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Report No.: PAD1719

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF US$100 MILLION

INTERNATIONAL DEVELOPMENT ASSOCIATION

ON A

PROPOSED CREDIT IN THE AMOUNT OF SDR 1.3 MILLION
(US$1.7 MILLION EQUIVALENT)

TO THE

SOCIALIST REPUBLIC OF VIETNAM

FOR A

VIETNAM ENERGY EFFICIENCY FOR INDUSTRIAL ENTERPRISES (VEEIE) PROJECT

March 22, 2017

Energy and Extractives Global Practice
East Asia and Pacific Region

CURRENCY EQUIVALENTS
(Exchange Rate Effective as of February 28, 2017)
Currency Unit = VND
VND22,232.00 = US$1
US$1 = SDR 0.74

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

ACT	Avoided Cost Tariff
BIDV	Bank for Investment and Development of Vietnam
CPEE	Clean Production and Energy Efficiency
DANIDA	Danish International Development Agency
DONRE	Department of Natural Resources and Environment
EE	Energy Efficiency
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EOI	Expression of Interest
EPC	Environment Protection Commitment
ERR	Economic Rate of Return
ESCO	Energy Service Company
ESMF	Environmental and Social Management Framework
EVN	Vietnam Electricity
FIRR	Financial Internal Rate of Return
FM	Financial Management
FOREX	Foreign exchange
FS	Feasibility Study
GDE	General Directorate of Energy
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GOV	Government of Vietnam
GRS	Grievance Redress Service
GW	Gigawatt
GWh	Gigawatt hour
IA	Implementing Agency
ICB	International Competitive Bidding
IE	Industrial Enterprise
IFC	International Finance Corporation
IFRS	International Financial Reporting Standards
kV	Kilovolt (1000 Volts)
kVA	Kilovolt Ampere (1,000 Volt Amperes)
kW	Kilowatt (1,000 Watts)
kWh	Kilowatt hour (1,000 Watt hours)
MoF	Ministry of Finance
MoIT	Ministry of Industry and Trade
MW	Megawatt (1,000 kilowatts)
MWh	Megawatt hour (1,000 kilowatt hours)
NCB	National Competitive Bidding
NDF	Nordic Development Fund
NPV	Net Present Value
O&M	Operations and Maintenance
OM	Operational Manual
PCRA	Procurement Capacity and Risk Assessment
PFI	Participating Financial Institution
PMB	Project Management Board
QCBS	Quality- and Cost-Based Selection

RE	Renewable Energy
REDP	Renewable Energy Development Project
REoI	Request for Expression of Interest
RIP	Required Information Package
ROE	Return on Equity
SBV	State Bank of Vietnam
SECO	Swiss State Secretariat for Economic Affairs
SME	Small and Medium Enterprise
SSS	Single Source Selection
TA	Technical Assistance
UNIDO	United Nations Industrial Development Organization
VCB	Joint Stock Commercial Bank for Foreign Trade of Vietnam
VEEIE	Vietnam Energy Efficiency for Industrial Enterprises
VND	Vietnamese Dong
VNEEP	Vietnam Energy Efficiency Program
VSD	Variable Speed Drive

Regional Vice President:	Victoria Kwakwa
Country Director:	Ousmane Dione
Senior Global Practice Director:	Riccardo Puliti
Practice Manager:	Julia Fraser
Task Team Leaders:	Franz Gerner, Thi Ba Chu

VIETNAM
Vietnam Energy Efficiency for Industrial Enterprises (VEEIE) Project

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Vietnam Energy Efficiency for Industrial Enterprises (VEEIE) Project (P151086)

PROJECT APPRAISAL DOCUMENT

EAST ASIA PACIFIC REGION

ENERGY AND EXTRACTIVE GLOBAL PRACTICE

Report No.: PAD1719

Basic Information			
Project ID P151086	EA Category FI - Financial Intermediary	Team Leaders Franz Gerner, Thi Ba Chu	
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints [ ]		
	Financial Intermediaries [x]		
	Series of Projects [ ]		
Project Implementation Start Date July 31, 2017	Project Implementation End Date July 31, 2022		
Expected Effectiveness Date July 31, 2017	Expected Closing Date July 31, 2022		
Joint IFC: No			
Practice Manager Julia Fraser	Senior Global Practice Director Riccardo Puliti	Country Director Ousmane Dione	Regional Vice President Victoria Kwakwa
Borrower: The Socialist Republic of Vietnam			
Responsible Agency: Ministry of Industry and Trade			
Contact: Mr. Đặng Huy Cường	Title: Director General of General Directorate of Energy/MoIT		
Telephone No: +84 4 62786185	Email: CuongDH@moit.gov.vn		

Project Financing Data(in US$, millions)							
[X] Loan	[ ] IDA Grant	[ ] Guarantee					
[X] Credit	[ ] Grant	[ ] Other					
Total Project Cost:	158.0	Total Bank Financing:	101.70				
Financing Gap:	0.00						

Financing Source	**Amount**
Borrower	56.30
International Bank for Reconstruction and Development	100.00
International Development Association	1.70
Donors	0.00
Total	**158.00**

Expected Disbursements (in US$, millions)						
Fiscal Year	2018	2019	2020	2021	2022	2023

Annual	30	20	20	20	10	1.7
Cumulative	**30**	**50**	**70**	**90**	**100**	**101.7**

Project Development Objective		
The PDO is to improve energy efficiency in Vietnam's industrial sector.		
Systematic Operations Risk-Rating Tool (SORT)		
Risk Category	**Rating**	
1. Political and Governance	Moderate	
2. Macroeconomic	Substantial	
3. Sector Strategies and Policies	Moderate	
4. Technical Design of Project or Program	Moderate	
5. Institutional Capacity for Implementation and Sustainability	Substantial	
6. Fiduciary	Substantial	
7. Environment and Social	Moderate	
8. Stakeholders	Moderate	
9. Other	Moderate	
OVERALL	**Substantial**	

Compliance		
Policy		
Does the project depart from the CAS in content or in other significant respects?	Yes [ ]	No [X]
Does the project require any waivers of Bank policies?	Yes [ ]	No [X]
Have these been approved by Bank management?	Yes [ ]	No [ ]
Is approval for any policy waiver sought from the Board?	Yes [ ]	No [X]
Does the project meet the Regional criteria for readiness for implementation?	Yes [X]	No [ ]

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	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

Legal Covenants

Name	**Recurrent**	**Due Date**	**Frequency**
Institutional Arrangements	X		Continuous

Description of Covenant

Loan Agreement (LA), Schedule 2, Section I.A.2: Provisions requiring the Borrower, through MoIT, to maintain the Project Management Board throughout Project implementation and cause said Project Management Board to oversee the day-to-day operations of the Project, including: the provision of support to, and supervision of Project activities; maintaining accounting and financial systems, and competent staff, including a Project coordinator, technical, environmental, social, financial and procurement personnel in adequate numbers, in each case with relevant qualifications and expertise; all in form and substance satisfactory to the Bank.

Name	Recurrent	Due Date	Frequency
Operations Manual	X		Continuous

Description of Covenant

LA, Schedule 2, Section I.D; Project Agreement (PA), Schedule, Section I.E: Provisions requiring the Borrower, through MoIT, and the PFIs to ensure that the Project is carried out in accordance with the Operations Manual.

Name	Recurrent	Due Date	Frequency
Safeguards	X		Continuous

Description of Covenant

LA, Schedule 2, Section I.E; PA, Schedule, Section I.G: Provisions requiring the Borrower, through the Ministry of Industry and Trade, and the PFIs to, ensure that the Project is carried out in accordance with the provisions of the Safeguards Instruments.

Name	Recurrent	Due Date	Frequency
Mid-term review		36 months after the Effective Date	

Description of Covenant

LA, Schedule 2, Section II.B; PA, Schedule, Section II.B: Provisions requiring the Borrower, through MoIT, and the PFIs to carry out a midterm review to assess the status of Project implementation.

Name	Recurrent	Due Date	Frequency
Energy Efficiency Sub-Projects	X		Continuous

Description of Covenant

PA, Schedule, Section I.D: Provisions requiring the PFIs to select, appraise and evaluate sub-project proposals to be financed by Energy Efficiency Sub-Loans and enter into Energy Efficiency Sub-Loan Agreements in accordance with the principles, eligibility criteria and procedures set forth in the Operations Manual, the Anti-Corruption Guidelines, the Safeguard Instruments and the provisions of the PA.

Name	Recurrent	Due Date	Frequency
Annual Work Plans and Budgets	X	November 30	Annually

Description of Covenant

PA, Schedule, Section I.F: Provisions requiring the PFIs to: (a) furnish to the Bank an annual work plan and budget for their Respective Part of the Project for each subsequent year of implementation of the Project, of such scope and detail as the Bank shall have reasonably requested; and (b) thereafter ensure that their Respective Part of the Project is carried out in accordance with such plan and budget as approved by the Bank.

Conditions

Source Of Fund	Name	Type
IBRD / IDA	Cross Effectiveness and Subsidiary Loan Agreements	Effectiveness

Description of Conditions

- The Financing Agreement and the Loan Agreement has been executed and delivered and all conditions precedent to its effectiveness have been fulfilled.
- The Subsidiary Loan Agreement has been executed between the Borrower, through its Ministry of Finance, and each of BIDV and VIETCOMBANK.

Team Composition

Bank Staff

Name	Title	Specialization	Unit
Franz Gerner	Lead Energy Specialist	Task Team Leader	GEEDR
Thi Ba Chu	Energy Specialist	Co-Task Team Leader	GEEDR
Aristeidis I. Panou	Counsel	Lawyer	LEGES

Thu Ha Le	Associate Counsel	Lawyer	LEGES
Chau-Ching Shen	Senior Financial Official	Finance	WFALN
Thao Thi Do	Financial Analyst	Finance	WFALN
Ky Hong Tran	Senior Energy Specialist	Energy Efficiency	GEEDR
Rutu Dave	Energy Specialist	Energy Efficiency	GEEDR
Xiaodong Wang	Senior Energy Specialist	Energy Efficiency	GEEDR
Anh Tuong	Operational Officer	Energy Efficiency	CASEE
Hoa Chau Nguyen	Program Assistant	Team Support	GEEDR
Viet Quoc Trieu	Senior Financial Specialist	Finance/ Banking	GFMDR
Thang Toan Le	Procurement Specialist	Procurement	GGODR
Mai Thi Phuong Tran	Senior Financial Management Specialist	Financial Management	GGODR
Thuy Cam Duong	Environmental Specialist	Environment	GENDR
Nghi Quy Nguyen	Social Specialist	Social Development	GSURR
Non-Bank Staff			
Name	**Title**	**Specialization**	**Location**
Peter Meier	Economist	Economist	Zurich
Nguyen Hoan Cau	Cement Industry Consultant	Cement Industry	Hanoi
Ha Trung Hieu	Banking Consultant	Banking Sector	Hanoi

I. STRATEGIC CONTEXT

A. Country Context

1. Vietnam has witnessed impressive economic growth and poverty reduction in the past 25 years. The country's gross domestic product (GDP) has grown from about US$33.6 billion in 2000 to US$185.3 billion in 2014. Access to electricity services, which was below 10 percent in 1986,[1] has grown to 98 percent in 2014, contributing to reducing poverty and boosting shared prosperity. Expanded grid electrification of rural households was mirrored by a sustained increase in the value of GDP per capita. Rural electrification has been a critical component of the government's program to eliminate poverty, redress imbalances in development, and improve overall welfare levels by providing reliable energy sources, better living conditions, health care, and rural services.[2] Using the extreme international poverty line of US$1.25 per person per day, the extreme poverty headcount in Vietnam fell from 64 percent in 1993 to less than 3 percent in 2012.

2. Vietnam is one of the most energy-intensive countries in East Asia. Its energy intensity of GDP is steadily increasing, and its energy elasticity of GDP is estimated at 2, compared to less than 1 for most countries.[3] As a result, the final energy consumption tripled over the past decade. Industrial growth has been one of the key drivers of Vietnam's increasing energy intensity, accounting for 48 percent or almost half of the final energy use. Vietnam Energy Statistics 2013 shows that cement and constructional materials and food processing industries consumed most energy. Because industry is the most energy-intensive economic sector, the increased industrialization of Vietnam's economy by itself contributes to the increase in Vietnam's overall energy intensity.

3. The government recognized the importance of green growth and passed the Vietnam Green Growth Strategy for the period 2011–2020 with vision to 2050, which aims to restructure and improve economic institutions toward more efficient use of natural resources and improved competitiveness of the economy, which will be achieved through increased investments in technological innovation, natural capital, and economic instruments. This will contribute to responding to climate change, reducing poverty, and ensuring sustainable economic development challenges. One of the important strategic objectives is to encourage energy efficiency (EE), with a 2020 target to reduce the intensity of greenhouse gas (GHG) emissions by 8–10 percent as compared to 2010 and reduce emissions from energy activities from 10–20 percent compared to the business-as-usual case.

4. The development of the energy sector has been a key factor in the recent industrialization process, creating jobs and increasing shared prosperity. While the energy access agenda drove electricity demand expansion in the 1990s, the industrial sector has taken the lead in the past decade. In the period 2000–2011, industrial demand grew 8.2 percent per year, more than any other sector. Employment by the industry sector has also grown substantially by 7 percent per year. According to the General Statistics Office, the number of 'Plant and Machine Operators and Assemblers' and 'high-level professionals' is sharply on the rise, more so than any other non-

[1] Van Tien, H. 2010. *Vietnam Rural Electrification Program.* World Bank.
[2] Khandker, S. R., D. F. Barnes, H. A. Samad. 2013. *Welfare Impacts of Rural Electrification: A Panel Data Analysis from Vietnam.* Economic Development and Cultural Change 61 (3): 659–692. The University of Chicago Press.
[3] World Bank. 2014. Vietnam Low Carbon Study.

managerial job category at 18 and 29 percent, respectively.

5. Growth in the number of skilled professionals in the industry sector runs parallel to the strengthening of small and medium enterprises (SMEs), which are the cornerstone of the Vietnamese economy. Currently, SMEs represent roughly 97 percent of the overall number of businesses, employ 77 percent of the workforce, and account for 80 percent of the retail market. Electricity supply to industry and SMEs has been a crucial contributor to employment growth and with that to increased prosperity. In fact, the income of the bottom 40 percent grew by 9 percent over the last decade on average. The main centers for industrial growth and proliferation of SMEs are the greater Hanoi area and the greater Ho Chi Minh City area.

The Banking Sector

6. **Macroeconomic setting.** Over the past few years, the monetary policy measures of the SBV – aimed at controlling inflation, easing interest rates, and restoring liquidity in the banking system – have provided reliable conditions for credit institutions to lower their lending rates. At the same time, it administratively required banks to consider reducing interest on existing loans to share the borrowers' burdens. This measure has dual impact, inducing the banks to increase their capital controls and improve credit risk management capabilities. As a result, bank liquidity has been gradually improved, which in turn helped stabilize financial markets and meet capital needs in the economy at more sustainable interest rates, in harmony with current economic conditions. The SBV planned to consolidate the banking system and the introduction of new rules on prudential ratios under Circular 36 (effective February 1, 2015) and the revision by Circular 06 (in May 2016) are commonly viewed to benefit the sector. Consolidation should improve efficiency through better economies of scale and reduce supervisory burden. The SBV announced plans to approve banking mergers and acquisition deals in 2015 to reduce the number of banks from around 40 to between 15 and 17 by 2017. However, implementation may be a challenge while such long-term structural problems such as weak asset quality, poor transparency, and low capital buffers remain. The bulk of the consolidation wave is expected to comprise weak, smaller banks merging into large state-owned commercial banks. The impact on state-owned commercial banks should be manageable as potential targets remain small relative to their suitors' total assets, although absorbing weaker banks could heighten asset quality and execution risks in the near term.

7. **Interest rate trends and liquidity.** Interest rates have been on a downward trend since 2013 and they stabilized in 2016. While the caps on deposit rates were removed, deposits of 6 months and below are still subject to a cap of 5.5 percent per annum. Recently, a few banks have attempted to cut deposit interest rates owing to favorable macro-conditions, including good liquidity and low inflation, but smaller banks have kept the higher rates to maintain or expand market shares. Low inflation and declining deposit rates may also motivate many retail depositors to switch to higher-yield investment channels such as stocks and properties. The SBV used several monetary policy tools for lowering lending interest rate, such as (i) requiring credit institutions to reduce lending rates by cutting and managing operation costs (ii) keeping low discount rates, encouraging low interbank rates. To date, Vietnamese dong lending rates to prioritized sectors are commonly set at 6-9 percent p.a. for short-term loans, while medium- and long-term rates charged by state-owned commercial banks remain in the 8–10 percent p.a. range; lending rates to normal manufacturing/business sectors commonly range of 7-10 percent p.a. for short terms and 9-12 percent p.a. for longer terms. To put this into perspective, current lending rates have now become

even lower than the past levels during the booming period of 2005–2006. System liquidity has been stable and banks normally do not have to use short-term deposits for medium and long-term loans up to the threshold set forth by the SBV.

8. **Credit growth and dynamics.** Since 2015, credit activities have developed strongly, a positive sign for monetary and banking operations with the economy's continued turnaround. The growth pattern has been maintained with credit growth almost surpassing 2016 targets (18 percent). Banks' lending rose quickly in the last few months of 2016, reflecting strengthened domestic demand as well as accommodative monetary policy of the authorities in order to support economic activities. However, quick credit growth raises concerns on the quality of lending. This trend should come as no surprise since many enterprises had been expecting further economic recovery and factoring it in. Some bank executives have been quoted as saying that many sources had predicted that economic performance would improve, so they expected good credit growth. Both lending and deposit rates are at stable and lower levels as outlined above, which also fueled credit growth. The SBV's new policy of allowing lenders to use up to 60 percent of short-term deposits for long- and medium-term loans has also contributed to credit growth (however, this ratio will be gradually revised down, especially to 50% starting 2017 according to Circular 06/2016/TT-NHNN which amended Circular 36/2014/TT-NHNN).

B. Sectoral and Institutional Context

9. **Sector context.** During 2005–2014, average annual growth in electricity demand was 12.1%, electricity consumption increased from 45.6 terawatt-hours (TWh) to 128.4 TWh[4], and peak demand grew from 9.5 gigawatts (GW) to 22.2 GW. Per capita electricity consumption increased from 156 kilowatt-hours (kWh) in 1995 to 983 kWh in 2010 and to 1,415 kWh in 2014. The total installed and operating generation capacity in Viet Nam was 11.6 GW in 2005 and 34.1 GW in 2014, an average annual growth of 12.6% in generation additions. Vietnam's energy sector is facing two major challenges to meet future energy demand: (a) resource constraints and energy security and (b) high energy demand and huge financing needs. Vietnam has achieved 98 percent electricity access rates connecting over 20 million households and industry and commercial customers—this is a remarkable achievement. Today's biggest energy challenge is to provide those customers with reliable electricity services and meet future demand. Per capita electricity consumption remains relatively low (that is, one-third of China) and it is anticipated that electricity demand will continue to grow fast for the next two decades. Current demand projections show a dramatic increase from 32 GW of installed capacity in 2013 to 70 GW in 2020 to 120 GW in 2030.

10. Vietnam has limited domestic energy resources and will rely increasingly on imported coal to meet future energy needs. Most of the larger hydropower projects have been developed and Vietnam will need to improve the regulatory and pricing framework to further develop the smaller hydro and largely unexplored solar and wind potential. There is potential to bring more gas into the market from domestic fields. However, these resources will not materially alter the dependence on coal for power generation and industrial usage in the near to medium term. Therefore, increasing reliance on energy sources from abroad over the next decade raises issues of energy supply security, vulnerability to international price fluctuations, and subsequent impacts on

[4] Vietnam Electricity. 2014. *Annual Report*. Hanoi.

domestic energy prices.

11. The cost of energy to Vietnam's consumers currently amounts to around US$14–15 billion per year. In the power sector alone, the financing needs are about US$5-6 billion annually to meet future demand for generation and network investments.

12. **Electricity tariff reform.** The 2009 Prime Minister Decision 21 initiated the electricity tariff reform process, establishing both the principles of a market-based mechanism to annually adjust the tariffs for the period 2010–2012 and a subsidy regime aimed at protecting vulnerable and poor consumers. This decision was further reinforced by an updated 2011 PM Decision 24, which allows for the tariff to be adjusted during the course of a year to reflect changes in uncontrollable costs (e.g. fuel, rate of exchange). Through the application of these mechanisms, the average electricity tariffs have increased steadily and have started to be revised more than once per year. The PM Decision 2165 from November 2013 approves an average electricity retail tariff bracket in 2013–2015 between a price floor of VND 1,437/kWh (U.S. cents 7.2/kWh) and a price ceiling of VND 1,835/kWh (U.S. cents 9.2/kWh), demonstrating the government's commitment to further adjust electricity prices.

13. **Implementing demand-side EE.** The Vietnam Energy Efficiency Program (VNEEP), approved in 2006, has created a comprehensive set of government-led activities to improve EE and conservation. To promote efficient use of electricity and reduce consumption, the government has introduced time-of-use electricity tariffs for medium and large customers and developed an EE standard and labeling road map. A pilot demand side response program using the time-of-use tariff will be implemented by the Ho Chi Minh City Power Company (PC) under the Distribution Efficiency Project financed by the World Bank.

14. Vietnam's emissions are expected to increase dramatically by 2030. Between 2010 and 2030, Vietnam's overall GHG emissions will increase fivefold, per capita emissions fourfold, and the carbon intensity of GDP by 20 percent.

15. Meeting future energy demand by improving EE is the single best and cheapest option to improve energy security, help consumers save and cope with potential rate hikes, reduce pollution, and mitigate climate change. If stronger programs and policies are put in place, current wasteful practices can be reduced and more efficient energy use technology can be adopted. This can meet a sizable portion of the business-as-usual demand for increased energy services, at costs which are typically one-fourth the cost of additional energy supply. The Bank's Low Carbon Study has demonstrated that Vietnam could save up to 11 GW of new generation capacity by 2030 if comprehensive demand-side EE investments are carried out.

16. **Rationale for public sector financing and Bank engagement.** The Vietnamese government has passed a Law on Energy Efficiency and Conservation, issued a series of decrees to promote EE by the prime minister, and set a target of 5–8 percent of energy savings from 2012 to 2015 compared to the forecast energy demand. The VNEEP is a national target program and the first ever comprehensive plan to institute measures for improving EE and conservation in all sectors of the economy in Vietnam. VNEEP Phase I (VNEEP-I) from 2006 to 2010 aimed to actively start up all components of the program, and VNEEP Phase II (VNEEP-II) from 2011 to 2015 aims to expand each component, based on lessons learned from Phase I. In addition to the

government's national programs, a number of parallel efforts have been initiated in direct cooperation with donor agencies.

17. Despite these initiatives for EE from both the government and donor community, significant barriers remain such that many energy-saving opportunities remain unexploited. The constraints to EE investments are usually not due to the financial viability and maturity of EE technologies but to market failures and barriers, which include (a) low or subsidized energy pricing; (b) the small share that energy costs represented in operating costs, leading to consumers' low interest in energy conservation; (c) a lack of institutional champions due to the fragmented nature of EE measures; (d) limited financing for the up-front capital expenditure; and (e) lack of EE awareness and capacity to identify and develop EE projects. The low or subsidized energy pricing is being addressed by tariff reform, the average tariff increased from VND1,053/kWh in 2010 to VND1,622/kWh in March 2015.

18. This is an integrated IBRD/IDA-funded project designed to help remove principal barriers impeding investments in industrial EE projects. The technical assistance (TA) activities will address the knowledge, institutional, and capacity-building needs of the banking and industrial sectors, mitigate the risks concerns of enterprises, and strengthen government supervision of industrial EE. Those efforts will be accompanied by an EE financial intermediary lending program, which will demonstrate viable mechanisms for financing industrial EE investment, and provide direct support to the government EE targets and green growth strategy.

19. **Institutional context.** The power sector falls under the auspices of the Ministry of Industry and Trade (MoIT). Through its General Directorate of Energy (GDE), it exercises all state management functions for the energy sector, including EE. The Department of Energy Efficiency and Science and Technology support the GDE in supervising and monitoring the implementation of the EE and Energy Conservation law and related regulations. Energy Conservation Centers established in provinces and cities support energy users and enterprises on efficient uses of energy and raising awareness of energy savings. Within the MoIT and directly under its minister, the Electricity Regulatory Authority of Vietnam is responsible for licensing, technical codes, and performance standards for distribution and transmission and monitoring the electricity market, supply security, and compliance with technical and performance standards. Tariff setting is assigned in the amendment to the Electricity Law to the MoIT and the Ministry of Finance (MoF).

C. Higher Level Objectives to which the Project Contributes

20. The project is consistent with the World Bank Country Partnership Strategy for 2012–2016 and contributes directly to the 'Sustainability' pillar. Furthermore, the project addresses the cross-cutting theme of 'resilience' by reducing energy consumption and contributes to climate change mitigation. The cross-cutting nature of the operation reflects its direct support to the following Country Partnership Strategy outcomes: (a) Outcome 1.2: Improved Quality and Efficiency of Infrastructure Services and (b) Outcome 2.2: Climate Change Mitigation: CO_2 emissions reductions associated with investments supported.

21. The project contributes to the Bank's 'twin goals' strategy of eliminating extreme poverty and promoting shared prosperity through economic growth in the bottom two quintiles. The project is expected to generate positive poverty reduction by comparatively lowering energy bills for

consumers, reducing air pollution and CO_2 emissions, and mitigating climate change impacts.

22. The project is also closely aligned with the World Bank Energy Strategy and contributes to the Bank's Energy Engagement Strategy for Vietnam to support supply- and demand-side EE, which is a key engagement pillar. The project will leverage the ongoing Clean Production and Energy Efficiency (CPEE) Project[5] that provides the analytical underpinning of the Bank's EE engagement in industrial enterprises. Furthermore, the project will contribute to the government's objective of Vietnam's National Energy Development Strategy up to 2020 with vision to 2050; Vietnam Green Growth Strategy period 2011–2020, vision to 2050; the Law on Energy Efficiency and Conservation; and Vietnam Power Development Plan VII period 2010–2020, vision to 2030.

II. PROJECT DEVELOPMENT OBJECTIVES

A. Project Development Objective (PDO)

23. The PDO is to improve energy efficiency in Vietnam's industrial sector. The Project would contribute to achieving the government's energy efficiency and GHG's reduction objectives.

B. Project Beneficiaries

24. The primary beneficiaries will be industrial enterprises (IEs) and participating financial institutions (PFIs). The IEs will benefit from adopting improved technologies and optimization of production, thus reducing energy consumption and production costs and increasing their overall competitiveness in the domestic and international markets. The PFIs benefit from creation of new loan products for industrial EE, thereby building technical capacity for EE investment appraisal and monitoring, which will enable them to scale up EE lending to industries. Participating government agencies will be supported to strengthen capacity in the development of the regulatory framework, relevant EE standards, and guidelines.

C. PDO Level Results Indicators

25. The project will contribute to achieving the government's energy efficiency and GHG reduction objectives. Project outcome performance indicators include (a) projected lifetime energy savings (MWh) and (b) number of industrial enterprises adopting improved EE technologies.

26. The intermediate performance indicators include: (a) direct project beneficiaries including percentage of female; (b) total annual reductions of GHG (tons of CO_2); (c) national EE database and relevant measuring, reporting and verification (MRV) tool developed for industrial sector; (d) EE circular for food processing industry; and (e) number of bankable EE project developed.

27. Detailed information on the above mentioned indicators is available in Annex 1.

[5] TF099859, Approved on July 05, 2011.

III. PROJECT DESCRIPTION

A. Project Components

28. This is an integrated IBRD/IDA-funded project designed to help remove the principal barriers to investments in industrial EE projects. The TA activities financed by IDA will address the knowledge, institutional, and capacity-building needs of the banking and industrial sectors, mitigate risk concerns of enterprises, and strengthen government supervision of industrial EE and energy conservation. Those efforts will be accompanied by an EE financial intermediary lending program, which will demonstrate viable mechanisms for financing industrial EE investments, in direct support of the government's EE targets and green growth strategy. A detailed project description is provided in Annex 2.

Component 1: Energy Efficiency Investment Lending (US$156.3 million, of which US$100 million from IBRD, US$25 million from PFIs, and US$31.3 million from IEs)

29. This component consists of an EE lending program of US$156.3 million over five years: (a) US$100 million is from IBRD debt financing; (b) PFIs will co-finance project activities, financing 20 percent of the loan to IEs; and (c) sub-borrowers (that is, IEs) will contribute 20 percent of investments as equity financing, which is common practice for loan applications in Vietnam.

30. A US$100 million IBRD loan will be on-lent by the MoF to selected PFIs. The PFIs in turn will lend the funds to IEs and/or energy service companies for EE investment subprojects. Their lending rates will be determined based on market conditions and will adequately cover the financing and operating costs and provide for a reasonable profit margin for the PFIs.

31. The PFIs will be selected in accordance with agreed financial and non-financial criteria. Non-financial criteria will include demonstrated EE lending strategy/commitment, and ability to generate a solid EE project pipeline. The selection of PFIs will fully comply with the Bank's OP 10.0 requirements. The IBRD funds will be allocated among selected PFIs based on the demonstrated pipeline and remaining funds will be allocated on a first-come, first-served basis.

32. An Operational Manual (OM) was developed, which outlines selection criteria for sub-borrowers and subprojects, appraisal procedures, roles and responsibilities of the PFIs and the government, the PFIs' internal institutional arrangement for project implementation, technical evaluation, environmental and social assessment, procurement, and financial management frameworks that are consistent with the Bank and the Vietnamese government rules and procedures. During project implementation, the PFIs will be responsible for identifying, appraising and financing subprojects that meet the criteria in the OM and will bear all associated risks.

Component 2: Project Implementation Support (US$1.7 million financed through IDA)

33. Project Implementation Support component will provide technical assistance and capacity building support to MoIT on Project monitoring and supervision, including audits of Project activities and safeguards implementation.

34. IFC is providing advisory services to VietinBank and is working with the Bank to identify a suitable support capacity mechanism for the PFIs under the Project. Under the existing CPEE

project, the Bank is providing TA to key energy-consuming IEs to develop voluntary agreements, which could form a key part of the pipeline. The TA and capacity building for the PFIs will include support for (a) capacity building and training, particularly to staff at both headquarters and the branches as well as risk assessment staff, including support for the development of necessary procedures, and the creation of an adequate knowledge base to evaluate and extend EE loans; (b) marketing and business development to generate a robust EE lending pipeline; (c) support to due diligence of eligible EE subloans, including financial, technical, social and environmental assessments; and (d) development of energy-conservation-related financing instruments and risk management tools.

35. **Parallel related operations**. In addition to submitting a proposal for technical assistance to the Green Climate Fund, the Bank discussed with various donors including the government of Israel, Swiss State Secretariat for Economic Affairs (SECO), Danish International Development Agency (DANIDA), GIZ, Nordic Development Fund (NDF), and United Nations Industrial Development Organization (UNIDO) for potential cooperation on the EE agenda, leveraging donors' effort to address EE barriers. The Israeli government has indicated its interest to support specific sectors and industries through targeted EE workshops and studies conducted in parallel to the Vietnam Energy Efficiency for Industrial Enterprises (VEEIE) project. Similar targeted activities are being discussed with UNIDO and are closely coordinated with the MoIT. The following parallel operations will potentially contribute to the VEEIE and are being coordinated closely by the Bank team. See Annex 2 for additional details.

B. Project Financing

Lending Instrument

36. During project design, several financing instruments were considered, including wholesale financing, direct financing, competitive bidding, and a guarantee facility. However, an Investment Project Financing (IPF) with Financial Intermediary Financing is the most appropriate Bank lending instrument to address the existing financing gap and to mobilize commercial financing for the EE. The PFIs (BIDV and VIETCOMBANK) were selected on a competitive basis based on financial and non-financial criteria. The Bank loan product chosen by the MoF is a LIBOR-based U.S. dollar denominated single currency for US$100 million with fixed spread and disbursement-linked repayment. The MoF will on-lend to the PFIs at the same financial terms and conditions and will not provide any interest subsidy to the PFIs. The PFIs will be fully responsible for debt service and will bear all financial risks associated with the Bank loan.

37. The PFIs can extend the loan to the IEs either in U.S. dollars or Vietnamese dong. If the loan to the IEs is in Vietnamese dong, the PFIs will carry FOREX risk and the interest rate to the IEs shall be determined on commercial basis by adding up the PFIs' margin and their FOREX risk premium. If the loan to the IEs is in U.S. dollars, the PFIs will decide the interest rate to the IEs, on commercial basis by adding a margin that will be determined by its cost, subproject risk, and sub-borrower's creditworthiness.

Project Cost and Financing

Project Components	Project Cost	IBRD Financing Total	IBRD Financing %	IDA Financing Total	IDA Financing %	Borrower[6] Financing Total	Borrower Financing Total (%)
1. EE Investment Lending	156.30	100.00	64			56.30	36
2. TA and Capacity Building	1.70			1.70	100		
Total Project Costs	**158.00**						
Front-end Fees, commitment fee[7]	0.75						
Total Financing Required	**158.00**	**100.00**		**1.70**		**56.30**	

C. Lesson Learned and Reflected in the Project Design

38. **Readiness.** For operations in Vietnam, including in the energy sector, implementation success has typically been constrained by the lack of readiness at project initiation. Financial intermediation operations are no exception. Project stakeholders—PFIs, project investors, and the government—must be adequately prepared to undertake their roles in the project. The key to readiness, however, is to ensure that the subproject pipeline is solid. Providing TA during preparation to potential participants is also an important aspect to ensure readiness. The team has worked with several industry associations such as cement, pulp and paper, and seafood to introduce the proposed financing facility and discuss various EE technologies with the aim of identifying relevant projects. An initial list of projects in the pipeline is attached as Annex 3.

39. **Financial intermediation operations require special attention.** The review of financial intermediary operations Bank-wide suggests several preconditions for success, including the need for a stable macroeconomic and financial framework, use of eligibility criteria for PFIs, and monitoring the PFIs and the subloans during implementation. A review of Vietnam's financial intermediary portfolio recently mirrored the findings of the Bank-wide review while the recent financial turmoil has underscored the importance of constant monitoring of conditions during preparation and implementation. Experience from the Renewable Energy Development Project (REDP)[8] showed that the project pipeline dried up when the financial market was volatile and interest rates sharply increased. In this operation, the MoF will extend the IBRD loan to PFIs in U.S. dollars and the U.S. dollar rate is generally stable over the medium and long term, making it suitable to EE investment. The LIBOR benchmark is widely accepted in the international banking market.

40. **Fiduciary oversight and execution.** Oversight by governments and their agencies tend to be weak, and efforts are required to streamline it through clearly set and agreed procedures, particularly for procurement and disbursement. Projects which have minimized processing and approval steps consistent with sound management and which encourage decision making have done better. In part, this is addressed in the project by the use of commercial practices for

[6] Financing by PFIs and IEs
[7] Commitment fees are calculated based on disbursement schedule.
[8] Cr.4564-VN approved on May 5, 2009.

procurement, with which the PFIs and IEs are already familiar. Also, government will have no involvement in the review, assessment, and approval of EE subprojects approved by the PFIs.

41. **Provide TA and investment lending in one operation.** It is preferable to combine TA with investment lending projects for two main reasons. EE investment lending on its own often results in slow uptake of funds as the PFIs and IEs have insufficient capacity to deal with the key bottlenecks and challenges of EE projects. TA on its own does not address the key issue of availability of financing, which is a key constraint.

42. Several Bank EE credit lines were reviewed for design of the VEEIE, including the China Energy Efficiency Financing (CHEEF, China), Uzbekistan Energy Efficiency Facility for Industrial Enterprises (UZEEF, Uzbekistan), Ukraine Energy Efficiency, and Tunisia Energy Efficiency. Lessons learned from those credit lines are valuable for setting up the financing mechanism, designing operation for the VEEIE.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

43. The project will be implemented over five years. The MoIT has the overall project coordination and supervision responsibility and is responsible for the implementation of the capacity building and TA component. The current Project Management Board (PMB) for CPEE under the GDE will coordinate and supervise the VEEIE implementation. This existing PMB has been effectively conducting project coordination activities under the CPEE project. The PMB will coordinate the VEEIE project monitoring and reporting requirements and implement the capacity-building component. The MoIT will select an independent external auditor to conduct the annual project audit; this will be financed from the TA component. The MoIT has the main responsibility for signing the contract and coordinating the auditor's work.

44. The SBV will represent the Socialist Republic of Vietnam in signing the Loan Agreement with the Bank. The MoF will sign subloan agreements with each selected PFI that will be responsible for implementing the credit line component. The PFIs will have full responsibility for the EE lending process and approvals, following the agreed OM, and will bear all the associated credit risks. The MoIT will not be involved in the review/approval of the subloan applications of eligible IEs. Each PFI will form a Project Implementation Unit with dedicated teams supported by technical, environmental and social safeguards, and procurement experts. The Project Implementation Unit will implement the sublending activities and act as the PFI's focal point to interact with the Bank, MoIT, MoF, and other stakeholders.

45. The PFIs are responsible for appraisal and evaluation of subprojects and bear all associated risks regarding the loans to the IEs. The PFIs will supervise/monitor all subloans to ensure they are implemented according to Vietnamese and Bank requirements and guidelines and provide periodic reports, including fiduciary and safeguards reports to the MoIT, MoF, and the Bank. Independent auditors will be selected to conduct annual project audit on the performance of the PFIs and IEs.

46. A detailed project OM covering technical, fiduciary, safeguards, and management requirements and procedures was prepared. The OM is incorporated into the project

agreements between the World Bank and PFIs and will be binding on all participants. The OM defines the detailed eligibility criteria for subprojects, for example, the minimum energy savings to be achieved.

B. Results Monitoring and Evaluation

47. Project implementation monitoring involves (a) monitoring of performance indicators (as included in Annex 1); (b) periodic progress reports; and (c) a midterm review of implementation progress. The PMB will be responsible for overall monitoring and evaluation (M&E) of implementation progress, including the collection of project performance information and reporting on the impact and results of the project. It will develop an M&E plan during the first year of implementation, and a member of the PMB will be assigned to collect information and maintain databases to monitor the implementation performance of all the project components. For activities to be implemented by the PFIs, the project team within each PFI will be responsible for collecting information with the assistance of the PMB and reporting to the Bank and the PMB.

C. Sustainability

48. Several studies conducted by the MoIT confirmed the large potential for EE investment in the IEs, as well as the interest of commercial banks to develop an EE business line in their portfolios. Sustainability will be achieved through an integrated, two-pronged project approach: (a) operational engagement of the PFIs making available loans for dedicated EE investments and (b) TA for capacity and market development to support EE lending activities and capacity building.

49. During project preparation and the early stages of implementation, it is critical to develop a robust subproject pipeline that is financially attractive to demonstrate project viability and ensure project replication and scale-up. The replication of a sound EE lending business model among domestic banks will be promoted by providing hands-on assistance to identify and develop demonstration projects. Dissemination of the early experiences of the PFIs throughout the banking and industrial sectors, to be implemented as part of the project, should result in replication of successful initiatives. It is expected that the PFIs will build expertise in EE lending to specific industries and project types, based on their project portfolios and targeted markets. Through such specialization and replication, the PFIs should be able to quickly build a strong knowledge base to target financially sound EE projects, lower transaction costs as evaluation and appraisal processes are streamlined, and thereby gain business confidence to further scale up their EE business line. Overall, the replication potential is backed by the large size of the industrial EE market in Vietnam, especially in energy-intensive manufacturing industries such as steel, cement, textiles, food processing, and pulp and paper.

50. International experience demonstrates that dedicated credit lines are effective at increasing the capacity and interest of PFIs in mainstreaming EE financing business lines through a learning-by-doing process and at changing their perceptions so that they recognize that EE investments are a profitable business. This approach can achieve a double leverage effect by leveraging substantial debt contributions from the PFIs and equity financing from the IEs and later revolving the loans that are paid back. It offers the best prospect for program sustainability; evidence shows that the PFIs continue to provide EE financing after the Bank's credit line is completed.

51. The success formula for the credit line instrument is well established: (a) careful selection

of PFIs against well-defined criteria; (b) inclusion of a few PFIs so that developers can shop for the best deal; (c) strong manageme006Et commitment, dedicated teams at both headquarters and branches, and incentives to staff within the PFIs; (d) TA to support project pipeline development and capacity building of both PFIs and IEs; and (e) aggressive marketing and business development as well as new financial products tailored to EE financing are critical to generate sufficient deal flows.

52. Several credit lines with the PFIs are under implementation in Vietnam, including the IBRD-financed REDP. IFC has provided a US$25 million credit line to Techcombank for EE financing and Techcombank has financed US$41.5 million for EE projects for SMEs. Many Vietnamese banks are familiar with credit lines although the capacity for implementation remains relatively low.

V. KEY RISKS

A. Overall Risk Rating and Explanation of Key Risks

Risk Category	Rating
1. Political and Governance	Moderate
2. Macroeconomic	Substantial
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial
7. Environment and Social	Moderate
8. Stakeholders	Moderate
9. Other	Moderate
OVERALL	**Substantial**

53. **Political, Sector Strategies: Weak government commitment and capacity to promote industrial energy conservation.** Despite the government's EE target, the current policies, financial incentives, and the government's institutional capacity are limited to achieve these targets. The project will provide TA and capacity building to the MoIT to strengthen EE policies and institutional capacity.

54. **Stakeholders: Slow subproject pipeline development.** This is the most common issue facing credit lines, including the REDP. This project will (a) provide TA and capacity building to the PFIs for business development; (b) link with the government's voluntary agreements with key IEs; and (c) link with the ongoing IFC's EE financing advisory services to the PFIs.

55. **Macroeconomic risks: Unfavorable macroeconomic developments (interest rate volatility, FOREX risk, low oil prices, and so on) may lessen the incentives for EE projects.** The project will provide TA to the IEs and PFIs on FOREX management and interest rate swaps. The sensitivity analysis provided in the economic and financial analysis (Annex 3) shows that the expected economic and financial returns are robust with respect to these risks.

56. **Project risk.** The overall project risk is assessed as Substantial, recognizing the institutional constraints and challenges of EE investments in Vietnam as well as the dependence on the macroeconomic and fiscal stability to achieve the PDO.

VI. APPRAISAL SUMMARY

A. Financial and Economic Analysis

Due Diligence of PFIs

57. The selection criteria of the PFIs were agreed with the MoIT, MoF, and SBV based on the Bank's requirements and existing government regulations. The MoIT undertook an initial assessment of potential PFIs, and the MoF and SBV are responsible for final due diligence and selection based on the MoIT's recommendation. The selection was reviewed and cleared by the Bank and only becomes effective once the Project Agreement is signed between the PFI and the Bank and the Subsidiary Loan Agreement between the MoF and the PFI.

58. Potential PFIs identified included Bank for Investment and Development of Vietnam (BIDV), Bank for Foreign Trade of Vietnam (VCB or Vietcombank), Vietnam Technological Commercial JS Bank (Techcombank), Vietnam JS Commercial Bank for Industry and Trade (Vietinbank), Asia Commercial Bank (ACB), Sai Gon Hanoi Commercial Bank (SHB), and Sai Gon Thuong Tin Commercial Bank (Sacombank). The Government has selected two PFIs for on-lending IBRD loan, namely VCB and BIDV, and these two PFIs passed selection criteria set forth to become participating banks. It is anticipated that additional PFIs will be added during implementation stage. A summary of the PFIs' due diligence is set out in Annex 4.

Economic and Financial Analysis

59. A financial and economic analysis for a sample of representative EE projects (cogeneration from waste heat recovery [cement industry]), variable speed motors and regenerative burners (steel industry), and energy-efficient pulp washers (pulp and paper industry) shows robust financial and economic returns over a wide range of input assumptions. Annex 3 provides a detailed evaluation.

60. For the financial analysis, the evaluation is from the perspective of the equity investors (i.e., industrial enterprises) who are recipients of loans provided by the PFIs, calculating both the equity return (Financial Internal Rate of Return [FIRR]) and debt service cover ratios. The benefits are based on estimated nominal financial prices of electricity, fuel oil, and coal (the three main energy forms used in Vietnamese industry). In some cases, additional financial savings derive from reductions in operations and maintenance (O&M) costs and other chemical inputs. The results show FIRR ranging from 19 percent to 103 percent, with small reductions for plausible scenarios of higher interest rates, lower fossil fuel prices, and low rates of electricity tariff increases. For example, a 2 percent increase in interest rate from the assumed 8.83 percent to 10.83 percent reduces the FIRR for the paper industry project from 20.2 percent to 19 percent, or if coal prices stayed unchanged at their present (nominal) level (that is, falling real coal prices), the corresponding FIRR falls to 18.3 percent). Annex 3 provides details on the sensitivity and risk analysis; in most cases, the risk analysis shows that the probability of not meeting the financial hurdle rate is less than 5 percent (and for the largest project examined, wastes heat recovery/cogeneration in the cement industry, less than 1 percent). Table 1 summarizes the main results of the economic and financial analysis.

Table 1. Summary of Economic and Financial Analysis Results

	Unit	Waste Heat Recovery	Regenerative Burner	VSD	High-pressure Pulp Washers
Sector		Cement	Steel	Steel	Paper
Saving		Electricity	Fuel oil	Electricity	Electricity coal
Baseline FIRR	%	25.6%	65.2%	114.2%	19.1%
Baseline ERR	%	33.4%	40.0%	124.6%	17.1%
Investment (financial)	VND billion	297	13.7	85.0	75.4
Distributional analysis					
NPV to IE	VND billion	200	21	325	28
NPV to EVN	VND billion	-31	Not applicable	-112	-1
Avoided externality benefits					
ERR including GHG emissions	%	70.6%	49.2%	244%	29.8%
Lifetime GHG savings	1,000 tons	722	23	553	164

Note: ERR = Economic Rate of Return; NPV = Net Present Value; EVN = Vietnam Electricity.

61. For the economic analysis, benefits are assessed at international (border) prices. Industry savings in electricity are assumed to result in backing down of thermal generation (coal for base-load savings, combined cycle gas for intermediate and peak loads), based on the results of detailed simulations prepared by the National Load Dispatch Centre for calculation of the avoided cost tariff (ACT) for small renewable energy (RE) producers. The economic returns (ERR and NPV) are calculated with and without consideration of environmental and global externalities: in the case of GHG emissions, using the Bank's recent guidance document for carbon accounting,[9] and valuing avoided GHG emissions at the values recommended in the recent guidance document on the social value of carbon.[10]

62. As in the case of the financial analysis, the economic returns are robust with respect to the general level of international fuel prices, which were at their lowest in early 2015 (and which have already recovered from their lows of US$50/bbl (Brent) in mid-January to US$60/bbl at the beginning of March 2015. Even in the unlikely case that such low prices prevail (unchanged) for the next 15 years, economic returns are substantially above the hurdle rate.

63. When the benefits of reduced carbon emissions are included in the economic analysis, economic returns are significantly higher, particularly where coal is displaced. In the paper industry example (which reduces the quantity of steam raised in an anthracite-fueled boiler), the baseline economic returns increase from 17 percent to 30 percent. All projects examined result in significant reductions in lifetime GHG emissions; EE therefore makes a significant contribution to reducing the carbon intensity of the economy at no incremental cost (a win-win option)—particularly when compared to options such as high-cost RE alternatives (such as wind) that bring carbon reductions only at significant incremental costs.

64. The distributional analysis shows that EVN's loss-of-tariff revenue from industrial EE projects does not offset their avoided financial costs in fossil fuel cost savings. This is a common

[9] World Bank. 2015. *Guidance Note: Greenhouse Gas Accounting for Energy Investment Operations (Transmission & Distribution Projects, Power Generation Projects and Energy Efficiency Projects*), Version 2.0, January 2015. World Bank Sustainable Energy Department.

[10] World Bank. 2014. *The Social Value of Carbon in Project Appraisal*. Guidance Note to the World Bank Group Staff, September.

finding, encountered also in the Organization for Economic Co-operation and Development (OECD) countries and explains the widely encountered lack of enthusiasm for EE by power sector utilities. However, as shown in Annex 3 in case of the cement industry distributional analysis, this loss is far outweighed by the other benefits to society. Any significant negative impact on EVN is readily mitigated by fully cost-reflective tariffs that are passed to other (industrial) consumers rather than left to erode EVN's margins. Any increase in electricity tariffs experienced by consumers are offset by much larger increases in welfare attributable to a more efficient industrial sector and further incentivize investments in EE by others.

B. Technical Assessment of EE Technologies

65. EE technologies vary by industrial subsectors but typical energy-saving measures include:

- **Energy systems.** Upgrading boilers and switching fuels, using cogeneration facilities and electric-driven systems, including compressed air systems, electric chillers, machinery and lighting.
- **Process technology.** Upgrading and replacing equipment, machinery, and facilities.
- **Waste heat and waste use.** Use of waste heat (of hot/warm gases, liquids and solids) and burning combustible waste (gases, liquids, solids).
- **Use of RE** to decrease fuel and/or electricity consumption may also be considered.

66. Energy intensive industrial sectors include cement, steel, textile, pulp and paper, food processing, bricks, and ceramics. Potential EE measures for cement industry include using roller mill for grilling raw material, improving furnace fans, installation of variable speed drivers, using waste fuel and waste heat recovery. The cement industry is one of the energy-intensive sectors, producing a huge volume of heat exhaust at a temperature up to 350^{o}C. Therefore, the key measure to improve EE is the utilization of heat exhaust for power generation. This is a well-tested solution achieving multiple purposes, including utilizing heat waste without consuming more fuel for power generation at a sizeable capacity scale, reducing emissions of GHG CO_2, reducing heat and dust emissions into the environment, and increasing efficiency of equipment production line. More detailed project pipeline information is presented in Annex 2.

67. EE technologies for steel and iron industries would include waste heat recovery, construction of closed production lines, replacement of low-performance air compressor, and installation of inverter for motors to operate at low or fluctuating load. Waste heat recovery uses the heat from flue gas (exhaust heat from electric arc furnaces, furnaces, kilns, and so on) to preliminarily heat up the steel scraps before putting into the electric arc furnace for reducing the time in the furnace, saving energy, and improving capacity. It could help heat the steel bars before entering the kiln to save oil for furnaces. Furthermore, it also helps heat up the oil instead of the drying resistors to reduce electricity consumption.

68. Project information provided by the Vietnam Paper Corporation include the investment of new efficient boilers for cogeneration (heat and electricity), replacement of motors, switching to biomass fuel technology, and chemical waste recovery for heating. Technical details of subprojects submitted by the corporation are presented in Annex 2.

69. An OM will detail eligibility criteria, and industry specialists and energy audit experts will

be included in the subproject due diligence teams. They will ensure that the subprojects are in compliance with Vietnamese industrial and technical policies and regulations, fully satisfy the technical eligibility criteria, and are technically feasible. TA to build capacity for project technical due diligence will also be provided to the PFIs during project implementation. This will ensure that the design of the subprojects will be technically sound.

C. Financial Management

70. The financial management (FM) assessment was completed and concluded that the project has adequate FM arrangements acceptable to the Bank. The overall arrangements in place for implementing the VEEIE Project provide reasonable assurance that the proceeds of the credit and loan will be used for the purposes intended. The MoIT and most PFIs have adequate FM staff capacity and experience of implementing other similar Bank-funded investment projects, with satisfactory performance. Additional training would be provided to the PFIs' FM staff on Bank FM requirements and disbursement procedures. All PFIs are required to have annual financial statements prepared in accordance with International Financial Reporting Standards (IFRS) and audited by an audit firm acceptable to the Bank as a condition of project participation. Two selected PFIs for on-lending IBRD loan, VCB and BIDV, satisfy this requirement. The FM risk is assessed as Substantial. Further details of the FM assessment and proposed arrangements are in Annex 4.

D. Procurement

71. A Procurement Capacity and Risk Assessment (PCRA) of the major project implementing agencies (IAs), including the MoIT and two potential IEs—Hoang Thach Cement Factory and Chinfon Cement Factory—was undertaken. The assessment noted that:

(a) the MoIT and the two IEs have adequate institutional and organizational capacity in place; the MoIT, however, has no specific organizational arrangements and staffing for implementation of their respective procurement under the project at this stage;

(b) the MoIT has some knowledge and experience of Bank procurement as a result of its implementation of several ongoing Bank-financed projects, including CPEE; however, new staff being assigned to implement the project may not be familiar with the Bank procurement procedures;

(c) the two IEs are experienced and proficient in using the procurement procedures under national public procurement law and regulations or established private sector/commercial practices; they, however, are unfamiliar with the Bank procurement procedures such as International Competitive Bidding (ICB) and Quality- and Cost-Based Selection (QCBS) methods which may be applicable to their subprojects.

72. Based on the above findings and considering the specific nature of procurement work required for the project, the procurement risk for the proposed project is rated as Substantial. More detailed findings of the PCRA, the proposed procurement arrangements, and measures to address the identified risks are presented in Annex 4. A Procurement Plan for the first 18 months of project implementation, acceptable to the Bank, was prepared by the PMB.

E. Social (including Safeguards)

73. The project is expected to have overall positive social benefits because it promotes EE and thus reduces GHG emissions and other pollutants into the atmosphere. It will also have positive impacts from the perspective of consumers and of workers who are employed by the participating IEs. Through EE investments, the company's energy cost will be reduced per unit of output with positive impacts on final prices of consumer products and services. This will also make IEs more competitive and ensure job security and potential expansion of the workforce.

74. The EE subprojects to be financed under the proposed loan will be within the existing premises of industrial facilities. However, to anticipate the potential need of land acquisition required for subprojects identified in implementation cycle, OP 4.12 is triggered and Resettlement Policy Frameworks (RPF) was prepared. Among others, it lays down the principles and objectives, eligibility criteria of displaced persons, modes of compensation and rehabilitation, participation features and grievance procedures, review and clearance process of subproject's resettlement plan. OP 4.10 Indigenous People is also triggered to maximize the project benefits in ethnic minority community. Ethnic Minority Planning Framework (EMPF) was prepared, setting out guidelines to: (a) ensure that the ethnic minority peoples receive social and economic benefits that are culturally appropriate; (b) avoid potentially adverse effects on the ethnic minority communities; and (c) when such adverse impacts cannot be avoided, minimize, mitigate, or compensate for such effects. The IEs must be able to demonstrate that it has obtained broad community support for the subproject through a process of free, prior, and informed consultations with the affected ethnic minority communities. Any non-social safeguard impacts (for example, gender and employment) will be addressed in the project Environmental and Social Management Framework (ESMF) developed under the framework of OP 4.01. The subloan agreement between the PFIs and the IEs will specify that participating IEs must fully comply with the existing national labor laws, including those related to children and women and will include appropriate mitigation measures.

75. **Gender.** The Bank conducted a gender analysis as part of social impact assessment to understand the potential impacts at community, organizational, and individual levels once introducing industry EE investments under the proposed project. The specific objectives of the assessment were to: (a) identify and analyze the potential organizational impacts (positive and negative) and adaptation strategies of the concerned enterprises; (b) identify and analyze the potential impacts (positive and negative with particular attention to gender and ethnic minority groups) and adaptation strategies of the employees working in the concerned enterprises; (c) identify and analyze the perception of men and women living in communities in surrounding areas of concerned enterprises, about the potential impacts (positive and negative) caused by the proposed investments; and (d) provide recommendation/suggestion to inform the design of Bank-funded project, ensuring that impacts (if any) on men and women, respectively, will be addressed. The social risk for the project is rated as Low.

F. Environment (including Safeguards)

76. OP/BP 4.01 Environmental Assessment is triggered due to the potential adverse environmental and social impacts associated with the financed subprojects under components 1

and certain technical assistance activities under component 2.

77. Under the component 1, the Project will finance various subprojects under energy intensive industries such as cement, iron and steel, and pulp and paper. The following potential energy saving measures will be used: (a) adoption of energy saving industrial technologies (e.g., efficient industrial boilers, kilns, and heat exchange systems); (b) recovery and utilization of wastes and waste heat; (c) installation of highly efficient mechanical and electrical equipment (e.g. motors, pumps, heating and ventilation equipment); and (d) industrial system optimization to reduce energy use.

78. On the positive side, the project will brings about important benefits to industries and the environment by contributing to the reduction of GHGs and pollutants, increasing energy savings, and encouraging the promotion of environmentally good industry practices. On the negative side, the project will cause potential environmental impacts during the construction and operation of subprojects under component 1. These impacts include noise, dust, labor safety, and disposal of old parts and equipment which may hazardous waste and, in rare cases, the oil extracted from transformers which may contain PCBs. The possible impacts during the operation of new equipment and facilities may include worker and health safety issues, air pollution, generation of solid waste, wastewater, and disposal of hazardous substances from such polluting industries such as cement, steel, textile, pulp and paper, food processing, etc., even though less and lower toxicity than those generated from the old technologies and equipment. It is anticipated that most of subprojects will be category B, with typical impacts which are assessed as localized varying from small to moderate scale, and which can be mitigated via good management practices and readily designed mitigation measures.

79. As the subprojects are not c prior to appraisal, an ESMF has been prepared by the Client to guide the environmental assessment process and ensure compliance of the financed subproject with the World Bank's safeguard policies and national environmental regulations. The ESMF is in accordance with the national regulations on environmental assessment and Bank's safeguards policies and requirements on public consultation and information disclosure. The ESMF also refer to the Interim Guidelines on the Application of Safeguard Policies for TA activities in Bank-financed Projects. TA activities will be screened against the Interim Guidelines. The ESMF also includes the procedures for conducting environment and social audit/due diligence of existing facilities that will be supported/retrofitted by the project. The Project Management Board (PMB) under MOIT, PFIs and IEs are the key actors responsible for safeguard implementation of the project. More details on environmental assessment, ESMF content, public consultation and information disclosure are described in Annex 4.

80. A primary requirement of the ESMF is that the sub-borrowers provide the PFI an Information Package that includes the sub-borrower EIA approval letter or certificate, the EIA document and documentation that consultation and disclosure were performed in accordance with Vietnamese and Bank requirements. All PFIs will contract with Vietnamese environmental consultants for any technical reviews or activities that are their responsibility, given the likely absence of any local environmental concerns. An audit/due diligence of existing facilities that will be supported/retrofitted by the project will be done by PFIs officer/consultant to determine the eligibility of the subproject. The environmental risk for the project is rated as Moderate.

81. **Public Consultation and Information Disclosure**. During the ESMF, EMPF and RPF preparation, consultation workshop was conducted on October 9, 2015 with the aim to collect feedbacks/comments on the frameworks developed under the project. The workshop was attended by various participants coming from NGO, central government, research institute. Comments received in the workshop have been incorporated in the final version of the framework. All safeguard frameworks have been disclosed at the subproject sites, MOIT's website, and in the InfoShop. All subprojects' safeguard instruments are also required to follow the Bank policy on access to information in public consultation and disclosure of information. The updated ESMF was disclosed in-country and on the Bank's website on November 24, 2015.

G. Other Safeguards Policies Triggered

82. **Physical Cultural Resources OP/BP 4.11** is triggered. The project would not involve significant excavations, demolition, moving of earth, flooding, or other environmental changes. It is not expected that the project will affect any known PCR. However, there is a possibility that some unknown PCR may be revealed during the subproject implementation if they include excavation activities. Therefore, the policy is triggered and a chance finds procedure has been prepared and included in the ESMF, and will be incorporated in site-specific subproject safeguards instruments, bidding, and contractual documents during implementation

H. World Bank Grievance Redress

83. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit www.worldbank.org/grs. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

Annex 1: Results Framework and Monitoring

Country: Vietnam

Project Name: Vietnam Energy Efficiency for Industrial Enterprises (VEEIE) (P151086)

Results Framework

Project Development Objectives

PDO Statement

The PDO is to improve energy efficiency in Vietnam industrial sector.

These results are at	Project Level

Project Development Objective Indicators

		Cumulative Target Values					
Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
Projected lifetime energy savings (MWh) (Core)	0	231,000	1,159,000	2,551,000	3,943,000	4,639,000	4,639,000
Number of IEs adopting improved EE technologies	0	2	4	7	15	25	25

Intermediate Results Indicators

		Cumulative Target Values					
Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
Direct Project Beneficiaries (number) (Core)	0	1,891	9,456	20,802	32,149	37,822	37,822
Percentage of female beneficiaries (Percentage) (Sub-type: Supplement)	0	15	20	30	30	30	30
Annual GHG emissions avoided in IEs (tons of CO2 equivalent) (Tones/year)	0	251,000	1,256,000	2,764,000	4,272,000	5,027,000	5,027,000
Number of EE bankable projects developed	0	5	10	20	25	60	60

Indicator Description

.

Project Development Objective Indicators

Indicator Name	Description (indicator definition etc.)	Frequency	Data Source / Methodology	Responsibility for Data Collection
Projected lifetime energy savings (Core)(MWh)	This indicator projects lifetime energy savings directly attributable to the project, converted to MWh. The baseline value for this indicator should be 0. Projected savings should be calculated against baseline or business-as-usual scenario in the absence of the project. Include the projected savings for the lifetime of the intervention in the year it is completed; for a series of small subprojects financed through the overall intervention, lifetime savings should be recorded at the time of the completion of the subproject.	Biannually	IA report	MoIT
Number of IEs adopting improved EE technologies	Number of IEs adopting improved EE technologies through the VEEIE support	Annually	IAs report	MOIT

Intermediate Results Indicators

Indicator Name	Description (indicator definition etc.)	Frequency	Data Source / Methodology	Responsibility for Data Collection
Direct project beneficiaries (Core) (Number)	Number of beneficiaries supported by the project	Biannually	IAs report	MoIT
Percentage of female beneficiaries(Percentage) (Sub-type: Supplement)	Percentage of female beneficiaries over total IEs population beneficiaries	Biannually	IAs report	MoIT
Annual GHG emissions avoided in IEs (tons of CO2 equivalent)	Cumulative CO2 emission reduction	Biannually	IAs report	MoIT
Number of EE bankable projects developed	Subprojects supported by financing facility or/and TA component.	Annually	IAs report	MoIT

Annex 2: Detailed Project Description

VIETNAM: VIETNAM ENERGY EFFICIENCY FOR INDUSTRIAL ENTERPRISES (VEEIE) PROJECT

1. The project comprises two components: (a) Energy Efficiency Investment Lending and (b) Technical Assistance and Capacity Building for Improving Energy Efficiency.

Component 1: Energy Efficiency Investment Lending (US$156.3 million, of which US$100 million from IBRD, US$25 million from PFIs, and US$31.3 million from IEs)

2. This component consists of an EE lending program over five years: (a) US$100 million in debt financing from IBRD; (b) PFIs will co-finance project activities, financing tentatively 20 percent of the total investment costs (as PFIs take all credit risks, this co-financing ratio is not mandatory); and (c) sub-borrowers (that is, IEs) will contribute 20 percent of investments as equity financing, which is common practice for loan applications in Vietnam.

3. The project is a financial intermediary operation. The PFIs will be selected on a competitive basis based, in accordance with financial and non-financial criteria set forth. Non-financial criteria will include an EE lending strategy, experience, and ability to generate a solid project pipeline. The selection of PFIs will comply with the Bank's OP 10.0 requirement for selection of PFIs. The IBRD funds will be allocated among the selected PFIs based on the demonstrated project pipeline and remaining funds will be allocated on a first-come, first-served basis.

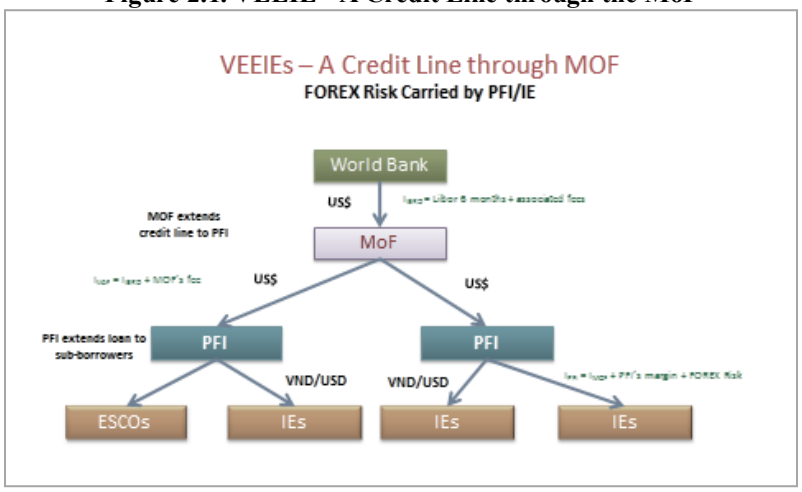
4. The Bank loan product chosen by the MoF is a LIBOR-based U.S. dollar denominated single currency fixed-spread loan (FSL) for US$100 million, with 10year maturity, including five year grace period. The MoF will on-lend to the PFIs at the same financial terms and conditions and will not provide any interest subsidy to the PFIs. The PFIs will be fully responsible for debt service and will bear all financial risks associated with the Bank loan.

5. The PFIs can extend the loan to the IEs either in U.S. dollar or Vietnamese dong. If the loan is in Vietnamese dong, the PFIs will carry FOREX risk and the interest rate to the IEs shall be determined on commercial basis by adding up the PFIs' margin and their FOREX risk premium. If the loan is in U.S. dollar, the PFIs decide the interest rate to the IEs on commercial basis by adding a margin determined by its cost, subproject risk, and sub-borrower's creditworthiness.

6. International experience demonstrated that dedicated credit lines are effective at increasing the capacity, interest, and confidence of PFIs in mainstreaming the EE financing business line through a learning-by-doing process and changing their perceptions so that they recognize that EE investments are actually a profitable business. This approach can achieve a double leverage effect by leveraging substantial debt contributions from the PFIs and equity financing from end beneficiaries and then revolving the loans that are paid back to the fund. It offers the best prospect for program sustainability. Evidence is accumulating that PFIs continue to provide EE financing after the credit line program is completed. The success formula for the credit line instrument is well established: (a) careful selection of PFIs against well-defined criteria; (b) inclusion of a few PFIs so that developers can shop for the best deal; (c) strong management commitment, dedicated teams at both headquarters and branches, and incentives to staff within the PFIs; (d) TA to support project pipeline development and capacity building of both PFIs and local project developers; and

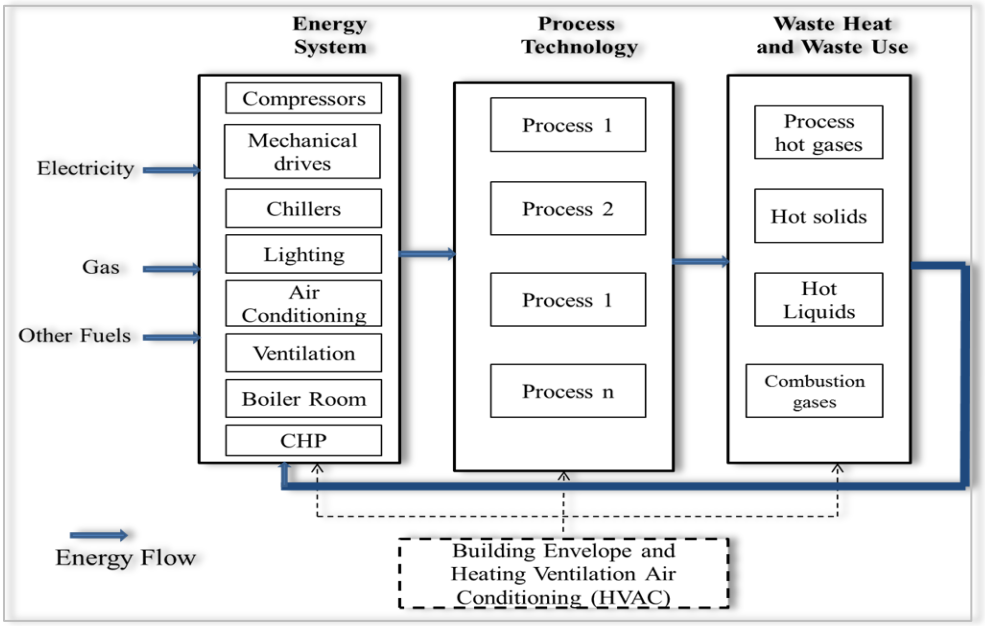
(e) aggressive marketing and business development as well as new financial products tailored to EE financing that are critical to generate sufficient deal flows.

Figure 2.1. VEEIE - A Credit Line through the MoF



7. EE and energy-saving technologies vary by industrial subsectors but potential energy-saving measures include (a) energy systems: upgrading boilers and switching fuels, using cogeneration facilities and electric-driven systems, including compressed air systems, electric chillers, machinery, and lighting; (b) process technology: upgrading and replacing equipment, machinery, and facilities; and (c) waste heat and waste use: use of waste heat (of hot/warm gases, liquids and solids) and burning combustible waste (gases, liquids, solids). Use of RE sources to decrease fuel and/or electricity consumption in IEs may also be considered. Investments may include (a) cogeneration facilities or process furnaces and stoves and (b) solar water heaters for sanitary hot/warm preparation. Eligible subproject criteria will be detailed in the OM. Figure 2.2 depicts the energy flows and investment in typical IEs.

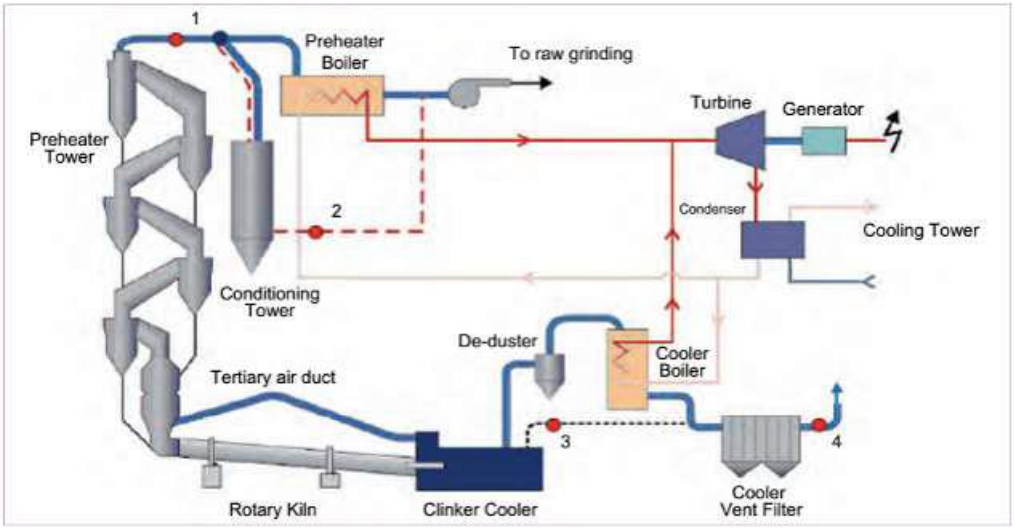
Figure 2.2. Potential EE Measures



8. Energy intensive industrial sectors include cement, steel, textile, pulp and paper, food processing, bricks and ceramics. Potential energy-saving measures for cement industry include using roller mill for grilling raw material, improving furnace fans and optimization of fans, installation of variable speed drivers, using waste fuel and waste heat recovery. The cement industry is one of the energy-intensive consumption sectors, producing a huge volume of heat exhaust at a temperature up to 350^{o}C. Therefore, one of measures to improve EE applied by countries worldwide is utilization of heat exhaust for power generation. This is a comprehensive solution achieving multipurpose, including utilizing heat waste without consuming more fuel for power generation at a sizeable capacity scale, reducing emissions of GHG CO_2, reducing heat and dust emissions into the environment, and increasing efficiency of equipment production line.

9. Figure 2.3 demonstrates a typical waste heat recovery system in cement plants. Waste heat recovery power systems used for cement kilns operate on the Rankine cycle. This thermodynamic cycle is the basis for conventional thermal power generating stations and consists of a heat source (boiler) that converts a liquid working fluid to high-pressure vapor (steam, in a power station) that is then expanded through a turbo generator producing power. Low-pressure vapor exhausted from the turbo generator is condensed back to a liquid state, with condensate from the condenser returned to the boiler feed water pump to continue the cycle. Waste heat recovery systems consist of heat exchangers or heat recovery steam generators (HRSGs) that transfer heat from the exhaust gases to the working fluid inside turbines, electric generators, condensers, and a working fluid cooling system. Three primary waste heat recovery power generation systems are available, differentiated by the type of working fluid, of which the Steam Rankine cycle is the most popular technology. The Steam Rankine Cycle, the most commonly used Rankine cycle system for waste heat recovery power generation, uses water as the working fluid and involves generating steam in a waste heat boiler, which then drives a steam turbine. Steam turbines are one of the oldest and most versatile power generation technologies in use.

Figure 2.3. Waste Heat Recovery Technology



10. By the end of 2014, total design capacity of all cement production lines in Vietnam reached 80 million tons of cement per year. Total outputs of the lines producing greater than or equal to 2,500 tons of clinker per day that are required to invest in waste heat recovery power generation

is nearly 70 million tons of cement per year. That means about 325 MW from waste heat recovery can be produced. The average investment cost is about US$2 million/MW and the total financing requirement is about US$650 million. Six cement companies expressed their interested in participating in the VEEIs financing facility, as detailed in the table.

Table 2.1. Potential Waste Heat Recovery Projects

No.	Name of Company	Generation Capacity (MW)	Investment Cost (US$, millions)	Implementation Timeline
1	Huong Duong Cement Company	9.0	18.0	18 months
2	Vietnam Constructional Material Co. Ltd	8.0	15.0	18 months
3	Song Thao Cement Company	4.5	7.5	15 months
4	Tan Quang Cement Company	3.0	6.0	2017-2018
5	FiCo Tay Ninh Cement Company	5.2	9.0	2017-2018
6	Trung Son Cement Company	5.0	15.0	2018
Total		**34.7**	**70.5**	

11. Energy-saving technologies for steel and iron industry would include waste heat recovery, construction of closed production lines, replacement of low performance air compressor, and installation of inverter for motor to operate at low or fluctuating loads. Waste heat recovery uses the heat from flue gas (exhausted heat from electric arc furnaces, furnaces, kilns, and so on) to preliminarily heat up the steel scraps before putting into the electric arc furnace to reduce the time in the furnace, thereby saving energy and improving capacity. It could help to heat the steel bars before entering the kiln to save oil for furnaces. Furthermore, it also helps to heat up the oil instead of the drying resistors to reduce electricity consumption.

12. Project information from the Vietnam Paper Corporation include the investment of new efficient boilers for cogeneration (heat and electricity), replacement of motors, switching to biomass fuel technology, and chemical waste recovery for heating. This table presents initial investments proposed by the Vietnam Paper Corporation.

Table 2.2. Potential EE Projects in the Pulp and Paper Sector

No.	Project description	Investment cost (US$, millions)	Implementation Timeline
I	**Vietnam Paper and Pulp Corporation**		
1	Replacement of motor	0.7	2018
2	Wood Plet (biomass)-fired project replacement of coal fired	2.7	2018
3	Replacement of turbine for cogeneration (8 MW)	2.0	2017
4	Replacement of new boiler for cogeneration	20.0	2017–2018
5	Chemical recovery boiler	50.0	2017–2018
6	Replacement of washing and cleaning machine	3.5	2018
	Subtotal I	**78.9**	
II	**Viet Tri Paper Co**		
7	Power Boss	1.0	2017
8	Biomass boiler and cogeneration	5.0	2017-2018
	Subtotal II	**6.0**	
Total		**84.9**	

Assessment of EE Investment Needs

13. The investment need in Table 2.3 is based on data and studies carried out by the MoIT and other agencies. There is no comprehensive assessment for all industrial sectors but the MoIT intends to carry out an assessment for most energy-intensive industrial sectors, for which action plans and sectoral targets will be prepared.

Table 2.3. Investment Needs in Selected Industrial Sectors

Industrial Sector	Investment Need (US$, millions)	Note
Cement	650	For waste heat recovery investment only, more than 40 factories need to install waste heat recovery
Pulp and paper	85	Just for Vietnam Paper Corporation
Steel	450	
Chemical	12	Just for few subsectors
Beverage	230	About US$50 million within the first 5 years and US$180 million in the next 5 years
Total	**1,427**	

14. **Cement sector.** The government has issued Decision no. 1488/QD-TTg approving the cement sector master plan for the period 2011 to 2020, vision to 2030, for which all new production lines with a capacity above 2,500 tons clinker per day must install waste heat recovery systems. The existing cement factories with capacity above 2,500 tons of clinker must install a waste heat recovery system before 2015. The cement factories that have lower capacity are encouraged to install waste heat recovery systems. According to the cement association, more than 40 factories will need to install a waste heat recovery system for power generation. The average cost of waste heat recovery generation is about US$2 million/MW. The total investment demand for the cement sector is about US$650 million.

15. **Iron and steel sector.** Approximately VND 9.23 million (US$450 million)[11] will need to be invested in EE technology measures, with an estimated energy savings benefit of about 177 ktoe per year. This amount of savings is equivalent to approximately VND 3.24 million at the current prices of electricity and thermal energy and an additional benefit from Clean Development Mechanism or Carbon Credit was not included. This targeted savings will be reached at the end of the plan in 2025. It should be noted that new installations after 2015 will have to comply with the new regulation requiring that all new installations must adapt to high efficiency, modern technologies and must generate specific energy consumption (SEC) not exceeding the specified values. Therefore, EE measures which will need investments will be implemented only in the existing plants.

16. **Chemical sector.** The MoIT carried out an assessment in 2013 for the chemical sector, which evaluates the energy-saving targets in the short term covering the first 1–5 years of the program and also energy-saving targets in the medium term of 6–10 years. The energy-saving targets are based on achieving low-cost implementation before the higher-cost actions. The EE actions proposed are based on the output of the benchmarking process, the energy audits, and from

[11] MoIT, Establishment of an Energy Savings Scheme in Steel Sector in Vietnam, April 2014.

experience on similar work. The total investment cost for energy-saving measures short to medium term is about US$12 million.

Table 2.4. Investment Needs in the Chemical Sector

Sector	Industry Medium Term Priority Investment					Government Indirect Investment
	Energy Saving PE (MJ/Yr)	Project Areas	Small Investment (million VND)	Medium Investment (million VND)	Large Investment (million VND)	Total marketing cost in 6-10 year (million VND)
Rubber sector	18,425,743	Biogas and gasification		109,714		6,626
NPK fertilizers	41,135,345	Solar dryers		77,347		14,812
Solvent based paints	107,101	efficient grinders and VSD	1,134			37
Water based pains	596,218	efficient grinders and VSD	6,800			197
Total	60,264,407		7,934	187,061	194,994	21,672

17. **Beverage sector.** Investment demand depends on the priorities of energy-saving measures in the short or medium term. According to the sector development plan and assessment of energy-saving potential, about US$56 million investment is needed for attaining the first 5 years' energy-saving target and about US$161 million will be needed for the next 5 years. Table 2.5 presents more details.

Table 2.5. Investment Needs in the Beverage Sector

Production	Investment need over 1-5 years (billion VND)	Investment need over 5 years (billion VND)	Investment need over 10 years (billion VND)
Beer			
Capacity>100 million liters	394	1,065	1,459
Capacity:20-100 million liters	515	1,440	1,955
Capacity <20 million litters	16	40	56
Sub-total	**925**	**2,545**	**3,470**
Non-alcoholic beverage			
Carbonated beverage	169	576	745
Non carbonated beverage	95	294	389
Sub-total	**264**	**870**	1,134
Total	**1,189**	**3,415**	**4,604**

18. An OM was developed which outlines the selection criteria for sub-borrowers and subprojects, appraisal procedures and guidelines, roles and responsibilities of the PFIs and the government, the PFIs' internal institutional arrangement for project implementation, technical evaluation, environmental and social assessment, procurement, and financial management frameworks that are consistent with the Bank and Vietnamese government rules and procedures. During project implementation, the PFIs will be responsible for identifying, appraising, and financing subprojects that meet the criteria in the OM and bear all associated risks. Further, OM defines the requirements and guideline of technical designed and energy saving estimation to be reviewed by qualified independent engineers, and post-review arrangement.

19. A financial and economic analysis for a sample of representative EE projects (cogeneration from waste heat recovery (cement industry), variable speed motors and regenerative burners (steel industry), and energy-efficient pulp washers (paper) shows robust financial and economic returns over a wide range of input assumptions. Detailed financial and economic analysis is presented in Annex 3.

Component 2: Project Implementation Support (US$1.7 million funded through IDA)

20. This TA and capacity-building component intends to provide technical assistance and capacity building support to MoIT on Project monitoring and supervision, including audits of Project activities and safeguards implementation.

21. IFC is providing advisory services to Vietinbank and it will continue to work further with the Bank team to identify suitable support capacity mechanism once the PFIs are identified. Under the existing CPEE project, the Bank is providing TA to key energy consuming industrial enterprises to develop voluntary agreements, which could form a key part of the pipeline. The TA and capacity building for PFIs will include support for (a) capacity building and training, particularly to staff at both headquarters and the branches as well as risk assessment staff, including support for the development of necessary procedures, and the creation of an adequate knowledge base to evaluate and extend EE loans; (b) marketing and business development to generate a robust EE lending pipeline; (c) support to due diligence of eligible EE subloans, including financial, technical, social, and environmental assessments; and (d) development of energy-conservation-related financing instruments and risk management tools.

Potential additional TA grant is proposed to be mobilized from Green Climate Fund (GCF) in parallel to support the following activities:

84. *TA and capacity building to the MoIT* will support (a) strengthening of the policy and legal and regulatory framework for EE in IEs; (b) development of relevant energy use standards and establishment of EE industrial benchmarks; and (c) development of the ESCOs, scaling-up and encouraging EE voluntary agreement, and conducting a communication campaign to raise awareness on EE for IEs.

85. *The TA and capacity building to the PFIs* include (a) business startup, including creation, organization, staffing, and initial business plan of the EE lending business unit (or team); (b) capacity building and training, including support for the development of necessary financial instruments, procedures, and the creation of an adequate knowledge base to evaluate and extend EE loans; (c) marketing and development of an EE subproject pipeline; (d) support to due diligence

of eligible EE subloans, including financial, technical, social, and environmental assessments; and (e) development of energy-conservation-related financing instruments and risk management tools.

86. *The TA and capacity building for IEs* will include support to (a) identify EE projects and prepare relevant energy audits, technical design, and EE project preparation and (b) raise awareness through a communication campaign organized jointly with relevant industry associations. Capacity building on safeguards for the PFIs, ESCOs, and IEs as well as on-the-job training will be provided. TA to ensure adequate capacity for the review and implementation of safeguard issues will also be considered.

87. A detailed TA and capacity-building program and plan for the MoIT, PFIs, and IEs and the associated procurement plan will be developed for the first 18 months. A Bank-executed grant from the Canadian Externally Financed Output will be used to conduct a strategic sector study for the food processing industry in Vietnam, including the following:

- Strategic sector work on energy savings and ozone/climate benefit potential and EE benchmarking resulting from EE policy and investments in the seafood processing sector. This work will draw from an initial sector survey that was carried out under the Vietnam-HCFC Phase-out Project (Phase I) (P115762) as well as the IFC study from 2010.
- Workshops to inform IEs, financial institutions, and government, as well as donors about opportunities for EE technologies and financing.
- Pipeline preparation support, with specific energy audits, technical pre-feasibility study (FS).

22. The ongoing CPEE provides support on sectoral studies, energy auditing, and benchmarking for energy-intensive industries. It also provides information on energy-saving potential and a road map for EE measures. The project will build on the outcomes of the CPEE and develop a solid project pipeline for financing, thereby transforming voluntary agreement into real investment.

Parallel Related operations

88. **International Finance Corporation.** IFC has provided advisory service to Techcombank and VietinBank for EE financing and is providing technical support for industrial zone on resources use efficiency, which contributes to development of project pipeline for VEEIE.

89. **Nordic Development Fund.** An ongoing €1.5 million grant project financed by the NDF aims at improving Vietnam's readiness to benefit from international climate financing by supporting scaling-up mitigation actions in the cement sector. The project will explore and address gaps in data availability and quality regarding sectoral GHG emissions, technical and institutional capacity, and potential barriers to implementing scaling-up GHG mitigation actions in the cement sector in Vietnam. Special emphasis will be given to exploring opportunities to use new forms of international climate finance, including possible new market-based mechanisms in Vietnam's cement and constructions sector, implying a results-based approach for provision of future support. The project will close in December 2016; however, the NDF is in discussion with the Bank on potential parallel financing with the VEEIE as a continuation of cement sector support.

90. **Danish International Development Agency.** US$6.5 million ongoing Low Carbon Transition Energy Efficiency (LCEE) project financed by DANIDA grant supports Vietnam's SME in the brick, ceramic, and food processing sectors adopting EE measures that will contribute to the VNEEP energy-saving targets between 5 - 10 percent. The project provides green investment fund and guarantee facility for investment in EE technologies. The project can help SMEs access financing facility under the VEEIE.

91. **United Nations Industrial Development Organization.** UNIDO is currently developing a TA program to promote EE boiler adoption and operating practice in Vietnam. The TA aims to develop the relevant regulatory framework to support boiler standardization, training, and capacity building for government agencies and boiler owners and demonstration of efficient boiler adaptation. This TA will scale up investment in efficient boilers in industrial sector.

92. **Swiss State Secretariat for Economic Affairs.** SECO established a trust fund that provides partial credit guarantees and incentive grants for cleaner production (such as pollution prevention, EE, water and material recycling, and so on). This Green Credit Line works with three commercial banks (Techcombank, Asia Commercial Bank, and Vietnam International Bank), which will be leveraged by the VEEIE technical and financing sources.

Potential Carbon Finance Program: Given the VEEIE project will support energy efficiency and energy conservation in the industrial enterprises, the project is expected to bring additional benefits through reduction in carbon emissions. It is estimated that the project, if fully implemented, will generate about 9.7 million ton of carbon equivalent reduction annually. Several donors have shown their interest in supporting development of carbon finance program. The Bank's Climate and Carbon Unit is also working jointly with MOIT to develop a program for the Carbon Partnership Facility and/or Transformative Carbon Asset Facility that is under preparation and a concept note is being prepared for donors' review.

Annex 3: Detailed Financial and Economic Analysis

VIETNAM: VIETNAM ENERGY EFFICIENCY FOR INDUSTRIAL ENTERPRISES (VEEIE) PROJECT

1. The selection of subprojects for EE financing will be the responsibility of the on-lending banks, based on the normal commercial principles of bank lending. The basic presumption is that projects that are financially viable will also be economically efficient. This presumption has been widely observed in similar projects in other countries. This is a consequence of the fact that financial viability excludes the significant environmental benefits not reflected in market prices and that financial returns reflect a variety of transfer payments (taxes, duties, and so on) that are excluded from the economic accounts. Moreover, with electricity prices that do not yet fully reflect the economic cost of thermal fuels, the financial benefits of saved electricity will be lower than the economic value used to estimate economic benefits.

2. This Annex presents the economic and financial analysis of a representative sample of subprojects and will likely be in the initial project pipeline. This analysis will also reflect the new Bank requirements for carbon accounting[12] and the guidance note for the value of the global social cost of carbon.[13]

3. The projects analyzed here have been selected to illustrate the economic and financial returns for a range of industrial EE measures rather than specific projects in the VEEIE pipeline (which has yet to be confirmed). At a later stage, the specific projects proposed by the PFIs can be quickly analyzed since the methodology and calculation tools are now in place. The illustrative measures include the following:

- Waste heat recovery (replace grid-supplied electricity)
- Replacement of burners (fuel oil saving)
- Variable speed drive motors (reduce grid-supplied electricity)

4. **Valuation of economic benefits.** Where EE projects reduce direct fuel consumption (fuel oil, diesel, and coal) valuation is straightforward, based simply on the relevant border prices. Where EE projects reduce electricity consumption, valuation is more complex, since it will depend on relevant marginal changes in dispatch and the extent to which a capacity credit is warranted.

5. Where base-load generation is displaced, as for example in the case of a waste heat recovery project in the cement industry and where load factors are comparable to utility coal-fired projects, then a capacity credit based on the avoided fixed costs is added to the avoided variable costs of coal generation. These variable costs are based on the relevant import parity cost (that is, border price adjusted for any transportation differentials) rather than the EVN's avoided financial costs at the plant gate (which would be relevant only for the financial analysis).

[12] World Bank. 2015. *Guidance Note: Greenhouse Gas Accounting for Energy Investment Operations (Transmission & Distribution Projects, Power Generation Projects and Energy Efficiency Projects*), Version 2.0, January 2015. World Bank Sustainable Energy Department.

[13] World Bank. 2014. *The Social Value of Carbon in Project Appraisal*. Guidance Note to the World Bank Group Staff, September.

6. At low load factors, the electricity displaced will be the most-expensive thermal generation, which will be gas-fired generation in combined cycle units whose gas price is linked to international price markers. During peak hours, this will be the Ca Mau combined cycle gas turbine, whose gas price is tied to the Singapore heavy fuel oil price.[14] Dispatch studies by the National Load Dispatch Centre show that for the foreseeable future, some gas CCGTs run 24 hours/day, including during the wet season.[15] However, much of this generation is in independent power plants under take-or-pay contracts, so the assumption that coal is the displaced base-load generation is conservative. In any event, the valuation of gas should be at the international benchmark which is 90 percent of the Singapore heavy fuel price (and it is noted that Malaysia exports some of its share of the Ca Mau field to Singapore at this benchmark, rather than the 45 percent used by Vietnam).

7. Table 3.1 shows the fuel price forecasts used in this analysis, which are based on the latest commodity forecast published by the Bank in October 2014 (rows 1-7). These have been adjusted in light of the current collapse in oil prices, but it is assumed that the price will gradually rise again to meet the long-term forecast again by 2017 (the shaded cells in table show the assumed deviations from the Bank forecast).

Table 3.1. International Fuel Price Forecasts - Nominal

		Unit	2014	2015	2016	2017	2018	2020	2025
[1]	**World Bank** (1)								
[2]	Crude oil (2)	US$/barrel	101.5	95.7	96.6	97.4	98.3	100.2	105.7
[3]	Natural gas								
[4]	United States	US$/mmBTU	4.4	4.7	4.9	5.1	5.3	5.7	7.0
[5]	Europe	US$/mmBTU	10.3	10.2	10.1	9.9	9.8	9.6	9.0
[6]	Japan liquefied natural gas	US$/mmBTU	16.5	16.8	15.4	15.1	14.7	14.1	12.5
[7]	Coal, Australia	US$/ton	71.0	75.0	77.2	79.4	81.8	86.6	100.0
[8]	**Adjusted forecast**								
[9]	Crude oil	US$/bbl	–	70	80	97.4	98.3	100.2	105.7
[10]	Coal, Australia	US$/ton	–	65	70	79.4	81.8	86.6	100.0

Notes: (1) World Bank Commodity Price Forecast, October 2014; (2) Average of spot Brent, West Texas Intermediate, and Dubai.

8. Table 3.2 shows the carbon valuations to be used in project appraisal. These are at constant 2014 prices and so require escalation at the assumed U.S. dollar inflation rate for use in the economic analysis (which is at constant 2015 prices).

Table 3.2. Carbon Valuation

		2015	2020	2030	2040	2050
1	Low	15	20	30	40	50
2	Base	30	35	50	65	80
3	High	50	60	90	120	150

Source: World Bank. 2014. *The Social Value of Carbon in Project Appraisal*, Guidance Note to the World Bank Group Staff, September.

9. **Macroeconomic assumptions.** The economic/financial analysis draws on the following

[14] Gas price in US$/mmBTU = 1.17 + 0.45 (Singapore fuel oil price).
[15] These studies are conducted annually with the issuance of the ACT for qualified small RE producers.

assumptions:

- *Discount rate:* 10 percent
- *2015 Exchange rate:* US$1 = VND 21,200, future nominal rates adjusted by the ratio of domestic to U.S. dollar inflation
- *Domestic inflation:* 6 percent
- *U.S. dollar inflation:* 2 percent

Illustrative Project A: Cement Industry: Waste Heat Recovery

10. **Project features.** The project involves the installation of a waste heat recovery system for electricity generation at the HOLCIM cement company. The electricity generated would displace purchased electricity from the grid—the benefit to the industry being the avoided financial cost of electricity purchases.

Table 3.3. Project Data

	Unit	Value
Installed capacity	MW	7
Full-load operating hours	[hours]	7,660
Load factor	[ ]	0.87
Capital cost	US$/MW	2,000
	US$, millions	14
Own-use	[ ]	7%
O&M costs per year	US$, millions	0.45
Annual energy production	GWh	49.9

Source: Provided by HOLCIM.

11. **Financial analysis.** The financial analysis is based on 30 percent equity, 70 percent debt provided by the PFI in Vietnamese dong, for which we assume an interest rate of 8.83 percent as shown in Table 3.4. It is assumed that the MoF will on-lend to the PFI in U.S. dollars, so the FOREX risk resides with the PFI, for which we assume a 3.5 percent margin, in addition to the normal commercial risk margin of 3.5 percent (the impact of higher rates of interest is tested in the risk analysis below). Loan repayment is six equal principal repayments starting in the first year of operation.

Table 3.4. Interest Rates

	IBRD	MoF	PFI
Lending in	US$	US$	VND
[1] LIBOR	1.08%	–	–
[2] Commitment fee	0.50%	–	–
[3] Cost of refinance	–	1.58%	1.83%
[4] MoF fee	–	0.25%	–
[5] PFI margin	–	–	3.50%
[6] FOREX margin	–	–	3.50%
[7] Total	1.58%	1.83%	8.83%

12. **Other assumptions for the financial analysis:**

- *Average industrial electricity tariff 2015*: VND 1,438 per kWh, escalated at the domestic inflation rate

- *Corporate income tax rate:* 25 percent
- *Depreciation:* 20 years, straight line

13. Under these assumptions, the post-tax nominal financial return on equity (ROE) is 25.6 percent.

Table 3.5. Financial Returns

				NPV	2015	2016	2017	2018	2019	2020	2025	2030
						[1]	2	3	4	5	10	15
[1]	Installed capacity		MW			7.0	7.0	7.0	7.0	7.0	7.0	7.0
[2]	gross generation	0.87	GWh			53.6	53.6	53.6	53.6	53.6	53.6	53.6
[3]	own-use	7.0%	GWh			-3.8	-3.8	-3.8	-3.8	-3.8	-3.8	-3.8
[4]	Net generation at meter		GWh			49.9	49.9	49.9	49.9	49.9	49.9	49.9
[5]	Load factor		[ ]			0.81	0.81	0.81	0.81	0.81	0.81	0.81
[6]	Average tariff	0.06	VND/kWh		1438	1524	1616	1713	1815	1924	2575	3446
[7]			USc/kWh			7.6	8.1	8.6	9.1	9.6	12.9	17.2
[8]	Revenue		VNDbillion			76.0	80.6	85.4	90.5	96.0	128.4	171.9
[9]	**Costs**											
[10]	Equity		VNDbillion		89.0							
[11]	O&M fixed	3.2%	VNDbillion			9.5	10.7	11.4	12.0	12.8	17.1	22.9
[12]	O&M variable		VNDbillion									
[13]	debt service: principal		VNDbillion			34.6	34.6	34.6	34.6	34.6	0.0	0.0
[14]	debt service: interest	8.83%	VNDbillion		9.2	16.8	13.8	10.7	7.6	4.6	0.0	0.0
[15]	income tax		VNDbillion			13.5	15.7	17.8	20.0	22.3	32.7	45.0
[16]	Net financial flows		VNDbillior	*151.5*	*-98.2*	*1.6*	*5.8*	*10.9*	*16.2*	*21.7*	*78.7*	*104.0*
[17]	equity IRR		[ ]	25.6%								

14. **Financial risk assessment.** The two main potential risks to the project returns (assuming that the FOREX risk is carried by the PFI and reflected in the interest rate) are as follows:

- Tariff increases may not keep up with inflation (so benefits of self-generation will be lower than expected).
- Capital costs may be higher than expected.

15. The switching values assessment is shown in this table. The relevant hurdle rate is assumed to be 14 percent post-tax ROE. The financial returns are robust with respect to these uncertainties.

Table 3.6. Switching Value Assessment

	Unit	Baseline	Switching Value	
Capital cost	US$/kW	2,000	2,825	A 41% increase in capital cost is unlikely and easily mitigated—if the tender price were at this level, the project would not proceed.
Tariff escalation rate	[ ]	6%	1.7%	The switching value implies a tariff that declines in real terms (given the assumed 6% rate of inflation). This may be considered unlikely under the new arrangements for regular tariff adjustment.

16. **Economic analysis.** Given the high load factor (87 percent), the counterfactual is base-load coal under the following assumptions:

- Transmission losses at industrial supply voltage 5 percent (so for every kWh not supplied by the grid, 1.05 kWh of thermal generation is avoided).

- Electricity displaced is base-load imported coal project, 500 MW super-critical, lower heating value efficiency - 38 percent, economic capital cost - US$1,200/kW, net heat rate, fixed O&M - US$35/kW/year.

17. The baseline estimate of economic returns is shown in Table 3.7. The ERR is 33.4 percent and NPV is US$6.4 million. These are high economic returns typical of waste heat recovery investments.

Table 3.7. Economic Analysis

	Numeraire=$US			*NPV*	2015	2016	2017	2018	2019	2020	2025	2030
[1]	*Benefits*											
[2]	Thermal electricity displace	0.06	[GWh]			53.0	53.0	53.0	53.0	53.0	53.0	53.0
[3]	Heat rate at marginal plant	9257	[BTU/kWh]									
[4]	Thermal fuel requirement		mmmBTU			491	491	491	491	491	491	491
[5]	fuel cost, import parity [nominal]		[$/mmBTU]		2.8	3.0	3.4	3.5	3.6	3.7	4.2	4.8
[6]	Fuel cost, nomimal		[$USm]			1.47	1.66	1.71	1.76	1.80	2.08	2.38
[7]	At constant 2015 prices		[$USm]	*11.3*		1.44	1.59	1.61	1.62	1.63	1.70	1.76
[8]	avoided capital cost	1200	[$USm]		8.4							
[9]	avoided fixed O&M	35	[$USm]			0.25	0.25	0.25	0.25	0.25	0.25	0.25
[10]	*Costs*											
[11]	Investment		[$USm]	*-11.5*	-12.6							
[12]	Fixed O&M	3.2%	[$USm]	*-2.8*		-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41
[13]	Net flows		[$USm]	*6.39*	-4.20	1.28	1.43	1.45	1.46	1.47	1.54	1.60
[14]	ERR		[ ]	*33.4%*								

18. **Carbon accounting.** The carbon accounting required by the carbon accounting guidelines is shown in Table 3.8. In the project baseline, the carbon emissions are those that are required in EVN's coal-fired generating stations to provide the same electricity at the HOLCIM plant (that is, 6 percent more than the net output of the waste heat generator since one also avoids the losses in the transmission system). In the nomenclature of carbon accounting, these are 'scope 2' emissions, that is, they occur outside the project boundaries. In the absence of the project, there are no 'scope 1' emissions (that is, inside the project boundary)

19. With the project in place, both scope 1 and scope 2 emissions are zero. Thus the net carbon impact is the sum of the no-project scope 2 emissions, the lifetime total of which is 722,000 tons of CO_2. The emission factor to be used is not the average grid emission factor but that which corresponds to the thermal generation that is displaced, which is coal calculated at 910 g/kWh.

Table 3.8. Carbon Accounting

				NPV	2015	2016	2017	2018	2019	2020	2025	2030
[1]	**Baseline [scope 2]**											
[2]	Electricity displaced		GWh			49.87	49.87	49.87	49.87	49.87	49.87	49.87
[3]	T&D losses to HT cust	0.06	GWh			2.99	2.99	2.99	2.99	2.99	2.99	2.99
[4]	Thermal electricity		GWh			52.86	52.86	52.86	52.86	52.86	52.86	52.86
[5]	Coal emisison factor		kg/kWh			0.91	0.91	0.91	0.91	0.91	0.91	0.91
[6]	GHG emissions		tons			48101	48101	48101	48101	48101	48101	48101
[7]												
[8]	**With project [scope 1]**											
[9]	GHG emissions		tons			0	0	0	0	0	0	0
[10]												
[11]	Avoided GHG emissions		mill.tons	0.722		-48101	-48101	-48101	-48101	-48101	-48101	-48101

Note: T&D = transmission and distribution; HT.

20. The impacts of the carbon valuations required by the new guidelines on economic returns are dramatic. Baseline economic returns increase from 33.4 percent to 70.6 percent. However, this

is easily explained. At US$30/ton (increasing gradually over time), the cost per kWh is about the same as the cost of coal itself. As shown in rows 7 and 8 of Table 3.9, in 2016 the cost of coal is U.S. cents 2.72/kWh, but the damage cost is U.S. cents 3.05/kWh. Under such assumptions, it is not a surprise that the economic return doubles when the avoided GHG emissions are valued at US$30/ton (and increasing over time in real terms).

Table 3.9. Economic Returns including Avoided GHG Valuations

			NPV	2015	2016	2017	2018	2019	2020	2025	2030
[1]	net flows (excluding externalities)		*6.4*	-4.2	1.3	1.4	1.4	1.5	1.5	1.5	1.6
[2]	Social Global Cost Carbon	[$/ton]			31.6	32.6	33.7	34.7	35.7	40.8	51
[3]		[$USm]	*12.4*		1.5	1.6	1.6	1.7	1.7	2.0	2.45
[4]	adjusted economic flows	[$USm]	*18.7*	-4.2	2.8	3.0	3.1	3.1	3.2	3.5	4.1
[5]	ERR	[ ]	70.6%								
[6]	*memo items*										
[7]	variable cost of fuel	USc/kWh			2.72	3.00	3.03	3.06	3.08	3.21	3.33
[8]	carbon valuation	USc/kWh			3.05	3.15	3.25	3.35	3.44	3.94	4.92

21. **Risk analysis.** The main risks to the economic returns are as follows:

- Capital costs are higher than expected.
- Persistently low international energy prices (at around their present level of US$60/bbl) prevail.
- The capacity credit (that is, the avoided capital and fixed O&M cost of EVN coal generation) may be smaller than assumed.

22.

23. Table 3.10 shows the switching value analysis for these input assumptions. The risk of not achieving the hurdle rate (even in the absence of the avoided GHG emission benefit) is small.

Table 3.10. Switching Values Analysis: Economic Returns

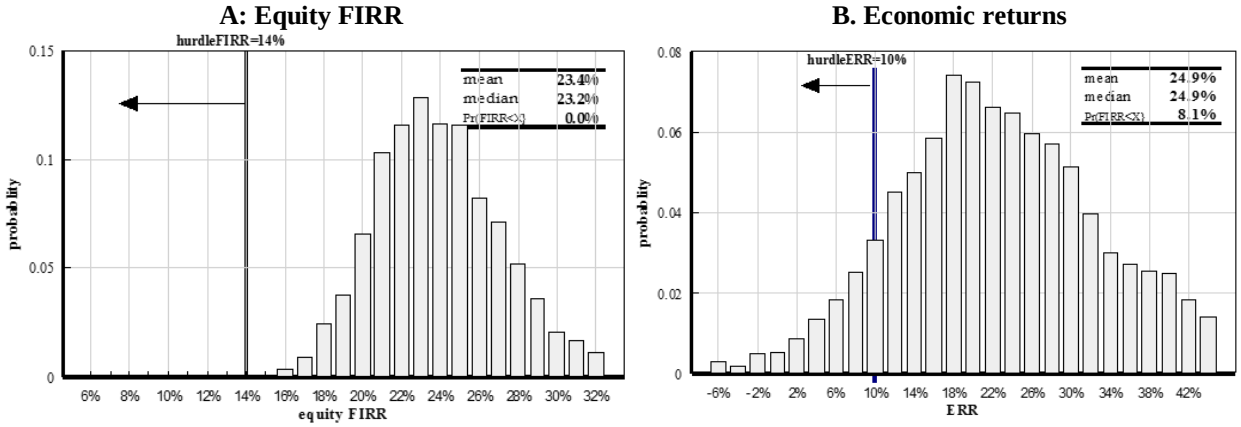
	Unit	Baseline	Switching Value	
Capital cost(1)	US$/kW	1,800	2,606	A 45% increase in economic capital cost is unlikely (and mitigated by the project not proceeding were the bid price for the waste heat recovery plant greater than this value).
2020 oil price(2)	US$/bbl	100	Not defined	Even if the oil price stays unchanged at its assumed 2015 value of US$70/bbl (and coal at US$65/ton), the ERR is still 23.5%.
Capacity credit	[ ]	100%	32%	At such a low-capacity credit, the displaced project would not be base-load but gas CCGT, whose fuel cost is triple that of coal and for which the ERR without a capacity credit is > 42.4%.

Note: (1) The tax and duty content of the capital cost is assumed at 10 percent. (2) Bank's long-term price forecast.

24. A quantitative risk assessment using Monte Carlo simulation shows a low probability of not achieving the hurdle rate. For the financial returns, the probability is essentially 0; for the economic returns, 8 percent.[16]

[16] The variables defined as probability distributions include the world oil price, the escalation rate of the electric tariff, the capacity credit, and the up-front investment cost.

Figure 3.1. Quantitative Risk Assessment



Conclusions: Waste Heat Recovery for Electricity Generation

25. The financial returns to equity to the project company (23.7 percent) are significantly above the likely equity return hurdle rate (assumed at 14 percent post tax). The financial risks are small; if the capital costs were to exceed US$2,800 (the switching value), the project would not proceed.

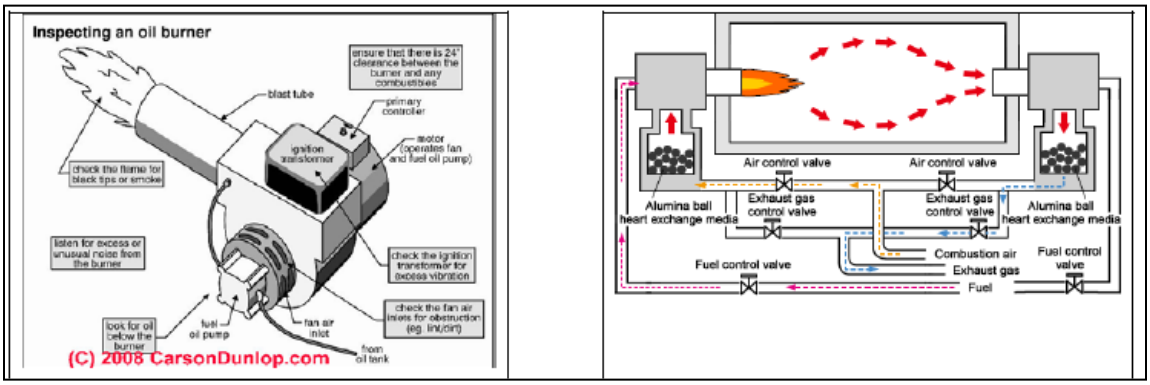
26. It may be concluded that the economic and financial returns are robust with respect to the main uncertainties (investment cost, the world oil price, and the industrial electricity tariff). The probability of the economic and financial returns falling below the hurdle rate is small.

Illustrative Project B: Steel Industry: Installation of Regenerative Burners

27. This project is recommended by the detailed energy audit of the NatSteelVina Co. Ltd. Established in 1993, it specializes in reinforcement bars and wire rods. Located in Thai Nguyen Province, Vietnam, NatSteelVina is one of the most efficient steel mills in Vietnam. It has an ISO 9001 certification and a rolling capacity of 120,000 tons per year. However, even in an otherwise efficient facility there are several additional opportunities for energy saving, in this particular case, fuel oil savings through state-of-the art regenerative burners. Although this was identified as a cost-effective EE option in 2013 at a time when the fuel oil price was around VND 21,000 per liter, the analysis shows that even at the present (February 2015) price of VND 12,000 per liter, the project would still have a payback of less than one year. The project involves the replacement of the existing fuel oil burners in the reheating furnace with so-called regenerative burners. Table 3.11 summarizes the project data.[17]

[17] In a related measure, the audit report recommends reduction of the excess air for the reheating furnace. This involves no capital investment, but would save an additional 219,000 liters of fuel oil per year. We claim no credit for this additional (albeit related) measure.

Figure 3.2. Burner Technology - Fuel Oil Burner Regenerative Burner



Source: *Walk-through Energy Audit, NatSteelVina (hot rolling process), Establishment of an Energy Savings Scheme for the Steel Sector in Vietnam.* MoIT and AfD.

Table 3.11. Project Data: Regenerative Burners

Investment for burner replacement(1)	VND billion	20.1
O&M cost(2)	% of capital cost	3%
Fuel oil savings per year	1,000 liters/year	548.7
	VND billion	11.5(3)

Source: Walk-through Audit Report, p.21.
Notes: (1) The report states the investment as VND 13.1 billion. The price level and exchange rate is unclear, so as a conservative calculation, we have adjusted this by 50 percent.
(2) No specific assumption provided in the report: 3 percent is taken as the default.
(3) At the then prevailing fuel oil price of VND 20,959 per liter.

28. Table 3.12 shows the financial analysis based on a gradually increasing fuel oil price, assuming recovery of the global crude oil price to US$100/bbl by 2020; the FIRR is 65.2 percent. However, even if the oil price stayed at the present level, with an unchanged fuel oil price of VND 12,000 per liter, the FIRR is still 35 percent. To reach the assumed post-tax hurdle rate of 14 percent, the oil price could be as low as VND 6,000 per liter for the assumed 15-year life.[18] In other words, such EE measures will have high financial returns even under low oil prices.

Table 3.12. Regenerative Burners, Financial Analysis

				NPV	2015	2016	2017	2018	2019	2020	2025	2030
						[1]	2	3	4	5	10	15
[1]	***Fueloil savings***											
[2]	quantity saved	0.01	1000 litres/year			548.0	542.5	537.1	531.7	526.4	500.6	476.1
[3]	Fueloil price		VND/litre		12000	13714	16697	16851	17014	17177	18120	18977
[4]	total fueloil savings		VNDbillio	*61.4*		7.5	9.1	9.1	9.0	9.0	9.1	9.0
[5]	Total benefits		VNDbillio	*61.4*		7.5	9.1	9.1	9.0	9.0	9.1	9.0
[6]	**Costs**											
[7]	Equity		VNDbillio	*3.7*	4.1							
[8]	O&M fixed	3.0%	VNDbillio	*4.2*		0.4	0.5	0.5	0.5	0.5	0.7	1.0
[9]	O&M variable		VNDbillio	*0.0*								
[10]	debt service: principal		VNDbillio	*6.0*		1.4	1.4	1.4	1.4	1.4	0.0	0.0
[11]	debt service: interest	8.83%	VNDbillio	*2.5*	0.4	0.8	0.7	0.5	0.4	0.3	-0.0	-0.0
[12]	income tax		VNDbillio	*11.8*		1.3	1.6	1.7	1.7	1.7	1.8	1.9
[13]	Net financial flows		VNDbillio	*33.2*	*-4.5*	*3.7*	*4.9*	*5.0*	*5.0*	*5.1*	*6.5*	*6.2*
[14]	equity IRR		[ ]	*96.2%*								

[18] In other words, the FIRR switching value for the oil price is VND 10,100 per liter.

29. The carbon accounting shows that the lifetime avoided GHG emissions compute to 22,971 tons of CO_2.

Table 3.13. Carbon Accounting for Fuel Oil Savings

				Lifetime	2016	2017	2018	2019	2020	2025	2030
[1]	**Baseline [scope 2]**										
[2]	***electricity***										
[3]	Electricity purchased		GWh		0.00	0.00	0.00	0.00	0.00	0.00	0.00
[4]	T&D losses to HT cust	0.06	GWh		0.00	0.00	0.00	0.00	0.00	0.00	0.00
[5]	Thermal electricity		GWh		0.00	0.00	0.00	0.00	0.00	0.00	0.00
[6]	Grid emission factor		kg/kWh		0.90	0.90	0.90	0.90	0.90	0.90	0.90
[7]	GHG emissions		tons		0	0	0	0	0	0	0
[8]	***fueloil***										
[9]	Fueloil saved		1000litres		548	543	537	532	526	501	476
[10]			GJ		21208	20996	20786	20578	20372	19374	18424
[11]	GHG emissions		tons		1641	1625	1609	1593	1577	1500	1426
[12]	Total scope 2 emissions		tons		1641	1625	1609	1593	1577	1500	1426
[13]											
[14]	**With project [scope 1]**										
[15]	GHG emissions		tons		0	0	0	0	0	0	0
[16]											
[17]	Avoided GHG emissions		tons	-22971	-1641	-1625	-1609	-1593	-1577	-1500	-1426
	IPCC default, fueloil emissions		kg/GJ	77.4							
	heat content of fueloil		GJ/litre	0.0387							

30. The corresponding economic returns are shown in Table 3.14. The economic returns are 40.0 percent (NPV US$1.04 million), increasing to 49.2 percent when avoided GHG emissions are included in the economic flows at the baseline values shown in the table.

Table 3.14. Economic Returns: Regenerative Burners

	Numeraire=$US			*NPV*	2015	2016	2017	2018	2019	2020	2025	2030
[1]	*Benefits: avoided electricity*											
[2]	Thermal electricity dis	0.06	[GWh]			0.0	0.0	0.0	0.0	0.0	0.0	0.0
[3]	Heat rate at marginal	9257	[BTU/kWh]									
[4]	Thermal fuel requirement		mmmBTU			0.00	0.00	0.00	0.00	0.00	0.00	0.00
[5]	fuel cost, import parity [nomi		[$/mmBTU]		2.79	3.00	3.37	3.47	3.57	3.67	4.23	4.84
[6]	Fuel cost, nomimal		[$USm]	*0.00*		0.00	0.00	0.00	0.00	0.00	0.00	0.00
[7]	At constant 2015 prices		[$USm]	*0.00*		0.00	0.00	0.00	0.00	0.00	0.00	0.00
[8]	avoided capital cost	1200	[$USm]	*0.00*	0.00							
[9]	avoided fixed O&M	35	[$USm]	*0.00*		0.00	0.00	0.00	0.00	0.00	0.00	0.00
[10]	total electricity benefits		[$USm]		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
[11]	*process cost benefits*											
[12]	chemicals		[$USm]			0.00	0.00	0.00	0.00	0.00	0.00	0.00
[13]	O&M		[$USm]			0.00	0.00	0.00	0.00	0.00	0.00	0.00
[14]	*benefits, avoided coal*											
[15]	coal saved		[tons]			0.00	0.00	0.00	0.00	0.00	0.00	0.00
[16]	border price	0.7	[$/ton]			52.57	59.22	60.97	62.73	64.48	74.27	84.89
[17]	avoided cost of coal		[$USm]			0.00	0.00	0.00	0.00	0.00	0.00	0.00
[18]	*Benefits, avoided fueloil*											
[19]	fueoil savings		[1000litres]			548.00	542.52	537.09	531.72	526.41	500.61	476.07
[20]	border price		[$/litre]			0.42	0.50	0.50	0.49	0.49	0.46	0.44
[21]	avoided cost of oil		[$USm]			0.23	0.27	0.27	0.26	0.26	0.23	0.21
[22]	***total benefits***		[$USm]		0.00	0.23	0.27	0.27	0.26	0.26	0.23	0.21
[23]	***Costs***											
[24]	Investment		[$USm]	*-0.53*	-0.58							
[25]	Fixed O&M	3.0%	[$USm]	*-0.12*		-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
[26]	Net flows		[$USm]	*1.04*	-0.58	0.21	0.25	0.25	0.24	0.24	0.21	0.19
[27]	ERR		[ ]	*40.0%*								

31. The switching value for capital cost is 220 percent of the baseline cost estimate, and the

switching value for oil price is VND 6,000 per liter (corresponding to a crude oil price of US$35/bbl). The crude oil price has already recovered from its January 2015 low of US$48/bbl (Brent) to US$60/bbl in March 2015—so an average price of US$35/bbl over the next 15 years is highly unlikely. The economic returns are therefore robust with respect to the two main uncertainties.

Figure 3.3.Crude Oil Price

Source: TradingView.com.

Conclusions: Steel Industry Regenerative Burners (Fuel Oil Saving)

32. This fuel oil saving measure has high economic and financial returns, even if fuel oil prices stay unchanged at their present low levels for the entire assumed life of 15years. The switching values show that even with large increases in the required capital investment, returns are assured.

Illustrative Project C: Steel Industry, VSD for Water Pumping

33. Substantial electricity savings can be achieved with the variable speed motors that could replace the widely used asynchronous induction motors. This illustration is based on a 2013 factory audit of the Iron and Steel Mechanic Company (Thai Nguyen), which proposed the installation of VSD for water pumping.

Table 3.15. Project Data: Regenerative Burners

	Unit	Before	With VSD
Factory working hours/year	[hours]	8,400	8,400
Measured power	kW	15	10.5
Electricity requirement	kWh/year	126,000	88,200
Investment cost	VND million		85
Electricity tariff	VND/kWh	1,400	1,400

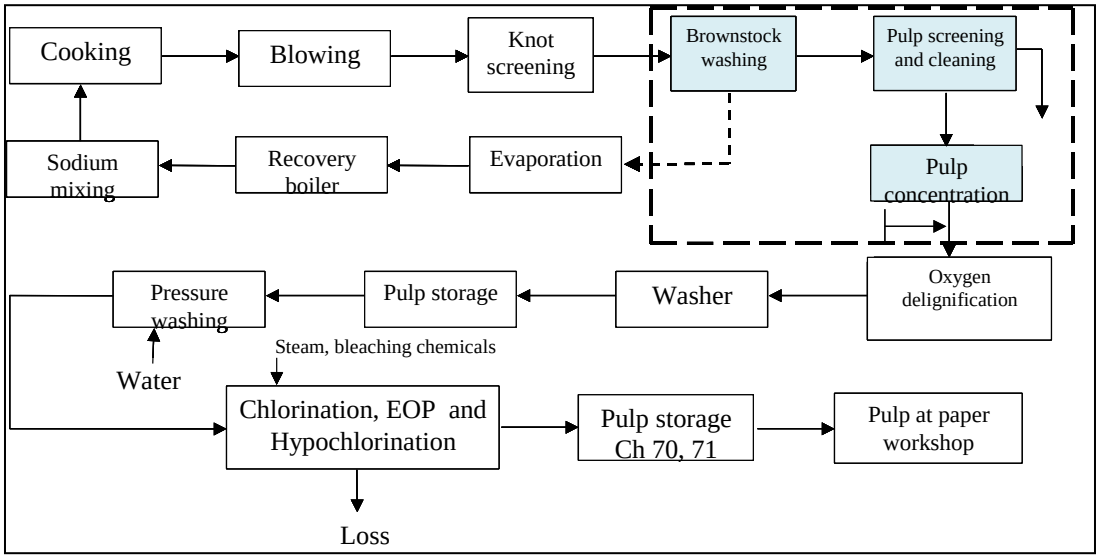
Source: *Walk-through Energy Audit, P.19, NatSteelVina (hot rolling process), Establishment of an Energy Savings Scheme for the Steel Sector in Vietnam. MoIT and AfD.*

34. Such simple interventions have high returns; in this case, the FIRR to the industry is in excess of 100percent and the payback time is less than a year. Even if there were no further tariff escalation in nominal terms (so a decrease in real terms), the FIRR is 88 percent. The baseline ERR is slightly higher at 124.6 percent. While an individual upgrade to VSD for a specific application (e.g. water pumping) may be small, the potential for VSD is large. Such opportunities for VSD exist throughout Vietnamese industry in almost all sectors.

Illustrative Project D: Paper Industry: Pulp Washing Improvement Project

35. The Vietnam Paper Corporation observes that the efficiency of its pulp cleaning and washing process is only 80–85 percent, compared to 92 percent with modern technology. Analysis of the electricity and steam inputs in the evaporation process shows high values (0.47 MWh/ton, 4.33 ton steam/ton), with high maintenance costs and loss of production through downtimes. Figure 3.4 shows the steps in the existing process flow.

Figure 3.4. Existing Process Technology



36. The company has therefore proposed a project to increase the efficiency of the brownstock washing and cleaning process by the installation of two pressure washers (Figure 3.5), with the following specific objectives:

- Increase concentration of black liquor dilution to evaporator from 15.0 percent to 15.5 percent and to over 16.5 percent.
- Reduce steam consumption in the evaporation process by 8 percent per ton of pulp.
- Achieve reduction of 7.0 percent electricity consumption in pulping line.
- Reduce consumption of bleaching chemicals by 5 percent of current level.
- Reduce outage time due to repairing, maintenance cost, and pulp amount purchased from outside for two paper machines, thereby contributing to paper production cost.

Figure 3.5. Revised Process Configuration

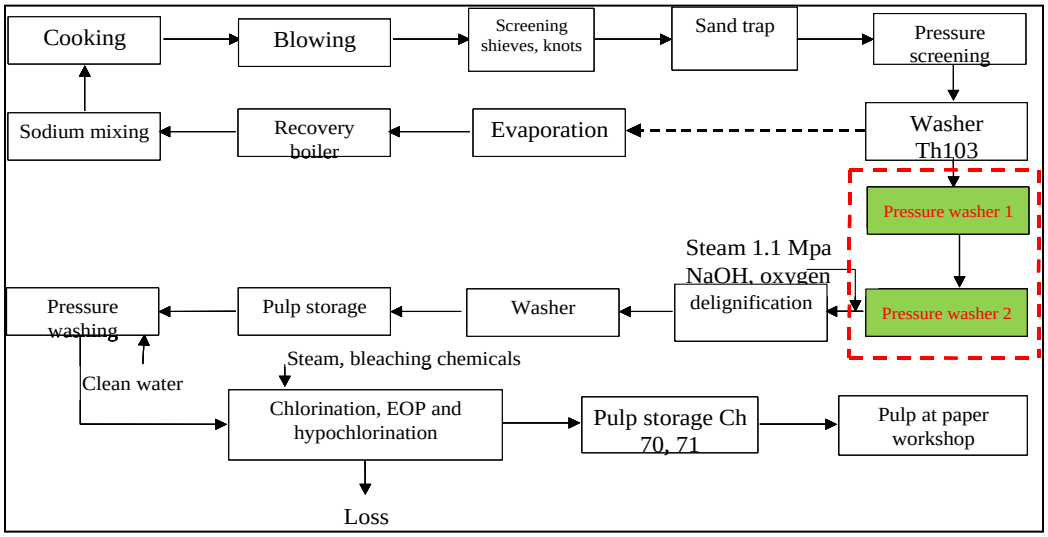


Table 3.16. Project Data

		Unit	Current	With EEI	Savings, units	Savings, VND billion
1	Electricity for pulping	MWh/ton product	0.077	X	X	
2	Electricity for evaporation	MWh/ton product	0.33	X	X	
3	Steam for pulping	ton steam/ton product	2.6	X	X	
4	Steam for evaporation and recovery	ton steam/ton product	1.83	X	X	
5	Annual throughput	tons product/year	X	X	X	
6	Annual electricity consumption	kWh/year	X	X	X	
7	Annual steam requirement	tons/year	X	X	X	
8	Chemicals	VND billion/year	X	x	X	3.43
9	O&M maintenance cost	VND billion/year	X	X	x	2.05
10	Steam generation	kg coal/ton steam	X	X	x	
11	Calorific value of coal(1)	GJ/kg	x			
12	Purchased electricity	VND/kWh	1,438	1,438		2.32
13	Purchased coal(1)	VND/kg	2,000	2,000		4.00
14	Total savings					11.80

Source: Vietnam Paper Corporation.
Note: (1) Dust coal 4aHG.

37. The projected capital cost is 75.4 billion (US$3.56 million), as provided by the company (Table 3.17).

Table 3.17. Cost Estimate

		VND thousands	US$ thousands
1	Construction cost:	2,013,000	94,953
2	Equipment cost:	66,440,760	3,133,998
2.1	Equipment system (including taxes and fees)	58,640,000	2,766,038
2.2	Equipment transport, insurance, custom duty, verification fees	320,760	15,130
2.3	Old equipment dismantlement and new equipment installation	4,015,000	189,387
2.4	Connection (including control cable, software design)	3,465,000	163,443
3	Compensation, support, and resettlement:	–	–
4	Project management cost :	693,799	32,726
5	Consultancy on investment - construction	833,963	39,338
6	Other costs:	1,260,966	59,480
7	Contingencies:	4,226,446	199,361
	Total	75,468,934	3,559,855

Source: Vietnam Paper Corporation.

38. The baseline estimate of financial returns is 19.14 percent, as shown in Table 3.19. This is slightly lower than the 22.7 percent after-tax FIRR calculated by the Vietnam Paper Corporation.[19] It is assumed that the reduction in steam requirement would be reflected in coal savings in the steam boiler (assumed to be dust coal 4aHG, anthracite).

Table 3.18. Financial Returns: Installation of Pressure Washers

				NPV	2015	2016	2017	2018	2019	2020	2025	2026	2030
						[1]	2	3	4	5	10	11	15
[1]	*electricity savings*												
[2]	Installed capacity		MW			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
[3]	gross generation	0.87	GWh			1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
[4]	own-use	0.0%	GWh			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[5]	Net generation at meter		GWh			1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
[6]	Load factor		[ ]			0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
[7]	Average tariff	0.06	VND/kWh		1438	1524	1616	1713	1815	1924	2575	2730	3446
[8]			USc/kWh			7.6	8.1	8.6	9.1	9.6	12.9	13.6	17.2
[9]	Revenue		VNDbillio	*22.5*		2.3	2.5	2.6	2.8	2.9	3.9	4.2	5.3
[10]	***Process cost savings***												
[11]	Chemicals		VNDbillion			2.1	2.2	2.4	2.5	2.7	3.5	3.8	4.7
[12]	O&M costs		VNDbillion			3.4	3.6	3.8	4.0	4.3	5.7	6.1	7.7
[13]	***coal savings***												
[14]	coal saved		tons/year			4000.0	4000.0	4000.0	4000.0	4000.0	4000.0	4000.0	4000.0
[15]	coal price		VND/kg			1000.0	1060.0	1123.6	1191.0	1262.5	1689.5	1790.8	2260.9
[16]	coal savings		VNDbillion			4.0	4.2	4.5	4.8	5.0	6.8	7.2	9.0
[17]	***Fueloil savings***												
[18]	quantity saved	0.01	1000 litres/year			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[19]	Fueloil price		VND/litre		12000	13714	16697	16851	17014	17177	18120	18291	18977
[20]	total fueloil savings		VNDbillio	*0.0*		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[21]	Total benefits		VNDbillio	*114.5*		11.8	12.5	13.3	14.1	14.9	20.0	21.2	26.7
[22]	**Costs**												
[23]	Equity		VNDbillio	*20.6*	22.6								
[24]	O&M fixed	0.0%	VNDbillio	*0.0*		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[25]	O&M variable		VNDbillio	*0.0*									
[26]	debt service: principal		VNDbillio	*33.4*		7.5	7.5	7.5	7.5	7.5	0.0	0.0	0.0
[27]	debt service: interest	8.83%	VNDbillio	*13.5*	2.3	4.3	3.7	3.0	2.3	1.7	-0.0	-0.0	-0.0
[28]	income tax		VNDbillio	*15.4*		0.7	1.0	1.3	1.6	1.9	3.2	3.5	4.6
[29]	Net financial flows		VNDbillio	*31.7*	*-25.0*	*-0.8*	*0.3*	*1.4*	*2.6*	*3.8*	*16.7*	*17.7*	*22.1*
[30]	equity IRR		[ ]	*20.2%*									

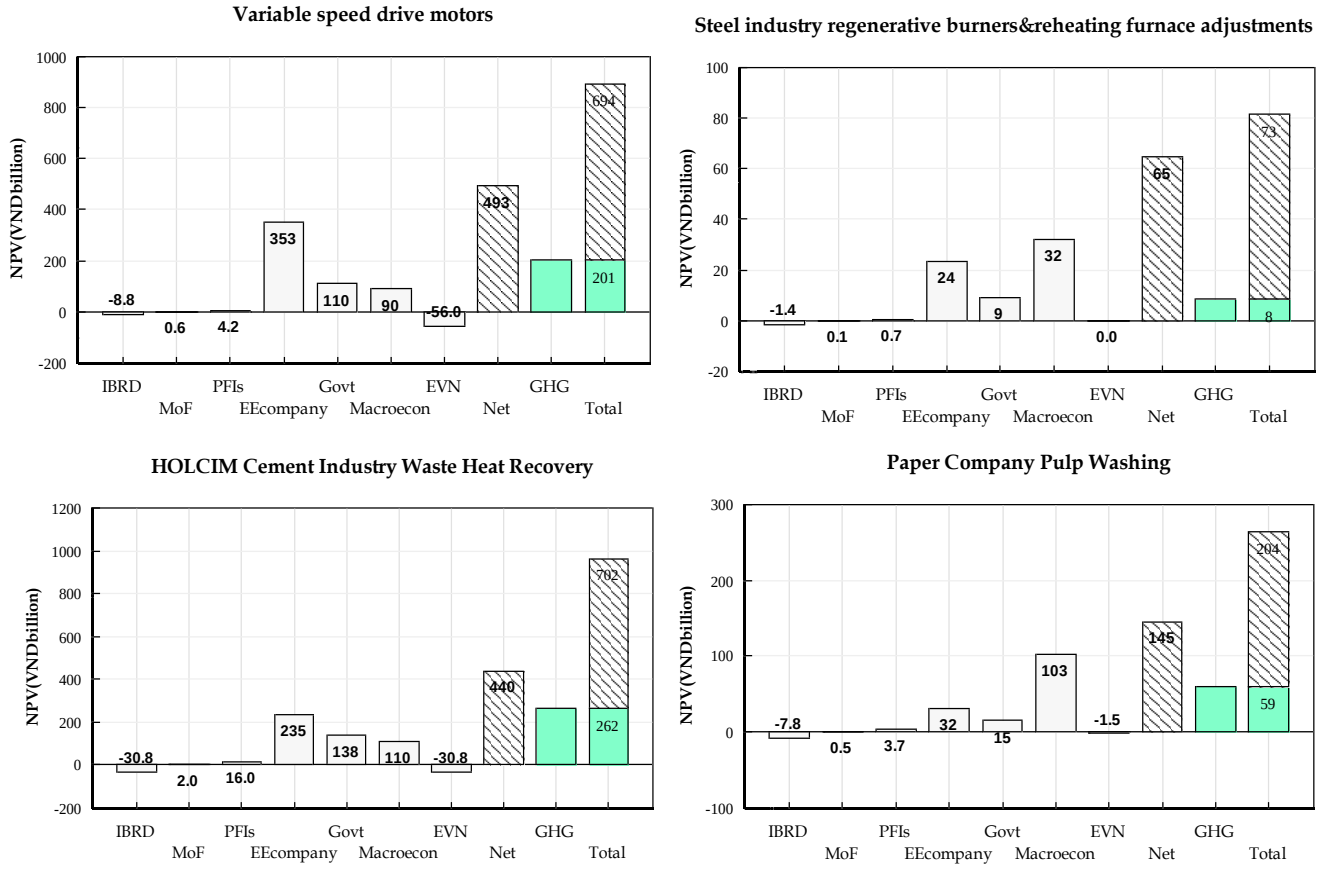
39. **Distributional analysis.** Figure 3.6 shows the summary of the distributional analysis for the four subprojects—expressed as the net impact on each of the stakeholders as an NPV at 10 percent discount rate. These results follow from a reconciliation of the financial and economic

[19] The Vietnam Paper Corporation's table of cash flows has not been cited, so the difference cannot be explained. The difference is likely to be in inflation and escalation assumptions and the future cost of electricity and fossil fuels.

flows. The following should be noted:

- IBRD shows a small negative impact in each case because it provides concessionary finance (1.58 percent) at a rate that is considerably lower than the assumed economic opportunity cost of capital (10 percent).
- The result shown as 'Govt' represents the increase in corporate income tax. This is separately recorded from the MoF lending margin (borrowing from IBRD in U.S. dollar at 1.58 percent, on-lending to the PFIs at 1.83 percent).
- The benefit shown to the macro economy accrues primarily as the difference between the financial prices used in the financial analysis and the border prices used for the economic analysis.
- As with most EE interventions that involve electricity, the financial impact on the grid supplier is **negative**. Under a cost-reflective tariff, this implies that the incremental financial losses are passed to the consumer (that is, it involves a [very small] tariff increase). However, the gain to the IE and the macroeconomy far exceeds the loss to EVN and hence the net economic benefit to the country in all cases. The gain in economic welfare due to a more efficient industrial sector outweighs any loss of consumer surplus attributable to tariff increases and indeed (all other things equal and given electricity demand that is price elastic) constitutes an incentive for more efficiency in consumption by other consumers.

Figure 3.6. Distributional Impact Summaries



Conclusions

40. The above analyses of representative industrial EE measures provide comfort that EE projects investments likely to be considered by the PFIs have high economic and financial returns and are robust with respect to the principal uncertainties. The returns are as high for small interventions as for large waste heat recovery projects (Table 3.19).

41. Note that **all** of the options are win-win with respect to GHG emissions and economic efficiency.

Table 3.19. Summary of Results: Representative EE Investments

	Unit	Waste Heat Recovery	Regenerative Burner	VSD	High-pressure Pulp Washers
Sector		Cement	Steel	Steel	Paper
Saving		Electricity	Fuel oil	Electricity	Electricity coal
Baseline FIRR	[ ]	25.6%	65.2%	114.2%	19.1%
Baseline ERR	[ ]	33.4%	40.0%	124.6%	17.1%
Investment (financial)	VND billion	297	13.7	85.0	75.4
Distributional analysis					
NPV to IE	VND billion	200	21	325	28
NPV to EVN	VND billion	-31	Not applicable	-112	-1
Avoided externality benefits					
ERR including GHG emissions	[ ]	70.6%	49.2%	244%	29.8%
Lifetime GHG savings	1,000 tons	722	23	553	164

Annex 4: Implementation Arrangements

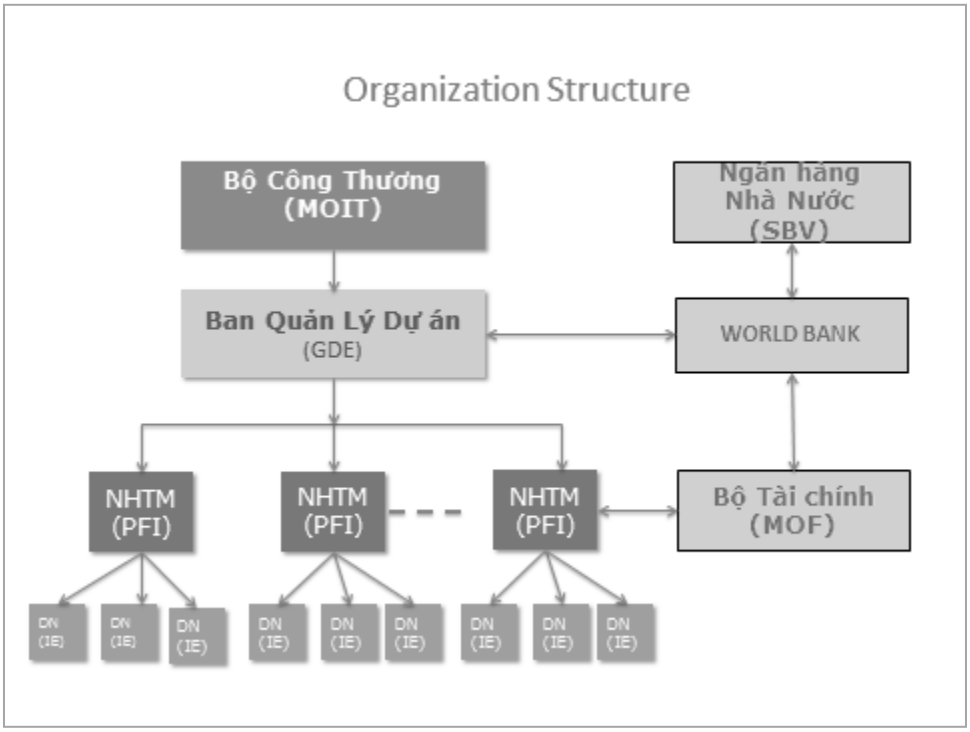
VIETNAM: VIETNAM ENERGY EFFICIENCY FOR INDUSTRIAL ENTERPRISES (VEEIE) PROJECT

Project Institutional and Implementation Arrangements

1. The project will be implemented by the MoIT and the respective selected participating banks. The Project Management Board (PMB) for the CPEE under the MoIT is extended to implement the project on behalf of the MoIT. The PMB will have two main functions under the VEEIE: (a) to coordinate and supervise overall project implementation including performance of the PFIs and (b) to manage all TA activities being financed by the proposed project.

2. IEs will approach participating banks with EE subprojects for financing. The PFIs will be solely responsible for the subprojects' appraisal and evaluation and assume all associated risks. PFIs will select qualified EE engineers for independent review and verification. IBRD funding will be routed to the PFIs through the MoF.

Figure 4.1. Role of Each Project Participant



3. The PMB will be responsible for managing and supervising the overall VEEIE, monitoring the VEEIE progress, and reporting regularly to the MoIT and the Bank. The PMB will also manage all TA activities under the VEEIE and will submit requests to the MoF to make the TA-related payments from the special accounts established under the VEEIE.

4. The PFIs will supervise and monitor each IE and their subproject(s) with a view to ensuring repayment of the loan and fulfilling all other implementation criteria in line with the terms agreed

in their subsidiary loan agreements. Technical, social, and environment experts contracted by the PFI will conduct due diligence of subprojects. Project requirements will also affect the loan agreement between the PFIs and developers by requiring adherence to the Bank's environmental and social safeguards policies.

5. The IEs will prepare and submit loan applications to the PFIs and adhere to all requirements in the planning and implementation of their eligible subprojects, including procurement requirements and implementation of safeguard plans, if required. The enterprises will also participate in training and provide reports, as required.

6. MoIT will enable the PMB to carry out all necessary work required for successful implementation of the VEEIE. The MoF will sign a subsidiary loan agreement with each of the selected PFIs. Under these agreements, the MoF will review and approve refinancing requests from the PFIs for subproject financing.

7. The SBV, which will sign the loan and financing agreements with the Bank on behalf of the Socialist Republic of Vietnam, will also provide periodic certifications to the MoF and MoIT that the PFIs are adhering to the applicable banking regulations. If any PFIs cease to adhere to the regulations at any time during the project, the SBV will indicate this to the MoF and MoIT.

Due Diligence of PFIs

8. The MoIT will lead the selection of the PFIs in conjunction with the MoF and SBV. Currently two PFIs, VCB and BIDV, have been selected. Additional PFIs may be added during implementation stage. The Bank has reviewed the performance of these two banks and found that VCB and BIDV meet all selection criteria to become participating banks under VEEIE project. The selection of VCB and SBV was followed as per steps outlined below and this the same process will be carried out for selection of future PFIs:

Step 1: *Request for Expression of Interest and Required Information Package*

9. The MoIT, which is responsible for the VEEIE project management, will lead the selection process with the support of a banking consultant. The MoIT issued a Request for Expression of Interest (REoI) and associated Required Information Package (RIP) directly to the short-listed banks. Subsequently, the PFIs should submit the Expression of Interest (EoI) and the RIP which include the following documents:

- Introduction of the VEEIE Project
- PFI selection process
- Demonstration on meeting eligible criteria
- Standard format for providing required information
- Declaration
- Guidelines for completing the format for providing required information

10. The envelope with the EoI and RIP must be marked 'Expression of Interest and Required Information Package for participation of the VEEIE Project'. Responses received after the deadline, for whatever reason, will not be taken into consideration. These envelopes will be

returned unopened. Receipt of the additional information will be confirmed by email. All information provided will be treated as highly confidential by the PMB, the due diligence consultant, the selection committee, the MoIT, and the Bank.

11. Questions about the REoI and RIP and its procedures can only be asked in writing. Short-listed banks providing the required information do this at their own risk. The MoIT reserves the right to reject any of the short-listed banks and cancel the entire selection process without any obligation to inform the banks of the grounds for these actions.

Step 2: *PFIs' Performance Due Diligence*

12. Once the PFI submissions are received, a due diligence will be conducted by the banking consultant and a relevant report submitted to the MoIT. Subsequently, the MoIT should form a selection committee consisting of the MoF and SBV to review the findings of the consultant and make the final selection of PFI participation in the VEEIE Project.

13. The MoIT will organize visits to all banks, if necessary, with the local banking consultant to carry out due diligence. The banking consultant will prepare a detailed due diligence report for each bank visited. This due diligence report will be used to finally select participating banks. The due diligence will be conducted against the following criteria:

1	**Experiences in EE Financing**
	PFI demonstrates its experience in EE financing by stating the number of projects financed and names of projects.
2	**EE Financing Strategy and Pipeline**
	The PFI strategy must include EE financing. The bank must demonstrate a number of EE pipeline projects; the PFI can be formally selected and can sign the Project Agreement with the Bank only if it has EE subprojects ready for financing.
3	**Minimum Share Capital**
	The bank must have a minimum chartered capital of [VND 2 trillion].
4	**Minimum Number of Branches**
	The bank must have a minimum of [30] branches (Tier 1) with good geographical coverage in Vietnam.
5	**IFRS Accounts**
	The bank must have unqualified audited accounts which are audited by one of the major international firms for the past two years, that is, 2012 and 2013. These accounts must be audited to IFRS. All the PFIs should commit to submitting IFRS financial statements at the point of loan effectiveness and signing the Subloan Agreement (or Project Agreement). If it is not possible for a PFI to submit the IFRS accounts immediately after joining the project, they need to submit the accounts, acceptable to the Bank, before receiving funds from the project.
6	**Compliance with all SBV Regulations**
	The PFI must be fully licensed by the SBV and be in compliance with all the SBV regulations and banking law.
7	**Corporate Governance**
	The PFI must have in place a management structure with clear segregation of duties between the Supervisory Board and the Management Board as well as a good corporate governance process in full compliance with the requirements of SBV Decree 59/2009/ND-CP (and any subsequent revised versions of this regulation).
8	**Loan Classification and Provisioning**
	The bank must be in compliance with current decision 493 and any subsequent revised version of this regulation (Circular 02) of the SBV in relation to the classification and provisioning of its loan portfolio
9	**Maximum Level of Nonperforming Loans**
	Total nonperforming loans defined as all loans in excess of 90 days overdue must be less than [7%] of the total loan portfolio according to the SBV regulations.
10	**Minimum Level of Provisions**
	The PFI must have sufficient provisions in place against nonperforming loans of the value of nonperforming loans according to the SBV regulations.

11	**Shareholder Funds**
	The level of shareholders' funds to total risk weighted assets must be not less than 9% in line with the requirements of SBV Circular No. 36/2014/TT-NHNN dated November 20, 2014 and any subsequent revisions.
12	**Liquid Assets**
	The bank must have liquid assets in excess of 15% of liquid liabilities as defined in SBV Circular No. 36/2014/TT-NHNN dated November 20, 2014 and any subsequent revisions.
13	**Liquidity**
	Total loans should not be in excess of [80%] of all mobilized funds.
14	**Profitability**
	The bank should have an ROE of at least 10% in 2013 as well as a return on assets in excess of 0.5%.

14. All members of the committee, the PMB representative, and consultants involved shall be independent of all banks in Vietnam. Confidential information obtained during the process shall only be used to carry out the work assigned as part of the process.

15. In carrying out their responsibilities, committee members shall make independent decisions irrespective of any other interests. The PMB, the PFIs selection committee member, and consultants involved shall not accept any gift, hospitality, or other advantage from short-listed banks. When PMB staff, committee members, and consultants involved have finished carrying out their duties, they shall neither disclose any confidential information nor give anyone advice based on information that is not available to the public and that they have obtained within the scope of carrying out their responsibilities.

16. **Communication with short-listed banks.** Any amendment, correction, or addition to the selection of the PFIs' package or any supporting document provided to short-listed banks as part of the selection process shall be communicated in writing simultaneously to all the short-listed banks. During the selection process, the short-listed banks can only ask questions or request clarification in writing to the PMB. The PMB will send the question or clarification request with the response from the PMB by email simultaneously to all short-listed banks without revealing the identity of the short-listed bank that asks the question or requested clarification.

17. After the deadline and after completing all due diligence reports for short-listed banks that submitted the information before the deadline, the PFIs selection committee members will meet to review the additional information provided and the due diligence reports and assess whether or not the short-listed bank meets all criteria to be accepted as a VEEIE PFI. Each committee member will first make an independent assessment. After that, the committee members will discuss the individual assessments and work to reach a consensus assessment. The PFIs selection committee will prepare a detailed assessment report containing the assessments of the individual members and the consensus assessment. This report will be submitted to the MoIT for approval.

Step 3: *Finalization of PFIs' Selection*

18. Finally, the MoIT will submit the selection report with recommendation of PFIs participation to the Bank for clearance. Based on information provided, the Bank will provide its 'no objection', stressing that it only becomes effective once a Project Agreement is signed between the PFI and the Bank, and the Subsidiary Loan Agreement is signed between the MoF and the PFI. After receipt of the Bank's 'no objection', the PMB will inform the short-listed banks of the outcome.

19. The VEEIE Loan Agreement is signed by the authorized representatives of the Bank and the Socialist Republic of Vietnam, whereas the PFIs will sign a Project Agreement with World Bank, and then a Subsidiary Loan Agreement with MoF. Under the Subsidiary Loan Agreement, loans for EE projects that meet all requirements can be refinanced. The Subsidiary Loan Agreement will, among others, specify the financing terms and reporting requirements of the PFIs. Project requirements will also be reflected in the loan agreement between the PFIs and IEs by requiring additional clauses to be included, allowing, for instance, the PMB to visit the projects and obtain required information

Project Management, Disbursements, and Procurement

Financial Management

20. **FM assessment.** An assessment of the FM arrangements carried out during preparation concluded that the FM arrangements for the project meet the Bank's minimum FM requirements. A Substantial FM risk rating was assigned to the project. The FM assessment identified the following key risks: (a) low FM capacity of the investment owners which may lead to misreporting of transactions or ineligible expenditures; (b) delays in approving and processing payments at all levels, including the PFIs branches and head office, the MoIT PMB, and the MoF due to lack of experience, knowledge, or responsibility; and (c) lack of capacity of the PFIs in financial reporting in accordance with international standards, which will limit their opportunity to participate in the project. This will be mitigated by (a) the appointment of a qualified project chief accountant by all IAs, to be approved by the Bank; (b) detailed OM with established formal process of approving payments at all levels and all IAs; (c) separating the MoIT PMB from the lending cycle to PFIs and investment owners to minimize the bureaucratic procedures; and (d) training on the Bank FM requirements to the PMB, PFIs, and investment owners.

21. **Implementation arrangement.** The PMB established at the MoIT will implement the VEEIE with two main functions: (a) to support and supervise EE investment lending and (b) to manage all TA activities being financed under the project. The PMB will be responsible for the financial management of its component, including preparation and submission of biannual interim financial reports (IFRs) for its own expenditures within 45 days of the end of the period covered, and also responsible for the whole Project consolidated annual financial statements and audit. Key staff of the PMB will be employed from the existing Bank-financed CPEE project in the MoIT.

22. Each PFI will supervise and monitor the investment owners and their subprojects and be responsible for FM of its subprojects. At each PFI, the project FM function (including budgeting, accounting, internal controls, staffing, reporting, auditing, credit appraisals, and monitoring of subprojects) will be fully integrated in the management processes of the PFIs. The OM sets out principles and procedures particularly for the project, which are additional to the current procedures of the PFIs, including preparing:

- withdrawal applications which will be co-signed by the MoF-External Finance Department (MoF- EFD) to get funds from the Bank;
- biannual IFRs and submitting to the Bank; and
- annual project financial statements and annual IFRS entity financial statements; arranging for the audit of the entity financial statements and submitting audited

financial statements and auditors' reports to the Bank. Audit of project financial statements will be consolidated by the MoIT PMB.

23. **External audit.** The PMB will appoint independent auditors acceptable to the Bank. The project consolidated financial statements will be audited annually in accordance with international auditing standards and acceptable terms of reference. The auditors' reports will be made available to the Bank within six months of the close of the fiscal year. The auditor will also provide a management letter addressing internal control weaknesses of the IAs. Each PFI will be responsible for submitting IFRS financial statements audited by the auditor, acceptable to the Bank, within 6 months after financial year-end.

24. **Disbursements.** The project will use the following disbursement methods:

- *Reimbursement.* The Bank reimburses the borrower for expenditures eligible for financing pursuant to the Loan and Financing Agreement ('eligible expenditures') that the borrower has pre-financed from its own resources.
- *Advance for Component 1:* Two (2) segregated designated accounts will be established for each of the two PFIs, ie Bank for Foreign Trade of Vietnam (VietcomBank) and Bank for Investment and Development of Vietnam (BIDV). Advance to the ceiling will be fixed at USD 20 million and minimum application size for reimbursement, direct payment and special commitment will be USD 100,000 equivalent.
- *Advance for Component 2*. The Bank will advance credit proceeds into a segregated designated account opened by the borrower to finance eligible expenditures incurred in respect of component 2 and for which supporting documents will be provided at a later date. The ceiling of the advance to designated account of the PMB is variable, based on forecast of one (1) quarter and minimum application size for reimbursement, direct payment and special commitment will be USD 100,000 equivalent.

25. The disbursement deadline date will be four months after the closing date of the project. Supporting documentation required for reimbursement and for documenting eligible expenditures paid from the designated accounts and for reimbursements will be Statements of Expenditure (SOE), together with other required records and/or statements as indicated in the disbursement letter.

26. The project will finance 100 percent (inclusive of taxes) of eligible expenditures. Eligible expenditures of Component 1 - Energy Efficiency Investment Lending will be defined in the Loan Agreement as loans made by the PFIs to the IEs. Eligible expenditures of Component 2 - Technical Assistance and Capacity Building are in accordance with the Bank standard condition, as in the table below. Counterpart funds of US$56.3 million represents contributions from PFIs and IEs to the subprojects under component 1 of the Project.

Category	Amount of the Loan Allocated (expressed in USD)	Amount of the Credit Allocated (expressed in SDR equivalent)	Percentage of Expenditures to be financed (inclusive of Taxes)
(1) Energy Efficiency Sub-loans under Part 1 of the Project	99,250,000		100% of amounts disbursed

(2) Goods, works, non-consulting services, consultants' services, and Incremental Operating Costs under Part 2 of the Project		1,300,000	100%
(3) Commitment Charge on the Loan accrued on or before the last Payment Date immediately preceding the Closing Date.	500,000		Amount payable pursuant to Section 2.04 of the Loan Agreement, in accordance with Section 2.07 (c) of the General Conditions
(4) Front-end Fee	250,000		Amount payable pursuant to Section 2.03 of the Loan Agreement in accordance with Section 2.07 (b) of the General Conditions
TOTAL AMOUNT	100,000,000	1,300,000	

27. Retroactive financing: Retroactive financing for an amount up to US$20 million from the loan for disbursement category 1 will be available for eligible expenditures incurred prior to loan signing but on or after July 15, 2016.

Procurement

28. **The procurement capacity review and risk assessment.** A PCRA of the major project IAs, including the MoIT and two potential IEs (Hoang Thach Cement Factory and Chinfon Cement Factory), was undertaken in March 2015 as part project preparation. It concluded that:

(a) the MoIT and the two IEs have adequate institutional and organizational capacity in place; the MoIT however has no specific organizational arrangements and staffing for implementation of their respective procurement under the project at this point;

(b) the MoIT has some knowledge and experience of Bank procurement as a result of its implementation of several ongoing Bank-financed projects, including CPEE; however, new staff being assigned to implement the project may not be familiar with the Bank procurement procedures; and

(c) the two IEs are experienced and proficient in using the procurement procedures under national public procurement law and regulations or established private sector/commercial practices; they, however, are unfamiliar with the Bank procurement procedures such as ICB and QCBS methods which may be applicable to their subprojects.

29. Based on the above findings and considering the specific nature of procurement work required for the project, the procurement risk for the proposed project is rated as Substantial.

30. **Mitigation measures.** To mitigate the identified procurement-related risks and strengthen procurement implementation capacities, the following key actions have been agreed with the borrower and will be implemented throughout project preparation and implementation. The post-mitigation procurement risk is rated as Substantial.

Table 4.1. Mitigation Measures

No.	Actions	Responsibility	Date of Completion
1	Appoint procurement officer or hire a procurement specialist with adequate qualifications and experience.	MoIT/IEs	To be completed before effectiveness
2	Prepare and adopt a project OM, including a chapter on procurement, which is incorporated by reference in the subloan agreements with private developers.	MoIT/IEs	Completed before effectiveness
3	Procurement training for project management unit staff, including initial procurement training at project launch and in-depth procurement trainings during project implementation	MoIT/IEs	Continued during implementation

31. **Applicable procurement procedures**. For contracts financed in whole or in part by the IBRD Loan or IDA Credit, procurement would be carried out in accordance with the Bank's 'Guidelines: Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers' dated January 2011, revised July 2014 (the Procurement Guidelines); 'Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by World Bank Borrowers' dated January 2011, revised July 2014 (the Consultant Guidelines); and the provisions stipulated in the Financing Agreement. For contracts procured through National Competitive Bidding (NCB), the additional provisions listed in the Attachment to Schedule 2 of the Financing Agreement will be applicable.

32. **Procurement thresholds**. Procurement under Component 2 will mainly include the following categories: goods and consulting Services and works that are not foreseen at the project preparation stage. Thresholds for procurement methods and Bank prior review under this component are presented in the table. These can be changed during project implementation in accordance with the changes made by the Bank to such procurement thresholds.

Table 4.2. Thresholds for Procurement Methods and Bank Prior Review

Category	Procurement Method Thresholds		Prior Review Thresholds	
	Money value (US$)	Remarks		Remarks
Works/Supply and Installation				
ICB	≥ US$20 million		All contracts	Contracts below US$15 million but using ICB are subject to post review.
NCB	< US$20 million		• The first contract plus all contracts above US$15 million	
Shopping	< US$0.2 million		None	
Goods, IT Systems, Non-consulting Services				
ICB	≥ US$3 million		All contracts	Contracts below US$3 million but using ICB may be subject to post review.

Category	Procurement Method Thresholds		Prior Review Thresholds	
	Money value (US$)	**Remarks**		**Remarks**
NCB	< US$3 million	Where goods are not normally available within Vietnam (such as certain electrical equipment and materials and medical equipment), the method of procurement will be ICB even if the contract value is below the threshold.	• The first 1 contract	
Shopping	< US$0.1 million		None	
Consultant Services				
CQS	< US$0.3 million	Other methods (QCBS, QBS, FBS, and LCS) shall be applied for contracts equivalent or above US$0.3 million and may also be applied for contracts below US$0.3 million.	• **Firms**: ≥ US$0.5 million (for competitive selection) plus the first contract for each method regardless of value. For Single Source Selection (SSS), US$100,000 (Para 3.9 of the Consultant Guidelines, January 2011). • **Individuals**: Only in exceptional cases (for competitive selection); for SSS, US$50,000 (Para 5.6 of Consultant Guidelines, January 2011); • **SSS** shall be reflected in Procurement Plans with proper justification.	• For individual consultants, prior review applies to long-term (project period) and large-value (≥ US$0.2 million) contracts. For legal or procurement work or critical project management consultants, terms of reference and CVs of selected candidates should be prior reviewed but such reviews should not be considered as prior review of the transaction. • Audit contracts should be treated as any other contracts and subject to prior review only if value is above threshold. The task team leader/FM specialist may prior review the terms of reference, short list, and so on from a technical perspective.
Short list of all national firms	< US$0.5 million	Para 2.7 of the Consultant Guidelines (January 2011). The threshold applies to assignments for which there is adequate local capacity and sufficient number of qualified local firms (such as technical design and construction supervision).		

Note: Direct Contracting for works/goods is normally subject to prior review except small-value contracts (below US$200,000 for works and US$100,000 for goods). The Procurement Plan should indicate Direct Contracting or SSS method with justifications. If the justifications are sound, the contracts below the thresholds should be subject to post review.

33. **Procurement under Component 1.** Procurement under this component will be conducted in accordance with paragraph 3.13 of the Bank's Procurement Guidelines. IEs that borrow the subloans will be responsible for implementing the procurement activities under their respective subloans and the procurement will be conducted as follows:

(a) If IEs belong to the public sector, the procurement will be conducted similar to Component 2, and the thresholds mentioned in Table 4.2 will apply.

(b) If IEs belong to the private sector, they are encouraged to use open competitive bidding methods; nevertheless, they may use well-established private sector procurement methods or commercial practices acceptable to the Bank. IEs shall not award contracts to their parent or affiliate companies, controlling shareholders, or ineligible government-owned enterprises or institutions. Direct Contracting may be used only under the circumstances set forth in paragraph 3.7 of the Bank's Procurement Guidelines. The Bank will review the Procurement Plan, which is part of the subloan application prepared by each IE. The IEs can choose to use ICB procedures if needed. In such cases, the contract will be subject to Bank prior review if its cost is equivalent or more than US$20 million; other contracts will be subject to Bank post review.

(c) All FIs and IEs will ensure that no companies on the Bank's debarment list (at http://www.worldbank.org/debarr) and suspension list (at https://clientconnection.worldbank.org) are awarded contracts. Since the suspension list is not a public list, in order to ensure that the suspension list will also be observed by all the relevant parties in this project, the Bank will share the "current" suspension list with the FIs on a quarterly basis and the FIs are required to monitor their clients (IEs) to ensure that no companies on the suspension list are awarded contracts, in addition to requiring their clients to check the debarment list which is public and available on-line on the WB website. Furthermore, the ToRs for the auditor will require the auditor to check that the FIs had performed in accordance with our requirements in respect of the debarment and suspension lists.

34. **Retroactive financing**: Procurement activities that require retroactive financing have been identified in the procurement plan and will be carried out in accordance with the Procurement Guidelines. Prior review will be required for all such activities. For retroactive financing under Component 1, the Bank will carry out post review of the procurement process being conducted by private IEs using commercial practice. Cut-off date of expenditures to be covered for retroactive financing is July 15, 2016. Total amount of retroactive financing will not exceed 20% of IBRD loan.

35. **Procurement Plan**. A Procurement Plan for the first 18 months of implementation, acceptable to the Bank (latest by project negotiation), has been prepared by the PMB and approved by the MoIT. The Procurement Plans will be updated annually (or as needed) by the PMB to (a) reflect project implementation; (b) accommodate changes that should be made; and (c) add new packages necessary for the project. Each update will be subject to Bank prior review. Procurement Plans will be published on the Bank's website.

36. **Procurement supervision and post review by the Bank.** Contracts not subject to prior review will be subject to post review. The Bank will carry out procurement post reviews on an annual basis with an initial sampling rate of 20 percent. This rate will be adjusted periodically during project implementation based on the performance of the project IAs. The Bank will also carry out regular procurement supervision missions on a biannual basis. In addition to applicable prior review, the capacity assessment of the PMB and IEs has recommended annual supervision missions to visit the sites to carry out post review of procurement actions. On an annual basis, the PMB will send to the Bank a consolidated list of all contracts for goods, works, and consultants'

services awarded under the whole project that are subject to the Bank's post review, including, but not limited to, (a) reference number as indicated in the Procurement Plan and a brief description of the contract; (b) estimated cost, (c) procurement method; (d) date of contract award; (e) name of awarded supplier, contractor, or consultant; and (f) final contract value.

Environmental Safeguards

37. The project is part of the Bank's long-term engagement to support Vietnam to increase energy savings and improve demand-side EE. Overall, this project brings benefits to selected industries and the environment by contributing to reduction of GHGs and pollutants, increases energy savings, and encourages the promotion of environmentally good industry practices.

38. The safeguard policy OP/BP 4.01 is triggered due to the potential adverse environmental safeguard impacts associated with project activities under components 1 and 2. Under component 1, the Project will finance various subprojects under energy intensive industries such as cement, iron and steel, and pulp and paper, public and private; using these potential energy saving measures: (a) adoption of energy saving industrial technologies (e.g., efficient industrial boilers, kilns, and heat exchange systems); (b) recovery and utilization of wastes and waste heat; (c) installation of highly efficient mechanical and electrical equipment (e.g. motors, pumps, heating and ventilation equipment); and (d) industrial system optimization to reduce energy use.. Under the component 2, the project will support capacity building activities and technical pre-feasibility studies to provide pipeline support for the food processing industry under the Bank-executed Canadian Externally Finance Outputs grant.

39. The potential impacts during the construction phase of subprojects under component 1 involve: (i) noise, dust, disposal of domestic waste and waste water typical to the installation/construction of activities; (ii) disposal of old parts of inefficient equipment which may contain hazardous waste and in rare case, PCB oil extracting from the old transformers; and safety issue during the construction/installation of new equipment and facilities. The construction related impacts are likely to be localized, can be managed and mitigated to acceptable levels by applying good construction standards and practices. The possible impacts during the operation phase of new equipment and facilities may include safety issues, air emission, solid waste, and wastewater; and disposal of hazardous substances from such polluting industries such as cement, steel, textile, pulp and paper, food processing. For example, there may be some issues of combustion gas emissions associated with the installation of new boilers, kilns or other types of heat treating equipment. These are long-term impacts, however, the magnitude of toxicity and amount of pollutants generated from the new energy efficiency facilities are assessed to be lower than those from the older replaced technologies and equipment. These impacts are site-specific and measures for managing these impacts could be readily designed. Overall, it is anticipated that the project would mostly include category B subprojects. In any case, during the project implementation, all subprojects will be screened carefully case by case, to determine the appropriate category and environmental safeguard instruments to manage the potential impacts.

40. The Technical Assistance (TA) under component 2 mostly involves capacity building activities. These activities usually do not have adverse environmental and social impacts and risk. In addition, technical pre-feasibility studies will be carried out for pipeline support for the food processing industry under Canadian Externally Finance outputs, which may imply potential

environmental and social aspects. As such, the TOR for these studies will include requirements on screening, analysis, and on environmental and social aspects so as to ensure that the proposed activities are in accordance to the Bank safeguard policies and the national regulations.

41. **Environmental and Social Management Framework**. During the preparation stage, the MOIT has prepared an ESMF to guide and set out the requirements to ensure the safeguard compliance of the Project during implementation period. The ESMF is in compliance with the Bank's safeguard policies and national legislations on environmental protection. It will be adopted by MOIT and integrated in the Project Operation Manual. For the subproject under component 1, the ESMF describes procedures to be followed by any IE and PFI to satisfy both Vietnamese environmental regulations and the Bank's safeguard policies. Key features of the framework include procedures to be followed for screening, environmental assessment documentation, public consultation, EIA review and approval, disclosure, supervision, and reporting. The ESMF also include the procedures for conducting environment and social audit/due diligence of existing facilities that will be supported/retrofitted by the project. It also covers TA under Component 2. Concretely, it provides requirements for TA activities identified by appraisal stage. The ESMF also refer to the "Interim Guidelines on the Application of Safeguard Policies for TA activities in Bank-financed Projects" to screen the other TA activities during implementation period for their implications on environmental and social impacts and determine the appropriate safeguard instruments.

42. **Implementation Arrangement**. The key stakeholders participating in ESMF implementation include IEs, PFIs and MOIT. A Project Management Board (PMB) set up under MOIT will provide support to enhance capacity for PFIs staff on safeguard screening and management via TA activities.

43. Each PFI will form a Project Implementation Unit (PIU) teams, supported by technical, safeguard and procurement experts. The PIU will implement the sub-lending activities and act as the PFI's focal point to interact with the Bank, MOIT, MOF and other stakeholders. The PIU with dedicated safeguard specialist will carry out the safeguard screening, appraisal, clearance and monitoring of subprojects under its management. The WB will associate with PMB to provide technical support to enhance capacity of PFIs as needed.

44. Subproject screening is primarily the responsibility of the PFI. The category of the subproject will be classified in accordance to the Bank's safeguard policies and appropriate instruments will be required as necessary. The results of subproject screening by PFIs will be reviewed by the WB.

45. The IEs will have to prepare all necessary documents in line with the national regulations on environmental assessment and protection. In addition, each IE has to prepare an EA in accordance with the Bank's safeguard policies and requirements on public consultation and disclosure. For a category A subproject, a full EIA with an EMP as an integral part, has to be prepared, and the TOR for EIA and EIA report shall be prior reviewed and cleared by the WB. For a category B subproject, an EMP shall be prepared by the IE, primarily reviewed and cleared by PFI. The Bank will selectively review and clear about 30% of EMP of the total category B subprojects. In the case that the EA report of category B subprojects is available when the IEs approach the loan, an internal due diligence of EA reports may be conducted and followed by an

EMP preparation by IE as necessary.

46. During subproject implementation, the IEs will have the overall responsibility to carry out mitigation measures as set out in subproject EMPs. The IEs will be responsible for inclusion of Environmental Code of Practices (ECOPs) into the bidding documents of construction contracts. The IEs and its CSC will carry out internal monitoring to ensure the contractors' implementation of mitigation measures. The PFIs, PMB and WB and local authorities will carry out external monitoring on IEs safeguard implementation on periodical basis.

47. The knowledge and experience of key stakeholders of safeguard implementation, i.e. IEs, PFIs and MOIT, are considered limited. The MOIT has engaged in several WB funded projects. However, it is unlikely that the safeguard staff from previous WB projects will participate in the VEEIE project; therefore activities to build safeguards capacity will be required. The potential PFIs included BIDV, HSB, Vietinbank, Vietcombank, and Techcombank. Among those, the BIDV and Vietinbank have participated in Rural Finance 3 Project (RF3) and Renewable Energy Development Project respectively, supported by the Bank. As such, they are familiar with safeguard requirements of the World Bank. However, the other potential PFIs do not have experience with the WB safeguard policies. IEs too have almost no experience with those policies. Therefore, close guidance and tailored training programs for MOIT, PFIs and IEs will be developed and implemented to enhance their capacity in safeguards implementation.

48. **Public Consultation**. During the preparation of the ESMF, a consultation workshop was conducted on October 9, 2015 with the aim to collect feedback/comments on the framework developed under the project. The workshop was attended by various participants from NGOs, central government, and research institutes. Comments received in the workshop have been incorporated in the final version of the ESMF. The ESMF has been disclosed at the subproject sites, MOIT's website, and in the InfoShop on November 24, 2015.

Social Safeguards

49. The project is expected to have overall positive social benefits because it promotes EE and thus reduces GHG emissions and other pollutants into the atmosphere. It will also have positive impacts from the perspective of consumers and workers who are employed by the participating IEs. Through EE investments, the company's energy cost will be reduced per unit of output with positive impacts on the final prices of consumer products and services. This will also make IEs more competitive and ensure job security and potential expansion of the workforce.

50. The EE subprojects to be financed under the proposed loan will be within the existing premises of industrial facilities. However, to anticipate the potential need of land acquisition required for subprojects identified in implementation cycle, OP 4.12 is triggered due to the possibility of the involuntary taking of land required for subprojects implementation cycle. Resettlement Policy Frameworks (RPF) was prepared, laying down the principles and objectives, eligibility criteria of displaced persons, modes of compensation and rehabilitation, participation features and grievance procedures, review and clearance process of subproject's resettlement plan. The OP 4.10 is triggered due to the potential presence of ethnic minorities or their collective attachment to land/natural resources in the subproject areas. Triggering this policy to maximize the project benefits in ethnic minority community. Ethnic Minority Planning Framework (EMPF) was prepared, setting out guidelines to: (a) ensure that the ethnic minority peoples receive social and

economic benefits that are culturally appropriate; (b) avoid potentially adverse effects on the ethnic minority communities; and (c) when such adverse impacts cannot be avoided, minimize, mitigate, or compensate for such effects. The IEs must be able to demonstrate that it has obtained broad community support for the subproject through a process of free, prior, and informed consultations with the affected ethnic minority communities. Any non-social safeguard impacts (for example, gender and employment) will be addressed in the project Environmental and Social Management Framework (ESMF) developed under the framework of OP 4.01. The subloan agreement between the PFIs and the IEs will specify that participating IEs must fully comply with the existing national labor laws, including those related to children and women and will include appropriate mitigation measures.

51. **Gender.** During preparation, the Bank conducted a gender impact assessment. The assessment was conducted to understand the potential impacts at community, organizational, and individual levels once introducing industry EE investments under the proposed project. The specific objectives of the assessment are to (a) identify and analyze the potential organizational impacts (positive and negative) and adaptation strategies of the concerned enterprises; (b) identify and analyze the potential impacts (positive and negative with particular attention to gender and ethnic minority groups) and adaptation strategies of the employees working in the concerned enterprises; (c) identify and analyze the perception of men and women living in communities in surrounding areas of concerned enterprises, about the potential impacts (positive and negative) caused by the proposed investments; and (d) provide recommendation/suggestion to inform the design of Bank-funded project, ensuring that impacts (if any) on men and women, respectively, will be addressed. Scope of work for the assessment includes the following:

- Develop a complete assessment proposal (including for example, methodology, sample size, data collection tools, and analysis strategy).
- Conduct a desk review of relevant documents (for example, project-related documents, similar studies/reports, and employment records of implicated industries and institutions divided by gender and ethnicity).
- Identify potential stakeholders/target groups for the assessment (for example, policymakers, enterprise leaders, employees, and surrounding communities).
- Develop data collection tools (quantitative or qualitative) appropriate to different target groups (for example, enterprise leaders, employees, community members, and policymakers) and conduct data collection in the selected enterprises.
- Analyze data, draft, and finalize the report.

Monitoring and Evaluation

52. Monitoring of the implementation of the proposed project would involve (a) the monitoring of performance indicators, as included in Annex 1; (b) annual progress reports; and (c) a midterm review of implementation progresses. The PMB will be responsible for overall M&E of implementation progresses, including the collection of project performance information and reporting on the impact and results of the project. It will develop an M&E plan during the first year of implementation. A member of the PMB will be assigned to collect information and maintain databases to monitor the implementation performance of the project components. For activities to be implemented by the PFIs, the project team within each PFI will be responsible for collecting information with the assistance of the PMB and reporting to the Bank through the PMB. An independent third party will be contracted to monitor and validate energy-conservation-related

lending disbursements by the PFIs. The midterm review will provide an opportunity to discuss and agree on more significant changes to achieve the project objectives or to increase the impact of the VEEIE.

Annex 5: Implementation Support Plan

VIETNAM: VIETNAM ENERGY EFFICIENCY FOR INDUSTRIAL ENTERPRISES (VEEIE) PROJECT

Strategy and Approach for Implementation Support

1. The strategy for implementation support has been developed based on the specific nature of the project. It aims at making the support to the client for implementation of its dual functions more efficient and focusing on the implementation of the risk mitigation measures. Detailed inputs from the Bank team are outlined below:

(a) **Procurement.** The Bank team will provide implementation support by (i) providing training to members of the procurement committee and related staff in the regional project offices; (ii) reviewing procurement documents and providing timely feedback to the procurement committee; (iii) providing detailed guidance on the Bank's Procurement Guidelines to the procurement committee and engineering consultants; and (iv) monitoring procurement progress against the detailed Procurement Plan developed by borrowers.

(b) **Financial management.** Supervision will review the project's FM system, including, but not limited to, accounting, reporting, and internal controls. Supervision will also cover subprojects on a random sample basis. The Bank team will also work with the project management consultant to assist the PMB and PFIs in improving coordination among different departments and units for FM and reporting.

(c) **Environmental and social safeguards.** The Bank team will supervise and provide support to the PMB and IAs for (i) the implementation of the ESMF/EMPs in accordance with the Bank's safeguard policies and (ii) the preparation of safeguards instruments as necessary for new subprojects identified during the implementation. Training will be provided to relevant staff from IAs to prepare and supervise implementation of the safeguards plan.

Implementation Support Plan

2. Most of the Bank team members will be based in the Vietnam country office and other country offices in the region to ensure timely, efficient, and effective implementation support to the client. Timely monitoring and support to the IAs will be provided mainly by the team members in the country offices. Formal supervision will be carried out semi-annually; field trips will be undertaken as needed for subprojects under implementation but also for new subprojects in the pipeline. Detailed inputs from the Bank team are outlined below:

(a) **Technical inputs.** EE specialist inputs are required to review and provide advice on EE saving measures, selection of EE technologies, preparation of energy audit, and bankable EE projects.

(b) **Fiduciary requirements and inputs.** Both FM and procurement specialists will be

based in the country office to provide timely support. Formal supervision of FM will be carried out semiannually, and procurement supervision will be carried out on a timely basis as required by the client. It is estimated that around two staff weeks will be required annually from the FM specialist and around four staff weeks annually from the procurement specialist in the first three years of the project implementation and around two staff weeks thereafter.

(c) **Safeguards.** Inputs from an environment specialist and a social specialist are required throughout the project implementation. Training will be provided to the IA staff on preparation of safeguards instruments and on monitoring and reporting. Supervision will focus on the implementation of the agreed land acquisition and resettlement plan. Field visits for supervision are required on a semiannual basis.

(d) **Review performance of PFIs.** Input is required from a financial specialist for regular review of PFIs' performance. Semi-annual reviews and field visits will be required.

(e) **Operational.** An operations officer based in the country office will provide day-to-day supervision of all operational aspects and coordination with the client and among Bank team members.

3. The main focus of implementation support is summarized in the table.

Table 5.1. Implementation Support

Time	Focus	Resource Estimate	Partner Role
Year 1 to Year 5	Technical and procurement review of the bidding documents	EE specialist(s)	n.a.
	Procurement training	Procurement specialist(s)	
	FM training and supervision	FM specialist	
	Supervise the implementation of safeguard instruments	Social specialist	
	Review of EMPs, provision of training, and supervision	Environmental specialist(s)	
	Review of PFIs' performance	Financial specialist	
	Institutional arrangement and project supervision coordination	Operations officer	
	Team leadership and development of project pipeline	Task team leader	