

PROJECT INFORMATION DOCUMENT (PID)
APPRAISAL STAGE

Report No.: PIDA99684

Project Name	Vietnam HCFC Phaseout Project Stage II (P152232)
Region	EAST ASIA AND PACIFIC
Country	Vietnam
Financing Instrument	Investment Project Financing
Project ID	P152232
Borrower(s)	State Bank of Vietnam
Implementing Agency	Ministry of Environment and Natural resources
Environmental Category	B-Partial Assessment
Date PID Prepared/Updated	11-Jan-2018
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Appraisal Review Decision (from Decision Note)	
Other Decision	

I. Project Context

Country Context

1. Montreal Protocol. The Vienna Convention for the Protection of the Ozone Layer, which was adopted in 1985 and entered into force on 22 September 1988 and was the first Convention of any kind to achieve universal ratification, served as a framework for efforts to protect the globe's fragile ozone layer. The Montreal Protocol (MP) on Substances that Deplete the Ozone Layer was designed under the Convention to reduce and phase out the production and consumption of ozone depleting substances (ODSs). The original MP was agreed on 16 September 1987 and entered into force on 1 January 1989. Since then the MP has been adjusted six times. The Multilateral Fund (MLF) for the Implementation of the MP was established by a decision of the Second Meeting of the Parties to the MP (London, June 1990) and began its operation in 1991. Since 1991, the MLF has approved activities including industrial conversion, technical assistance, training and capacity building worth over US \$3.0 billion.

2. Hydrochlorofluorocarbons (HCFCs) are chemical substances used primarily as refrigerants in refrigeration and air-conditioning (AC) equipment and as blowing agents for producing insulation foam. HCFCs were introduced as transitional substances to replace the wide use of chlorofluorocarbons (CFCs) that were phased out globally as of 1 January 2010 by the MP. Although significantly less potent than CFCs, HCFCs are also ODSs and are consequently controlled by the MP and subject to eventual elimination by all Parties.

3. In 2007, the Parties to the MP accelerated the HCFC consumption and production phase-out

schedule for both developed and developing countries, with the latter being subject to a freeze on HCFC consumption and production in 2013 and the first reductions in 2015. A major driver for the adjustment to the MP is that HCFCs, similar to other ODS, are greenhouse gases (GHGs) with a global warming potential (GWP) ranging from several hundred to several thousand times that of carbon dioxide (CO₂). Table 1 below provides a snapshot of the ozone depleting potential (ODP) and GWP of major CFCs and HCFCs. In fact, through ODS phase-out, climate mitigation already achieved by the MP alone is far larger than the reduction target of the first commitment period of the Kyoto Protocol. Furthermore, the 2007 MP decision requested that phase-out of HCFCs is done in a manner that also takes into account energy efficiency (EE) considering that these substances are often used in energy intensive refrigeration and AC equipment. HCFC phase-out therefore presents an opportunity to reduce direct and indirect CO₂ equivalent (eq.) emissions through replacement of HCFCs by no-ODP and low-GWP alternatives and through more technology advanced, energy efficient refrigeration and AC equipment respectively.

Table 1: ODP and GWP of several CFCs and HCFCs

CFCs	ODP*	GWP**	HCFCs	ODP*	GWP**
CFC-11	1.0	4,750	HCFC-123	0.02	77
CFC-12	1.0	10,900	HCFC-141b	0.11	780
CFC-113	0.8	6,130	HCFC-142b	0.065	2,310
CFC-114	1.0	10,000	HCFC-22	0.055	1,810
CFC-115	0.6	7,370	HCFC-225	0.02-0.07	122

* Ozone Depleting Potential (ODP) values from the 2012 Montreal Protocol Handbook

** Global Warming Potential (GWP) values of all chemicals are from IPCC Fourth Assessment Report: Climate Change 2007

4. Performance-based Sector Approach to MP Implementation. For nearly two decades, the MLF has applied a performance-based, sector approach for delivering financial assistance for ODS phase-out, which entails investments to convert manufacturing facilities to use of non-ODS, lower GWP technologies, combined with policy actions and technical assistance (TA) across enterprises at a sector level, therefore, facilitating sectoral transformation to more environmentally-sound production. This approach has proven to be cost-effective and efficient while providing developing countries with more flexibility in achieving ODS phase-out objectives.

A. Country Context

5. Vietnam acceded to the Vienna Convention and the MP in January 1994. It acceded to the MP London and Copenhagen Amendments at the same time, and the Beijing and Montreal Amendments in December 2004. Accession to the MP rendered Vietnam eligible to receive grant funding from the MLF to support its ODS phase-out targets and compliance efforts.

6. CFC/Halon/Methyl Bromide Phase-out. The Government of Vietnam began to enact regulations and implement policies to control ODS in accordance with its MP obligations in the mid-1990s such as a ban on the new installation of CFC-based refrigeration equipment in the fisheries industry in 1997, and mandatory registration of ODS importers in 2001. It was in conjunction with the development and MLF approval of its National CFC and Halon Phase-out Plan (NCHPP) that the Ministry of Trade (now the Ministry of Industry and Trade (MOIT)) and the Ministry of Natural Resources and Environment (MONRE) promulgated an ODS licensing and quota regulation effective on 10 August 2005. It covers the majority of substances controlled by the MP and is the country's key policy for ensuring MP compliance. Through the NCHPP and later the National Phase-out Plan of Methyl Bromide approved in 2007, both funded by the MLF and in collaboration with the World Bank, as one

of the Implementing Agencies of the MLF, Vietnam completely phased out CFCs and halon, and methyl bromide consumption by 2010 and 2015 respectively.

7. Stage I HCFC Phase-out. In accordance with the MP, Vietnam committed to HCFC reductions from its baseline of 221.2 ODP tons in order to remain within obligatory consumption caps as summarized in the table below.

Table 2: MP Obligations for Vietnam
Montreal Protocol Maximum Consumption** Limit (ODP tons)
Allowable Consumption Levels
of Annex C Substances (HCFCs)

Baseline (2009-2010 average)	221.2
2013 - Freeze on baseline levels	221.2
2015 - 90% of the baseline	199.1
2020 - 65% of the baseline	143.8
2025 - 32.5% of the baseline	71.9
2030 - 2.5% of the baseline*	5.5
2040 - No consumption	0

*Per the MP, the sum of calculated consumption levels from 2030 to 2040 should not exceed 2.5% of the baseline and this quantity is allowed only for the purpose of servicing the remaining fleet of HCFC dependent equipment.

** Pre-blended HCFC-141b is not included as it is not considered as consumption under the MP.

8. Again with support of the MLF and the World Bank through the HCFC Phase-out Project Stage I approved in April 2011, Vietnam successfully met its phase-out obligations for 2013 and 2015. A Joint-Circular between MONRE and MOIT providing for management of import, export and temporary import-re-export of ODS in accordance with MP regulations dated 30 December 2011, sets forth import quotas from January 2012 to December 2019 for HCFCs as follow:

Table 3: HCFC Import Quota Schedule - 2012-2019 (in MT)

Refrigerant/Year	2010	2013	2014	2015	2016	2017	2018	2019
HCFC-141b	500	300	150	0	0	0	0	0
Other HCFCs	3,700	3,400	3,700	3,600	3,600	3,600	3,600	3,600

Source: Joint-Circular No.47/2011/TTLT-BCT-BTNMT

9. In conjunction with the Stage I phase-out of HCFC-141b at 12 foam manufacturing companies, the Government of Vietnam has banned the import and export of bulk (controlled by the MP) HCFC-141b as of January 1, 2015. Monitoring of the import of HCFC-141b pre-blended polyol, which as a product is not controlled by the MP, has now been facilitated with the implementation of a registration system where importers must register planned imports of HCFC-based polyols with MONRE and Customs must track the actual imports. In addition, on January 16, 2014, MONRE issued a letter to all line ministries and local governments, requesting that they stop issuing new business licenses as well as licenses for expansion of certain HCFC-based manufacturing (foam and AC) while reducing issuance of licenses in other sectors. Vietnam also has an environmental tax on using HCFCs.

10. Stage II HCFC Phase-out Strategy. Vietnam's next obligation is to meet the 35% reduction target by January 1, 2020 through continued MLF support – the Stage II project, amounting to 55.3 ODP tons (1,006 MT) of reductions in HCFCs from the last funded, agreed level in 2015. The Government of Vietnam has put forward a phase-out strategy for Stage II which will have the greatest impact in

terms of ozone and climate co-benefits. Considering the relatively small amount of HCFC-22 consumption (251 MT) in the AC manufacturing sector, the low number of enterprises, and the high growth rate for new AC units in the country and the direct relationship to increased demand in energy and HCFC-22 for servicing, this entire sector will be targeted. This decision is bolstered by trends in the regional market (including China, Japan, Indonesia and Thailand), where penetration of more energy-efficient AC based on alternative refrigerants is increasing. Tackling the entire sector will allow imports of HCFC-based AC equipment to be banned and will as a result have significant impact on HCFC-22 consumption growth in servicing.

11. As the refrigeration manufacturing sector is extremely diverse in the applications employed by end users, eliminating consumption of HCFC-22 in the entire sector is not feasible. This is because there are affordable, lower-GWP alternative technologies (less than 750) available for some applications, but not for all applications. Therefore, the country proposes to phase out 303 MT of HCFC-22 (60% of the total identified consumption) in the refrigeration manufacturing sector under Stage II project.

12. In addition, support for containment and efficient use of HCFC-22 refrigerants and training on the use of non-ODS alternatives in the refrigeration servicing sector, is also critical to reduce servicing demand for HCFC-22 and Vietnam's efforts will focus where the most impact can be achieved with the least resources, i.e. in large cities and large end-users. 352 MT will be phased out from the AC and refrigeration servicing sectors. A remaining 100 MT of phase-out will be from one foam company with a specialty use of HCFC-22 for XPS foam production. The total impact will be 1,006 MT of HCFC phase-out as is required for Vietnam's 2020 phase-out target.

13. Furthermore, in order to ensure sustainable phase-out of controlled bulk HCFC-141b at the Stage I enterprises, Vietnam considers it important to support complete transformation of the foam sector, phasing out HCFC-141b contained in pre-blended polyol, under Stage II. Lastly, because HCFCs can also be used in electronics and metal processing and fire protection (but in small amount only), the project will also introduce measures to ensure that there is no new growth.

14. Ozone and Climate Co-benefits. The dual benefits of HCFC phase-out is particularly important for Vietnam which as a coastal country is one of the most vulnerable countries to climate change and part of the newly formed "V20" group. The Government is responding to climate change through a range of national policies including concrete GHG mitigation measures that have been undertaken throughout the past decade, as stated in its Intended Nationally Determined Contribution (INDC) of September 2015. Amongst the most pioneering countries in the Region on green growth, Vietnam issued its Green Growth Strategy in 2012 and related action plan in 2014 to, among others, efficiently and effectively use energy and reduce GHG emissions in energy consuming industrial sectors while improving energy management capacity, and to promote consumer uptake of green products through minimum energy performance standards and energy labeling.

15. The refrigeration and AC sectors (including both manufacturers and end users) lend themselves to significant mitigation of emissions from both HCFC phase-out and energy savings. When comparing the direct climate benefit arriving from reductions in emissions associated with the replacement of HCFCs with the indirect benefit associated with energy savings from new equipment, the value of the indirect benefit is larger. However, the MLF only supports eligible incremental costs related to ODS phase-out, and does not fund the additional costs of energy efficiency related improvements. There are, in principle, a number of sources of financing that address energy efficiency in developing countries that could, potentially, be leveraged to finance the additional climate benefits associated with HCFC phase-out. Opportunities to enable energy efficiency scale-up alongside MP investments in refrigeration and AC sectors through other funding sources will continue to be explored during

project appraisal and implementation.

16. A study on “Food Processing Industry – Strategic Sector Study and Subproject Pipeline Development for Improving Energy Efficiency with Integrated Ozone and Climate Benefits” has been developed as part of the preparation of the Vietnam Energy Efficiency Financing for Industrial Enterprises (VEEIE) project and indirectly, the Stage II HCFC project. The study has identified three subsectors with most potential of integrated EE improvement and HCFC reduction: seafood processing, dairy and sugar industries where potential pipeline projects for EE improvement could be supported by the VEEIE project. Another study on Additional Financing Options for Climate Co-Benefits through HCFC Phase-out is also ongoing and may be useful to estimate additional funding requirements for a more impactful and rapid transition to low-carbon technologies in Stage II HCFC phase-out.

Sectoral and Institutional Context

17. AC Sector. Vietnam manufacturers AC equipment by five companies (four are eligible under the MLF) according to the 2015 survey and consumed 251 MT of HCFC-22 in 2014, a relatively small but growing amount compared to 2012 and 2013. Vietnam is seen as one of the countries where the demand for air conditioners will increase rapidly in the coming years as a result of its growing economy and increasing living standards. In addition to the residential AC market, ACs are widely used in office buildings, shops, restaurants, and hotels. In the last five years, imported AC (from China, Japan, Korea, and Thailand) has taken an increasing share of the market, reaching about 70% in 2014 and the remaining 30% made up by domestic manufacturing – amounting to approximately 1.26 million units total. This is creating a large demand for not only downstream servicing (where additional HCFCs are consumed) but for electricity.

18. Since 2013, a number of leading appliance manufacturers have built new production lines or expanded their lines in Vietnam. Another notable trend in the AC market has been the entry into the market of R-410A and HFC-32 based AC, including to a certain degree inverter technology which has been promoted by Daikin Japan since 2000. In April 2014, Daikin launched HFC-32 AC in Vietnam.

19. Vietnam issued Decisions 51/2011/TTg and 03/2013/QĐ-TTg mandating since July 1, 2013, energy performance labeling for non-inverter AC appliances. Since January 1, 2014, energy performance labeling is mandatory for inverter AC appliances, and since November 1, 2015, import and manufacture of AC having energy efficiency less than the minimum energy performance standards (MEPS), which was established based on a 5-star scale in 2015, are not allowed. This has influenced the market and is an explanation for a growing niche market for inverter technology and alternative-based units considered to be more energy efficient.

20. Refrigeration Sector. The market for refrigeration equipment grew steadily in proportion to that of Vietnam’s economy which was at 6% in 2014 (GDP). According to Vietnam’s GSO, the number of registered food processing (including seafood) enterprises in Vietnam in 2012 was 5,708 and the annual growth rate was estimated at 3.8%. The food service sector, including restaurants, cafes and fast food establishments, had an average annual growth rate of 11.8% between 2008 and 2012 and was expected to rise to 13% in the following five years. As of 2014, there were more than 700 supermarkets, 125 shopping centers and 8,600 traditional markets in operation.

21. The majority of HCFC-based refrigeration products include stand-alone factory sealed equipment, condensing units and centralized systems, which are mainly used in food processing, storing and distribution and cooling in industrial processes. However, HCFC-22 use in refrigeration manufacturing is declining because of industrial rationalization and improved technologies for larger scale

production. Remaining HCFC-based production mostly relies on second-hand components and thus offers a price advantage, especially for small and medium urban users with limited space and capacity to handle ammonia. A 2015 HCFC consumption survey identified 71 Vietnamese industrial refrigeration manufacturers and collected HCFC-22 consumption data from 59 (about 34 enterprises were established before September 2007). These 59 consumed 505 MT of HCFC-22 in 2014 for refrigeration manufacturing. Most refrigeration manufacturers in Vietnam operate on a small-scale and on an order-by-order basis.

22. Servicing Sector. The refrigeration and AC servicing sector plays a vital role in Vietnam's economy. The sector is of key significance to domestic consumers, the tourist industry and other industries including food-processing. Large and growing amounts of HCFC-22 are used to service installed refrigeration and AC equipment that is subject to periodic leaks and repair – more than 70% of all HCFC-22 consumed in Vietnam in 2014. As in many developing countries, Vietnam's servicing sector is subject to wasteful use of HCFC-22 due to lack of policies on recovery and recycling, insufficient technical capacity and tools for identifying and repairing leakage, lack of recordkeeping and reporting requirements of adding refrigerant to equipment or a system, and the low cost of HCFC-22.

23. The 2015 survey identified 1,642 MT of HCFC-22 consumed in 2014 from about 2,380 servicing shops, 420 food processing enterprises, 150 pharmaceutical enterprises, 210 ice-maker users (including cut flower sector) and most refrigeration manufacturers, representing about 78% of the total estimated HCFC-22 consumption for servicing in 2014. Most of technicians of these shops have no certificates from formal training institutes.

24. Foam Sector. Vietnam prioritized the phase-out of controlled HCFC-141b in the foam sector in the Stage I HCFC phase-out project given HCFC-141b's high GWP and the availability of a viable low-GWP alternative technology. A total of 462 MT of bulk HCFC-141b was phased out. HCFC-141b in imported pre-blended polyol however, continues to rise in the foam sector. This is primarily a reflection of economic growth, particularly in construction (roofing material) and the signal by the Government of Vietnam that bulk HCFC-141b would be banned starting in 2015.

25. The 2015 survey confirmed 71 foam producers using HCFC-based polyol with about 2,035 MT of HCFC-141b in 2014, representing 70% of the total estimated pre-blended HCFC-141b consumption. 80% of these enterprises can be considered small and medium size enterprises (SMEs) with use of under 50 MT of HCFC-141b. Survey results show that the Vietnamese foam sector is comprised of foam system distributors, seven subsectors that used HCFC-141b pre-blended polyol and one XPS (extruded polystyrene) producer. There are two established system houses within large multinational appliance and kitchenware manufacturers. One Chinese company with plans to supplement its import business with blending polyol systems in 2016, was also discovered in South Vietnam. Among the 71 PU foam manufacturers, 44 and 27 were established before (eligible for MLF funding) and after September 2007 respectively.

26. Institutional context. The main actors in forming the institutional framework for Montreal Protocol implementation are MONRE, MOIT and Customs. Together, they control the source of ODS as well as engage in different capacities with the regulated community. MONRE hosts the National Ozone Unit (NOU) which acts as the focal point for MP implementation and which is responsible for ODS quota allocation and regulation. The Stage I project employs a project management unit (PMU), which works directly with the NOU and has been facilitating and coordinating preparation of this proposed Stage II HCFC project.

27. Rationale for Bank Involvement. The proposed project relates to the focus area 3, objective 9 promote low carbon energy generation including renewables and energy efficiency, and reduce GHG emissions of the Bank's Country Partnership Framework (CPF) FY2018-2022 for Vietnam. One of the outcomes under the CPF is "reduced GHG emission in selected areas." Conversion to HCFC alternatives will deliver more advanced technologies to beneficiaries for improving their competitiveness in global markets which increasingly demand compliance with stringent environmental standards. Conversion to HCFC alternatives will bring both ozone and climate benefits. The recently closed HCFC Phase-out Project Stage I avoided GHG emissions of about 2 million tons of CO₂/year. The National CFC and Halon Phase-out Project closed in 2014 also contributed significant direct climate co-benefits of 2.6 million tons of CO₂/year emission reduction. The proposed project is expected to reduce about 2.9 million CO₂ eq tons of GHG emissions.

28. In its capacity as one of the four MLF implementing agencies, the Bank has assisted many countries to phase out nearly 70% of the total ODP phased out under the MLF. For Vietnam in particular, the Bank's assistance was strategically important and effective in bringing down the persistent demand of CFC during the period 2000 to 2004 and conform to MP phase-out milestones in 2005, 2007, 2010, 2013 and 2015. The proposed project is a continuation of this successful partnership with Vietnam on ozone layer protection and a follow-on activity of the Stage I Project.

II. Proposed Development Objective(s)

The project development objective is to reduce HCFC consumption in order to assist Vietnam meet its HCFC phase-out obligations under the Montreal Protocol, and to reduce greenhouse gas emissions arising from the replacement of these HCFCs.

III. Project Description

Component Name

Component 1: HCFC Consumption Reduction

Comments (optional)

Component Name

Component 2: Technical Assistance and Policy Actions

Comments (optional)

Component Name

Component 3: Project Management

Comments (optional)

IV. Financing (in USD Million)

Total Project Cost:	14.64	Total Bank Financing:	0.00
Financing Gap:	0.00		
Financing Source			Amount
Borrower			0.00
Montreal Protocol Investment Fund			14.64

Total	14.64
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V. Implementation

VI. Safeguard Policies (including public consultation)

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	X	
Natural Habitats OP/BP 4.04		X
Forests OP/BP 4.36		X
Pest Management OP 4.09		X
Physical Cultural Resources OP/BP 4.11		X
Indigenous Peoples OP/BP 4.10		X
Involuntary Resettlement OP/BP 4.12	X	
Safety of Dams OP/BP 4.37		X
Projects on International Waterways OP/BP 7.50		X
Projects in Disputed Areas OP/BP 7.60		X

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