

Document of  
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Report No: ICR00002603

IMPLEMENTATION COMPLETION AND RESULTS REPORT  
(IDA-36800 IDA-47810 TF-51229)

ON A

CREDIT  
IN THE AMOUNT OF SDR 195.5 MILLION  
(US\$ 251.51 MILLION EQUIVALENT)

AND A

GLOBAL ENVIRONMENTAL FACILITY GRANT  
IN THE AMOUNT OF US\$ 4.5 MILLION

TO THE

SOCIALIST REPUBLIC OF VIETNAM

FOR A

SYSTEM EFFICIENCY IMPROVEMENT, EQUITIZATION AND  
RENEWABLES PROJECT

June 27, 2013

Vietnam Sustainable Development Unit  
Sustainable Development Department  
East Asia and Pacific Region

## CURRENCY EQUIVALENTS

(Exchange Rate Effective December 26, 2012)

Currency Unit = Vietnam Dong (VND)

VND20,850 = US\$1

US\$1.00 = VND0.000048

## FISCAL YEAR

[January 1 – December 31]

## ABBREVIATIONS AND ACRONYMS

ACT	Avoided cost tariff	MPI	Ministry of Planning and Investment
AF	Additional financing	MPI	Ministry of Planning and Investment
APL	Adaptable program loan	MoF	Ministry of Finance
AusAID	Australian Agency for International Development	Mol	Ministry of Industry
CAS	Country Assistance Strategy	MoIT	Ministry of Industry and Trade
CFL	Compact fluorescent light	MS	Moderately Satisfactory
CPPMB	Central Power Project Management Board	MTR	Mid-term review
CO2	Carbon dioxide	MV	Medium-voltage
CPC	Central Power Corporation	MVA	Megavolt ampere
CPS	Country Partnership Strategy	MVAR	Megavolt ampere reactive
CSG	China Southern Grid	MW	Megawatt
DA	Designated account	NGC	Northern Grid Company
DCA	Development Credit Agreement	NLDC	National Load Dispatch Center
DLC	Direct load control	NOx	Nitrogen oxides
DNPC	Dong Nai Power Company	NPC	Northern Power Corporation
DOME	District Operation and Maintenance Entity	NPMU	Project Management Unit of Northern Power Corporation
DPC	District Peoples' Committee	NPPMB	Northern Power Project Management Board
DPL	Development policy lending	NPT	National Power Transmission Company
DPO	Development policy operation	NPV	Net present value
DSM	Demand-Side-Management	NSL	Nam Si Luong
GDP	Gross Domestic Product	O&M	Operation and maintenance
GOV	Government of Vietnam	PAD	Project Appraisal Document
GWh	Giga watt hour	PC	Power Company or Power Corporation
EA	Environmental Assessment	PC2	Power Company Number 2
EE	Energy Efficiency	PC3	Power Company Number 3
EG	Environment Guideline	PDO	Project Development Objective
EIA	Environmental Impact Assessment	PPA	Power Purchase Agreement
EIRR	Economic Internal Rate of Return	PPC	Provincial People's Committee
EMDF	Ethnic Minorities' Development Framework	PECC	Power Engineering Consulting Companies
EMDP	Ethnic Minorities' Development Plan	PMU	Project management unit
EMP	Environmental Management Plan	PPMB	Power Projects Management Board
EOCK	Economic opportunity cost of capital	PSR	Project Status Report
ERAV	Electricity Regulatory Authority of Vietnam	PTC	Provincial Transmission Company
ESMAP	Energy Sector Management Assistance	RAP	Resettlement Action Plan

	Program		
EVN	Vietnam Electricity	RARE	Remote Areas Renewable Electricity
FEP	Foreign exchange premium	REAP	Renewable Energy Action Plan
FIRR	Financial Internal Rate of Return	REDP	Renewable Energy Development Project
FS	Feasibility Study	REP	Rural Energy Project
FM	Financial Management	RESSP	Renewable Energy for Small Power Producers
FS	Feasibility Study	RP	Resettlement Plan
FMIS	Financial Management Information System	RPF	Policy Framework for Resettlement, Compensation and Rehabilitation of Project Affected People
FTL	Fluorescent tube light	RVP	Regional vice president
FY	Fiscal year	SDP	Standard disbursement percentage
g	Gram	SDR	Special Drawing Right
GEF	Global Environment Facility	SEDS	Socio-Economic Development Strategy
GEO	Global Environment Objective	SEIER	System Efficiency Improvement, Equitization and Renewables Project
GOV	Government of Vietnam	SER	Shadow exchange rate
HCM	Ho Chi Minh	SHP	Small hydropower project
PC1	Power Company Number 1	SI	Sensitivity Indicator
HDPC	Hai Duong Power Company	SIL	Specific Investment Loan
HR	Human Resource	SMO	System and market operator
HVDC	high-voltage, direct current	SPC	Southern Power Corporation
ICR	Implementation Completion and Results Report	SPP	Small power producer
IDA	International Development Association	SPPA	Standard Power Purchase Agreement
IDC	Interest During Construction	SPPMB	Southern Power Project Management Board
ISR	Implementation Status and Results Report	SPPMU	Southern Power Projects Management Unit
kWh	Kilo watt hour	SV	Switching value
kV	Kilovolt	TA	Technical Assistance
IDA	Interactional Development Association	TD1	Transmission, Distribution and Disaster Reconstruction Project
IMC	Independent Monitoring Consultants	TD2	Second Transmission and Distribution Project
IPP	Independent power producer	TNA	Training needs analysis
ISR	Implementation Status and Results Reports	TOU	Time of use
IT	Information and telecommunication	TOR	Terms of reference
IPDP	Indigenous People Development Plan	TTL	Task Team Leader
Km	Kilometer	USc	United States cent
KPI	Key performance indicator	USD	United States dollar
LRMC	Long run marginal cost	VCGM	Vietnam competitive generation market
M&E	Monitoring and evaluation	VDB	Vietnam Development Bank
MBA	Master of business administration	VND	Vietnamese Dong
MMIS	Material Management Information System	WB	World Bank
MMS	Market Management System	MPI	Ministry of Planning and Investment
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MMIS	Material Management Information System	VND	Vietnamese Dong
MMS	Market Management System	WB	World Bank

Vice President:	Axel Van Trotsenburg
Country Director:	Victoria Kwakwa
Sector Manager:	Jennifer J. Sara
Project Team Leader:	Ky Hong Tran
ICR Team Leader:	Natsuko Toba

**SOCIALIST REPUBLIC OF VIETNAM**  
**System Efficiency Improvement, Equitization and Renewables Project**

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IDA Map No. 31943

A. Basic Information			
Country:	Vietnam	Project Name:	System Efficiency Improvement, Equitization & Renewables Project
Project ID:	P066396, P073778	L/C/TF Number(s):	IDA-36800, IDA-47810,TF-51229
ICR Date:	06/27/2013	ICR Type:	Core ICR
Lending Instrument:	SIL	Borrower:	SOCIALIST REPUBLIC OF VIETNAM
Original Total Commitment:	XDR 177.90M, USD 4.50M, Additional Financing XDR 17.60M	Disbursed Amount:	XDR 177.39M, USD 4.09M, Additional Financing XDR 16.83M
Environmental Category: B, B		Focal Area: C	
Implementing Agencies:			
Ministry of Industry and Trade (former Ministry of Industry)			
Vietnam Electricity (EVN)			
Northern Power Corporation (former Power Company No. 1)			
Southern Power Corporation (former Power Company No. 2)			
Central Power Corporation (former Power Company No. 3)			
Power Company Dong Nai			
Power Company Hai Duong			
Electricity Regulatory Authority of Vietnam (ERAV)			
Power Company Dong Nai			
Cofinanciers and Other External Partners:			

<b>B. Key Dates</b>				
<b>System Efficiency Improvement, Equitization &amp; Renewables Project - P066396</b>				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	03/09/2001	Effectiveness:	02/19/2003	02/19/2003
Appraisal:	01/18/2002	Restructuring(s):		06/29/2005 11/13/2007 05/21/2009 12/30/2009 06/23/2010
Approval:	06/25/2002	Mid-term Review:	07/01/2005	08/25/2006
		Closing:	12/31/2007	12/31/2012

System Efficiency Improvement, Equitization & Renewables Project (GEF Renewable Component) - P073778				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	03/09/2001	Effectiveness:	02/19/2003	02/19/2003
Appraisal:	01/18/2002	Restructuring(s):		06/29/2005 11/13/2007 05/21/2009 12/30/2009
Approval:	06/25/2002	Mid-term Review:	07/01/2005	08/25/2006
		Closing:	12/31/2007	12/31/2010

## C. Ratings Summary

### C.1 Performance Rating by ICR

Outcomes	Moderately Satisfactory
GEO Outcomes	Moderately Satisfactory
Risk to Development Outcome	Moderate
Risk to GEO Outcome	Moderate
Bank Performance	Moderately Satisfactory
Borrower Performance	Moderately Satisfactory

### C.2 Detailed Ratings of Bank and Borrower Performance (by ICR)

Bank	Ratings	Borrower	Ratings
Quality at Entry	Moderately Satisfactory	Government:	Moderately Satisfactory
Quality of Supervision:	Satisfactory	Implementing Agency/Agencies:	Satisfactory
Overall Bank Performance	Moderately Satisfactory	Overall Borrower Performance	Moderately Satisfactory

### C.3 Quality at Entry and Implementation Performance Indicators

#### System Efficiency Improvement, Equitization & Renewables Project - P066396

Implementation Performance	Indicators	QAG Assessments (if any)	Rating
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA)	None
Problem Project at any time (Yes/No):	No	Quality of Supervision (QSA)	None
DO rating before Closing/Inactive status	Satisfactory		



System Efficiency Improvement, Equitization & Renewables Project (GEF Renewable Component) - P073778			
Implementation Performance	Indicators	QAG Assessments (if any)	Rating
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA)	None
Problem Project at any time (Yes/No):	No	Quality of Supervision (QSA)	None
GEO rating before Closing/Inactive Status	Satisfactory		

D. Sector and Theme Codes		
System Efficiency Improvement, Equitization & Renewables Project - P066396		
	Original	Actual
<b>Sector Code (as % of total Bank financing)</b>		
Central government administration	6	6
Energy efficiency in Heat and Power	55	55
Other Renewable Energy	6	6
Transmission and Distribution of Electricity	33	33
<b>Theme Code (as % of total Bank financing)</b>		
Climate change	14	14
Infrastructure services for private sector development	14	34
Participation and civic engagement	14	14
Poverty strategy, analysis and monitoring	29	9
Rural services and infrastructure	29	29

System Efficiency Improvement, Equitization & Renewables Project (GEF Renewable Component) - P073778		
	Original	Actual
<b>Sector Code (as % of total Bank financing)</b>		
Central government administration	33	33
Renewable energy	67	67
<b>Theme Code (as % of total Bank financing)</b>		
Climate change	29	29
Participation and civic engagement	14	14
Poverty strategy, analysis and monitoring	28	18
Rural services and infrastructure	29	39

<b>E. Bank Staff</b>		
<b>System Efficiency Improvement, Equitization &amp; Renewables Project - P066396</b>		
<b>Positions</b>	<b>At ICR</b>	<b>At Approval</b>
Vice President:	Axel van Trotsenburg	Jemal-ud-din Kassum
Country Director:	Victoria Kwakwa	Andrew D. Steer
Sector Manager:	Jennifer J. Sara	Mohammad M. Farhandi
Project Team Leader:	Ky Hong Tran	Anil Kumar Malhotra
ICR Team Leader:	Natsuko Toba	
ICR Primary Author:	Natsuko Toba	

<b>System Efficiency Improvement, Equitization &amp; Renewables Project (GEF Renewable Component) - P073778</b>		
<b>Positions</b>	<b>At ICR</b>	<b>At Approval</b>
Vice President:	Axel van Trotsenburg	Jemal-ud-din Kassum
Country Director:	Victoria Kwakwa	Andrew D. Steer
Sector Manager:	Jennifer J. Sara	Mohammad M. Farhandi
Project Team Leader:	Ky Hong Tran	Anil Kumar Malhotra
ICR Team Leader:	Natsuko Toba	
ICR Primary Author:	Natsuko Toba	

## **F. Results Framework Analysis**

### **Project Development Objectives (from Project Appraisal Document)**

According to the Development Credit Agreement, the objective of the Project is to assist the Borrower to: (a) enhance electricity system efficiency in Vietnam; (b) provide electric power in selected rural areas of Vietnam; and (c) sustain reform and institutional development of the Borrower's energy sector.

### **Revised Project Development Objectives (as approved by original approving authority)**

There were no changes to the PDO.

### **Global Environment Objectives (from Project Appraisal Document)**

The global objective of the renewable energy components is to contribute to reduced greenhouse gas emissions by promoting the use of electricity production using renewable resources.

### **Revised Global Environment Objectives (as approved by original approving authority)**

There was no change to the global environment objective.

#### **(a) PDO Indicator(s)**

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
<b>Indicator 1 :</b>	Number of interruptions Faults/100 km/year at 500kV			
Value (quantitative or Qualitative)	500kV: 0.33 220kV: 0.596	0.321 0.578		0.310 0.553
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Achieved system wide: Reduced interruption and faults are 3% more than the target for 500kV and 4% more for 220kV. SEIER contributed to a portion of the whole system and its specific attribution is difficult to calculate (See Annex 2 for details).			
<b>Indicator 2 :</b>	Average duration of faults on 500kV and 220 kV lines, minutes/year			
Value (quantitative or Qualitative)	500 kV: 15.75 220 kV:21.2	15.28 20.57		5.08 10.09
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Achieved at system level: Average duration of faults was reduced 65% more than the target for 500kV and 49% more for 220kV. SEIER contributed to a portion of these results.			
<b>Indicator 3 :</b>	Transmission losses (%)			
Value (quantitative or Qualitative)	4.35	3.75		2.56
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Achieved system-wide: Reduced transmission loss is 27% more than the target. SEIER contributed to part of these results.			
<b>Indicator 4 :</b>	Number of interruptions /100 km/year at 110kV			
Value (quantitative or Qualitative)	3.32	3.221		3.17
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Achieved for system: Interruptions are reduced 2% more than the target. SEIER contributed to part of these results.			
<b>Indicator 5 :</b>	Average duration of faults on 110kV lines, minutes/year			
Value (quantitative or Qualitative)	28.8	27.94		19.6
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Achieved system-wide: Average duration of faults was reduced 29% more than the target. SEIER contributed to part of these results.			
<b>Indicator 6 :</b>	Distribution losses (%)			
Value (quantitative or Qualitative)	8.65	7.25		6.80

Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Achieved system-wide: Reduced distribution loss 5% more than the target. SEIER contributed to part of these results.			
<b>Indicator 7 :</b>	Rural access: Number of new households electrified from off grid or mini grid			
Value (quantitative or Qualitative)	0	10,000		460
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Not achieved: Due to the rapid expansion of the rural grid connection across the country (connected communes increased from 78% in 2000 to 97% in 2012), the need for off-grid connections was reduced. Another 1,176 households benefited from rehabilitation.			
<b>Indicator 8 :</b>	Increase in small hydro and biomass capacity on line			
Value (quantitative or Qualitative)	0	20MW		13.6MW
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	68% achieved: Target was reduced to take into account the rapid grid expansion replacing the need for off-grid generation. Grid connected electrification of communes increased from 78% in 2000 to 97% in 2012 in Vietnam.			
<b>Indicator 9 :</b>	Evaluation of accounts of newly formed joint stock and equitized companies			
Value (quantitative or Qualitative)	No accounts available	Financially sustainable companies		A relevant report was produced in September 2006.
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	A study on the equitization program of EVN was completed in September 2006. The Bank continued to monitor the equitization process.			
<b>Indicator 10 :</b>	Reduction of time and complexity for Small Power Producers (SPPs) to get approved			
Value (quantitative or Qualitative)	Long time	Significant progress		Some progress
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Specific achievement difficult to quantify as no baseline was established. While the project supported the improvement of regulations and streamlining procedures, anecdotal evidence shows that the process is still long.			
<b>Indicator 11 :</b>	Financial management/material management system improved			
Value (quantitative or Qualitative)	Poor quality	Improvement in financial and material management		The relevant activity cancelled in 2010
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Activity canceled in 2010. EVN carried out the task with its own funds due to contractual problems with the consultant initially hired with IDA resources.			
<b>Indicator 12 :</b>	Sound procedures for the effective implementation of tariff and market regulations			
Value	Not available	Issuance of	Sound	Sound procedures

(quantitative or Qualitative)		regulations	procedures for the effective implementation of tariff and market regulations in place	for the effective implementation of tariff and market regulations in place
Date achieved	12/01/2007	12/31/2009	12/31/2012	12/31/2012
Comments (incl. % achievement)	Achieved, with contributions from the Project TA resulting in the issuance of procedures for market rules, Prime Minister's Decisions on tariff setting methodology and on market-based electricity tariff mechanism, among others.			
<b>Indicator 13 :</b>	Ability to assess effectiveness and improve regulations and implementation procedures			
Value (quantitative or Qualitative)	Newly established without experience	Ability to effectively prepare, issue and enforce regulations for the market and licensed activities	Sound ability by ERAV to assess effectiveness and improve regulations and implementation procedures	Sound ability by ERAV to assess effectiveness and improve regulations and implementation procedures
Date achieved	12/01/2007	12/31/2009	12/31/2012	12/31/2012
Comments (incl. % achievement)	Achieved: As a result of training and capacity building ERAV staff has significantly improved its capacity at all levels.			

**(b) GEO Indicator(s)**

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
<b>Indicator 1 :</b>	CO2 emissions reduced			
Value (quantitative or Qualitative)	0 ton	208,350-219,140 tons		278,164 tons
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Achieved: 259,264 CO2 tons of reduced emissions are from five rehabilitated small hydropower plants, while three new off grid mini hydropower plants and four rehabilitated mini hydropower plants contributed the remainder.			

**(c) Intermediate Outcome Indicator(s)**

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
<b>Indicator 1 :</b>	Length of 500kV transmission line installed, km			
Value (quantitative or Qualitative)	0	TBD		0

Qualitative)				
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	In 2004, prior to 2005 project restructuring, the planned 500kV line was withdrawn as it had been financed by other sources, and funds were reallocated to investments in 220kV lines.			
<b>Indicator 2 :</b>	Capacity of 500/220kV substation capacity installed, MVA			
Value (quantitative or Qualitative)	0	450		900
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Target exceeded by 100%.			
<b>Indicator 3 :</b>	Length of 220kV transmission line installed, km			
Value (quantitative or Qualitative)	0	470		490
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Target exceeded by 4%.			
<b>Indicator 4 :</b>	Capacity of 220kV/110kV substation capacity installed, MVA			
Value (quantitative or Qualitative)	0	3370		3313
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	98% of the target was achieved.			
<b>Indicator 5 :</b>	Capacity of 110 kV capacitors installed, MVAR			
Value (quantitative or Qualitative)	0	930		565
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	61% of the target was achieved as funds were reallocated to higher priority investments.			
<b>Indicator 6 :</b>	Capacity and energy saved from DSM activities (MW/GWh)			
Value (quantitative or Qualitative)	0	12/84		301.1/2506
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	2509% of the MW target and 2983% of the GWh target were achieved due to the successful CFL market transformation.			
<b>Indicator 7 :</b>	Length of 110kV lines installed, km			
Value (quantitative or Qualitative)	0	910		965

Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Target exceeded by 6%.			
<b>Indicator 8 :</b>	Capacity of 110/22kV and 110/35kV substations installed, MVA			
Value (quantitative or Qualitative)	0	1700		3210
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Target exceeded by 89%.			
<b>Indicator 9 :</b>	Number of additional communes connected to minigrid			
Value (quantitative or Qualitative)	0	20		6
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	Only 30% of the target was achieved, as communes became connected to the national grid and no longer needed off-grid solutions.			
<b>Indicator 10 :</b>	Effective equitization program in place			
Value (quantitative or Qualitative)	Program initiated	Substantial progress		A relevant study on equitization was prepared in September 2006
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	A study on equitization program of EVN was completed in September 2006. The Bank continued to monitor the equitization process.			
<b>Indicator 11 :</b>	Number of companies in which management system installed and operating			
Value (quantitative or Qualitative)	Not installed	500 users at 30 main sites		Not installed as this component was cancelled in 2010.
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	This activity was carried out by EVN using its own funds.			
<b>Indicator 12 :</b>	Regulations for small power producers issued, enforced			
Value (quantitative or Qualitative)	Not effective	Effective and streamline regulations		Improved regulations in place
Date achieved	04/01/2005	12/31/2007		12/31/2012
Comments (incl. % achievement)	The project helped establish the Standard Power Purchase Agreement (PPA), Avoided Cost Tariff (ACT) regulations, and MoIT guideline No.2014 for economic and financial analysis of renewable energy projects, and contributed to improved licensing procedures.			
<b>Indicator 13 :</b>	30 additional formal training received by ERAV staff Effective processes for information collection and monitoring			
Value	Not yet in place	35 staff received	30 additional	97 additional

(quantitative or Qualitative)		training; Database functioning; an effective public relation campaign	training received, Effective processes for information collection and monitoring in place	ERAV staff received training
Date achieved	12/01/2007	12/31/2009	12/31/2012	12/31/2012
Comments (incl. % achievement)	Staff training target exceeded by 223%. Procurement of the regulatory/market monitoring IT system was dropped as ERAV required more time to review and finalize system technical specifications.			
<b>Indicator 14 :</b>	All tariff, market and technical codes regulations issued. Five market procedures and five technical procedures effective			
Value (quantitative or Qualitative)	Not yet in place	Five effective regulations	Eleven regulations issued. Five under preparation	21 Regulations and 14 Procedures issued.
Date achieved	12/01/2007	12/31/2009	12/31/2012	12/31/2012
Comments (incl. % achievement)	Target for number of regulations exceeded by 91%.			
<b>Indicator 15 :</b>	Road map for reform of gas market in place, 10 MoIT staff received training			
Value (quantitative or Qualitative)	Not yet in place	Road map for reform of gas market in place, 10 MoIT staff received training		These activities were initially supported by the project but not fully implemented
Date achieved	05/25/2010	12/31/2012		12/31/2012
Comments (incl. % achievement)	The project provided some funding to support MoIT holding an initial workshop on the gas market reform. However there was limited follow up. This work is still being supported by the Bank under a separate TA.			
<b>Indicator 16 :</b>	EVN capacity to plan and finance investments improved; 20 EVN and National Power Transmission Company (NPT) staff received training			
Value (quantitative or Qualitative)	Not yet in place	Establishment of Corporate Financing Unit in EVN and NPT; 20 Staff received training		The training of EVN and NPT staff and establishment of corporate financing unit were not implemented under this project.
Date achieved	05/25/2010	12/31/2012		12/31/2012
Comments (incl. % achievement)	This work on NPT was transferred to the Bank supported Second Transmission and Distribution Project (TD2) to better link the institutional strengthening with a broader investment program.			



## G. Ratings of Project Performance in ISRs

No.	Date ISR Archived	DO	GEO	IP	Actual Disbursements (USD millions)	
					Project 1	Project 2
1	08/06/2002	S	S	S	0.00	0.00
2	06/14/2003	S	S	S	0.00	0.00
3	12/25/2003	S	S	S	4.08	0.25
4	06/29/2004	S	S	S	15.67	0.27
5	12/28/2004	S	S	S	33.51	0.30
6	04/29/2005	S	S	S	46.22	0.37
7	04/17/2006	S	S	MS	69.29	0.74
8	05/21/2007	S	S	S	83.11	0.98
9	06/19/2008	S	S	S	157.03	1.62
10	06/22/2009	S	S	S	217.38	2.48
11	01/12/2010	S	S	S	240.73	2.79
12	04/23/2011	S	S	S	268.62	4.10
13	05/11/2012	S	S	S	274.09	4.09
14	01/17/2013	S	S	S	292.84	4.09

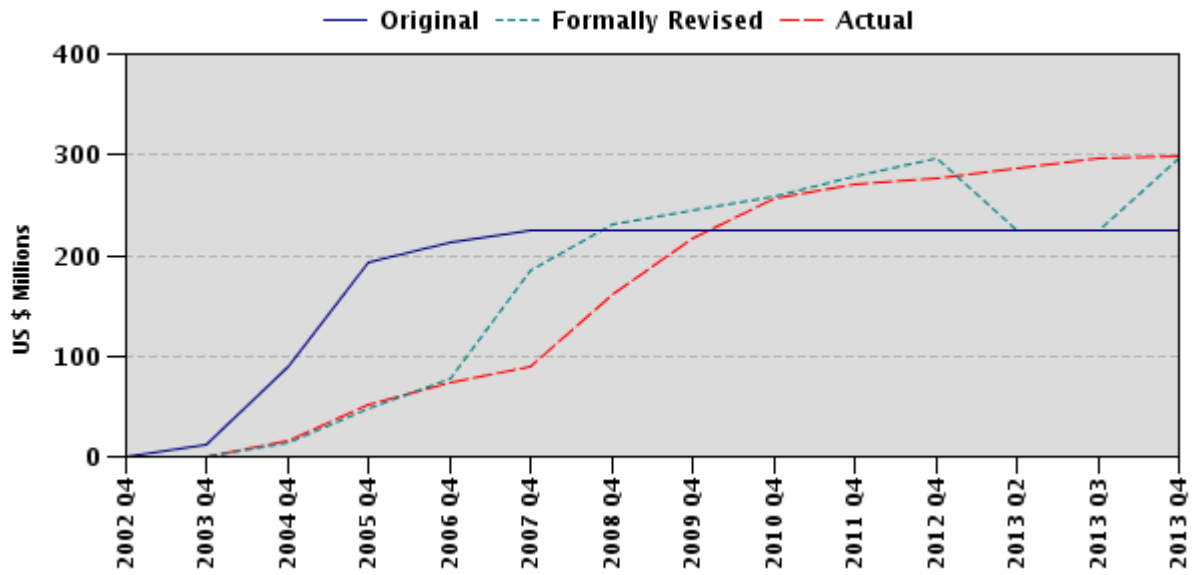
## H. Restructuring (if any)

Restructuring Date(s)	Board Approved		ISR Ratings at Restructuring			Amount Disbursed at Restructuring in USD millions		Reason for Restructuring & Key Changes Made
	PDO Change	GEO Change	DO	GEO	IP	Project1	Project 2	
06/29/2005	N		S		S	52.21		A programmatic approach was introduced to increase flexibility for the selection of subprojects that could be financed by the Project.
06/29/2005		N		S	S		0.41	A programmatic approach was introduced to increase flexibility for the selection of subprojects that could be financed by the Project.
11/13/2007	N		S		S	111.83		A newly established Electricity Regulatory Authority of Vietnam (ERAV) and a newly independent power company were added as implementing agencies to further support the ongoing sector reform. The closing date was also extended to implement remaining activities.
11/13/2007		N		S	S		1.28	A changing sector environment and limited capacity delayed implementation and required changing the focus of activities from off-grid renewable energy to grid-connected renewable energy. The closing date was also extended to implement the remaining activities.

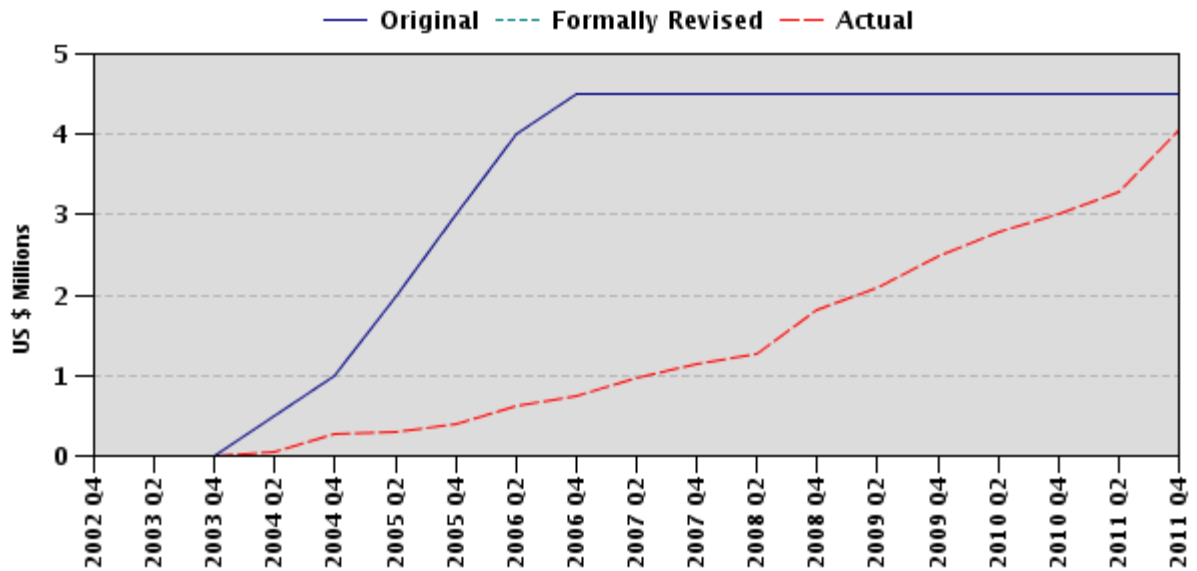
05/21/2009	N		S		S	215.84		The Credit Agreement was revised to include preparation of the Renewable Energy Development Project and to simplify the disbursement categories.
05/21/2009		N		S	S		2.48	The Credit Agreement was revised to include preparation of the Renewable Energy Development Project and to simplify the disbursement categories.
12/30/2009	N		S		S	240.00		The Project closing date was extended to complete some delayed activities and to process the additional financing.
12/30/2009		N		S	S		2.79	The Project closing date was extended to complete some delayed activities due to macroeconomic problems.
06/23/2010	Y		S		S	256.70		Additional financing was approved to meet a funding gap of original activities and scale up the power reform support including support to ERAV and capacity building of EVN and NPT. A closing date extension was required to complete the existing and additional activities.

## I. Disbursement Profile

P066396



P073778



## **1. Project Context, Development and Global Environment Objectives Design**

### **1.1 Context at Appraisal**

1. The energy sector was regarded as a key driver for economic growth and a contributor to poverty reduction in Vietnam. The sector contributed to over a quarter of total foreign exchange earnings from oil and coal exports. Energy demand had been growing 13 percent per year, faster than Gross Domestic Product (GDP) during the five years prior to the project appraisal in 2002. The energy sector expansion was deemed to help alleviate poverty by providing energy access to the poor and mitigate environmental degradation by encouraging the shift from traditional to commercial energy and making appropriate fuel choices.

2. The major sector issues at time of appraisal included: (i) needs for large sector investments and improvement in overall system efficiency, (ii) a low rate of rural access to electricity, (iii) weak management of institutions, (iv) limited capacity to utilize renewable energy, (v) financial sustainability of the power sector, (vi) environmental management, and (vii) lack of a comprehensive legal and regulatory framework. The Government of Vietnam (GOV) had been addressing these challenges with development partners including the World Bank. The System Efficiency Improvement, Equitization and Renewables Project (SEIER) was part of a broader program of investments agreed to between the GOV and the Bank, to address the above sector issues. Within this framework, the GOV preferred to bundle cross-cutting investments to address different aspects of the sector reform program into a specific investment loan (SIL) to be completed in the same time frame, rather than through a more sequenced adaptable approach, such as one that could be supported by an adaptable program loan (APL).

3. The Project was in line with the Bank Group's Country Assistance Strategy (CAS) for 1999-2002, which saw the International Development Association's (IDA) role for the power sector as filling a niche not covered by other players and assisting the GOV in its poverty alleviation efforts. The Project was consistent with the CAS focus on reducing poverty, promoting equitable growth and raising productivity through provision of infrastructure. The Project was designed to support the objectives of the Interim Poverty Reduction Strategy Paper for 2001-2002. The renewable energy subcomponents of SEIER addressed the Global Environment Facility (GEF) Operational Program 6 on Climate Change: promotion of the adoption of renewable energy by removing barriers and reducing implementation costs. The Project was designed to support a long-term programmatic approach to strategically develop Vietnam's renewable energy sources based on the Vietnam Renewable Energy Action Plan (REAP) published in 2002.

### **1.2 Original Project Development Objectives (PDO) and Key Indicators (as approved)**

4. The objective of the Project, as defined in the Development Credit Agreement (DCA), was to assist the Borrower to: (i) enhance electricity system efficiency in Vietnam; (ii) provide electric power in selected rural areas of Vietnam; and (iii) sustain reform and institutional development of the Borrower's energy sector. The ICR chooses to use the DCA version because it is more measurable and attributable to the Project interventions. The original Project Appraisal Document (PAD) included a longer term objective that linked project results to poverty alleviation. As such, the PAD included the following key performance indicators (KPIs): (i) number of additional rural households with electricity (conventional and renewable), as well as indicators on social benefits and income generating impacts; (ii) additional renewable electricity used to supply isolated communes; (iii) increased efficiency, reliability and quality of overall power system services; (iv)

progress in implementation of reforms and maintenance of financial soundness of Vietnam Electricity (EVN) and affiliated power distribution companies; and (v) development of a program for creation of a creditworthy distribution sector. Annex 1 of the PAD provided more specific KPIs, which did not set baselines and specific targets or include indicators on social benefits and income generating impacts (see Annex 2 for details).

### **1.3 Original Global Environment Objectives (GEO) and Key Indicators (as approved)**

5. The global environment objective of the renewable energy components was to contribute to reduced greenhouse gas emissions by promoting the use of electricity production using renewable resources. The key indicator was carbon dioxide (CO<sub>2</sub>) emissions reduced.

### **1.4 Revised PDO (as approved by original approving authority) and Key Indicators, and reasons/justification**

6. No change was made to the PDOs. The key performance indicators (KPIs) were revised and adjusted during the first project restructuring in 2005. Some KPIs in the result framework were modified to be more measurable and baseline and target values were set (see Annex 2 for details). During the second restructuring in 2007, additional KPIs were added to the results framework, especially for an additional implementing agency of a newly created Electricity Regulatory Authority of Vietnam (ERAV), and were made more specific in the arrangements for results monitoring. The June 2010 restructuring further adjusted the KPIs as part of the additional financing to include modification of the ERAV related KPIs as well as new KPIs on the gas market reform plan and financing capacity of EVN and the National Power Transmission Corporation (NPT) (the final result framework, which incorporated all revisions is in Annex 2).

### **1.5 Revised GEO (as approved by original approving authority) and Key Indicators, and reasons/justification**

7. The Global Environment Objective (GEO) and key indicators were not revised.

### **1.6 Main Beneficiaries**

8. The Project's investments in the improvement of transmission and distribution system efficiency benefitted consumers of electricity across the country. The Project also expanded reliable power supply to industrial zones, as well as to the rural poor and agricultural areas. The Northern Power Corporation (NPC), Central Power Corporation (CPC), and Dong Nai Power Company (DNPC) together benefited more than 5.9 million consumers with improved power supply, which included rural consumers; the other implementing agencies also increased their numbers of consumers and improved the quality of power supply.

9. The rehabilitation of small hydropower provided power for rural areas and the Remote Areas Renewable Electricity (RARE) subcomponent provided access to electricity for 460 new rural poor households, and benefited an additional 1,176 households through rehabilitation of off-grid micro hydropower. Nearly 600 ERAV staff and other stakeholders (EVN, National Load Dispatch Center (NLDC), Ministry of Industry and Trade [MoIT], etc.) received training on power market, pricing and other courses, and participated in study. The relevant policy framework and simplification of the approval procedures for the promotion of renewable energy (e.g., development of Standard Power Purchase Agreement [SPPA], Avoided Cost Tariff [ACT], etc.) benefited small power producers (SPPs) using renewable energy.

## **1.7 Original Components (as approved)**

10. The Project components are listed below.

- Component A (US\$183.6 million, of which US\$115 million was IDA financed). System efficiency improvement, focusing on upgrades of 500kV and 220kV transmission systems and demand side management (DSM). This component was also supported by a separate DSM and Energy Efficiency (EE) Project (P071019), financed by the GEF and the private sector, and closed on June 30, 2010, for which a separate ICR had already been prepared with a satisfactory rating for the overall outcome.
- Component B (US\$151.2 million of which US\$82.7 million was IDA financed and US\$1.5 million funded by the GEF). Improving rural access, including upgrading of 110kV sub-transmission systems, rehabilitation of small hydro and development of off-grid or mini-grid power supply using renewable energy.
- Component C (US\$31.4 million, of which US\$27.3 million was IDA financed and US\$3 million funded by the GEF). Institution building, including capacity building, support to equitization and improvement of EVN's management information system.

## **1.8 Revised Components**

11. The three core Project components were not revised but some sub-components and activities were either revised or cancelled as a result of implementation progress and agreements reached during supervision missions. The smaller changes were documented in mission aide memoires, while others were covered through project restructurings and the additional financing. The detailed list of changes to project sub-components is presented in Annex 2.

12. The key changes to the Project at the 2005 restructuring were to make Components A and B more programmatic in the selection of sub-projects to be financed. For Component A, additional subprojects included 220 kV level 423 kilometers (km) of single and double circuits and 13 substations with capacity totaling 2,125 MVA (further sub-projects were to be identified); and an additional sub-component of commercial metering at the transmission system interface with generation and distribution was introduced. Component B included further investments of 122 km of single and double circuit 110kV lines and 18 substations totaling about 560 MVA capacity. The range of eligible subprojects to be financed under the RARE program under Component B was expanded to include other modalities beyond hybrid renewable energy grid, and also allowed for plants to cover privately-owned, village and province levels (in addition to commune level). Also, during 2007-2010, Component 3 added more activities, including capacity building of ERAV, institutional development of the gas sector, establishment of corporate financing units in EVN and NPT and associated training. During the 2007 restructuring, the additional support to ERAV was made possible through US\$2.89 million that became available from the SDR appreciation and from the reduction of RARE grants under the IDA Credit.

13. Aide memoires recorded the following cancellations: (i) the Wind-Diesel Project as the feasibility study found low potential of wind resource. The remaining funds were transferred to MoIT to revise the Strategy and Master plan on Renewable Energy Development; and (ii) technical assistance (TA) for Improved Maintenance Management at the EVN corporate structure was changed. The funds were allocated to finance a Feasibility Study for the Interconnection between EVN and China Southern Grid. Some activities that were not (fully) implemented and were not recorded as cancelled in aide memoires were as follows: (i) Establishment of corporate financing

units in EVN and NPT and associated training; (ii) Strengthening of Project financial management and (iii) Institutional development of the gas sector.

14. Incomplete activities resulted mainly from implementation delays and evolving sector needs. For example, contractual problems delayed implementation of the Financial Management Information System and Material Management Information System (FMIS/MMIS). Some activities were carried out by the implementing agencies with their own funding (e.g., FMIS/MMIS) or by other Bank supported projects or TA. The installation and upgrades of a commercial metering system were moved to be financed under the Second Transmission and Distribution Project (TD2) due to the need to align with the power sector reform schedule. The equitization program was partly revised during the 2005 restructuring to provide training to EVN and newly established power distribution joint stock companies because it was decided there was no longer a need to create joint stock companies and equitization at the commune or district level due to the lack of economies of scale and capacity. After the equalization study was completed in 2006 and distribution systems were upgraded, the Bank continued to monitor the equitization process. Most of these activities were dropped as a joint GOV and Bank response to changing needs and environment, while maintaining consistency with the PDO.

## **1.9 Other Significant Changes**

15. The Project was restructured three times, as Level Two restructurings according to the current definition, and obtained additional financing (AF). The first restructuring occurred June 29, 2005, and was approved by the Board on a non-objection basis to adapt to changes and introduce a more programmatic approach. During the second restructuring on November 13, 2007, two implementing agencies were added and approved by the Regional Vice President (RVP). The third restructuring of May 21, 2009, also approved by the RVP, was required to prepare for the AF, support preparation of the Renewable Energy Development Project (REDP, Cr. 4564 VN), and simplify the disbursement categories. The AF was approved by the Board on June 23, 2010 to meet a financing gap resulting from cost overruns and to scale up support to other aspects of the power sector reform.

16. The Project's closing date was extended three times. The first two extensions totaled three years up to December 31, 2010 and were required to complete existing activities and prepare the AF. On June 23, 2010, the third closing date extension to December 31, 2012 was approved by the Board, along with the AF..

## **2. Key Factors Affecting Implementation and Outcomes**

### **2.1 Project Preparation, Design and Quality at Entry**

#### *Soundness of the Background Analysis*

17. The Project was designed based on recommendations of the underpinning major sector study "Fueling Vietnam's Development: New Challenges for the Energy Sector" (December 1998, Report No. 19037-VN), which served as a rationale of the Bank intervention. This report identified the key issues and laid out a strategy for the sector. First, IDA lending would shift toward extending access to electricity in rural areas. Second, IDA would increase the efficiency in the entire energy chain and create creditworthy institutions, as well as improve corporate governance and rationalize sector management. Third, the focus would shift toward mobilization of external financial resources for the sector to ensure the country would meet its energy demands, providing services that would facilitate private participation in the energy sector. This would include advisory services for putting



in place a transparent and independent regulatory framework and for promoting private participation in distribution and renewable energy power plants.

18. The investment components of the Project were developed to support the GOV with the Vietnam Power Development Master Plan V for 2001-2010 and the Rural Electrification Master Plan. For the technical assistance (TA) component, the key areas to ensure success of the power sector reform were supported. Lessons learned from the relevant projects supported by the Bank and other agencies were incorporated into the Project design. However, early lessons from the Transmission, Distribution and Disaster Reconstruction Project (TD1) in the country on slow implementation and disbursement did not appear to have been reflected in the project design.

#### *Assessment of the Project Design*

19. The Project design included, for the first time in a Vietnam energy sector project, significant IDA financing for institutional development, staff training and TA. This was appropriate, given the sectoral needs in the context of the country's growing power sector. Also for the first time the Project sought to mainstream renewable energy. The economic and financial analyses were conducted to select least cost options.

20. The PDO as specified in the PAD entailed poverty alleviation, included as a higher level objective to which the Project would contribute. However, this proved to be overly ambitious and difficult to measure and attribute to the Project. In addition, the choice of the KPIs posed challenges for evaluating project outcomes as explained in Section 2.3 (Monitoring and Evaluation (M&E) Design, Implementation and Utilization).

21. The Project design adequately addressed the expected challenges in improving efficiency, extending access and implementing reform in a simultaneous manner, during a period of fast growth of power demand by including consultant support to all of the implementing agencies. However, the capacity of implementing agencies especially at local levels (e.g., province, district and commune) was not comprehensively analyzed during project preparation. Since the Project components included a range of sub-sectoral issues (transmission, distribution, renewable energy, rural electricity access, equitization, community-based approach to electricity supply, power sector reform, etc.), it ended up being very complex, involving a large number of implementing agencies, including those at the provincial level, dispersed across the country. This approach was more complex than what was adopted for other power projects in Vietnam. In addition, as the power sector was undergoing reform, the institutional structure was also continuously evolving, and had an impact on the Project as the number of implementing agencies had to be increased and were also submitted to organizational changes. The Project preparation could have better assessed this context.

22. In addition, community-based approaches to power supply operation and commune and district level equitizations of power companies were relatively new concepts in the country, and yet the Project was designed to mainstream this approach based on very few success cases in the country. There was a lack of realism regarding the capacity of these local level organizations to achieve a large scale up.

23. Overall, the social and environmental safeguard issues were addressed adequately in the Project design to minimize social and environmental impact and ensure compliance with the relevant World Bank safeguard policies.

#### *Adequacy of Government's Commitment and Stakeholder Involvement*

24. Stakeholder involvement was adequate. Consultations among the central GOV and local government agencies and people were held. Sites for commune based mini grids were planned to be selected by direct participation of local people and authorities. A number of consultation and workshops were also held with major international donors, civil society organizations and other stakeholders. The GOV's strong commitment could be seen from (i) the counterpart fund allocation of about half of the IDA Credit amount at appraisal, (ii) their engagement in the preparation of safeguard documents, and (iii) their approval of The Master Plan of Power Sector Development for the 2001-2010 period in June 2001. The Project supported the investment priorities identified in the Plan.

#### *Assessment of Risks and Mitigation Measures*

25. In general, the risks associated with the project and measures to mitigate them were adequately identified at the Project appraisal although there were some shortcomings. An overall project risk rating was modest risk (M). Modest risks were rated for (i) low management capacity of MoI, Provincial People's Committee (PPC) and EVN in rural areas; (ii) equitization program implementation capacity; and (iii) schedule and cost overruns. These three ratings appeared optimistic. The lessons learned from the IDA operations in the country highlighted the various delays caused by approval procedures, foreign exchange shortfalls, financial difficulties of suppliers and contractors, and insufficient on-time information and guidelines. The scale of business and limited management capability and human resources in many districts and communes should have been more realistically assessed.

26. The risk rating for tariff increases and changing tariff structure was determined to be substantial. This risk was mitigated by agreement of the GOV to increase average power tariff to maintain IDA-agreed financial ratios. This tariff increase covenant was applied to all power sector projects supported by the Bank and not specifically to SEIER, and was later removed from all power sector projects as considered inappropriate. The PAD noted the rapid load growth and economic growth and included a lesson learned on the need for good load forecasting to predict the loading levels of transmission and distribution lines and substations. Accordingly, the risk of over-estimating or under-estimating these growths could have been included, because it could change the priority of energy investments and the need for project activities. In general, key factors (institutional, financial, technical, environmental and social, and market) critical for Project sustainability was adequately identified, which should have been fully reflected in the risks and mitigation measures. There was no Quality Assurance Group (QAG) review of the project's quality at entry.

## **2.2 Implementation**

### *Rapid Growth and Evolution of the Power Sector*

27. Soon after the Project became effective in February 2003, transmission and distribution systems needed to keep up with rapid growth and change in patterns of electricity demand. Implementing agencies responded to this by periodically reviewing and reassigning priorities of the sub-project investments. Some sub-projects had been overtaken by events that made them of lower priority, while other investments not included for financing under the Project had become more pressing. Due to the time required for the Bank financing to become available (e.g. procurement process, etc.), the implementing agencies financed some of the sub-projects that were included in SEIER with other financing sources. For example, EVN financed the planned 260 km 500kV line between Pleiku-Da Nang, which was worth US\$ 45 million in IDA funding, with other financing sources, and requested reallocating the IDA funding for other 220 kV investments (including lines,

substation, and upgrading). As the Project design was quite rigid, implementation progress suffered until the programmatic approach was introduced.

28. A programmatic approach was formalized through the 2005 restructuring so that additional investments could be selected based on evolving demand. This was a pragmatic response to the evolving situation in the transmission and distribution subsector and was seen as a first step towards greater reliance on country systems and sector-wide approaches by increasing reliance on the GOV and EVN and its subsidiaries' investment planning and prioritization. Consequently, while the EVN/IDA procedures were made easier, implementing agencies still were required to follow the complex and extended GOV approval process for each subproject. Subprojects still required a process of feasibility study and detailed design and preparation of procurement documents which required separate, sequential approvals. Yet, as a result of the adoption of the programmatic approach, the MoI was delegated to approve EVN subprojects and EVN was delegated to approve power corporation and power company (PC) subprojects while all procurement could be approved by EVN. This was a significant improvement compared with project preparation when approval by the Prime Minister was required at several stages.

29. While this change in approach was a commendable achievement, it overlooked the longer time required to prepare and implement additional subprojects, resulting in implementation delay. The cause of these delays included (i) the long time needed to prepare feasibility studies, technical designs and procurement documents for new sub-projects as most power-engineering consulting companies in Vietnam were overloaded with projects financed by other sources to meet power demand growth of 15 per cent per year; (ii) changes in some subproject sites due to changes in local planning priority or difficulties with resettlement and compensation; and (iii) the need for new GOV procurement approval in case actual costs after competitive procurement were higher than the approved studies, as the market prices of goods had become increasingly volatile.

30. The changing sector environment also affected the implementation of renewable energy subcomponents. The rapid expansion of the grid and network resulting from the successful national rural electrification program substantively reduced the scope of off-grid renewable energy development that could be supported under the RARE component. Following recommendations of the 2006 Mid-Term Review (MTR), the RARE program was rationalized while new activities were introduced for the development of a sound regulatory framework for grid connected renewable energy.

31. The decision to scale down the original scope of RARE (from 20 subprojects to 7) was the best decision the MoIT could have made under in the circumstances the Project was facing during the 2006 MTR. Whether the project could have foreseen the rapid pace of grid expansion and the resulting decline in the need for mini-grid or off-grid energy services is unclear. By the end of 2000, 69.7 percent of households in Vietnam had an electricity connection, which itself is a high ratio compared to many other countries in the region with a comparable development status. About 2,000 communes did not have access to the grid at that time, and the RARE program planned to provide mini-hydro based mini-grids to 1 percent of these communes, with a forecast that it could be scaled up to reach 200 communes. The GoV's rural electrification plans expected to raise the electrification level to 90 percent by the year 2010, with assistance provided by all the partner agencies including the Bank. This 90 percent target has been exceeded, with much less off-grid solutions than anticipated, and has now reached more than 97 percent coverage.

32. To a certain degree, the MoIT's assessment of the upcoming rapid grid extensions over the period 2002-2005, which reduced the demand for off-grid or mini-grid services, was inadequate. As reported by stakeholders, despite extensive consultations with NPC prior to Project implementation, NPC expedited the grid extension programs, particularly since 2004. The multitude of funding

sources and the higher degree of autonomy to the provinces and to the PCs may account, in part for the inability of the MoIT to monitor demand for off-grid services and make early corrections to the RARE program, particularly before and during the Screening Study (2004). The corrections were finally made in 2006.

33. Regulatory changes also affected Project implementation. For example, additional work required for land compensation and new clearance requirements for high voltage transmission lines (Decree 69/2009/ND-CP and 81/2009/ND-CP) contributed to implementation delays.

34. For the TA, particularly for the FMIS/MMIS subcomponent, uncertainty over changes to EVN's corporate structure contributed to implementation delays, although contractual problems were also a contributing factor. Also, changes in EVN's corporate structure led to cancellation of the TA for Improved Maintenance Management.

35. This rapid evolution of the power sector and the sector reform resulted in several cancellations and rationalization or delay of subprojects. Since the associated KPIs and intermediate indicators were not changed accordingly, these changes ultimately affected the achievement of related Project indicators. However, the Bank's positive responses to the changing needs and circumstances in the power sector, allowed it to embrace new opportunities. For example, the Bank's refocus on promoting grid-connected renewable energy by helping develop and implement key laws and regulations, such as ACT and SPPA, had major impacts on promoting renewable energy.

#### *Addition of Implementing Agency of Newly Established ERAV*

36. The Project played a key role and made solid and significant contributions to the regulatory reform and institutional development by adding the newly established ERAV as a project implementing agency. This was the Project's response to a range of structural changes of the power sector and enabled the Project to focus more on the sector reform and institutional development component.

37. The activities implemented by ERAV focused on three main technical areas: (i) strengthening ERAV's organization and systems; (ii) design of a regime of tariffs, transmission charges, subsidies and market fees for participants in a competitive power market; and (iii) development and enforcement of a comprehensive and efficient framework for a competitive power market. The TA support to ERAV was later scaled up under the AF to ensure the following: (i) successful introduction of the Vietnam competitive generation market (VCGM), (ii) implementation of a major tariff reform, (iii) transition to the wholesale market phase of the reform and (iv) capacity of the sector players to operate in the new environment. The Project also supported capacity building of ERAV, including the development of expertise in relevant areas, resulting in a number of important laws and regulations being developed and implemented (grid and distribution codes, market rules, pricing and tariff methodologies and SPPA).

#### *Limited Capacity*

38. Lack of technical and management capacity of some of the implementing agencies caused implementation delays or cancellation of several subprojects, especially during the early years of Project implementation. For transmission and distribution system improvement subprojects, there existed inexperience in control systems for substations, poor coordination between equipment suppliers and civil contractors, delays in compensation of affected persons, and prolonged contracting processes. For RARE, especially in the early years, the lack of capacity and enthusiasm or diligent follow-up by the MoIT and its Project Management Board (PMB) slowed the

implementation process. Overall, the drive required to steer a complex project of this nature seemed lacking at the MoIT/PMB, especially during the early years. Although the RARE component attempted to decentralize project implementation responsibilities to provincial and district committees, the results were mixed. Site visits pointed to deficient financial aspects of the district operation and maintenance (O&M) and very poor conditions of the power plants. The communes, who were direct beneficiaries, seemed to lack enthusiasm to assume any responsibilities for the sub-projects. The Project noted this deficiency and switched from the community approach to a district approach during the early stages. However, the district approach, particularly the O&M company was still not performing as expected.

39. For the TA component, it became clear that the subcomponent of creating a joint stock company and equitization at the commune or district level was not practicable because of the lack of economies of scale and capacity in terms of management, commercial and technical skills. In 2003, EVN requested that the 15 communes under this subcomponent be deleted from the Project completely and the single district retained only for rehabilitation. As a result, the 2005 restructuring revised one of two activities under *Component C 2. Support EVN's equitization program in the generation and distribution sub-sectors*, as "Provision of technical assistance for equitization transactions, and provision of training for staff of EVN and of newly established power distribution joint stock companies including in corporate governance and operation of securities markets". In addition, EVN's limited capability to handle large and complex information and telecommunication (IT) investment also affected implementation of the TA component.

#### *Overestimates of Project Costs*

40. The feasibility studies of energy projects tended to overestimate the project costs by 30 percent more than the actual costs during early 2000's in Vietnam. This overestimate was due to (i) implementing agencies' newly gained ability to use competitive procurement (ii) the GOV's requirement to estimate costs based on standard price lists, and (iii) avoidance of resubmitting feasibility studies as it would take a long time to obtain approvals. As a result, by 2005, the Project saved about US\$24 million on sub-projects implemented at the time. Similarly, the associated TD1 had substantial savings of about US\$87.5 million out of an original loan amount of US\$199 million. This partly contributed to the adoption of programmatic approaches in 2005 to enable transmission subprojects prepared under SEIER to be financed under TD1.

#### *Prolonged Approval Process of Development Assistance Fund/Vietnam Development Bank*

41. The Development Assistance Fund, later renamed Vietnam Development Bank (VDB), required prolonged, complicated and sometimes duplicative processes, which seriously affected the disbursement after the 2005 restructuring and lasted at least 2-3 years. By January 2007, across the whole portfolio of energy projects, some US\$32 million was held up. Several implementing agencies expressed difficulty in meeting the VDB's requirements for supporting evidence. The documentary requirements of different branches of the VDB also varied. The VDB explained that it was overwhelmed with disbursement applications. This was a wider issue than any single project or even the power sector as a whole could resolve. At the same time, there was scope to improve information flow between project entities to ensure that the VDB received required documents in a timely manner. The Bank recommended that continued improvements to communications be sought, including those through the introduction of FMIS/MMIS and through the use of email rather than the postal system. This issue was later resolved through the Bank team's intensive discussions with the Ministry of Finance (MoF), the VDB and implementing agencies. By May 2008, disbursements were again back on track.

#### *Cost Overruns*

42. At a later stage of the Project, unanticipated macroeconomic circumstances (i.e., rising construction costs and interest rates brought many domestic construction companies to standstill or severely reduced activities, resulted in terminating and rebidding many contracts) caused cost overrun and delayed implementation. As a result, an AF was prepared in part to meet this financing gap.

#### *Mid-term Review*

43. A Mid-term Review (MTR) for the Project was originally planned on July 1, 2005. Since a more comprehensive review, analysis and due diligence had already been conducted for the restructuring in May 2005, it was decided that the MTR would be incorporated into the restructuring process. In addition, a more detailed MTR focused on RARE and Renewable Energy for Small Power Producers (RESSP) sub-components was conducted in 2006. As a result of MTR, the wind diesel plant on Phu Quoc was cancelled as wind resources were found to be insufficient. Moreover, due to faster than expected extension of the grid, the number of communes with potential to be electrified with small-grid renewables was reduced to 44 (compared to 1,100 at appraisal). Subsequently, the subcomponent was restructured to focus on a district-level approach where economies of scale made operations and maintenance more attractive. In addition, the sub-projects that would be supported were such that they would be economically and financially robust should the area become connected to the grid.

44. For Development of Grid-Connected Electrification sub-component, at the time of the MTR, only 12.4 percent of the budget of the sub-component to strengthen regulations, planning and implementation capacity had been committed. The limited progress was attributed mainly to poor management. The main recommendation of the MTR was that the objective of this sub-component should be modified to focus on development of a program for grid-connected renewable electricity development. The subcomponent was substantially restructured to refocus on enabling the connection of small renewables to the grid. This restructuring has taken place in the context of reform of the power sector which made the restructured component more relevant and timely. Under the restructured power sector, ERAV was created and has been developing the regulations required to connect small generators. In addition, renewables and particularly small hydro projects below 30 MW for which studies financed by this subcomponent had shown there are many are not obligated to participate in the market and thus must have special provision made for them. This work helped to create the conditions for the Renewable Energy Development Project (REDP), a follow on IDA Credit whose preparation was supported by SEIER.

45. The MTR identified weak management by MoIT's Project Management Board (PMB) for power projects, which included responsibilities for rural and renewable energy projects. It also found that the Bank's supervision of the projects needed to be strengthened. The main remedy adopted by MoIT was to split the PMB for power projects into two, with one PMB retaining responsibility for Rural and Renewable Energy. The new PMB was placed under the supervision of a newly recruited Deputy Director of the Energy and Petroleum Department. Supervision by the Bank was intensified. Following the unsatisfactory progress of these sub-components, they were restructured and the project was extended in December 2007 to close on December 31, 2009.

## **2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization**

### *M&E Design*

46. The monitoring and evaluation (M&E) system in Annex 1 of the PAD included CAS level indicators that were not directly attributable to SEIER. In addition, there were too many indicators,

and only the indicators of the DSM programs had target values. Indicators for the transmission and distribution systems were set for the entire EVN system, rather than for the parts benefiting from SEIER. Given the small contribution of SEIER to the national system, this makes it difficult to assess project outcomes (detailed percentage share of SEIER contribution to the country system is presented in the Arrangements for Results Monitoring section of Annex 2). In retrospect, the project should have selected indicators that could be directly attributable to project interventions. M&E design did not examine data sources, reliability and collection carefully; instead relying on reports by national and local level government agencies.

#### *M&E Implementation*

47. During the restructurings and the AF, the M&E indicators were significantly revised; CAS level indicators were dropped; indicators for power-sector reform were almost entirely revised; and indicators for the system efficiency improvement and rural electricity access components were also revised to some extent. Outcome level indicators were designed to be reported at the end of the Project, except for improvement in efficiency of the system, which required annual reporting. Annual or biannual reporting would have been more appropriate. All intermediate and component level indicators were designed to be reported quarterly, which placed a burden on government agencies.

48. Data on transmission and distribution systems relied on EVN and PCs' own performance management data. However, since these data cover EVN's entire system, it has been difficult to measure the specific attribution of SEIER. Use of the system-level KPIs were not specific to SEIER but also were used in other transmission and distribution projects supported by the Bank such as Transmission, Distribution and Disaster Reconstruction Project (TD1) and Second Transmission and Distribution Project (TD2). Data reported by the implementing agencies for subprojects was also believed to be unreliable. The Bank should have made more efforts during the various project restructurings and AF to replace the PDO level indicators for the whole country system by relevant project level indicators. This was a major shortcoming that has affected the measurement of PDO achievement. The M&E arrangements and indicators specific to social and environmental safeguards were adequate.

49. Appropriate data agreed on at the project appraisal and project restructurings only started to be collected in 2007 when the Bank team addressed this matter; even then, only some indicators in the arrangements for results monitoring were collected. Many progress reports were initially of poor quality and M&E reports on safeguards issues were delayed; but performance of implementing agencies on these issues improved over time.

#### *M&E Utilization*

50. M&E data on physical progress were utilized to propose the 2007 restructuring and the 2010 AF. The data was used to inform decisions and reallocate resources. Appropriate adjustments were made to adapt to the changing environment to achieve better results. M&E data on transmission and distribution system are still being routinely collected after the closing of the Project since these data have been integrated into the EVN and PCs' own performance management.

## **2.4 Safeguard and Fiduciary Compliance**

#### *Environmental Safeguards*

51. The Project's environmental safeguard category was B. Safeguards triggered in the project included Environmental Assessment (OP 4.01, BP 4.01, GP 4.01); and Natural habitats (OP 4.04,

BP 4.04, GP 4.04); Forestry (OP/GP 4.36). Independent external monitors oversaw the environment management plan. At a later stage of the Project, it was found that insufficient environmental measures in micro hydropower sites under the RARE program and the transmissions and distribution system improvement components resulted in environmental safeguard performance being marginally satisfactory; however these issues were resolved by the end of the Project.

52. All implementing agencies have undergone a learning process. They improved the Monitoring of Environmental Management plan (EMP), and the Quarterly Progress Reports. Submissions of required reports had been delayed frequently. In a few cases, the independent monitoring agencies were not mobilized in a timely manner. Information and safeguard policy disclosures were also improved. All implementing agencies needed to improve communication and dissemination practices. As implementation of many subprojects was delayed from several months to a year, some contracts with Independent Monitoring Consultants (IMC) for EMP implementation had to be adjusted to the new subproject timetable.

#### *Social Safeguards*

53. Indigenous Peoples (OD 4.20, later converted into OP 4.10 in 2005); and Involuntary Resettlement (OP/BP 4.12) were triggered. A resettlement policy and ethnic minority framework were developed. Adequate institutional and financial arrangements for Resettlement Action Plan (RAP) and Indigenous People Development Plan (IPDP) implementation were made. Independent external monitors oversaw the RAP and IPDP implementation and provided a quarterly report to the Bank. At a later stage of the Project, there were delays in compensation and completion of a resettlement plan (RP) under the RARE program but these were resolved by the end of the Project.

54. As with the environmental safeguards, all implementing agencies have undergone learning processes, and over time, they improved the monitoring of RAP and the Quarterly Progress Reports. There were some delays in report submissions and mobilization of the independent monitoring agencies. In many subprojects, the compensation process ended up being much more prolonged than planned and resulted in delayed construction. As implementation of many subprojects was delayed from several months to a year, some contracts with Independent Monitoring Consultants (IMC) for RAP and EMP implementation had to be adjusted to the new subproject timetable.

#### *Financial Management*

55. The Project had an adequate financial management (FM) system in place to meet the Bank's fiduciary requirements. For EVN implemented projects, the Bank fully utilizes the systems of the recipients. Therefore, the FM arrangements of the project were fully integrated into the financial management system of EVN, which made the project FM more efficient and effective. The budgeting, fund flows, staffing, accounting and financial reporting, internal control systems and external audit, and maintenance of supporting documents at the Project's implementing agencies were generally adequate. With the exception of non-compliance with some financial covenants<sup>1</sup> which has been a sector/corporate issue rather than being specific to the Project, the implementing agencies were proactive in dealing with the recommendations from the task team's missions. The audited financial statements (for both the Project and entities) were submitted later than the deadlines several times during the project life, mainly due to poor coordination with the external auditors.

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<sup>1</sup> Examples are tariff increases, financial performance ratio, carrying out time bound action, and EVN to complete and incorporate a current valuation of all fixed assets.



56. There was only one designated account (DA) established for the NPT. Under the NPT, the power project management boards (PPMBs) were responsible for FM. Instances of delays in payments were noted, either due to insufficient available funding in the DA for all PPMBs or due to several approval levels from the PPMBs to the NPT. Poor coordination between the PPMBs and the NPT were also noted sometimes when the PPMBs were not kept informed of payments which caused difficulties in timely recording and contract management. Therefore, the implementation arrangements between the NPT and the PPMBs need to be simplified in future projects.

57. Audits have been qualified since 2007. The audit opinions in the EVN Corporation consolidated financial statements and all PC Entity 2010 and 2011 financial statements were qualified due to non-compliance with a number of IFRS standards. However, the qualifications were not regarded to have a substantial impact on the capacity of the implementation agencies since the qualification points were on technical accounting treatments and disclosures pertaining to some standards of IFRSs. The audit opinion on the ERAV component of the Project for 2010 was qualified because the Project had not determined, calculated and declared the personal income tax for foreign individual consultants since the beginning of the Project. This has long been an outstanding issue and ERAV hired a special tax consultant to look into tax matters of SEIER at ERAV. This qualification however does not mean the Bank's funds were not used for the intended purposes.

58. The Project management still needs to submit audited financial statements for the period from 1 January 2012 to 31 December 2012 plus the four-month grace period (i.e. through April 30, 2013) to the Bank as required by the Financial Covenants. The audited Financial Statements for such period shall be furnished to the Association not later than six (6) months after the end of such period.

### *Procurement*

59. The project procurement packages covered civil works, electrical and mechanical equipment, erection and installation, and consulting services. These activities were effectively organized and carried out in accordance with the Bank's guidelines. The implementing agencies were effective in following the procurement process to overcome such issues as delays in the procurement and delivery of the main equipment and lag between the delivery of material/equipment and construction work. At early stages in the Project, some implementing agencies delayed the procurement process in large part due to their unfamiliarity with the Bank's procurement process, such as training packages, but also due to uncertainty related to the power reform, such as FMIS/MMIS. Other reasons for delays in procurement were complex approval processes, but this was not specific to the Project or the power sector. However, this situation improved as the implementing agencies learned from experience and with the Bank's support. The Bank's oversight and close involvement in all phases helped to ensure the transparency and effectiveness of all procurement, and contributed to the implementing agencies' ability to procure quality goods and services at competitive prices.

## **2.5 Post-completion Operation/Next Phase**

60. All project activities have been institutionalized in the power sector and will be continued by implementing agencies. Furthermore, most project activities have been replicated and/or scaled up through other Bank supported projects, which SEIER directly or indirectly supported through preparation and/or implementation including, Renewable Energy Development Project (REDP), TD2, Rural Distribution Project, Power Sector Reform Development Policy Operation (DPO) series, etc. Almost all activities that were not fully completed under SEIER are being continued by implementing agencies with or without Bank support as discussed elsewhere in this ICR.

61. For off-grid micro hydropower plants subprojects, additional investment is still required for worker houses, a range of equipment and bridges. The operators' capacity has been seen to be weak, and improper operations may damage the plants, shorten the plants' life, and increase the life cycle cost. These micro hydropower plants serve some of the poorest households, whose ability to pay for electricity may be quite limited. Insufficient revenue collection and working capital, and unrealistic assumptions about the cost and stocks of spare parts affect the sustainability of these plants. It was agreed that the MoIT and Lai Chau province will continue providing support to the operation of the company (Muong Te HPco), and will amend the power purchasing agreement between Muong Te HPco and NPC. The amendment is expected to increase the purchasing tariff thereby improving the financial situation of the company. The support will also include providing office, equipment, variable capital and capacity building to the company.

### **3. Assessment of Outcomes**

#### **3.1 Relevance of Objectives, Design and Implementation**

62. The Project's objectives, design, and implementation are relevant to the Bank's Country Partnership Strategy (CPS) for Vietnam for FY2012-2016. Under the CPS, the Bank will continue to support policy dialogue, investment, and advisory services regarding transmission and distribution system, energy efficiency, renewable energy, regulatory environment, low-carbon growth, and rural households' access to electricity. Relevant strategic energy priorities in the Vietnam Sustainable Development Engagement Strategy for FY2014-16 (draft April 16, 2013) include (i) increased supply-side energy efficiency by upgrading and rehabilitating transmission and distribution networks and introducing smart grids, (ii) expansions of renewable energy, and (iii) successful implementation of power market reform.

63. The Project's objectives, design and implementation are also relevant to the GOV's priorities in the power sector and the Socio-Economic Development Strategy (SEDS) for 2011-2020. The six priorities in the power sector are to (i) Integrate power sector development with socio-economic development, (ii) Combine efficient use of domestic energy with import of energy and diversify power generation, (iii) Improve quality of service and promote efficient use of electricity, (iv) Create competitive power market, (v) Ensure sustainable development of energy sector, and (vi) Continue promotion of rural electrification. SEDS aims at developing power sources quickly and sustainably (including hydropower), improving the electrical grid, and using energy-saving technologies to guarantee sufficient power supply for development.

64. The Project's GEO, designs and implementation are relevant to the current global priorities for GEF projects. One of the six objectives of the Climate Change Mitigation Strategy for GEF-5 (2010-2014) is to promote investment in renewable energy technologies.

65. The Project was implemented during a period of rapid economic growth, power-sector reform and increasing energy demand. Although the Project objectives remained the same, such dynamic growth and the reform process required the Project flexibility to adjust to changing priorities and new physical and institutional developments through project restructurings including taking a programmatic approach to ensure that the Project meets the PDOs.

#### **3.2 Achievement of Project Development Objectives and Global Environment Objectives**

66. The first objective to enhance electricity system efficiency in Vietnam was achieved by reducing transmission system loss and interruptions and outage rates. All three KPIs at PDO level (number and average duration of interruption and faults at 500 kV and 220 kV level and transmission system loss) achieved targets defined at the whole-system levels, although these cannot be directly attributed to the project. At the level of intermediate indicators, three out of the total six KPIs' targets were achieved. KPI for Length of 500 kV transmission line installed did not have an initial target and no investment was made. The reason is that when the target was set for all other KPIs at the 2005 restructuring, at EVN's request, the originally planned 260 km of 500 kV line between Pleiku-Da Nang had already been withdrawn as it had been financed by other sources, and funds allocated for the 500 kV line were used for 220 kV investment. When the programmatic approach was adopted at the 2005 restructuring, there were no identified 500 kV line sub-projects, but the KPI was not omitted because of the desire to maintain a flexible programmatic approach in case new 500 kV lines would further be identified. This did not affect the Project's performance in achieving the PDO because the GOV's priorities for IDA financing was changed to 220 kV level and other sub-components. For the other two KPIs that did not achieve the targets, one (220kV/110 kV substation capacity installation) came close to meeting the target (98 percent) while the other (110 kV capacitor installation) did not (61 percent). However these were not failures; rather, they were a result of a priority shift to other subprojects which significantly exceeded the target by 100 percent and 98 percent (500/220 kV and 220/110 kV capacity substations). This is a result of the programmatic approach that the Project adopted to allow flexibility to invest in priority sub-projects which constantly changed during the period of a rapidly growing power sector.

67. Project performance is based on the intermediate KPIs. The system loss and outage and interruption data of 138 sub-projects was provided by the implementing agencies based on engineering estimates and used to perform individual subproject economic analyses. Based on the data provided, the analysis shows improvement in system loss and outage and interruption rates. It can reasonably be assumed that the upgrading, new additions and expansion and some rehabilitation of the power system financed by SEIER improved the system efficiency. As mentioned, the programmatic approach adopted by the project contributed to the higher impacts because the Project did not need to invest in sub-projects that became lower priority. The economic analysis of 500kV/220kV level sub-projects had an estimated economic internal rate of return (EIRR) of 45 percent.

68. The second objective of providing electric power in selected rural areas of Vietnam was achieved by (i) expanding or upgrading transmission and distribution lines in selected rural areas and (ii) providing off-grid power supply through rehabilitating and building new hydropower plants in selected remote rural areas. There were a total of five PDO level KPIs. However, three of them (*number and average duration of interruption and faults at 110kV level and distribution system*), while exceeding their targets, were measured at the whole system level, and thus cannot be solely attributable to the Project interventions. The other two intermediate KPIs (*number of new households electrified from off grid or mini grid and increase in small hydro and biomass capacity on line*) did not fully achieve the targets (5 percent and 68 percent, respectively) because the investments were no longer needed since the households were electrified through national grid connections. The Project therefore decided to focus on promoting electrification by grid connection using renewable energy – a better decision that responds to the changing circumstances and new opportunities that can further benefit rural people with more reliable on-grid power than off-grid power.

69. Regarding the intermediate outcome indicators related to the second objective two out of three achieved their targets. KPI for *length of 110 kV lines installed* exceeded the target by 6 percent. KPI for *capacity of 110/22kV and 110/35kV substations installed* exceeded the target by 89 percent. KPI for *number of additional communes connected to mini-grid* achieved only 30 percent of the

target due to the same reason above on the rapid grid connection and thus became no longer relevant to provide power to rural areas. The expansion and upgrades of transmission and distribution lines had by far the biggest impacts on providing power to rural areas; for example, SPC, CPC, NPC and DNPC alone benefited 5,884,174 consumers, which included many rural consumers, and provided more reliable power than the off-grid or mini-grid renewable power with limited capacity. At the 110 kV level, EIRR was 35 percent.

70. Similar to the first objective, the intermediate outcome indicators for the 110kV system were used to assess the impacts in achieving the second objective. For the same reasons discussed in the first objective, we could reasonably assume that the Project's upgrading, new additions and some rehabilitation of the 110 kV/35 kV/25 kV system contributed to the achievement of the second objective. Although the PDO and intermediate KPIs for off-grid or mini-grid micro-hydropower did not meet the targets, this should not be considered as a failure. Similar to the reasons under the first objective, this was a positive response of the Project to quickly adapt to emerging trends and shift to promoting even better power supply to much broader populations (off-grid target was 10,000 new consumers and on-grid power benefited over 5.6 million consumers though this includes both existing and new consumers). The Project also ensured that this grid-based power supply would be able to integrate renewable energy by supporting the development of renewable energy related laws and regulations (e.g., SPPA, ACT, etc.), which are discussed below under the third objective.

71. The third objective to sustain reform and institutional development of the Borrower's energy sector was achieved by (i) developing a number of policy and regulatory documents to implement the Electricity Law, many of which were finalized and implemented and (ii) building capacity of EVN, MoIT, NLDC, ERAV and other stakeholders. Three out of the five PDO level KPIs were achieved. KPI for *evaluation of accounts of newly formed joint stock and equitized companies* did not achieve the target as the activity was not fully implemented. However, the Report "Advisory Assistance and Development of an Implementation Program for Power Sector Equitization in Vietnam: Recommendations for Definition and Implementation of a Strategy for Equitization of Electricity Distribution Companies, was prepared in September 2006. The Bank continued to monitor the equitization program (see also section 1.8 Revised Components above for more details). Since there were other Government priorities for IDA funding support to build capacity of the nascent ERAV to become fully operational and effective, this did not have any impacts on the Project in achieving this third objective. KPI for *reduction of time and complexity for SPPs to get approved* did not fully achieve the target but there was limited data to properly assess this achievement. Two quotations from the report entitled "*SEIER Project, RARE Program and RESPP Program, Report on Lessons Learned*" (Siyambalapitiya and Dang, 2010) were the only relevant source of data: one bank expected the government's approval procedures to be shortened and another bank thought that the approval process for projects for refinancing was too long. However, the Project support to designing, issuing and implementing SPPA, ACT and other regulations and methodologies should contribute to streamlining the approval process as they promoted consistency.

72. The KPI for *financial management/material management system improved* did not achieve its target because funding from IDA for FMIS/MMIS was cancelled due to contractual problems with consultants. EVN has been continuing the work using its own funds with a plan to complete Phase 1 by the end of 2013, followed by piloting in eight subsidiaries and eventually applying FMIS/MMIS widely. Therefore, this does not really affect the Project's performance in achieving the PDO as EVN is carrying out to achieve the target with its own funding using the same consultants. KPI for *sound procedures for the effective implementation of tariff and market regulations* achieved the target since, for example, procedures of market rules, Prime Minister's Decisions on tariff setting methodology and on market-based electricity tariff mechanism were issued. KPI for *ability to assess effectiveness and improve regulations and implementation*

*procedures* was achieved because as a result of training and capacity building, ERAV staff has significantly improved its ability.

73. Two and one-half out of seven intermediate-level KPIs achieved the targets. The KPI for *effective equitization program in place* did not achieve the target as discussed earlier and did not significantly affect the Project in achieving the third objective. The KPI for *number of companies in which management system installed and operating* did not achieve the target because IDA funding of FMIS/MMIS as discussed above and thus did not really affect the Project performance in achieving the PDO. The KPI for *regulations for small power producers issued and enforced* achieved the target. Examples of these regulations include SPPA, ACT, Updated the guideline No.2014 of MoIT for economic and financial analysis of renewable energy projects, Permitting and licensing procedures, and Development of encouragement mechanism for Renewable Energy Projects, while some improvements are still required. The KPI for *30 additional formal training received by ERAV staff and effective processes for information collection and monitoring* partially achieved the target because, although 97 additional ERAV staff received training, procurement of the regulatory/market monitoring IT system was cancelled because ERAV needed more time to review and decide on the software. This was a rather wiser decision to avoid rushing to purchase inappropriate software simply because of the Project closing date.

74. KPI for *all tariff, market and technical codes regulations issued and five market procedures and five technical procedures effective* achieved the target as 21 regulations and 14 procedures were issued. The KPI for *road map for reform of gas market in place and 10 MoIT staff received training* did not achieve the target because these activities were not fully implemented. The Bank organized a workshop on Issues and Options for Market based Gas Development in 2011 financed by the Energy Sector Management Assistance Program (ESMAP). Also, under a study on Key Trends in East Asia's Natural Gas Market (P124916), the Bank has been supporting the MoIT through technical advice and training on key gas policy issues including (i) identifying suitable locations for potential LNG regasification terminals, (ii) developing a suitable gas pricing regime for pipeline gas and LNG, and (iii) supporting the development of the Gas Master Plan in 2011. The MoIT has requested continued Bank TA in the gas sector beyond the project. KPI for *EVN capacity to plan and finance investments improved and 20 EVN and NPT staff received training* did not achieve the target as both the Bank and the implementing agencies did not follow up on the activities. However, the additional financing of TD2, approved March 29, 2011, is providing TA for capacity building to enhance NPT's capabilities in the critical areas of investment planning and financing, debt management, and the management of regulatory affairs through staff training and technical assistance from specialized consultants. It is being further strengthened by a Bank's TA on Strategic Options for Financial Recovery of Vietnam's Power Companies.

75. The Project supported institutional capacity building and development and issuances of laws and regulations that had significant impacts, such as, new tariff policies and regulations followed by a series of tariff increases, VCGM, and grid and distribution codes. Outcomes of Project support to ERAV include development and completion of (i) an electricity pricing mechanism, whereby a cost-reflective pricing mechanism has been built up step by step, including generation pricing, transmission and distribution charges, some governing and management fees and retail tariff; (ii) technical codes and regulations to support the standardization of power system operation and the effective operation of the power system; and (iii) VCGM design, including market rules, procedures under market rules, and procedures for market surveillance and monitoring. The pilot VCGM has become operational in July 2011 and the full VCGM was launched in July 2012. ERAV staff gained a significant amount of knowledge and experiences in regulatory work. ERAV staff members have significantly improved their capability; some have become senior experts in electricity price setting, power market design and regulation, and power system development and monitoring.

76. As a result of Project support to ERAV, the GOV implemented a series of tariff increases after approving and issuing new tariff policies and regulations. This was a significant step toward resolving the continuing tariff issues affecting the power sector and power projects supported by the Bank.

77. Although there were some shortcoming in achieving PDO and intermediate level KPIs, most of them were due to changes in the GOV's priorities related to the best use of IDA funding and lack of data to properly assess performance. The Project support to ERAV offset these shortcomings and had significant and far-reaching impacts.

78. The GEO to contribute to reduced greenhouse gas emissions by promoting the use of electricity production using renewable resources was achieved by rehabilitating grid-connected small hydropower plants and rehabilitating and newly constructing off-grid micro hydropower plants. The KPI target of CO2 mitigation of 208,350-219,140 tons was achieved as the Project's mitigated CO2 was estimated at 278,164 tons. In addition, the Project supported the preparation of REDP and the Renewable Energy Master Plan, promoted the Renewable Energy Partnership and attracted other donor-funded renewable energy projects. The Project supported development and issuances of laws and regulations that had significant impacts on promoting renewable energy; for example, the avoided cost tariff law and regulations were a substantial step forward for the country's power sector.

### **3.3 Efficiency**

#### **A. Economic Analysis**

79. The same methodology, assumptions and constant US\$ 2001 prices, which were used in the project appraisal, were used to compare the results. However, some modifications were made: (i) many subprojects that were actually implemented and the Project timeframe were different from those envisaged at the appraisals due to the restructuring and extension of closing date of the Project, (ii) under this ICR, economic opportunity cost of capital (EOCK) and shadow exchange rate (SER) were estimated, (iii) nitrogen oxides (NOx) emission mitigation was estimated, (iv) distribution analyses were conducted (v) economic analyses of off-grid micro hydropower plants were conducted, and (vi) TA on capacity building is partially assessed by training cost per person.

80. Economic analysis was conducted by comparing two scenarios: (a) "with" the Bank project and (b) "without" the Bank project. Available data and information were at each subproject level. Therefore, it was necessary to conduct many economic analyses for all these subprojects to arrive at each agency level, totaling 138 economic analyses. Detailed methodology, assumptions, distribution analyses, and sensitivity analyses, which include switching values (SV) and sensitivity indicators (SI), are presented in Annex 3.

81. The economic analysis at appraisal covered 74 percent of the total project cost. The economic analyses at completion covered 89 percent of the total project cost. An estimated EIRR at completion was 36 percent, which was slightly higher than the EIRR of 31 percent in the main text and 28 percent in Annex 4 in the PAD at appraisal. An estimated net present value (NPV) at completion was US\$ 408 million, which is lower than the NPV of 460 million in the main text and US\$ 435 million in Annex 4 in the PAD at appraisal. An estimated mitigation of CO2 emission at completion was higher than that at appraisal. The lower NPV at completion than that of the appraisal is because of the delays in completion, which in some cases were about 10 years longer than the original implementation schedule. Consequently, the benefits were reduced by more than that could be made up from the reduced costs. Also, there are slight slowdown of annual electricity production growth at 11 percent in 2007 and 10 percent 2008, compared to higher growth during

2000-2006 at average 14 percent. Afterward, this growth increased again, at 13 percent in 2009 and 14 percent in 2010.<sup>2</sup> Details are presented in Annex 3.

82. EVN staff training program has spent US\$ 3.0 million (about 0.7 percent of the total project cost) to train about 360 EVN staff members, which on average about US\$8,300 was spent per staff. In addition, a total of 227 people received training, including 132 ERAV staff and 95 from other stakeholders (EVN, NLDC, MoIT, etc.) received training, on an average of US\$ 2,692 per person. These training programs covered, among others, power market and pricing, power system optimization and safety, human resources, and master of business administration (MBA), including study tours.

## **B. Financial Analysis**

83. Financial analysis for each component at both appraisal and completion stage used the same methodology which considers the cash flow for the operation period of 20 years. Financial internal rate of return (FIRR) and NPVs at 6.5 percent discount rate are calculated for both appraisal and completion stages. The financial analysis at appraisal covered 74 percent of the total project cost. The financial analyses at completion covered 89 percent of the total project cost. An estimated FIRR at completion was 25.5 percent, which was higher than the FIRR of 15 percent at appraisal. An estimated NPV at completion was US\$ 628 million, which is higher than the NPV of 274 million at appraisal. Financial indicators have been generally improved since electricity prices, which are one of the most influential factors for financial performance, have been substantially raised during the project period compared to the assumption set out in PAD. In particular, the financial performance of distribution projects has been significantly improved because of the wider gap between power purchase costs and sales prices. On the other hand, several factors including delay of investment, change in sub-project portfolio, and increase in construction cost caused lower NPV on several sub-projects, mainly 220kV transmission projects and hydropower rehabilitation projects. Details are found in Annex 3.

## **3.4 Justification of Overall Outcome and Global Environment Outcome Rating**

### **Rating: Moderately Satisfactory**

84. Considering the Project's relevance and achievements of PDO and GEO and efficiency, overall outcome and global environment outcome rating is moderately satisfactory. In terms of the volume of investment, the dropped activities and those that did not achieve the KPI targets had less significant investment volumes and those that largely met the KPIs were transmission and distribution system with rehabilitation of grid connected hydropower plants, which consisted 88 percent of the total project cost. Furthermore, most of the dropped activities were Bank's positive response to the changing needs and priorities in the power sector by reallocating the funding to those activities that yielded much better development impacts. A small percentage- (2 percent) of the investment on the capacity building of ERAV and TA contributed to significantly advancing power market regulatory reform and helped develop other Bank supported and non-Bank supported projects. Many of the cancelled activities were either carried out by other Bank supported TA or projects or by the implementing agencies.

## **3.5 Overarching Themes, Other Outcomes and Impacts**

### **(a) Poverty Impacts, Gender Aspects, and Social Development**

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<sup>2</sup> Source: World Bank Data Development Platform.

85. Although a specific poverty, gender and social impact assessment has not been undertaken, transmission and distribution network expansions and upgrades have provided increased and reliable electricity access to the rural areas where relatively poorer people reside. The impact assessment surveys of REP (ASTAE 2001) showed that there were multiple benefits from the REP and the broader rural electrification effort for rural households in Vietnam. Access to electricity created conditions for economic development, particularly in the south, job opportunities for local people, and increased household income. Access also helped improve social and cultural life, reduced the burden of household chores for women and children, improved public primary health care, and improved children's education. The findings of these surveys were consistent with results from studies by other researchers and international development agencies. Increased access to electricity will in general benefit both men and women, however regional and global evidence suggests that women in particular benefit (World Bank 2012).<sup>3</sup> Furthermore, having access to electricity extends the hours available for both productive and leisure activities, particularly for women and girls (World Bank, 2012). The Project provided increased and reliable electricity to households, business and industry. Economic analysis in Annex 3 illustrates poverty and social impacts.

#### **(b) Institutional Change/Strengthening**

86. The project has achieved high impacts on institutional change and strengthening of the power sector, especially by helping ERAV develop and implement the laws and regulations to promote a competitive environment in the power sector and integration of renewable energy and by building capacity of implementing agencies. About 600 staff of ERAV, MoIT and EVN were provided a variety of training, to help them better run the business of the power sector. In addition, the Bank team provided extensive training on Bank's procurement rules, procedures, contracts, and financial management. The PCs and PPMBs became more familiar with the competitive procurement process to gain the maximum benefits. The GOV's acceptance of using programmatic approach, decentralization and streamlining of subproject approval process (e.g., delegation of approvals to EVN and PCs, streamlining VDB approval process, etc.) were significant institutional changes to which the Project contributed. The Project fell short in strengthening corporate financing aspects as corporate financing units in EVN and NPT and associated training were not implemented and FMIS/MMIS was not completed. However, these were followed up by EVN and NPT with other Bank supported projects and TA. The Project also met little progress in supporting the development of the gas market but this was added at the additional financing and appeared to be a little overstretching of the Project scope. The Bank's TA has been following up on this gas market.

#### **(c) Other Unintended Outcomes and Impacts (positive or negative)**

87. No other unintended outcomes and impacts were identified.

### **3.6 Summary of Findings of Beneficiary Survey and/or Stakeholder Workshops**

88. No beneficiary survey and stakeholder workshops were carried out.

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<sup>3</sup> According to World Bank. 2012. Toward Gender Equality in East Asia and the Pacific: A Companion to the World Development Report. Washington, DC: World Bank, , while lack of electricity affect both female- and male-led enterprises, evidence suggests that such constraints may be more onerous among small and informal firms than among larger firms and, therefore, may constrain female-led enterprises disproportionately.



## **4. Assessment of Risk to Development Outcome and Global Environment Outcome**

### **Rating: Moderate**

89. There is modest financial risk as the current financial problems of EVN affects its subsidiaries but currently Bank is providing TA to improve this situation. As discussed above section 2.5 Post-completion Operation/Next Phase, the off-grid micro hydropower plants subcomponent have high financial and operational risks due to the needs for more investment and lack of capacity of operators and revenue. However, it was agreed that MoIT and Lai Chau province would continue to provide support to the operation of the company (Muong Te HPco), particularly in amendment of the PPA between Muong Te HPco and NPC, which will increase the purchasing tariff. The support will also include providing office, equipment, variable capital and capacity building to the company. Furthermore, this subcomponent is less than one percent of the total project cost. The institutional and reform risk is low because the GOV is continuing to pursue this direction although the progress is slow but this is a nature of this kind of reform process.

90. The environmental risk, especially regarding promoting renewable energy and mitigation of greenhouse gas emissions, is modest. The grid-connected renewable energy sub-projects will continue operations. The Project helped prepare REDP, attracted other donors to fund renewable energy projects (e.g., the Vietnam Sweden Rural Energy Program (US\$ 4 million) and the Solar Energy Application for Mountainous and Ethnic Minority area in Vietnam (EURO 6.3 million)), and supported the preparation of the Renewable Energy Master Plan and the Renewable Energy Partnership. Environmental safeguards issues have been resolved and no specific follow up is necessary except the potential future needs for the small sub-component of off-grid micro hydropower plants whose sustainability is at high risk, but these issues are taken care of by the MoIT and Lai Chau province.

## **5. Assessment of Bank and Borrower Performance**

### **5.1 Bank Performance**

#### **(a) Bank Performance in Ensuring Quality at Entry**

#### **Rating: Moderately Satisfactory**

91. The investment components of the Project were developed following technical, economic and financial studies that have taken into consideration environmental and social aspects as appropriate. While the Project designs had some shortcomings (Please see Section 2.1), overall, the Bank preparation was relatively of high quality, thorough and speedy.

#### *Improvement of Overall System Efficiency*

92. A consortium of international consultants was selected to assist EVN to identify and implement cost-effective improvement in system efficiency and technical performance of the power system. High-priority projects were included in the Project based on detailed feasibility studies that take into account all technical, economic, financial, environmental and social aspects of investment. However, the following shortcomings are identified. First, the Project duration of five years was overly optimistic. Given the rapid growth of the power sector and economy, the change in investment priority and the related delay should have been anticipated. Secondly, an appropriate measurement of the project performance should have been carefully considered. Third, the economic analysis should have provided more explanation on the methodology.

### *Improving Rural Access*

93. The Project was designed based on the Rural Electrification Master Plan which considered various alternatives for extending rural electrification.. Grid extension was selected as the most attractive alternative in communes where it constitutes the least-cost solution and generates adequate economic returns. But the sub-transmission systems supplying power to the rural areas were overloaded and needed to be upgraded to reduce losses and improve the quality of power supply. The upgrading of the 110kV sub-transmission systems were verified by the detailed feasibility studies and were also designed to have minimum environmental and social impacts. The shortcomings were the same as above.

### *Providing Electricity for the Poorest, Remote-area Communes*

94. The rehabilitation efforts of five existing mini-hydro stations in remote areas were developed based on detailed feasibility studies, economic viability and least cost option. Given the nascent state of private sector activity in these areas, the communes and districts were selected to develop and manage the utilities under the overall supervision of the Provincial authorities, with the use of a pilot institutional mechanism under the REP. More due diligence on the feasibility of this community or district level management should have been carried out, such as financial and operational capacity, the potential of higher than expected expansion of grid-connections, as well as Bank's supervision challenges in these remote areas.

### *Institutional Development of EVN*

95. EVN's corporate business management information system, based on a coherent IT strategy, was designed to link EVN and all its affiliated offices and agencies into an integrated management information system. EVN's IT Strategic Plan for implementing computer systems called for the purchase of integrated, packaged software-based solutions. The Bank should have recognized the complexity and high volume of procurement package, potential duplications of work by many consultants involved, and the limited capacity of the EVN staff on IT system, as well as potential changes required as a result of ongoing power-sector reform and restructuring.

### *Promoting Equitization of Distribution in Districts and Communes*

96. Promoting equitization of distribution in districts and communes was included in the Project provide experience in the development of a program for the creation of a creditworthy distribution sector and in the more effective separation of generation, transmission and distribution elements of the power sector. This would also promote the entry of the private sector. The pilot programs under the Project were expected to provide the necessary experience for an enlarged program as soon as the Electricity Law is passed by the Government. The Bank should have carefully assessed the feasibility of commune and district level privatizations given the potential lack of capacity and economy of scale.

## **(b) Quality of Supervision**

### **Rating: Satisfactory**

97. The Bank team has continuously focused on maximizing the development impact by adjusting project activities to changing needs and circumstances. The Bank team paid sufficient attention to fiduciary issues, including the resolutions of the use of fund unintended and the slow approval process of the VDB. Safeguards aspects were also well taken care of, providing adequate

guidance in reporting and management. Although the Bank team discovered some problems with compensation at the later stage of the project, they were resolved before the closing date of the Project. The Bank team's supervision, inputs and process were adequate and timely from the outset, providing training for implementing agencies on project management and on preparation of their own ICRs at the end of the Project. The Bank team has been consistently addressing reporting delays by implementing agencies from the early stage of the Project and these delayed situations were improved later. The MTR identified weakness in supervision in isolated remote areas, which was properly addressed, and overall the MTR was conducted with good quality.

98. The Bank team continued to address the need for improvement of the economic and financial analyses of feasibility studies of subprojects by hiring a consultant to assess the problems and develop guidelines and training for the implementing agencies. However, the problem still remained and the Bank ended up approving some subprojects with incorrect economic and financial analyses. Candor and quality of performance reporting could also be improved, especially during the early stage of the Project regarding implementation delays and achievements. Also, there was a lack of attention to the need to follow up on activities for which KPIs and intermediate indicators were set (e.g., capacitor, corporate financing unit and gas market reform) partly due to too many indicators and activities, which were changed frequently.

99. Since the Project was restructured three times, indicators for cancelled activities (e.g., FMIS/MMIS) and activities with reduced relevance (e.g., off-grid mini hydropower, etc.) should have cancelled or revised accordingly. PDO level indicators that measured the whole system level should also have been revised during the restructuring.

### **(c) Justification of Rating for Overall Bank Performance**

#### **Rating: Moderately Satisfactory**

100. Although there were some shortcomings, the Bank's commitment to supporting the implementing agencies, timely responding to the changing needs and situations and seeing the Project through to a successful completion are highly commendable. Therefore, the Bank's overall performance is moderately satisfactory.

## **5.2 Borrower Performance**

### **(a) Government Performance**

#### **Rating: Moderately Satisfactory**

101. The GOV's ownership and commitment to achieving development objectives was in general high. The GOV was strongly committed to improving the efficiency of operations of EVN and the PCs and increasing rural electrification. The GOV approved the Project and provided an enabling environment including supportive sectoral and institutional policies. During project implementation, GOV streamlined the excessive centralization and control, and adopted more flexible approaches to project implementation, including delegation of investment decisions and day-to-day investment management to EVN and the PCs, and acceptance of the phased approach to project implementation.

102. Provision of counterpart funding was adequate. The GOV's difficulty in reforming tariff resulted in removing the covenant on tariff increase. However, as noted earlier, this financial covenant had been applied to all Bank-supported power sector projects and was later removed from all projects. In fact, the GOV implemented a series of tariff increases after approving and issuing new tariff policies and regulations as a result of SEIER support through the ERAV component. The

Government demonstrated its continuing commitment by approving the additional financing to SEIER and follow up projects such as REDP and TD2.

#### **(b) Implementing Agency or Agencies Performance**

##### **Rating: Satisfactory**

103. Implementing agencies' commitment to achieving development objectives has been consistently strong, except the lack of interest in off-grid micro hydropower plant scheme in remote areas due to the increasing grid expansion. Beneficiary and stakeholder consultations and involvement during the project preparation were adequate, with implementing agencies' outreach to local communities, civil society organizations and other international development communities. The adequacies in terms of (i) readiness for implementation, (ii) implementation arrangements, and (iii) implementation capacity (including sufficient appointments of key staff) were mixed, especially for the sub-components on (a) FMIS/MMIS, (b) RARE community based power plants operations and (c) equitization of community or district based power utilities. However, these sub-components were relatively small investment.

104. Thanks to the close working relationship between the implementing agencies and the Bank team, most of the implementation issues were openly discussed. Many implementing agencies and local governments were still learning project implementation and management, in order to be compliant with Bank policies. Some implementing agencies used the Bank funding for unintended purpose but this was not significant and was successfully resolved.

105. Actual M&E arrangements were inadequate and difficult to implement due to hundreds of subprojects implemented by multiple implementing agencies which had not yet had the competency. However, some implementing agencies demonstrated their commitment to improving M&E and to providing requested data, especially during the preparation of ICR and compensated their capacity gap by allocating their own resources to hire consultants to help with the data collection and analyses. Transitional arrangements for regular operation of project supported activities after the closing of the Project were adequate, as implementing agencies will continue to operate the transmission, distribution and hydropower plant stations and to carry out the ongoing power sector reform.

#### **(c) Justification of Rating for Overall Borrower Performance**

##### **Rating: Moderately Satisfactory**

106. Based on the above ratings of the performance of Government and implementing agencies, the rating of overall borrower performance is moderately satisfactory.

## **6. Lessons Learned**

107. The Project took a big risk by including such a wide ranging institutional development component, and in many ways provided GOV with the analytical support to undertake the broader set of reforms in the sector, many of which are now being supported through other Bank-funded investment and policy loans. This experience showed that significant institutional development and capacity building are possible to achieve through an investment operation. This achievement was possible because the Project was implemented at the right time during the evolving power-sector reform and restructuring, and had the strong commitment and partnership from the Government and the implementing agencies. This achievement is having a far reaching impact on the sustainability and reform process of the power sector, and had helped establish a high level of trust to continue

to work on some of the more challenging aspects of sector development, particularly related to its financial recovery.

108. When the client is experiencing high economic and energy demand growth and the energy sector reform and a programmatic approach cannot be adopted, the project design should be focused and have a shorter duration. If the project design involves many predetermined activities of a wide ranging energy sector issues and many implementing agencies, there is a high risk that the predetermined activities need to be modified to adjust to the changing needs and circumstances, which could result in implementation delays and project closing date extension. When a project uses a programmatic approach, the project life should consider much more time than that required for a project with predetermined activities. Preparing and getting approvals of project activities will take a much longer time.

109. There is a need for a follow up training to implementing agencies to strengthen their capacity to conduct sound economic and financial analyses of transmission and distribution investments. This becomes more important when a project takes a programmatic approach and requires implementing agencies to prepare feasibility studies and economic and financial analyses, as a means to approve subprojects.

110. The current practice of using the country power system levels for KPIs in transmissions and distributions projects should be revisited. For example, TD2, which was approved by the Board in July 2005, also used the whole system indicators but at the additional financing, which was approved in 2011, clarified that the TD2's limited contribution to the system wide interruptions indicators and the achievement of PDO will be assessed on the basis of the outcome indicator on the new generation capacity connected as a result of the project and the intermediate indicators related to the transmission and distribution assets created, with the latter serving as good proxies for system reliability. TD2 also had project specific PDO level KPIs for each of selected substations, in addition to the whole system KPIs. The use of project level indicators is also included in the Bank's Sustainable Development Network Core Sector Indicators: Average interruption frequency per year in the project area (number) and Electricity losses per year in the project area (percentage). If these project areas level indicators are not available, proxy or other relevant indicators of the project areas should be used, not the country system wide data. TA is recommended to explore better ways to measure project's performance and results.

111. A more realistic assessment of using lower level of administration (community, commune or district) of power supply operations should be made. District or commune based joint stock distribution companies and community based off-grid micro hydropower plant operations proved to have limited operational and financial capacity and lacked economies of scale to be viable.

## **7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners**

### **(a) Borrower/implementing agencies**

112. See Annex 7

### **(b) Cofinanciers**

113. Not applicable.

### **(c) Other partners and stakeholders (e.g. NGOs/private sector/civil society)**

114. Not applicable.

## Annex 1. Project Costs and Financing

### (a) Project Cost by Component (in USD Million equivalent)

<b>System Efficiency Improvement, Equitization &amp; Renewables Project - P066396</b>			
Components	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
1. System Efficiency Improvement			
Upgrading 500 kV and 220 kV transmission systems	143.1	193.2	135.0%
DSM phase 2 by EVN	6.0	2.1	35.7%
2. Improving rural access			
Upgrading the 110 kV sub-transmission and MV distribution system for rural electrification program	102.3	170.3	166.4%
Rehabilitation of existing small hydro power plants	8.1	8.7	107.9%
Community-based hybrid renewable energy grids	4.8	2.2	46.8%
3. Institution building			
Improvement of information system management	12.7	0.6	4.3%
Creation of District or Commune level Joint Stock Distribution Companies	7.0	2.7	38.7%
Strengthening regulation, planning and implementation capacities for Renewable Energy Projects	0.5	0.0	0.0%
EVN staff training program	3.0	3.0	100.9%
Technical assistance and capacity building for ERAV	0.0	6.0	-
Technical Assistance	3.9	0.0	0.0%
Total Baseline Cost	291.4	388.9	133.5%
Physical Contingencies	13.2	0.0	0.0%
Price Contingencies	13.2	0.0	0.0%
Tax and duties	11.3	9.8	87.1%
Total Project Costs (without IDC)	329.1	398.8	121.2%
Interest During Construction (IDC)	18.8	20.8	110.5%
Total Project Costs (with IDC)	347.9	419.5	120.6%
Total Financing Required	347.9	419.5	120.6%

<b>System Efficiency Improvement, Equitization &amp; Renewables Project (GEF Renewable Component) - P073778</b>			
Components	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
1. System Efficiency Improvement			
Upgrading 500 kV and 220 kV transmission systems			
DSM phase 2 by EVN			

2. Improving rural access			
Upgrading the 110 kV sub-transmission and MV distribution system for rural electrification program			
Rehabilitation of existing small hydro power plants	0.5	0.3	54.6%
Community-based hybrid renewable energy grids	1.0	0.6	61.7%
3. Institution building.			
Improvement of information system management			
Creation of District or Commune level Joint Stock Distribution Companies			
Strengthening regulation, planning and implementation capacities for Renewable Energy Projects	3.0	3.2	106.6%
EVN staff training program			
Technical assistance and capacity building for ERAV			
Technical Assistance			
Total Baseline Cost	4.5	4.1	90.9%
Physical Contingencies			
Price Contingencies			
Tax and duties			
Total Project Costs (without IDC)	4.5	4.1	90.9%
Interest During Construction (IDC)			
Total Project Costs (with IDC)	4.5	4.1	90.9%
Total Financing Required	4.5	4.1	90.9%

## (b) Financing

<b>P066396 - System Efficiency Improvement, Equitization &amp; Renewables Project</b>				
Source of Funds	Type of Financing	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
Borrower		122.9	119.8	97.4%
International Development Association (IDA)		225.0	299.7	133.2%

<b>P073778 - System Efficiency Improvement, Equitization &amp; Renewables Project (GEF Renewable Component)</b>				
Source of Funds	Type of Financing	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
Borrower		0	0	
Global Environment Facility (GEF)		4.5	4.1	90.9%





## Annex 2. Outputs by Component

### Original and Revised Components

Original components	Revised components (2005 restructuring required Board Approval based on non-objection)
<p>Part A. Transmission System Efficiency Improvement</p> <p>A.1. (a) Upgrade pre-identified the 500 kV and the 220 kV transmission networks and associated substations, including installation of capacitors to selected substations;  (b) Carry out resettlement and rehabilitation of Affected Persons under Part A.1 (a) of the Project; and  (c) Provide consulting services for: (i) preparation of detailed design, bidding documents and project management support for Part A.1 of the Project, (ii) improvement of maintenance work for the power systems under Part A.1 of the Project, and (iii) design, creation and implementation of a joint-stock company model for a hydroelectric power project.</p> <p>A.2. Reducing system peak load of over 120 MW through implementation of several pre-identified DSM measures.</p>	<p>Part A. Transmission System Efficiency Improvement</p> <p>A.1 -2. became a program to add subprojects as needed.</p> <p>A.2. The direct load control (DLC) program was cancelled due to lack of customer interest (at mid term review) and at EVN's request, IDA fund was not used for procuring time of use (TOU) meters because EVN had already installed using its own funds over 60,000 TOU meters.</p> <p>A.3. Carrying out a program to install and upgrade a commercial metering system between transmission systems and generation and distribution systems, which was additional component at the 2005 restructuring but was later moved to be financed under the Second Transmission and Distribution Project (TD2) as it had to wait for ERAV's preparation and approval of metering codes.</p>
<p>Part B: Rural Energy Access Improvement</p> <p>B.1. (a) Upgrade and strengthen the pre-identified 110 kV subtransmission line and substations;  (b) Carry out resettlement and rehabilitation of Affected Persons under Part B.1 (a)</p> <p>B.2. Rehabilitate pre-identified five existing small hydropower plants and construct a small-scale hybrid wind-diesel power plant for Phu Quoc Island; and</p> <p>B.3. Pilot development of about 20 community-based hybrid renewable-energy grids in remote areas.</p>	<p>Part B: Rural Energy Access Improvement (revised at the restructuring in 2005)</p> <p>B.1-2. became a program to add sub-projects as needed.</p> <p>B.2. The Wind-Diesel Project was cancelled as the feasibility study found low potential of wind resource. The remaining fund under the EVN component of the GEF Grant was transferred to MoIT to revise the Strategy and Master plan on Renewable Energy Development.</p> <p>B.3. became a program to add subprojects as needed and the eligibility of the subprojects was expanded to include other modalities without restricting to only hybrid renewable energy grid and the definition of eligible plants was expanded to cover those at village and province level (in addition to commune level) as well as privately-owned projects.</p>
<p>Part C: Sector Reform and Institutional Development</p> <p>C.1. Improve the financial and accounting management system and to</p>	<p>Part C: Sector Reform and Institutional Development</p> <p>C.1. Technical Assistance for Improved Maintenance Management was cancelled in</p>

<p>strengthen and expand the activities of Information Technology Center to carry out the proposed IT plan.</p> <p>C.2. Creation of one District and 15 commune-level joint-stock distribution companies;</p> <p>C.3. Strengthening of regulation, planning and implementation capacity for renewable electricity projects</p>	<p>November 2006 due to changes in EVN corporate structure. The fund was allocated to finance a Feasibility Study for the Interconnection between EVN and China Southern Grid. However, the study was delayed and eventually was not completed due to information security issues between Vietnam and China. The study is continued with EVN's funds as of a broader study on interconnection of the Greater Mekong Sub-region.</p> <p>C.1. Integrated financial and material management information system (FMIS/MMIS) subcomponent was terminated due to contractual issues. EVN continued the work with its own fund with the same consultant.</p> <p>C.1. was revised to support Institutional development of EVN, including (i) financial, accounting, and MMIS; (ii) public utility technology and management; and (iii) financing and planning. But the planned establishment of corporate financing units in EVN and NPT and associated training were not implemented. NPT component was addressed in the additional financing of the Second Transmission and Distribution Project (TD2).</p> <p>C. 2. Support EVN's equitization program in the generation and distribution sub-sectors, one of the two activities under this C.2. was revised in 2005 project restructuring as: "Provision of technical assistance for equitization transactions, and provision of training for staff of EVN and of newly established power distribution joint stock companies including in corporate governance and operation of securities markets". This revision was because during 2003-2005, a joint stock company and equitization at the commune or district level could not be created due to the lack of economies of scale and capacity and only one district was retained only for rehabilitation. After the equalization study was completed in 2006 and distribution systems were upgraded, the Bank continued to monitor the equitization process but no further activities were implemented partly because the implementing agency equitized a provincial company without support of the Project and the Bank viewed that the timing of equitization of all power corporations' and power companies (PCs) would be too early.</p> <p>C.4. is added as Strengthening of Project financial management through the provision of technical assistance, including for purposes of the carrying out of audits.</p> <p>C.5. is added as Institutional development of ERAV</p> <p>C.6. is added as Institutional development of the gas sector, and the MoIT. But this was not implemented due to the MoIT's changes of approach and follow up work has been done with the Bank support.</p>
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### The Original Result Framework in Annex 1 Project Design Summary of the PAD

Different KPIs were included from those in the main text and indicators of social benefits and income generating impacts were not included. No targets were set in the PAD.

<p>1. Transmission and distribution system:</p> <p>Transmission losses and distribution losses  Number of transmission line fault (time/year/100km) for 500 kV, 220 kV and 110 kV  Duration of transmission line fault (min/year) for 500 kV, 220 kV and 110 kV  Number of transformer faults (time/year/unit) for 500/220 kV and 220/110 kV  Duration of transformer faults (min/year/unit) for 500/220 kV and 220/110 kV  Percentage of 500/220 kV and 220/110 kV transformers loaded&gt;80%  Energy sales/employee</p>	<p>2. Rural Access:</p> <p>Number of household electrified  Number of off grid community mini systems installed  Number of household electrified with renewables</p>	<p>3. Power sector reforms:</p> <p>Financial soundness of joint-stock distribution companies  Electricity Sales  Customers numbers  Application of financial management and information system (FMIS) throughout EVN and power companies (PCs)  Government documents creating sustainable mechanism for decentralized off grid rural electrification and functioning of Off grid Rural Electrification Facility</p>
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**Final Arrangements for Results Monitoring (Revised at the Restructuring in May 2005, December 2007, Additional Financing May 2010)**

<b>Project Development Objective (PDO):</b> (a) enhance electricity system efficiency in Vietnam; (b) provide electric power in selected rural areas of Vietnam; and (c) sustain reform and institutional development of the Borrower's energy sector. <b>Global Environment Objective:</b> contribute to reduced greenhouse gas emissions by promoting the use of electricity production using renewable resources							
PDO Indicators	Level	Results	Baseline	Project end target	Actual Achievement on December 15, 2012	Notes	
2002		2012			Increase for 2002-2012	SEIER (upgrading, new, rehabilitation)	SEIER contribution to country system in 2002
						SEIER contribution to country system in 2012	SEIER contribution to incremental system for 2002-2012
Total country 220kVkm							
4,266		11,313		7,047	490	11%	4%
Total country 220kV transformers					265%		
9,726		25,351		15,625	3313	34%	13%
Total county 500kV transformers					261%		
3,150		15,150		12,000	900	29%	6%
					481%		
Transmission reliability at 500kV and 220 kV						These indicators are for the entire EVN electricity system level. SEIER covered only a small share of the EVN entire system as in the table above. Data on how much the project has contributed to the indicator are not available.	
Number of interruptions Faults/100 km/year at 500kV			500kV: 0.33	0.321	0.310		
Average duration of faults on lines, minutes/year			220kV: 0.596	0.578	0.553		
Transmission losses (%)			500 kV: 15.28	15.75	5.08		
			220 kV: 21.2	20.57	10.09		
			kV: 21.2				
			4.35	3.75	2.56		

<b>Distribution reliability at 110kV:</b>				These indicators are for the entire EVN electricity system level. SEIER covered only a small share of the EVN entire system as in the table above. Data on how much the project has contributed to the indicator are not available
Number of interruptions /100 km/year at 110kV	3.32	3.221	3.17	
Average duration of faults on lines, minutes/year	28.8	27.94	19.6	
Distribution losses (%)	8.65	7.25	6.80	
Rural access: Number of new households electrified from off grid or mini grid	0	10,000	460	The main reason of this low achievement is because other households have been electrified through rapidly increasing grid connections. Under RARE, additional 1,176 households were benefited from rehabilitation of off-grid micro hydropower plants. The expansion and upgrades of transmission and distribution lines had by far the major impacts on providing power to rural areas, for example, SPC, CPC, NPC and DNPC alone benefited 5,884,174 consumers, which included many rural consumers, and provided more reliable power than the off-grid or mini-grid renewable power with limited capacity. This trend of increase in grid-connection in the country is demonstrated by 78 percent of communes with grid connection in 2000, which was increased to 97 percent in 2009 and 70 percent of household with grid-connection in 2000, which was increased to 94 percent in 2009. Report on Lessons Learned from SEIER RARE and RESSP Learned (Siyambalapitiya and Dang, 2010) noted the number of household electrified from off grid or mini grid is 418 rather than 460 reported in the ISR.
Increase in small hydro and biomass capacity on line	0	20 MW	13.6MW	The main reason of this low achievement is because other households have been electrified through rapidly increased grid connections, rather than originally planned off-grid or mini-grid micro hydro or biomass power. The expansion and upgrades of transmission and distribution lines had by far the major impacts on providing power to rural areas, for example, SPC, CPC, NPC and DNPC alone benefited 5,884,174 consumers, which included many rural consumers, and provided more reliable power than the off-grid or mini-grid renewable power with limited capacity. This trend of increase in grid-connected in the country is demonstrated by 78 percent communes with grid connection in 2000, which was increased to 97 percent in 2009 and 70 percent of household with grid-connection in 2000, which was increased to 94 percent in 2009. Last Implementation and Results Report noted 14.9MW but data obtained from implementing agencies for preparing this ICR had a total of 13.6MW.

Power sector reform: Evaluation of accounts of newly formed joint stock and equitized companies	No accounts available	Financially sustainable companies	A relevant study was prepared in September 2006.	The activity was not fully implemented. But a Report “Advisory Assistance and Development of an Implementation Program for Power Sector Equitization in Vietnam: Recommendations for Definition and Implementation of a Strategy for Equitization of Electricity Distribution Companies, was prepared in September 2006. The Bank continued to monitor the equitization program.
Reduction of time and complexity for SPPs to get approved	Long time	Significant progress	Limited progress	Report on Lessons Learned from SEIER RARE and RESSP Learned (Siyambalapitiya and Dang, 2010) noted that the Vietcombank expects the MoIT and MOF approval procedure to be shortened and another bank thinks that the approval process for projects for refinancing is too long. However, the Project support to designing, issuing and implementing SPPA, ACT and other regulations and methodologies, should have streamlined the approval process.
Financial management/material management system improved	Poor quality	Improvement in financial and material management	Improvement of financial and material management was cancelled due to contractual problems with consultant.	EVN continued the work using its own finances with the same consultant. FMIS is planned to be used by EVN and its subsidiaries. The FMIS subcomponent is expected to complete Phase 1 by the end of 2013, will be piloted in eight subsidiaries and then widely applied.
Sound procedures for the effective implementation of tariff and market regulations	Not available	Sound procedures for the effective implementation of tariff and market regulations in place	Sound procedures for the effective implementation of tariff and market regulations in place	Examples are the following: issuance of procedures of market rules, Prime Minister’s Decisions on tariff setting methodology and on market-based electricity tariff mechanism etc. Detailed are found in the ERAV’s capacity component table below.
Ability to assess effectiveness and improve regulations and implementation procedures	Newly established without experience	Sound ability by ERAV to assess effectiveness and improve regulations and implementation procedures	Sound ability by ERAV to assess effectiveness and improve regulations and implementation procedures	As a result of training and capacity building, ERAV’s staffs have significantly improved their ability to assess the effectiveness and improve regulation and implementation procedures, such as electricity price setting, power market design and regulation, power system development and monitoring. Total 227 persons of ERAV (132 persons) and other stakeholders (95 persons including EVN, NLDC, MoIT, etc.) received training, on an average of US\$ 2,692 per person, in the areas of basic and advance training on power market and pricing courses, study tours and Master of Business Administration (MBA).

Global Environment Objective Level Results Indicators	Baseline	Project end	Actual Achievement on December 15, 2012	
CO2 emissions reduced	0 ton	208,350-219,140 tons	278,164 tons	Of this total, 259,264 CO2 ton emission reductions (up to 2020, which is the end year consistent with the project appraisal) are from five rehabilitated small hydropower plants (total capacity of 12,930 kW of the five plants). These emissions were estimated from avoided generations from the system with weighted average of power plants with various technology and fuels in the power system. Also, under RARE, three new off grid mini hydropower plants were constructed and four mini hydropower plants were rehabilitated, totaling 706 kW capacity. This contributed to 18,900 of carbon avoided for 20 years through displacement of kerosene for lighting and diesel for rice mills.
Intermediate Results Indicators for Each Component				
<b>Component One:</b> Transmission efficiency improved:				
Length of 500kV transmission line installed, km	0	Tbd	0	Before the 2005 project restructuring, at EVN request, the planned 260 km 500kV line between Pleiku-Da Nang was withdrawn as it had been financed by other sources, and funds allocated for the 500kV line were used for 220kV investment. No further 500kV lines were requested following the adoption of a programmatic approach in 2005.
Capacity of 500/220kV substation capacity installed, MVA	0	450	900	
Length of 220kV transmission line installed, km	0	470	490	
Capacity of 220kV/110kV substation capacity installed, MVA	0	3,370	3,313	
Capacity of 110 kV capacitors installed, MVAR	0	930	565	
Capacity and energy saved from DSM activities (MW/GWh)	0	12/84	301.1/2,506	Data from NPC, NPPMB, SPC and DNPC  Estimated for EVN's DSM program in the ICR of the GEF DSM and EE project P071019. These achievements were due to the successful CFL market transformation.

<b>Component Two:</b> Rural access enhanced: Length of 110kV lines installed, km Capacity of 110/22kV and 110/35kV substations installed, MVA Number of additional communes connected to minigrid	0 0 0	910 1,700 20	965 3,210 6	<p>The rapid expansion of the national grid, has caused this minigrid electrification to be no longer relevant. The expansion and upgrades of transmission and distribution lines had by far the major impacts on providing power to rural areas, for example, SPC, CPC, NPC and DNPC alone benefited 5,884,174 consumers, which included many rural consumers, and provided more reliable power than the off-grid or mini-grid renewable power with limited capacity. This trend of increase in grid-connected in the country is demonstrated by 78 percent communes with grid connection in 2000, which was increased to 97 percent in 2009.</p>
<b>Component Three:</b> Governance, management and regulation improvements Effective equitization program in place  Number of companies in which management system installed and operating  Regulations for small power producers issued, enforced  30 additional formal training received by ERAV staff Effective processes for information collection and monitoring;	Program initiated  Not installed  Not effective  Not yet in place	Substantial progress  500 users at 30 main sites  Effective and streamline regulations  30 additional training received, Effective processes for information	A relevant study was prepared in September 2006.  Not installed as this component was cancelled.  Effective and streamline regulations in place but still some improvement needed.  97 additional ERAV staff received training, procurement of the regulatory/market monitoring IT system cancelled.	<p>The activity was not fully implemented. But a Report “Advisory Assistance and Development of an Implementation Program for Power Sector Equitization in Vietnam: Recommendations for Definition and Implementation of a Strategy for Equitization of Electricity Distribution Companies, was prepared in September 2006. The Bank continued to monitor the equitization program.</p> <p>EVN continued with its own funding with the same consultant under SEIER. FMIS is planned to be used by EVN and its subsidiaries. The FMIS subcomponent is expected to complete Phase 1 by the end of 2013, will be piloted in eight subsidiaries and then widely applied.</p> <p>Examples include Standard Power Purchase Agreement (PPA), Avoided cost tariff (ACT), Updated the guideline No.2014 of MoIT for economic and financial analysis of renewable energy projects, Permitting and licensing procedures, Development of encouragement mechanism for Renewable Energy Projects. However, some improvements are needed, such as the PPA, ACT, etc.</p> <p>The procurement of the regulatory/market monitoring IT system was dropped in December 2012 because ERAV required more time to review and finalize the system technical specifications.</p>



All tariff, market and technical codes regulations issued. Five market procedures and five technical procedures effective	Not yet in place	collection and monitoring in place Eleven regulations issued. Five under preparation	21 regulations and 14 procedures were issued.	These achieved numbers of regulations and procedures were reported by ERAV. However, there may be more than 21 regulations and 14 procedures depending on what are considered as regulations and procedures, e.g. each tariff increase has been accompanied by MoIT Circular (prepared by ERAV) with the regulations for its implementation; load research has issued procedures, etc.
Road map for reform of gas market in place  10 MOIT staff received training	Not yet in place	Road map for reform of gas market in place 10 MoIT staff received training	These activities were initially supported by the project but not completed	After the Bank organized a workshop on Issues and Options for Market based Gas Development in 2011 financed by Energy Sector Management Assistance Program (ESMAP), MoIT changed their approach. Therefore, no activities were implemented afterward. Under a study on Key Trends in East Asia's Natural Gas Market (P124916), the Bank has been supporting MoIT through technical advice and training on key gas policy issues including (a) identifying suitable locations for potential LNG regasification terminals; (b) developing a suitable gas pricing regime for pipeline gas and LNG (c) supporting the development of the Gas Master Plan in 2011
EVN capacity to plan and finance investments improved; 20 EVN and NPT staff received training	Not yet in place	Establishment of Corporate Financing Unit in EVN and NPT; 20 Staff received training	The training of EVN and NPT staff and establishment of corporate financing unit were not implemented.	Establishment of Corporate Financing Unit in EVN and NPT and 20 Staff training were not implemented both the Bank and the implementing agencies did not follow up the activities. However, the additional financing of TD2, approved on March 29, 2011, is providing TA for capacity building to enhance NPT's capabilities in the critical areas of investment planning and financing, debt management, and the management of regulatory affairs through staff training and technical assistance from specialized consultants.

## **Annex 3. Economic and Financial Analysis**

### **A. Economic Analysis**

#### **A.1. Transmission and Distribution Systems and Hydropower Plants**

##### **1. Introduction**

The same methodology, assumptions and constant US\$ 2001 prices, which were used in the project appraisal, were used to compare the results. However, some modifications were made: (i) many subprojects that were actually implemented and the project timeframe were different from those envisaged at the appraisals due to the restructuring and extension of closing date of the project, (ii) under this ICR, economic opportunity cost of capital (EOCK) and shadow exchange rate (SER) were estimated, (iii) NOx emission mitigation was estimated, (iv) distribution analyses were conducted (v) economic analyses of off-grid micro hydropower plants were conducted, and (vi) TA on capacity building is partially assessed by training cost per person.

##### **2. Methodology**

Economic analysis was conducted by comparing two scenarios: (a) "with" the Bank project and (b) "without" the Bank project.

The main benefits of the transmission and distribution systems and small hydropower subprojects were derived from (i) increased power supply, (ii) reduced electricity technical system losses, and (iii) increased reliability and quality of power supplied.

The main benefits of the off-grid micro hydropower subprojects were derived from estimated avoided costs for alternative electricity supply from diesel power plants.

Also, for both small hydropower and off-grid micro hydropower subprojects, benefits to the project's global environment objective of climate change mitigations through carbon dioxide (CO<sub>2</sub>) reductions and benefits to mitigating health and environmental impacts through nitrogen oxides (NO<sub>x</sub>) were estimated as illustrative purpose since their contribution were insignificant, but the results could provide implication for scaling up these hydropower projects.

Costs were about 73 percent (US\$ 309.2 million) of an estimated total disbursed amount of the Project (IDA, GEF and the GOV). Incremental operation and maintenance (O&M) costs of the Project were obtained by implementing agencies. However, almost all incremental O&M costs were not actual costs but were assumed estimates, which ranged between 0.5 – 2 percent of the investment costs.

The above explanations could be presented in the following formula:

$\Delta W = \Delta C + \Delta B$ , where,

$\Delta W$  = Change in welfare

$\Delta C$  = Costs (investment and O&M)

$\Delta B$  = Benefits (for transmission and small micro hydropower - increased power supply, reduced technical electricity system losses, and increased reliability and quality of power supplied; and for off-grid micro hydropower – avoided costs of diesel based power)

The above formula showed that the net present value of change in welfare level as a whole was the sum of the net present value of change in costs and benefits between (a) "with" the Bank project and (b) "without" the Bank project.

For the transmission system, each implementing agency had 5-40 sub-projects (Central Power Project Management Board (CPPMB) 5 sub-projects, Southern Power Project Management Board (SPPMB) 5 sub-projects, Northern Power Project Management Board (NPPMB) 9 subprojects, CPC 24 sub-projects, NPC 37 sub-projects, SPC 40 sub-projects<sup>4</sup>, DNPC 9 subprojects and HDPC 2 subprojects). Furthermore, RARE component had 7 micro hydropower subprojects. Therefore, to arrive at the result of each agency level, it was necessary to conduct many economic analyses for all these sub-projects totaling 138 economic analyses.

### **3. Assumptions**

Following assumptions are made in this analysis.

#### *Without Bank Project Scenario*

It was assumed that no investment would have been made to implement SEIER without the IDA and GEF financing support. The reason for this assumption is because an aide memoire for a January 2003 mission noted the continuing shortfall in available investment funds for the power sector as one of the reasons that rather than cancelling the saving of US\$ 77 million of TD1, the saving was used for (i) the financing of the interconnection between Vietnam and Cambodia; and (ii) the transfer of subprojects from SEIER. The Bank team also consulted with PCs, EVN and other implementing agencies about their view on what would have happened if Bank and GEF financing had not been available. One PC responded that they would have used their own financing to implement their subprojects anyway even without the Bank and GEF financing. However, all the other implementing agencies did not provide any views. Therefore, insufficient information was available to establish the counterfactual scenario of SEIER that would be financed by other funding sources in absence of the Bank and GEF financing.

#### *Shadow Exchange Rate (SER)*

Although the project appraisal did not make an adjustment for shadow exchange rate (SER), SER was used by estimating FEP at 8.97 percent (average FEP over 2002-2010).<sup>5</sup>

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<sup>4</sup> No suitable data available for subproject # 34. Cau Ke substation, #18 Installing capacity in Soc Trang substation and #19 Installing capacity in Kien Luong 2 substation. Cau Ke substation has been not put into operation yet because Binh Minh - Cau Ke transmission line (financed by EVN) has not been constructed, and the reason is difficult in compensation of land. Performance of Soc Trang and Kien Luong 2 were improved. First, the power factor (cos j) was enhanced. Without the Bank project, it was assumed cos j = 0.9 and with the Bank project, it was cos j = 0.98-0.99. Secondly, voltage stability was stabilized. Without the Bank project, voltage would have been very low about 91kV. With the Bank project, the voltage was improved which increase to 95kV-115kV.

<sup>5</sup> Estimated based on the methodology by Glenn P. Jenkins, 2008. Program on Cost-Benefit Analysis on Economic Analysis/Project Appraisal; and Graham Glenday, 2011. Program on Project Appraisal and Risk

### *Economic Opportunity Cost of Capital (EOCK)*

Net present values (NPV) are based on the discount rate of 10.21 percent, which was an estimated value of EOCK (average EOCK over 2002-2011) of Vietnam.<sup>6</sup> The project appraisal used the default value of 10 percent.

### *Electricity Costs*

The input energy bought as input, and sell as the output from the system were evaluated by the long run marginal cost (LRMC) at the inlet and outlet of the system, which had been estimated in the Power Development Plan No. 5. The LRMC was estimated up to the year 2020. The values at different level were as follow: at bus bar of the power station 3.904 USc/kWh, at 500/220 kV level 4.569 USc/kWh, at 110 kV level 5.166 USc/kWh, at medium voltage level 6.551 USc/kWh, and 9.373 USc/kWh at the consumer end. The unserved energy due to the unreliability of the system was evaluated at 46.865 USc/kWh. Electricity system loss value for supply and construction of 110 kV transmission systems was evaluated at LRMC of 5.166 USc/kWh and the incremental energy attributed to the project evaluated at the LRMC for the development of 110 kV system was equal to 0.597 USc/kWh (the LRMC at the 110 kV less the LRMC at 500/220 kV). For the supply and construction of 500kV and 220 kV transmission system, the losses were evaluated at LRMC of 4.569 US c/kWh and the incremental energy attributed to the project evaluated at the LRMC for the development of 110 kV system was equal to 0.665 USc/kWh (the LRMC at 500/220 kV less the LRMC at generation). For the component of small hydropower rehabilitation, the incremental output of the small hydropower was estimated at LRMC at the end of the 110 kV transmission system 5.166 USc/kWh. In the “without” the Bank project scenario, due to the bad condition and lack of the spare parts, the hydropower stations were assumed to stop operation in a few-year time. All these above assumptions and values were used at the project appraisal.

There are caveats about these assumptions at the appraisal. There are large differences in LRMC between medium voltage level and the consumer ends and more clarification was needed. Unserved energy value was extremely high value, which could be used for the Power Crisis and thus should be justified. In particular related to a specific amount of unserved energy, this value depends on the amount in question. Moreover, this value should be consistent with the much lower values for supply losses. There was no clarification or justification of the validity to include the capacity benefit inherent in LRMC for small hydropower projects if the firm power produced by these subprojects is a small (or large) proportion of their total output. Also, no information was available on how was the LRMC were calculated. Furthermore, since LRMC will change overtime, especially during the rapid development of transmission and distribution system. However, no updated LRMC was available to prepare this ICR. Also, assumption of economic life of small hydropower rehabilitation only up to 2020 should be clarified.

### *Electricity Generation, System loss, and Interruptions and Outage*

The values (kWh) of electricity generations, system loss and interruptions and outages were obtained from implementing agencies. Although many subprojects have already started

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Management May 15-June 10, 2011, Economic Opportunity Cost of Foreign Exchange, Duke Center for International Development.

<sup>6</sup> Estimated based on the methodology by Glenn P. Jenkins, 2008. Program on Cost-Benefit Analysis on Economic Analysis/Project Appraisal.

operations much earlier than the closing date of SEIER of December 31, 2012, almost all data provided from the implementing agencies were updated forecasts and assumptions and are not the actual data. Some subprojects data provided by the implementing agencies had system losses and interruptions and outage rates higher than the “without” Bank project scenario. This would not justify the investment. The Bank team sought for clarification but no responses were provided from these implementing agencies. This lack of actual performance data and clarification of their assumptions severely affected the assessment of impacts of the SEIER appropriately.

Other assumptions are the following:

CO<sub>2</sub> and NO<sub>x</sub> emissions were estimated based on the power generation mix of Vietnam for 2006-2010, CO<sub>2</sub> emission rates from the World Bank data base and NO<sub>x</sub> emission values from power plants from Canada, Mexico and the United States.<sup>7</sup> From 2011, average values of 2006-2010 were used (321 CO<sub>2</sub>g/kWh and 0.81NO<sub>x</sub>g/kWh). Carbon price was based on US\$3.3/CO<sub>2</sub> ton (in 2001 price) under European Union Emissions Trading Scheme on January 24, 2013. NO<sub>x</sub> price is US\$18.32/NO<sub>x</sub> ton, which is the lowest of the price range up to US\$36.64/NO<sub>x</sub> ton (all in 2001 prices).<sup>8</sup>

- No shadow wage rate was used because the most of employees under the project were assumed to be skilled workers, who were either employees of the implementing agencies or consultants, and were supposed to find alternative employments with similar wages.
- The analyses were made over a project economic life of 20 years or up to 2025 for transmission and distribution system and up to 2020 for small hydropower plants, which were consistent with the project appraisal.
- If the actual data were not available, the operation and maintenance cost are evaluated at 0.5-2 percent of the investment cost, which are reported by implementing agencies.

To estimate economic costs from financial costs, if actual costs of taxes were not available, value added tax at 10 percent, industrial import duties at 17 percent and personal income tax at 5 percent were employed.<sup>9</sup>

- Micro hydropower plants were assumed to operate at 40 percent capacity factor.

Avoided costs were based on 100kW diesel power plants at 60 percent capacity factor at levelized cost of US\$0.18/kWh including diesel US\$0.53/liter, which were converted in to 2001 prices.<sup>10</sup>

#### **4. Results**

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<sup>7</sup> Miller, P. and C. Van Atten, 2004. North America Power Plant Air Emissions. Commission for Environmental Cooperation of North America.

<sup>8</sup> Source: Asian Development Bank. (1996). Economic Evaluation of Environmental Impacts, A Work Book. Parts I and II. Environment Division, Office of Environment and Social Development, ADB, March 1996. Mimeo. Asian Development Bank, the Philippines.

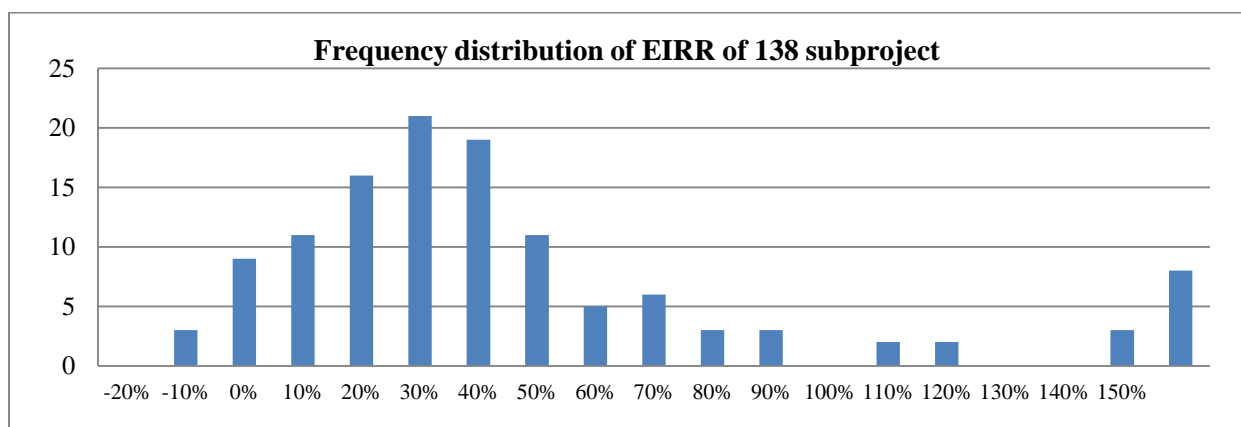
<sup>9</sup> Source: <http://www.vietnam-ustrade.org/index.php?f=news&do=detail&id=32&lang=english>; and PricewaterhouseCoopers (Vietnam) Ltd. 2012, Vietnam Pocket Tax Book 2012.

<sup>10</sup> Diesel power plant's levelized cost was estimated from the World Bank data. Fuel price was obtained from NPC.

**The Tables and figure below shows the summary of results**

	At Appraisal – Economic analysis covered 74% of total project cost		At Completion – Economic analysis covered 89% of total project cost	
Project Component	NPV (US\$ million)	EIRR	NPV (US\$ million)	EIRR
	@10% discount rate		@EOCK 10.21%	
Total	460	31%	408	36%
1. 1. Transmission system of EVN (NPPMB, CPPMB, and SPPMB)	220	26%	200.4	42%
1.2 DSM phase 2	59.9	467%	Not available	
2.1a 110 kV system PC1 (NPC and HDPC)	80.1	26%	79.8	37%
2.2 a Rehabilitation of mini hydro power plants in PC1 (NPC)	4.2	32%	2.2	84%
2.1b 110 kV system PC2 (SPC)	78.8	38%	19.2	21%
2.2 b Rehabilitation of mini hydro power plants in PC2 and Wind-diesel power plant for Phu Quoc Island (SPC)	1.67	19%	2.8	34%
2.1c 110 kV system PC3 (CPC)	32.8	31%	10.2	9%
2.2 c Rehabilitation of mini hydro power plants in PC3 (CPC)	6.2	68%	5.2	82%
2.1d 110 kV system DNPC	9	34%	104	176%
2.3 Community-based hybrid renewable energy grids	Not available		0.02	11%

CO2 emission mitigation (ton) from small and micro-hydropower plants	At appraisal	At completion
Chieng Ngan and Thac Bay (NPC)	189,140	259,264
Ankroet (SPC)		
An Diem and Kon Dao (CPC)		
7 off-grid micro hydropower plants	19,200 to 30,000	18,900
Total	208,340 to 219,140	278,164



The economic analysis at appraisal covered 74 percent of the total project cost. The economic analyses at completion covered 89 percent of the total project cost. An estimated economic internal rate of return (EIRR) at completion was 36 percent, which was slightly higher than the EIRR of 31 percent in the main text and 28 percent in Annex 4 in the PAD at appraisal. An estimated net present value (NPV) at completion was US\$ 408 million, which is lower than the

NPV of 460 million in the main text and US\$ 435 million in Annex 4 in the PAD at appraisal. An estimated mitigation of CO2 emission at completion was higher than that at appraisal. This is because of the delays in completion, which in some cases were about 10 years longer than the original implementation schedule. Consequently, the benefits were reduced by more than that could be made up from the reduced costs. Also, there are slight slowdown of annual electricity production growth at 11 percent in 2007 and 10 percent 2008, compared to higher growth during 2000-2006 at average 14 percent. Afterword, this growth increased again, at 13 percent in 2009 and 14 percent in 2010.<sup>11</sup>

An estimated mitigation of CO2 emission at completion is higher than that at appraisal.

Overall the Project is economically viable in terms of EIRR. However, some subprojects had negative EIRR and/or NPV not only at the completion but due to estimated lower level of load demand than the load that the increased capacity can accommodate and higher levels of system loss and interruptions/outages in the “with” Bank project scenario than the “without” Bank project scenario. The NPVs of the actual subprojects, however, were not as high. Relatively very high EIRR and NPV of DNPC are because their estimates of high interruptions and outage rates under the “without” Bank project scenarios.

Nevertheless, as noted in the assumption section above, almost all data provide by the implementing agencies were updated forecasts and estimated assumptions, and were not actual data. Also, since some subprojects were directly or indirectly linked, consolidated agency level results included some double counting of costs and benefits. Therefore, careful interpretations of the results are necessary.

The following are detailed illustrations of subprojects.

Ankroet small hydropower subproject of SPC had an EIRR of 33.8 percent and an NPV of US\$ 2.8 million without including values of CO2 and NOx. With added CO2 and NOx values, EIRR was increased slightly. NOx impacts are based on conservative value using the lowest value among the range of estimates and are distributed in various health and environmental impacts below.

Ankroet small hydropower subproject	Without CO2 and Nox	With CO2	With CO2 and NOx
EIRR	33.8 %	34.4%	34.4%
NPV	\$2,802,138	\$2,886,181	\$2,887,463

Ankroet small hydropower subproject NOx impacts distribution	Premature Respiratory	Adult chronic morbidity	Acute morbidity	Material soiling	Visibility reduction
Percentage share	70%	10%	5%	10%	5%

Distribution of this net benefit without CO2 and NOx impacts is shown in the table below. Consumers benefitted from reduced interruptions and outages. SPC is the biggest gainer due to reduced technical system loss and increased ability to supply electricity. Government and economy needed to finance the project cost and had some loss due to FEP although there were

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<sup>11</sup> Source: World Bank Data Development Platform.

incremental tax revenues. Employees or consultants of the power company gained due to the project activities. Using the national poverty rate in 2010, the poverty impact ratio is 36 percent.

Ankroet small hydropower subproject Total NPV	Consumers benefits from reduced interruptions and outages	SPC	Labor	Government/Economy
\$2,802,138	\$19,682	\$4,300,436	\$151,766	(\$1,669,746)
	1%	153%	5%	-60%
Impact on poor based on 21% poverty rate in 2010	\$4,133	\$903,092		\$89,132
Poverty impact ratio	36%			

The table below show how the externalities were distributed. SPC benefited most from the increased ability to supply power. The Government and economy benefited due to the incremental tax revenues. Consumers benefited due to the reduced outage and interruptions as discussed above.

Ankroet small hydropower subproject Economic-Financial NPV	Consumers	SPC	Government/Economy
\$4,975,133	\$19,682	\$4,531,014	\$424,437
	0.4%	91%	9%
Impact on poor based on 21% poverty rate in 2010	\$4,133	\$951,513	\$89,132
Poverty impact ratio	21%		

Sensitivity analyses on selected variables, which include switching values (SV) and sensitivity indicators (SI), are presented as below. This shows the value of the incremental energy is the most sensitive to the results.

Ankroet small hydropower subproject sensitivity analysis						
	System Loss (%)	Unserviced energy GWh	Incremental energy GWh	System Loss USD/kWh	Unserviced energy USD/kWh	Incremental energy USD/kWh
SV	-3285%	-5372%	191%	-1215%	14238%	62%
SI	-0.03	-0.02	0.52	-0.08	0.01	1.62

500kV Doc Soi substation subproject by CPPMB had an EIRR of 23.5 percent and an NPV of US\$ 8.4 million as in the table below.

500kV Doc Soi substation subproject	
EIRR	23.47%
NPV	8,357,384

Distribution of this net benefit is shown in the table below. Even the interruptions and outages rate was reduced compared to the without project scenario, due to the increased load, consumers experienced increased interruptions and outages. CPPMB is the biggest gainer due to reduced technical loss and increased ability to supply electricity. Government and economy needed to finance the project cost and affected communities (resettlement, compensation and environmental management) and had some loss due to FEP although there were incremental tax revenues. Employees or consultants of the power company gained due to the project activities. Using the national poverty rate in 2010, the poverty impact ratio is 89 percent.



500kV Doc Soi substation subproject				
Total NPV	Consumers benefits from reduced interruptions and outages	CPPMB	Labor	Government/Economy
\$8,357,384	(\$381,926)	\$15,198,632	\$724,127	(\$7,183,449), of which (\$30,622) paid to affected communities
	-5%	182%	9%	-86%
Impact on poor based on 21% poverty rate in 2010	(\$80,205)	\$3,191,713		\$4,301,326
Poverty impact ratio	89%			

The table below show how the externalities were distributed. The Government and economy benefited the most due to the incremental tax revenues. CPPMB also benefited from the increased ability to supply power. Consumers were worse off due to the increased outage and interruptions as discussed above.

500kV Doc Soi substation subproject Economic-Financial NPV	Consumers	CPPMB	Government/Economy
\$20,197,331	(\$381,926)	\$96,751	\$20,482,506
	-2%	0%	101.4%
Impact on poor based on 21% poverty rate in 2010	(\$80,205)	\$20,318	\$4,301,326
Poverty impact ratio	21%		

Sensitivity analyses on selected variables, which include switching values (SV) and sensitivity indicators (SI), are presented as below. This shows the power demand and the value of the incremental energy are the most sensitive to the results.

500kV Doc Soi substation subproject sensitivity analysis						
	System Loss MWh	Unserved energy MWh	Incremental energy MWh	System Loss USD/kWh	Unserved energy USD/kWh	Incremental energy USD/kWh
SV	-2149%	-1323%	55%	8638%	-2188%	55%
SI	-0.05	-0.08	1.81	0.01	-0.05	1.81

220kV Tuy Hoa substation subproject by CPPMB had an EIRR of 73.5 percent and an NPV of US\$ 18.1 million as in the table below.

220kV Tuy Hoa substation subproject	
EIRR	73.5%
NPV	18,055,427

Distribution of this net benefit is shown in the table below. Due to the reduced interruptions and outages, the consumers gained the most. CPPMB benefited due to reduced technical loss and increased ability to supply electricity. Government and economy needed to finance the project

cost and affected communities (resettlement, compensation and environmental management) and had some loss due to FEP although there are incremental tax revenues. Employees or consultants of the power company gained due to the project activities. Using the national poverty rate in 2010, the poverty impact ratio is 26 percent.

220kV Tuy Hoa substation subproject				
Total NPV	Consumers benefits from reduced interruptions and outages	CPPMB	Labor	Government/Economy
\$18,055,427	\$20,102,608	\$986,676	\$421,610	(\$3,455,466), of which (\$15,697) paid to the affected communities
	111%	5%	2%	-19%
Impact on poor based on 21% poverty rate in 2010	\$4,221,548	\$207,202		\$330,600
Poverty impact ratio	26%			

The table below shows how the externalities were distributed. CPPMB did not benefit because CPPMB estimated that during the early years of the operation of the Tuy Hoa substation, they could have provided more power in the without project scenario than the with Project scenario. The Government and economy benefited due to the incremental tax revenues. Consumers benefited the most due to the decreased outages and interruptions as discussed above.

220kV Tuy Hoa substation subproject Economic-Financial NPV	Consumers	CPPMB	Government/Economy
\$21,413,441	\$20,102,608	(\$263,452)	\$1,574,285
	94%	-1%	7.4%
Impact on poor based on 21% poverty rate in 2010	\$4,221,548	(\$55,325)	\$330,600
Poverty impact ratio	21%		

Sensitivity analyses on selected variables, which include switching values (SV) and sensitivity indicators (SI), are presented as below. This shows the outage and interruption rate and value are the most sensitive to the results.

220kV Tuy Hoa substation subproject sensitivity analysis						
	System Loss MWh	Unserved energy MWh	Incremental energy MWh	System Loss USD/kWh	Unserved energy USD/kWh	Incremental energy USD/kWh
SV	-3460%	90%	168%	1444%	90%	-6853%
SI	-0.03	1.11	0.59	0.07	1.11	-0.01

Khe Sanh 110kV sub-station and branchline subproject of CPC had an EIRR of 15.7 percent and an NPV of US\$ 0.49 million as in the table below.

Khe Sanh 110kV sub-station and branchline subproject	
EIRR	15.7%
NPV	\$494,290

Distribution of this net benefit is shown in the table below. Although the interruption and outage rate was reduced compared to the without project scenario, due to the increased load, consumers experienced increased interruptions and outages. CPC was the biggest gainer due to the increased ability to supply electricity. However, it should be noted the CPC assumed that the system loss rate was higher in the with Project scenario than the without project scenario. Although the Bank team asked for their reasoning of this higher system loss rate, the CPC has not provided any responses. Government and economy needed to finance the project cost and affected communities (resettlement, compensation and environmental management, including land acquisition and trees) and had some loss due to FEP although there were incremental tax revenues. Employees or consultants of the power company gained due to the project activities. Using the national poverty rate in 2010, the poverty impact ratio was 63 percent.

Khe Sanh 110kV sub-station and branchline subproject				
Total NPV	Consumers benefits from reduced interruptions and outages	CPC	Labor	Government/Economy
\$494,290	(\$275,018)	\$1,760,035	\$125,146	(\$1,115,873) Of which Project Affected Communities (\$6,838)
	-56%	356%	25%	-226%
Impact on poor based on 21% poverty rate in 2010	(\$57,754)	\$369,607		\$1,177
Poverty impact ratio	63%			

The table below shows how the externalities were distributed. CPC also benefited the most from the increased ability to supply power. The Government and economy benefited due to the incremental tax revenues. Consumers are worse off due to the increased outages and interruptions as discussed above.

Khe Sanh 110kV sub-station and branchline subproject	Consumers	CPC	Government/Economy
Economic-Financial NPV			
\$2,392,749	(\$275,018)	\$2,662,162	\$5,604
	-11%	111%	0%
Impact on poor based on 21% poverty rate in 2010	(\$57,754)	\$559,054	\$1,177
Poverty impact ratio	21%		

Sensitivity analyses on selected variables, which include switching values (SV) and sensitivity indicators (SI), are presented as below. This shows the value of the incremental energy is the most sensitive to the results.

Khe Sanh 110kV sub-station and branchline subproject sensitivity analysis						
	System Loss MWh	Unserved energy MWh	Incremental energy MWh	System Loss USD/kWh	Unserved energy USD/kWh	Incremental energy USD/kWh
SV	-49%	-64%	56%	-54%	-180%	19%
SI	-2.06	-1.56	1.78	-1.85	-0.56	5.39

The micro hydropower plants subprojects showed an estimated EIRR of 22.2 percent and an NPV of US\$0.68 million without CO<sub>2</sub> and NO<sub>x</sub> values as in the table below. Adding CO<sub>2</sub> and NO<sub>x</sub> increased the net benefit by a small amount.

Micro hydropower subprojects	Without CO <sub>2</sub> and NO <sub>x</sub>	With CO <sub>2</sub>	With CO <sub>2</sub> and NO <sub>x</sub>
EIRR	22.2%	24.2%	24.3%
NPV	\$676,754	\$846,642	\$849,053

Distribution of the NPV with CO<sub>2</sub> and NO<sub>x</sub> was presented in the table below. Provincial Peoples Committees, who own all the assets created under the RARE component, gained the most due to the avoided costs. Employees or consultants benefitted due to the subproject activities. Communities will also benefit because they could avoid NO<sub>x</sub> emissions that would have been generated from diesel fired power plants. The NO<sub>x</sub> impacts could be health and social welfare impacts including premature respiratory (70 percent), adult chronic morbidity (10 percent), material soiling (5 percent), acute morbidity (10 percent), and visibility reduction (5 percent). Government and economy had to pay for these subprojects and lost due to FEP while they have gained from incremental taxes and mitigation of CO<sub>2</sub> emission. The poverty impact ratio is 54 percent.

Micro hydropower subprojects	Provincial Peoples Committees (PPC)	Communities	Labor	Government/Economy
Total NPV				
\$849,053	\$1,965,142	\$2,657	\$162,096	(\$1,280,841)
	290%	0.4%	24%	-189%
Impact on poor based on 21% poverty rate in 2010	\$412,680	\$558		\$48,722
Poverty impact ratio	54%			

The table below shows the distribution of externalities. Communities will gain due to the avoided NO<sub>x</sub> emissions. Government and economy will gain from the incremental tax revenues and mitigation of CO<sub>2</sub> emissions.

Micro hydropower subprojects	Communities	Government/Economy
Economic-Financial NPV		
\$234,668	\$2,657	\$232,011
	4%	372%
Impact on poor based on 21% poverty rate in 2010	\$558	\$48,722
Poverty impact ratio	21%	

Sensitivity analyses on capacity factor and avoided costs, which include switching values (SV) and sensitivity indicators (SI), are presented as below. This shows both variables are similarly sensitive to the results, which reflects the fuel cost and supply risks and water availability risk.

	Capacity factor	Avoided cost (US\$/kWh)
SV	34%	34%
SI	2.9	2.9

## A.2. Technical Assistance subprojects

## **1. Introduction**

The rest of SEIER, i.e., about US\$ 31.6 million (8 percent of the total project cost) was spent on technical assistance (TA) including training of EVN and ERAV staff, studies, drafting policies and regulations, and preparing for the Bank projects. These TA activities will indirectly magnify impacts in achieving PDO across the energy sector.

## **2. Strengthening regulation, planning and implementation capacities for Renewable Energy Projects**

US\$ 3.2 million (about 0.8 percent of the total project cost) was spent to deliver varieties of laws and regulations, studies and preparation of the Bank projects (e.g., REDP), with special focus on promoting small independent power producers (IPPs) using renewable energy.

## **3. EVN staff training program**

US\$ 3.0 million (about 0.7 percent of the total project cost) was spent to train about 360 EVN staff members, which on average about US\$8,300 was spent per staff.

## **4. Technical assistance and capacity building for ERAV**

- US\$5.95 million (about 1.5 percent of the total project cost) was spent to develop capacity and knowledge on international practices for ERAV staff and managers and to develop the regulatory framework (tariff, technical and market regulations and procedures) to implement the Electricity Law, mainly the first phase of the roadmap for the development of the competitive power market (the VCGM). The following summarizes these activities.
- Development and completion of regulatory framework for power sector including: (i) cost reflective electricity pricing regulations for transmission, distribution and bulk supply, and market based mechanisms for retail electricity tariffs including regulations for the implementation of each tariff adjustments since the Prime Minister's Decision 21; (ii) technical codes and load research, and the implementation procedures for those codes and load research; (iii) Vietnam Competitive Generation Market (VCGM) detailed design and market rules, and the market surveillance and monitoring procedures. ERAV reported a total of 21 regulations and 14 implementation procedures approved. However, depending on the definition of regulations and procedures, the total number could be more than the reported total. Each tariff adjustment was accompanied since Decision 21 with MoIT Circular (prepared by ERAV) with the implementation regulation; therefore each was a regulation. There are procedures for the Grid Code (around 13 procedures) procedures for the Distribution Code (around seven procedures needed) and procedures for the Load Research Regulations (three procedures). Additionally, the market rules have implementing procedures (a SEIER-funded consultant drafted six but others were drafted by EVN; more than six were approved when pilot VCGM started).
- Support for the implementation of power market in Vietnam: A pilot VCGM started on July 1, 2011 and the full VCGM has been launched in July 1, 2012.
- Support in capacity building for ERAV's staff: About US\$ 0.6 million was spent on capacity building and training activities including study tours/knowledge exchange, which resulted in increased ERAV expertise in electricity price setting, power market design and regulation, power system development and monitoring, etc. Total 227 persons of ERAV (132 persons)

and other stakeholders (95 persons including EVN, NLDC, MoIT, etc.) received training, on an average of US\$ 2,692 per person, in the areas of basic and advance training on power market and pricing courses, study tours and MBA.

## 5. Technical Assistance to NLDC and NPT

US\$ 0.7 million was spent to provide TA to NLDC on (i) Developing ancillary services procedures for Vietnam Competitive Generation Market (VCGM), (ii) Design Training program for the System and Market Operator in Vietnam, (iii) Development of management system technical requirements for Vietnam Competitive Generation Market and (vi) Efficiency improvement training of System and Market operators.

NPT also had a two TAs: "Integrated Control, Automation and Information System for 500 kV, 220 kV and 110 kV Substations - Bid Evaluation Methodology" and "Study on the high voltage connection between EVN and China Southern Grid - CSG". EVN proposed to continue the study as part of a boarder study on interconnection of the Greater Mekong Sub-region.

## B. Financial Analysis

Financial analysis for each component at both appraisal and completion stage used the same methodology which considers the cash flow for the operation period of 20 years. The cash flow for each year is calculated subtracting cash-out including investment cost during construction period, annual operational and maintenance cost, and power purchase cost at each voltage level, from cash-in which is solely power sales revenue at each voltage level. All the cost and revenue assume to include tax. Investment cost also includes financing cost (i.e., interest during construction).

The data used for financial analysis are; (a) investment cost including duties, taxes and interest during construction as estimated in PAD at appraisal and as reported by each implementing agency at completion; (b) operation and maintenance cost assuming at 2 percent of investment cost at appraisal and as reported by each implementing agency at completion; and (c) revenues from energy sales (after allowing for losses) at the average sales prices for each power company as estimated in PAD at appraisal and as reported by each implementing agency at completion<sup>12</sup>. Financial internal rate of return (FIRR) and NPVs at 6.5 percent discount rate are calculated for both appraisal and completion stages as follows. The financial analysis at appraisal covered 74 percent of the total project cost. The financial analyses at completion covered 89 percent of the total project cost. An estimated FIRR at completion was 25.5 percent, which was higher than the FIRR of 15 percent at appraisal. An estimated net present value (NPV) at completion was US\$ 628 million, which is higher than the NPV of 274 million at appraisal.

### *Transmission and distribution projects*

Agencies	At appraisal		At completion	
	FIRR	NPV@6.5%	FIRR	NPV@6.5%

<sup>12</sup> The electricity prices used for financial analysis at completion are followings (Units; VND/kWh); For NPPMB and CPPMB, 668.05 at the bus bar of the power station, 773.05 at 500/220kV, and 837.07 at 220/110kV. For SPPMB, 808.05 at 500/220kV, and 891.30 at 220/110kV. For NPC and HDPC, 683 (~2011) and 1,170 (2012~) at 220/110kV level, and 777 (~2011) and 1,217 (2012~) at retail level. For SPC and DNPC, 524.74 (in 2005) is gradually raised to 1,058.74 (2012 onwards) at 220/110kV level, and 775.37 (in 2005) is gradually raised to 1,312.43 (2012 onwards) at retail level. For CPC, 431.46 (in 2005) is gradually raised to 855 (2012 onwards) at 220/110kV level, and 435.97 (in 2005) is gradually raised to 1,373.40 (2012 onwards) at retail level.

		(%)	(\$ million)#	(%)	(\$ million)#
EVN	NPPMB	17.5	216	20.3	60
	CPPMB			14.8	23
	SPPMB			19.8	102
PC1 (NPC)		6.8	2	6.3	0
PC2 (SPC)		12.0	22	27.6	124
PC3 (CPC)		11.0	8.5	48.2	275
Hai Duong PC		*	*	79.0	24
Dong Nai PC		10.7	2.1	50.8	43

#: At 2001 price level

\*: No estimates available

### *Rehabilitation of Small Hydropower Projects*

Agencies	At appraisal		At completion	
	FIRR (%)	NPV@6.5% (\$ million)#	FIRR (%)	NPV@6.5% (\$ million)#
Chieng Ngan and Thac Bay (NPC)	19.6	3.8	32.7	3.7
Kon Dao and An Diem (CPC)	68.0	9.8	16.4	2.5
Ankroet (SPC)	31.8	6.8	25.5	4.3

#: At 2001 price level

Financial indicators have been generally improved since electricity price, which is one of the most influential factors for financial performance, has been substantially raised during the project period compared to the assumption set out in PAD (3.33 cent/kWh for bulk supply tariff and retail tariff). In particular the financial performance of distribution projects has been significantly improved because of the wider gap between power purchase cost and sales price. On the other hand, several factors including delay of investment, change in sub-project portfolio, and increase in construction cost caused lower NPV on several sub-projects, mainly 220kV transmission projects and hydropower rehabilitation projects.

Overall, the project was found to be financially worthwhile for each implementing agency. It should be noted that more accurate financial calculation and interpretation would be possible by addressing several challenges associated with data collection. These include, (i) precise yearly profile of disbursement for each-subproject, (ii) estimation of incremental electricity attained with project using a consistent methodology among each sub-project, (iii) estimation of inter-relationship among each sub-project (double counting of project benefit), (iv) precise yearly profile of electricity price with tax at each voltage level, and data consistency among each transmission and distribution implementing agency.

## Annex 4. Bank Lending and Implementation Support/Supervision Processes

### (a) Task Team members

Names	Title	Unit	Responsibility/ Specialty
<b>Lending</b>			
Anil Malhotra	Task Team Leader		
Rebecca Sekse	Senior Financial Analyst		
Kurt Schenk	Senior Power Engineer		
Ranjit Lamech	Senior Restructuring Specialist		
Susan Bogach	Senior Energy Economist		
Jon Exel	Renewable Energy Specialist		
Anil Cabraal	Senior Renewable Energy Specialist		
Jas Singh	Energy Efficiency Specialist		
Jack Fritz	Environmental Specialist		
Mary Judd	Senior Anthropologist		
Behdad Nowroozi	Senior Financial Management Specialist		
Mei Wang	Legal Counsel		
Hung Tien Van	Senior Operations Officer		
Anh Nguyet Pham	Operations Officer		
Thang Chien Nguyen	Procurement Specialist		
Kien Trung Tran	Procurement Analyst		
Hong Vu	Operations Officer (Resettlement)		
Phuong Thi Thanh Tran	Environmental Specialist		
Jitu Shah	Senior Environmental Specialist		
Quyen Duong Do	Disbursement Analyst		
Anh Thuy Nguyen	Program Assistant		
Hung Viet Le	Financial Management Officer		
Arun Sanghvi	Peer Reviewer		
Douglas Barnes	Peer Reviewer		
H. Ezaki	Peer reviewer (JBIC)		
<b>Supervision/ICR</b>			
Anh Nguyet Pham	Senior Energy Specialist	EASIS	
Hung Tien Van	Senior Energy Specialist	EASVS	
Franz Gerner	Lead Energy Specialist	EASVS	
Beatriz Arizu de Jablonski	Senior Energy Specialist	EASWE	
Cung Van Pham	Senior Financial Management Specialist	EASFM	
Dilip R. Limaye	Consultant	ECSEG	
Dung Kim Le	Team Assistant	EACVF	
Hoi-Chan Nguyen	Consultant	OPCIL	
Hung Tan Tran	Power Engineer	EASVS	
Kien Trung Tran	Senior Procurement Specialist	EASR2	
Ky Hong Tran	Energy Specialist	EASVS	



Lien Thi Bich Nguyen	Program Assistant	EACVF	
Mai Thi Phuong Tran	Financial Management Specialist	EASFM	
Quang Ngoc Bui	Operations Officer	EASVS	
Ramesh Sivapathasundram	Lead Information Officer	TWICT	
Richard Jeremy Spencer	Country Sector Coordinator	SASDE	
Phuong Thi Thanh Tran	Senior Environmental Specialist	EASVS	
Yen Thu Thi Cao	Consultant	EASVS	
Natsuko Toba	Senior Economist	EASWE	
Daisuke Miura	Energy Specialist	EASVS	
Hanh Thi Huu Nguyen	Financial Management Specialist	EASFM	
Nghi Quy Nguyen	Social Development Specialist	EASVS	
Son Van Nguyen	Environmental Specialist	EASVS	
Thi Ba Chu	ET Consultant	EASVS	
Peter Meier	Economic Consultant		
Dung Manh Tran	Consultant	EASFM	Financial Management
Ly Thi Dieu Vu	Consultant	LCSEN	Environment
Joel Maweni	Operations Advisor	EASSD	
Thuy Bich Nguyen	Program Assistant	SECPO	
Hiep Quan Phan	Financial Officer		
Jennifer Thomson	Senior Financial Management Specialist		
Lan Thi Thu Nguyen	Natural Resources Economist	EASVS	
Van Nguyen Thanh			
Hoi Chan Nguyen	Senior Counsel		
Hung Viet Le	Financial Management Specialist		
Teri Vellila	Program Assistant		
Philip Gray	Senior Energy Economist		
Grayson Heffner	Consultant		
Hien Minh Vu	Program Assistant	EASWE	
Teresita Ortega	Program Assistant	EASWE	

**(b) Staff Time and Cost**

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	USD Thousands (including travel and consultant costs)
<b>Lending</b>		
FY00	13.99	29,305.18
FY01	58.25	148,813.40
FY02	106.34	228,381.29
FY03	0.00	0.00
<b>Total:</b>	178.58	406,499.87
<b>Supervision/ICR (as of June 17, 2013)</b>		
FY00	0.45	517.03
FY02	0.00	40.31
FY03	26.15	98,228.38
FY04	22.34	56,320.29
FY05	25.99	50,853.48
FY06	36.00	69,404.52
FY07	21.36	71,134.71
FY08	32.00	62,070.50
FY09	29.03	85,368.06
FY10	17.06	68,501.22
FY11	17.59	56,723.67
FY12	23.84	74,225.23
FY13	33.40	94,881.87
<b>Total:</b>	285.21	788,269.27

## **Annex 5. Beneficiary Survey Results**

Not applicable

## **Annex 6. Stakeholder Workshop Report and Results**

Not applicable

## **Annex 7. Summary of Borrower's ICR and/or Comments on Draft ICR**

### **A. Summary of Borrower's ICR**

#### **1. Assessment of the operation's objective, design, implementation, and operational experience**

##### ***CPC:***

The initial design of SEIER project was not reasonable about some respects. Due to very few sub-projects (including eight subprojects of 110kV power network and rehabilitation of two hydropower plants), the capital has partly been used and the efficiency of use has not been promoted too much. Moreover, equitizing communes were not actually suitable resulting in three modifications, extension of the loan agreement. The first revision of Agreement has applied new project approach allowing the project more flexibly carried out in supplementing, changing list of sub-projects component, and facilitated the implementation units to initiate investment and construction. Afterwards, with the second revision and the savings from already implemented projects and coordination of capital among implementation agencies of EVN, the addition of list of subprojects has expanded scope of power supply, reduced power loss and promoted investment efficiency. After being revised, not only the project design was streamlined in accordance with the actual situation with the construction location where there is an urgent demand, but also CPC has enough time to perform and projects were fully completed meeting the urgent demand of power supply to areas and enhancing technical criteria of power network operation.

The aim of project was basically rational and suitable to actual requirements. Subprojects completed by CPC partially reached the objectives.

In recent years, the area load's growth has risen sharply. The development of 110 kV power network under project has enhanced transmission capacity and efficiently supplied power source from the national electricity grid, power source, significantly decreased the radius of power supply to high, medium-low voltage power network. Thus, the loss of the transmission grid has significantly been reduced, efficiently shared load of existing substations of area and reduced investment to increase source of local power generation. It also raised possibility of power supply to the poor in remote areas by (i) upgrading 110kV and medium voltage power network for rural electrification; and (ii) rehabilitating small hydropower to supply power to rural areas. Thus, the power supply to households in project areas has remarkably decreased in terms of cost, creating favorable conditions for poor households to use power from national power grid. In addition, the rehabilitation of small hydropower also enhanced to supply power to rural areas.

##### ***ERAV:***

The project objectives were highly relevant to the current national development priorities and the Bank's country assistance strategy. That is to reform the Vietnam power sector from vertically integrated model into unbundling model and introduce competitive market in power activities. ERAV has implemented a number of TA projects. Notwithstanding the high relevance, the design and implementation of the project to achieving the objectives had some shortcomings, as some activities were not implemented or delayed.

##### ***Donai PC:***

The need of improvement network and increasing reliability are still strong. Demand has continued to grow as predicted and the investment-related PDOs remain highly relevant.

The level and the timing of tariff increases were discussed during project preparation. However, EVN delayed to do this and had to bear the large amount of loss. EVN distributed it to all member PC, thus DNPC received the debt of VND253 billions due to SPC's issue. This much affects the DNPC financial performance in borrowing capital for investment.

***NPC:***

SEIER has been completed and in good operation. Project design and preparation have been done in detail. The design and implementation of the project were based on the objective of the project. So far, at the time of ICR preparation for the project, the design and implementation of the project were suitable with the target of the project. However, the objective of increasing the number of households is allowed to connect to the system does not seem to be suitable with the objective, design and implementation of projects in this component of the project. Project only invested at a voltage level of 110 kV and people cannot connect directly to the 110kV electrical grid. Besides that, the people in the project area has connected to the system that increases the number of households who connect the grid that will be more suitable target for rural energy projects or rural electrification rather than this project.

***NPT and SPC:***

The project was carried out in accordance with the Electricity Development Master Plan 2001-2010, meet the requirements of infrastructure development of power sector and energy demand growth at an average of about 15 percent per year, as well as the required power transmit from the power source to the customer (the power company).

***NPPMB:***

The need of improvement network and increasing reliability are still strong. Demand has continued to grow much as predicted and the investment-related PDOs remain highly relevant. The project substantially met its PDOs and is rated satisfactory in these dimensions:

- Improve overall system efficiency through optimization of transmission system to reduce losses and remove bottlenecks: Achievement of this objective is satisfactory. There have been gains in transmission reliability and efficiency.
- Rehabilitation of distribution network in rural economic growth centers: Achievement of this objective is satisfactory. Distribution systems have reduced losses and improved reliability.

**2. Assessment of the outcome of the operation against the agreed objectives**

***CPC:***

Subprojects are selected in emergency areas served for the power supply, scattered over many provinces of the Central Highlands region, meet more and more increased needs of load, and simultaneously are in the provincial development planning approved by specialized ministries. Thanks to reasonable design, the project met the target requirements.

Project scopes are also appropriately designed to the rational use of WB loans. Total implemented and disbursed value of WB loans is USD 34.4 million, substantially appropriated to the value of Loan Agreement. Relating to the local fund, CPC had also balanced and suitably arranged fund to perform projects with total value of VND 218 million. Project progress lasted but in general it was consistent with the actual conditions.

***ERAV:***

In general, the outcomes of ERAV's Component under SEIER project met its objectives, those are: (i) Development and completion of regulatory framework for power sector, (ii) Support for

the implementation of power market in Vietnam, (iii) Support in capacity building for ERAV's staff.

***Donai PC:***

The project substantially met its PDOs and is rated satisfactory in these dimensions:

- Improve overall system efficiency through optimization of transmission system to reduce losses and remove bottlenecks: Achievement of this objective is satisfactory. There have been gains in transmission reliability and efficiency and loss has been sharply reduced from 7.03 percent in 2002 to 2.9 percent in 2011.
- Rehabilitation of distribution network in rural economic growth centers: Achievement of this objective is satisfactory. Distribution systems have reduced losses and improved reliability.
- Enhance rural access to electricity by upgrading 110kV subtransmission and MV distribution lines for rural electrification: Achievement of this objective is satisfactory. The amount of rural households having electricity access is up to 99 percent now in Dong Nai province.

***NPC:***

Component of the project has contributed to the achievement of development objective of the project. Actual implementation cost of the project components was reduced more than the appraised cost. However, the progress of project completion was very long due to changes in the macro-economic situation, some of the project's works had to be implemented again (for example, material and equipment prices are highly increased so project cost should be determined again or bidding again). Output result of the project components have met the main objective of the project is to improve the implement performance of electrical energy systems that contributes to economic and social growth in project area. However, the objective on electricity supply for rural areas and increase the access ability for electrical grid for people was not achieved. In general, the project components have gained the relatively good outcome result, it helps the electricity system operate more efficiently to create high-voltage capacity network that is ready to make pre-condition for electricity distribution projects in medium-voltage and lower - voltage or electricity programs, rural energy in coming time.

***NPT:***

The project meets its PDOs and is rated satisfactory in the following aspects:

- Meet the growing load demand and transmission capacity: Power transmission 220/500kV grid increased from 65.4 billion kWh in 2008 to 104.3 billion kWh in 2012.
- Loss of Power transmission 220/500kV grid decreased from 3.48 percent in 2006 to 2.33 percent in 2012.

***SPC:***

The project meets its PDOs and is rated satisfactory in the following aspects:

- To meet the growing load demand: electricity production of SPC increased from 7,839 million kWh (2002) to 36,290 million kWh (2012) (including Dong Nai PC).
- To reduce power losses in the network: power loss is reduced significantly from 10.37 percent (2002) down to 5.64 percent (2012) (including Dong Nai PC).
- To meet the objective of rural electrification in the South of Vietnam: from 2002 to 2012, household using electricity is increased twice from 3,412 thousand of households to 6,863 thousand of households (including Dong Nai PC).

**3. Evaluation of the borrower's own performance during the preparation and implementation of the operation, with special emphasis on lessons learned that may be helpful in the future**

### ***CPC:***

The CPC complied with policies and committed to the Bank without situations contrary to regulations. CPC implemented subprojects sufficiently, following the order and steps in course of investment and construction. CPC designed and used capital loan reasonably, arranging counterpart funding sufficiently and timely to complete projects. The whole completed project which was in use reached high efficiency and met proposed objectives. The exploitation and usage of project was safe, efficient and sustainable.

The course of project implementation gained good result in general. Nevertheless, some subprojects experienced shortcoming such as poor implementation progress, unsynchronized steps in implementing subprojects, slow compensation and resettlement, multiple designs, slow equipment and materials supplies which are unsynchronized with construction and so on. From these, some experiences which are learnt from subproject implementation management are as follows:

- Prepare investment procedures early before signing loan agreement in order to shorten project implementation time since this step takes a long time.
- Establish and manage the overall project implementation progress, focusing on areas affecting project progress such as forming and approving investment project, compensation and resettlement, procurement and supply of equipment and materials, starting and conducting the construction.
- Focus on establishment of investment project, reaching the agreement of construction location, improving basic design quality and organizing the compensation and resettlement in timely manner so that the construction can start on time.
- Approach local authorities early before starting the project, providing information on efficiency that the project brings to the local communities and project requirements that need help from authorities, making use of the local support during project implementation process. In case which the authorities do not meet project's requirements, suitable adjustments need to be considered.
- Coordinate with local government closely to organize compensation and resettlement, people mobilization, solve problems immediately to assure construction conditions.
- The procurement of equipment and materials must be held soon after investment project is approved, shortening bidding time, strengthening the management of suppliers' contracts, ensuring required quality and quantity so that equipment supply are synchronized with construction progress, avoiding situation that contractors waiting for equipment to install. Enhancing and rationalizing the course of management, preservation and equipment allocation.
- The work of design and appraisal need to be checked and managed seriously to limit errors and trouble in construction process.
- Specialize the project management by processes and regulations so that the implementation is put into order.
- Organize the bidding to select qualified contractors, reasonable prices and compliance with regulations.
- Organize the collection and payment immediately for contractor to create favorable conditions in carrying out project completely, avoiding situation where contractor's ability is weakened due to slow payment or unsolved problems from investors.
- Apply flexibly the WB capital disbursement and payment methods depending on scale, weight and actual conditions such as: advance account, special commitment, direct payment and payback payment.



- Enhance the management of technique so the project implementation and operation is safe, flexible and efficient.

#### ***ERAV:***

The Government cooperated closely with the Bank during the project preparation. It provided support throughout the project implementation, particularly in project modifications. MoIT demonstrated a strong support to ERAV and project as well to achieve the project development objectives. MoIT worked closely with the Bank during project preparation. It showed a high degree of ownership and made effort to get results. ERAV's Component were successfully implemented and the basically, project's targets were met. Nonetheless, ERAV's commitment was failed in implementing 2 TAs and did not take advantages all the training targets. After five years implemented the project, ERAV has gained many experiences not only in the way of project management but also the actual experience in aspects of management of electricity. The key lesson as follow:

The lesson from project management

- Deep understanding in all procedures of selection and employment consultant, the procurement of goods, works and non consulting service.
- High knowledge in disbursement procedures, financial management, reporting (e.g., financial management reports, procurement plan reports, progress reports, etc.), contract management.
- Big lessons for managers of project in internal control, supervision of all the activities of project, effective coordination between consultant, beneficiary (ERAV) and the World Bank.
- The lesson learned from activities of project.
- A clear road map, with objective to meet the pressing needs in monitoring and evaluation of all framework in electricity aspects. It also will drive the next stage of the road map in developing the VCGM and completing some legal frameworks in electricity aspects which will be regulated by Viet Nam government in the next stage.
- ERAV staff's capacity built to access and decide technical options and project planning and implementation the TAs.

#### ***Donai PC:***

The Government cooperated closely with the Bank during the preparation especially highly supported DNPC in drawing from special account. Due to restructuring, DNPC belonged to SPC and could not draw capital. After the necessary procedures, MoF and DNPC signed two additional agreements enough for DNPC disbursing two last subprojects. Strong commitment and action enabled the subprojects to be completed. From the technical standpoint, the subprojects have been well implemented, with thorough consultation, proper preparation and implementation of engineering, environment, resettlement plans and good fiduciary control.

Lessons learned are following:

- Well-qualified project design consultant unit is very important because that will lead to optimal technical design projects and reduce many difficulties during implementation.
- Project supervision should be done closely, regularly and reported clearly so the problems could be solved properly.
- Being careful in choosing contractors with full ability of financing plays an important role in project completion in right progress especially in this crisis period.

#### ***NPC:***

All loan conditions have been fulfilled, the Government has made timely guidance when problems arose during project implementation. The Government arranged the budget to disburse for the project. Although the project was not completed under the first schedule, the execution

units worked closely together, jointly solving problems during project implementation. Because the affected people did not fully understand the project's compensation policy, land acquisition work was slow. It is possible to see that the project has been completed and is operating well, which indicates good results of the project implementation units.

Lessons learned are the following.

- Shortening the implementation time: Right from the project preparation stage, it is possible to carry out the procurement of supplies and equipment after FS is approved. At the same time organizing at the site clearance. Thus, after the detailed design is approved, the site, equipment and supplies preparation is ready which will shorten the duration of the project.
- The coordination between the authorities involved in the project implementation needs to be strengthened further. There should be clearly assigned responsibilities for subordinate agencies (local authorities at district level and below), in cooperation with the execution contractors, project management units for co-implementation.
- The role of community supervision: The role of community supervision is generally not clear for 110kV power projects. If the rural electrification projects promote this role well, the 110 kV project have not been developed yet. Community supervision will help resolve issues faster.
- Flexibility: The project had a large numbers of sub-components, to be implemented in difficult areas during a long period of time. Flexibility is essential, both in term of physical scope and approval, to allow for fast adjustment to unexpected conditions (and in this case cost savings) that may arise in implementation and increase the benefit of the project.

***NPT, SPC and NPPMB:***

The Government and EVN cooperated closely with World Bank during implementation of the project. NPT tried the best to complete all of subprojects, supported by consultants in investigation, engineering and Environmental Impact Assessment, Environmental Management Plan, and Resettlement Plan. Some projects had been delayed due to the followings reasons: the compensation cost did not match, resulted in the late compensation and no site clearance, the financial capacity of contractor was very low during the global financial crisis such that some contractors could not implement the project on time and rebid was required, due to the NPT's difficult financial situation, the counterpart funding could not meet the progress of the project. In general, EVN tried to obtain the good results during implementing the project.

**The lessons from project design are following.**

**a. Bidding**

- Preparation of Bidding Plan.
- Separating procurement of materials and equipment into bidding packages is a very important content in planning for the project. It will facilitate the manufacturer directly supply of goods to meet the requirements at the most reasonable prices. The arrangement of varying materials, and equipment into lots to have multiple bidders also increase the competitiveness and efficiency of bidding.
- Bidding Document
- The difficult problems in the bidding process and implementing the contract need to be analyzed, and learn from experience for bidding documents updated accordingly. The specification requirements in the bidding documents are particularly important for the process of evaluation and selection of contractors, affecting the planning and implementation of the project.
- Bidding Evaluation

- Bidding evaluation based on the specification requirements of the bidding documents for the selection of contractors should be made clear and transparent. The evaluation of bids should be completed within the valid period of the bidding documents, avoid to extend the validity of bids. The security of information in the bid evaluation process is important as it can cause complex problems affecting the progress of procurement of materials and equipment for the project.

## **b. Construction Process**

- Compensation and site clearance

For 220 kV and 110kV transmission line, the compensation and site clearance must be implemented in parallel with the construction and installation, because the compensation and site clearance takes a lot of time. In stage of inventory of assets affected, the PPMBs should coordinate with the local government to mobilize households to agree handing over their land for construction before they were paid for site clearance and compensation. This solution is very effective in speeding up construction and is applied during the construction of 220 kV transmission line. In fact, difficulties in compensation happened with 10% of households in total affected households, the majority of households agreed handing over their land for construction prior to receive payment of compensation.

- Materials and Equipment

We need to test and assembly accessories before erection at site for transmission line subprojects, as well as commissioning materials and equipment prior to installing in substations to ensure compliance with the specification requirements of the contracts to avoid processing defects at site causing slow progress of subprojects.

## **c. Financial matters**

During the implementation of the project, in year 2008 due to the high inflation, the financial fluctuation, the signed contracts changed from fixed price contract to adjustable price contract. At present, most of the contracts have been signed in the form of adjustable price.

## ***MOIT-RARE***

### *Problem 1: Project Management is weak*

The three mini-hydro projects visited by the mission in the end of year 2010 did not display a complete project in each case, and there were different problems in each project, ranging from incomplete work, poor contractor performance and poor maintenance. All of the above are related to (i) lack of strong and clear ownership, (ii) absence of the sense of responsibility, care and experience in project management as well as for operation, and (iii) reported delays in payments to consultants, contractors, operation and management (O&M) company, all of which cause the final product to be poorly completed or to be incomplete. All three projects visited in the end of year 2010 displayed negligible community ownership or participation in the project activities and care for the project. The remote location of the projects, implemented by contractors from Hanoi or outside the province, the two day travel requirement each way and extremely poor road conditions, and impacts of weather on travel, material transport and on-site work, are all contributory factors to poor and delayed performance of contractors and consultants.

### *Lessons Learned*

Placement of the project management responsibility on the District Peoples' Committee (DPC), a Government institution, which has only limited administrative capabilities and no technical capability, should have been avoided. Even a small hydropower plant requires technical and project management knowledge, to supervise and manage the contractors, especially in remote

locations. A different structure, in which MoIT would directly hire a contractor with proven in-house project management and technical capability, and the resources may have performed the tasks to yield a quality output, but at a higher cost. Competitive bidding and selection of perhaps the lowest bid, is likely to have caused the selection of a contractor with limited resources, with consequent delays in work, and this causes lack of enthusiasm to complete the work.

*Problem 2: Community ownership is absent*

The detailed plan prepared in the RARE Organization and Operation Manual for the program to help organize the community into a cooperative and involve at each stage of the project planning, construction, and finally, in the O&M of the project, has not been implemented. Reasons sighted were (i) lack of financial capacity of the communes to provide even a small portion of the capital, and for subsequent O&M, and (ii) lack of interest owing to fast expansion of the national grid, and communes expect the grid to reach them any moment. As such, community participation and ownership of the projects does not exist. The community expects DPC and PMB to assume full responsibility.

*Lessons Learned*

It is difficult to conclude whether the community participation to the scale that was originally expected in the RARE operations manual, would have yielded better results causing the community to display a sense of ownership of the project. “What happens when the grid arrives” would be upper-most in their minds, if they are required to commit some funds even for a small portion of the investment. The power plant at Na Hu rehabilitated by in the RARE program is an example. Since the project was implemented, the grid has arrived, and a 35 kV line has been drawn right overhead of the 27 kW power plant. There is no reason why the commune should remain dependent on the mini hydro and its uncertain lower quality supply, when the grid is available. Sooner or later, the DPC would spend for a transformer substation to tap the 35 kV line, and connect the commune distribution system to the grid, and the Na Hu power plant will be abandoned, and the funds and the effort would have been wasted.

*Problem 3: Reducing demand for min-grids, off-grid services*

The demand for mini-grid projects is on the decline with the rapid expansion of the national grid. This situation is to be expected and common across all the developing countries, and the issues of “waiting for the grid to arrive” is not limited to Vietnam. At the outset, the project expected the 20 mini-hydro based projects implemented under RARE program over 2002-2006, would build national capacity in project management and development, to enable the program to scale-up 10 times, to build 200 mini-grids in a possible follow-up program.

*Lessons learned*

MoIT as the implementation agency appears to have been unaware of the upcoming rapid grid extensions over the period 2002-2005, which reduced the demand for off-grid or mini-grid services. The multitude of funding sources and the higher degree of autonomy to the Provinces and to the power companies may have partly caused the inability of MoIT to monitor the demand for off-grid services and make early corrections to the RARE program, particularly before and during the Screening Study (2004). The corrections were made in 2006.

**4. Evaluation of the performance of the Bank, during the preparation and implementation of the operation, including the effectiveness of their relationships, with special emphasis on lessons learned**

***CPC:***

Effective Bank performance created convenient conditions for the CPC to implement, produce high quality outputs and finish the project. The Bank timely responded to the proposal of the CPC, such as the extension of project closing date and application of the new approach to implement the project flexibly and change items of project, which enabled to have suitable time to design and implement the project with best effect. The Bank allowed using the cost saving or reallocating fund between subsidiaries of EVN, which helped the CPC to adjust or add more projects. The Bank timely disbursed fund for suppliers. The Bank's procurement policy in bidding and implementing contracts was effectively limited risks to the CPC.

Supervision of the Bank has been carried out fully to ensure coherence and quality to use the fund effectively and meet the planned purposes, such as procurement, contract implementation, resettlement compensation, environment and ethnic minority development plan. The Bank gave advices and helpful experiences for the CPC to develop expertise and fix their limitation to carry out the work better.

***ERAV:***

Preparation and appraisal were sufficiently prepared for ERAV's component. Moreover, basic project design, monitoring, evaluation, and project benefits analysis were sound.

One of the noteworthy aspects and key factors of success in project implementation was Bank's support to project.

- Strong support from the Bank such as advice in managing project and quality of TAs, and detailed guidance on capacity building. Problems were identified early and quick responses provided.
- Tight supervision by the Bank. It helped the project to avoid all risks in the implementation progress.
- Annual training by the Bank on disbursement procedures, contract management, procurement, financial management guideline efficiently and other meetings. It helped ERAV continuously updated all policies of project management.
- International experience incorporated in project supervision. The Bank was focused on development impact and played an effective role in addressing implementation problems as they arose to accelerate the project implementation.

***Donai PC:***

The project responded to meet PDOs and was in line with the Bank's strategy for power sector. All key lessons learned from previous project were considered in PAD and during the implementation such as flexibility in all aspects of project design and implementation, good load forecasting, quick and smooth start of the project. The schedules of the Bank monitoring, review and reporting were rational. Progress reports were submitted quarterly, 10 days after the end of each calendar quarterly; annual integrated reports on December 31 each year. Moreover, The Bank had field trips annually, assessed the implementing progress as well as noted the issues raised by the implementing agency and suggested appropriate solutions afterwards.

***NPC:***

WB has done a good job. The project has been completed and met the origin objectives. In project preparation stage, the Bank's expert team worked together with EVN to prepare the document for the project, building the policy framework, creating the model of financial and economic analysis, manual for project implementation, providing the detailed tasks for agencies in charge of the project, and giving the standard form. WB and EVN organized workshops on the project, disseminating the requirements of the project, specific tasks of the project implementation agencies. WB supported timely and advised the project implementation agencies

to achieve the objectives. WB was ready to disburse funding for the project. The Bank has inspected the project through the establishment of the plan and periodic discussions with the project implementation units, receiving the periodic reports of those units and field testing. The Bank team supervised timely potential problems.

***NPT and SPC:***

The Bank responded to objectives of World Bank and the Government's Plan period 2001 – 2010 for investment in basic infrastructure of power sector and has done well the role of the lender. The investment project was well prepared. World Bank supported demand of finance for NPT to strengthen and development transmission power network, to improve the voltage quality for the areas far from substations and transmission lines. But during implementation of the project, sometimes the Bank was slow to answer to the difficulties of the SPC.

**5. Description of the proposed arrangements for future operation of the project**

***CPC:***

After each sub-projects are put into operation, CPC issued operational and technical regulations to manage the operation safely and effectively. CPC assigns subordinate units to manage and operate project. Since then, CPC continued to invest and develop medium and low voltage grid to supply power, scaling up the 110kV subprojects and promote socioeconomic development in the load centers. Hydropower plants were put into operation, partially generated power to the national power grid and partially provided power to the medium and low voltage grid of area, promoting high performance. Financial and economic policy was applied to assure reasonable operation and maintenance of the subprojects.

***ERAV:***

ERAV has been still finding funds to support ERAV to develop more legal documents, regulations on electricity sector and develop continuously the VCGM, particular focus on the following tasks: (i) Develop regulations on smart grids, demand response to improve the efficiency of the power operation system, of monitoring and evaluating the implementation all issued technical regulations; (ii) Develop regulations on electricity prices, complete convert electricity prices to market mechanisms to encourage efficient electricity using; (iii) develop the VWCM in the formation and development plan of the electricity market in Vietnam; and (iv) Continue capacity building and deeply training for ERAV's staffs.

Since February 2013, ERAV has implemented Distribution Efficiency Project funded by WB under the Australian Agency for International Development (AusAID) to support ERAV on the tasks (i), (ii) and a part of task (iv) as mentioned above. At present, ERAV is seeking fund to design and build the VWCM and related regulations to VWCM, capacity building ERAV' staffs to meet the requirements on management and monitoring on VWCM.

***NPC:***

After the project implementation, it has been handed over to the operation management unit of electrical grid at 110 kV level, Northern Grid Company (NGC). NGC was established in 2010 under the NPC with the main functions to manage, operate, repair 110kV electrical grid system in whole Northern area. As soon as the sub-project completion, Project Management Unit of NPC (NPMU) handed over asset, technical document and operation documents for the NGC. NGC within strong personnel organization and management network in all provinces and locality in whole Northern area receives, operates project.

After project completion and during operation, it was visible that the objectives of the project of upgrading the system effectively by optimizing the system to reduce losses, increase electrical energy quality, reducing incidents on the grid, reducing overload of transformers, and increase reliability on electrical energy supply. The project gave a significant benefit to the power sector. Besides that, it contributed to the overall development of whole society. The project's contribution to development index in rural area, electricity and other economic sectors are still continued and evaluated. SEIER has helped Vietnam achieve the macro-economic social development target for 2000-2010, and stabilize the economy after the economic crisis in 2008. Under economic development plan for 2010-2020 and electrical energy development plan, a lot of electrical energy projects will have to be done. The continuation of the further assistance of the Bank will be the key factor to help Vietnam fulfill the socio-economic objectives under the plans.

***NPT:***

Provincial Transmission Companies (PTCs) are responsible for operation substations and transmission lines under SEIER which handed over from PPMBs. PTCs will send periodically a report of indicators for monitoring system performance covering faults, losses and power flows. These indicators are maintained for operating stabilization and reliability in whole of Vietnam Transmission grid.

***SPC:***

Southern Power Projects Management Unit (PPMU) was responsible for construction bidding, bidding assessment, supervision at site, and commissioning of completed subproject. Southern Grid Company is responsible for operation substations and transmission lines which handed over from SPPMU. SPC will send periodically a report of indicators for monitoring system performance covering faults, losses and power flows. These indicators are maintained for operating stabilization and reliability not only of Southern grid system in particular but also whole of Vietnam grid.

***MOIT – RARE:***

District Operation and Maintenance Entity (DOME) was established to operate the small hydropower stations under RARE program, namely Muong Te Hydropower Company and started operated December 2010. Although the cash-flows is starting up, there is no accounting system in place for management of revenues and expenses, the company director is responsible for all related financial and technical management without accountant/cashier. The constraints of DOME for recruitment of additional staff working within Muong Te office is low revenue which hardly covers operation cost as well as remuneration expense for technical and accountant/cashier as proposed in business plan. Very limited revenue could not also facilitate the company to hire a part-time technical specialist for investigation, maintenance and repairing of completed facilities during operation phase. Grid connection of Nam Si Luong (NSL) small hydropower plant (SHP), which currently still operated off-grid, would help to improve the revenue by selling surplus electricity to the national grid.

Technical capacity of operating team is major issue to long term sustainability of the project. Although operators have been trained by contracted suppliers and consultant hired by MoIT, site evidences show that there are no compliances with operation procedures and no maintenance. Operators are recruited from subproject communes with low education would hardly absorb all technical knowledge provided by training courses which may lead to incompetent operators for proper operation of facilities. The handing over of completed plants to DOME should spell out roles and responsibilities of the company, the ownership and obligation of maintenance. Additional training for operators in O&M should be provided and more staff should be recruited

for DOME Office in case NSL re-operation. Accounting system should be strengthened to ensure transparency and accountability to all stakeholders.

To assure survival and sustainability of the program, number of issues should be addressed including the following:

- Additional investment: (i) worker houses in Mu Ca, Thu Lum, Na Hu; (ii) two motor driven operating machines for upper sand gates at Nam Si Luong dam; (iii) A meter 220V-5A for about 170 households in Ban Giang Station; and (iv) an operating bridge for Pa U SHP, total investment cost for those additional works is estimated by 3,745 million VND. The provincial government should allocate provincial budget to finance this additional investment.
- Capacity building for DOME: Capacity of operators of all small hydropower plants have been weak, improper operating may damage the facilities, shorten equipment life, and increasing life cycle cost. The training and qualifications of operators and personnel, and the subsequent retention of that personal are crucial. Their salaries paid should be competitive. Although two rounds of training provided during project implementation, additional O&M training for operator is suggested. When all assets created by the program handing over to DOME and the revenue start from NSL connected SHP, there should be additional staff for accountant/cashier, financial and technical manage to make sure operation, routine maintenance, and accountability to all technical and financial management.
- Working capital and robustness of cash flows: at present, there is no working capital arranged for the company. The project should find the way for the company's working capital which is recommended to meet at least 180 days (six months) to cover the various contingencies associated with start-up operations due to higher level of uncertainty in revenue collection. Many off-grid SHPs serve some of the poorest households of the community, whose ability to pay for electricity may be very limited. Overoptimistic assumptions about revenue collection, inadequate working capital, unrealistic assumptions about the cost and stocks of spare parts are ever-present hazard
- Spare Parts Purchase: Although number of spare parts is included in the supply contracts, it is foreseen that those spare parts would be consumed rapidly owing to often improper operation. It is suggested that Muong Te DPC to arrange sufficient spare parts inventory to avoid generation delay, by using PPC budget.
- Grid Connection and Acceptance of NSL: The NSL is very important to the survival of the program, thus Muong Te DPC should install the connecting equipments and re-start the plant as soon as possible. The revenue from this SHP shall improve the cash flows and may reduce the working capital needs. To avoid further damage and risks, Muong Te DPC should be careful in selection of consultant undertaking all necessary testing, verification and commissioning in accordance with standards and procedures. The DOME should arrange protection measures for facilities at dam site as well as provide safeguards from any accident that may occur.
- Amendment of Power Purchase Agreement for NSL: NPC has agreed in amendment of PPA for NSL to enable the plant for benefits of avoided cost tariff (ACT) with higher tariff, but DOME should obtain the license for generating and power business from Department of Industry and Trade, which may expose the difficulty for DOME at the time being as lack of technical engineer team within the company.



## **B. Borrower's Comments on Draft ICR**

The Borrower raised the following:

- Data related to financial and economic analysis. The figures were not consistent with what CPC provided and were much lower than their calculation.

Bank's response: The reasons of different figures were because the Bank has corrected the economic and financial analyses provided by the implementing agencies. During the ICR preparation, the Bank team repeatedly provided guidance on how to conduct economic analyses and asked clarification of the data and methodology of the economic analyses provided by the implementing agencies.

- Lessons learned are not sufficient or very few. Assessments also are not very specific or do not focus on major issues that readers would remember about the project outcomes or results.

Bank's response: Lessons learned and assessments were increased and strengthened in the revised ICR.

- If ICR is to list all things related to the project, then it is not enough or incomplete.

Bank's response: ICR is not intended to list all issues related to the Project and also has a limitation on the page length in the main text, and already exceeds the requirements.

## **Annex 8. Comments of Cofinanciers and Other Partners/Stakeholder**

Not applicable

## **Annex 9. List of Supporting Documents**

All documents filed in IRIS, WBDocs and Project Portal, such as aide memoires, reports, email correspondences, etc.

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