

**INTEGRATED SAFEGUARDS DATA SHEET
APPRAISAL STAGE**

Date ISDS Prepared/Updated: February 10, 2014

I. BASIC INFORMATION

1. Basic Project Data

Country:	Thailand	Project ID:	P115761
Project Name:	Thailand HCFC Phaseout Project (Phase I)		
Task Team Leader:	Viraj Vithoontien		
Estimated Appraisal Date:	12 February 2014	Estimated RVP Approval Date:	31-March 2014
Managing Unit:	EASTS	Lending Instrument:	Investment Project Financing (OTF Grant)
Sector:	Other Industry (90%); Central Government Administration (10%)		
Theme:	Pollution Management and Environmental Health (50%); Environment Policies and Institutions (50%)		
Is this project processed under OP 8.50 (Emergency Recovery) or OP 8.00 (Rapid Response to Crises and Emergencies)?			No
Project Financing Data (in USD Million)			
Total Project Cost:	33.82	Total Bank Financing:	23.92
Total Cofinancing:	9.91	Financing Gap:	0.00
Financing Source			Amount
BORROWER/RECIPIENT			9.91
International Bank for Reconstruction and Development			0.0
Montreal Protocol (OTF Grant)			23.92
Total			33.82
Environmental Category:	B - Partial Assessment		
Is this a Repeater project?	Yes		
Is this a Transferred project?	Yes		

2. Current Project Development Objectives

The Project Development Objective (PDO) is to reduce HCFC consumption in the air-conditioning and foam sectors in order to contribute to Thailand's efforts to meet its HCFC

consumption phase-out obligations under the first phase of the program (2014-2018).

3. Project Description

Component 1: Investment in HCFC Consumption Reductions (US\$30.95 Million; OTF \$21.05 million; beneficiaries \$9.91 million)

- i. Provision of Sub-grants to Beneficiary Enterprises in the foam sector to carry out HCFC consumption reduction subprojects;
- ii. Carry out demonstration subprojects to perform in-house testing of new non-HCFC-141b foam systems;
- iii. Provision of Sub-grants to 12 Beneficiary Enterprises in the air-conditioning sector to carry out HCFC consumption reduction subprojects; and
- iv. Provision of Sub-grants to Beneficiary Enterprises for the development of non-ozone depleting substances compressors for refrigeration and air-conditioning equipment.

Component 2: Technical Assistance (US\$0.63 million)

- i. Provision of technical assistance to support HCFC-22 phase-out in the air-conditioning sector through, *inter alia*, technical workshops on climate friendly refrigerants for large and small AC systems;
- ii. Development and provision of train-the-trainer programs on good servicing practice for HFC-32 air-conditioning units and inclusion of said programs in the curricular of training institutes in the territory of the Recipient;
- iii. Carry out of public awareness programs to promote energy efficiency and low global warming potential technology in air-conditioning equipment;
- iv. Provision of technical assistance to 12 air-conditioning manufacturers to convert their production facilities to HFC-32 technology and to develop proper installation and servicing procedures; and
- v. Provision of technical assistance to support HCFC-141b phase-out in the foam sector through, *inter alia*, marketing of non-HCFC-141b formulation by foam system houses and introduction of the use of non-HCFC-141b formulations by micro enterprises;

Component 3: Project Management (US\$1.38 million)

- i. Provision of technical assistance to the Department of Industrial Works-Project Management Unit (DIW-PMU) for managing, supervising, monitoring and reporting on the implementation of activities under Component 2 (a) – (c) of the Project;
- ii. Provision of technical assistance to the DIW-PMU for the development of sector-specific regulations and policy, such as, *inter alia*, rules governing HCFC imports and exports and a ban on the use of HCFC in the air-conditioning and foam

manufacturing sectors; and

- iii. Provision of technical assistance to the Government Savings Bank-Project Management Unit (GSB-PMU) for managing, supervising, monitoring and reporting on the implementation of Components 1 and 2 (d) and (e) of the Project.

Component 4: Strengthening of the National Ozone Unit (US\$0.87 million)

- i. Provision of technical assistance to strengthen the capacity of the National Ozone Unit (NOU) to fulfill the obligations of the Recipient under the Montreal Protocol.

4. Project location and salient physical characteristics relevant to the safeguard analysis (if known)

The project will cover selected enterprises manufacturing air-conditioners and those manufacturing foam products including rigid polyurethane foam, flexible polyurethane foam and integral skin foam. About 131 small and medium-sized foam manufacturers and foam system houses and twelve locally owned air-conditioner manufacturers and a compressor manufacturer are eligible to be project beneficiaries.

In the foam sector, about 23 out of 131 potential foam enterprises with HCFC 141b consumption of more than 20 million tons per year will be converted to hydrocarbon technology. Hydrocarbon (cyclopentane) has a global warming potential (GWP) less than 25. Due to its flammability, safety requirements associated with hydrocarbons are important and must be in place. The rest will be converted to Hydrofluorocarbon (HFC)-based alternatives (such as a reduced formulation to minimize the amount of high-GWP substances used) and water blown (CO₂) technology both of which have minor adverse environmental impact. Selection of alternative technologies will take into account the capacity and – for hydrocarbon technology – their physical location to satisfy the safety requirements.

In the air-conditioning sector, twelve air-conditioner manufacturing enterprises will be financed by the project to switch refrigerant from HCFC-22 to HFC-32 with GWP of 700 (about 1/3 of HCFC-22). Since HFC-32 is mildly flammable, potential safety risks and fire hazards need to be properly addressed in the environmental management plan (EMP).

These enterprises are located in Bangkok and nearby provinces in commercial and industrial areas at safe distances from residential areas and will be able to implement the required safety measures within their existing facilities. All participating enterprises must be in compliance with National, local laws and regulations related to environment/ social/health and safety protection.

Project investment under Component 1- Investment in HCFC Consumption Reductions will take place within existing enterprises or in relevant industrial area. There will be no new construction or expansion of the existing factories, and no land acquisition will be required. Eligibility criteria for funding under the project are mainly governed by the ExCom guidelines and/or the approved HPMP project document in line with the criteria set forth by the Multilateral Fund.

5. Environmental and Social Safeguards Specialists on the Team

Songling Yao (Sr. Social Development Specialist, EASCS)

Waraporn Hirunwatsiri (Sr. Environmental Specialist, EASTS)

Wasittee Udchachone (Environmental Specialist, EASTS)

6. Safeguard Policies	Triggered?	Explanation (Optional)
Environmental Assessment OP/BP 4.01	Yes	<p>The project will have a positive impact on the global environment as HCFCs are not only ozone depleting substances, but they are also high global warming gases whose global warming potential (GWP) ranges from several hundred to several thousand times that of carbon dioxide. Moreover, the conversion of various HCFC-based manufacturers to alternative, advanced technologies to be used under this project will lead to improved energy efficiency, particularly in the refrigeration and air-conditioning sectors.</p> <p>The project triggers Environmental Assessment (OP/BP 4.01), as its interventions may impact on environmental safety and occupational health particularly from the conversion to HFC-32 and hydrocarbon as described earlier. However, project activities will likely occur in the existing facilities and these impacts will be site-specific, which can be mitigated by implementation of proper measures as specified in EMP and EMF. Therefore, the project is assigned as an Environment Category B project.</p> <p>For the foam sector, since the participation of the potential enterprises had not been confirmed by the project appraisal stage, the consultants conducted site visits to the selected enterprises to understand the operation of sample foam manufacturing enterprises and its environmental health and safety management. To address the environment impacts, health and safety issues that may arise from the foam manufacturing conversions, an Environmental Management Framework (EMF) has been prepared for the implementation of foam conversion sector prior to appraisal. This is also in line with</p>

	<p>Thai regulation that an Environmental Impact Assessment (EIA) is not required for the type and size of these foam enterprises. The EMF defines the content, procedures and institutional responsibilities for environmental management of the foam enterprises to ensure compliance with Thai Law and regulations and the World Bank Group Environment, Health and Safety (EHS) Guidelines, and the World Bank OP/BP 4.01 (Environment Assessment). In addition, the EMF also includes the proposed mitigation measures for conversion to hydrocarbon and the template of an Environmental Management Plan (EMP) to be prepared site-specifically by each participating enterprise that convert to hydrocarbon technology.</p> <p>The site specific EMP of each enterprise will be prepared and submitted for approval at sub-project approval stage. The mitigation measures proposed are based on requirements of relevant regulations and information from the site visits. The EMP will include mitigation measures to address safeguard issues including compliance to the relevant regulations on safety and environmental management and site emergency response.</p> <p>For all project sites in the air-conditioning sector, a due diligence review on occupational health and safety measures, fire and exposure risk was conducted by consultants hired by DIW. A specific Environmental Management Plan (EMP) which includes appropriate emergency preparedness and response measures has been prepared for each of 12 air-conditioner manufacturing enterprises. The EMP follows the requirements of the World Bank Group Environment, Health and Safety (EHS) Guidelines as well as the Thai law and regulations. No EIA preparation will be required. Staff involved in the production, installation and services will be trained as needed.</p> <p>Concerned stakeholders were consulted in</p>
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		the preparation of both EMP and EMF, which were disclosed in country and at the Bank's Infoshop prior to project appraisal. The public consultation of these documents took place on September 6, 2013.
Natural Habitats OP/BP 4.04	No	The project will not affect any protected areas, known natural habitats, or established or proposed critical natural habitats as all the project activities will take place in existing industrial facilities. According to Thai law and regulation, the respective factories are not permitted to be located in any protected areas, known natural habitats, or established or proposed critical natural habitats.
Forests OP/BP 4.36	No	The project will not finance activities that would involve significant conversions or degradation of critical forest areas or related critical natural habitats as defined under the policy.
Pest Management OP 4.09	No	The project will not finance procurement of pesticides or pesticide application equipment (either directly or indirectly). In addition the project will not affect pest management in a way that harm could be done, nor lead to increased pesticide use and subsequent increase in health and environmental risk.
Physical Cultural Resources OP/BP 4.11	No	The project will not adversely affect sites with archeological, paleontological, historical, religious, or unique natural values as all project activities will be developed within the existing plants of the project beneficiary enterprises or in an industrial area.
Indigenous Peoples OP/BP 4.10	No	All project activities will be developed within the existing plants of project beneficiary enterprises or in industrial area. The prospective beneficiary enterprises are not located in an area with indigenous peoples. No indigenous peoples group will be affected.
Involuntary Resettlement OP/BP 4.12	No	All the project activities will be within the existing plants of project beneficiary enterprises. There will be no land acquisition or involuntary resettlement related impact.
Safety of Dams OP/BP 4.37	No	The project will not involve any construction or rehabilitation of any dams.
Projects on International Waterways	No	The project will not involve international

OP/BP 7.50		waterways.
Projects in Disputed Areas OP/BP 7.60	No	The project is not located in any known disputed areas.

II. Key Safeguard Policy Issues and Their Management

A. Summary of Key Safeguard Issues

1. Describe any safeguard issues and impacts associated with the Restructured project. Identify and describe any potential large scale, significant and/or irreversible impacts:

The activities under the Project may have minor to moderate adverse environmental impacts that are specific to each factory site, including potential impacts and risks on occupational health and safety and fire hazards due to flammability of hydrocarbon and HFC-32. Consequently, the project is category B for EA purposes.

For the air-conditioning (AC) sector which will be converting to HFC-32, a mildly flammable refrigerant the general condition of refrigerant charging procedure has a very low likelihood of HFC-32 to be released and reach the lower flammable limit. However, there is a possibility that HFC-32 may leak out to the atmosphere due to failure of connections or hose ruptures. The air-HFC-32 mixture can cause a flash fire. A good ventilation system is required in the area where HFC-32 is stored and this may need to slightly redesign the existing storage facilities within the same foot print. Installation of the Ex-Proof transfer electrical equipment in the storage area, production line around HFC-32 refrigerant charging, vacuum pumps, transfer pumps and piping are among the technical steps required to upgrade the existing facilities. In addition, gas detection and alarm systems are recommended to be installed at HFC-32 storage area, refrigerant charging area, vacuum area and finished good warehouse. It is anticipated that there will be no significant adverse impact from the project if all mitigation measures that proposed in EMP are followed.

For the foam sector, 131 enterprises (mostly small and medium enterprises) will be converting to water blown and/or HFC-245fa technology, which require few modifications to their production process. There will be no significant impact on the environment from the conversion to these two technologies. However, there is concern on the conversion to hydrocarbon (cyclopentane) technology due to its low flash point and flammability. Twenty-three (23) out of 131 foam enterprises will be supported for conversion to hydrocarbon technology. Each participating enterprise will need to prepare a site-specific EMP that covers proper measures to mitigate potential impacts from the conversion. An EMF has been prepared to provide guidance to these foam enterprises in preparing their EMP. It is anticipated that impacts from the conversion to hydrocarbon will be site-specific and manageable through implementation of the required safety measures in the EMF and its site-specific EMP. In addition, most of the enterprises current practices already involve handling of other types of flammable substances e.g. oxygen gas, welding gas etc.

2. Describe any potential indirect and/or long term impacts due to anticipated future activities in the project area:

There will be a long term positive impacts due to phase out of the HCFC in the project area. As per the approved HPMP, the overall HCFC consumption shall be reduced from 1,155 Ozone

Depleting Potential (ODP) tons in 2012 to 927.6 ODP tons in 2013, 834.84 ODP tons in 2015 and 788.46 ODP tons in 2018. The reductions will be achieved through a phase-out of HCFC-22 consumption of 67.86 ODP tons in the air-conditioning sector and 151.68 ODP tons of HCFC-141b in the PU foam sector. The phase out will also enhance reduction in GHG emissions. However, to reduce risk on occupational health and safety of the workers and possible limited fire hazard, the change of refrigerant to hydrocarbon and HFC-32 will require not only the redesign of the production line but also proper safety management practices for plant operation and maintenance. Training for workers on safety handling of mildly flammable liquid will be conducted regularly and agreed mitigation measures followed closely to ensure that only qualified/trained operators could enter to hot zone.

3. Describe any project alternatives (if relevant) considered to help avoid or minimize adverse impacts.

There are three alternatives for conversion HCFC-141b in the foam sector namely, hydrocarbon technology, HFC-based technology and water blown (CO₂) technology. Due to the flammability of hydrocarbon, only large foam enterprises with HCFC-141b consumption of more than 20 MT per year will be eligible to convert to hydrocarbon technology. This will help minimize adverse impacts to small enterprises.

For the AC sector under the project, HFC-32 was selected as the alternative refrigerant as per relevant guidelines from the Executive Committee of the Montreal Protocol's Multilateral Fund. Compared to hydrocarbon, HFC-32 is considered a good alternative to help minimize adverse impacts on occupational health and safety and fire hazard due to its milder flammability characteristic.

4. Describe measures taken by the borrower to address safeguard policy issues. Provide an assessment of borrower capacity to plan and implement the measures described.

The activities under the Project may have minor to moderate adverse environmental impacts that are specific to each site, including potential risks on occupational health and safety and fire hazards due to flammability of hydrocarbon and HFC-32. In order to identify and mitigate such impacts, DIW hired consultants to conduct a due diligence for all air-conditioner manufacturing enterprises and some representatives of different types of foam enterprises to identify potential risks that may occur due to the conversion from HCFC-22 to HFC-32 (for the AC sector) and from HCFC 141b to hydrocarbon technology (for foam sector). The consultant prepared an Environmental Management Plan (EMP) for each of the twelve participating manufacturers in the air-conditioning sector. For the foam sector, since not all the foam beneficiaries have been identified at the time of project appraisal, an Environmental Management Framework (EMF) has been prepared by the consultants in close consultation with DIW to provide guidance to all stakeholders including the DIW-PMU and beneficiary enterprises to effectively identify and address environmental safeguard issues that may arise from the proposed conversion project. Each participating foam enterprise that will be converting to hydrocarbon technology will prepare a specific EMP and get approval from the Bank at Sub-project approval stage.

The EMF and EMPs were prepared and publicly disclosed in country and at the Bank's Infoshop in line with the World Bank's Operational Policy (OP)/Bank Procedure (BP) 4.01 - Environmental Assessment (EA) and in accordance with Thai National Laws and Regulations.

Furthermore, the applicable World Bank Group Environmental Health and Safety Guidelines have been taken into consideration in preparing the EMF and EMPs where practically feasible.

The capacity assessment confirmed that the Department of Industrial Works (DIW) which is the responsible agency for the implementation of the Montreal Protocol and its amendments, has the capacity to oversee, supervise, and monitor the overall implementation of the foam and AC conversion sub-projects. DIW can provide training and capacity building to enterprises on good practices in handling hazardous substances, flammable liquid and gas, etc. DIW will also be in charge of the coordination among government agencies and the industries. The National Ozone Unit (NOU) under the DIW is experienced with Hazardous Substance Control Act, and safeguard issues under the implementation of the Thailand-National CFC Phase-out project.

From the site visit and due diligence report, most of the enterprises have experienced handling flammable liquid and gas. However, there is room for improvement to minimize risks to occupational health and safety and fire hazard. The mitigation measures and good practices in handling hydrocarbon and HFC-32 were included in the EMP and EMF. The project will provide technical assistance for the development of training modules for service technicians for employing good practices in servicing air-conditioning units with flammable refrigerants and for avoiding leakage. In addition, technical assistance financed by the Project will be undertaken to assist the beneficiary enterprises in the conversion process. Experts with extensive experience in the safe handling and use of HFC32 will assist the beneficiary enterprises with the redesign of plant layout and manufacturing of new air conditioners in order to ensure not only safety but the quality of the new air conditioners.

5. Identify the key stakeholders and describe the mechanisms for consultation and disclosure on safeguard policies, with an emphasis on potentially affected people.

Following Bank guidelines, the EMPs for the 12 beneficiary enterprises for the air conditioning sector were disclosed by the respective AC manufacturer on their website and at the World Bank's Infoshop by February 7, 2014. For the foam sector, the EMF was disclosed in country on DIW's website on January 8, 2014 and at the World Bank's Infoshop on February 2, 2014. Consultations were held with the key stakeholders; i.e. foam and AC manufacturing enterprises, a non-profit organization and relevant national authorities in particular DIW who managing requirements regarding storage of flammable materials and hydrocarbons at factories and use of hydrocarbon in the production of foam.

The Project Stakeholder Consultation for the draft Environmental Management Framework (EMF) for the Foam Sector was held at DIW on September 6, 2013. There were 48 participants from 10 polyol suppliers/system houses, 9 foam enterprises that will be converting to cyclopentane technology. Also in attendance were representatives from the Polyurethane Group of the Federation of Thai Industries (FTI), Treaties and International Strategies Bureau of DIW, Industrial Cluster 3 Bureau of DIW, Industrial Cluster 4 Bureau of DIW, Central Office for Machinery Registration of DIW, Bangkok Fire and Rescue Department of Bangkok Metropolitan and Administration (BMA), Department of Labor Protection and Welfare and the Department of Public Works and Town & Country Planning participating in this consultation workshop.

The main objective of this consultation workshop was to present outcomes of EMF preparation comprising of: (i) general risk assessment for the foam sector; (ii) applicable local regulations for the foam enterprises regardless of selected alternative; (iii) specific local regulations for enterprises planning to convert to cyclopentane technology; (iv) characteristic of raw materials used for the production of foam; and (v) proposed mitigation measures for the conversion to alternatives to HCFC-141b in the foam sector. Feedback and recommendation from the consultation workshop were included in the final EMF and project appraisal document.

The Project Stakeholder Consultation for the Environmental Management Plan (EMP) for the Air-conditioning (AC) Sector was held at the Department of Industrial Works (DIW) on September 6, 2013 from 13.30 pm-16.30 pm. There were 33 participants representing project stakeholders attended the consultation workshop and included: (i) 12 AC manufacturing enterprises that will be converting to HFC-32 technology; (ii) Air conditioning and Refrigeration Industry Club of the Federation of Thai Industries (FTI); (iii) manufacturer of compressor; (iv) Daikin Industries (Thailand); (v) Treaties and International Strategies Bureau of DIW; (vi) Industrial Cluster 4 Bureau of DIW and (vii) the Department of Public Works and Town & Country Planning.

The main objective of this consultation workshop was to present the outcomes of the EMP for 12 AC manufacturers to concerned agencies regarding: (i) the general risk assessment for the AC sector; (ii) local regulations applicable for the AC enterprises; (iii) local regulations specific for HFC-32 refrigerant; and (iv) proposed mitigation measures for the conversion from HCFC-22 to HFC-32 refrigerant. Feedback received from the workshop have been incorporated into the final EMP and project appraisal document including the request from the AC enterprises for DIW to conduct training on the safe handling of HFC-32.

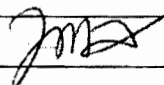
B. Disclosure Requirements

Environmental Assessment/Audit/Management Plan/Other	
Date of receipt by the Bank	February 7, 2014
Date of submission to InfoShop	February 7, 2014
For category A projects, date of distributing the Executive Summary of the EA to the Executive Directors	NA
"In country" Disclosure: The EMF for foam sector was disclosed in DIW's website. For the site-specific EMP for 12 air-conditioning manufacturing enterprises, each EMP was disclosed in the enterprise's website. The EMF for foam sector was disclosed at InfoShop on February 2, 2014. The 12 EMPs were disclosed at InfoShop from February 3 – 7, 2014.	
If the project triggers the Pest Management and/or Physical Cultural Resources policies, the respective issues are to be addressed and disclosed as part of the Environmental Assessment/Audit/or EMP.	
If in-country disclosure of any of the above documents is not expected, please explain why:	

C. Compliance Monitoring Indicators at the Corporate Level

OP/BP/GP 4.01 - Environment Assessment			
Does the project require a stand-alone EA (including EMP) report?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	NA <input type="checkbox"/>
The World Bank Policy on Disclosure of Information			
Have relevant safeguard policies documents been sent to the World Bank's InfoShop?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	NA <input type="checkbox"/>
Have relevant documents been disclosed in-country in a public place in a form and language that are understandable and accessible to project-affected groups and local NGOs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	NA <input type="checkbox"/>
All Safeguard Policies			
Have satisfactory calendar, budget and clear institutional responsibilities been prepared for the implementation of measures related to safeguard policies?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	NA <input type="checkbox"/>
Have costs related to safeguard policy measures been included in the project cost?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	NA <input type="checkbox"/>
Does the Monitoring and Evaluation System of the project include the monitoring of safeguard impacts and measures related to safeguard policies?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	NA <input type="checkbox"/>
Have satisfactory implementation arrangements been agreed with the borrower and the same been adequately reflected in the project legal documents?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	NA <input type="checkbox"/>

III. APPROVALS

Task Team Leader:	Name: Viraj Vithontien		
<i>Approved By:</i>			
Sector Manager:	Name: Julia Fraser		Date: Feb. 11, 2014