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Report No: ICR00003350

IMPLEMENTATION COMPLETION AND RESULTS REPORT

TF 94877

ON A

GRANT

IN THE AMOUNT OF

US$ 6.30 MILLION

TO THE

REPUBLIC OF INDIA

FOR THE

CHILLER ENERGY EFFICIENCY PROJECT

December 13, 2019

Environment, Natural Resources & The Blue Economy Global Practice
Sustainable Development
South Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective {Dec 31, 2014})

Currency Unit	=	Indian Rupees (INR)
63.19	=	US$1

FISCAL YEAR
April 01 – March 31

Regional Vice President:	Hartwig Schafer
Country Director:	Junaid Kamal Ahmad
Regional Director:	John A. Roome
Practice Manager:	Magdolna Lovei
Task Team Leader(s):	Harinath Sesha Appalarajugari
ICR Main Contributor:	Dora Nsuwa Cudjoe

ABBREVIATIONS AND ACRONYMS

BEE	Bureau of Energy Efficiency
CDM	Clean Development Mechanism under the Kyoto Protocol
CDM EB	Executive Board of the Clean Development Mechanism
CEEP	Chiller Energy Efficiency Project
CER	Certified Emission Reduction
CFC	Chlorofluorocarbon
CO2	Carbon dioxide
CO2e	Carbon dioxide Equivalent
CPS	Country Partnership Strategy [CPS, 2013-17]
DEA	Department of Economic Affairs, Ministry of Finance, Government of India
EE	Energy Efficiency
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
ER	Emissions Reduction
ERPA	Emissions Reduction Purchase Agreement
ESCOs	Energy Services Companies
FEEMP	Financing Energy Efficiency at MSMEs Project [P100530]
GEF	Global Environment Facility
GEO	Project Global Environmental Objectives
GHG	Greenhouse Gas
GOI	Government of India
GWP	Global Warming Potential
HCFC	Hydrochlorofluorocarbon
HFC	Hydrofluorocarbon
IDBI	Industrial Development Bank of India
IAs	Implementing Agencies
IRR	Internal Rate of Return
KfW	Kreditanstalt fur Wiederaufbau (Germany bilateral development)
KP	Kyoto Protocol
Kw/TR	Kilowatt-hour per ton of Refrigeration
M&E	Monitoring and Evaluation
MIS	Management Information System
MLF	Multilateral Fund for the Implementation of Montreal Protocol
MM&V	Measurement, Monitoring and Verification
MoEFCC	Ministry of Environment, Forests and Climate Change
MP	Montreal Protocol on Substances that Deplete the Ozone Layer
Mt	Metric Tons [1 ton = 1000 kg]
MTR	Mid Term Review
NFV	Net Present Value
NPD	National Project Director
OC	Ozone Cell of the Ministry of Environment, Forests and Climate Change
ODS	Ozone Depleting Substance
PAD	Project Appraisal Document

PDO	Project Development Objective
PIM	Project Implementation Manual
PMU	Project Management Unit
PSU	Public Sector Undertaking
RAC	Refrigeration and Air Conditioning
SME	Small and Medium Enterprise
tCO2	Tons of CO2
TA	Technical Assistance
TR	Ton of Refrigeration, a unit of measure equivalent to 12,000 BTU/hour
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCC	United Nations Framework Convention on Climate Change
UNIDO	United National Industrial Development Organization

TABLE OF CONTENTS

DATA SHEET

BASIC INFORMATION

Product Information

Project ID	Project Name
P100584	Chiller Energy Efficiency
Country	**Financing Instrument**
India	Investment Project Financing
Original EA Category	**Revised EA Category**
Partial Assessment (B)	Partial Assessment (B)

Organizations

Borrower	Implementing Agency
Republic of India	Ministry of Environment and Forests (MoEF)

Project Development Objective (PDO)

Original PDO

The overall global environment objectives of the CEEP are to reduce greenhouse gas emissions whilst simultaneously supporting the completion of the phase-out of consumption of Ozone Depleting Substances required under the Montreal Protocol.

PDO as stated in the legal agreement

The PDO as stated in Legal Agreement and PAD is: The project development objectives (PDO) of the CEEP are to accelerate the replacement of centrifugal chillers with efficient non-CFC-based centrifugal chillers in order to promote deployment of energy efficient technologies and products to reduce GHG emissions, and support the phase-out of CFC demand in India.

FINANCING

	Original Amount (US$)	Revised Amount (US$)	Actual Disbursed (US$)
World Bank Financing			
TF-94877	6,300,000	1,105,703	1,105,703
Total	**6,300,000**	**1,105,703**	**1,105,703**
Non-World Bank Financing			
Local Beneficiaries	70,120,000	0	0
Total	**70,120,000**	**0**	**0**
Total Project Cost	**76,420,000**	**1,105,703**	**1,105,703**

KEY DATES

Approval	Effectiveness	MTR Review	Original Closing	Actual Closing
30-Jun-2009	23-Nov-2009	15-Jul-2013	30-Jun-2014	31-Dec-2014

RESTRUCTURING AND/OR ADDITIONAL FINANCING

Date(s)	Amount Disbursed (US$M)	Key Revisions
26-Aug-2014	.99	Change in Loan Closing Date(s)

KEY RATINGS

Outcome	Bank Performance	M&E Quality
Unsatisfactory	Unsatisfactory	Modest

RATINGS OF PROJECT PERFORMANCE IN ISRs

No.	Date ISR Archived	DO Rating	IP Rating	Actual Disbursements (US$M)
01	26-Nov-2009	Moderately Satisfactory	Moderately Satisfactory	0
02	25-May-2010	Moderately Satisfactory	Moderately Satisfactory	.99

03	06-Dec-2010	Moderately Satisfactory	Satisfactory	.99
04	08-Jun-2011	Moderately Satisfactory	Moderately Satisfactory	.99
05	25-Dec-2011		Moderately Unsatisfactory	.99
06	26-Jun-2012		Moderately Satisfactory	.99
07	01-Jan-2013		Moderately Satisfactory	.99
08	08-Jul-2013		Unsatisfactory	.99
09	29-Oct-2013		Unsatisfactory	.99
10	03-May-2014		Unsatisfactory	.99
11	30-Jun-2014		Unsatisfactory	.99
12	12-Nov-2014	Moderately Unsatisfactory	Unsatisfactory	.99
13	22-Dec-2014	Moderately Unsatisfactory	Unsatisfactory	.99

SECTORS AND THEMES

Sectors

Major Sector/Sector	(%)
Energy and Extractives	**100**
Public Administration - Energy and Extractives	9
Other Energy and Extractives	91

Themes

Major Theme/ Theme (Level 2)/ Theme (Level 3)	(%)
Environment and Natural Resource Management	**100**
Climate change	100
Mitigation	100

ADM STAFF

Role	At Approval	At ICR
Vice President:	Isabel M. Guerrero	Hartwig Schafer
Country Director:	N. Roberto Zagha	Junaid Kamal Ahmad

Director:	John Henry Stein	John A. Roome
Practice Manager/Manager:	Karin Erika Kemper	Magdolna Lovei
Project Team Leader:	Charles Joseph Cormier	Harinath Sesha Appalarajugari
ICR Co Author:		Dora Nsuwa Cudjoe

I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

A. CONTEXT AT APPRAISAL

Context

1. At the time of appraisal, India's economy was growing at a relatively steady pace between 7 percent and 8.4 percent and contributing to reducing extreme poverty. To accelerate and maintain the high rate of economic growth and to achieve the Millennium Development Goals by 2015, India needed to increase access to clean and secure energy supply. Already experiencing an energy shortage estimated to be in the order of 13 percent at peak times, insufficient supply of energy was considered a potentially key constraint to economic growth. In response to this constraint, the 11th Five Year Plan (2007–2011) of the Government of India (GoI) weighed in on increasing energy supply and achieving energy efficiency (EE) by 20 percent by 2016–2017 while reducing the nation's contribution to greenhouse gas (GHG) emissions.

2. An increase in its energy supply by 18 percent at the 2004 level correlating with 133 tons of CO_{2e}, would make it imperative to adopt approaches that spurred economic growth while simultaneously reducing energy demand and GHG emissions. Chillers presented a fertile ground for achieving this multipronged goal since India was the second highest user of Chlorofluorocarbons (CFC) -based refrigerants globally and the sixth largest emitter of GHG in the world. Having ratified the Montreal Protocol in 1992, the United Nations Framework Convention on Climate Change (UNFCCC) in 1993, and the Kyoto Protocol in 2002, India was obliged to phase out Ozone Depleting Substances (ODS), including CFCs, and to avail CDM-type (Clean Development Mechanism) investments. At the time of appraisal, India was playing an active role in the emerging CDM market, with the second largest number of CDM-type investments in the pipeline globally.

3. With the Refrigeration and Air Conditioning (RAC) sector accounting for about 20 percent of ODS consumption (mostly CFCs) at the time of India's accession to the MP, the Government of India (GoI) was keen on expediting the switch to non-CFC based equipment, an initiative which became even more imperative given the GoI's decision to expedite cessation of new CFC production by August 1, 2008, advanced from 2010. From experience, even with advances in chiller technology and potential EE gains and savings, chiller owners were typically reluctant to replace chillers in advance of the end of life of the equipment, prompting an incentive structure that could attract chiller owners.

4. **Background studies and analysis to underpin the project design** carried out in 2002[1] by the World Bank, the India Chiller Sector Study, confirmed that a financial incentive arrangement was necessary to accelerate the replacement of old centrifugal chillers with new non-CFC based energy efficient chillers.

5. A related manufacturers' survey undertaken in 2001 as part of the India Chiller Sector Study showed an inventory of 966 CFC chillers with refrigerant capacity 100 tons of refrigeration (TR) or larger, manufactured in India between 1970 and 2000. By 2003, most chiller manufacturers had completed their conversion and were not supplying CFC-based chillers to the domestic market in compliance with the ODS rules. However, there were still a significant number of superannuated chillers that were either overdue for replacement or due for replacement before the phaseout date of 2010. By 2005, the inefficient CFC-based chiller population in India was estimated at about 1,045.

[1] India Strategy for the Phaseout of CFC in the Chiller Sector, World Bank, August 2002.

6. A global study carried out by the World Bank in 2005[2] highlighted the following benefits of converting a worldwide population of 12,500 chillers to energy efficient non-CFC chillers:

(a) Approximately 2,000 tons per year and 30,000 tons total of ODS use would be eliminated.
(b) Peak electric power demand would be reduced by 1.25 GW, avoiding US$1.6 billion in new generation investment.
(c) Approximately US$1.6 billion (Net Present Value [NPV]) in operating costs would be saved.
(d) Over 2.9 million tons of local air pollution would be avoided.
(e) 3.2 billion tCO2e would be avoided.

7. **Institutional structure.** The MoEF&CC, earlier MOEF, is empowered by the GoI with overall responsibility for implementing the MP. The MoEF&CC established the Ozone Cell (OC) with the operational responsibility for implementing MP-related activities, including CFC phaseout. The OC's mandate to provide technical guidance and advisory services for implementing the MP agreement is stipulated in the GoI Ozone Rules.

8. The CEEP's objective complemented the GoI's overarching strategy to meet the expedited CFC phaseout schedule as mandated by the MP and the domestic objective to reduce the demand for recycled or reclaimed CFCs. The Industrial Development Bank of India (IDBI) had successfully supported the phase-out of ODS, playing the roles of financial intermediary (FI) and executing agency, and therefore embodied a wealth of experience and a network of potential beneficiaries to further support CFC phaseout under the CEEP.

9. **Fit with the global environmental financing mechanisms.** As parties to both the Montreal and Kyoto Protocols, India was eligible for financial and technical assistance (TA) from the MLF, GEF, and CDM. The CEEP met the objective of the: (a) KP, by encouraging energy savings and GHGs reduction; (b) GEF,[3] by transforming the marketplace and introducing the concept of life cycle-based decision making in the chiller sector; and (c)MP, by facilitating the replacement of old CFC-based chillers and reducing the burden of CFC usage in the servicing sector.

10. **Rationale for Bank Assistance:** The Bank is one of the key implementing agencies (IAs) for the MLF, GEF, and CDM and was uniquely positioned to mobilize funds from a number of sources to achieve the desired outcomes of the CEEP. First, it is the largest IA of the GEF and MLF[4] and is committed to implementing activities toward achievement of GEF operational programs. Second, the Bank-India partnership with the MP was the second largest program to eliminate the production and use of ODS and is a long-term partnership on climate change. At the time of appraisal, the GoI and the Bank enjoyed a decade-long partnership on implementation of a US$250 million program and had established a comparative advantage with large MP subprojects—ODS I; Ozone Depleting Substances II (ODS II); CFC Production Sector Closure Project (ODS III); and the CTC Sector Phase-out Project (ODS IV). Third, the Bank's strategy took a programmatic approach, matching instruments to the nature and content of the programs pursued. This approach aligned with the fundamental goals of the World Bank India Country Assistance Strategy (CAS) on environmental protection and improvement within a strategic and holistic approach.

11. In consideration of the successful performance of the ODS phase-out projects and building on the long-standing engagement between the Bank and the GoI on cross-sectoral global environmental quality issues, the GoI invited the Bank as the IA to develop an innovative chiller replacement project, bringing on board global experience from similar operations in Mexico, Thailand, and Turkey. The Bank was a significant player in the global carbon market and had extensive experience in developing CDM-related operations in addition to vast global

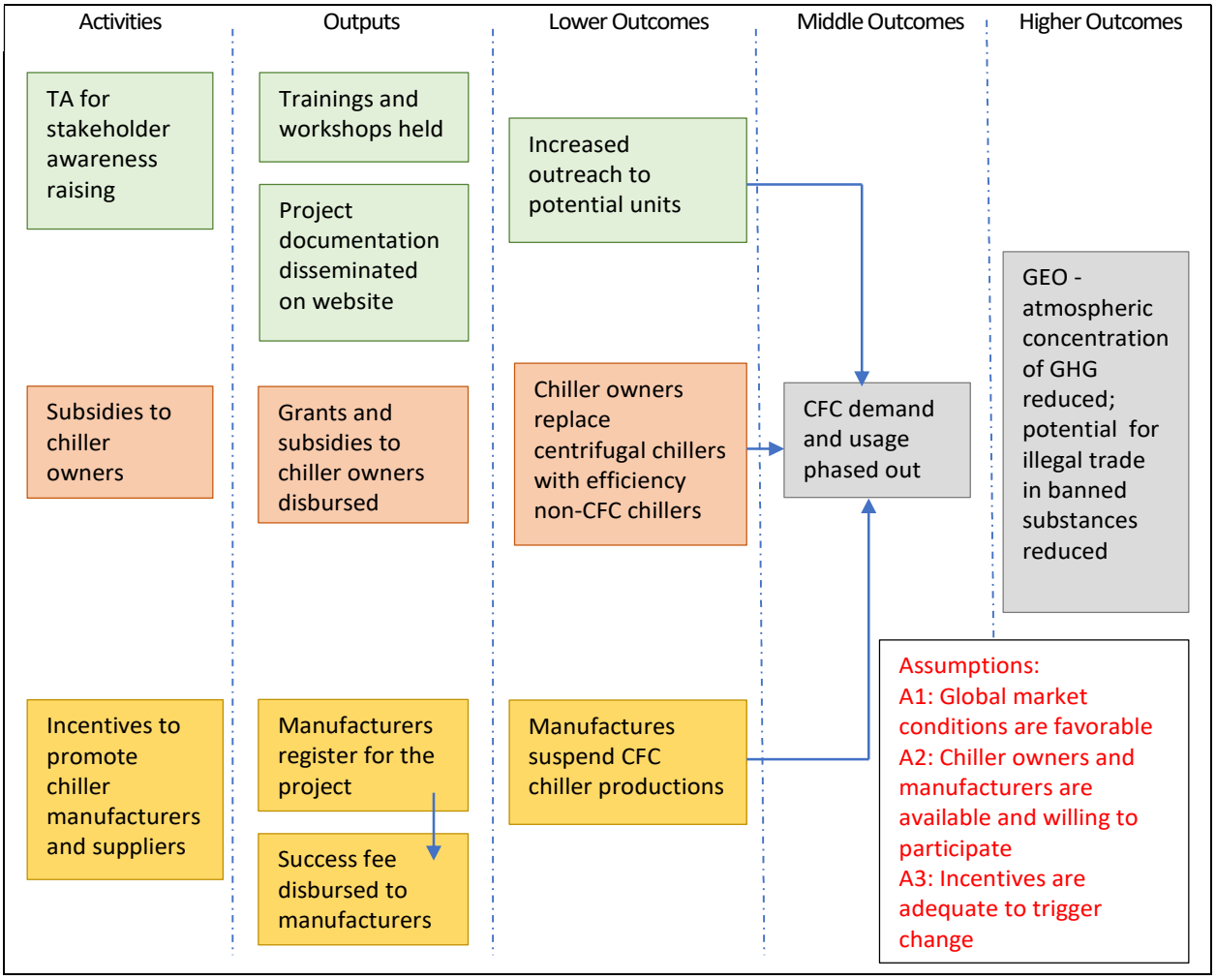
[2] International Chiller Sector Energy Efficiency and CFC Phaseout, ICF Consulting, January 2005.
[3] Operational Program #5: Removal of Barriers to Energy Efficiency and Energy Conservation.
[4] Other implementing agencies are the United Nations Development Program (UNDP), United Nations Industrial Development Organization (UNIDO), and United Nations Environment Program (UNEP), along with bilateral donor agencies.

experience in dealing with large-scale energy-saving projects.

Theory of Change (Results Chain)

12. Theory of Change is shown in **Error! Reference source not found.**. The project was designed as part of a Programmatic Framework Project for Energy Efficiency in India to promote and increase EE through practices, technologies, products and materials in domestic and commercial sector. The project, through demonstration, would support GoI's efforts to comply with the MP to completely phase out both production and consumption of new CFCs by 2010 and to support domestic commitment to reduce demand for recycled or reclaimed CFCs with minimum impact on the economy. As such two PDO outcomes were designed to enable the project to reach its objectives: (i) promote deployment of energy efficient technologies and products to reduce GHG emissions and (ii) support phasing out CFC demand in India.

Figure 1: Theory of Change of FEEM Project



Project Development Objectives (PDOs)

13. The PDOs of CEEP were to accelerate the replacement of centrifugal chillers with efficient non-CFC-based centrifugal chillers in order to promote deployment of energy efficient technologies and products to reduce GHG emissions, and support the phase-out of CFC demand in India by:

(i) supporting India's efforts to comply with the Montreal Protocol obligations pertaining to complete phase-out (including production and consumption) of new CFCs by 2010 and domestic commitment for the reduction in the demand for recycled or reclaimed CFCs, with minimum impact on economic development;
(ii) removing market and techno-economic barriers to early replacement of inefficient chillers, with priority given to CFC chillers, through provision of financial incentives directly to chiller owners in order to lower their opportunity costs and up-front capital costs and remove perceived technology risks;
(iii) Establishing an in-country mechanism to support a permanent transformation of the chiller market in India by availing them of GEF and MLF grants along with carbon finance revenues and strengthening national capacity for carbon finance intermediation; and
(iv) Demonstrating significant rate-of-return on investment of chiller replacement which would be replicable to other low-cost and/or no-cost energy conservation measures in large buildings.

14. **Project Global Environment Objective (GEO):** The PDO are in line with the global environmental agendas related to the stabilization of atmospheric concentration of greenhouse gases (GHG) and the phase out of ODS.

Key Expected Outcomes and Outcome Indicators

15. The project focused on the refrigeration and air conditioning (RAC) sector which (a) represented a significant use of CFC and other MP-restricted ODS[5] as refrigerants that also had high global warming potential (GWP); (b) used inefficient energy consuming technology; and (c) constituted the highest energy consumer in building/industrial systems. The project aimed to achieve its both PDO and GEO, through:

(a) phasing out 158 million tons of ODS consumption by replacing chillers;
(b) reducing carbon emissions by 4.495 million tons CO_2 over 20 years as direct benefits from the GEF-financed project (target value) through an increase in EE; and
(c) saving 4.08 million MWh over 20 years and reducing energy demand by 48 MW.

16. Additional indicators which could not be quantified included:

(i) Market transformation through making chiller owners, including public sector, aware of the life cycle approach to decision making; and
(ii) Reduced potential for illegal trade in banned substances brought about by the removal of CFC demand for the chiller sector.

Components

17. The project was designed to mobilize US$83.27 million from three global environmental financing sources: the GEF (US$6.3 million); the MLF (Multilateral Fund) for the implementation of the MP (US$1.0 million); the CDM through the Spanish Carbon Fund purchase of Certified Emission Reductions (CERs) from the project (US$5.85 million); plus US$70.12 million in contributions from chiller owners (public/private). The project had four major components and several subcomponents with the financing breakdown based on the initial project funding of US$83.27 million (Annex 3).

[5] CFC-11, CFC-113, CFC-114, CFC-115, CFC-12, HCFC-123, HCFC-22, HFC-134a, HFC-236fa, R-500, and R-502.

Component 1: Provision of Incentives to Accelerate Replacement of Energy Efficient Chillers

18. **Subcomponent 1.1 - Incentive to chiller owners.** This component was to help remove market and techno-economic barriers through a subsidy that was to lower the up-front capital costs for chiller replacement in advance of their natural attrition rate for 370 CFC-based chillers. The chiller owners were given two options to avail this financial incentive: (a) to take an up-front subsidy grant of 20 percent of the cost of the new non-CFC chiller at a normative price of US$400 per TR or (b) to avail of 60 percent annual subsidy from the CDM revenues generated through sale of CERs based on actual energy savings.

19. The project incentive mechanism was designed such that proposed chiller owners who received the initial assistance of the up-front 20 percent capital subsidy from the GEF and MLF (option 1 above, comprising 215 chillers) were to transfer potential carbon credits to the revolving fund of the project. In case the owners opted for option 2, they could not avail the 20 percent subsidy, but they receive 60 percent of the future carbon finance revenues. The balance 40 percent was to be given to the Financial Intermediary (FI i.e. IDBI) for CDM costs including monitoring and verification costs.

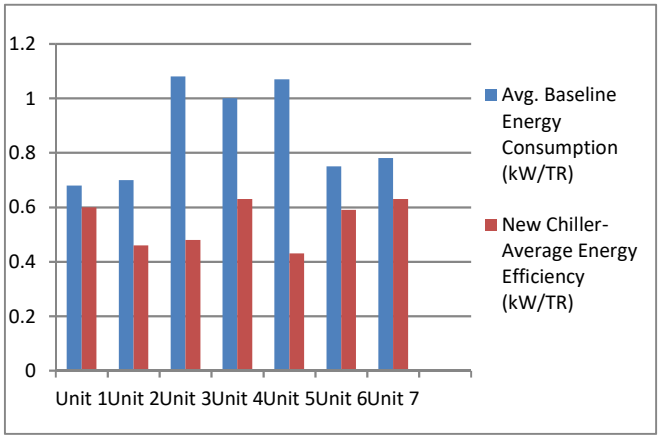
20. Similar to a revolving fund, certified emissions credits from units receiving incentive payments under option 1 were to provide additional resources to the project to support the replacement of an additional 155 chillers, making a total of 370 chillers that were to be replaced. The project registered 59 CFC-based eligible chillers into the program. Of these, 31 centrifugal CFC-11 chillers have been replaced mostly with screw chillers with HFC-134a and grant incentives have been disbursed after completion of documentation and compliances.

21. To address the anticipated constraint of PSUs availing the 20 percent up-front grant support, the MoEF&CC was to assist in the recruiting process to enable them to participate in the carbon market. Only five PSUs registered with the CEEP.

22. **Subcomponent 1.2 - Incentive to chiller manufacturers and suppliers.** This subcomponent was designed to promote the participation of chiller manufacturers and suppliers since their cooperation in project implementation was crucial. It created an incentive mechanism for them to bring in their existing chiller owner clientele into the program. For each chiller owner introduced who registered for the project and successfully replaced CFC-based chillers with new energy efficient non-CFC chillers, the chiller manufacturer was to be given a success fee of US$ 0.50 per ton of CER per year.

Component 2: Measurement, Monitoring, and Verification (MM&V)

23. For the CDM component, IDBI hired an MM&V agency in July 2010, to measure the baseline energy consumption and energy savings of the new equipment and monitor the performance of the new chillers. The contract also required developing an MIS for data collection and storage, including an online system for monitoring and collating chiller performance data. The MM&V consultant completed the baseline measurement of 30 units across 2 climatic zones. According to the original project design, data loggers were to be installed to measure and track detailed energy and cooling outputs, which would facilitate estimation of emission reductions for CDM verification.



24. However, with termination of the CDM component, these services were also terminated and the method of 'deemed savings' rather than 'real-time savings' was adopted through three months monitoring of log books and other records. IDBI monitored the EE performance of new chillers by collecting actual power consumption data for three months initially for ensuring compliance to an EE norm of below 0.63 kW per TR. Subsequently, IDBI compiled power consumption data on a quarterly basis for the project period. All chillers had to record an average of 0.63 kW per TR or less to avail the grant. This has successfully been achieved in all the chillers funded under the grant. The extent of EE by a sample of the replaced chillers is shown in Figure 2.

Figure 2:Energy Consumption by Sample Chillers (Source: MTR Mission Aide Memoire – July 15-August 6, 2013)

Component 3: Technical Assistance

25. Subcomponent 3.1 - Training and workshops on project awareness and energy efficiency opportunities for large buildings, IDBI organized extensive stakeholder awareness on the CEEP incentive options and the opportunity for energy savings through chiller replacements and proper maintenance. IDBI marketed the project through its regional offices and specialized corporate branches across India to maximize project visibility, reaching about 1,244 potential units (see section 1.5). Awareness and outreach also included uploading of project-related documents on the IDBI website for wider dissemination and easy access.

Component 4: Project Management Unit (PMU)

26. The PMU was established by IDBI by delegating dedicated staff to manage operations of the CEEP, with responsibilities for identifying beneficiaries, reviewing the eligibility criteria, setting up the MIS, signing financial agreements with selected beneficiaries, disbursing grants, and monitoring the performance of replaced chillers. The IDBI PMU retained its four-member staff throughout the project. The National Project Director (NPD) of the project is the representative from the MoEF&CC and was mandated with overall monitoring and policy guidance on the project.

B. SIGNIFICANT CHANGES DURING IMPLEMENTATION (IF APPLICABLE)

Revised PDOs and Outcome Targets

27. The PDO was not revised during the life of the project.

Revised PDO Indicators

28. The PDO indicators were not revised during the life of the project.

Revised Components

29. The components were not revised during the life of the project.

Other Changes

30. A Level 2 project restructuring was proposed in 2014 due to the (a) downturn of the global carbon market which eventually culminated in canceling the CDM component in November 2011, (b) delayed project start affecting the perceived timeliness of the project activities, and (c) lower than expected chiller owner beneficiaries which was a direct result of the GoI's decision to accelerate the CFC phase to August 2008. The restructuring would have widened the eligibility criteria for potential beneficiaries and facilitated the full disbursement of the grant subsidy. However, in lieu of restructuring, including a two-year extension, the closing date was extended by six months from

June 30 to December 31, 2014 following a joint decision by GoI's DEA and the Bank senior management based on consistently weak project performance and delayed action to restructure. The six-month extension was to understand the feasibility of restructuring the project and to allow the client to explore options to find another IA for the GEF funding attached to the project (deduced from informal consultations during the ICR preparation mission).

31. Further, poor performance of the CDM component resulted in IDBI and KfW mutually agreeing to terminate the Emissions Reduction Purchase Program (ERPA) in November 2011. However, the discontinuation of CDM component was never included in formal restructuring as intended. With the cancellation of the CDM component which accounted for US$5.85 million and funding for replacing 155 chillers, the scope and scale of the project were considerably reduced to only energy efficiency while extending to non-CFC based chillers. Other related sub-activities such as the MM&V consultancy, installation of data loggers on replaced chillers, the MIS which was to be developed by the CDM consultant and managed by the PMU as a core component of the monitoring and evaluation (M&E) system, and the annual program to recognize chiller owners for verified improved performance (fashioned as a market outreach tool) were also not pursued further after 2011 (further details in chapter IV). These adjustments hampered the overall M&E program.

32. Of the total GEF grant of US$ 6.3 million, project had disbursed US$ 0.99 million at closing. US$ 5.19 million of the total savings was diverted to the Financing Energy Efficiency at MSMEs Project (FEEMP; P100530) as additional finance. FEEMP was a parallel ongoing project with the objective of increasing demand for energy efficiency investments in target micro, small and medium enterprise clusters and building their capacity to access commercial finance. Both CEEP and FEEMP were operationalized through GEF grant IV cycle under GEF Programmatic Framework for Energy Efficiency in India and aligned with GEO.

Rationale for Changes and Their Implication on the Original Theory of Change

33. Implementation of CDM component of the project remained poor since 2011 due to uncertainty surrounding the timing of the registration of the project with the CDM Executive Board, the perceived tedious monitoring and verification requirements and the long-term revenue inflows. Mutual agreement of stakeholders led to cancellation of the CDM component and project continued to focus on EE, extending the eligibility criteria to non-CFC based chillers.

34. In the larger picture, the objective of phasing-out CFCs was taken as a policy decision by GoI. The project continued to support EE in chiller industry. Overall the original Theory of Change was not significantly impacted. The project could not leverage carbon finance through CDM thereby strengthening GoI's carbon finance intermediation.

II. OUTCOME

A. RELEVANCE OF PDOs

Assessment of Relevance of PDOs and Rating

35. **Rating: Modest.** The barriers to transforming the chiller market were relevant even in 2009 at project effectiveness as the number of eligible chillers and underlying drivers of the project had changed significantly, thereby affecting the relevance of the project objectives and design. As a result, though the project's core objectives of reducing GHG emissions, phasing out CFC, and supporting energy efficient technology remained relevant to the Bank, to the GoI's national development priorities, and to GEF conservation priorities at project closing, the project

could not use the 'window of opportunity' optimally to transform the chiller market.

36. The project remained partially relevant to Bank's Country Partnership Strategy (CPS, 2013–17) at its closing. The CPS recognized the use of trust funds to implement global conventions and support global partnerships/global public goods and to support activities in country programs that implement country, regional, and sector priorities. The trust funds were used towards implementing EE investments in chiller industry and thereby reducing GHG emissions.

37. Since the project could not pursue phasing-out of ODS and had to terminate CMD component due to reasons explained above, the project could not support the Ozone Trust Fund and the Carbon Finance Program of CPS (Annex 6). The Ozone Trust Fund assists countries in phasing out ODS as agreed under MP for the Protection of Ozone Layer, with funding from Multilateral Fund of the MP. The Carbon finance Program uses money contributed by governments and companies in OECD countries to purchase project-based GHG ERs in developing countries, within KP's CDM.

B. ACHIEVEMENT OF PDOs (EFFICACY)

Assessment of Achievement of Each Objective/Outcome

38. Comparing achieved targets with the original targets, the project performed at an estimated average of 15 percent, rendering the overall GEO and PDO of supporting the phaseout of CFC and reducing GHG emissions unsatisfactory. At the end of the project, 31 chillers out of 370 were replaced, constituting 8.4 percent and 6.81 tons (out of 159 tons) of CFC recovered, constituting 4.3 percent of the set targets, respectively. On the other hand, taking into consideration that only 59 chillers were registered and of this, 31 eventually completed the replacement process, had the project been restructured, success could have been calculated at 52.5 percent. All chillers successfully recorded the average specific energy consumption (SEC) of 0.63 kW per TR or less to avail the grant. Therefore, the target on energy savings was partially met through the replacement with new chillers. The average savings have been recorded by IDBI (Annex 3). The direct CO_2 benefits could not be calculated with the dropping of the data logging system. See Table 1 and Table 2.

Table 1: Targeted (from PAD)

Chillers to be Replaced	CFC to be Recovered (tons)	Direct CO_2 Benefits Targeted, including GWP of CFC (in million tCO_{2e})	Indirect CO_2 Benefits Targeted, including GWP of CFC (in million tCO_{2e})	MWh Saved over 20 Year Period (in million MWh)	MW Demand Reduced (MW)
370	159	4.495	8.68	3.978	48

Table 2: Achieved (project results received from the PMU)

Chillers Registered	Chillers Replaced	CFC Recovered (tons)	Total Chiller Capacity	Direct CO_2 Benefits Achieved, GWP of CFC	Indirect CO_2 Benefits Achieved	MW Demand Reduced *(estimated)*
59	31	6.81	10,606 TR	Not measured in absence of data loggers	Not measured in absence of data loggers	35.89% (range between 15–56%)
Comparing Original with Achieved Targets						
16% of chillers registered 8.4% of chillers replaced 4.3% of CFC target recovered 9.9% MWh saved ~35.89% MW of energy demand reduced *Average performance: 15%*						

39. Although the project design was comprehensive and innovative, demonstrating an intricate combination of policy, regulatory, and market interventions, performance was Unsatisfactory. The reasons that accounted for the weak performance are (a) delayed project start narrowing the 'window of opportunity' to avail the thriving CER market and to support the accelerated CFC phaseout; (b) absence of project baselines' assessment after the prolonged design phase; (c) absence of revisions to the results framework to reflect changes to the project baselines; (d) delayed decisions to restructure the project; (e) institutional arrangement slowing critical policy decisions; (f) unavailability of technical experts in the PMU; and (g) the overall complex financing mechanisms. Nevertheless, the project contributed to stabilizing the atmospheric concentration of GHGs and phaseout of CFCs. The project helped reduce the consumption of CFCs in the chiller market by 6.81 tons and simultaneously reduced GHG emissions by replacing inefficient CFC-based chillers. India's achievements under this operation are very important on the global front, in that at the time of project concept, it represented one of the largest global producers and consumers of CFC. Successful contribution to phasing out of CFCs therefore represents a significant progress in reducing anthropogenic pressure on the stratospheric ozone layer. The new chillers have improved designs, making them more robust and reducing refrigerant leakage to less than 1 percent a year, compared to older CFC technology with a 10 percent average leakage rate. Replaced chillers are also offering significant improvement in EE as their average energy consumption is less than 0.63 kW per TR at rated capacity.

Justification of Overall Efficacy Rating

Rating: Negligible

C. EFFICIENCY

Assessment of Efficiency and Rating

40. The impacts demonstrated above were achieved with energy savings per chiller replaced, and payback period for chillers replaced, as assessed based on the cost-effectiveness of the phaseout achieved. Energy savings estimated according to the PAD for each new non-CFC chiller (430 TR) is 614 MWh per year. From the project data, the computed actual energy savings per chiller replaced (Annex 1) ranged from 1.3 percent to 56 percent (lower than anticipated), based on various factors such as SEC, operating hours, and percentage load capacity. Estimating the value of energy savings in monetary terms at INR 4.50 per kW (at the exchange rate of INR 45 per US$1 during

implementation), savings range from US$1,620 per year to US$70,000 per year per chiller. If taken at an enterprise level, the energy savings show considerably high figures since each enterprise might have replaced more than one chiller in a few cases with CEEP financing and mostly with own financing. Though many of the chillers replaced are in the range of 250–350 TR (except three which are >500 TR), they have shown considerable energy savings because of the high efficiency of the new machines.

41. From the analysis, energy savings over a 20-year period (US$11,185,902.3) far exceeds the total investment (US$2,004,000) by a considerable margin. The internal rate of return (IRR) was derived as 28.9 percent. Therefore, the time required to cover the total investment, that is, the payback period, will be 3.4 years (as against the PAD estimate of 2.7 years). On this basis, it could be deduced that the project is efficient. However, it is worth noting that the estimates were based on available data from 7 units (12 chillers), comprising about 38 percent of the chillers replaced, and therefore overall efficiency is rated **Substantial.**

D. JUSTIFICATION OF OVERALL OUTCOME RATING

42. The project's core objectives of improving EE and reducing GHG emissions and the underlying design of combining multiple global environmental financing objectives remain relevant for India. However, the project encountered significant shortcomings in the achievement of its set objectives, both in achieving the chiller replacements and in strengthening the capacity for carbon finance intermediary that was expected to transform the chiller market. The number of chillers replaced, CFC recovered, energy consumption reduced or energy savings, and GHG emissions reduced (could not be measured at project end) were significantly low compared to the original targets. It is worth noting that although the PMU registered the vastly changed market conditions, including the reduced number of eligible chillers, early in the implementation phase, there was no requisite action to restructure the project. The prolonged preparatory phase resulted in missing the window of opportunity, rendering the objective essentially redundant.

43. In view of the above, the project outcome is rated Unsatisfactory.

E. OTHER OUTCOMES AND IMPACTS (IF ANY)

Gender

None

Institutional Strengthening

44. The institutional arrangement was rather complex with disconnects between the arms of MoEF&CC, affecting the project implementation decisions. Despite its commitment, GoI did not establish an international standard incineration system for the final disposal/destruction of CFC as per ODS rules.

45. The Bureau of Energy Efficiency (BEE) is responsible for spearheading energy conservation, integrating and coordinating the GEF into the GoI National Energy Conservation and Efficiency Strategy and coordinating EE mission of the National Action Plan on Climate Change. However, BEE services could not be leveraged to strengthen the technical capacity of the PMU since it only provided advisory services with no direct mainstream activity.

Mobilizing Private Sector Financing

46. All 31 chiller replacements were done by availing the option of 20% upfront subsidy with 80% invested by the chiller owners. Even with small number of replacements, the project was able to mobilize US$517,915.

Poverty Reduction and Shared Prosperity

None

Other Unintended Outcomes and Impacts

47. Diversion of project savings of US$5.19 million towards FEEMP (P100530) as additional finance contributed towards GHG emission reduction (ER) of 1.2 million tons of CO_2 over lifetime through direct investments of INR 1,804 million to improve energy efficiency (EE) and resource efficiency (RE) in MSMEs. The potential cumulative lifetime ER of the entire FEEM project is estimated as 17.59 million tons of CO_2. This contributed towards bottom line GHG reduction and thereby towards GEO. Further details are available in ICRR of FEEMP (Report #ICR4831 of December 2019).

III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

A. KEY FACTORS DURING PREPARATION

48. **Soundness of the background analysis and lessons from earlier operations.** Three studies on chillers at the national and global level informed the project design, including on relevance and benefits. The project design and implementation mechanisms built on the lessons and experience from earlier ODS operations. It adopted elements of the Bank's strategy on global environmental protection targeting GHG emission reductions using state-level interventions, strengthening institutional capacity, and improving market penetration aimed at EE and demand energy reduction.

49. **Assessment of the project design.** The overall project design was technically comprehensive and innovative and reflected an extensive risk analysis. However, it was operationally complex and dependent on extraneous factors which were beyond the control of the implementing and executing agencies, one being a sustained global CER price (see next section B). Also, the was designed as a standalone project with no physical linkages to other projects under the Programmatic Framework.

50. The thrust of the operation, the 20 percent grant subsidy, was designed to attract private investors and enterprises. It was based on examples from other ongoing chiller replacement operations without necessarily testing it on the Indian market to gauge the attractiveness to the target group. Although it was long, the PDO was clear, the results framework included measurable indicators, and the M&E arrangements had provisions for collecting the necessary data. The innovativeness of the project stemmed from using the CFC phaseout regulatory requirement to tackle the broader goals of promoting EE and reducing GHG emissions. Conceptually, the project had a good mix of policy thrust and financial incentives (grant subsidy and revolving CER funds) to tackle the multipronged objective. It innovatively combined the MP MLF (to phase out ODS); GEF (to remove barriers to EE and energy conservation); CDM (from CER trading); and private investment financing (to support cleaner technology), collectively targeting a transformational impact on the chiller and EE sector.

51. Involving IDBI as an executing agency and FI was to ensure access to a larger stream of potential beneficiaries. The CDM programmatic approach helped aggregate a number of eligible chiller replacements by many small individual projects to participate in the carbon market, reducing the individual transaction cost.

52. IDBI had acquired almost two decades of experience implementing Bank-supported GoI ODS phaseout operations, with good working knowledge of Bank operational, fiduciary, and safeguards standards. Whereas the ODS-type operations involved simpler technical, fiduciary/procurement, and safeguards implementation design and

a comparatively smaller direct clientele list, the CEEP implementation process demanded multisectoral expertise in energy conservation technology; RAC equipment technology; global environmental policies and regulations; multiple stakeholder marketing; specialized expertise in EE data collection and analysis; and project management. Provision was made therefore to constitute a 6-person PMU with room for hiring additional consultants (further details in III-B). The proposal to install data loggers and develop the MIS was to promote and better integrate efficient monitoring, reporting, and analysis of chiller performance.

53. Adequacy of GOI commitment. GoI's level of commitment at the time of project preparation/design was adequate. As a signatory to the MP, the UNFCCC, and the KP, the GoI had committed to (a) eliminate MP-controlled uses and production of CFC and (b) reduce GHG emissions by an average of 5.2 percent between 2008 and 2012, compared to the 1990 baseline, using flexible mechanisms such as the CDM. In the earlier ODS phaseout programs, the GoI's commitment was a key factor in successful implementation. The GoI also demonstrated its commitment by developing a Low Carbon Programmatic Framework for Energy Efficiency in 2008 in which the CEEP formed one of the five components; and by establishing the OC to provide support to the national CFC phaseout and the BEE to facilitate and coordinate EE initiatives.

54. **Assessment of risks.** The GoI conducted robust risk assessment as part of the project design, generating a comprehensive outlay of 'critical risks and potential controversial aspects'. Results from the risk assessment, informed implementation, primarily about the following:

(a) **Risk of lower than anticipated demand for the program** affecting the number of chillers that get replaced with project funding and, subsequently, overall success of the project.

(b) **Low to moderate uptake of EE measures despite high rates of return.** The TA component was therefore designed to create extensive awareness with potential beneficiaries about project benefits. The tool developed in cooperation with the U.S. EPA, helped demonstrate the financial benefits of chiller replacements. On the basis that CFC production and import were banned, it was assumed that CFC chiller replacement would take place anyway during the project implementation period and given the grant to subsidize the cost of replacement, the rate of replacement could be increased. However, the **rate of penetration of the grant subsidy was minimal**, partially attributable to the onerous burden of monitoring and reporting required of beneficiaries, possibly incurring a net cost on the interest rate on a commercial loan to cover the remaining 80 percent of the chiller cost and/or missed targeting of the awareness program (refer to next section B).

(c) **No existing technology in India for disposal/destruction of old recovered CFCs and ODS refrigerants in an environmentally sound manner at the end of their useful life, posing a moderate risk of noncompliance with disposal, potential venting, or resale.** The GoI was ultimately responsible for the destruction of the recovered CFCs and committed to establish a destruction facility, with funding which was apparently to be made available by the MLF. Alternatively, the GoI was to review other options such as retrofitting old cement kilns to operate as destruction facilities or export the old CFCs to countries which have destruction facilities, with recommendations to re-access disposal options during the midterm review (MTR).

(d) **Potential delay in registration and CER issuance.** Considering the backlog of projects seeking registration and the review requirements of the CDM executive board (CDM EB), the project perceived risks in losing its transformative edge should the CDM registration fail to proceed and the number of targeted chillers to be replaced drop by 115.

55. The Bank mobilized strategic bilateral cooperation to support the successful implementation of the operation: the U.S. Environmental Protection Agency (EPA) provided financial support for a marketing tool that outlined the advantages to chiller owners. Also, chiller manufacturers who operated at the global level contributed to developing the incentive framework—and the design of the delivery mechanism.

56. Interviews with the project preparation team backed by the exhaustive list of risks identified showed that the Bank project preparation team was fully abreast of the challenges ahead and the risks involved in developing and implementing this new and innovative project. The wording of the GEO and the PDO allowed for eventual adjustments although this flexibility, including restructuring to expand the eligibility criteria, was not exploited in a timely manner, affecting project outputs and outcomes. Overall risk for the CEEP was appropriately rated as High.

B. KEY FACTORS DURING IMPLEMENTATION

57. The project implementation plan was built on findings from key studies and analysis carried out on the chiller market. While the project design was innovative with an inbuilt revolving financing mechanism to support transformation of the chiller sector, implementation was complex and could have benefitted from a timely piloting of the implementation model to potentially gauge attractiveness of the 20 percent subsidy before launching into full implementation. Also, the unduly delayed start coupled with extraneous factors further complicated implementation.

58. Considering that project preparation activities, including the analytical studies, began in 2001, it was deduced that the appraisal (2008) and launch (2009) were significantly delayed. Reasons attributed included the following:

(a) Length of time, 24 months,[6] required by the GEF to endorse its portion of the project grant
(b) Length of time for registering CDM subprojects
(c) Unwillingness of many chiller owners to adopt the CDM-based deferred revenues in preference for the up-front 20 percent grant.

59. **Early phaseout of CFCs.** The GoI had advanced the date for phasing out CFCs by 17 months, from 2010 to August 2008, significantly affecting the number of available eligible CFC chillers. The assessments carried out in 2010 when the project became effective estimated around 100; of this, IDBI could actually identify and register 59 potential beneficiary chillers and replaced 31.

60. **Grant subsidy.** For most beneficiaries, once the expedited CFC phaseout was completed, chiller replacement was no longer considered priority especially where it involved taking a commercial interest rate loan to cover the remaining 80 percent of the cost of the chiller. As a result, project beneficiaries operating more than one chiller opted to replace, on average, one chiller with project support grant. With the available lower-cost option, some registered beneficiaries resorted to retrofitting CFC chillers even after being informed about benefits of increased EE and shorter payback period with new chillers. The burden of monitoring and reporting required of beneficiaries also accounted for the poor penetration of the subsidy. It is worth noting that for a majority of the beneficiaries, their main drive was to get recognition for their commitment to environment management and energy conservation, to comply with GOI laws and not necessarily the incentive of the subsidy.

61. Whereas the small and medium enterprises (SMEs) with relatively smaller chiller capacities (below 100 TR) formed a significant portion of the chiller market and could have benefitted from the subsidy, they were not

[6] The lengthened period required by the GEF may have been as a result of waiting out the registration of the CDM component on the CDM EB.

eligible according to the original beneficiary selection criteria. Similarly, hydrochlorofluorocarbon (HCFC) based chillers were originally not eligible.

62. **CDM component.** The project framework originally envisaged enhancing energy savings benefits by linking it to the CDM, creating a revolving fund to sustain the project outcomes beyond closing. However, the unforeseen downturn of the carbon market and procedural complexities of registering the project with the CDM EB eventually resulted in canceling the CDM component. During 2007–2008, while the project was still in preparation, the international market for CERs peaked at around US$12 per tCO_2 but crashed in 2010 to US$4 per tCO_2 and has subsequently been on a steady decline. Contrary to expectations, prospective beneficiaries who had already replaced chillers but were willing to register for the CDM were not eligible.

63. Based on interviews with beneficiaries, the continuous monitoring of the subprojects required under the project was onerous in comparison with the size of the grant. If the monitoring were to be used for the recognition program to give visibility to participating chiller owners, as initially planned, beneficiaries would have been more responsive.

64. By mid-2011, it had become clear that the CDM uptake by chiller owners had reduced significantly. In relation, the uncertainty surrounding the timing of the registration of the project with the CDM EB, the perceived tedious monitoring and verification requirements, and the unattractive long-term revenue inflows cumulated in the proactive decision between IDBI and the Bank to drop the CDM component in November 2011.

65. Subsequently, the Bank, jointly with the MoEF&CC and in consultation with key stakeholders, agreed to recast the project as an EE operation with a plan to expand the eligibility criteria, involve the BEE to influence the public sector procurement policy around EE, and finalize the restructuring by June 2012 (aide memoire/management letter, November 2011). Recommendations from the MTR report, which was completed in August 2013, rather later in the project cycle, supported restructuring the project with flexible eligibility criteria, higher financial incentive for chiller owners, inclusion of R-22 chillers, and extension of the project closing date by 24 months. However, for reasons that included limited time to complete the key recommendations in the MTR, coupled with the GoI's view that the project could no longer influence the chiller market, the proposed restructuring request was not proceeded with (see Chapter I-B).

66. **Composition of the PMU.** EE investments are generally not considered a top priority for the average business owner in India. The project was therefore designed to incentivize chiller market transformation using subsidies and TA, employing technical expertise. The PMU team was to comprise one manager, three technical staff, one financial management officer, one part-time procurement officer, and one administrative officer. The PMU had the financial space to contract consultants to support them when needed. However, all respective responsibilities were taken up primarily by the four IDBI banking staff deputed to the PMU. Considering the technical complexities of the project design, a robust PMU comprising IDBI's 4-member banking staff and hired technical experts could have (a) sufficiently demonstrated cost savings with new CFC replaced chillers instead of retrofitting chillers as a cheaper option, (b) facilitated an early understanding of the dynamic market conditions, and (c) guided decisions for timely restructuring of the project. It is worth noting that although EE was designed as an integral part of the chiller replacement program, it gained greater momentum after November 2011 when the project was recast to capture visible reduction in energy consumption by beneficiaries.

67. **Institutional arrangements.** The institutional arrangement essentially did not support strong client ownership, making critical implementation decisions, including on restructuring, difficult. Coming under the gamut of both the MP and the KP, the mandate for the CEEP fell under the following different national agencies offering a complex institutional framework: (a) the inter-ministerial Empowered Steering Committee of the MP overseeing

implementation of MP operations; (b) the OC to provide relevant policies such as directives on proper and safe handling of recovered CFCs; (c) the GEF Empowered Committee to facilitate implementation of GEF-funded operations; (d) the International Cooperation and Sustainable Development as the focal point for GEF in India; (e) the BEE to spearhead improvement in EE through regulatory and promotional measures; and (f) the Designated National Authority to approve all CDM projects in India. Clearly the institutional framework depicted a need for collaboration across different government agencies, particularly between the MP and the GEF units, noting that the GEF-MP funds covered almost 60 percent of the original chiller target. However, there was a disconnect between these arms of the MoEF&CC, affecting the project implementation decisions to restructure the operation.

68. **Chiller manufacturers' role.** Chiller manufacturers had a pivotal role to inform and introduce eligible chiller owners to the CEEP. IDBI entered into memorandums of understanding with chiller manufacturers and an incentive of US$0.50 per CER, under the CDM component, was agreed to be paid for successful entry of chiller owners into the project. However, none of the chillers replaced were brought into the program by the manufacturers and therefore they could not avail of the success fee. With the dropping of the CDM component, the restructured project design was to include an incentive to manufacturers, of 5 percent of the subsidy to be given to chiller owners. Since the restructured proposal was aborted, the key role of chiller manufacturers eventually dissipated.

IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME

A. QUALITY OF MONITORING AND EVALUATION (M&E)

M&E Design

69. In the original project design, the project adopted two levels of monitoring—at the project activity level and at the program level. The former involved the measurement of energy consumption and verification of carbon emission reductions in an MIS, using data loggers and transmitters (which were dropped as part of the CDM component). At the program level, indicators were identified to capture project performance, sustainability of energy savings, and larger participation of beneficiaries. The institutional arrangements for M&E involved the MoEF&CC with the overarching project monitoring responsibility and policy support. The Bank supervised implementation and reviewed progress while the PMU managed the day-to-day implementation of the project. External M&E involved third-party audit of CERs according to the requirement of CDM procedures. The M&E system was well designed to capture all project-related information and also to facilitate coordination between agencies.

M&E Implementation

70. Implementation entailed measurements to determine EE levels and monitor and verify conversion of CFC to non-CFC chillers. In the early stages of implementation, MM&V under the CDM component proceeded seamlessly. The private MM&V agency hired in July 2010 measured the baseline energy consumption of existing chillers and was to install data loggers to measure and track detailed energy and cooling output and estimate energy savings and carbon emission reduction. However, with the canceling of the CDM component, the services of the private MM&V agency, the MIS, and data logging and transmitter systems were also terminated. Subsequently, the PMU took over monitoring of EE performance by collecting actual power consumption data for three months after installation of the new chiller to track and ensure compliance with the EE norm of 0.63 kW per TR or below. Dropping the CDM-related M&E activities affected streamlined data collation and monitoring. With a functioning

data logging system and the MIS, the population of replaced chillers could have been monitored efficiently over the project period, extending beyond the closing date, thereby maintaining a system for tracking and informing beneficiaries on energy savings.

M&E Utilization

71. Use of M&E data could have been optimized. For example, early market analysis carried out by the PMU in 2010 showed a drastic reduction in the number of eligible CFC chillers, following the expedited phase out of CFC. The aide memoire of June 2011 recorded this development. However, the original target of 370 chillers was not officially revised to reflect this adjustment. M&E information also inferred a slowed uptake of CDM registration due to a new procedure at the CDM EB and the financial viability of carbon financing to the CEEP. IDBI noted in the June 2011 mission report that due to the fall in the CDM market, the expected revenues would be much less than originally anticipated.

72. The M&E findings buttressed by (a) the complex requirements for monitoring energy savings as per the CDM procedures and (b) ineligibility of already registered projects under the CEEP justified dropping the CDM component. The M&E also captured the low disbursements on TA activities, a relevant indicator for determining project impacts.

73. While project relevant data was to be maintained by all beneficiaries, routine collection of data on energy savings was done for only seven units, creating a challenge for estimating overall project energy savings and demand reduction gained (PAD annex 3B).

74. The M&E system was adequately designed at the onset to respond to the needs of the project. However, the collected data could not be used to sufficiently trigger the needed policy decision and actions in a timely manner.

Justification of Overall Rating of Quality of M&E

75. The overall quality of M&E is rated as Modest. The system was well designed and well implemented during initial years of project. The inability of the project to install data loggers and have a functioning MIS hampered the streamlined data collection, tracking and utilization.

B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

76. Phasing out CFC yielded both global and local environmental benefits (refer to Chapter I-A). The project triggered safeguards policy on Environmental Assessment (OP/BP 4.01) and was classified as 'Category B', requiring environmental analysis but not a comprehensive (full scale) environmental impact assessment. Safeguards requirements included an environment and social screening implemented as part of the project management activities. The project also developed an EMP to address the potential environmental risks associated with the replacement of old CFC-based chiller systems, including provision of the verification mechanism to ensure that chiller replacement was undertaken in a safe and environmentally sound manner in compliance with Bank safeguards standards and the GoI Ozone Rules. Extensive consultations were held with chiller manufacturers and owners to explain the EMP requirements which were included in the legal documents signed with all project participants. The MEP was disclosed on World Bank's website on December 01, 2008.

77. Decommissioning of CFC chillers involved cutting open the compressors in the presence of a PMU representative and a chartered engineer, who issued a certificate to confirm compliance with EMP standards. Having received 20 percent of the grant subsidy at the onset, beneficiaries received the remaining 80 percent only after verification that the required environmental and safety measures were met. The PMU maintained

destruction certificates of all beneficiaries along with photographic evidence. Destroyed equipment could be sold off as metal scrap. On an average, about 80 percent of the original CFC contents of chillers were recovered.

78. According to the ISRs, compliance was consistently rated Satisfactory throughout the implementation with only minor resolvable issues. Issues involving the recovery and storage of used ODS refrigerants, decommissioning and scrapping of old chiller compressors, management of new refrigerants, and associated health and safety aspects were well managed onsite according to the Bank's Operational Policy on Environmental Assessment (OP 4.01). In an ideal scenario, the replacement refrigerant should have zero ozone depleting potential and GWP, but this was not feasible due to such refrigerants being commercially unviable or not well accepted.

79. Beneficiaries recovered and safely stored 6.81 tons of CFC. IDBI maintained responsibility for overseeing and reporting the inventory of recovered CFCs, the ultimate responsibility for providing guidance for its disposal rested with the OC. Interviews with beneficiaries confirmed that issuance of directives from the OC was delayed during the implementation phase. The OC had issued a letter to one beneficiary, upon direct inquiry, to dispose CFC with 'an authorized facility', but information or a database of such facilities were not readily available. Inferences in the PAD (paragraph 85) indicate that the GoI was committed to explore the establishment of CFC incineration facilities if funds were made available from the MLF but the ICR could not confirm the status of this commitment.

80. Fiduciary compliance. There were no major financial management or procurement issues during implementation. At the time of closing, the overall fiduciary performance rating of the project was Satisfactory. IDBI—the FI and PMU—implemented the project in accordance with the original design. There were not many transactions as most of the financial resources were disbursed to CFC-based chiller owners. The project design did not involve extensive procurement activities except a few consultancy contracts less than 1 percent of the project cost.

81. Overall, the planning and budgeting process at IDBI, involving a component-wise expenditure tracking system, was Satisfactory. IDBI initiated an online procurement plan review system (SEPA) for tracking project expenditure. The internal control mechanism was satisfactory with well-defined rules/procedures/financial authority. The level of record keeping was adequate, fixed assets verification process was done regularly, and IDBI maintained satisfactory external auditing arrangements. IDBI adopted a transparent complaint handling mechanism for the project.

C. BANK PERFORMANCE

Quality at Entry

Rating: Unsatisfactory

82. In terms of design, the Bank project team carried out a comprehensive global- and national-level analysis of the chiller market to establish the basis of the project design and economic viability; used the lessons from the previous four ODS projects; and adopted market innovation, combining three sources of global environmental financing complemented with private sector financing. The project design involved comprehensive risk identification and analysis, taking lessons and recommendations from similar Bank-financed operations. However, the risk with coupling these funds—slowed implementation—was not necessarily duly reflected in the mitigation measures of the project, resulting in the prolonged design phase. The design also adopted disbursing the grant subsidy to beneficiaries through an FI, a model which had proven successful in earlier ODS phaseout projects.

83. Though the significant changes in the price per ton of CO_2 and the reduced number of eligible chillers

occurred 14 months before the project approval by the Bank Board, the project design and results framework were not modified to reflect these major shifts, affecting the project quality at entry.

Quality of Supervision

Rating: Unsatisfactory

84. The Bank's performance in supervision is rated Unsatisfactory. The Bank conducted regular implementation support missions which were systematic and held routinely throughout the project period. The structured aide memoires kept track of project performance. Early Bank supervision missions noted issues regarding the slow implementation of the project and the causative factors and raised them with the PMU as well as the GoI. Although the MTR was significantly delayed, its findings resonated poor performance and the need to revamp project design to salvage the objective. Considering that the Bank mission teams comprised technical experts and were abreast with the changing market conditions, the team was not proactive in providing immediate guidance or taking ready actions in response to critical findings such as the results from the 2010 market analysis carried out by the PMU. Two years into implementation, the project implementation progress was rated Moderately Unsatisfactory, further prompting a need for proactive actions. The Bank management letter (November 17, 2011) indicated completing restructuring by June 2012 but the action, for multiple reasons including those above the team level, did not follow.

85. Given the quasi overall monitoring mandate of the MoEF&CC, it was not clear which of the two arms of this ministry was responsible for sending the restructuring request to the Bank through the DEA. Also, the pseudo-formal role of the MoEF&CC implied that the Bank had no direct counterpart on this project, which explained the exhibited limited interest, given that they had no formal or direct monitoring or implementation mandate (see section 5.2).

86. Action to initiate project restructuring had begun rather late in the project cycle, in 2013 (August 2013 aide memoire). The Technical Bank mission emphasized with the GoI the urgent need to restructure the project to facilitate disbursement of the GEF grant. However, "after a series of discussions between the Bank and the GoI in January 2014, joint DEA, MoEF&CC discussions in February 2014 and in May 2014, and with the implementing agencies (IDBI, MoEF&CC, EESL), it was jointly decided by the GoI and Bank management that the project will not be restructured" (June 2014 aide memoire), (see Chapter I-B).

Justification of Overall Rating of Bank Performance

Rating-Unsatisfactory

87. Based on Unsatisfactory ratings both for Quality at Entry and Supervision, overall Bank performance is rated Unsatisfactory in view of the (a) prolonged design phase which affected the key drivers of the project and the window of opportunity; (b) delayed decision and failure to either drastically adjust the project design or cancel it before approval; (c) institutional arrangement that essentially did not support strong client ownership and making critical implementation decisions, including on restructuring; and (d) project implementation reports (aide memoires, MTRs, management letters) signaling a need to revamp the design to possibly salvage the overall objective, but the action not following.

D. RISK TO DEVELOPMENT OUTCOME

88. The risk to development outcome is negligible since as per GoI's policy change, CFC-based chillers were phased out thereby deploying energy efficient chillers which contributed to reduction in GHG and to GEO. The project targeted only 370 chillers whereas GoI's directive phased-out all CFC-based chillers.

V. LESSONS AND RECOMMENDATIONS

89. **The lessons are grouped by** design, implementation, institutional arrangements, governance and ownership, and Bank management support.

Design

90. **Pilot innovative risky approaches before scaling up.** Considering the innovativeness of the project design, the financing mechanism, and the size of the chiller population, the project could have been classified as a pilot, targeting fewer states/sectors, to generate lessons and solutions for addressing the multiple risks of transforming and promoting EE of the chiller market.

91. **The different sources of financing were combined to** provide the space for addressing the policy, regulatory, marketing, and public-private-partnership dimensions of chiller replacement. Considering the risks involved, such operations should ideally have a stronger risk management/exit strategy and inbuilt flexibility to retrofit the design and implementation plan as needed.

92. **Subsidy versus attractive loans.** Lessons from other countries show that financial support for chiller replacements can take various forms, from low interest loans to rebates and performance guarantee contracting where the technology provider guarantees EE. Whether the recommendation to provide a subsidy of 20 percent was an attractive offer to the chiller owners should have been assessed for its penetration with potential beneficiaries at the onset before launching the project. This is worth noting since feedback from most beneficiaries indicated that the subsidy was not economically attractive enough considering the perceived risks with CERs, onerous monitoring and reporting requirements, and the inherent cost of decommissioning compressors and handling recovered CFCs. In a related perspective, due to the opportunity cost, EE investments are generally not perceived as productive investments even with a payback of a couple of years, which is a classic problem when implementing cleaner production in SMEs, for example. This requires careful tailoring of financing packaging to correspond with specific beneficiary expectations.

93. **Energy savings is best captured at the building management systems level.** Many of the beneficiaries felt that energy savings could be more visible had it been addressed at the building systems level. Consuming 40 percent of the total energy in a building, if the intervention of choice were to be building management systems, it would also be important to keep the ODS/refrigerant aspect at the forefront as it might run the risk of being overlooked in a regular EE project.

Implementation

94. **Keep the rationale for intervention under constant watch, in particular, if the project start is delayed.** When project start gets unduly delayed for any reason, it is crucial to assess the possible impacts the delay could have on the underlying pillars and market conditions and, subsequently, the project output and outcomes and, where necessary, immediate actions should be taken to ensure relevance of the project development design. In the case of the CEEP, on the basis of the pertinent issues raised by IDBI during the early stages of

implementation, as recorded in the aide memoires of the Bank, the techno-economic assessment of the project life cycle should have been carried out at the commencement of implementation in 2010.

95. For complex innovative operations involving multiple stakeholders and various financing streams, it would be essential to ensure that the MTR is held within the first half of the project cycle to inform any adjustments to improve project performance, if needed. In the case of the CEEP, although the MTR generated viable recommendations for revamping the operation, due to the significant delays, the proposed restructuring could not be undertaken. The MTR was undertaken in 2013 when the project was scheduled to end in 2014.

Institutional Arrangements

96. **Enhance the technical capacity of the FI, when needed.** IDBI's role as the project implementing entity and FI had the added value of providing operational and technical experience from successfully implementing earlier ODS projects, established clientele, and credibility. For a technically complex operation like the CEEP, it was important to ensure that technical experts are contracted on the team (as highlighted in the PAD) in addition to providing training to the assigned team. With reference to the inconsistencies between the PIM and the PAD, it would be essential to conduct a more thorough review of the project package to ensure consistency and enhance clarity to the IA. Implementation support missions should have duly assessed IA's capacity vis a vis project performance. In this case, the World Bank did not highlight any issue regarding PMU's strengths and capacity during implementation of project.

Governance and Ownership

97. **CFC recovery** was an important aspect of the project to ensure sustainable outcomes, making the issue of ready and safe disposal of the CFCs a key consideration. Knowing at the time of appraisal that there were no CFC incineration or recycling plants in India, the project should have been clearer on how the recovered CFCs were to be handled. A coordinated mechanism between the OC, chiller owners, chiller manufacturers, and IDBI should have been built into the project, eliminating the uncertainty that surrounded handling of the CFC even beyond project closing.

98. **Chiller manufacturers** play crucial influential roles in the chiller market, especially on the owners, and therefore become the best channels for influencing the chiller market. IDBI has used this channel quite well though a lot more could have been achieved in securing their buy-in if the incentives structure for the manufacturers were to be aligned with their interests.

99. Since the eligibility criteria were based on the CDM methodology and future CDM revenue of about US$5.85 million was assumed under the project, the program of activities should have been registered before launching implementation in 2009.

100. **Need for greater regulatory thrust.** Regulation is a primary driver in a country to achieve the GEOs. While MP CFC phase-out regulations accelerated the replacement of chillers, the EE regulation (Energy Conservation Act 2001) was not used effectively to promote the project. If the BEE had issued an 'advisory' or an order requesting chiller owners to adopt energy efficient chillers, it could have helped trigger and stimulate interest in the project.

What could have been done better

101. More proactive and innovative Bank engagement on finding a solution to a challenging situation when the original project design became largely outdated by the time the project was approved. Even before the MTR

stage, it was clear that the underlying pillars of the project had changed over the delayed project preparation stage although the project was still relevant from the perspective of energy savings and GHGs. At this stage the GoI jointly with Bank management should have made the decision to cancel a portion or restructure to salvage the project. While the team dropped the CDM component in November 2011, it could have restructured the project to revise the results framework, revised the eligibility criteria, and brought on board the BEE to support more robust implementation. While actions to salvage the project were delayed beyond the implementation period of the project, at the end, both the Bank and GoI have stepped up to the challenge through agreeing to and processing a major amendment request, albeit this was too late to change the assessment of the original CEEP. Following approval of major amendment by GEF Council, the Bank and the government moved forward with implementing the remaining balance of the GEF funds under another Bank instrument linked to the India PFEE i.e. FEEMP.

ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS

A. RESULTS INDICATORS

A.1 PDO Indicators

Objective/Outcome: Replacement of centrifugal chillers with efficient non-CFC-based centrifugal chillers to promote EE

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of CFC-based centrifugal chillers replaced by the CEEP	Number	0.00 17-Jul-2002	370.00 29-May-2009		31.00 31-Dec-2014

Comments (achievements against targets):
With a target of replacing 370 CFC-based chillers with non CFC-based chillers, the CEEP registered 59 CFC-based eligible chillers and successfully replaced 31. Grant incentives were disbursed after satisfactory completion of documentation and compliances, completing 8.4% of the original target. Refrigerants for all chillers replaced under the project were changed from CFC-11 to HFC-134a. As part of the background studies, baselines assessments were carried out in 2002.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion

Reduction of CFC consumption	Metric ton	0.00 01-Oct-2009	158.00 01-Oct-2009		6.81 31-Dec-2014

Comments (achievements against targets):
For a total of 370 CFC-based chillers that were to be replaced, 158 tons of CFC was to be recovered. However, having successfully replaced 31 chillers, the operation recovered 4.2% of the original target.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
MWh savings & MW demand reduction	Megawatt hour(MWh)	0.00 01-Oct-2009	4.08 01-Oct-2009		2.00 31-Dec-2014

Comments (achievements against targets):
According to the quarterly energy efficiency (EE) data reported by beneficiaries at the time of closing, the project had successfully achieved 34% of energy savings per ton of refrigerant. Estimates derived from (limited) project performance data at project closing ranged between 15% and 56%.

A.2 Intermediate Results Indicators

Component: Measurement, Monitoring and Verfication

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Indirect Carbon emission reductions achieved by chillers replaced	Text	0 01-Oct-2009	8.868 01-Oct-2009		0 31-Dec-2014

Comments (achievements against targets):

Emission reductions could not be measured since data loggers were not installed. Using US$ 5.19 million in FEEMP (P100530), 2.27 million tons of CO2 over lifetime through direct investments of INR 3,322 million to improve energy efficiency (EE) and resource efficiency (RE) in MSMEs. The potential cumulative lifetime ER due to impact of FEEM project is estimated as 13.34 million tons of CO2. Further details of ER available in ICRR of FEEMP.

B. KEY OUTPUTS BY COMPONENT

Objective/Outcome 1 Replacement of centrifugal chillers with efficient non-CFC-based centrifugal chillers to promote EE	
Outcome Indicators	1. Cumulative ERs as direct benefit from CEEP (Target: 4.495 mt CO_2 over 20 years) 2. Reduction of CFC consumption (Target: 158 metric tons) 3. MWh savings & MW demand reduction (Target: 4.08 MWh)
Intermediate Results Indicators	1. Indirect Carbon emission reductions achieved by chillers replaced (Target: 8.68 million tons of carbon ERs)
Key Outputs by Component (linked to the achievement of the Objective/Outcome 1)	Component 1: 1. 20% subsidy was given to chiller owners. 31 chillers were replaced with new non-CFC chillers out of the targeted 370 chillers. The second incentive option that was to be availed through carbon credits was dropped. 2. Since this component was linked to CDM revenues, it was following the cancellation of that component. Component 2: 3. Measurement of EE data was carried out through manual submission of data by owners. 4. MIS as designed was not set up following the cancellation of the CDM component. 5. CFC-based chiller compressors were destroyed to prevent reuse. 6. CFC that was recovered was stored in cylinders and verified by chartered engineers. 7. Data loggers were not purchased due to dropping of the CDM component.

	8. Carbon emission reductions could not be estimated in the absence of sufficient data. Component 3: 9. Created awareness, reaching about 1,800 potential beneficiaries in the private and public sector. 10. 3 awareness workshops were conducted. 11. Recognition program to encourage chiller owners was dropped. It was recorded in the PAD but was not conducted. Component 4: 12. The PMU was established by IDBI with four staff to work on the project. The PMU looked after the daily operations including identification of beneficiaries, signing FIAs, and monitoring of chiller performance. 13. The USA Environmental Protection Agency financial analysis tool was used by IDBI in its marketing and awareness campaigns.

ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION

A. TASK TEAM MEMBERS

Name	Role
Preparation	
Supervision/ICR	
Harinath Sesha Appalarajugari	Task Team Leader(s)
Kumaraswamy Sankaravadivelu	Procurement Specialist(s)
Anantha Krishna Karur	Financial Management Specialist
	Team Member
Santhanam Krishnan	Social Specialist
Ruma Tavorath	Environmental Specialist
Arvind Prasad Mantha	Team Member
Dora Nsuwa Cudjoe	Team Member
Charu Jain	Team Member

B. STAFF TIME AND COST

Stage of Project Cycle	Staff Time and Cost	
	No. of staff weeks	US$ (including travel and consultant costs)
Preparation		
FY06	.625	3,355.75
FY07	3.050	16,878.74
FY08	0	4,799.69
FY09	0	-1,551.98
Total	**3.68**	**23,482.20**

Supervision/ICR		
FY10	8.000	23,282.92
FY11	4.875	23,939.77
FY12	6.175	34,550.84
FY13	4.877	15,327.30
FY14	18.957	50,204.20
FY15	8.325	32,314.62
FY16	4.019	16,731.79
Total	**55.23**	**196,351.44**

ANNEX 3. PROJECT COST BY COMPONENT

Components	Amount at Approval (US$M)	Actual at Project Closing (US$M)	Percentage of Approval (US$M)
Provision of Incentives to Accelerate Replacement of Energy Efficient Chillers	0	79.66	0
Measurement, Monitoring and Verification		1.57	0
Technical Assistance and marketing	0	.53	0
Project management	0	1.47	0
Total	**0.00**	**83.23**	**0.00**

ANNEX 4. EFFICIENCY ANALYSIS

1. The efficiency of the project has been estimated based on the data provided by seven enterprises that are beneficiaries of the CEEP. These enterprises have installed 12 new chillers under the project with a total capacity of 4,283 TR. They constitute about 40 percent of the total chillers replaced under the CEEP, which represents about 3 percent of the baseline target of 370.

2. Energy savings for each machine may vary depending on factors such as operating hours, percentage of loading (part load/full load), and operating conditions. Further, most of the new chillers are of less than 430 TR capacity, which was the average capacity considered for each chiller in the PAD. Since the capacities of the new chillers were altered, the SEC also changed, thereby varying the absolute energy savings for each machine. Since all chillers have SEC<0.63 they are much more energy efficient than the old machines. It can be seen in annex 2 that there has been considerable improvement in SEC as compared to baseline machines although it varies from 19 percent to 56 percent.

3. For determining the efficiency of the project, it must be seen whether in the long run (that is, 20 years) the chillers yield enough savings to cover the total investment (US$2,004,000) and bring in added income in the form of savings in the subsequent years. From the calculated estimates of these enterprises, the energy savings being made in 20 years (US$11,185,902.3) exceed the total investment by a considerable margin. It is important to note that none of these enterprises have borrowed capital from external agencies, rather they have met the capital investment required for the machine from internal sources of funding. This makes the IRR much better than if they had borrowed capital. The IRR has been calculated at 28.98 percent. Therefore, the time required to cover the total investment, that is, the payback period, will be 3.4 years (as against the PAD estimate of 2.7 years). On this basis, it could be deduced that the project is efficient. However, it is worth noting that the estimates were based on available data from 7 units (12 chillers), comprising about 10 percent of the targeted number of chillers, and therefore overall efficiency is rated Moderate. The financial analysis is summarized in the following table:

Table 3: Summary of Financial Analysis

Measure	Value	Units
Costs		
Total investment on energy efficient chillers (without tax)	US$2,004,000	Average size - 370 TR
Benefits		
Energy savings	93,240 MWh	MWh over 20-year lifetime of chillers
Value of energy savings	US$11,185,902.3	US$ over 20-year lifetime, measured at INR 4.5 per kWh and INR 45 per US$
Value of Investment		
NPV	US$68,558	Evaluated at 28% discount rate
IRR	28.98%	Percentage
Simple payback	3.4	Years

Table 4:: Average Energy Savings Data

Sr. No.	Name of the beneficiary	No. of old Chillers	Capacity (TR)	Avg. Power Consumption old CFC chillers as per MM&V baseline reports	No. of New Chillers	Capacity (TR)	Average monthly power consumption of new non CFC chillers(KW/TR)						Average Energy consumption (KW/TR) for the period as reported by the beneficia	Improvement in Specific Energy Consumption over baseline (%)	Average operating hours	Initial daily khW consumption			Present daily kWh consumption			Present daily Energy (kWh) Saving (based on present 6 months	Energy (kWh) Saving per year (considering 300 days of operati	% Energy Saving per year	Energy (kWh) Saving for the first 10 years	Energy(kWh) Saving for the next 10 years considering fall in efficiency by 10%	Energy (MWh) Saving for 20 years	Investment per chiller	Monetary savings per year considering the unit cost of Rs. 4.5/kWh (for first 10 years)	Monetary savings per year considering the unit cost of Rs. 4.5/kWh (for next 10 years for a fall in
							Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14				Min	Max	Average	Min	Max	Average									
1	Essar Steel Ltd.	1	300	0.68	1	350	0.58	0.56	0.54	0.55	0.53	0.54	0.55	19	16 to 24 hrs	3264	4896	4080	3080	4620	3850	230	69000	5.64%	690000	621000	1311	6300000	310500	279450
		1	300	0.68	1	350	0.58	0.55	0.57	0.56	0.57	0.56	0.565	17	16 to 24 hrs	3264	4896	4080	3264	4746	4005	75	22500	1.84%	225000	202500	428	6300000	101250	91125
		1	300	0.68	1	350	0.62	0	0.53	0.54	0.55	0.52	0.57	16	16 to 24 hrs	3264	4896	4080	3264	4788	4026	54	16200	1.32%	162000	145800	308	6300000	72900	65610
2	Residency Hotel, Coimbat	1	250	1.08	1	250	0.47	0.46	0.47	0.52	0.45	0.47	0.47	56	22 hrs			5940			2585	3355	1E+06	56.48%	1E+07	9058500	19124	4500000	4529250	4076325
										Sep-14	Oct-14	Nov-14																		
3	Gujarat Narmada Valley Fertilizer Compan	1	200	1.08	1	200				0.57	0.60	0.60	0.59	45	24 hrs			5184			2832	2352	705600	45.37%	7E+06	6350400	13406	3600000	3175200	2857680
							Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14																		
4	Bennett, Coleman	1	300	0.75	1	300	0.59	0.58	0.58				0.58	23	4 to5 hrs	900	1125	1012.5	696	870	783	229.5	68850	22.67%	688500	619650	1308	5400000	309825	278842.5
5	Appu Hotels Lts	1	350	1.12	1	350	0	0.59	0.62				0.605	46	10 to 12 hrs	3920	4704	4312	2117.5	2541	2329.3	1982.75	594825	45.98%	6E+06	5353425	11302	6300000	2676712.5	2409041.3
		1	300	1.09	1	350	0.55	0.58	0.57				0.566	48	10 to 12 hrs	3270	3924	3597	1981	2377	2179.1	1417.9	425370	39.42%	4E+06	3828330	8082	6300000	1914165	1722748.5
		1	300	1.20	1	350	0.54	0.54	0.60				0.560	53	10 to 12 hrs	3600	2352	2976	1960	2352	2156	820	246000	20.71%	2E+06	2214000	4674	6300000	1107000	996300
6	Reliance Industries Ltd-Vadodar	1	510	1.1	1	560	0.55	0.535	0.54	0.542	0.566	0.51	0.540	51	24hrs			13464			7257.6	6206.4	2E+06	53.90%		16757280	16757	10080000	8378640	7540776
	Reliance Industries Ltd-Vadodar	1	510	1.1	1	560	0.534	0.53	0.54	0.542	0.524	0.524	0.534	51	24hrs			13464			7177	6287.04	2E+06	53.30%	2E+07	16975008	35836	10080000	8487504	7638753.6
							Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14																		
7	Reliance Industries Ltd-	1	663	0.65	1	1040	0.533	0.58	0.56	0.56	0.56	0.54	0.550	15	24hrs			10342.8			13728	-3385.2	-1E+06		-1E+07	-9140040	-19296	18720000	-4570020	-4113018
																												90180000	26492926.5	23843634

NOTE: In case of same capacity replacement absolute energy savings hold good. However where the capacity after replacement has been altered improvement in SEC has to be considered as prediction of absolute energy saving will not be a correct indicator of saving.

Without knowing the % Loading prediction becomes less accurate as % loading has a great impact on efficiency.

		amount($	2004000	588731.7	529858.5

Assum 10% Efficiency fall after 10 years

300 days of operation per year

ANNEX 5. BORROWER, CO-FINANCIER AND OTHER PARTNER/STAKEHOLDER COMMENTS

(not formal comments from MOEF&CC)

COMMENTS FROM IDBI BANK LTD, PROJECT IMPLEMENTING ENTITY FOR THE INDIA CHILLER ENERGY EFFICIENCY PROJECT (ICEEP)

Sl. No.	Para No.	ICRR Remarks	IDBI's Comments
1.	Para 103	Enhance the technical capacity of the FI, when needed: For a technically complex operation like the CEEP, it was important to ensure that technical experts are contracted on the team in addition to providing training to the assigned team. In reference to the inconsistencies between the PIM and the PAD, it would be essential to conduct a more thorough review of the project package review to ensure consistency and enhance clarity to the IA.	WB did not raise any issue regarding PMU's strengths and capacity during implementation of project.
2.	Implementing Agency Rating: *(as per earlier approved version of ICR)*	IDBI's extensive awareness reached some 1,244 potential beneficiaries, which was a remarkable feat considering that the target was 370 chillers. However, based on the final output (see section 2.2), it is deduced that the outreach may have been short on targeting intended senior management/decision makers.	PMU contacted almost all the CEOs and MDs of potential chiller owners in Public and private sectors. PMU had one to one meeting with Senior Executives during marketing of CEEP. Joint Secretary, MoEF who was National Project Director (NPD) addressed DO letters to all the CEOs of Central PSUs pursing them to join the project. PMU in association with WB and MoEF organized workshop exclusively for CEOs/MDs and Sr. Executives. Thus, IDBI has ensured that Senior management of chiller owners are appraised about project benefits.
3.	Implementing Agency Rating: *(as per earlier approved version of ICR)*	Considering the technical complexity of the project, providing for an energy conservation expert on board the PMU was critical to supporting effective implementation, particularly when the	Exhaustive energy efficiency data was required for claiming CERs only. Since the no. of eligible chillers as per criteria was not sufficient, after dropping CDM component, hiring another expert agency to analyze data was not considered justifiable. WB was kept

Sl. No.	Para No.	ICRR Remarks	IDBI's Comments
		Project focus became centered on EE in 2011.The PMU initially relied on the MM&V consultant and a CDM consultant to work out technicalities, but later when the CDM component was dropped, the PMU relied on the internal capacity for monitoring chiller performance during the first three months of chiller installation. Data gathered have been insufficient to support comprehensive analysis on energy savings (see section 3.3). Funds that were not needed to hire an MM&V consultant could have been reallocated to hiring a consultant to collect data on chiller performance for project-specific purpose again bringing to bear the PMU's weak judgment on dropping the MIS	informed in the matter. PMU however, ensured that only energy efficient chillers were installed under the project to the satisfaction of WB. Further, data on energy efficiency achieved by new chillers was provided as and when required by WB. The project had earmarked USD 0.21 million (20.62% of OTF grant) for MM&V. Out of which, PMU incurred USD 0.067 million (32.3% of earmarked fund) on MMV activities during first three years of project. It was justified to cancel MM&V activities after dropping CDM component. Further PMU ensured that the beneficiaries are maintaining log books of chiller operations for evaluating energy efficiency of new chillers. As restructuring of the project for replacement of inefficient HCFC 22 chillers was under consideration, balance unutilized grant earmarked for MM&V was reallocated to be utilized during implementation of proposed restructuring of the project.
4.	Implementing Agency Rating: *(as per earlier approved version of ICR)*	The IDBI's compliance with fiduciary and reporting requirements is commendable. Without the technical experts on board, the PMU focused on standard administrative reporting but not on proactive and strategic management. Partly due to the weak communication channels with the MoEF&CC and the rather 'arm's-length' oversight approach of the NPD, reports and findings on the project's progress could not be translated into actionable interventions to revamp the slow-performing project. Nevertheless, the personal commitment of the PMU staff to the project is noteworthy.	PMU presented detailed performance reports to National Project Director (NPD) during his review meetings held at PMU during 2010-11. PMU also made detailed presentations on progress of the project to MoEF and GEF Operational Focal Point during meeting convened on Nov 8, 2012 and May 15, 2013. PMU regularly submitted activity-wise implementation progress report to WB and NPD. PMU brought out various externalities affecting the project performance to WB during various review meetings and interactions. PMUs suggestions were considered by WB in its Aide Memoires submitted to MoEF and DEA, MoF, GOI for considering recommendations. WB also revised the restrictive eligibility criteria to cover all available CFC chillers after dropping

Sl. No.	Para No.	ICRR Remarks	IDBI's Comments
			CDM component.
5.	Implementing Agency Rating: *(as per earlier approved version of ICR)*	Inconsistencies between the PAD and the PIM: While gaps in IDBI's technical capacity and some lack of proactivity may have contributed to the project's poor implementation performance, selection of the PMU team conformed to the provisions in the PIM, which did not directly match/respond to the directives in the PAD.	We are not in agreement with the observation as the same was not relevant. As condition precedent, IDBI Bank's overall capabilities cities viz. technical, financial, managerial and manpower strengths were assessed by World Bank before selection as FI and PIE for project effectiveness. Further, IDBI Bank has carried out all roles and responsibilities for implementation of CEEP as per directives in the Project Appraisal Document (PAD). WB did not raise any issue about IDBI's capabilities during review missions. Incidentally, it may be noted that PIM is evolving document and relevant portion in PIM is relating to MM& V activities required for claiming CERs for the project. After evaluating various requirements for implementing CEEP which was conceived as CDM Climate change project, World Bank had incorporated the need for engaging expert's consultancy services for monitoring, measurement and verification (MM&V) and an another experts for registration of CEEP as CDM project with UNFCCC. Accordingly PMU as per WB's procurement policy contracted services of experienced ESCO M/s. Dalkia Energy Services Ltd for MM & V requirement and Dr. Sydney Thomas, CDM expert for requirements of the CEEP were registration of CDM POA well in time. Hence all technical met well in time. As CDM component was found economically unviable due to external factors, WB dropped CDM component in the interest of the project. PMU also proactively took requisite steps for restructuring of the project envisaging replacement of inefficient HCFC 22 chillers.

Sl. No.	Para No.	ICRR Remarks	IDBI's Comments
			PMU organized meetings of all stakeholders (EESL, BEE, chiller manufacturers, potential chiller owners, Tata Power etc), prepared revised eligibility criteria, financing structure and revised project implementation manual and submitted the same to WB. The PMU's project implementation performance was impacted due to number of externalities faced by PMU and which were recognized by WB, NPD and external consultants during MTR and not because of PMU's lack of capabilities.

ANNEX 6. SUPPORTING DOCUMENTS

1. Project Appraisal Document for the CEEP
2. CEEP ISRs
3. CEEP Aide Memoires/Management Letters
4. India CEEP Midterm Review Report
5. CEEP Project Implementation Manual
6. Government of India Twelfth Five Year Plan
7. World Bank India Country Partnership Strategy (2013–17)
8. Progress Report to the MLF
9. International Chiller Sector Energy Efficiency and CFC Phaseout, ICF Consulting, 01/2005
10. India Strategy for the Phaseout of CFC in the Chiller Sector, World Bank, August 2002