overspent for data acquisition and underspent for knowledge exchange visits in Europe and for LiDAR acquisition
- The workplan was updated every six months to account for minor changes in the timing of the delivery of activities.
- One of the main concerns with the deployment of offshore wind turbines is the degree of resilience to corrosion in the water. To tackle this issue, NIWE was engaged with Risoe and Siemens to indigenise the machines
- The indicators are well defined. But they should be updated to set more specific target values and include the time dimension.
- Two major risks identified were:
  (i) LiDAR deployment and related statutory clearances and
  (ii) cooperation among the partners
- Expenditure verification details were also given in separate files
- As of 2018 expenditure verification details, the Total cost of Action was € 5,458,257.18 and the grant maximum amount was € 4,000,000. Further budget expenditure details were in the final audit report

Log Frame:

- Logical framework (2018)[178] and TOR files are also available for this project

Financial details:[179]

Total amount received by the beneficiary from the contracting party	
746,479.17 €	As per 03.02.2014
836,873.32 €	As per 01.07.2015
577,190.18 €	As per 09.08.2016
1,039,457.33 €	As per 09.04.2018
3,200,000.00 €	**Total received till 19.06.2018**

Useful links for project reports/details:
https://mnre.gov.in/wind/offshore-wind/
https://mnre.gov.in/img/documents/uploads/2e423892727a456e93a684f38d8622f7.pdf
https://pib.gov.in/newsite/PrintRelease.aspx?relid=178608
[redacted]
dnvgl.com/cases/facilitating-offshore-wind-in-india-69949
gwec.net/about-winds/fowind/

[178] 2018 Annex_C_logical_Framework
[179] 2016.05.20 Audit Verification Report (Year 2)

6.3 TA Environment

TA Environment - Technical Cooperation for Environment in India

Contract No[180].	Contracting Party	Start date	End date	EUR	Amount
ACA/2014/346-495 Technical Cooperation for Environment in India (Status: Ended)	IVL Svenska MiljoInstitutet AB	18/07/2014	17/09/2018	EUR	1.03 million

Location: Delhi and Mumbai
Project duration – 48 months
Project consultants:[181]

- IVL Swedish Environmental Research Institute, Stockholm, Sweden
- Danish Technological Institute, Taastrup, Denmark
- Shriram Institute for Industrial Research, Delhi

Stakeholders:[182]

- Central ministry level
  - Ministry of Environment, Forest and Climate change
  - Ministry of Urban Development
  - Ministry of New and Renewable Energy
  - Ministry of Agriculture
  - Central Pollution Control Board (CPCB)
  - Bureau of Indian Standard (BIS)
  - Department of Science & Technology (DST)
  - Department of Bio-Technology (DBT)

- Implementers in Delhi and Mumbai
  - North Delhi Municipal Corporation
  - South Delhi Municipal Corporation
  - East Delhi Municipal Corporation
  - Delhi Jal Board
  - Municipal corporation of Greater Mumbai

[180] TOR_Renewable Energy
[181] Inception_report_in_PDF
[182] WP-1-3

- Regulators (central and state government)
  - Central Pollution Control Board
  - Department of Environment/ DPCC, the government of NCT of Delhi
  - Maharashtra Pollution Control Board

- NGOs and Private actors
  - Stree Mukti Sanghatana, Mumbai
  - Mumbai First
  - Waste processing operators like Timarpur Okhla Waste Management Co. Ltd.
  - Bal Vikas Dhara

- Others
  - Academic institutions (schools, universities etc.)
  - PHD chamber of commerce and industry
  - Security Watch India
  - Indus Media

Objectives:[183]

- The overall objective was to contribute to India's sustainable and inclusive development objectives by increasing the use of green energy sources, energy efficiency and clean technologies, based on the local experience of both India and the EU.
- The specific objective was to support the exchange of best practices policies and implementation and enforcement of existing regulations and policies, through the implementation of seminars, training courses, studies, awareness raising, visibility activities and study tours.

The focus of the project[184] was on two major themes viz., sewage treatment and solid waste management on Delhi and Mumbai with 10 work packages

Work Packages (**WP 1-10):**[185]

1. Inception phase
2. Stakeholder's interaction – site visit and status report
3. Policy analysis
4. Consultation workshops at city level
5. Training needs analysis of the target institutions in the selected themes
6. Training programs to encourage stakeholders to switch over to clean energy and resource efficiency technologies
7. Detailed project compendium
8. Organization of national seminars
9. Creation of knowledge management tools
10. Project visibility and communications

Expected Outcomes of the Project:[186]

[183] TOR_Renewable Energy
[184] EU_India_Manual_for_LFMC
[185] WP-1-3
[186] Inception_report_in_PDF

- To enhance technical and institutional capacity of Indian authorities to create enabling environment on promoting clean technologies – WP 1 to 5
- To enhance human capacity through the transfer of required skills and technical know-how for the use and development of clean technology in the local context – WP 6 & 7
- To increase awareness amongst the public and private sectors on environmentally friendly development activities – WP 8 to 10

Activities done:

2014
- Project kick off meeting was held on 28 October[187]
- Inception report and overall work plan for the execution phase of the project[188]

2015[189]
- First Programme Advisory Committee (PAC) meeting was conducted on 25 January
- Interactions and intense deliberations were made with the stakeholders comprising municipal corporations, central ministries, regulatory bodies and NGOs
- Inception report with work plan was submitted on 30 April[190], which included guidelines, framework, stakeholder mapping, situation analysis, timeline, etc.
- Presentation on "Smart Cities in India" at Delhi conference on 21 May[191]
- Presentation on "sustainable urbanization & world cities" at Mumbai conference on 25 May
- Appointment of two Short Term Experts (STEs) on solid waste and waste water management
- Interactive meeting held with key engineers of Delhi municipal corporation during October and November

2016
- Mumbai mission was held for the short-term experts during January[192]
- Developed communication and visibility plan during January
- Presentation on water management at New Delhi conference during February
- International study tour to Europe during June and technical assistance to develop the manual "Manual for processing of recyclable plastic mined out during landfill mining and reclamation"[193]. In this manual, quantity of wastes generated, segregation of plastic wastes, waste management methodologies were mentioned in detail.

[187] WP-4-6 - file-1
[188] 2016_2018_TC_Plan_29102016_1_
[189] Technical_Cooperation_for_Environment_Project_Brief_08082016
[190] Inception_report_in_PDF
[191] 2016_2018_TC_Plan_29102016_1_
[192] WP-4-6 - file-1
[193] EU_India_Manual_for_LFMC

- After the Europe mission, a manual[194] on 'waste management practices in EU and India' was prepared. This manual comprises the learnings and ideas arisen from the mission for further project development in India.
- Survey data collection and analysis on solid waste management and sewage operations
- One-week workshop on sludge waste management during 4-11 June in Sweden and Denmark was conducted. Tentative sludge generation in India is 9 tonnes per day[195]
- One-week workshop on sludge waste management during 11-18 June in Stockholm, Sweden was conducted. As of 2016[196], there were 53 compost plants, 22 RDF plants, 41 Biogas plants and 13 other power plants to treat the solid waste.
- Terms of reference[197] for STE was framed (04 July) for the development of comprehensive response to the study tour technical/policy questions.
- Follow up meeting[198] after study tours in Sweden (05 July) with meeting participants
- Second PAC meeting on 22 August[199]
- Mission to Mumbai[200] during 06-16 September for cooperation with stakeholders to develop the project
- One-week metropolitan lab[201] on Maharashtra was conducted during 19-24 September to explore the challenges and opportunities for sustainable development in Mumbai.
- Report on sludge management and solid waste management study workshops was submitted on September
- Mission to Mumbai[202] during November 23-25 was held in order to finalize the execution plan for consultation workshops

2017

- Around 4 consultation workshops[203] on Delhi and Mumbai were held during the months of January and February
- Technical training - I[204] on 'solid waste processing technologies' was conducted during February in Mumbai.
- A 7 days mission[205] during February 03-10 was conducted in order to strengthen the project and its implementation in Mumbai. Discussions on solid and wastewater management were held.
- Technical training - II[206] on 'wastewater management technologies' was conducted in Mumbai on 15 March.

[194] EU_India_Technical_Policy_Report
[195] Joint_Report_of_Study_Tours_07092016
[196] Joint_Report_of_Study_Tours_07092016
[197] TOR_for_STE_for_Techical_Policy_Questions_04072016
[198] MOMs_from_MoUD_Meeting_on_5th_July_2016_06072016
[199] MOMs_2_PAC_22_08_2016
[200] Description_Mumbai_Mission_in_September_2016_04092016
[201] Article_for_Urban_Update_without_pics_10112016
[202] Description_Mumbai_Mission_in_November_2016_06112016
[203] Description_of_Consultation_Workshops_in_Mumbai_Delhi_29102016
[204] Concept_Mumbai_Solid_Waste_Technical_Training_I
[205] Description_Mumbai_Mission_in_February_2017_30012017
[206] Concept_Waste_Water_Mumbai_CWII

- Mission to Mumbai[207] from 30 March to 06 April undertaken for discussion on landfill tax regarding solid waste management project.
- Smart cities Indian Expo was held in New Delhi on 11 May.
- Study mission to Europe was organized during June[208] to examine the implementation of waste management hierarchy, review on modern technologies relevant to India and analysing the challenges and opportunities for the project's implementation
- Regarding solid waste pilot plant project, a 5 days mission[209] was conducted during July 10-14 in Mumbai. Meeting with sewage treatment project team for discussions.
- Most of the visits to sewage treatment plants were conducted during 2017

2018[210]

- Lecture on 'Integrated water resource management in India' was held on 08 February at the University of Delhi
- Third PAC meeting was held on 27 February
- The project compendium document was submitted by the project consortium during September 2018 with eight chapters[211]
- Visit was conducted to Kondi sewage treatment plant, Delhi on 28 March along with the professors of University of Delhi
- Lecture on 'water and wastewater quality' was held on 25 May at Shriram school, Delhi
- Lecture on 'EU project experience in waste to energy projects in India' was held on 01 June
- On occasion of World Environment Day (05 June), more than 500 children and their families from Mahipalpur community learnt about waste management through fun filled activities
- Mumbai mission was held by ATL and STEs during August

Log Frame

Description	Indicators	Means of Verification	Assumptions
Overall Objective			

[207] Description_Mumbai_Mission_in_March_April_2017_29032017
[208] EU_study_tour_17_24_June_2017
[209] Description_Mumbai_Mission_in_July_2017_06072017
[210] WP-4-6 - file-1
[211] WP-7-10

Description	Indicators	Means of Verification	Assumptions
To contribute to India's sustainable and inclusive development objectives by increasing the use of green energy sources, energy efficiency and clean technologies, based on the local experience of both India and the EU	Increased capacity of the Government of India to implement the eight missions identified under the NAPCC. Help Government of India to enhance adaptation and mitigation to the impacts of Climate Change. Improvement in the efficiency of Sewage Treatment by adopting Best Practices and Best Available Technologies. Improved Solid Waste Management with an aim to achieve efficiency in conversion of waste-to-energy and waste-to-compost and thereby would facilitate in reduction of Carbon Emissions. Improved relations between EU and Indian legislators on environmental and climate change issues	Progress reports of the Coordination Agency, the MoEF&CC, MNRE and MoUD on the implementation of the NAPCC specific to the National Mission on Sustainable Habitat. Reports of the Joint Committee monitoring the EU-India Joint Action Plan (JAP) Feedback from the EC Delegation, and Indian beneficiaries in the programme Regular Progress Reports on the implementation of the project. Final Project Reports and Compendiums Overall Impact Evaluation Report. Participation in Capacity Building & Training Programmes and Evaluation Reports.	No disagreements among the beneficiaries on the direction of the project, e.g. selection of final themes for implementation Political conditions are stable and bilateral relations between EU and India continue to be cordial. Continued commitment to MoEF&CC, MNRE, MoUD and EU Delegation and with key private sector and civil society stakeholders
Specific Objective			

Useful links for project reports/details:

- https://www.euprojectinindia.com/
- [redacted]
- [redacted]
- https://ec.europa.eu/regional_policy/sources/cooperate/international/india_joint_decl_en.pdf
- https://www.euprojectinindia.com/project-6
- [redacted]

6.4 TA Clean Energy

TA Energy - Technical Cooperation for Clean Energy in India

Contract No[212].	Contracting Party	Start date	End date	EUR	Amount
ACA/2014/343-602 Technical Cooperation for Clean Energy in India (Status: Ongoing)	IDOM Consulting, Engineering, Architecture SA	21/07/2014	30/09/2020	EUR	2.02 million

Location: Bihar, Goa, Kerala[213], Madhya Pradesh (MP)[214], Maharashtra[215], Odisha, Punjab, Uttar Pradesh (UP) and West Bengal in India

Stakeholders:

- MNRE
- Bureau of Energy Efficiency (BEE)
- Solar Energy Corporation of India (SECI)
- European Investment Bank (EIB)
- International Solar Alliance (ISA)
- Central and state pollution control board
- Respective State Governments
- IDOM Consulting Engineering Architecture
- Ministry of Environment and Forests (MOEF)
- Central and State Pollution Control Board (CSPCB)

Objectives:[216]

- The overall objective is to contribute to India's sustainable and inclusive development objectives by increasing the use of green energy sources, energy efficiency and clean technologies, based on the local experience of both India and the EU.
- The specific objective is to support the exchange of best practice policies and implementation and the enforcement of existing regulations and policies, through the implementation of seminars, training courses, studies, awareness raising, visibility activities and study tours.
- The three major activities are
  i. promoting solar roof-top energy,

[212] TOR_Renewable Energy
[213] ADB_Letter_to_MNRE
[214] 20160117_madya_pradesh_workshop_
[215] 201509_maharshtra_
[216] TOR_Renewable Energy

ii. promoting waste to energy,
iii. raising awareness amongst public and private actors.

Project Extension:

- Initially, the project contract was aimed to end on 2018 with the contracting value of € 1,010,500.[217]
- The project was extended till 2020[218]
- The contract was extended[219] with an additional budget[220] until September 2020. The total budget is € 2,021,000[221]

Three expected results of the project:

- Enhanced technical and institutional capacity to create enabling environment promoting RE
- Enhanced human capacity
- Increased awareness among public and private sectors on environmentally friendly development through clean energy activities

Activities undertaken:

2014
- Concept note prepared[222]
- Activity schedule and financial agreement completed
- A service contract[223] was signed between the contracting authority (EUD) and the contracting party (IDOM) with a maximum contract value of 1,010,500 EUR and an implementation period of 48 months from the start date.

2015
- Supported the implementation of ECBC (04/09/2015)[224]
  - Aim to curb the rise in energy consumption in buildings
  - Extend its support to four Indian states (Bihar, Odisha, Maharashtra[225] and Madhya Pradesh[226]) as a part of the project “Clean Energy Cooperation with India” (CECI) on a pilot basis
  - An objective of the project is to facilitate establishment of ECBC cells at these four states, which will provide legal and policy support to the development and implementation of energy efficiency legislation for the building sector in India in collaboration with the Bureau of Energy Efficiency (BEE)
  - Several workshops, meetings and missions were conducted (stakeholder workshops in Bhopal and Bhubaneshwar)

[217] Original_Contract_Budget
[218] Letter_of_the_Extension
[219] 01_343_602_Cover_letter
[220] 08_343_602_IDOM_Request_Letter
[221] IDOM_Overview_343602
[222] PP_for_01062018
[223] signed_contract
[224] 201509_ecbc
[225] 201509_maharshtra_
[226] 20160117_madya_pradesh_workshop_

- The results of this project activities include updating of energy efficiency legislation, design studies with respect to energy, capacity development, national level coordination activities, improved access of EU companies in India to improve energy efficiency, supporting relevant joint working groups.
- Cooperation[227] with Bureau of Energy Efficiency (BEE)
- Cooperation with Solar Energy Corporation of India (SECI)
- Cooperation with European Investment Bank (EIB)

2016

- Providing Technical Assistance for solar park projects[228]
  - Development of solar park standards, guidelines and financial model
  - Financial model for solar farm assessed[229].
- Solar mission to Europe in February 2016 and visited
  - PV Plant at "El Chorchito" – 25 MW capacity
  - Platforma De Solar Almeria (PSA) – concentrating solar thermal energy and solar photochemistry
  - Termosolar Borges Hybrid Power Plant at Catalonia – biomass solar hybrid thermal powerplant with net output of 22.5 MW
- Formation of PV Rooftop Cell under the leadership of Joint Secretary, MNRE in July 2016
- ARUN (Arial Rooftop solar User Navigator) Mobile applications for PV technology, solar calculators etc contributed support in August, 2016[230]

2017[231]

PV Roof top Cell activities:

- Proposed cooperation with International Solar Alliance (ISA) (18/09/2017)
- Proposed cooperation with other technical assistance programmes – related to GCRT programmes
- Session on "Rooftop solar connecting the dots" at REI EXPO, 21/09/2017
- Reallocation of working days for the project team members including all experts and updated budget - October 2017
- Framework for Standard Bid Document –the second version of the tender document was developed on 13/10/2017
- Hosting session on RTS in RenewX Hyderabad
- Recruitment of 2 new team members[232] to the cell
- Guidelines developed on Rooftop Readiness
- Case studies on Solar Rooftop plants – two projects on grid connected rooftop in UP (5.76 MW) and in MP (5MW)
- First draft report prepared on 'Opinion - Non-substantial growth of residential rooftop PV market in India'.
- Webinar series conducted on PV Design and Simulation software
- Database of State Solar Policies, Metering Regulations, ED, CEIG, & RPO were submitted

[227] 3rd_6_month_report_20160420
[228] 2016_EU_SEA_Updated
[229] Financial_Model_Documentation_v2_0_Mar16
[230] PP_for_01062018
[231] 02_7_th_6_month_financial_report_v2_20180625
[232] 01_7_th_6_month_narrative_report_20180703

- Sustainable Rooftop Implementation study for Solar Transfiguration of India (SRISTI) through DISCO implementation
- Study conducted on standardisation of technical parameters of solar inverters & mounting structures

2018[233]

- Note on the state-wise summary of Metering Regulations – database submitted on 04/01/2018
- Compilation of comments received by MNRE on the SRISTI scheme concept note – compiled document submitted on 17/01/2018
- Study on inspection procedure for RTS inspection/approval by Electrical Inspector's in India
- Study of Electricity Acts and subsequent amendments
- Presentation of Single Window Clearance Portal Concept to Joint Secretary, MNRE on February 2018
- Meeting with EEREM Centre, DISCO, National Informatics Centre etc. in February regarding development of Single Window Clearance Portal
- Meeting with Director MNRE regarding project activities and possible extension on 21/02/2018
- Single Window Clearance (SWC) portal for Delhi completed[234]
- Cooperation with the concerned states on:
  - Review of the Solar Roof top Policy and Scheme - with findings and conclusions
  - Development of the Single Window Portal[235], including scheme simplification
  - Development of concept of cooperation with stakeholders (mainly installers)
  - Development of pilot projects (with ADB, IFC, and EIB)
- The project contract Addendum 2[236] was signed with an extension of the maximum contract value to 2,021,000 EUR and the implementation period extended to 73 months from the start date.

2019

- Single Window Clearance Portal[237] [238] for solar rooftop application established in the additional states of Goa, Kerala[239], Uttar Pradesh, Punjab, West Bengal and Maharashtra
- Kissan Urja Suraksha evam Utthaan Mahabhiyan (KUSUM)[240] [241] scheme launched, which focussed on[242]
  - solar water pumping in rural areas for irrigation purposes
  - Installation of grid connected solar power plants, each of capacity up to 2 MW in rural areas

[233] 02_7_th_6_month_financial_report_v2_20180625
[234] 09_343_602_IDOM_Work_Plan_of_the_Extension
[235] Oct_2018_March_2019
[236] Signed_Addendum_no_2_pdf
[237] 09_343_602_IDOM_Work_Plan_of_the_Extension
[238] Work_Plan_of_the_Extension
[239] ADB_Letter_to_MNRE
[240] 09_343_602_IDOM_Work_Plan_of_the_Extension
[241] Work_Plan_of_the_Extension
[242] For further details – http://pib.nic.in/newsite/PrintRelease.aspx?relid=177489

  - Installation of standalone off-grid solar water pumps
  - Solarisation of existing agricultural solar pumps and enabling them to sell surplus power to obtain extra income
  - Solarisation of tube-wells and lift irrigation projects of Govt sector
- Waste to Energy[243] [244]
  - Program on “Energy from Urban, Industrial and Agricultural Wastes / Residues”
  - MNRE set waste-to-energy target of 57 MW
  - Biogas production from Industrial waste, Sewage Treatment Plants, Urban & Agricultural Waste/residue through AD/Biomethanation
  - Installation of biomass gasifier-based projects in industry
  - Power generation or production of Bio-CNG/enriched Biogas from biogas produced from Industrial waste, Sewage Treatment Plants, Urban & Agricultural Wastes/residues
  - Assessing the potential to produce energy from waste in Haryana and Punjab regions
  - Identification of suitable technologies like landfill gas technology, large scale anaerobic digestion, incineration techniques etc.
  - Study undertaken that estimates that crop residues wasted in India is around 540 million tons per year which has the potential to yield 16,000 MW
  - Found that over 100 biomass power projects with an aggregate capacity of 773.3 MW have been installed in India
  - Conducted workshops on biogas technologies[245]
  - Promotional activities including R&D, Resources assessment, technology upgradation and performance evaluation, etc.
- The development and integration of SWC and Technical Assistance provided in Punjab, Uttar Pradesh, Maharashtra, West Bengal, Goa and Delhi[246]
- Scoping study conducted in Punjab and Haryana regarding waste to energy projects.
- Scoping study also done for PV Recycling[247]
- Project Advisory Committee meeting and other meetings with Maharashtra Deputy secretary, PWD officials and IFC held in April 2019
- Meetings with officials of MNRE, NISE and Govt. Banking group held during May 2019
- The integration of SWC portal completed for Uttar Pradesh and Maharashtra by June 2019
- First training workshop on crystalline PV modules conducted in West Bengal.
- Meetings with MNRE, MEDA, PEDA and HREDA held during June 2019
- Several meetings and conferences on WTE conducted during July 2019
- Project Sub Advisory Committee Meeting held on 01/08/2019
- Webinar conducted in September 2019 regarding solar PV recycling – policy landscape in Europe
- Meetings with officials of MNRE, UPNEDA, PSPCL and DISCO held during September 2019.

[243] 09_343_602_IDOM_Work_Plan_of_the_Extension
[244] Work_Plan_of_the_Extension
[245] 20160410_other_activities
[246] 10_th_6_month_narrative_report_20200326
[247] 10_th_6_month_narrative_report_20200326

- Work plan matrix until 2020 proposed.[248]

2020

- BRPL Solar Delhi[249] is envisioned to be a one-stop solution for information and associated services on grid-connected solar systems. It also aims to develop mobile applications on Solar PV, Solar Street lights and Bio-Gas for the Ministry of New and Renewable Energy to disseminate information on other potential renewable energy areas
- Waste to energy programme – MNRE has set a target of 57 MW in 2020[250]
- Supporting RESCO projects implemented by electricity distribution companies (DISCOs)[251]
- Supporting solar rooftop application in Madhya Pradesh to achieve the target of 265 MW

Log Frame:

- The project's logical framework was upgraded in 2019[252]

Useful links for project reports/details:

- http://isolaralliance.org/
- [redacted]
- https://beeindia.gov.in/content/buildings
- https://www.researchgate.net/project/Technical-assistance-for-the-implementation-of-the-Sector-Policy-Clean-Energy-Cooperation-with-India-CECI
- https://www.euindiaenergy.net
- http://pib.nic.in/newsite/PrintRelease.aspx?relid=177489

[248] 10_th_6_month_narrative_report_20200326
[249] BSES_Press_Release_Draft
[250] 09_343_602_IDOM_Work_Plan_of_the_Extension
[251] 09_343_602_IDOM_Work_Plan_of_the_Extension
[252] Oct_2018_March_2019

6.5 Eco Cities

Eco-cities - EU India Cooperation on Clean Technologies and Energy Efficiency for Eco-cities

Contract No[253].	Contracting Party	Start date	End date	EUR	Amount
ACA/2014/346-764 Eco-cities - EU India Cooperation on Clean Technologies and Energy Efficiency for Eco-cities (Status: Ongoing)	International Finance Corporation (IFC)	19/12/2014	30/09/2020	€	9 million

- Implementer: International Finance Corporation (IFC)
- Location: (i) Bhubaneshwar, Odisha State; (ii) Bengaluru, Karnataka State; (iii) Chennai, Tamil Nadu State; (iv) Pune[254], Mumbai, Thane and 5 other cities in Maharashtra State; (v) 5 cities in Bihar State.

Key Stakeholders:

- IFC
- MNRE (Ministry of New and Renewable Energy), Bureau of Energy Efficiency (BEE)
- Relevant State Government energy development agencies: OREDA; MEDA, TEDA; etc.
- Small Industries Development Bank of India (SIDBI)
- Chennai Municipal Corporation
- Tamil Nadu Infrastructure Development Board (TNIDB)

Objectives:[255]

- The overall objective of the action was to contribute to India's sustainable and inclusive development goals.
- The specific objective was the increased use of renewable energy, clean technologies and energy efficiency in the delivery of municipal services, the new building construction market, and SME clusters/supply chains in selected eco-cities.

[253] TOR_Renewable Energy
[254] approval of interim Rep_Jan_June_2017
[255] Annexes_I_II_III_EU_Partnership_for_Eco_cities_in_India_346_764_pdf

Expected Results/Impacts[256]:

- Mobilizing over USD 200 million in climate-smart private investment
- Reducing GHG emissions by over 1 million metric tons/year
- Reducing energy use by over 4,000 MWh/year
- Saving more that €80 million in costs for private sector companies
- Improving access to services for over 80,000 people

General:

- The Eco-Cities project focused its efforts on four key urban sectors under three components[257] focusing on five (5) cities.
- Later, it extended to ten (10) additional cities.

Four sectors: [258]

i. Urban Transport
ii. Green Buildings
iii. Water &Solid Waste Management and
iv. Energy Efficiency and Renewable Energy

Selected cities

Initially:

i. Bhubaneshwar
ii. Bengaluru
iii. Chennai
iv. Pune[259], and
v. Mumbai

Later extended to 10 additional cities, 5 more in Maharashtra and 5 more in Bihar.

Activities undertaken:

2013[260]

- Grant application form was published with an overview of the project description and the required experience of the applicants, in which the deadline for submission of concept notes and full applications was given as 23/05/2014.
- The implementation period of the project was fixed as an initial 48 months
- Guidelines[261] for the grant applicants provided

2014[262]

[256] EU_IFC_India_Ecocities_Background_Note
[257] approval of interim Rep_Jan_June_2017
[258] Nov_2017_project Brochure Revised
[259] approval of interim Rep_Jan_June_2017
[260] Final_EU_
[261] Guidelines_for_Grant_Applicants_Eco_Cities_24122013
[262] Administrative_Agreement_EU_Parternship_for_Eco_cities_in_India_346_764_pdf

- Agreement between the EU and IFC was signed on 19 Dec 2014
- The total budget of the Eco Cities program was Twelve Million Euro (€ 12,000,000), among which EU contribution was 75% (€ 9,000,000) and IFC contribution was 25% (€ 3,000,000).

2015

- Convened voluntary Sustainable Housing Leadership Consortium (SHLC) (draft 20/10/2015)[263] to drive sustainability in India's urban housing sector and to support the country's transition to a low-carbon economy (GHG reduction).
- Customization undertaken of IFC's Excellence in Design for Greater Efficiency (EDGE) system for voluntary building energy efficiency certification in pilot cities[264]
- Workshop held in Bhubaneshwar on October 2015 with IT vendors and city officials for Smart Cities proposal
- Discussions held with Chennai Municipal Corporation for energy efficient public street lighting (US$ 20 million project)[265]

2016[266] [267]

- IFC organized a workshop on 21/01/2016 in Chennai to promote captive power options with selected corporate tenants.
- IFC media coverage report on 04/02/2016[268] mentioned the new SHLC CEO-led consortium to drive sustainability in India's housing sector – including in the Hindu Business Line, The Hindu, DNA, Business Standard, ET Realty, The Economic Times, Equity Bulls, Orissa Diary, India CSR and Finthoughts.com
- Discussions held with BEE (Bureau of Energy Efficiency) and SIDBI (Small Industries Development Bank of India) to promote energy efficiency in SMEs
- Under the EDGE program[269], 6,868 residential buildings and 126,196 sq. ft. of commercial space were registered for certification
- Initiated city-wide mapping studies[270] for Bangalore and Chennai to develop low carbon roadmaps
- Completed the energy mapping study in Bengaluru which used The World Bank Group's (WBGs) Climate change action for Urban sustainability (CURB) tool for the first time in India to delineate the city wide energy consumption patterns and options

- IFC structured an energy efficient street lighting ESCO project for around 40,000 lights in Bhubaneswar by developing bid documents and assisting the bid management process
- An implementation agreement was signed for a 5MW solar rooftop project in Bhubaneswar
- IFC convened SHLC with nation's leading corporate developers and obtained commitments to relevant objectives.

[263] India_Sustainable_Housing_Consortium
[264] semi annual_Rep_Feb_to_Aug_2016
[265] semi-annual Rep Aug_2015_to_Jan_2016
[266] semi-annual Rep Aug_2015_to_Jan_2016
[267] semi annual_Rep_Feb_to_Aug_2016
[268] IFC_SHLC_Coverage_report_4th_Feb_2016
[269] semi annual_Rep_Feb_to_Aug_2016
[270] semi-annual Rep Aug_2015_to_Jan_2016

- Evaluation of innovative climate smart interventions discussed with Tata Steel and Jamshedpur Utilities and Services Company (JUSCO) for a proposed solar power project.

2017[271]

- Initially, Jamshedpur was selected for the project. Due to some difficulties, IFC requested a change from Jamshedpur city to Pune city. In response, EUD approved this change on July 2017)[272]
- Remarks on the six-monthly financial report was given in August 2017[273]
- Discussion with Tamil Nadu government for wastewater reuse options in September 2017
- Chennai WTE (Waste To Energy) – discussions for two 25 MW plants in Chennai
- Final report on climate action planning was submitted for Bengaluru and Chennai
- Capacity building assistance provided for GHG emission reductions in the urban transport sector in Bhubaneswar
- A feasibility report for a 275 MW phase I solar PV park in Bhubaneswar was submitted
- IFC worked to establish E-Waste management options in Bhubaneswar
- An E-vehicle project was initiated focussing on Bhubaneswar, Bengaluru and Thane
- The project logical framework was revised[274]
- Reports on legal due diligence were submitted
- Workshop on RE procurement for tenants of Mahindra world city was held on 24/05/2017[275]
- SHLC finalized the NDTV as a channel partner from August 2017
- A proposal was submitted for Technical assistance for conducting EE trainings to SMEs
- Budget expenditure and commitment details were provided in the interim report[276]
- The material database was launched in November 2017[277] for public dissemination through the integration of database into the EDGE tool

2018[278] [279]

- Technical due diligence initiated in four cities and approximately 25 MW of rooftop PV projects identified
- Conducted 20 workshops in India regarding Green Buildings
- "Training Needs Assessment" report for Energy Saving Companies (ESCO) prepared
- 6 – 7 of the technology specific EE modules were developed
- Continuing work with the Ministry of Environment, Forest and Climate Change (MoEFCC) for fast-track PV clearance; policy incentives for multiple states; scale-

[271] semi annual_Rep_Jul_to_Dec_17
[272] approval of interim Rep_Jan_June_2017
[273] approval of interim Rep_Jan_June_2017
[274] 346764_prososed_revision_logframe_Dec_2017
[275] Interim_progress_report_for_IFC_Eco_Cities_Jan_to_June_17
[276] Interim_progress_report_for_IFC_Eco_Cities_Jan_to_June_17
[277] EU_IFC_India_Ecocities_Background_Note
[278] semi annual Rep_Jan_to_Jun_18
[279] EU_IFC_India_Ecocities_Background_Note

up of Pradhan Mantri Awaz Yojana (PMAY) program; addressing consumer awareness; upskilling, technology, etc.
- Electric Vehicles options in Bengaluru, Thane, Bhubaneswar and Pune initiated.

Bhubaneshwar, Odisha:
- E-waste management project reached 40,000 households through awareness activities, channelized over 8 tonnes of e-waste to responsible recyclers
- IFC structured an energy efficient street lighting project for around 40,000 lights and bidder was identified for the street lighting project which was expected to save about US $ 25 million in annual energy costs
- Regarding the solar rooftop project, a capacity building exercise was conducted. A study tour was organized to Germany and Austria for key officials
- PPP for 1000 MW solar park project in Odisha; to be completed in two phases. (275 MW in first phase and 725 MW in second phase) – technical due diligence completed and DPR submitted for second phase

Chennai, Tamil Nadu:
- IFC selected Chennai as the first city to implement a Waste To Energy (WTE) project
- Development finalised of a 52 MW WTE plant based on a hybrid annuity model. A Financial Advisory Services Agreement (FASA) between IFC and Tamil Nadu Infrastructure Development Board (TNIDB) was signed in December 2018. During this reporting period, the technical and legal due-diligence were completed

Pune, Maharashtra:
- Regarding Pune solar rooftop replication project, 25.5 MW capacity was identified in four cities.

Bengaluru, Karnataka:
- Bengaluru Public Streetlighting PPP Project - PPP finalised for 485,000 street-lights in Bengaluru; ongoing implementation support including replacement of 465,000 fluorescent and metal vapor fixtures with energy-efficient lamps (LEDs).

At the initial stage, the end date of the project was supposed to be on 30 September 2018. The project was granted a no-cost extension for 1 year in October 2018 and then subsequently another no-cost extension until September 2020.[280]

- Work plan[281] was submitted for the period of 01/08/2018 to 30/09/2019
- Addendum no. 2[282] agreement signed and entered into force, indicating the new end date of the implementation period of 19/10/2019. An updated logframe was attached.
- The Bhubaneshwar E-waste management project was completed successfully by October 2018 with the collection and channelization of 11,227 kgs of e-waste.
- An agreement was signed between IFC and Tamil Nadu Infrastructure Development Board in December 2018 for the 52 MW waste to energy plant in

[280] IFC_Extension_request_for_EU_Contract_No_ACA_2014_346_764
[281] Worlplan_until_Sep_2019
[282] 346764_signed_Add2

Chennai and potential rehabilitation of two dumpsites as a first hybrid annuity PPP in waste to energy, with replication potential to several cities.

- Regarding Pune grid connected rooftop replication, the site survey assessment on additional four cities in Maharashtra was completed and a cumulative potential of 51.5 MW rooftop solar projects was identified for eight selected cities.
- Provided policy recommendations (16 regulatory green building policies) to Tamil Nadu housing department to upscale green buildings

2019[283]

- Chennai Waste to Energy project - Completion of Technical due diligence and finalization of project agreement and transaction structure.
- Rooftop Solar (RTS) PV proliferation in Odisha (OREDA):
  - The project was facing delays due to a change in the implementation model from net-metering to gross metering for which IFC assisted GEDCOL by preparing a note comparing the two models.
  - A web-based IT platform and mobile app was finalized. As of 2019, 1000 vendors were registered for RTS installations.
- Odisha solar park PPP – site selection was delayed despite several meetings. Subsequently, MNRE reduced the size from 1000 MW to 275 MW and the second phase capacity was also reduced.
- Bihar Green Affordable Housing PPP – PPP for 6,900 green affordable housing units to meet economically weaker section (EWS) needs in Bihar. IFC assisted the Urban Development & Housing Department covering around 60 acres of land in 5 selected cities within Bihar.
- Pune grid-connected solar replication – a site survey assessment was done for an additional four cities out of eight in Maharashtra and a cumulative capacity of 51.5 MW was identified.
- Wastewater initiatives – TOR was developed to conduct country wide assessment for the reuse of industrial wastewater in India
- Energy storage – IFC proposed an agreement with Tata Power to study the techno commercial benefits
- Bihar affordable green housing PPP – Transaction Structure Report (TSR) was submitted
- As of 2019, 30,000 homes were registered for EDGE certification
- Three ESCO trainings and 11 EE trainings were conducted. 182 ESCO/SME firms were trained.
- Provided support in structuring 16 regulatory green building policies - exceeding the program target of five policies.
- A Project Advisory Committee meeting[284] was held in April 2019
- The program registered approximately for 34,000 homes for EDGE certification with a total floor area of more than 10 million sq. ft.
- Regarding access to financing barriers for SMEs, an EE Financing Toolkit had been developed, which covers 5 clusters and 15 technologies.
- Budget summary[285] expenditure and remaining funds provided

[283] semi annual_Rep_Jan_Jun_19

[284] IFC_presentation_Eco_Cities_India_April_2019_pdf

[285] IFC_presentation_Eco_Cities_India_April_2019_pdf

- Key achievements as of October 2019[286] tabulated:
- As of October 2019, the project was claimed to have mobilized USD150 million in climate-smart private investments and reduced 167,000 metric tons of GHG emissions per year [note that this was not able to be independently verified].

Commitments of SHLC[287]:

- To make 100% of their own housing portfolio sustainable by 2017 as evidenced by appropriate green building certificates
- To achieve 20% reduction in incremental variable costs for sustainable housing construction to further improve the business case for green buildings
- To provide leadership and advocacy for broader industry and government policy actions that make 20% of India's new multifamily housing construction sustainable by 2022

Log Frame:

There were three components (mentioned in all semi-annual reports):

<u>Component 1: Enable Climate-Smart Municipal Services</u>

- Promote EE, renewable energy, and clean technology projects and practices in the delivery of municipal services and replace ageing infrastructure by involving the private sector through public private partnerships (PPPs) and other funding mechanisms,
  - Activity 1.1: Engage with local government authorities to Identify sectors
  - Activity 1.2: Conduct citywide mapping studies to better define private sector opportunities
  - Activity 1.3: Develop integrated management plans and bankable projects
  - Activity 1.4: Develop projects under public-private partnerships {PPPs)
  - Activity 1.5: Conduct technical due diligence on selected PPP projects
  - Activity 1.6: Assist city governments in managing the project bidding process
  - Activity 1.7: Provide post-transaction advisory services (on as-needed basis)

<u>Component 2: Catalyse Green Buildings Market</u>

- Assist government authorities in implementing the Energy Conservation Building Code (ECBC) and jump start the untapped mass market for voluntary green building certification by addressing energy, water, and material inefficiencies in new building design.
  - Activity 2.1: Provide Implementation Support for Regulations and Incentives
  - Activity 2.2: Promote Voluntary Green Building (GB) System for the Mass Market
    - Activity 2.2.1: Conduct Market Study for a Voluntary GB Standard for the Mass Market
    - Activity 2.2.2: Design and Implement GB Demonstration Projects in Pilot Cities
  - Activity 2.2.4: Use a Web Based Platform to Promote Voluntary GB Certification
  - Activity 2.3: Enable Construction and Housing Finance for Green Buildings

[286] India_Ecocities_Program_IFC_presentation_24_Oct_2019
[287] EU_IFC_India_Ecocities_Background_Note

- Activity 2.4: Engage Stakeholders, Build Institutional Capacity, and Raise Awareness

Component 3: Promote Competitive SMEs (Small Medium Enterprises)

- Facilitate financing for SMEs by working through financial institutions and help factories implement projects that address manufacturing and supply chain inefficiencies, reduce operating costs, and improve competitiveness and productivity.
  - Activity 3.1: Promote Resource Efficiency in Selected SME Clusters
  - Activity 3.2: Address Access-to-Financing Barriers for SMEs
  - Activity 3.3: Engage Multiple Stakeholders and Promote Dialogues to Raise Awareness

Financial details:[288]

Expenditure details: (2019)[289]

Total Expenditure & Commitments on EU Funds (€ Millions) as of June 30, 2019					
Total contribution	Funds received	Spend	Open commitments	Spend + committed	Spend + commitments (% of funds received)
9.0	6.3	5.07	0.98	6.05	96%
Total IFC contribution on EU approved cities and replication to other cities with effect Feb 2015 (EUR Millions) as of June 30, 2019					
Donors	Total contribution	Spend	Open commitments	Spend + committed	% of total IFC budget

[288] Annexes_I_II_III_EU_Partnership_for_Eco_cities_in_India_346_764_pdf
[289] exp Contribution_June_30_2019

Hungary, Japan, Canada, DEVCO, IFC, Denmark and Australia	3.0	1.7	0.27	1.97	66%
Total Spend + committed (EU + IFC contribution)					8.02

Useful links for project reports/details:

- https://www.ecocities.in/
- http://ace-e2.eu/wp-content/uploads/2017/10/S3-P4_Goswami_Impact-Assessment-of-construction-materials.pdf
- https://ppp.worldbank.org/public-private-partnership/energy-efficient-street-lighting-ppps
- https://www.ecocities.in/node/15
- http://sameeeksha.org/pdf/presentation/IFC-EU-Eco-Cities-Project.pdf
- https://beeindia.gov.in/sites/default/files/BEE_ECBC%202017.pdf

Annex 7: Overview and Recommendations for Future EU Engagements of IFC

Overarching Recommendation. The EU should work directly with private sector transaction advisors instead of appointing an intermediary such as IFC. The EU, potentially through allied institutions such as EIB or EBRD, should develop the skill to structure PPPs using in-house personnel, potentially by hiring from the private sector, instead of relying on another donor-funded institution such as IFC.

Reason for donors utilising IFC. Larger donors such as KfW, USAID, JICA generally have a suitable on-the-ground presence and expert personnel to implement projects themselves (i.e., without intermediaries such as IFC). As a result, donors using IFC are predominantly bilateral aid agencies from smaller countries (Nordics, Canada), which lack such capabilities or reach. These turn to IFC as a delegated implementing agency. IFC has an internal policy prohibiting it from accepting grants from private sector institutions (e.g., foundations, individuals, corporations). The EU is a typical case of the donors using IFC, because the EU is predominantly a grant-making institution. The World Bank Group (of which IFC is a member) has long experience in raising monies from donors. It uses trusts established under New York or English law: while immediate responsibility rests with the program officer at IFC who is backed up by a specialist trust fund department, consisting of accountants and lawyers. The accountants are responsible for financial reporting. In-house lawyers prepare the trust fund agreement, which follows a template. There is effectively no negotiation: it is a take-it-or-leave-it proposition for donors such as the EU using IFC.

Constraints on IFC effectiveness. IFC Investment Officers are saddled with a heavy administrative burden, which exists largely as a result of the weakness of IFC senior management. Indeed, a characteristic of IFC is that the quality of personnel decreases the higher one climbs the chain of command. This is manifest in several different ways: (a) the top performers usually leave IFC when they reach the Investment Officer or Senior Investment Officer (G rank) because pay grades become increasingly uncompetitive the higher an individual rises up the ranks; (b) IFC has implemented a system of racial and gender quotas ("diversity"), due to pressure from important constituencies in America, with result that many of IFC's managers have been promoted to a level above that which their talents or character would permit them to rise. (c) IFC managers favour a consensus approach to decision making, largely because individual managers lack the commercial knowledge and leadership skills to take decisions based upon individual authority; (d) IFC management has a process-oriented instead of a results-oriented culture, which is manifest in formalistic reporting (by contrast reporting in the private sector occurs orally, when managers "walk the floor"). These factors are obscured by frequent rotations and the softness of performance criteria used for promotion.

IFC takes on projects that are too small or risky for private sector. IFC frequently claims it serves as a "catalyst," meaning that although individual transactions are small (i.e., their

impact is limited), successful transactions have a demonstration effect, creating new markets for the private sector. This is an assertion which cannot be proven, except anecdotally, and this is why stories (rather than statistics) play such an important role in IFC reporting materials.

However, India is already well served by local advisers. There is a large pipeline of projects, so IFC's catalytic role in India is weak. Rather, it appears that IFC's Transaction Advisory team serves a niche between two groups of projects: those that are not commercially viable, and which need to be funded on a concessional basis and those which are obviously commercial viable, and which can readily be structured and financed by the private sector. In other words, IFC intrinsically takes on projects which are too small or too risky to be of interest to private sector advisors.

Fundraising pressures at WBG. IFC management is under enormous pressure to raise donor funds to supplement their own resources (e.g., monies raised from capital markets through bond issuances, fees earned from advisory clients, capital gains on portfolio investments and of course interest on loans). This is for two reasons: first, the last ten years have been a low-interest environment, and this hit the WBG net interest margin hard and, second, many bilateral donors are developing the necessary in-house capability to implement projects and therefore they are re-directing monies internally that they would have given to the WBG to their own agencies.[290] IFC was supposed to contribute its own funds to help pay for the transaction costs associated with the activities of the EUD-India programme but instead it raised donor monies from bilateral donors such as Hungary, Japan, Canada, Devco, Denmark, and Australia to cover the IFC contribution. This amounts to a lack of IFC focus by IFC because there is no longer an alignment of financial interest between IFC and the EU.

It is therefore recommended that, in the future, the EU should ask for proof that IFC has contributed its own retained earnings (FMTAAS) instead of just mobilising third-party development grant monies to cover its share.

Cost of using IFC. The two areas that are always a point of contention are: (a) IFC's management fees and (b) reporting.

For this particular trust fund, IFC charged an up-front fee of 5%. This results in a doubling-up in overheads because the EUD has its own administrative costs and then another layer of administrative costs is incurred by IFC as the implementing agency. The IFCs 5% admin fee represents a dead-weight cost on the programme.

Reporting is often another point of contention because the donor governments have formats and requirements imposed by budget legislation which are not identical with IFC formats.

It is recommended that: since the EU is a major donor and one of the most important funders of World Bank Group projects, the EU should attempt to negotiate fees on a global basis. This

[290] The consequences at the WBG were a hiring freeze, a freeze on promotions, pushing staff to move to "the field" (i.e., outside the USA) where costs are lower, downgrading travel to economy class (for short-haul flights), and a reduction in pension benefits.

would increase the impact of EU monies and force IFC to be more efficient (i.e., reduce back-office and managerial personnel costs).

Claw-back of "project development fees". IFC PPP Transaction Advisory (C3P) offers a fee-based service. An internal policy requires a split between an upfront fixed fee retainer paid by the public-sector client and a success based (contingent) fee payable by the private sector investor at commercial close (when the PPP contract is signed). For instance, the RfP for the development of the solar PV rooftop projects in 17 cities in Odisha - one of the projects under the EU-India Eco Cities project - calls for a "project development fee" of $200,000 to be paid to IFC (see Clause 9.1 in the EU-IFC Financing Agreement).

It is therefore recommended that the EU should claw-back IFC "project development fees", because the EU has already financed IFC's overheads and transaction costs. The "project development fee" of $200,000 for Odisha Rooftop solar project a represents pure profit to IFC.

Information sharing. Historically, IFC has not released project documentation to donors such as the EU. The reason why IFC takes this stance is: (a) it views the donor's gift of monies as separate from project implementation; (b) the beneficiaries of the services, namely, municipalities, generally have confidentiality agreements with IFC that cover all work-in-progress. Some of these documents may be available publicly due to disclosure requirements under local law or they may have been published in the interest of promoting the project during the procurement process, but this is the exception rather than the rule.

It is therefore recommended that the EU requires IFC to amend its standard-form service agreement (FASA) to permit disclosure of key documents such as the feasibility study, financial model, project contracts and tender documentation to the EU so that the EU can undertake meaningful independent assessments of IFC projects funded by the EU.

Annex 9: Evaluation Terms of Reference

SPECIFIC TERMS OF REFERENCE
Impact Evaluation: Support to Renewable Energy, Clean Technologies And Energy Efficiency in India

FWC SIEA 2018 - Lot 2: Infrastructure, sustainable growth and jobs
EuropeAid/138778/DH/SER/multi
RfS No. 2019/414-088
Contracting Authority: the European Union Delegation to India

BACKGROUND

Relevant Country/Sector background

In 2010, at the start-up of planning the Action, India was the 11th largest economy in the world (in 2017 advanced to the 3rd largest in terms of Gross Domestic Product (GDP), average growth 7% ultimo 2016). The country was expected to make huge economic strides over the next 10 years and the increase of investments were expected to bring increased benefits for employment, development, and growth in the quality of life, but mainly to the major cities. In 2010 80% of India's population lived with less than $2 per day, and 12% of urban and 56 % of rural households were un-electrified. (Average figure for the whole country primo 2017: 24% un-electrified, and for the rural population in Sep 2016: around 36%). India (still) needs to accelerate the provision of energy infrastructures to support its fast-growing economy, also coinciding with increased concerns regarding climate change globally. The states Bihar, Uttar Pradesh, Assam, Jharkhand and Odisha are the ones with the lowest rural electrification.

India was at the start-up of planning of the Action generating about 3% of the world electricity (approx. 140 GW), but its share of the world population was 16% (in 2017: 17,9%). Renewable power plants constituted 30% of total installed capacity. India was the world's 3rd largest producer and 4th largest consumer of electricity. It is expected that energy generation capacity needs to be increased at least 6-fold to about 900 GW by 2050, with real installed capacity of 315 GW as of 31 January 2017. The per capita electricity consumption is lower compared to many countries, and the country in general needs to increase its energy efficiency and the share of renewables in the overall energy mix. In June 2008 India's first National Action Plan on Climate Change (NAPCC) was released, and India in 2009 submitted its objective to reduce its energy emission intensity by 20%-25% by year 2020, meaning e.g., fuel efficiency standards for vehicles; green building code for energy conservation; and ensuring 50% of all new power capacities based on clean coal technologies.

Based on the Energy Conservation Act (2001) and the NAPCC, two noteworthy initiatives were launched in 2009: National Mission on Enhanced Energy Efficiency (NMEEE, to save 5% of the energy consumption by 2015); and the Jawaharlal Nehru National Solar Mission (JNNSM, with an aim for rapid diffusion of solar technology, mandating each State to purchase a certain share as solar energy). JNNSM enhances a rapid scale-up of solar technologies, with an aim to reach 10 GW solar energy generation or more by 2017 and 20 GW by 2020 (end 2016: 9.01 GW). The expansion of new renewable energy sources (in 2010 constituting about 7% of the total sources, excluding large hydro) was to play a crucial role to achieve the targeted emission reductions (15% in 2025 an 20% in 2050). Another relevant initiative to support adoption of energy efficiency and renewable energies at local level, is the Development of Solar City Programme (started in 2008), with min. aim 10% reduction in demand of conventional energy in 5 years, through enhancing supply from renewable energy sources, and energy efficiency measures. EU and India have held energy dialogues from 2005 onwards, being part of the EU-India Joint Action Plan (JAP). The EU-India Energy Panel meets once a year. In 2012, as Joint Declaration for enhanced cooperation on energy EU-India was signed, under which the Action was launched. In March 2016 a new Joint Declaration was adopted on a clean energy and climate partnership. The Declaration outlines the commitment to continued dialogue and cooperation on clean energy, energy efficiency and climate action, including work on energy efficiency in buildings, development of renewable energy sources including solar and offshore

wind, smart grids, energy research and innovation. This includes seeking exposure to European best practice experiences on green energy sources.

The EU initiated implementation of the programme "Support to Renewable Energy, Clean Technologies and Energy Efficiency in India" in 2013. The programme aims to support, one the one hand, policy implementation through capacity building at the central, state and local level and exchange of best practices with the EU and on the other hand, technology implementation through demonstration/pilot projects in renewable energy and energy efficiency across India. The programme supports the priorities identified in the Joint Statement of the EU-India Summit held in 2010 and is in line with the Commission's Country Strategy Paper (CSP 2007-2013) and the Multi-annual Indicative Programme (MIP 2007-2010)).The programme envisages in helping India to increase its usage of clean technologies and green energy to have a significant impact in the long-term in mitigating its contribution to global greenhouse gas, along with enhancing its national energy security. In addition, the widespread deployment of an eco-friendly economy would also create significant employment potential for skilled and semi-skilled workers is foreseen. A ROM evaluation by an independent expert was carried out in March 2017.

The Action[s] to be evaluated

Titles of the Actions to be evaluated	EU-India Capacity-building Initiative for Trade Development (CITD) (included 5 different actions /contracts, listed below) ACA/2013/317-274- SCOPE BIG - Scalable CSP Optimized Power Plant Engineered with Biomass Integrated Gasification (Status: Terminated) ACA/2013/317-281- FOWIND- Facilitating India's Transition towards low carbon development by supporting implementation of national policies and programmes for offshore wind (Status: Ended) ACA/2014/346-495- Technical Cooperation for Environment in India (Status: Ended) ACA/2014/343-602- Technical Cooperation for Clean Energy in India (Status: Ongoing) ACA/2014/346-764 - EU India Cooperation on clean technologies and energy efficiency for eco-cities (Eco-cities) (Status: Ongoing)
Budget of the Actions to be evaluated	ACA/2013/317-274 : € 2,704,015.00 ACA/2013/317-281 : € 3,200,000.00 ACA/2014/346-495 : € 1,029,220.72 ACA/2014/343-602 : € 2,021,000. 00 ACA/2014/346-764 : € 9,000,000.40
CRIS Decision number of the Action to be evaluated	ACA/2010/022-349
Dates of the Action to be evaluated	ACA/2013/317-274: 27/09/2013 till 31/05/2017 ACA/2013/317-281: 12/12/2013 till 12/03/2018 ACA/2014/346-495: 18/07/2014 till 17/09/2018

	ACA/2014/343-602: 21/07/2014 till 30/09/2020 ACA/2014/346-764: 19/12/2014 till 30/09/2020

The overall objective of the programme "Support to Renewable Energy, Clean Technologies and Energy Efficiency in India" is to contribute to India's sustainable and inclusive development objectives by increasing the use of green energy sources, energy efficiency and clean technologies, based on the local experience of both India and the EU.

The specific objectives are:

to provide support to the implementation of India's national policies and programmes that promote the development of New Renewable Energy sources and related economic and employment activities, in particular for Solar.

to support the government's efforts, at central and local level, in promoting energy efficiency and green energy sources, technologies and solutions in India and its effective take-up by public and private sectors.

The expected results are:

Enhanced capacity of Indian authorities to create an enabling environment promoting renewable energy and energy efficiency.

Increased penetration of renewable energies and improved use of clean technologies and energy efficiency.
Enhanced human capacity and new employment opportunities created, through the transfer of the required skills and technical know-how for the use and development of clean technology in the local context.

Increased awareness amongst public and private actors and the public at large on environmentally friendly development activities.

Activities under the above programme are implemented through 5 contracts, two are still ongoing and envisaged to end in 2020; two have already ended in 2018, one terminated in 2017. The contracts are listed below. Project specific log-frames will be provided to the selected evaluators.

S.No.	Contract No.	Contracting Party	Start date	End date	EUR	Amount
I	ACA/2013/317-274	(Grant) CENTER FOR STUDY OF SCIENCE, TECHNOLOGY AND POLICY LIMITED	27/09/2013	31/05/2017	EUR	2,704,015.00
II	ACA/2013/317-281	(Grant) GLOBAL WIND ENERGY COUNCIL ASBL	12/12/2013	12/03/2018	EUR	3,200,000.00

III	ACA/2014/346-495	(TA) IVL SVENSKA MILJOINSTITUTET AB	18/07/2014	17/09/2018	EUR	1,029,220.72
IV	ACA/2014/343-602	(TA) IDOM CONSULTING, ENGINEERING, ARCHITECTURE SA	21/07/2014	30/09/2020	EUR	2,021,000.00
V	ACA/2014/346-764	(Administration Agreement) INTERNATIONAL FINANCE CORPORATION	19/12/2014	30/09/2020	EUR	9,000,000.00

Description of the individual contracts/ projects

Project I) - ACA/2013/317-274- SCOPE BIG - Scalable CSP Optimized Power Plant Engineered with Biomass Integrated Gasification.

Implemented by CENTER FOR STUDY OF SCIENCE, TECHNOLOGY AND POLICY LIMITED (C-STEP)

The overall objective of the Action was to promote sustainable and inclusive growth by developing solar thermal and biomass technologies for application to rural India in collaboration with EU. The aim was to create a viable business model and realistic policy environment for adoption of these technologies on large scale. The specific objective of the Action was to design, develop, implement and operate a 3 MW Solar Thermal - Biomass hybrid power plant in Bihar in close association with central and state governments for creating conducive policy environment. It was envisaged to develop scalable models for wider dissemination thereby building capacities and generating employment in Solar and Biomass technologies.

The project was terminated with effect from 31st May 2017 as the technology proposed for demonstration was not considered to be viable in the long-run given the competitive costs of other renewables like solar photovoltaic. The activities implemented under this action were limited to studies, technological designs, land identification and preparation for the envisaged solar-biomass hybrid plant in the state of Bihar.

The decision to terminate the contract was a mutual decision of MNRE and EU as it was evident that the demonstration project (solar-biomass hybrid technology) envisaged under this action would not be viable and had no scope of scaling up or replication. Hence termination of the contract was agreed by both the EU and Government of India (Ministry of New and Renewable Energy) in the Project Advisory Committee held between EU and the Ministry of New and Renewable Energy on 20 April 2017.

Project 2 - FOWIND- Facilitating India's Transition towards low carbon development by supporting implementation of national policies and programmes for offshore wind
Implemented by GLOBAL WIND ENERGY COUNCIL ASBL

The overall objective of the action was to promote offshore wind power development to facilitate India's transition towards a low carbon energy future.

Specific objectives were to create an enabling environment through resource mapping, policy guidance and capacity building measures to unlock the offshore potential of India; to utilize EU offshore learning to reduce technical barriers, financial risks; undertake techno-commercial studies to showcase the potential of offshore wind projects; to create strategic partnerships, which enhance access to and awareness of offshore wind technology; to develop an Offshore Wind Outlook and development pathway for India up to 2032.

Since 2014 FOWIND held several capacity building workshops across the country for all stakeholders including policy makers, state owned energy utilities, power sector technical experts, industry actors and the research institutions. Best available technical know-how was shared with hundreds of participants over the years through the active participation of offshore wind experts and industry actors from Europe across all the workshops and seminars. FOWIND partnered with NIWE in 2015 to work on several technical issues including the development of an offshore wind resource assessment platform and an offshore R&D meet with leading technical institutes in India and experts from European academia and industry.

During the project period FOWIND has successfully delivered on its mandate to facilitate India's transition towards low carbon development by supporting implementation of national policies and programmes for Offshore Wind power. FOWIND has created significant awareness about the offshore wind segment in the 51 months of its implementation phase through regular press releases, interviews and media interactions at industry conferences since 2014. FOWIND's industry partners (GWEC, DNV GL and ReNew Power) have created a strong interest globally about the Indian offshore wind conditions and the potential for this sector therein. By the end of the FOWIND project implementation period in March 2018, detailed offshore wind related high quality, innovative and path-breaking research (with a focus on Gujarat and Tamil Nadu) was available in the public domain. In the last year of its implementation FOWIND published four leading-edge reports including the two Technical Feasibility Studies, Offshore Wind Outlook and a comprehensive Grid Integration Report for the states of Gujarat and Tamil Nadu.

Project 3 - ACA/2014/346-495- Technical Cooperation for Environment

Implemented by IVL SVENSKA MILJOINSTITUTET AB

The overall objective of the project was to contribute to India's sustainable and inclusive development objectives by increasing the use of green energy sources, energy efficiency and clean technologies, based on the local experience of both India and the EU. The purpose of this contract was to support the exchange of best practices policies and implementation and enforcement of existing regulations and policies, through the implementation of seminars, training courses, studies, awareness raising, visibility activities and study tours.

Some of the main achievements of the project included consultation workshops on solid waste management on solid waste management processing and sewage treatment & sludge management technologies in Mumbai and Delhi; publication of reports on the Sewage Treatment in Greater Mumbai illustrating the status of sewage generation, collection, and treatment; development of an "E-learning module" was completed, which included information

about solid waste management challenges at the community and was approved by the Ministry of Housing and Urban Affairs (MoHUA), Government of India for the Swachch Bharat website; and mobile exhibitions in Mumbai and Delhi municipalities. Solid waste management study visits were organised to Sweden and Denmark to build capacity of officials in India and develop synergies on sludge and solid waste management between EU and India.

Project 4 - ACA/2014/343-602- Technical Cooperation for Clean Energy

Implemented by- IDOM CONSULTING, ENGINEERING, ARCHITECTURE SA

The overall objective of the action is to contribute to India's sustainable and inclusive development objectives by increasing the use of green energy sources, energy efficiency and clean technologies, based on the local experience of both India and the EU.

The specific objective of the project is to support the exchange of best practices policies and implementation and enforcement of existing regulations and policies, through the implementation of seminars, training courses, studies, awareness raising, visibility activities and study tours.

The project envisages achieving the following results by the end of the project:

Enhanced technical and institutional capacity of Indian authorities to create an enabling environment promoting renewable energy.

Enhanced human capacity through the transfer of the required skills and technical know-how for the use and development of clean technology in the local context.
Increased awareness amongst public and private actors and the public at large on environmentally friendly development activities through clean energy.

Since the beginning of the programme in August 2014, the project has been successfully engaging with Ministry of new and Renewable Energy (MNRE) towards enhancing technical and institutional capacity of MNRE officials and other stakeholders involved in promoting solar roof-top energy; waste to energy, raising awareness amongst public and private actors by organizing study tours, webinars, seminars, newsletters and case studies in the renewable energy sector. The project was expended for one year in September 2018 with an additional funding.

Project V)- ACA/2014/346-764 - EU India Cooperation on clean technologies and energy efficiency for eco-cities (Eco-cities)

Implemented by - INTERNATIONAL FINANCE CORPORATION

The overall objective of the action is to contribute to India's sustainable and inclusive development goals.

The specific objective is increased use of renewable energy, clean technology and energy efficiency in delivery of municipal services, the new building construction market, and SME clusters/supply chains in selected eco-cities. The project activities are implemented under three components with a focus on 5 selected cities (Bhubaneshwar, Bengaluru, Chennai, Pune and Mumbai). Best practices form these cities have been replicated in other cities in India.

Eco-Cities project has focused its efforts on four key urban sectors that, taken together, are significant contributors to emissions and the resultant effects on the environment. These are Urban Transport, Green Buildings, Water &Solid Waste Management, and Energy Efficiency & Renewable Energy. Interventions include the development of policy incentives and business initiatives designed to help businesses transition to carbon neutral sources of power, certification standards for eco-friendly construction, as well as city-wide energy mapping and greenhouse gas inventories. Over the past years, the project has been able to implement several first of its kind, climate smart, initiates which have high replication potential in other Indian cities- including waste to energy pilots, promoting awareness and enhancing demand for affordable green housing, deployment of large scale PV roof-top in coordination with Distribution Companies, to name a few.

The project was granted a no-cost extension for 1 year in October 2018 and then subsequently another no-cost extension until September 2020.

Annex VI contains the LogFrame of the programme as resulting from the Action Document, which the evaluators will reconstruct during Inception (see below, chapters 2.3.1 and 2.3.2) as a preliminary step to the finalisation of the Evaluation Questions and of their methodology

Stakeholders of the Actions

The direct beneficiaries of action at the central level included Indian Ministries and Government agencies including Ministry of New and Renewable Energy (MNRE), Ministry of Environment, Forests and Climate Change (MoEFCC), Ministry of Power (MoP), Ministry of Urban Development (MUD) and Department of economic Affairs/ Ministry of Finance (DEA/MoF) for the entire programme. Project level stakeholders included State/ city level authorities of the focus cities where the respective projects were implemented. The cities targeted under the different projects are as follows:-

SCOPE- Big- Bengaluru, Bihar

Fowind- Gujarat, Tamil Nadu

TA Environment- Delhi and Maharashtra

TA Energy- Delhi, Punjab, Uttar Pradesh, Maharashtra and Goa

Eco Cities- Bhubaneshwar, Mumbai, Pune, Bengaluru, Chennai,

The involved agencies benefitted from specific support related to policy development in clean energy (renewable energy- solar and off-shore wind; energy efficiency, solid waste management and sewage management) and implementation through capacity building trainings and best practice exchange through study tours; support to the expansion of new and renewable energy sources; development of eco-cities in India through the different projects implemented under this action.

Other available information

The action was implemented under the Financing agreement signed between EU and India in 2011. The programme has been monitored in March 2017 through external experts under Result Oriented Monitoring (ROM).

All reports related to the five contracts, including the ROM report are available with the EUD and will be shared with the experts selected for this assignment.

DESCRIPTION OF THE EVALUATION ASSIGNMENT

Type of evaluation	**Impact Evaluation- Support to Renewable Energy, Clean Technologies And Energy Efficiency in India**
Coverage	The Programme in its entirety
Geographic scope	India- New Delhi, Mumbai, Pune, Chennai, Bengaluru, Bhubaneshwar, Gujarat, Tamil Nadu, Punjab, Uttar Pradesh
Period to be evaluated	The period of the programme starting 27/09/2013 till date

Objectives of the evaluation

Systematic and timely evaluation of its programmes and activities is an established priority[291] of the European Commission[292]. The focus of evaluations is on the assessment of achievements, the quality and the results[293] of Actions in the context of an evolving cooperation policy with an increasing emphasis on result-oriented approaches and the contribution towards the implementation of the SDGs.[294]

From this perspective, evaluations should look for evidence of why, whether or how these results are linked to the EU intervention and seek to identify the factors driving or hindering progress.

Evaluations should provide an understanding of the cause and effect links between inputs and activities, and outputs, outcomes and impacts. Evaluations should serve accountability, decision making, learning and management purposes.

The main objectives of this impact evaluation are to provide the relevant services of the European Union and the interested stakeholders with:

[291] COM(2013) 686 final "Strengthening the foundations of Smart Regulation – improving evaluation" - http://ec.europa.eu/smart-regulation/docs/com_2013_686_en.pdf; EU Financial regulation (art 27); Regulation (EC) No 1905/200; Regulation (EC) No 1889/2006; Regulation (EC) No 1638/2006; Regulation (EC) No 1717/2006; Council Regulation (EC) No 215/2008

[292] SEC (2007)213 "Responding to Strategic Needs: Reinforcing the use of evaluation", http://ec.europa.eu/smart-regulation/evaluation/docs/eval_comm_sec_2007_213_en.pdf ; SWD (2015)111 "Better Regulation Guidelines", http://ec.europa.eu/smart-regulation/guidelines/docs/swd_br_guidelines_en.pdf ; COM(2017) 651 final 'Completing the Better Regulation Agenda: Better solutions for better results', https://ec.europa.eu/info/sites/info/files/completing-the-better-regulation-agenda-better-solutions-for-better-results_en.pdf

[293] Reference is made to the entire results chain, covering outputs, outcomes and impacts. Cfr. Regulation (EU) No 236/2014 "Laying down common rules and procedures for the implementation of the Union's instruments for financing external action" - https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/pdf/financial_assistance/ipa/2014/236-2014_cir.pdf.

[294] The New European Consensus on Development 'Our World, Our Dignity, Our Future', Official Journal 30th of June 2017. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:C:2017:210:TOC

an overall independent assessment of the performance of the programme "Support to Renewable Energy, Clean Technologies and Energy Efficiency in India", paying particular attention to the results of the programme against its objectives; and the reasons underpinning such results.

key lessons learned, conclusions and related recommendations in order to improve future Actions in similar sectors.

review the level of impact and sustainability in each of the specific sectors targeted- renewable energy (solar and off-shore wind) ,energy efficiency, green housing, climate smart municipal services, sustainable urbanisation; waste management (including sewage and solid waste) highlighting specific sectors where EU support may still be needed, and in which form for the coming years.

Propose recommendations for a smooth exit strategy for the two on-going actions – TA Energy and Eco-cities programme.

The report will serve as a stock-taking and lessons learning exercise for the EU to reflect and understand the key success factors and challenges that the action encountered during implementation. The findings of this evaluation will feed into the future EU interventions in this sector.

The main users of this evaluation will be DG DEVCO, DG ENER, DG ENV and the FPI since the findings of the evaluation will help them to draw lessons to improve the design and implementation of other related projects and programs ongoing in the sector.

Requested services

Scope of the evaluation

The evaluation will assess the quality of the actions supported under this programme using five standard DAC evaluation criteria, namely: relevance, effectiveness, efficiency, sustainability and early signs of impact.

In addition, the evaluation will assess:
the EU added value (the extent to which the Action brings additional benefits to what would have resulted from Member States' interventions only);

the coherence of the Action itself, with the EU strategy in India as well as Asia and with other EU policies and Member State Actions.

The evaluation team shall furthermore consider whether gender and other social development indicators were mainstreamed; the relevant SDGs and their interlinkages were identified; the principle of Leave No-One Behind and the rights-based approach methodology was followed in the identification/formulation documents and the extent to which they have been reflected in the implementation of the Action, its governance and monitoring.

Indicative Evaluation Questions

The specific Evaluation Questions as formulated below are indicative. Based on the latter and following initial consultations and document analysis, the evaluation team will discuss them

with the Evaluation Manager[295] and propose in their Inception Report a complete and finalised set of Evaluation Questions with indication of specific Judgement Criteria and Indicators, as well as the relevant data collection sources and tools.

Once the Inception report is agreed, the Evaluation Questions will become contractually binding.

What were the key results achieved under the specific objectives of the programme, to what extent were they intrinsically coherent and how did they contribute to the Overall Objective?

What key factors acted as facilitators, or created obstacles to the achievement of results, including the different modalities of implementations? Why and how so?

To what extent did the involvement of EUMSs contribute to the achievement of results?

To what extent did the programme contribute to achieve its Specific Objectives and its Overall Objective?

What further and unexpected impacts, being them positive or negative, did the programme contribute to achieve?

What key factors acted as facilitators of, or created obstacles to CITD's contribution to the achievement of impacts? Why so?

To what extent the project managed to meet the expectations of the involved stakeholders.

Were policy impact and strategic opportunities sufficiently explored to enhance EU-India cooperation on clean energy and climate change sectors?

The evaluation mission should also take into account the following aspects:

Achievements of the programme in supporting the development and adoption of new Technical

Regulations in the renewable energy sector- including solar and off-shore wind.

Change derived from the Action regarding the capacity of the involved stakeholders.

Contribution of the Action to SDG 7 (Affordable and Clean Energy) and SDG 11 (Sustainable Cities).

The extent to which the recommendations issued by the ROM mission were implemented and their contribution to impact and sustainability.

Similar initiatives funded or supported by other Member States, other donors or cooperation agencies.

External factors that influenced or impacted the implementation of the project.

[295] The Evaluation Manager is the staff of the Contracting Authority managing the evaluation contract. In most cases this person will be the Operational manager of the Action(s) under evaluation.

When issuing their recommendations, the evaluators are requested to indicate -based on findings from this evaluation- what additional and emerging needs could be addressed by future EU interventions in the same sector of intervention.

Phases of the evaluation and required outputs

The evaluation process will be carried out in three phases:

Inception/Desk

Field

Synthesis

The outputs of each phase are to be submitted at the end of the corresponding phases as specified in the synoptic table in section 2.3.1.

Synoptic table

The following table presents an overview of the key activities to be conducted within each phase and lists the outputs to be produced by the team as well as the key meetings with the Contracting Authority and the Reference Group. The main content of each output is described in Chapter 0.

Phases of the evaluation	Key activities	Outputs and *meetings*
Inception Phase , Including Desk review	Initial document/data collection Background analysis and Stakeholder analysis Reconstruction (or as necessary, construction) of the Intervention Logic, and / or description of the Theory of Change (based upon available documentation and interviews) Methodological design of the evaluation (Evaluation Questions with judgement criteria, indicators and methods of data collection and analysis) and evaluation matrix In-depth document analysis (focused on the Evaluation Questions) Identification of information gaps and of hypotheses to be tested in the field phase Telephonic interviews/ videoconference with EU experts involved in this action. Methodological design of the Field Phase	*Kick-off meeting with the Contracting Authority* [conference/video call]. Face to face meeting with the Contracting Authority will take place at the beginning of the Field Phase. Inception Note including evaluation work-plan
Field Phase	Gathering of primary evidence through face to face meetings/ interviews or other methods as identified in the Inception phase. Interviews/ meetings with EUD colleagues in Cooperation and Energy and Environment Section ; EU MS in New Delhi active in the focus sectors of this assignment Interviews/meetings with Government of India Ministries Data collection and analysis	Briefing meeting with EUD Programme Manager Meeting at country level with the Government of India Ministries most importantly Ministry of New and Renewable Energy; Ministry of Environment, Forest and Climate Change; Department of Economic Affairs/ Ministry of Finance and other stakeholders identified under section 1.3 of the ToRs Intermediary Note from the meetings with Government of India Ministries and other government institutions De-Briefing meeting with EUD and the Reference Group at the end of the Field Phase
Synthesis phase	Final analysis of findings (with focus on the Evaluation Questions) Formulation of the overall assessment, conclusions and recommendations Reporting	Draft Final Report Executive Summary according to the standard template published in the EVAL module Final Report

Phases of the evaluation	Key activities	Outputs and *meetings*
		Slide Presentation

Inception Phase, Including Desk Review

This phase aims at structuring the evaluation and clarifying the key issues to be addressed.

The phase will start with initial background study, to be conducted by the evaluators from home. It will then continue with a kick-off session via teleconference between EUD India and the evaluators. Half-day presence of evaluators is required. The meeting aims at arriving at a clear and shared understanding of the scope of the evaluation, its limitations and feasibility. It also serves to clarify expectations regarding evaluation outputs, the methodology to be used and, where necessary, to pass on additional or latest relevant information.

In the Inception phase, including Desk review, the relevant documents will be reviewed (see annex II). The analysis should include a brief synthesis of the existing literature relevant to the Action. The analysis of the relevant documents shall be systematic and reflect the methodology developed.

Further to a first desk review of the political, institutional and/or technical/cooperation framework of EU support to the programme being evaluated, the evaluation team, in consultation with the Evaluation Manager, will reconstruct or as necessary construct, the Intervention Logic of the Action to be evaluated.

Furthermore, based on the Intervention Logic, the evaluators will develop a narrative explanation of the logic of the Action that describes how change is expected to happen within the Action, all along its results chain, i.e., Theory of Change. This explanation includes an assessment of the evidence underpinning this logic (especially between outputs and outcomes, and between outcomes and impact), and articulates the assumptions that must hold for the Action to work, as well as identification of the factors most likely to inhibit the change from happening.

Based on the Intervention Logic and the Theory of Change the evaluators will finalise i) the Evaluation Questions with the definition of judgement criteria and indicators, the selection of data collection tools and sources, ii) the evaluation methodology, and iii) the planning of the following phases.

The methodological approach will be represented in an Evaluation Design Matrix[296], which will be included in the Inception Report. The methodology of the evaluation, if applicable, should

[296] The Evaluation Matrix is a tool to structure the evaluation analysis (by defining judgement criteria and indicators for each evaluation question). It helps also to consider the most appropriate and feasible data collection method for each of the questions,

be gender sensitive, contemplate the use of sex- and age-disaggregated data and demonstrate how actions have contributed to progress on gender equality.

The limitations faced or to be faced during the evaluation exercise will be discussed and mitigation measures described in the Inception Report. Finally, the work plan for the overall evaluation process will be presented and agreed in this phase; this work plan shall be in line with that proposed in the present ToR. Any modifications shall be justified and agreed with the Evaluation Manager.

The activities to be conducted during this phase should allow for the provision of preliminary responses to each evaluation question, stating the information already gathered and its limitations. They will also identify the issues still to be covered and the preliminary hypotheses to be tested. During this phase the evaluation team shall fine-tune the evaluation tools to be used during the Field Phase and describe the preparatory steps already taken and those to be taken for its organisation, including the list of people to be interviewed, dates and itinerary of visits, and attribution of tasks within the team.

Telephonic Interviews with the key and relevant EU experts involved in the action may be conducted during this phase to support the analysis of secondary sources. List of persons to be interviewed during the Field Phase needs to be prepared and agreed with the Programme Manager.

On the basis of the information collected, the evaluation team should prepare an Inception Report; its content is described in Chapter 0.

Field Phase

The Field Phase starts after approval of the Inception Report by the Evaluation Manager.

The Field Phase aims at validating / changing the preliminary answers formulated during the Inception and Desk phase and further completing information through primary research.

If any significant deviation from the agreed work plan or schedule is perceived as creating a risk for the quality of the evaluation or not respecting the end of the validity of the specific contract, these elements are to be immediately discussed with the Evaluation Manager and, regarding the validity of the contract, corrective measures undertaken.

In the first days of the field phase, the evaluation team shall hold a briefing meeting with the EU Delegation Programme Manager in New Delhi, India and relevant Government Ministries who have been involved in this action.

During the field phase, the evaluation team shall ensure adequate contact and consultation with, and involvement of the different stakeholders, with the relevant government authorities and agencies. Throughout the mission the evaluation team will use the most reliable and appropriate sources of information, respect the rights of individuals to provide information in confidence, and be sensitive to the beliefs and customs of local social and cultural environments.

At the end of the field phase, the evaluation team will summarise its work in an Intermediary Note, analyse the reliability and coverage of data collection, and present preliminary findings in a meeting with the EU Delegation.

Synthesis Phase

This phase is devoted to the preparation by the contractor of two distinct documents: the Executive Summary and the Final Report, whose structures are described in the Annex III; it entails the analysis of the data collected during the desk and field phases to answer the Evaluation Questions and preparation of the overall assessment, conclusions and recommendations of the evaluation.

The evaluation team will present, in a single Report with Annexes, their findings, conclusions and recommendations in accordance with the structure in Annex III; a separate Executive Summary will be produced as well, following the compulsory format given in the EVAL module (see Annex III).

The evaluation team will make sure that:

Their assessments are objective and balanced, statements are accurate and evidence-based, and recommendations realistic and clearly targeted.

When drafting the report, they will acknowledge clearly where changes in the desired direction are known to be already taking place.

The wording, inclusive of the abbreviations used, takes into account the audience as identified in art. 2.1 above.

The evaluation team will deliver the Draft Final Report to the Evaluation Manager to discuss the draft findings, conclusions and recommendations with the Reference Group comprising of Ministry of New and Renewable Energy (MNRE), Ministry of Environment Forest and Climate Change (MoEFCC); Department of Economic Affairs/ Ministry of Finance (DEA/MoF).

The Evaluation Manager consolidates the comments expressed by the Reference Group members and sends them to the evaluation team for the report revision, together with a first version of the Quality Assessment Grid (QAG) assessing the quality of the Draft Final Report. The content of the QAG will be discussed with the evaluation team to verify if further improvements are required, and the evaluation team will be invited to comment on the conclusions formulated in the QAG (through the EVAL Module).

The evaluation team will then finalise the Final Report and the Executive Summary by addressing the relevant comments. While potential quality issues, factual errors or methodological problems should be corrected, comments linked to diverging judgements may be either accepted or rejected. In the latter instance, the evaluation team must explain the reasons in writing. After approval of the final report, the QAG will be updated and sent to the evaluators via EVAL Module.

Specific Contract Organisation and Methodology (Technical offer)

The invited Framework Contractors will submit their specific Contract Organisation and Methodology by using the standard SIEA template B-VII-d-i and its annexes 1 and 2 (B-VII-d-ii).

The evaluation methodology proposed to undertake the assignment will be described in the Chapter 3 (Strategy and timetable of work) of the template B-VII-d-i. Contractors will describe how their proposed methodology will address the cross-cutting issues mentioned in these Terms of Reference and notably gender equality and the empowerment of women. This will include (if applicable) the communication action messages, materials and management structures.
Management and Steering of the evaluation

At the EU level
The evaluation is managed by the Cooperation Section Programme Manager of the EUD to India with the support of the Reference Group consisting of members from Ministry of New and Renewable Energy (MNRE), Ministry of Environment Forest and Climate Change (MoEFCC); Department of Economic Affairs/ Ministry of Finance (DEA/MoF). The involvement of DG ENER and DG ENV Section at EUD to India will also be encouraged.

The main functions of the Reference Group members are:

To define and validate the Evaluation Questions.

To facilitate contacts between the evaluation team and the EU services and external stakeholders.

To ensure that the evaluation team has access to and has consulted all relevant information sources and documents related to the Action.

To discuss and comment on notes and reports delivered by the evaluation team. Comments by individual group members are compiled into a single document by the Evaluation Manager and subsequently transmitted to the evaluation team.

To assist in feedback on the findings, conclusions, lessons and recommendations from the evaluation.

To support the development of a proper follow-up action plan after completion of the evaluation.

At the Contractor level

Further to the Requirements set in the art. 6 of the Global Terms of Reference and in the Global Organisation and Methodology, respectively annexes II and III of the Framework contract SIEA 2018, the contractor is responsible for the quality of: the process; the evaluation design; the inputs and the outputs of the evaluation. In particular, it will:
Support the Team Leader in its role, mainly from a team management perspective. In this regard, the contractor should make sure that, for each evaluation phase, specific tasks and outputs for each team member are clearly defined and understood.
Provide backstopping and quality control of the evaluation team's work throughout the assignment.

Ensure that the evaluators are adequately resourced to perform all required tasks within the time framework of the contract.

Language of the Specific contract

The language of the specific contract is to be English.

EXPERTISE REQUIRED

Number of experts and of working days per category

The table below indicates the minimum number of evaluators and the minimum number of working days (overall and in the field), per category of experts to be foreseen by the Contractor.

Experts	Category of Experts	Total minimum number of working days (total)	(Out of which) minimum number of working days on mission
Climate Change/ Renewable Energy	1	31	16
Renewable Energy	1	26	13
Environment/ Climate Change	1	23	14
Investment Expert	1	10	7

In particular, the Team Leader (to be identified in the Organisation and Methodology and in the Financial Offer) is expected to be a Cat I expert, possess a demonstrable senior evaluation expertise coherent with the requirements of this assignment and not provide less than 31 working days (Home Based and India), out of which 16 in the field (India).

Expertise required

Minimum requirements of the team

Expert 1: Team leader (Category I – Expert in Climate Change/ Renewable Energy)

The team leader is required to have the following qualifications and professional experience:

Qualification and skills:
Master's Degree/ engineering /equivalent academic level in environment, climate change, energy or discipline relevant to this assignment.
Excellent communication skills, both written and oral.
Proven strong analytical skills.

General professional experience

At least 12 years in evaluation design and methodologies applied to different modalities of project/programme implementation.
or equivalent professional experience of at least 15 years in the sector, if the candidate does not possess a Master Degree/ engineering degree;

Specific Professional experience

Minimum 7 evaluation assignments in the last 10 years being a team leader in evaluation of energy/ environment related programmes.
Minimum 5 assignments in the field of climate change/ renewable energy/ sustainable urbanisation in the last 10 years.
Minimum 5 assignments in the last 10 years involving institution/capacity building with governments and public administrations on clean energy/ environment/ sustainable urbanisation.

Will be an asset

Experience with EU-funded programmes and/ EU evaluations will be an asset.
Experience in Asian countries will be an advantage.

Team Leader will be responsible for the overall planning, management and implementation of the evaluation and consistency of outputs. S/he will ensure that all reports and documents produced by the mission are appropriate, consistent and of quality. S/he shall be the main contact point for the EU Delegation.

Expert 2: Team member (Category I – Renewable Energy Specialist)

Qualification and skills:
Master's Degree/ engineering/equivalent academic level in the energy sector (preferably renewable energy- solar, wind).

General professional experience

At least 12 years' experience in designing, implementation and monitoring of energy projects

Specific Professional experience

Minimum 7 assignments/projects designed and/or managed in the last 12 years related to renewable energy.
Minimum 5 assignments in the last 10 years involving institution/capacity building with governments and public administrations related to clean energy.

Will be an asset
Experience with EU-funded programmes and/ EU evaluations will be an asset.
Experience in Asian countries will be an advantage.

The responsibility of the expert is to conduct the evaluation and impact assessment of activities related to Scope-Big; Fowind, TA-Energy and parts of Eco-Cities project..

Expert 3: Team member (Category I –Environment/ Climate Change Specialist)

Qualification and skills:
Master's Degree/ engineering/ equivalent academic level in environment sciences or domains related to the assignment.

General professional experience
At least 12 years' experience in environment/ climate change/ waste management/ sustainable urbanisation/ or sectors related to the assignment.

Specific Professional experience
Minimum 7 assignments/projects designed and/or managed in the last 12 years related to climate change/environment.

Minimum 5 assignments in the last 10 years involving institution/capacity building with governments and public administrations related to climate change.

Will be an asset
Experience with EU-funded programmes and/ EU evaluations will be an asset.

Experience in Asian countries will be an advantage.

The responsibility of the expert is to evaluate Eco-Cities and TA Environment programmes.

Expert 4: Team member (Category I – Investment/ Public-Private-Partnerships Expert)

Qualification and skills:

Master's Degree/equivalent academic level in economics, international trade or business administration.

General professional experience

At least 12 years' experience in investment projects in the infrastructure sector or sectors related to this assignment.

Specific Professional experience

Worked on minimum 7 investment related transactions/ projects in the last 12 years involving development banks, multilateral agencies or similar organisations

Will be an asset

Experience with EU-funded programmes and/ EU evaluations will be an asset.

Experience in Asian countries will be an advantage.

Experience in public-private-partnerships will be an advantage.

The responsibility of the expert is to study the Interventions supported under the Eco-Cities project related to mobilising private sector funds for public-private partnerships.

Language skills of the team:

English: all members shall possess a level C1 expertise

Languages levels are defined for understanding, speaking and writing skills by the Common European Framework of Reference for Languages available at https://europass.cedefop.europa.eu/en/resources/european-language-levels-cefr and shall be demonstrated by certificates or by past relevant experience.

The European Union pursues an equal opportunities policy. Gender balance in the proposed team, at all levels, is highly recommended.

Presence of management team for briefing and/or debriefing

The presence of member(s) of the management team is not required for briefing or debriefing purposes.

LOCATION AND DURATION

Starting period

Provisional start of the assignment is March 2020.

Foreseen duration of the assignment in calendar days

Maximum duration of the assignment: 270 calendar days.

This overall duration includes working days, week-ends, periods foreseen for comments, for review of draft versions, debriefing sessions, and distribution of outputs.

Planning, including the period for notification for placement of the staff[297]
As part of the technical offer, the framework contractor must fill in the timetable in the Annex IV. The 'Indicative dates' are not to be formulated as fixed dates but rather as days (or weeks, or months) from the beginning of the assignment (to be referenced as '0').

Sufficient forward planning is to be taken into account in order to ensure the active participation and consultation with government representatives, national / local or other stakeholders.

Location(s) of assignment

The assignment will take place in India. Specific cities to be visited include- New Delhi, Mumbai, Pune, Bengaluru, Chennai, Bhubaneshwar, Gujarat, Tamil Nadu, Punjab and Uttar Pradesh.

[297] As per art 16.4 a) of the General Conditions of the Framework Contract SIEA

REPORTING

Content, timing and submission

The outputs must match quality standards. The text of the reports should be illustrated, as appropriate, with maps, graphs and tables; a map of the area(s) of Action is required (to be attached as Annex).

 # List of outputs:

	Number of Pages *(excluding annexes)*	Main Content	Timing for submission
Inception Report	10-12 pages	Intervention logic Stakeholder map Methodology for the evaluation, incl.: Evaluation Matrix: Evaluation Questions, with judgement criteria and indicators, and data analysis and collection methods Consultation strategy Field visit approach including the criteria to select the field visits Analysis of risks related to the evaluation methodology and mitigation measures Work plan Preliminary answers to each Evaluation Question, with indication of the limitations of the available information Data gaps to be addressed, issues still to be covered and hypotheses to be tested during the field visit	End of Inception Phase End of the Desk Phase
Intermediary Note	5-7 pages	Activities conducted during the field phase Difficulties encountered during the field phase and mitigation measures adopted Key preliminary findings (combining desk and field ones)	End of the Field Phase
Draft Final Report	45 pages, excluding annexes	Cf. detailed structure in Annex III	End of Synthesis Phase
Draft Executive Summary – by using the EVAL	N/A	Cf. detailed structure in Annex III	End of Synthesis Phase

	Number of Pages *(excluding annexes)*	Main Content	Timing for submission
online template			
Final report	45 pages	Same specifications as of the Draft Final Report, incorporating any comments received from the concerned parties on the draft report that have been accepted	2 weeks after having received comments to the Draft Final Report.
Executive Summary – by using the EVAL online template	N/A	Same specifications as for the Draft Executive Summary, incorporating any comments received from the concerned parties on the draft report that have been accepted	Together with the final version of the Final Report

Use of the EVAL module by the evaluators

It is strongly recommended that the submission of deliverables by the selected contractor be performed through their uploading in the EVAL Module, an evaluation process management tool and repository of the European Commission. The selected contractor will receive access to online and offline guidance in order to operate with the module during the related Specific contract validity.

Comments on the outputs

For each report, the Evaluation Manager will send to the Contractor consolidated comments received from the Reference Group or the approval of the report within 30 calendar days. The revised reports addressing the comments shall be submitted within 10 calendar days from the date of receipt of the comments. The evaluation team should provide a separate document explaining how and where comments have been integrated or the reason for not integrating certain comments, if this is the case.

Assessment of the quality of the Final Report and of the Executive Summary

The quality of the draft versions of the Final Report and of the Executive Summary will be assessed by the Evaluation Manager using the online Quality Assessment Grid (QAG) in the EVAL Module (text provided in Annex V). The Contractor is given – through the EVAL module - the possibility to comment on the assessments formulated by the Evaluation Manager. The QAG will then be reviewed following the submission of the final version of the Final Report and of the Executive Summary.

The compilation of the QAG will support/inform the compilation by the Evaluation Manager of the FWC SIEA's Specific Contract Performance Evaluation.

Language

All reports shall be submitted in English.

Number of report copies

Apart from their submission -preferably via the EVAL Module-, the approved version of the Final Report will be also provided in 5 paper copies and in electronic version (pen-drive) at no extra cost.

Formatting of reports

All reports will be produced using Font Arial or Times New Roman minimum letter size 11 and 12 respectively, single spacing, double sided. They will be sent in Word and PDF formats.

Annexes

Annex I: Specific Technical Evaluation Criteria

SPECIFIC TECHNICAL EVALUATION CRITERIA

Request for Services n. 2019/414088
FWC SIEA 2018 - LOT 2
EuropeAid/138778/DH/SER/multi

TECHNICAL EVALUATION CRITERIA

The Contracting Authority selects the offer with the best value for money using an 80/20 weighting between technical quality and price[298].
Technical quality is evaluated on the basis of the following grid:

Criteria	Maximum
Total score for Organisation and Methodology	*50*
Understanding of ToR and the aim of the services to be provided	5
Overall methodological approach, quality control approach, appropriate mix of tools and estimate of difficulties and challenges	30
Technical added value, backstopping and role of the involved members of the consortium	5
Organisation of tasks including timetable	10
Score for the expertise of the proposed team	*50*
OVERALL TOTAL SCORE	*100*

TECHNICAL THRESHOLD

[298] For more details about the 80/20 rule, please see the PRAG, chapter 3.3.10.5 - https://ec.europa.eu/europeaid/funding/about-funding-and-procedures/procedures-and-practical-guide-prag_en

Any offer falling short of the technical threshold of 75 out of 100 points, is automatically rejected.

INTERVIEWS DURING THE EVALUATION OF THE OFFERS

No interviews are foreseen.

Annex II: Information that will be provided to the evaluation team

Financing Agreement and addenda signed between EU and India

Contracts and addenda of the different projects to be evaluated

Action's annual progress reports, and technical reports

European Commission's Result Oriented Monitoring (ROM) Report of the Action
Minutes of the Project Advisory Committee meetings held with Government of India
Any other relevant document

Note: The evaluation team has to identify and obtain any other document worth analysing, through independent research and during interviews with relevant informed parties and stakeholders of the Action.

Annex III: Structure of the Final Report and of the Executive Summary

The contractor will deliver – preferably through their uploading in the EVAL Module - two distinct documents: the Final Report and the Executive Summary. They must be consistent, concise and clear and free of linguistic errors both in the original version and in their translation – if foreseen.

The Final Report should not be longer than the number of pages indicated in Chapter 6.

Additional information on the overall context of the Action, description of methodology and analysis of findings should be reported in an Annex to the main text.

The presentation must be properly spaced, and the use of clear graphs, tables and short paragraphs is strongly recommended.

The cover page of the Final Report shall carry the following text:

''*This evaluation is supported and guided by the European Commission and presented by [name of consulting firm]. The report does not necessarily reflect the views and opinions of the European Commission*''.

Executive Summary	A short, tightly-drafted, to-the-point and free-standing Executive Summary. It should focus on the key purpose or issues of the evaluation, outline the main analytical points, and clearly indicate the main conclusions, lessons to be learned and specific recommendations. It is to be prepared by using the specific format foreseen in the EVAL Module.

The main sections of the evaluation report shall be as follows:

1. Introduction	A description of the Action, of the relevant country/region/sector background and of the evaluation, providing the reader with sufficient methodological explanations to gauge the credibility of the conclusions and to acknowledge limitations or weaknesses, where relevant.
2. Answered questions / Findings	A chapter presenting the answers to the Evaluation Questions, supported by evidence and reasoning.
3. Overall assessment *(optional)*	A chapter synthesising all answers to Evaluation Questions into an overall assessment of the Action. The detailed structure of the overall assessment should be refined during the evaluation process. The relevant chapter has to articulate all the findings, conclusions and lessons in a way that reflects their importance and facilitates the reading. The structure should not follow the Evaluation Questions, the logical framework or the evaluation criteria.

4. Conclusions and Recommendations	
4.1 Lessons learnt	Lessons learnt generalise findings and translate past experience into relevant knowledge that should support decision making, improve performance and promote the achievement of better results. Ideally, they should support the work of both the relevant European and partner institutions.
4.1 Conclusions	This chapter contains the conclusions of the evaluation, organised per evaluation criterion. In order to allow better communication of the evaluation messages that are addressed to the Commission, a table organising the conclusions by order of importance can be presented, or a paragraph or sub-chapter emphasizing the 3 or 4 major conclusions organised by order of importance, while avoiding being repetitive.
4.2 Recommendations	They are intended to improve or reform the Action in the framework of the cycle under way, or to prepare the design of a new Action for the next cycle. Recommendations must be clustered and prioritised, and carefully targeted to the appropriate audiences at all levels, especially within the Commission structure.
5. Annexes to the report	The report should include the following annexes: The Terms of Reference of the evaluation The names of the evaluators (CVs can be shown, but summarised and limited to one page per person) Detailed evaluation methodology including options taken, difficulties encountered and limitations, detail of tools and analyses. Evaluation Matrix Intervention logic / Logical Framework matrices (planned/real and improved/updated) Relevant geographic map(s) where the Action took place List of persons/organisations consulted Literature and documentation consulted Other technical annexes (e.g., statistical analyses, tables of contents and figures, matrix of evidence, databases) as relevant

Detailed answer to the Evaluation Questions, judgement criteria and indicators

Annex IV: Planning schedule

This annex must be included by Framework Contractors in their Specific Contract Organisation and Methodology and forms an integral part of it. Framework Contractors can add as many rows and columns as needed.

The phases of the evaluation shall reflect those indicated in the present Terms of Reference.

		Indicative Duration in working days[299]		
Activity	Location	Team Leader	Evaluator …	Indicative Dates
Inception phase, including Desk Phase: total days				
Field phase: total days				
Synthesis phase: total days				
TOTAL working days (maximum)				

[299] Add one column per each evaluator

Annex V: Quality Assessment Grid

The quality of the Final Report will be assessed by the Evaluation Manager (since the submission of the draft Report and Executive Summary) using the following quality assessment grid, which is included in the EVAL Module; the grid will be shared with the evaluation team, which will have the possibility to include their comments.

Action (Project/Programme) evaluation – Quality Assessment Grid Final Report				
Evaluation data				
Evaluation title				
Evaluation managed by			Type of evaluation	
CRIS ref. of the evaluation contract			EVAL ref.	
Evaluation budget				
EUD/Unit in charge			Evaluation Manager	
Evaluation dates	Start:		End:	
Date of draft final report			Date of Response of the Services	
Comments				
Project data				
Main project evaluated				
CRIS # of evaluated project(s)				
DAC Sector				
Contractor's details				
Evaluation Team Leader			Evaluation Contractor	
Evaluation expert(s)				

Legend: scores and their meaning
Very satisfactory: criterion entirely fulfilled in a clear and appropriate way
Satisfactory: criterion fulfilled

Unsatisfactory: criterion partly fulfilled
Very unsatisfactory: criterion mostly not fulfilled or absent

The evaluation report is assessed as follows

Clarity of the report

This criterion analyses the extent to which both the Executive Summary and the Final Report:
Are easily readable, understandable and accessible to the relevant target readers
Highlight the key messages
The length of the various chapters and annexes of the Report are well balanced
Contain relevant graphs, tables and charts facilitating understanding
Contain a list of acronyms (only the Report)
Avoid unnecessary duplications
Have been language checked for unclear formulations, misspelling and grammar errors
The Executive Summary is an appropriate summary of the full report and is a free-standing document

Strengths	Weaknesses
Contractor's comments	Contractor's comments

Reliability of data and robustness of evidence

This criterion analyses the extent to which:
Data/evidence was gathered as defined in the methodology
The report considers, when relevant, evidence from EU and/or other partners' relevant studies, monitoring reports and/or evaluations
The report contains a clear description of the limitations of the evidence, the risks of bias and the mitigating measures

Strengths	Weaknesses
Contractor's comments	Contractor's comments

Validity of Findings

This criterion analyses the extent to which:
Findings derive from the evidence gathered
Findings address all selected evaluation criteria
Findings result from an appropriate triangulation of different, clearly identified sources
When assessing the effect of the EU intervention, the findings describe and explain the most relevant cause/effect links between outputs, outcomes and impact
The analysis of evidence is comprehensive and takes into consideration contextual and external factors

Strengths	Weaknesses
Contractor's comments	Contractor's comments

Validity of conclusions

This criterion analyses the extent to which:
Conclusions are logically linked to the findings, and go beyond them to provide a comprehensive analysis
Conclusions appropriately address the selected evaluation criteria and all the evaluation questions, including the relevant cross-cutting dimensions
Conclusions take into consideration the various stakeholder groups of the evaluation
Conclusions are coherent and balanced (i.e. they present a credible picture of both strengths and weaknesses), and are free of personal or partisan considerati
(If relevant) whether the report indicates when there are not sufficient findings to conclude on specific issues

Strengths	Weaknesses
Contractor's comments	Contractor's comments

Usefulness of recommendations

This criterion analyses the extent to which the recommendations:
Are clearly linked to and derive from the conclusions
Are concrete, achievable and realistic
Are targeted to specific addressees
Are clustered (if relevant), prioritised, and possibly time-bound
(If relevant) provide advice for the Action's exit strategy, post-Action sustainability or for adjusting Action's design or plans

Strengths	Weaknesses
Contractor's comments	Contractor's comments

Appropriateness of lessons learnt analysis *(if requested by the ToR or included by the evaluators)*	
This criterion is to be assessed only when requested by the ToR or included by evaluators and is not to be scored. It analyses the extent to which: Lessons are identified When relevant, they are generalised in terms of wider relevance for the institution(s)	
Strengths	Weaknesses
Contractor's comments	Contractor's comments
Final comments on the overall quality of the report	

Annex VI: logical framework matrix (logframe) of the evaluated action(s)