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Report No: PAD586

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT
IN THE AMOUNT OF SDR 92.6 MILLION
(US$ 140 MILLION EQUIVALENT)

TO THE

REPUBLIC OF THE UNION OF MYANMAR

FOR AN

ELECTRIC POWER PROJECT

August 29, 2013

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

CURRENCY EQUIVALENTS

(Exchange Rate Effective July 31, 2013)

Currency Unit	=	Myanmar Kyat (MMK)
969 MMK	=	US$ 1
US$ 0.6649	=	SDR 1

FISCAL YEAR
April 1 – March 31

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
Bcf	Billion cubic feet
BCS	Broad Community Support
CCGT	Combined Cycle Gas Turbine
CO2	Carbon Dioxide
DA	Designated Account
dB(A)	A-weighted decibel
DEP	Department of Electric Power
DFID	British Department for International Development
E&S	Environmental and Social
EC	European Commission
EHS-MS	Environment, Health and Safety Management System
EIRR	Economic Internal Rate of Return
EM	Ethnic Minority
ESMP	Environment and Social Management Plan
ENS	Energy not served
ESA	Environment and Social Assessment
ESE	Electricity Supply Enterprise
ESIA	Environmental and Social Impact Assessment
EU	European Union
FPIC	Free, prior and informed consultation
FM	Financial Management
FY	Fiscal Year
GDP	Gross Domestic Product
GoM	Government of Myanmar
GT	Gas Turbine
GWh	Gigawatt hour
HPGE	Hydropower Generation Enterprise
HRSG	Heat Recovery Steam Generator
HSM	Health and Safety Measures
kWh	Kilowatt hour
LPG	Liquefied Petroleum Gas
MECF	Ministry of Environmental Conservation and Forestry
MEPE	Myanmar Electricity Power Enterprise
MIGA	Multilateral Investment Guarantee Agency
MMBtu	Million British Thermal Unit
mmcfd	Million cubic feet per day
MMK	Myanmar Kyat
MOE	Ministry of Energy
MOEP	Ministry of Electric Power
MOF	Ministry of Finance
MOGE	Myanmar Oil and Gas Enterprise
MONPED	Ministry of National Planning and Economic Development
MS	Management System
MW	Megawatt
NEMC	National Energy Management Committee
NO_x	Nitrogen Oxides
NPV	Net present value
ORAF	Operational Risk Assessment Framework
PDO	Project Development Objective
$PM_{2.5}$	Particles smaller than 2.5 micrometers
PM_{10}	Particles smaller than 10 micrometers
PPP	Public-Private Partnership
QMS	Quality Management System
SEFA	Sustainable Energy for All
SOE	State-Owned Enterprises
T&D	Transmission and Distribution
TA	Technical Assistance
Tcf	Trillion cubic feet
gCO_2eq	gram of CO_2 equivalent

IBRD	International Bank for Reconstruction and Development	TWh	Terawatt hour
ICB	International Competitive Bidding	US$	United States Dollar
IDA	International Development Association	US¢	US dollar cent
IFC	International Finance Corporation	USAID	United States Agency for International Development
IFR	Interim Financial Statement	US-EPA	US Environmental Protection Agency
IPP	Independent Power Producer/ Indigenous People's Plan	WBG	World Bank Group
ISN	Interim Strategy Note	WTP	Willingness to pay
JICA	Japan International Cooperation Agency	YESB	Yangon Electricity Supply Board
km	Kilometer		
kV	Kilovolt		

Regional Vice President:	Axel van Trotsenburg
Country Director:	Constantine Chikosi (acting)
Sector Director:	John A. Roome
Sector Manager:	Julia M. Fraser
Task Team Leader:	Dejan R. Ostojic

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EASTS

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Basic Information			
Project ID	Lending Instrument	EA Category	Team Leader
P143988	Investment Project Financing	B - Partial Assessment	Dejan R. Ostojic
Project Implementation Start Date		Project Implementation End Date	
01-Nov-2013		31-Oct-2017	
Expected Effectiveness Date		Expected Closing Date	
31-Jan-2014		30-Apr-2018	
Joint IFC			
No			
Sector Manager	Sector Director	Country Director	Regional Vice President
Julia M. Fraser	John A. Roome	Constantine Chikosi (acting)	Axel van Trotsenburg

Borrower: Republic of the Union of Myanmar			
Responsible Agency: Ministry of Electric Power			
Contact:	Aung Than Oo	Title:	Deputy Minister
Telephone No.:	95-67-410-206	Email:	moepdmin@mepe.gov.mm
Responsible Agency: Myanmar Electric Power Enterprise			
Contact:	Mr. Htein Lwin	Title:	Managing Director
Telephone No.:	95-67-410-202	Email:	mepemd@gmail.com

Project Financing Data (in USD Million)							
[ ]	Loan	[ ]	Grant	[ ]	Other		
[X]	Credit	[ ]	Guarantee				
Total Project Cost:				140.00	Total Bank Financing:		140.00

Total Cofinancing:		Financing Gap:	0.00

Financing Source	**Amount**
BORROWER/RECIPIENT	0.00
International Development Association (IDA)	140.00
Total	140.00

Expected Disbursements (in USD Million)

Fiscal Year	2014	2015	2016	2017				
Annual	20.00	50.00	40.00	30.00				
Cumulative	20.00	70.00	110.00	140.00				

Institutional Data

Sector Board

Energy and Mining

Sectors / Climate Change

Sector (Maximum 5 and total % must equal 100)

Major Sector	Sector	%	Adaptation Co-benefits %	Mitigation Co-benefits %
Energy and mining	Thermal Power Generation	100		
Total		100		

☐ I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this project.

Themes

Theme (Maximum 5 and total % must equal 100)

Major theme	Theme	%
Rural development	Rural services and infrastructure	100
Total		100

Project Development Objective(s)

Proposed Development Objective(s)

The project development objective is to increase capacity and efficiency of gas-fired power generation and strengthen the institutional capacity of the Ministry of Electric Power and the Myanmar Electric Power Enterprise.

Components	
Component Name	**Cost (USD Millions)**
Component 1: Combined Cycle Gas Turbine (CCGT) power plant	130.00
Component 2: Technical assistance and advisory services	10.00

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

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

Legal Covenants

Name:	Recurrent	Due Date	Frequency
Implementation Arrangements	**X**		

Description of Covenant

Provisions requiring the maintenance of MEPE with functions, composition and resources satisfactory to the Association.

Name:	Recurrent	Due Date	Frequency
Environmental and Social Safeguards	**X**		

Description of Covenant

Activities under the Project are carried out in accordance with the Environmental and Social Assessment and the Environmental and Social Management Plan. Prior and informed consultations with affected Indigenous People are carried out during Project implementation.

Name	Recurrent	Due Date	Frequency
Environmental, Health and Safety Management System and Grievance Redressal Mechanism	X	6 months after Effectiveness	

Description of Covenant

Development and maintenance of: (i) an environment, health and safety management system for the existing and the new facilities at the Thaton plant, including health and safety measures and guidelines; and (ii) a grievance redressal mechanism for Indigenous Peoples in the Project area.

Name	Recurrent	Due Date	Frequency
Mid-term review		March 31, 2016	

Description of Covenant

Carrying out a mid-term review of progress of Project implementation.

Name	Recurrent	Due Date	Frequency
Financial Viability of MEPE	X	March 31, 2015	Annual

Description of Covenant

Preparation of an action plan for the financial viability of MEPE and preparation of annual progress reports on the implementation and update of such plan.

Team Composition

Bank Staff

Name	Title	Specialization	Unit
Dejan R. Ostojic	Sector Leader	Team Lead and power sector development	EASWE
Rome Chavapricha	Senior Infrastructure Specialist	Financial and economic analysis	MNSEG
Knut Opsal	Senior Social Scientist	Social development and safeguards	EASER
Frank Van Woerden	Senior Environmental Engineer	Environmental management and safeguards	EASER
Sheila Braka Musiime	Chief Counsel	Legal	LEGES
Aristeidis Panou	Associate Counsel	Legal	LEGES
Zhentu Liu	Senior Procurement Specialist	Procurement	EASR2

Sirirat Sirijaratwong	Procurement Specialist	Procurement	EASR2
Christopher Robert Fabling	Senior Financial Management Specialist	Financial Management	EASFM
Miguel Santiago Oliveira	Senior Finance Officer	Disbursement	CTRLN
Theingi Min	Operations Analyst	Operations Analyst	EACMM
Cristina Hernandez	Program Assistant	Program Assistant	EASWE
Hien Minh Vu	Program Assistant	Program Assistant	EASWE

Non Bank Staff			
Name	**Title**	**Office Phone**	**City**
Alfredo Baño Leal	Consultant		Kuala Lumpur

Locations

Country	**First Administrative Division**	**Location**	**Planned**	**Actual**	**Comments**

I. STRATEGIC CONTEXT

1. This first IDA operation after Bank re-engagement in Myanmar aims to help alleviate acute electricity shortages by quickly delivering results through the expansion of generating capacity, increasing efficiency and reducing emissions at the existing gas turbine stations. The longer-term challenges are addressed through technical assistance component, which will build capacity for the nation-wide electrification program, improvement of financial viability and strengthening environmental sustainability in the power sector. The project is a cornerstone of the joint WBG engagement in the energy sector. The sector is one of key drivers of economic growth and poverty reduction in Myanmar, but also a source of public frustration due to lack of access and poor supply in the domestic market. The joint WBG program includes future support for rural electrification, private sector investments in generation and distribution, hydropower and gas subsectors. Together these sequenced interventions support the WBG twin goals of reducing extreme poverty and increasing shared prosperity in an environmentally and socially sustainable manner.

A. Country Context

2. Myanmar is the largest country in mainland Southeast Asia with a land area of about 654,000 square km. It is located between China, India, and Thailand, with more than 2,800 miles of coastline. This geographic advantage, and the country's endowed natural resources leaves it well positioned to resume its traditional role as a regional trading hub and key supplier of minerals, natural gas and electric power. However, Myanmar is also one of the poorest countries in East Asia, with an estimated GDP per capita of US$900 and a poverty headcount of 26 percent among its population of around 64 million.

3. Since 2011, leaving behind decades of isolation, fragility, and conflict, a reformist government has ushered in unprecedented political and economic reforms to open Myanmar to the global economy, boost growth, and reduce poverty. Thus, Myanmar is embarking on a triple transition: from an authoritarian military system to democratic governance; from a centrally directed economy to market oriented reforms; and from 60 years of conflict to peace in the border areas.

4. The government has set economic reform as a key priority and announced a series of reforms to remove economic distortions, such as floating their currency, new fiscal regulations to rationalize personal income tax and reduce consumption tax, reforms aimed at developing the private sector and stimulating direct foreign investments, a review of the financial sector, promotion of access to finance, and creation of an environment conducive to job creation.

5. The economic outlook is bright, with growth accelerating to 6.5 percent in 2012/13, driven by gas production, construction and services. However, to translate favorable endowments into high, sustained and inclusive growth, institutions and policies to manage the economy need to be built rapidly. Also, the government recognizes that expanding the quantity and quality of basic infrastructure and improving access to modern energy in an efficient and sustainable manner is crucial to both economic growth and poverty reduction.

B. Sectoral and Institutional Context

6. Myanmar has one of the lowest rates of electrification in Southeast Asia with only 29 percent of households having access to electricity, and its electricity consumption per capita is among the lowest in the world with about 160 kWh per annum – twenty times less than the world average. Rural areas remain mostly unelectrified, with only 16 percent of rural households with access to grid-based electricity. Also, access to modern fuels for cooking, such as Liquefied Petroleum Gas (LPG), is limited to urban areas where only one third of population lives. Consequently, traditional biomass (fuelwood and animal dung) is widely utilized and accounts for about two-thirds of Myanmar's primary energy consumption.

Primary energy resources

7. Myanmar has abundant hydropower and natural gas resources, and is one of the major energy exporters in the region. Proven gas reserves total 11.8 trillion cubic feet (tcf) with a potential for more big discoveries. During the past decade, natural gas production increased seven-fold from 61 billion cubic feet (bcf) in 1999 to 426 bcf in 2011. This impressive growth was developed mostly for exports to neighboring countries, such as Thailand, which currently imports about 86 percent of Myanmar's total gas production[1]. The production will continue to rise after newly developed off-shore fields[2] start exports to China and Thailand in 2013-2014, with estimated outputs of 500 and 300 million cubic feet per day (mmcfd), respectively.

8. Since the first exports of natural gas to Thailand in 1998, the gas sector has been the country's most important source of export revenues, which are expected to peak at 6.5 percent of GDP in 2014-2015. Also, a third of the country's $13.6 billion in foreign direct investments is in the oil and gas sector (as of 2011). Although large foreign investments and revenues come from natural gas exports, the domestic gas market has remained underserved. Currently, Myanmar consumes about 60 bcf per year (14 percent of the country's gas production), which meets only around half of the domestic gas demand.

9. The government plans to eliminate gas shortages by increasing the share of gas allocated to the domestic market from new off-shore gas fields. Recently, the Government announced that the new M3 off-shore gas field (which is expected to start production in 2015) will be fully allocated to the domestic market, and most of its production will be earmarked for power generation. The Government recognizes that the reduction of gas shortages will also require adoption of market based pricing for domestic gas supply, implementation of transparent and efficient gas allocation mechanism, and investments in the primary and secondary gas network, which is underdeveloped and a bottleneck for the improvement of gas supply in the domestic market.

Electricity supply and demand

10. In the hydropower sector, Myanmar has identified 92 large-scale potential projects with a total installed capacity of 46 GW out of an estimated 100 GW of total hydropower resources. Currently, the total installed capacity of the hydropower plants is 2,660 MW with a firm capacity of 1,504 MW, out of which 860 MW is in reservoir-based plants and the rest in run-of-river plants. The Ministry of Electric Power (MOEP) plans to build 13 hydropower plants, adding 2,572 MW of installed capacity, while 44 further projects are planned as joint ventures with foreign investors for another 42 GW of total capacity. Hydropower accounts for about 71 percent of installed capacity and 65 percent of electricity production, with the balance mostly coming from gas-fired power generation, with a small coal-fired power plant accounting for about 4 percent of capacity and power production.

11. Due to a heavy reliance on hydropower, which accounts for about 70 percent of electricity production, the country's power generation is extremely seasonal. Delays in hydropower investment program and a rapid increase in electricity demand (which tripled in the last decade to reach 10 TWh in

[1] The Yadana and Yetagun off-shore gas fields account for 90 percent of the total gas production in Myanmar with the remaining production coming from on-land fields. Yadana started production in 1998 and has reserves of 5.7 tcf. In 2011, it produced 282 bcf of which 215 bcf were exported to Thailand. Yetagun started in 2000, and has reserves of 3.2 tcf. In 2011, it produced 164 bcf and exported 151 bcf to Thailand.

[2] The Shwe off-shore gas field, which was discovered in 2004 with reserves of 3.56 tcf, started production in July 2013. It is expected that 80 percent of its production will be exported to China and 20 percent (about 200 mmcfd) will be supplied to the domestic market. Also, the Zatwika gas project, currently under construction, is expected to start production of about 300 mmcfd in 2014. It will also follow the 80/20 split between exports to Thailand and the domestic market supply.

2012) resulted in large shortages which are estimated at about 30 percent of power demand during the dry season. As a result, load shedding, blackouts and low quality of power supply became a major obstacle for economic activities in the country and a source of popular frustration..

12. The existing gas-fired power generation is obsolete and operates at a half of its nominal capacity with very low efficiency (about 20 percent) for base-load duties. The overall efficiency of the power supply system is further reduced by large losses in transmission and distribution (T&D) networks, which amount to 25 percent of the total power supply. Therefore, the increasing efficiency of gas-fired power generation and cutting T&D losses are the priority measures to help reduce electricity shortages, balance the supply and demand, and improve the reliability and quality of power supply.

13. In order to mobilize urgently needed investments and improve efficiency in the power sector, the government plans to attract Independent Power Producers (IPPs) and promote public-private partnerships (PPPs) to accelerate construction of modern power generation projects and reduce losses in the power distribution sector. The first IPPs are already starting operation using a "tolling arrangement" under which the government has a responsibility to supply gas and off-take electricity, while the private investor takes the risk of completing the new plant on time and of being able to convert gas to electricity at an agreed fixed price. However, the availability of gas for the domestic market is likely to remain a major constraint for the construction of new gas-fired power plants in the near term.

Electricity subsidies

14. Prior to the devaluation of the Myanmar kyat in FY 2012/13, the direct budgetary energy subsidies in Myanmar are understood not to be significant. Prices of petroleum products, including cooking gas, were generally above the cost of supply. Electricity tariffs were adequate to cover overhead and operating costs of the electricity enterprises. However, the State budget had been allocated to supplement revenue from customers to finance capital expenditure as electricity enterprises had limited debt financing.

15. In FY 2010/11 revenue collected from electricity customers covered about 92 percent of overhead and operating costs of MOEP and electricity enterprises, excluding capital expenditure. Therefore, Government subsidies for operating costs of the electricity sector amounted to about 46 billion kyats, or about 0.1 percent of GDP. In that same year, the total capital expenditure of 180 billion kyats, or 0.5 percent of GDP, was covered from the State budget. The electricity enterprises had used limited debt financing to finance capital expenditure and the State budget contribution for capital expenditure represented additional Government equity in the electricity enterprises. The preliminary budget information for FY 2011/12 indicated that revenue from customers covered 99 percent of overhead and operating costs of the sector. The State budget financed 218 billion kyat of capital expenditure during the year.

16. Following the currency devaluation in FY 2012/13, petroleum product prices have been raised to reflect the new exchange rates. However, electricity tariffs for retail customers have not been adjusted since January 2012 and are currently about 27 percent below the cost of supply. This is because the new exchange rate has substantially raised the cost of natural gas for electricity generation which is denominated in US dollars. Therefore, Government subsidies for overhead and operating cost of the sector would substantially increase until electricity tariffs are brought to the cost recovery level. The preliminary budgetary estimates of MOEP indicate the level of required Government subsidies of 552 billion kyats in FY 2012/13 and 555 billion kyats in FY 2013/14 (about 1.2 and 1.1 percent, respectively of estimated GDP[3]), for both operating cost and capital expenditure. To put this in perspective, the

[3] Increase from about 0.6 percent of the GDP in the two prior fiscal years.

overall Union level fiscal deficit is estimated at 5.3 percent for FY 2012/13 including the MOEP deficit. External borrowing for MOEP including its economic enterprises was negligible.

17. In addition to the State budget support, there are implicit subsidies mainly from the cost of natural gas purchased by the power sector. However, the value of such implicit subsidies is not clearly known as an estimate of the *economic* value of natural gas for domestic consumption (reflecting the long run marginal cost of gas supply) is not currently available. The TA component of this project would help inform the economic value of natural gas for domestic consumption.

Financial sustainability of the power sector

18. The power sector in Myanmar faces the following challenges regarding its financial sustainability: (a) large increase in the cost of electricity supply due to higher cost of gas for electricity generation; (b) electricity tariffs below the economic cost of supply; (c) large T&D losses amounting to about 25 percent of total electricity produced; and (d) large investment needs in new power generation and T&D assets. Furthermore, explicit and implicit subsidies in the electricity sectors increase the volatility of financial situation in power enterprises.

19. The devaluation of the Myanmar kyat during FY2012/13 from 5.4 to 850 kyat/US$ had a large impact on the cost of gas supply for power generation in Myanmar Electric Power Enterprise (MEPE). The total cost of gas supply to MEPE – denominated in US dollars – increased from 2.5 billion kyats (FY2011/12) to over 150 billion kyats in FY 2012/13. Furthermore, the hydropower generation cost is rising as new and costlier dams are being added. As a result, the prevailing electricity tariffs – both at the retail (distribution) level and the wholesale (transmission) level – went below the cost of supply. Without further tariff increases or revenue subsidies from the Government, the electricity enterprises will incur financial losses in the coming years. Specifically for MEPE, the magnitude of potential losses in the coming five years is estimated at 20–90 billion kyats per year.

20. In response to the sharp worsening of financial situation in the power sector, the government reduced the price of natural gas for electricity generation from US$ 11.2 to US$ 5 per MMBtu[4] during FY 2011/12 and continuing in FY 2013/14. There is uncertainty on the level of natural gas price in the coming years. Since the cost of gas is now the second largest cost category for MEPE (after electricity purchased from hydropower plants) —and could become the top category in the next five years— this uncertainty is a major financial risk for the sector.

21. To mitigate the impact of rising cost, the government had also raised MEPE's wholesale tariff to distribution enterprises (ESE and YESB) – from 20 kyats/kWh to 35 kyats/kWh in FY2012/13 and again to 38.4 kyats/kWh on average in FY2013/14. However, the current MEPE's wholesale tariffs are still below the cost-recovery by about 10 percent.

22. Meanwhile, the retail tariffs for end-consumers of distribution enterprises, averaging 40-42 Kyats/kWh, are even less cost-reflective at about 27 percent below cost recovery. The authorities are currently reviewing electricity tariff options to help improve the financial sustainability of the electricity enterprises. These may include the introduction of block tariffs for consumers according to their electricity usage. Going forward, any adjustments of end-user tariffs will have to include measures to protect poor and vulnerable consumers who cannot afford full cost-recovery tariffs.

[4] Natural gas price for the power sector is based on the US dollar. The gas price is then converted to Myanmar kyat according to the official exchange rate.

23. The sharp increase in the cost of gas supply to MEPE exposed the low efficiency of existing gas turbine (GT) stations as one of the major weaknesses in the power sector, and a top priority for the improvement of technical and financial performance of MEPE. Therefore, increasing efficiency of gas-fired power generation through investments in high-efficiency combined cycle gas turbine (CCGT) technology would help improve financial viability of MEPE by doubling electricity production for the same amount of gas consumed, as well as reducing exposure to gas price fluctuations. Also, improving the financial viability of MEPE requires investments in reduction of T&D losses and modernization of metering, billing and power dispatch systems to increase sales revenues for the same amount of electricity produced.

Institutional framework and government's priorities in the power sector

24. The energy sector institutional framework is fragmented. Seven ministries are responsible for activities in the energy sector, with the Ministry of Energy (MOE) serving as the focal point for overall energy policy, and the Ministry of Electric Power (MOEP) as lead agency for power sector development. Overlapping responsibilities for policy-making, regulation, planning and supervision between several ministries hamper operations of eight state-owned enterprises (SOEs – four in the power sector and four in the oil and gas sector [5]), which are directly responsible for implementation of sector activities including investment operations. Furthermore, the low number of staff dedicated to energy policy and regulation in MOE and MOEP places severe limits on the institutional capacity in the sector.

25. The Government strategy to address the above challenges is based on two pillars. First, an inter-governmental National Energy Management Committee (NEMC) chaired by the Minister of Energy and co-chaired by the Minister of Electric Power, was established in January 2013 with the mandate to formulate the National Energy Policy and ensure its coordinated implementation. Second, a new Electricity Law was drafted clarifying conditions for private investments and concessions in the power sector. While ADB provided assistance to MOEP in drafting the new Electricity Law, the WBG prepared an *Outline of Energy Development Policy*[6], which was requested by NEMC as a basis for opening energy policy dialog and mobilization of technical assistance resources from WBG and other development partners.

26. As detailed in the *Outline of Energy Development Policy*, which was discussed and broadly agreed with NEMC, the main challenges facing the energy sector can be divided in two time horizons. In the near-term (2013-2015), the main challenges are: (a) to ensure financial viability of sector enterprises; (b) to secure affordable funding for capital investments to address urgent needs in power generation; and (c) to maximize efficiency of gas-fired power generation and reduce losses in transmission and distribution networks. In the medium to longer term, the energy (gas and electricity) sector faces three strategic transformations: from overdependence on energy exports to creation of well functioning domestic energy market; from underdevelopment of gas-fired power generation and overreliance on hydropower towards an optimal fuel mix in the power sector; and from the state-dominated energy sector towards increasing private sector participation. These three transformations are critical for the elimination of current gas and electricity shortages, increasing access to modern energy, and a sustainable sector development.

[5] Four of the eight SOEs operate in the electricity sector: (a) Myanmar Electricity Power Enterprise (MEPE) is responsible for the development and operation of the transmission network and gas-fired power plants; (b) Hydropower Generation Enterprise (HPGE) operates and maintains hydropower stations and the one coal-fired power plant; (c) Electricity Supply Enterprise (ESE) is in charge of the distribution outside Yangon area it also operates mini-hydro and diesel generation connected to the distribution grid; and (d) Yangon Electricity Supply Board (YESB) is responsible for the electricity distribution in Yangon City. The other four SOEs operate in the oil and gas sectors.

[6] The World Bank Group. 2013. *Myanmar: An Outline of Energy Development Policy.* Washington DC.

27. The proposed project targets the near term (2013-2015) challenges due to the urgent need to increase power generation, focusing specifically on improvement of efficiency of existing Gas Turbine (GT) stations. Replacing outdated and low efficiency GTs with modern, high efficiency GTs and Combined Cycle Gas Turbine (CCGT) technology is the fastest and least cost approach to increase electricity production without increasing the consumption of gas. Furthermore, such improvement of supply side efficiency will reduce local environmental impacts at the existing GT stations (noise and air emissions) without increasing CO_2 emissions. Other alternatives evaluated, such as green field CCGT, coal-fired generation, hydropower or other renewable energy technologies, are more expensive and would take much longer to prepare and implement. These alternatives will be further studied during the preparation of the Power Sector Master Plan supported by the Japan International Cooperation Agency (JICA).

28. The Government has demonstrated its commitment to the aforementioned reforms in the energy sector. Some highlights of Government's commitment include: (i) petroleum prices are generally cost reflective; (ii) electricity tariffs were raised closer toward cost recovery, and further adjustment is under review; (iii) efficiency improvement initiatives in electricity supply are being carried out; and (iv) private sector participation is increasing. Specific to the electricity sector, the largely public sector electricity providers seem supportive of the reform measures, including increased private participation in service delivery. As for consumers, it is not feasible to credibly gauge at this stage: (a) consumers' concerns about the price increases; (b) their understanding that reforms are necessary; and (c) the need for protection of poor and vulnerable consumers. However, the fact that many current consumers are already paying high tariffs for back-up/supplemental electricity provides some assurance that their willingness to pay is higher than the prevailing tariffs. In addition, due to the low electrification rate in Myanmar, many consumers will be experiencing electricity service for the first time in the coming years and would not experience the changes due to the reform. The TA component of this project has been designed to assist the Government with the reform initiatives, including the future design of a lifeline tariff or targeted subsidies for the poor and vulnerable consumers.

WBG program and donor coordination

29. The proposed project is the first IDA investment financing after Bank re-engagement in Myanmar and a cornerstone of the joint World Bank Group (WBG) program in the energy sector. The joint WBG program in the energy sector aims to help alleviate acute electricity shortages and set the power sector on a sustainable development path. The program includes analytical and advisory support and the financing support by the World Bank (IDA) and IFC. MIGA is also participating in the program although Myanmar is not yet a member of MIGA (process underway).

30. While IFC support will leverage and catalyze private sector investments in power generation (IPPs) and efficiency improvements in power distribution, IDA support to the government and MEPE will help improve regulatory environment and ability of MEPE to perform its role of power market operator. The WBG will also collaborate with IMF in avoiding the accumulation of quasi-fiscal deficit in the energy sector.

31. The WBG is working in close collaboration with several development partners active in the Myanmar energy sector. In addition to close collaboration with ADB (on the power sector reform and regulatory framework) and JICA (on the long-term power master plan), the WBG is also working with the Government of Norway which provided TA for the preparation of this project and has interest in expanding collaboration with WBG in other aspects of the power and gas sector development. Other partners, such as the Australian Agency for International Development (AusAID), the U.S. Agency for International Development (USAID), Sustainable Energy For All (SEFA) initiative, the UK Department for International Development (DFID) and the European Commission (EC), are also interested in possible

collaboration with the WBG particularly on the Public Expenditure Review in the energy sector (AusAID) and the electrification program (SEFA, USAID and the EC).

C. Higher Level Objectives to which the Project Contributes

32. After more than two decades of absence, the WBG is re-engaging in the development of Myanmar. On November 1, 2012 the WBG endorsed an *Interim Strategy Note*[7] (ISN) which outlines support around three Pillars: the first aimed at supporting government's efforts to transform institutions to allow them to deliver for citizens; the second aimed at building confidence in the ongoing reform process; and the third focused on preparing the way for the resumption of a full country program.

33. In line with the ISN, the proposed project contributes to the ISN's Pillar II by focusing on quick and tangible impact for communities through the improvement of reliability and quality of electricity supply; and Pillar III by initiating WBG's engagement in infrastructure and addressing urgent needs in coordination with other development partners, and by responding to the government's request to support the modernization and expansion of gas-fired power generation. Furthermore, the project will serve as a cornerstone for the future engagement, underpinning policy dialog in the energy sector and strengthening institutional capacity in MOEP and MEPE.

34. The expansion of the gas-fired power generation capacity at the existing GT stations is an important contributor to the ability of the national power grid to provide reliable electricity supply and therefore support economic growth, job creation and social development. This project will also contribute to the reduction of local and global environmental impacts of the gas-fired power generation in Myanmar through the introduction of CCGT technology, which would reduce noise and air emissions from the existing GT stations.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

35. The project development objective is to increase capacity and efficiency of gas-fired power generation and strengthen the institutional capacity of the Ministry of Electric Power and the Myanmar Electric Power Enterprise.

B. Project Beneficiaries

36. Direct beneficiaries of the project would be residential, commercial and industrial consumers served by the new CCGT plant. They would benefit from (a) increased hours of power supply due to avoided load shedding and blackouts; (b) reduced risk of power system collapse, with the associated economic losses while the power supply is cut; (c) better quality of power supply (e.g. more stable voltage and frequency) which would extend the operating life of electrical appliances; and (d) reduced noise and air emissions after the replacement of existing, obsolete GTs. The project would also bring direct temporary benefits for skilled and unskilled workers that would be employed for the construction of the project.

37. Indirect beneficiaries would include all segments of population, including poor people, which would benefit from increased economic activity enabled by productive uses of electricity generated by the

[7] Report No. 72458-MM.

plant in the years to come. Specifically, the power generation under the project will cover about 5 percent of the current peak demand in Myanmar and about 50 percent of peak demand in Mon State. Furthermore, the new generation capacity will establish the basis for the expansion of electrification program and increasing access to electricity primarily in Mon State.

38. In order to properly monitor and evaluate the project impacts, an impact assessment survey will be included under the Technical Assistance component to help monitor economic and social benefits received by communities in Mon State, with special focus on Indigenous Peoples' communities. The Poverty and Social Impact Analysis (PSIA) activity is currently under discussion with other interested donors, and a coordinated approach will be undertaken.

39. Institutional development and capacity building under the project will directly benefit MOEP and MEPE. Improved institutional performance in the power sector would indirectly benefit all stakeholders and consumers, including future consumers who will benefit from the implementation of the National Electrification Plan. Finally, MEPE staff at the new plan will benefit from better safety and improved working conditions.

40. The value-added of the WBG support is in line with the project beneficiary assessment above. In particular, the institutional development and capacity building under the project would help inform the authorities of technical, legal, economic and financial measures to ensure a viable power sector necessary to meet the sector challenges in the coming years. The Bank Group's convening role is also beneficial as this facilitates cross-dialogue among the public and private sector, the international development community, and other stakeholders. This contributes to improving coordination and consultation of development activities in the fast-changing environment in Myanmar.

41. The use of public sector financing for the project is considered appropriate given the large growth in electricity demand, the prevailing inadequate electricity supply, and the gradually increasing availability of private sector financing. Additional private sector financing in the power sector —both in generation and distribution— is being mobilized. However, the time required to structure and implement private sector projects varies from one project to the next, and these projects alone cannot meet the rising electricity demand especially in the short- and medium-term. Specific to the Thaton CCGT power plant, public financing remains necessary as the plant is owned by the public sector and there is no immediate plan or regulatory framework to sell or lease the plant to the private sector.

C. PDO Level Results Indicators

42. Achievement of the project development objectives will be measured by the following indicators: (a) firm generation capacity increase in Myanmar; (b) increase in domestic electricity generation; (c) increase in thermal efficiency of gas-fired power generation; (d) number of MOEP/MEPE staff involved in training and capacity building activities; and (e) the government adoption of the National Electrification Plan.

43. More outcome-oriented indicators, such as the reduction of electricity shortages, increased hours of power supply and fewer blackouts are not included in the Results Framework. This is because it is not possible to estimate these indicators with any certainty as they are dependent on several factors that are outside the project scope, such as the pace of industrial and residential demand growth, development of power supply from other sources (e.g. hydropower production) and performance of transmission and distribution network.

III. PROJECT DESCRIPTION

A. Project Components

44. The project consists of two components: (a) supply and installation (S&I) of a CCGT power plant at the existing Thaton GT station, and (b) technical assistance component focused on institutional and capacity building support to MOEP and MEPE.

45. **Component 1: Combined Cycle Gas Turbine (CCGT) Power Plant (US$ 130 million).** The main component of the proposed project is the expansion of the Thaton GT station into a new CCGT power plant. A modern, high-efficiency, low-emissions CCGT power plant will comprise two 40 MW gas turbines with inlet air chillers, one steam turbine of 26 MW, a heat recovery steam generator (HRSG) and air-cooled steam condenser.

46. The selection of the 106 MW CCGT in Thaton is based on two main considerations: (a) the severely constrained availability of gas supply allocation in the domestic gas market; and (b) the age and condition of existing GT stations. The existing Thaton GT station is located near the country's main gas-pipeline, which runs through Mon State, and the reliability record of gas supply in Thaton is significantly better than in other GT stations considered as alternative project locations. Also, the existing GTs in Thaton are among the oldest in the country, experiencing increased number of forced outages and very low thermal efficiency (on average below 20 percent). Furthermore, the Thaton station has a relatively strong connection to the 230 kV power transmission network and it provides electricity to both the national grid and local communities in Mon State. Finally, the proposed project will complement IFC's efforts involving independent power producer (IPP) projects located near major urban areas (such as Yangon and Mandalay), as it focuses on mostly rural areas and parts of the country with higher poverty levels and electricity shortages incidence.

47. The power plant component will be implemented as a "turn key" S&I contract including engineering and project management services, supply of equipment, construction, testing, commissioning, and maintenance support. Due to the urgent needs of power supply in Myanmar to reduce load shedding and power shortages, the project is designed to provide electricity as fast as possible through a phased approach. To achieve this, the project will start construction of the first phase (gas cycle) and begin generation 12-15 months after the contract signing. The second phase (steam cycle) will follow immediately and will be completed about 15-18 months after the first phase is commissioned.

48. **Component 2: Technical Assistance and Advisory Services (US$10 million).** This component will provide technical assistance and advisory services to MOEP and MEPE in two main areas. The first area of support is related to the capacity building for policy making and regulation in the power sector including, but not limited to: (a) development of National Electrification Plan (NEP); (b) financial analysis and forecasting for power enterprises; (c) economic valuation of natural gas in the domestic market; and (d) review of electricity tariffs and subsidy mechanisms. These TA activities would also assist the authorities and MEPE in the preparation of the Financial Viability Action Plan of MEPE. The second area of support is related to the capacity building for project implementation including, *inter alia*: (a) "owner's engineer" for the implementation of CCGT plant; (b) strengthening of procurement capacity and training on international procurement practices; and (c) improvement of financial management (FM) capacity and training in international FM standards and procedures; (d) strengthening of environmental and social safeguards capacity and (e) implementation of the Environmental and Social Management Plan (ESMP) at the project site.

49. Further activities, which are not yet fully identified, and require further discussion and study, may be included at later stages of the project. The details of the scope of these activities will be agreed with

the authorities during project implementation, in consultation with other development partners, to ensure a coordinated approach in technical assistance and capacity building support.

B. Project Financing

Lending Instrument

50. The proposed operation will be financed by an Investment Project Financing instrument. The credit will be provided through the Financing Agreement between the Republic of the Union of Myanmar, represented by the Ministry of Finance, and IDA. The Ministry of Finance will make the proceeds of the credit available to MEPE under the government's budget. MEPE is a State Owned Enterprise (SOE) operating under the control of MOEP.

Project Cost and Financing

51. Project cost and financing requirements for the investment components are presented in the table below. The project will be wholly financed by IDA.

Table 1: Estimated Project Costs and Financing

Project Components (US$ million)	Project cost	IDA Financing
1. Combined cycle gas power plant	130.00	130.00
2. Technical Assistance	10.00	10.00
Total Costs	**140.00**	**140.00**
Total Project Costs	140.00	140.00
Front-End Fees		
Total Financing Required	**140.00**	**140.00**

C. Lessons Learned and Reflected in the Project Design

52. Given the urgency to increase generating capacity in the country and the lack of detailed least-cost generation expansion plan, the upgrading of existing gas-fired power plants was identified by MOEP and MEPE as one of priority measures to quickly reduce electricity shortages in the near to medium term. In parallel, a complementary power generation expansion program was launched led by private investors focusing on new gas-fired power plants. Such approach ensured that the scarce public resources are used primarily to increase capacity and efficiency of existing state-owned power plants, while the private sector investments are mobilized and leveraged to add more generating capacity in the most efficient manner.

53. The project has been separated in two parts, an investment component for the CCGT power plant and a technical assistance component for policy advice and capacity building. This separation is both practical and strategic as experience in Middle East and North Africa countries shown that linking investments and policy issues too early may hinder the overall program implementation. For example, in Egypt, a separate TA program allowed the dialogue on politically sensitive issues in a progressive manner, while the investment track helped develop the trust and partnership required to re-engage with the government after a period of absence in the country, as well as support the development of power sector infrastructures to boost economic growth and service delivery.

54. Experience in countries such as Turkey show that deep reform measures that break the cycle of public subsidies and guarantees can promote energy security through private generation investments by establishing long term PPAs and a single off-taker structure that attracts private investors. The technical assistance component of this project, in parallel with IFC financial support to IPP development and in close collaboration with development partners active in the Power Sector Working Group, aims to provide the initial foundations for a deep policy reform dialogue and support the Financial Viability Plan of the power sector by identifying a sustainable tariff structure and pricing model.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

55. MEPE is the implementing agency. The implementation arrangements are based on MEPE's existing organization and business processes, which will be strengthened through capacity building and technical assistance in key areas, including (a) technical design, scheduling and construction management which are carried out by the Thermal Power Department (TPD); (b) procurement and contract management which are carried by Material Planning Department (MPD); and (c) Financial Management (FM) and reporting which is carried out by Financial Department.

56. Of MEPE's six departments (Administrative, Finance, Material Planning, Power Transmission, Power Systems, and Thermal Power), three will be responsible for the implementation of the project. Consultants engaged under Component 2 will work closely and build capacity within each department, and report to the General Managers of the Finance and Material Planning Departments (responsible for commercial procurement), and to the Chief Engineer of the Thermal Power Department (responsible for technical specifications). Full cooperation among three responsible departments is expected, while the Managing Director of MEPE will be responsible for overall coordination of the three departments involved in the project.

57. The World Bank carried out a capacity assessment of MEPE, as implementing agency, with regard to fiduciary issues: procurement, financial management (FM), and environmental and social (E&S) safeguards. The FM assessment shows that MEPE's FM staff are well versed in FM and accounting, and that main risks arise from: (a) inadequate documentation of policies and procedures (although the systems of internal control are reasonably strong); and (b) inexperience with donor funded projects.

58. These risks will be mitigated by: (a) having in place an acceptable FM manual for the project; (b) recruiting a qualified financial management consultant to complement the existing finance division staff and strengthen capacity; and (c) having the project financial statements subjected to an independent external audit annually by the Auditor General's Office.

59. Procurement assessment shows that although the President of Myanmar issued two letters with instructions to switch from a 'closed' to an 'open' tender system and established competitive bidding as the norm for public procurement, there are no comprehensive tender or public procurement regulations in place. Also, power sector staff has very limited experience in public procurement and competitive bidding, mostly limited to negotiations with suppliers. Therefore, procurement for the project will be carried out in accordance with the Bank's Guidelines and provisions stipulated in the Financing Agreement.

60. MEPE will be responsible for the procurement activities of the project, assisted by a team of international consultants to prepare the technical specifications following international practice, and support for preparation of bidding documents, evaluation reports and other procurement activities.

61. The Environmental and Social Assessment (ESA) shows lack of safeguards and operation procedures for workers and equipment safety, and environmental good practices at the existing Thaton GT station. Technical assistance to MEPE regarding the implementation of the ESMP and general E&S safeguards requirements will be provided under the project. Consultants will support MEPE for the development of a certified Environmental, Health and Safety Management System (EHS-MS) for the Thaton GT station, set up an E&S unit in the Thermal Power Department and prepare E&S guidelines and procedures. Also, the consultant will organize training for MEPE staff on the Bank guidelines for environmental impact assessments of projects in the power sector.

62. During the ESA process at the Thaton GT station, public consultations have been carried out and issues raised were incorporated in the ESA report and the ESMP. The project does not involve any associated infrastructure development and will be confined to the existing GT station, which has been in operation for more than 30 years. As all construction-related activities will take place within the existing site, no land acquisition, loss of livelihood or resettlement will be required. The minutes of the public consultations at the Thaton GT station and three nearby villages document a broad community support for the project.

63. Norconsult, funded by the Government of Norway, provided assistance to MEPE in preparing the feasibility study of the proposed CCGT plant, and throughout the ESA process including the preparation of ESMP for the Component 1. The continued support from the Government of Norway may include capacity building for preparation of bidding documents and services of "owner's engineer" to MEPE. However, this support from Norway has not been confirmed yet, and the IDA credit includes provisions for the financing of these important activities.

B. Results Monitoring and Evaluation

64. MEPE and MOEP will monitor progress of their respective components against the agreed performance indicators listed in Annex 1. The implementing agencies will monitor overall project implementation and contractors' performance. Data and statistics on actual project outputs and outcomes will be gathered, analyzed, and included in the quarterly progress reports to be submitted to the Bank. The technical assistance activities will have their own monitoring and evaluation mechanisms, some of which will be built into project design. The monitoring capacity of MOEP and MEPE is relatively limited and it will be augmented through the use of individual consultants under the Component 2. Most of the baseline data is already available and it will be completed before the project kick-off meeting which is planned around the time of credit effectiveness.

C. Sustainability

65. Sustainability of the project depends on the ability of MEPE to implement and operate the project successfully, and on the reliability of gas supply from Myanmar Oil and Gas Enterprise (MOGE). The project implementing agencies have proven track records in operating and maintaining GT stations, well over their technical life. However, there is concern of gas shortages as gas allocation to competing off-takers is one of the most important challenges facing the energy sector in Myanmar. In the near-term, MOGE can meet only about half of the domestic gas demand and the government is using *ad hoc* solutions to balance different priorities (e.g. maximum electricity production *vs.* supply of gas to fertilizer plants and other industries).

66. Nevertheless, it is expected that the availability of gas supply in the domestic market will improve after the start of two new off-shore gas fields in 2013-2014. The Shwe field (operated by Daewoo for exports to China) is expected to supply about 100 mmcfd to the domestic market, i.e. 20 percent of its total production capacity of 500 mmcfd, by the end of 2013. Starting in 2014, Zawtika field (operated by PTTEP for exports to Thailand) will supply an additional 100 mmcfd to the domestic market, out of its

total production of 300-340 mmcfd. Also, an additional 50 mmcfd from Yadana off-shore field is under re-negotiation with Thailand for supply to the domestic market. Therefore, by 2015, a total of about 250 mmcfd will be added to the domestic market, out of which 150 mmcfd is earmarked for the power generation. This would amount to the doubling of gas supply to domestic power generation, which currently consumes about 157 mmcfd.

67. The sustainability of Component 1 is further safeguarded by the project design which uses only the currently allocated amount of gas at the Thaton GT station (25 mmcfd) and, therefore, does not require additional gas supply. Also, after the completion, the new CCGT plant will have the highest efficiency and the lowest production cost in the gas-fired power generation sector in Myanmar, which will ensure its top ranking for power dispatch.

68. Finally, the project includes a TA component for capacity building on the gas pricing policies and electricity tariffs with the objective to support financial viability and sustainability of both gas and power sectors, reducing inefficient subsidies, reducing risks for investors, and improving affordability to consumers. Also, the WBG will continue advising NEMC about the importance of developing a gas sector master plan and sector strategy, including the necessary improvements in the legal and regulatory framework.

V. KEY RISKS AND MITIGATION MEASURES

A. Risk Ratings Summary Table

Risk Category	Rating
Stakeholder Risk	**Substantial**
Implementing Agency Risk	
- Capacity	Substantial
- Governance	Moderate
Project Risk	
- Design	Moderate
- Social and Environmental	Substantial
- Program and Donor	Moderate
- Delivery Monitoring and Sustainability	Substantial
Overall Implementation Risk	**Substantial**

B. Overall Risk Rating Explanation

69. The overall implementation risk is rated Substantial as the scale and pace of Myanmar's transition pose a unique set of risks that have been recognized in the ISN. In addition, the power sector, including the project implementing agency (MEPE), faces multiple risks stemming from fragmented institutional and regulatory framework, and implementation delays due to slow bureaucratic procedures, weak capacity, and limited MEPE experience with Bank financed operations, particularly in procurement, financial management, and safeguards.

70. The robust design of the project, following international best practices, should help keep the implementation risks manageable, as it is based on a well-proven solution for increasing efficiency of gas-fired power generation. Also, the location of CCGT plant within the existing GT station ("brown-field" site) significantly reduces project complexity, as all associated infrastructure (access road, water supply, connections to gas pipeline and power grid etc.) is already available at the site. Nevertheless, the lack of experience in implementing investment projects under WBG financing and the low institutional capacity are causes of substantial implementation risks, which will be mitigated through the intensive institutional capacity development and strong implementation support by the WBG team. Also, it is planned that a team of international consultants will continue to provide technical assistance to MEPE in key areas of project implementation, including procurement, construction management and implementation of the ESMP.

71. The main risks that could undermine sustainability of the project include:

a) project sustainability in terms of fuel supply risks, especially gas shortages due to fuel allocation to competing gas consumers, such as IPPs;

b) compromised financial position of MEPE due to fuel price volatility and higher cost of gas supply and/or insufficient cost recovery tariffs;

c) limited capacity and lack of attention from government staff due to many competing demands from donors and private sector investors.

72. The key mitigation measures include the following:

a) The project was designed to avoid exposure to fuel shortages by increasing efficiency of gas utilization and eliminating needs for additional gas supply to the existing GT station. Furthermore, the selection of Thaton GT station is based *inter alia* on its proximity to the main gas pipeline, which is unlikely to experience reductions in volumes of transported gas;

b) The project will provide technical assistance on the review of electricity tariff structure and energy pricing policy to support financial viability of the project and the power sector, as well as reduce investment risks in power generation projects;

c) The WBG and the government will agree on specific steps to minimize time taken for government's clearances, as well as steps to improve MEPE's performance in fiduciary procedures through technical assistance; and

d) The WBG will closely coordinate its support with other donors and development partners, as well as provide policy advice and technical assistance to the government and MEPE through intensive implementation support.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

Project Economic Analysis

73. Myanmar does not have any updated power sector master plan, and the least cost power generation option is therefore difficult to determine. In the long run, hydropower seems to be the least cost expansion option for Myanmar. However, developing new hydropower plants is likely to take at least

6–8 years to reach commercial operation, and it is, therefore, not a viable alternative to gas-fired power generation in the short to medium term. Considering the fact that hydropower generation in Myanmar has large seasonal variations, with the lowest generation in the dry season when the load reaches its peak, Myanmar will need to retain an alternative source for base load generation for at least 20–30 percent of the peak load. An efficient gas-fired power plant is therefore likely to be the least cost alternative for base load power in Myanmar.

74. The economic benefits for the Thaton CCGT power plant are derived from the reduction of Energy Not Served (ENS) during periods of peak demand, and the replacement of older and less efficient power generation during off-peak periods. The economic benefits of Thaton's contribution in reducing ENS is valued based on an indicative consumers' willingness to pay (WTP), taken as the estimated economic cost of operating diesel generators which are prevalent in Myanmar (about 23 US cents per kWh). The economic benefits of power generation from Thaton beyond the reduction of ENS is valued at about 12 US cents per kWh, which is the estimated economic cost of generation from new gas-fired power plants in Myanmar with gas valued at the opportunity cost of natural gas export (US$ 12 per MMBtu). The economic costs are the capital investment costs associated with the project, and the average annual operation and maintenance costs, including major overhauls every 3–4 years.

75. The project NPV is estimated to be US$ 142 million at 10 percent opportunity cost of capital, and the economic internal rate of return (EIRR) of the project is 22.7 percent, which comfortably exceeds the criteria for a positive economic return.

76. Because of the uncertainty about the values of the main evaluation variables, the sensitivity of the NPV and EIRR is tested in scenarios with different values for these variables from the values used in the base case scenario. The project tolerates a 90 percent increase in construction cost or a tariff drop of 14 percent before it becomes economically unviable. Similarly, the value of natural gas has to increase to almost US$ 15 per MMBtu to render the CCGT plant unviable. In addition, the project would remain economically robust when all the electricity supplied from the project is valued at the low-end of the willingness to pay. The EIRR was also estimated for the scenario where only the two gas turbines are in operation, and the plant remains an open cycle plant with an installed capacity of 85 MW and a thermal efficiency of 40.5 percent. In this case, the EIRR drops from 22.7 percent to 17.6 percent, which is still economically attractive.

77. **Project financial viability.** The estimated financial cost of electricity produced by the Thaton CCGT plant is marginally higher than the current average MEPE's sales tariffs of 38.4 kyats per kWh (4.2 US cents per kWh). The required financially viable tariff that would allow the project to generate a financial rate of return to equity of 8–10 percent is 4.3 US cents per kWh at the current gas tariff to MEPE of US$ 5 per MMBtu. At a gas tariff of US$ 12 per MMbtu, the required tariff is 9.16 US cents per kWh. As part of its technical assistance program, the WB will provide support to analyze and specify tariffs and gas pricing that would ensure a sustainable financial situation for the Myanmar power sector (see description of Component 2 for details).

B. Electricity Sector Financial Analysis

78. This analysis focuses on the financial situation of MEPE as the owner of the Thaton CCGT power plant and the project implementing entity. The main findings are:

a) The fiscal year 2012/2013 saw significant changes in MEPE financial situation resulting from the devaluation of the Myanmar kyat. This had led to a large increase in the value of outstanding foreign loans from 2 billion kyats to over 300 billion kyats, which increased

MEPE debt leverage from close to zero to about one times its capital. In addition, MEPE could incur a loss of over 200 billion kyats from the increase in the value of foreign loans[8] and the rise in the foreign-currency denominated cost of natural gas for electricity generation. To mitigate the impact of rising cost, the authorities had raised MEPE's wholesale tariff to distribution enterprises, from 20 kyats/kWh to 35 kyats/kWh in FY 2012/13 and again to 37–40 kyats/kWh in FY 2013/14. However, the current rates are still below the cost-recovery level by about 10 percent for MEPE. In the previous five years including FY 2011/12, MEPE had been profitable with a profit margin of not less than eight percent.

b) The average end-user tariff at the distribution (retail) level was around 40 kyats/kWh in FY 2011/12 [9], giving distribution enterprises net profit margins of 6–14 kyats/kWh. Therefore, the increase in MEPE's wholesale tariff to distribution enterprises (from 20 to 37–40 kyats/kWh)—and any further increases—would incur financial losses for the distribution enterprises unless end-user tariffs are adjusted or revenue subsidies are provided to the distribution enterprises. The technical assistance component of this project will help inform the authorities about the level of required electricity tariffs and/or revenue subsidies to achieve sector financial sustainability.

c) MEPE's assets have been largely financed from the budget of MOEP as part of the ministry budgetary process. Total assets reached 709 billion kyats in FY 2011/12. These assets were almost entirely financed by the State's equity in MEPE. The cash provided to MEPE from the State budget in the past three years were substantial at 298, 117 and 99 billion kyats, respectively, which helped finance new investments. There had been little debt financing prior to the currency devaluation in FY 2012/13; however, the book value of outstanding debt had increased to about 300 billion kyat following the currency devaluation. At the same time, this loss from foreign exchange rate movement could reduce MEPE's capital by a similar amount.

d) MEPE's cost base is expected to increase substantially in the coming years. The cost of natural gas to MEPE was set by the Government at US$ 5 per MMBtu for FY 2012/13 and FY 2013/14; the currency devaluation has increased the cost of gas to MEPE in local currency term. In the coming years, MEPE also expects to purchase more electricity from IPPs which adds to MEPE's cost base. Lastly, corporate overhead costs such as wages, salaries, and assets maintenance costs are expected to increase with higher standard of living in Myanmar and additions of new assets.

e) MEPE's electricity sales tariffs need to be adjusted and/or revenue subsidies from the State budget will be required for MEPE to maintain a sound financial status. A financial projection of MEPE's financial situation shows that the current sales tariffs of 37–40 kyats per kWh are not adequate for MEPE to fully cover operating costs. It follows that new investment and debt service would require external financing—either support from the State budget or new loan. If MEPE continues accumulating net losses over coming years, this could lead to a negative net worth (i.e. MEPE's capital reduced below zero).

[8] Pending confirmation of accounting procedure.

[9] Tariff for household and small consumers is around 35 kyats per kWh, while tariff for large energy-intensive consumers is around 75 kyats per kWh.

f) The projection shows that at the prevailing natural gas price to MEPE of US$ 5 per MMBtu, a tariff increase of about 6.5 percent per year is required for MEPE to become profitable again in three years (FY 2016/17). If gas price to MEPE goes back up to US 11.2 per MMBtu, a higher tariff increase of about 22 percent per year will be required.

C. Technical

79. The proposed project has been designed as the most cost efficient technical alternative to generate electricity urgently, without increasing gas consumption at an existing GT station, and at the same time improving environmental conditions in the area. The replacement of the outdated GTs at the Thaton station with a state-of-the-art CCGT will more than double the power output and increase the plant efficiency from the current 20 percent to 49 percent, while using the same amount of gas currently allocated to the Thaton station (about 25 mmcfd).

80. Thaton CCGT presents a model project for the rest of MEPE GT stations where the existing outdated GTs should be replaced with modern and efficient CCGT technology as soon as possible, in order to increase the efficiency of gas-fired generation and, therefore, help reduce load shedding to consumers and increase revenues to MEPE. At the same time, the Thaton CCGT will provide a benchmark of economically attractive gas-fired power generation with the generation cost of about 12 US¢/kWh at the price of gas of $12/MMBtu, and EIRR of 22.7 percent (see economic analysis for further details).

81. Furthermore, the proposed CCGT project also introduces an innovation in the gas-fired power generation in Myanmar through the use of inlet air chilling for gas turbines. The proposed chillers are particularly important for gas turbines operating in hot climates (>30 degrees Celsius), such as ambient conditions prevailing in Myanmar and specifically in Thaton, where they can increase the power output up to 20 percent compared to the power capacity without inlet air chilling.

82. Thaton station was selected as project location due to the following considerations:

a) Using a brown field site (existing GT station) ensures much faster project implementation than building a green field plant;

b) The existing GT units at the Thaton station accumulated more than 200,000 working hours over 35 years, which is well over their technical life. Also, their efficiency (about 20 percent) is much lower than modern CCGT plant;

c) Thaton station is conveniently located near the main gas-pipeline running across Mon State, which would ensure reliable gas supply, and its switchyard already hosts the 230 kV transmission line with enough capacity to evacuate all the electricity generated by the new CCGT and supply both the national grid and the local communities in Mon State;

d) There is an available space within the power plant to install the new CCGT without any land acquisition affecting areas outside the plant, while at the same time the new CCGT plant will reduce current environmental impacts such as noise and emissions; and

e) The existing Thaton station has an outdated fire fighting system which requires urgent improvements to meet international safety regulations.

D. Financial Management

83. The project design has been kept simple with one major component for the purchase and installation of a CCGT power plant for about US$ 130 million and a technical assistance component for

US$ 10 million. Therefore, the financial management and reporting requirements will also be relatively straightforward and MEPE's existing financial management systems and procedures will be used.

84. The overall financial management risk is assessed as Moderate. The main risks that need to be addressed are: (i) inadequate documentation of policies and procedures (although the systems of internal control themselves are reasonably strong); and (ii) inexperience with managing and implementing donor funded projects. These risks will be mitigated by: (a) having in place an acceptable financial management (FM) manual for the project; (b) recruiting a qualified financial management consultant to complement the existing finance division staff, particularly in the initial project implementation phase, to assist with the preparation of the project FM Manual and to assist with project implementation and build FM capacity; and (c) have the project financial statements subject to an independent external audit annually by the Auditor General's Office.

85. The financial management arrangements will be deemed acceptable and meet the requirements of OP 10.00 when the proposed mitigation measures have been implemented.

E. Procurement

86. Procurement for the project will be carried out in accordance with the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated January 2011; "Guidelines: Selection and Employment of Consultants by IDA Borrowers" dated January 2011; and the provision stipulated in the Financing Agreement.

87. MEPE will be responsible for the procurement activities of this proposed project. International consultants will be recruited to assist MEPE to prepare the technical specifications following international practice and will continue through support for preparation of bidding documents and other procurement activities including owner's engineer for the project implementation. The procurement packages financed under the proposed project will be procured according to the Bank's Guidelines, with the assistance from the consultants' team. For each contract to be procured and financed under the project, the different procurement methods, estimated costs, prior review requirements, and timeframe will be defined in a procurement plan. The plan will be updated annually, or as required, to reflect actual project implementation needs and improvements of the institutional capacity.

88. Based on a procurement capacity assessment undertaken in preparation of the project, the overall procurement risk is considered "high" due to the lack of a legal framework for public procurement and limited experience and capacity of the implementation agency. More detailed information is presented in Annex 3: Implementation Arrangements.

F. Environment (including Safeguards)

89. The project has been classified as category 'B' because the impacts that may occur during construction are limited, site-specific and mitigation measures can be readily designed. In accordance with the requirement of a Category B project, an Environmental and Social Assessment (ESA) was carried out for the proposed project components, and an associated Environmental and Social Management Plan (ESMP) was prepared to determine the mitigation measures, monitoring program and necessary institutional arrangements as well as needs for capacity development. The documents have been prepared by a reputable international consulting firm on the basis of good international practices, as well as applicable Bank safeguard policies, including the WBG General Environment, Health and Safety (EHS) Guidelines and WBG EHS guidelines for thermal power generation.

90. **Environmental benefits**: The Project will substitute the power generation from the old Thaton's gas turbines and the old facilities, which will not be dismantled under the Project and will only be used

for around two weeks per year in emergency situations or during periods of maintenance of the new equipment. With the substantially higher efficiency and environmental performance standards of the new equipment (lower emissions to air, less waste consumption, much lower noise generation levels) and the introduction of a certified Environmental, Health, Safety Management System (EHS-MS), the investment will reduce environmental impacts and is considered to be of benefit to the surrounding environment and the local population.

91. Due to lack of adequate national environmental standards, the WBG EHS general guidelines and those for thermal power generation will apply to the project, as well as international good standards such as EU Directives, US-EPA standards, or equivalent. All investments and other project interventions will occur at the existing site within its perimeter and there are no association investments, such as for the transmission and distribution network, water supply and road works.

92. Construction activities with the installation of the new CCGT units would cause emissions from construction equipment, airborne dust and noise, as well as small amounts of wastewater (washing water) and solid waste (inert construction waste). During the operational phase, air emissions and noise levels will be determined by the specifications of the installed equipment, in compliance with WBG EHS Guidelines and international standards, which represent a substantial improvement in comparison to the current situation. Mitigation measures are included in the ESMP for both the construction and operation stages and include the development for an EHS Management System based on a comprehensive due diligence audit.

93. The ESMP includes policies requirements and applicable environmental and social standards, the development of an EHS Management System for the project site during project implementation, mitigation measures, a monitoring plan, implementation arrangements, capacity building and estimated costs for the mitigation measures and monitoring programs for both the construction and operation phases. The initial due diligence review that was undertaken as part of the ESA showed a lack of safeguards and operation procedures for workers' health and safety and environmental good practices. The EHS Management System will include health and safety measures that will substantially improve standards and practices to deal with these issues for both the new and existing facilities in an adequate manner.

G. Social (including Safeguards)

94. **Indigenous Peoples (OP 4.10).** A Social Assessment (SA) was carried out as part of the ESA process mentioned above. The closest habitation is some 500 meters from the site perimeter fence, and there are three villages surrounding the proposed project site between 1.5 and 2 km, where the majority of the inhabitants are ethnic minorities. The Indigenous Peoples policy is triggered because of the presence of ethnic minorities (EMs)/Indigenous Peoples (IPs) within the project's area of influence. The overwhelming majority (over 90 percent) of the beneficiaries and affected peoples in the Project influence area are IPs; therefore, a separate Indigenous Peoples Plan (IPP) has not been prepared, but relevant elements of the policy have been integrated into the project design. In line with OP 4.10 requirements, this includes continued consultation to be carried out during the project implementation on the ESMP, including the technical assistance and support for the rural electrification program in the project area.

95. Broad community support (BCS) based on a process of free, prior and informed consultation (FPIC) has been documented in the SA during project preparation and public consultations. Furthermore, the affected communities will benefit from significantly reduced noise and pollution in the project area. Also, communal facilities, such as schools and hospitals, which are connected to the grid, will be provided with more reliable power supply. It is further recognized that women are generally the most affected by lack of access to basic services and gender concerns have been integrated into the ESA. The

improved power supply in the region will also result in considerable indirect benefits, which will include increased economic activities and job creation.

96. **Involuntary Resettlement** (OP 4.12). The SA has confirmed that there will be no physical resettlement, land acquisition or loss of income associated with the project, and all construction-related activities will take place within the existing site. No other entity except the existing power plant is currently using the project land. The existing plant has been in operation since 1975 and the due diligence review has not identified any legacy issues related to prior land use.

97. **Public Consultations and Information Disclosure.** The key project beneficiaries and potentially affected peoples include the inhabitants of the three IP villages that are located in the project influence area, and the project beneficiaries at the Mon State and national level.

98. Public consultations for the project affected area took place throughout project preparation. The SA contains the details of this process, concerns expressed by the affected people and how they were taken into account during the project preparation. The Executive Summary of the ESA was disclosed in local language to the NGOs and the local stakeholders including the local communities in the Project area in July 2013 and published on MEPE's website on July 9, 2013. The integrated ESA report was published at the World Bank's InfoShop on July 10, 2013.

Annex 1: Results Framework and Monitoring

MYANMAR: Electric Power Project

Project Development Objectives

PDO Statement

The project development objective is to increase capacity and efficiency of gas-fired power generation and strengthen the institutional capacity of the Ministry of Electric Power and the Myanmar Electric Power Enterprise.

Project Development Objective Indicators

				Cumulative Target Values						Data Source/	Responsibility for
Indicator Name	**Core**	**Unit of Measure**	**Baseline**	**2014**	**2015**	**2016**	**2017**	**End Target**	**Frequency**	**Methodology**	**Data Collection**
Generation capacity constructed under the project	☑	MW	0	0	40	80	106	106	Annually	MEPE Progress Report	MEPE
Electricity generation in Thaton station	☐	GWh	260	260	340	420	770	770	Annually	MEPE Progress Report	MEPE
Thermal efficiency of energy conversion in Thaton station	☐	Percentage	20	20	30	40	48	48	Annually	MEPE Progress Report	MEPE
MOEP/MEPE staff involved in training and capacity building activities	☐	Number	0	10	20	30	40	40	Semi-Annually	MEPE/MOEP Progress Report	MEPE/MOEP
National Electrification Plan (NEP)	☐	Text	None	Draft NEP submitted to National Energy Management Committee	NEP adopted by Government	Under implemen-tation	Under implemen-tation	Under implemen-tation	Semi-annually	MOEP Progress Report	MOEP

Intermediate Results Indicators											
				Cumulative Target Values						Data Source/	Responsibility for
Indicator Name	**Core**	**Unit of Measure**	**Baseline**	**2014**	**2015**	**2016**	**2017**	**End Target**	**Frequency**	**Methodology**	**Data Collection**
Construction Progress	☐	Percentage	0	30	60	80	100	100	Semi-Annually	MEPE Progress Report	MEPE
Actual cost vs Cost Estimates (overruns if >100%)	☐	Percentage	0	>75 <100	>60 <100	>60 <100	>80 <100	=100	Semi-Annually	MEPE Progress Report	MEPE
Reduction of CO_2 emissions per output generated	☐	gCO_2eq/kWh	0	0	0	0	400	400	Annually	MEPE Progress Report	MEPE

Annex 2: Detailed Project Description

MYANMAR: Electric Power Project

1. The project consists of two components: (a) a physical investment comprising a 106 MW CCGT power plant in Thaton, Mon State, and (b) a technical assistance and advisory services component focused on institutional and capacity building support of Ministry of Electric Power and Myanmar Electric Power Enterprise.

2. **Component 1: Combined Cycle Gas Turbine (CCGT) Power Plant (US$ 130 million).** The main component of the proposed project is the expansion of the Thaton GT station into a new CCGT power plant. A modern, high-efficiency, low-emissions CCGT power plant will comprise two 40 MW gas turbines with inlet air chillers, one steam turbine of 26 MW, a heat recovery steam generator (HRSG) and air-cooled steam condenser. Also, the plant auxiliary systems will include step-up transformers (11/66/230 kV) gas treatment filters and compressors, uninterrupted power supply, unit and plant control systems, and dry low emissions systems for reduction of NO_x emissions.

3. The selection of the 106 MW CCGT station, as the fastest and least cost approach to increase electricity production in Myanmar, is based on both technical and economic considerations. Regarding its contribution to the Myanmar's power sector development, the proposed CCGT power plant will provide a substantive increase in power generation capacity and electricity production for the country. It is expected that the project will provide 4.7 percent of the whole domestic electricity generation and an increase of 8.5 percent of the overall firm capacity, as of 2013. Also, the proposed project will meet roughly half of the peak demand in Mon State which is estimated at about 200 MW.

Table 2: Current capacity and electricity generation in Myanmar

Power Plant	Installed Capacity		Firm Capacity		Annual Production	
	(MW)	(%)	(MW)	(%)	GWh	(%)
Hydro	2,300	73.4%	709	65.5%	12,708	74.4%
Coal-fired	120	3.8%	27	2.5%	600	3.5%
Gas turbine	713	22.8%	346	32.0%	3,767	22.1%
Total	3,133	100%	1,082	100%	17,075	100%

Source: Ministry of Electric Power (MOEP) and WB staff estimations

4. Several considerations justify the selection of this technology for the first project in the energy sector since the re-engagement of the WBG in the country. The main factors are described below:

5. **Urgency.** The urgency of added capacity to the power grid in order to reduce power shortages and outages due to excessive demand prompted the government to request support from the WBG and other donors. Therefore, a solution that would meet the requirements in a short period of time, and at the same time being cost effective, was required. Upgrading and refurbishing a brown field power plant would be much faster and simpler than building a green field plant.

6. **Alternative technologies.** Other technologies such as hydropower, other renewable energies, or coal-fired power were evaluated. However, as an IEA report[10] shows on the investment costs of power generation, they would be more expensive and would take much longer to prepare and build, given the larger environmental impact, lack of access and services, as well as the need for construction of fuel supply and power discharge channels.

7. **Environment, Health, and Safety (EHS).** The safety and environmental standards under which the existing GT stations operate in Myanmar are far from what can be considered as good practice (including WBG's environmental standards for EHS and management of power plants). The operational replacement of obsolete GT units with modern and efficient turbines and control systems installed under the Project would more than double electricity generation with the same gas consumption and greenhouse gas (GHG) emissions in comparison to the old GT units, while reducing air emissions, decreasing noise levels, and improving operational control and hence occupational safety at the plant.

8. **Selection criteria.** Among 10 GT stations operating in the country, Thaton station was chosen in accordance with recommendations from the Norconsult report[11], due to the following reasons:

a) While IFC is considering support for IPPs located in the Yangon area with higher interest for private participation, this project focuses on GT stations serving other parts of the country, which have higher incidence of poverty and electricity shortages, such as Mon state;

b) Thaton is one of the oldest plants in the country, with no availability of spare parts for its control systems. Thaton gas turbines are still in operation after 200,000 working hours over 35 years, well over their technical life, and with efficiencies below 20 percent;

c) Thaton is conveniently located near the main country's gas-pipeline, which runs across Mon State towards Thailand, and is unlikely to experience reductions in volumes of transported gas. Thus, Thaton has a better gas supply reliability record compared with other GTs considered as alternative projects;

d) There is an existing 230 kV transmission line in the vicinity with enough capacity to evacuate all the electricity generated by the new CCGT and supply electricity to both the national grid and the local communities in Mon State;

e) There is available area within the power plant to expand and install the CCGT, without affecting other areas outside the plant; and

f) Thaton's plant configuration and fire fighting systems make it impossible to isolate a fire in a turbine from the rest of the turbines' hall. As such, Thaton's plant is more dangerous than other plants, and is in need of urgent improvement to meet international safety regulations

[10] International Energy Agency (IEA), 2010. *Projected Costs of Generating Electricity*, pp. 59-63.

[11] Norconsult AS, March 2013. *Inspection of gas turbine power plants: Shwedaung, Myanaung and Thaton.*

9. **Plant configuration and dimensioning.** Various options were evaluated with the objective to maximize the efficiency of the power plant with the constrained availability of gas supply in the domestic gas market, and particularly at Thaton station. Given the gas limiting factor, a system comprising 2 open cycle gas turbines of 40 MW each, plus one steam turbine of 26 MW has been proposed. Thus, the new CCGT station is designed to consume the same amount of gas (25 mmcfd) as the existing 3 outdated GTs are currently using, but generating double the amount of electricity. The use of state-of-the-art CCGT technology would increase the plant's thermal efficiency from the current 20 percent to approximately 50 percent.

10. **Design alternatives.** Due to the high ambient temperature (approximately 45 degrees Celsius) in the power plant, it is proposed to include air inlet chillers for the gas turbines to reduce the temperature of the air entering the gas turbines. Each air chiller will increase the power generated by each turbine on approximately 5 MW, while consuming around 1.5 MW to operate, and therefore increasing the overall power plant efficiency.

11. **Auxiliary systems.** The project includes the supply and installation of various auxiliary systems that would substitute outdated or missing equipment. Among others, step up transformers 11/66/230kV will be included, as well as gas treatment filters and compressors; emergency diesel generators; uninterrupted power supply for control systems; remote control station; and dry low emission systems that will reduce the emission of polluting NO_x.

12. **Construction and installation phases**. Due to the urgent needs of power supply in Myanmar to reduce load shedding and power shortages, the project is designed to provide electricity as fast as possible through a phased implementation schedule, as follows:

a) First phase of about 12-15 months, installation of two open cycle gas turbines with attached air inlet chillers; and

b) Second phase of 15-18 months, installation of two heat recovery steam generators (HRSG) and 1 steam turbine with the associated steam condenser.

13. The power plant will be implemented as a S&I contract including engineering and project management services, supply of equipment, construction supervision, testing, commissioning, and major maintenance. The contract will also include implementation of the environmental and social management plan during the construction phase, insurance and maintenance support. Furthermore, the contract will also include major maintenance works, spare parts, and training for staff during the initial 3-4 years following plant commissioning.

14. **Component 2: Technical Assistance and Advisory Services (US$ 10 million).** As the power sector faces several challenges after decades of underinvestment, aged infrastructures and poor sector performance, the technical assistance will be an integral part of the joint WBG analytical and advisory support for the power market reform, which will help improve investment environment and scale-up private sector participation in the power sector. This component will target some priority issues during the first 18 months, as described below:

a) **Development of the National Electrification Plan (NEP).** This activity will include a comprehensive strategy and implementation plan (to be started in 2014-15) to supply electricity to priority economic areas, investment needs and financing options, efficient institutional arrangements, capacity needs, and socioeconomic impact in different tiers of society, including aspects of gender protection and access to electricity for the poor. Also, the NEP will focus on the affordability of electricity services to the three main groups of stakeholders: (a) consumers, for connection and consumption costs; (b) electricity providers, for their operational and financial viability; and (c) national and local governments, for the fiscal affordability of subsidies needed for sustainable increases in electricity access. The WBG is collaborating with other donors (e.g. ADB, JICA, UNDP and EC) in the preparation of a Poverty and Social Impact Analysis (PSIA) for the energy sector, which will be helpful for the future design of a lifeline tariff or targeted subsidies for the poor and vulnerable consumers.

b) **TA on corporate financial analysis and forecasting for electricity enterprises.** This TA would enhance counterpart capacity to carry out a medium- and long-term assessment of corporate financial situation and financing requirements based on various technical, economic and financial parameters, and a financial viability action plan for the power sector. The results will assist the authorities make informed policy decisions –such as on electricity tariffs, electricity subsidies, natural gas price– that would ensure a sustainable sector financial situation and a sound Government fiscal management. A financial specialist could be hired to further develop the sector financial model prepared by the Bank for the Myanmar Electric Power Project. The specialist will provide training for the counterpart on the financial model and be available for implementation support.

c) **Study on the economic value of natural gas for domestic use in Myanmar.** The demand for natural gas in the domestic market is expected to increase substantially in the coming years, including additional demand for electricity generation. This study will help inform the government on the economic value of natural gas in Myanmar based on the principles of long run marginal cost (LRMC) analysis. Also, this analysis will help review competing demands for gas supply in the domestic market from the point of view of economic value added vis-à-vis gas exports.

d) **TA for review of electricity tariffs and subsidy mechanisms.** As the electricity cost of supply in Myanmar has risen sharply and the prevailing average electricity tariff is below the cost of supply, there is a need to adjust the tariff structure and to design an appropriate subsidies mechanism taking into consideration affordability issues of poor and vulnerable consumers. This TA will provide a comprehensive review of the current electricity tariff and fuel-pricing environment in Myanmar and selected comparator countries with similar tariff issues in the power sector. The TA will build on good practice and successful experience in tariff reforms from other countries that could be applicable for Myanmar. Also, a lifeline tariff will be considered as a protection measure to poor and vulnerable households.

e) **Owner's Engineer.** Engineering services for the procurement and implementation of CCGT plant including preparation of bidding documents, evaluation of bids, contract finalization,

contract management, project scheduling and quality assurance, plant testing and commissioning.

f) **Capacity building on procurement procedures.** Procurement capacity, particularly with WB procedures, is very limited. Technical assistance will include the preparation of bid documents and technical specifications, and bid evaluation reporting of the CCGT Plant. Also, the WB team in cooperation with consultants will provide intensive training on procurement, including WB procurement policy and procedures.

g) **Financial Management.** A technical assistance activity is proposed to help build MEPE's FM capacity, as well as train FM officers in WB procedures. A qualified financial management consultant will support MEPE and MOEP finance divisions for at least in the first year in a full time basis and later for periodic short term visits to assist with project implementation, FM capacity building and staff training. The consultant will report to MEPE General Manager Finance.

h) **TA for the implementation of Environment and Social Management Plan.** Environmental and social safeguards capacities and regulations in Myanmar fall largely behind to what is considered international good practice. This applies to screening and reviewing of economic activities and new investments for potential environmental and social adverse impacts as well as regulating, monitoring and enforcing compliance to adequate standards. Technical assistance in the field of environmental and social safeguards envisages support and capacity building at two levels. At the project site, this component will support the development, certification and operationalization of an Environment, Health, and Safety Management System (EHS-MS) for the Thaton Power Station and implementation of ESMP. Secondly, the Project will support MEPE with the development of a small environmental unit and the preparation and adaptation of EHS guidelines and procedures for operations of similar power stations in Myanmar.

15. Further activities, which are not yet fully identified, and require further discussion and study, may be included on a subsequent stage of the project. The details of the scope of these activities will be agreed with the government during project implementation, in consultation with other development partners, to ensure a coordinated approach on technical assistance and capacity building support.

Annex 3: Implementation Arrangements

MYANMAR: Electric Power Project

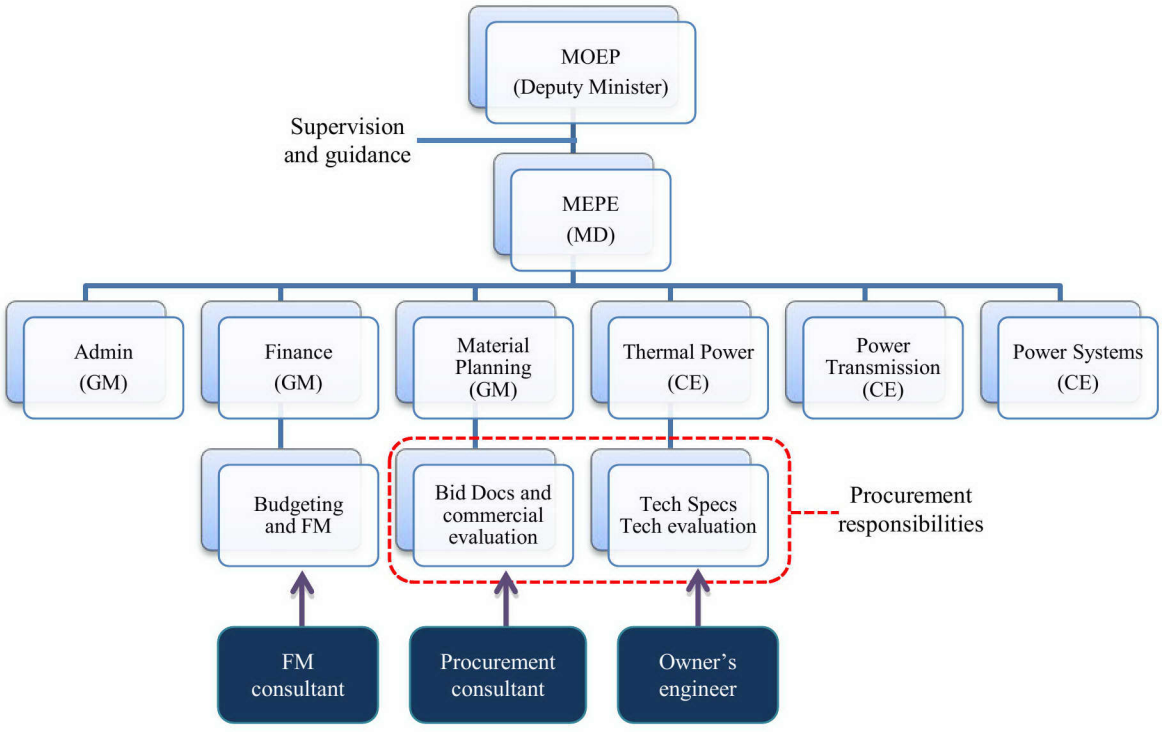
A. Project administration mechanisms

1. The project will be implemented between November 1, 2013 and November 1, 2017. Closing Date for IDA credit will be April 30, 2018.

2. **Component 1 – Combined Cycle Gas Turbine (CCGT) Power Plant** will be implemented by MEPE, which will own and operate the plant. MEPE will engage an experienced engineering company to assist as "owner's engineer", providing technical and operational support during preparation and implementation of the project.

3. The Implementing Agency MEPE is structured in 6 departments: Administrative, Finance, Material Planning, Power Transmission, Power Systems, and Thermal Power departments. Three of the mentioned departments will be responsible for the implementation of the CCGT project. Expected actions and responsibilities are represented in the following diagram:

Figure 1: Institutional arrangements



Legend:
MD: Managing Director
GM: General Manager
CE: Chief Engineer

4. The consultants will work closely with MEPE's operational staff, provide training and build capacity within each department, and report to the respective General Managers (GM) of Finance Department and Material Planning Department, and the Chief Engineer (CE) of the Power Thermal Department. Procurement responsibilities and actions will be carried out by Thermal Power Department on the technical part and by Material Planning Department the commercial part, and full cooperation between both is expected.

5. **Technical Assistance and Advisory Services** component will be implemented by MEPE as major recipient of TA and capacity building support. Other agencies may receive assistance from the project through TA activities to MEPE (e.g. E&S capacity building to MECF, gas pricing studies and policy advice to MOGE and MOE, etc.). Nonetheless, for the purpose of implementation arrangements, MEPE will be the implementing agency for all TA activities.

6. Further TA activities not identified at this stage and therefore not described in this document will be agreed during project implementation. In the case, future activities are proposed to be implemented by an agency different from MEPE, the government and the WB will need to agree on the arrangements prior to authorizing the activity.

7. **Lending arrangement.** There will be a Financing Agreement between IDA and Myanmar represented by the Ministry of Finance. The Ministry of Finance will make the proceeds of the credit available to MEPE under the government's budget. MEPE is a State Owned Enterprise (SOE) operating under the control of MOEP.

B. Financial Management, Disbursements and Procurement

i. Financial Management

8. The project design has been kept simple with one major component for the purchase and installation of a combined cycle gas turbine (CCGT) plant for about US$ 130 million and a technical assistance component for US$ 10 million. This means that the financial management and reporting requirements will also be relatively straightforward and therefore MEPE's existing financial management systems and procedures will be used.

9. **The overall financial management risk is assessed as Moderate**. The main risks that need to be addressed are (1) inadequate documentation of policies and procedures (although the systems of internal control themselves are reasonably strong), and (2) inexperience with managing and implementing donor funded projects. These risks will be mitigated by: (a) having in place an acceptable financial management (FM) manual for the project; (b) recruiting a qualified financial management consultant to complement the existing finance division staff, particularly in the initial project implementation phase, to assist with the preparation of the project FM Manual and to assist with project implementation and build FM capacity; and (c) having the project financial statements subject to an independent external audit annually by the Auditor General's Office.

10. The financial management arrangements will be deemed acceptable and meet the requirements of OP 10 when the proposed mitigation measures have been implemented.

Staffing

11. The Finance Division at MEPE's Head Office has a staff permit of 107 people with some positions unfilled. A good of number of staff members have a University degree and some have other undergraduate accounting qualifications. The General Manager Finance and the Finance Director are both qualified Certified Public Accountants with a good understanding of accounting standards, financial reporting, preparation of financial statements and the importance of strong internal controls. The General Manager Finance believes they have sufficient staff numbers but there are gaps at the staff officer level. Most staff members need more training particularly in accounting, and the development of their IT and English language skills.

12. As MEPE has no recent experience of working with the World Bank and does not have much experience managing other donor funds, assistance from a qualified financial management consultant will be needed at least in the first year (full time for the first year and then periodic short term visits) to assist with project implementation and FM capacity building, and reporting to the General Manager of the finance department.

Budgeting

13. The current budgeting process appears to be adequate for project budgeting purposes and therefore the project will follow the existing Government budgeting system and timetable to obtain Parliamentary approval. The Government budget is prepared on a cash basis and therefore Project budgeting and financial reporting will also be on a cash basis. A budget for the project will be prepared annually. The MEPE Finance Department will prepare the project's recurrent budget and the Thermal Power Department will prepare the capital budget and these two aspects will be consolidated into one overall project budget. It will then be reviewed by the Managing Director /Deputy Minister of Electric Power. Later, the overall project budget will be approved by the Minister of Electric Power, before submission to the Budget Department of the Ministry of Finance (MOF) and the Ministry of National Planning and Economic Development (MONPED). The Budget Department of MOF and MONPED will then review and approve the project budget, before its submission by the MOF -via the Vice President- to the Parliament for approval.

14. The annual budget will be broken down into 6 monthly budget allocations based on the timing envisaged for implementation of project activities. Explanations of variances between actual versus budgeted expenditure will be reported in the Interim Unaudited Financial Report (IFR) and linked to the physical progress report of project implementation on a 6 monthly basis.

15. It will be important that the budget for the initial period from the Project effectiveness date is included in the Government budget for the 2013/14 financial year. The revised budget process will take place during July/August 2013 and will be approved by Parliament in November 2013. This will mean MEPE has the ability to incur project expenditure from the date of Parliament's approval of the revised budget, which is expected to take place in November 2013, and ensure Project implementation activities are not delayed. The approval process will be similar to that described above. As construction of an asset is involved, the approval from the Ministry of Construction and the Ministry of Industry will also be required.

16. Budgets will be reviewed semi-annually and revised if necessary through the Government's supplementary budget process. The supplementary budget will be prepared and follow the same approval process as the annual budget. The budget execution will also be reviewed during each implementation support mission together with a review of implementation progress.

17. The budgeting process, timing and review of execution will be detailed clearly in the project's financial management manual.

Accounting Policies and Procedures

18. The Project will use the cash basis of accounting for preparation of the Project's interim financial statements and annual financial statements. MEPE's own financial statements are prepared on a partial accruals basis in accordance with the current accounting standards in place, which are based on a dated version of Generally Accepted Accounting Standards.

19. An acceptable financial management manual will be prepared. Appropriate accounting policies will be agreed and financial reporting procedures will be determined and detailed in the financial management manual. The financial management consultant will provide support and assist MEPE with drafting of the financial management manual. The consultant will review the current policies and procedures and the detailed systems of internal control and determine if any additional control measures need to be implemented for the Project. The financial management manual will subject to review and acceptance by the World Bank.

Internal controls

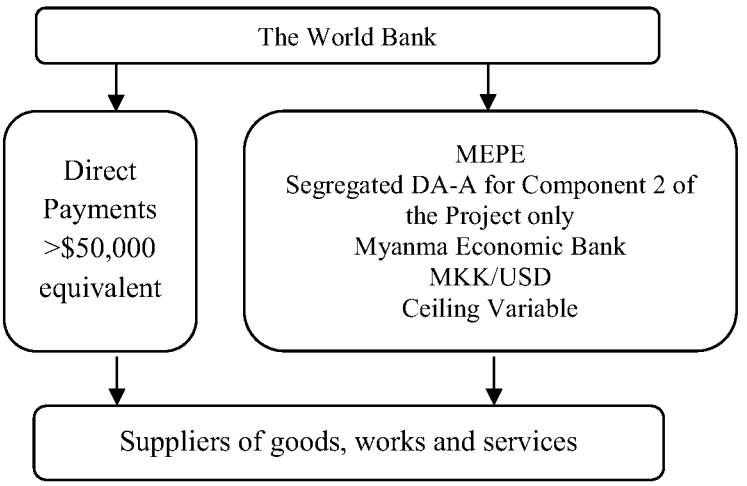
20. The Project will use the existing systems of internal control. Specific controls over soft expenditures (training, workshops, and travel and accommodation), commitments and the monitoring of work in progress will be implemented. The policies and procedures for accounting, financial authorities and delegation levels, segregation of duties for incompatible functions, reconciliations and policies on safeguarding of assets will be detailed in the financial management manual.

Fund flows

21. The expenditure under Component 1 will all be paid via Direct Payment. Expenditure under Component 2 will be primarily paid via two Designated Accounts (DAs). MEPE will open two Segregated DAs, one denominated in Myanmar Kyat (MKK) and one in United States Dollars at the Myanma Economic Bank or another domestic bank acceptable to IDA[12].

[12] The U.S. Department of the Treasury issued a general license on February 22, 2013 to authorize additional U.S. economic activity in Myanmar. The general license, issued by the Office of Foreign Assets Control (OFAC), allows individuals, companies, and financial institutions to conduct most transactions – including opening and maintaining accounts and conducting a range of other financial services – with four of Myanmar's major financial entities: Myanma Economic Bank, Myanma Investment and Commercial Bank, Asia Green Development Bank, and Ayeyarwady Bank.

Figure 2. Fund Flows



Financial Reporting

22. MEPE Finance Division will be responsible for the recording of all financial transactions for the Project, preparing the 6 monthly unaudited interim financial statements, and the annual project financial statements. The existing manual system will be used to record the Project's financial transactions on a cash basis. Monthly project financial reports will be produced including actual versus budget variance analysis for Project management decision making purposes. These financial reports will be reviewed by the Project Manager and Managing Director before forwarding to MOEP and the Budget Department of MOF.

23. The 6-monthly Interim Financial Statement (IFR) will also include a project implementation progress report that will be prepared by the Engineering Department. The Managing Director will review and approve the IFR prior to it being submitted to the World Bank no later than 45 days after the end of each 6-month period. The format and content of the IFR will be agreed during negotiations.

Audit arrangements

24. The Union Office of the Auditor General will be the external auditor of the Project based on a TOR acceptable to the World Bank. MEPE will agree on the TOR with the Office of the Auditor General within 3 months of project effectiveness.

25. Audit reports and management letters will be submitted to the World Bank no later than 6 months after the end of each fiscal year (31 March).

26. The audit report and audited financial statements are required to be publicly disclosed following the World Bank Policy on Access to Information. The Bank and MOEP agreed that these documents will be disclosed on the MOEP's website.

Implementation Support and Supervision Plan

27. Financial management implementation support will be frequent in the first year of project implementation, and then at least bi-annually, thereafter, depending on the updated project financial management risk assessment. The FM missions will include reviews of the ongoing adequacy of the financial management arrangements, the progress with FM capacity building and progress with the financial viability action plan for the power sector.

Disbursements arrangements

28. The primary disbursement methods will be Advances and Direct Payments. The Designated Accounts (DAs) will have a Variable Ceiling based on 6 monthly forecasts of expenditures under Component 2 only (since Component 1 will be disbursed via Direct Payment). Supporting documentation required for documenting eligible expenditures paid from the DAs are Summary Sheets with Records and Statements of Expenditures (SOE). The frequency for documenting expenditures paid from the DAs will be quarterly. Direct Payments will be documented by Records.

29. The Reimbursement and Special Commitment disbursement methods will also be available (to offer the maximum flexibility). Reimbursements would also be documented by Summary Sheets with Records and Statement of Expenditures (SOE). Special Commitment applications will require a Letter of Credit and Records as the supporting documentation.

30. The Minimum Application Size for Reimbursements, Special Commitments and Direct Payments will be US$ 50,000 equivalent.

31. Withdrawals up to an aggregate amount not to exceed SDR 70,000 (USD 100,000) may be made for payments made prior to the Signing Date, but on or after August 27, 2013 (Retroactive Financing) for Eligible Expenditures related to the Project Development Objective and included in the Project description, for items procured in accordance with the applicable Bank procurement procedures.

32. The Project will have a Disbursement Deadline Date (final date on which the World Bank will accept applications for withdrawal from the Recipient or documentation on the use of Credit proceeds already advanced by the World Bank) four months after the Closing Date. This "Grace Period" is granted in order to permit the orderly project completion and closure of the Credit account via the submission of applications and supporting documentation for expenditures incurred on or before the Closing Date. Expenditures incurred between the Closing Date and the Disbursement Deadline Date are not eligible for disbursement, except as otherwise agreed with the World Bank.

33. All documentation for expenditure submitted for disbursements will be retained by MEPE and be made available to the external auditors for their annual and interim audits, and to the World Bank and its representatives if requested[13]. Should the auditors or the World Bank Implementation Support mission

[13] The General Conditions require the Recipient to retain all records (contracts, orders, invoices, bills, receipts, and other documents) evidencing eligible expenditures and to enable the Bank's representative to examine such records. They also require the records to be retained for at least one year following receipt by the Bank of the final audited financial statement required in accordance with the legal agreement or two years after the closing date, whichever is later. Recipients are responsible for ensuring that document retention beyond the period required by the legal agreement complies with their government's regulations.

find that disbursements made were not justified by the supporting documentation, or are ineligible the World Bank may, at its discretion, require the Recipient to (i) refund an equivalent amount to the World Bank; or (ii) exceptionally, provide substitute documentation evidencing other eligible expenditures. The World Bank may also withhold disbursement of additional deposits into the DAs (if the ineligible expenditures were paid from the DAs). If the Recipient does not comply with any of the requirements stated above, within 12 months following notice by the World Bank to the Recipient of the requirement, the World Bank may (a) decline to allow the use of DAs under new Grants/Credits made to or guaranteed by the Recipient, (b) establish compliance as a condition for Board presentation of new Grants/Credits, (c) suspend disbursements under the Credit; or (d) in extreme cases, suspend disbursements under all ongoing Grants/Credits to or guaranteed by the Recipient.

34. Before the World Bank closes the Credit account (two months after the Disbursement Deadline Date), the Recipient must provide supporting documentation satisfactory to the World Bank that shows the expenditures paid out of the DAs, or refund any undocumented balance. If the Recipient fails to provide the documentation or refund required by the World Bank by this date (two months after the Disbursement Deadline Date), the World Bank does not permit the use of DAs under new Grants/Credits made to or guaranteed by the Recipient.

35. Disbursements from the Credit shall be made against the following expenditure category(ies):

Expenditure Category	**Allocation USD**	**Allocation XDR**	**Financing % (inclusive of taxes)**
(1) Goods, Works, Non-Consulting services, Consultants' Services, , Training and Workshops for the Project	140,000,000	92,600,000	100%
Total	**140,000,000**	**92,600,000**	

Financial Management and Disbursement Action Plan

Action	**Responsible party**	**Timing**
Project budget to be included in the Government budget for 2014 fiscal year	MEPE	Revised Government budget process August 2013
Terms of reference for FM consultant	MEPE	1 August 2013
Have in place acceptable FM Manual	MEPE	20 September 2013
MEPE Finance staff trained in FM policies, procedures and disbursements	MEPE and WB	Project launch workshop
Agreement with Office of the Auditor General on a TOR acceptable to the WB	MEPE	Within 3 months of project effectiveness

ii. Procurement

36. The country public procurement system and practices of Implementing Agency were assessed. The only written documents made available which could be said to provide a form of regulatory instruction in the field of public procurement are two instructions (letters) emanating from: (i) the Union Minister at the Ministry of the President's Office, dated June 2, 2011; and (ii) from the President of the Union, dated September 23, 2011. There is, in addition, a Tenders Regulation, published in the newspaper on May 3, 2013, that also provides a limited number of provisions relating to procurement. It is not, as its name would suggest, a comprehensive regulatory instrument governing all aspects of public tenders.

37. The thrust of the President's letter is to remove the practice of the 'Close Tender System' (this means 'closed – not openly advertised'). The letter uses two expressions: a closed tender system to refer to purchasing and a closed bidding system to refer to the disposal of State assets. The letter states "open tender/open bidding should be applied in accordance with the instructions by the President". It is understood that the letter itself is the means of conveying those instructions and that there is no separate document that does so. The President's instruction nevertheless firmly establishes competitive procurement through open tender as the norm based on concerns for ensuring competitive pricing, a free market, integrity and the avoidance of corruption.

38. Procurement for the project will, therefore, be carried out in accordance with the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated January 2011; "Guidelines: Selection and Employment of Consultants by IDA Borrowers" dated January 2011; and the provision stipulated in the Financing Agreement. MEPE will be responsible for the procurement activities of this proposed project. It is expected that an international consultant will assist MEPE to prepare the technical specifications following international best practices and continue through support for preparation of bidding documents, evaluation reports and other procurement activities. The procurement packages financed under the proposed project will be procured according to the Bank's Guidelines, with the assistance from the consultants. For each contract to be procured and financed under the project, the different procurement methods, estimated costs, prior review requirements, and timeframe will be defined in a procurement plan. The plan will be updated annually, or as required, to reflect actual project implementation needs and improvements of the institutional capacity. Contract award information shall be made publicly available in accordance with the World Bank's Procurement Guidelines in a format agreed with the Bank.

Goods, Works and Services

39. Under Component 1, there will be one large value contract for 106 MW Combined Cycle Gas Turbine (CCGT) plant, consisting of two gas turbines, 40 MW each, and one steam turbine of 26 MW, which shall be procured through International Competitive Bidding (ICB). Single-responsibility contract will be applied and the World Bank's Standard Bidding Documents for Plant Design, Supply and Installation shall be used.

Selection of consultants

40. The World Bank's standard Request for Proposals for the selection of consultants will be used. Short lists of consultants for technical assistance services with an estimated cost of less than US$ 100,000

or equivalent per contract may be composed entirely of qualified national consultant in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines. This threshold may need to be adjusted depending on the capacity of local firms and their willingness to participate in calls of proposals.

Individual Consultants

41. In case MEPE needs to hire individual consultants, they will be selected by comparing qualifications of at least three candidates and hired in accordance with the provisions of paragraphs 5.1 through 5.3 of the Consultant Guidelines.

Prior Review

42. All consultant contracts above US$ 50,000 and contracts following Single Source Selection procedures are subject to the World Bank's prior review. Other prior review requirements will be specified in the procurement plan.

MEPE's Procurement Capacity Assessment

43. The WBG carried out a procurement assessment in early 2013 with the following findings: (a) procurement is seen as synonymous of purchasing from suppliers and resolves primarily around prices offered by distributors; (b) there is significant attention to defining new rules and practices in procurement, primarily from the Office of the President; (c) agencies at national and regional levels are taking on responsibility for executing procurement, with limited guidance on what they are supposed to do and limited capacity to achieve efficient outcomes; and (d) there are almost no internal or external control mechanisms to monitor procurement performance.

44. Procurement capacity at MEPE is limited, since MEPE does not have experience with procurement financed by international financial institutions. However, the consultant is expected to assist MEPE to prepare the bidding documents (including technical specifications) and evaluation report of the CCGT Plant. Also, intensive training on procurement will be provided by the consultants and the World Bank's team.

Major risks and mitigations

45. **Lack of legal framework of public procurement:** There is no national level legislation on public procurement and no regulation within the MOEP/MEPE. In project implementation, there may be confusions to the project as for the procedures and rules to be followed. To address this risk, it is clarified and agreed with MEPE that the project will strictly follow the World Bank Procurement/Consulting Guidelines.

46. **Existing registration system:** In project implementation, the Bank team will discuss with DEP/MEPE to clarify that the existing registration procedures will not restrict open competition.

47. **Multiple rounds of pricing:** The practice of multiple rounds of pricing will not be used for the contracts financed by the proposed project.

48. **Limited capacity and no experience with the donor financed procedures:** As an initial plan, technical assistance will include the procurement preparation and evaluation of the CCGT Plant. Also, intensive training on procurement will be provided by international consultants. The Bank team will provide procurement training to the implementing agency staff to familiarize them with the Bank's procurement policy and procedures.

49. For employment of consultants, the Ministry of National Planning and Economic Development (MONPED) issued Guidelines, which require mandatory selection of national consultants from the list provided by line ministries. While this is not consistent with the latest regulations on open-tender, *it will be clarified with MEPE* that selection of consultants will not be restricted to the list established by the ministries.

50. **Inadequate technical specifications and use of brand names:** The consultants will assist MEPE to prepare the technical specifications following international practice.

51. **Lengthy process of procurement:** When the procurement plan is prepared, major milestones for each contract will be identified. The World Bank team will closely monitor the progress.

Procurement Plan

52. In accordance with the World Bank's Procurement and Consultant Guidelines, as part of project preparation, MEPE shall prepare a detailed and comprehensive procurement plan including all contracts for which procurement action is to take place in the first 18 months of project implementation. MEPE shall update procurement plans throughout the duration of the project, at least annually or as required, to reflect actual project implementation needs and improvements in institutional capacity. The World Bank will arrange the publication on its external website of the agreed initial procurement plan and all subsequent updates once it has provided a no objection.

Consultant Services

1	2	3	4	5	6	7
Ref. No.	**Contract (Description)**	**Estimated Cost (US$)**	**Selection Method**	**Review by Bank (Prior / Post)**	**Expected Proposal Submission Date**	**Comment**
MEPE-CS-1	Technical Assistance (TA) for the National Electrification Plan	500,000	Firm QCBS	Prior	September 2014	
MEPE-CS-2	TA for financial analysis and forecasting	300,000	Firm QBS	Prior	March 2014	
MEPE-CS-3	TA for economic valuation of cost of gas supply	100,000	Firm QBS	Prior	June 2014	
MEPE-CS-4	TA on electricity tariffs	300,000	Firm QCBS	Prior	March 2014	
MEPE-CS-5	TA on Environmental and Social Safeguards	500,000	Firm QCBS	Prior	December 2014	
MEPE-CS-6	Procurement Specialist	50,000	Individual	Prior	September 2013	
MEPE-CS-7	FM Specialist	50,000	Individual	Prior	September 2013	
MEPE-CS-8	Owners Engineer	5,000,000	Firm QCBS	Prior	November 2013*	

(*) Indicative date as services of Owners Engineer will be required after the signing of CCGT contract.

Goods

1	2	3	4	5	6	7	8	9
Ref. No.	**Contract (Description)**	**Estimated Cost (US$)**	**Procurement Method**	**Pre-qualifi-cation (yes/no)**	**Domestic Preference (yes/no)**	**Review by Bank (Prior / Post)**	**Expected Bid-Opening Date**	**Comments**
MEPE-EPC-1	CCGT Power Plant (Supply & Installation)	130,000,000	ICB	Yes	No	Yes	December 2013	

Frequency of Procurement Support

53. The procurement capacity assessment indicated the need for bi-annually implementation support missions to assist in project implementation during the first year of operation. The frequency of implementation support for procurement will be further defined depending on the progress and capacity of the implementing agencies.

Details of the Procurement Arrangements Involving International Competition

54. **Goods, Works and Services** – There will be international competitive bidding packages as part of the project for 106 MW Combined Cycle Gas Turbine (CCGT) plant, consisting of two gas turbines, 40 MW each, and one steam turbine of 26 MW, as well as auxiliary systems.

55. **Consulting Services** - The shortlists may comprise international firms with international experience for the consulting services under Component 2.

C. Environmental and Social (including safeguards)

i. Environmental assessment and safeguards

56. The project has been classified as category 'B' because the impacts that may occur during construction are limited, site-specific and mitigation measures can be readily designed. In accordance with the requirement of a Category B project, an Environmental and Social Assessment (ESA) was carried out for the proposed project components, and an associated environmental and social management plan (ESMP) was prepared to determine the mitigation measures, monitoring program and necessary institutional arrangements as well as capacity development. An internationally reputable consultancy firm on the basis of good international practices as well as applicable Bank safeguard policies including for WBG General EHS Guidelines and WBG EHS guidelines for thermal power generation has prepared the documents.

57. **Environmental benefits**: The Project's investments will take over power production from the old gas turbines at the Thaton power stations and the old facilities, which will not be dismantled under the Project, and will only be used in emergency situations or during periods of maintenance of the new equipment. Typically, downtime of the new turbines for maintenance or disruptions, and hence the possibility that the old turbines will be used, is around two weeks per year. With the substantially higher efficiency and environmental performance standards of the new equipment (lower emissions to air, less waste consumption, lower noise generation levels) and the introduction of a certified Environmental, Health, Safety Management System (EHS-MS), the investment will reduce environmental impacts and is considered to be beneficial to the surrounding environment and the local population. Natural gas fired power plant have low emissions of $PM_{10/2.5}$ and hydrocarbons. With the natural gas's sulfur contents of 0.002 percent or less also sulfur dioxide emissions are very low. The main air pollutant from natural gas is NO_x and emission levels are expected to be around 70 percent less after the new turbines become operational. The level of carbon dioxide emissions will be substantially reduced per unit of electricity produced, but the total CO_2 emissions will roughly remain at the existing level because the plant will continue to use the same amount of natural gas. Noise levels at the fence surrounding the site currently reach levels of 60-70 dB(A) and at places (main entrance) levels up to 80 dB(A). The noise levels from the new turbines, in compliance with international standards, are expected to be reduced to between 50 (nighttime) and 55 dB(A) (daytime) at the fence of the site.

58. Construction activities with the installation of the CCGT units would cause emissions from construction equipment, airborne dust and noise, as well as small amounts of wastewater (washing water) and solid waste (inert construction waste). During the operational phase air emissions and noise levels will be determined by the specifications of the installed equipment, in compliance with WBG EHS

Guidelines and international standards, which represent a substantial improvement in comparison to the current situation. Wastewater and waste generation are limited and largely unrelated to the core power generation process (cleaning and runoff water, wastewater from offices and maintenance area, etc.). Mitigation measures are included in the ESMP for both the construction and the operational stage. These potential measures for the operational stage will be substantially further defined under the EHS Management System and will include a comprehensive due diligence audit for the existing facilities (including identification of PCB and asbestos presence) and management procedures and interventions for sorting of waste and collection under municipal services (although these are limited) and basic wastewater control (through for instance a retention pond and/or septic tank).

59. Due to lack of adequate national environmental standards, the WBG EHS general guidelines and those for thermal power generation will apply to the project, as well as international good practice standards such as EU Directives, US-EPA standards, or equivalent. All investments and other project interventions will occur at the existing site within its perimeter and there are no association investments (such as for transmission and distribution network, water supply, and road works).

60. **Environmental and Social Management Plan (ESMP).** The ESMP includes policies requirements and applicable environmental and social standards; requirements for the development during project implementation of an EHS Management System to be applied to operations at the project site; and mitigation measures, monitoring plans, implementation arrangements, and capacity building for implementation of the ESMP. The ESMP also gives the estimated costs for the mitigation measures and monitoring programs for both the construction and operation phases. The ensure adequate implementation of the ESMP and development of the EHS-MS, the following activities and steps will be followed during project implementation:

a) Under Component 2, a firm will be contracted to give day-to-day support to MEPE for the implementation of the ESMP including supervision of the project investment works and the development of the EHS-MS.

b) Following the selection of the turn-key contractor, the contractor will be required to prepare an EHS plan for works implementation, subject to Bank review. The contractor's EHS plan need to comply with the ESMP and further specify environmental procedures, e.g. for the management of construction waste materials.

c) A comprehensive EHS due diligence audit will be conducted into the existing facilities and operational practices to form the basis for the development of the EHS-MS. The results of the audit are subject to Bank review.

d) The EHS-MS for the Thaton GT station will be developed and will be ready and adopted prior to the commissioning of the new facilities. The draft EHS-MS will be subject to Bank review and will be audited by a competent and internationally accredited agency. The EHS-MS will cover waste and wastewater management, environmental monitoring, worker's health and safety procedures, inspection regimes for these areas, basic emergency procedures, specifications for recurrent training programs, a three-year program for continuous performance improvements, reporting and supervision requirements including reporting of problems and near-misses, and a scheme for independent system audits.

61. The initial due diligence review that was undertaken as part of the ESA showed a lack of safeguards and operation procedures for workers' health and safety and environmental good practices. The EHS Management System will therefore, as mentioned, include health and safety measures that will substantially improve standards and practices to deal with these issues for both the new and existing facilities in an adequate manner.

ii. Social assessment and safeguards

62. **Indigenous Peoples (OP 4.10).** The Indigenous Peoples policy is triggered because of the presence of ethnic minorities (EMs)/Indigenous Peoples (IPs) within the project's area of influence. The overwhelming majority (over 90 percent) of the beneficiaries and affected peoples in the Project influence area are IPs and, therefore, a separate Indigenous Peoples Plan (IPP) has not been prepared, but relevant elements of the policy have been integrated into project design (see below). In line with OP 4.10 requirements, this includes continued consultation to be carried out during the project implementation on the ESMP, including the technical assistance and support for the rural electrification program in the project area.

63. A Social Assessment (SA) was carried out as part of the ESA process mentioned above. The closest habitation is some 500 meters from the site perimeter fence, and there are three villages surrounding the proposed project site. Two of these, Than Ban, and Kyar Pan are located about 1.5 km from the project site. Than Ban has a total household population of 150 (400 persons) while Kyar Pan consists of 330 households (1,500 persons). A third village, Nyaun Wyne, is located 2 km from the project site and is comprised of 252 households. In addition 120 staff households are located next to the plant. The majority of the inhabitants in the three villages are ethnic minorities. In Than Ban, the Keren represent 90 percent of the population, while there is almost an even distribution among Keren (45 percent) and Pao (40 percent) in Kyar Pan. In Nyaun Wyne 80 percent belong to the Keren group. According to the social assessment members of the different minorities prefer to be referred to as indigenous peoples rather than ethnic minorities.

64. Broad community support (BCS) based on a process of free, prior and informed consultation (FPIC) has been documented in the SA during project preparation and public consultations. Access to electricity is one of the main priorities of local IPs, as 85 percent of households are not electrified, 73 percent of which cannot afford the connection fee. Support for the project is 98 percent among households without connections and 100 percent among households with connections. No outright objections were documented in the SA.

65. The Bank will provide technical assistance and support to the government to prepare and accelerate rural electrification in the project area. Furthermore, the affected communities will benefit from significantly reduced noise and pollution in the project area. Also, communal facilities, such as schools and hospitals, which are connected to the grid, will be provided with more reliable power supply. It is further recognized that women are generally the most affected by lack of access to basic services and gender concerns have been integrated into the ESA. The improved power supply in the region will result in considerable indirect benefits, which will include increased economic activities and job creation.

66. A culturally appropriate grievance redress mechanism will be established in consultation with potentially affected IPs to address grievances by the affected IPs' communities and to ensure that any project related complaints are promptly addressed. A first instance of dispute handling where IPs are fully represented will be set up with the aim of settling any disputes amicably. If necessary, the project will establish a committee, which will include IP representatives and project management. Court cases will be time consuming and expensive and are likely to be beyond the reach of local IP stakeholders and should be considered a last resort. It is therefore critical to establish more informal first and second tier grievance management mechanisms. Each case should be carefully documented and the nature of grievance, agreed actions to be taken and subsequent monitoring recorded.

67. **Summary of SA findings.** The socioeconomic survey data incorporated 95 respondents from the 3 villages of Than Ban, Kyar Pan and Nyaun Wyne. First-hand data developed through the survey were combined/cross checked within group discussions. It is anticipated that the information gathered during the household survey will serve as project baseline for poverty and living standards, as well as a range of other social and economic data for subsequent project monitoring. A random sampling technique allowed for 10 per cent household coverage of the settlement in the target villages. The survey was coordinated by the social team using local enumerators in gathering the data.

68. A baseline survey, which has provided details on socioeconomic conditions of the project area, has been carried out as part of the SA. As mentioned above, there are three IP villages surrounding the proposed project site. In addition there are 120 staff households next to the plant. While the majority of the workers at the plant are Burmese, almost all the inhabitants in the three villages are ethnic minorities and the Burmese represent three to eight percent.

69. Among households without connections 40 percent of respondents viewed themselves as 'poor', 33 percent as 'near poor', 27 percent as 'average'. As discussed above, the households belonging to the first two categories cannot afford electricity connections. Access to regular employment is very limited and 62 percent of respondents have irregular/seasonal income from farming, fishing or other casual work. In terms of livelihoods, 26 percent of respondents are wage earners, 21 percent farmers and 17 percent are engaged in animal husbandry. Among households with connections only 5 percent viewed themselves as 'poor', 25 percent as 'near poor', 63 percent as 'average' and finally 8 percent as 'better off'. This group is also engaged in farming to a larger extent than the non-connected households. As expected connected households are on average better off than those that are not connected. Infrastructure in the project area is poor with inadequate drainage, water supply and roads.

70. In general SA findings indicate that villages are cohesive and social integration and a fairly high level of participation are observed in community affairs, children going to the same school, intermarriages, and openness within the community social network. With regard to gender, it is recognized that women are generally the most affected by lack of access to basic services and gender concerns have been integrated into the ESA. Women were also well represented in the different focus group discussions at the village level. However among the *Keren*, which is the dominant ethnic group in the project area, husband and wife share household responsibilities relatively equally, which is not common among other ethnic groups.

71. **Stakeholder consultation.** Following the completion of the social assessment a stakeholder workshop with about 50 participants was convened in Thaton. Participants included representatives from

government, civil society and key Project beneficiaries from the three IP villages that are located in the project influence area.

72. The conclusions from these consultations indicate that the expected impacts of the project are perceived to be positive, but also that there are expectations regarding future expansion of connections. It was emphasized at the workshop that the project would be limited to the replacement of turbines at the existing GT station. In other words, one of the key stakeholder priorities –access to electricity– will not be provided by the project. The most significant direct benefit identified is the anticipated availability of regular power supply for the 15 percent of households already connected. However, the current electricity shortages and power outages also affect business communities and communal facilities, such as schools and hospitals, which are connected to the grid. The supply of more reliable power supply will therefore benefit all stakeholders in the project area. Another significant impact discussed was the potential increase of opportunity for economic development, and many participants believed that improved power supply would result in an increase in trade and industrial activities. According to the SA over 90 percent of households had indicated their interest to connect to the grid and many of the questions raised were related to future additional power connections as a result of the project. Participants at the workshop recommended that villages near the project site should be included in the electrification program carried out by the power distribution company (ESE). In response it was emphasized that this project was limited to increased power generation and that plans regarding future rural electrification would depend on government priorities. It was however also explained that the project would represent a first step towards facilitating future expanded electrification, as the Bank will provide technical assistance and support to the government to prepare and accelerate rural electrification in the project area.

73. **Non-Governmental Organizations (NGO) meeting.** In order to reach major national NGOs, a separate meeting was convened in Yangon immediately following the Thaton consultations. Almost 50 representatives from a wide range of organizations participated. After a WB presentation of the planned project, ample time was set aside for a 'questions and answers' session and discussion. It is notable that the comments and questions all focused on the broader World Bank involvement in the energy sector rather than the project itself. Several issues were raised by NGO representatives regarding the current condition of distribution networks, rural electrification, affordability of access, and future tariffs and subsidies. Concerns about the protection of indigenous peoples and the poor in the context of future hydropower projects were also raised. In response the Bank emphasized that these issues were important and had to be addressed in line with the government plans and priorities.

74. **Involuntary Resettlement (OP 4.12).** The SA has confirmed that there will be no physical resettlement, land acquisition or loss of income associated with the project, and all construction-related activities will take place within the existing site. No other entity except the existing power plant is currently using the project land. The existing plant has been in operation since 1975. The due diligence review during Project preparation has not identified any legacy issues related to prior land use.

75. **Applying the Indigenous Peoples policy (OP 4.10) in Myanmar,** The Bank's knowledge of ethnic minorities (EMs) in Myanmar is still limited, and it is at this stage not clear which EMs would qualify as Indigenous Peoples according to the Bank policy. Further analytical work will be carried out to ensure that future decisions regarding EMs/IPs are based on solid knowledge. In the context of this project, the majority of the population in the project area belongs to different EMs, and the SA has also

underlined that the members of the concerned ethnic minorities identify themselves as Indigenous Peoples and indigenous languages are spoken. In order to explore IP related issues further the Bank hired an internationally recognized expert on ethnic minorities in Myanmar to review the findings of the social assessment and to give advice on issues related to ethnic minorities/ indigenous peoples. In view of the evolving and complicated ethnic relationships in the country, the review recommended further consultations.

76. While these broader challenges clearly cannot be addressed as part of this project, the Bank will expand consultations significantly as part of the technical assistance and support to the government to prepare and accelerate rural electrification in the project area.

77. Finally, the expert's review also recognized that the stakeholder consultation process for this project could set precedence for other future large-scale infrastructure projects and promote local awareness about the principle of free, prior and informed consent.

78. **Overview of consultation and disclosure process**. This is the first investment operation the WBG is supporting in Myanmar after more than two decades of absence. Also, the consultation and disclosure done under this operation is the first such public presentation of a government project in Myanmar, as the country has no such requirements and practices in place yet. Despite the lack of institutional capacity and experience in public consultations and disclosure of the government's investment projects, the Ministry of Electric Power (MOEP) and Myanmar Electric Power Enterprise (MEPE) did a very good job in pioneering this process in Myanmar, which is summarized below.

a) **Initial consultations**, 13 – 14 March 2013: Based on the Terms of Reference for the Environmental and Social Assessment (ESA) approved by the Bank, a first round of consultation was convened with local stakeholders in Thaton in March 2013. Consultations were held in Than Ban, Kyar Pan and Nyaun Wyne, the three villages considered to be within the zone of influence of the project.

b) **Consultations with local stakeholders**, 20 May 2013: Following the completion of the draft ESA, a stakeholder workshop with about 50 participants was convened in Thaton on May 20, 2013. Participants included representatives from government, civil society and local stakeholders.

c) **Meeting with national NGOs** in Yangon, 21 May 2013: In order to reach major national NGOs, a separate meeting was convened in Yangon immediately following the stakeholder consultation. More than 50 representatives from a wide range of organizations participated. Practically all comments and questions focused on the broader World Bank involvement in the energy sector rather than the specific project in Thaton, which was perceived as beneficial and did not raise any concerns among participants. Key issues raised by NGO representatives included reliability and efficiency of distribution services, rural electrification, affordability of access to electricity, and future subsidies.

d) **Disclosure of safeguard documentation:** The Executive Summary of the ESA was disclosed in local language to the NGOs and the local stakeholders including the local

communities in the Project area in July 2013 and published on MEPE's website on July 9, 2013. The integrated ESA report was published in the Infoshop on July 10, 2013.

79. **Integration of IP policy elements in project design:** The policy is triggered because of the presence of IPs within the project's area of influence. Since IPs represent the overwhelming majority of the potential beneficiaries and affected population in the Project influence area, no separate Indigenous People Plan was prepared, but relevant elements of the policy have been directly integrated into project design. The depth of analysis should be proportional to the expected impacts. Key IP policy elements include:

a) **Social assessment:** The preparation of a social assessment (SA) proportional to the anticipated impacts of the project has been prepared. The SA has identified the key project stakeholders and an assessment of potential impacts on IP communities has been carried out. The SA contains detailed socio-economic information on the three IP villages considered to be within the zone of influence of the project.

b) **Free, prior and informed consultation (FPIC):** As indicated in the main text, a process of free, prior, and informed consultation with the affected Indigenous Peoples' communities was carried out during project preparation that led to broad community support for the project. Access to electricity is one of the main priorities of local IPs, as 85 percent of households are not electrified, 73 percent of which cannot afford the connection fee. There are expectations that the project will help increase access to electricity in the three villages considered to be within the zone of influence of the project, but as documented in the SA, broad community support was nevertheless reached based upon an understanding that electrification of villages is beyond the scope of this project.

c) **Ensure FPIC during implementation:** In line with OP 4.10 requirements, continued consultation with IP households within the zone of influence of the project will be carried out during the project implementation.

d) **IP communities to receive social and economic benefits that are culturally appropriate:** Specific measures will be implemented to ensure that IPs receive social and economic benefits that are culturally appropriate. This will include technical assistance and support to the government to prepare and accelerate rural electrification in the three IP villages in the project's area of influence. Furthermore, the affected communities will benefit from significantly reduced noise and pollution in the project area. Also, communal facilities, such as schools and hospitals which are connected to the grid, will be provided with more reliable power supply. The improved power supply in the region will result in considerable indirect benefits, which will include increased economic activities and job creation.

e) **Cost estimates and financing plan:** Technical assistance for the electrification is included to establish (a) what technical option will be adequate and most sustainable; and (b) to determine the cost and implementation arrangements. Therefore, no cost or other implementation details are known at this stage, and will be determined during the early stages of project implementation.

f) **Grievance Redress Mechanism:** A culturally appropriate grievance redress mechanism will be established in consultation with potentially affected IPs to address grievances by the affected

Indigenous Peoples' communities and to ensure that any project related complaints are promptly addressed A first instance of dispute handling where IPs are fully represented will be set up with the aim of settling any disputes amicably. If necessary, the project will establish a committee, which will include IP representatives and project management. Court cases will be time consuming and expensive and it is therefore critical that the project establishes more informal first and second tier grievance management mechanisms which will be fully budgeted. Each case should be carefully documented and the nature of grievance, agreed actions to be taken and subsequent monitoring must be recorded.

g) **Monitoring, evaluation and reporting mechanisms:** These should be appropriate to the project and will include arrangements for the free, prior, and informed consultation with the affected Indigenous Peoples' communities. Arrangements will be finalized as soon as the most sustainable technical option for the rural electrification of the three IP villages has been determined.

80. **Monitoring & Evaluation.** MEPE and MOEP will closely monitor project progress against the agreed performance indicators listed in Annex 1. Data on actual project outputs and outcomes will be gathered, analyzed and included in semi-annual progress reports to be submitted to the World Bank. The owner's engineer (for Component 1) and consultants (for Component 2 TA activities) will support MEPE and MOEP to monitor procurement progress and project implementation of the physical components including monitoring the implementation aspects of their respective ESIA and ESMP.

Annex 4: Operational Risk Assessment Framework (ORAF)

MYANMAR: Electric Power Project
Stage: Board

Project Stakeholder Risks						
Stakeholder Risk	**Rating**	**Substantial**				
Description: The WBG is beginning activities in an uncertain operating environment. After two decades of absence from Myanmar, there is a need for WBG to better understand the Myanmar context, and among Myanmar counterparts to become more familiar with modalities of working with the WBG. It is unclear whether the economic and political reform process could be sustained beyond the direct involvement of key players. Moreover, there is potential risk of disruption due to public uncertainty in a still new reform environment, emergence of tensions in the context of new openness, and political party contest ahead of the 2015 election The rapid scale-up of international assistance to Myanmar poses donor coordination challenges to prevent draining government capacity, the provision of inconsistent advice, or the introduction of economic distortions.	**Risk Management:** The WBG is currently conducting a Public Expenditure and Financial Accountability Assessment and a Public Expenditure Review with the Ministry of Finance and development partners. This will help partners understand better the public financial management and procurement systems and identify areas for technical support. The WBG aims to support a move from individuals to institutions, including a focus on strengthening and working through government systems, and supporting civil society and processes that can help to reconnect the population with government authorities, especially at the local level. WBG is engaging with development partners to share lessons from project design and implementation with a view to strengthening a coordinated and sustainable donor support, scaling up gradually as knowledge and experience expand, and investing in coordination to identify respective areas of comparative advantage.					
	Resp:	**Stage:**	**Recurrent:**	**Due Date:**	**Frequency:**	**Status:**
	Client	Preparation	☑			Not Yet Due

Implementing Agency Risks (including fiduciary)		
Capacity	**Rating**	**Substantial**
Description: MEPE has weak capacity in project management, financial management, procurement, and E&S safeguards. While MEPE has significant technical and engineering capacity, it has not implemented a large-scale donor-funded project in the past two decades. Although financial management capacity at MEPE is relatively strong with experienced staff and a good level of accounting knowledge, there is no experience with WBG's financial management policies and procedures. There are no national regulations or laws regarding public procurement. Procurement capacity is very limited, as MEPE does not have experience with procurement processes, especially regarding selection of consultants, in projects financed by international financial institutions. There are high risks of implementation delays due to slow bureaucratic procedures, particularly regarding procurement decisions. MEPE has no experience with environmental and social safeguards and international practices in this area.	**Risk Management:** The project will allocate institutional support and technical assistance to support MEPE during implementation. International consultants will be engaged to provide assistance for capacity building in key areas, including project management, procurement, financial management, and design and implementation of environmental and social protection measures. A substantial training program in financial management will be put in place. All financial management procedures to be used under the project will be documented in a financial management manual. Mitigation measures, such as training in debt management, financial management operations manual, and external auditors would be required to reduce governance and implementation risks. MEPE will follow the World Bank's Procurement Guidelines, and procurement support will be given by consultants and the WB's procurement team. Intensive training activities are included under the TA component, and continuous support from the WBG procurement team is envisioned along preparation and implementation of the project. The WBG and the government should reach agreement on specific steps to minimize time taken for government's clearances, as well as steps to improve MEPE's procurement performance. The project will provide technical assistance to build capacity on environmental and social safeguards.	

	Resp: Client	**Stage:** Preparation	**Recurrent:** ☑	**Due Date:**	**Frequency:**	**Status:** In Progress
Governance	**Rating**	**Moderate**				
Description: Key findings of a recent governance assessment for Myanmar include a lack of transparency, top-down accountability, limited voice and weak institutions of accountability. As a part of the government, MEPE is also showing some of these shortcomings, but its governance structure is relatively simple and more transparent while accountability for technical activities is well established.	**Risk Management:** Governance, accountability and transparency measures will be integrated into the project's design, including capacity building for all actors involved in project implementation. Project documents, procurement plan, audited financial statements, and ESA/ESMP are required to be published on MEPE's website for public access.					
	Resp: Client	**Stage:** Preparation	**Recurrent:** ☑	**Due Date:**	**Frequency:**	**Status:** In Progress
Project Risks						
Design	**Rating**	**Moderate**				
Description: The main project risk is related to the availability of natural gas supply. Domestic gas production and supply may not be secured on time and/or competing export demands for gas may result in reduction of gas supply to specific GT stations. The future price of gas that MOGE sells to MEPE, and the approved electricity tariffs may affect the economic and financial viability of the project, as well as the MEPE's financial position.	**Risk Management:** The project was designed to avoid exposure to fuel shortages by increasing efficiency of gas utilization and eliminating needs for additional gas supply to the Thaton GT station. Furthermore, the selection of Thaton GT station is based inter alia on its proximity to the main gas pipeline, which is unlikely to experience reductions in volumes of transported gas. The project will provide technical assistance on the design of electricity tariff structure and energy pricing policy to support financial viability of the power sector, as well as reduce investment risks in power generation projects. The pricing policy should be informed by appropriate modeling and analysis of financial situation in the gas and power sector, and specifically in MOGE and MEPE.					

	Resp: Client	**Stage:** Implementation	**Recurrent:** ☑	**Due Date:**	**Frequency:**	**Status:** In Progress
Social and Environmental	**Rating**	**Substantial**				
Description: There is no established framework and very little capacity for environmental management in Myanmar. MEPE's capacity for E&S assessment, as well as design and implementation of an ESMP is inadequate. However, the project does not involve any associated infrastructure development and will be confined to within the site of existing GT station, which has been in operation for more than 30 years.	**Risk Management:** The specific project site (Thaton GT station) was selected based on a minimum expected environmental and social impacts of the proposed operation. In fact, the project is expected to improve environmental performance over the existing GT installation through the reduction of emissions and noise levels. WBG has mobilized technical assistance (from the Government of Norway) and has carried out an in-depth assessment of environmental and social issues associated with the proposed project. Also, WBG will provide technical assistance to build capacity in environmental assessment and management at responsible agencies, in coordination with the Ministry of Environmental Conservation and Forestry.					
	Resp: Client	**Stage:** Preparation	**Recurrent:** ☑	**Due Date:**	**Frequency:**	**Status:** In Progress
Program and Donor	**Rating**	**Moderate**				
Description: Due to its recent government reforms and international aperture, several donors are initiating ambitious development programs through government systems. MEPE and other government agencies may become overwhelmed by different donor financing modalities, procedures, and requirements.	**Risk Management:** The WBG will closely coordinate its support with other donors and development partners. Initial collaboration, specifically with ADB and JICA, established good foundations for coordination of donor activities in the power sector, including policy advice, which is essential to prevent draining government capacity and improving aid effectiveness.					
	Resp: Bank	**Stage:** Preparation	**Recurrent:** ☑	**Due Date:**	**Frequency:**	**Status:** In Progress
Delivery Monitoring and Sustainability	**Rating**	**Substantial**				

<table>
<tr><td>Description:

Unfamiliarity with WBG's operational policies may lead to delays in project implementation and reporting.

Changing pricing policies in the gas and electricity sectors causes concerns about price volatility and increases financial risks for investors in gas-fired power generation, which may affect the sustainability of future CCGT projects.</td><td colspan="6">Risk Management:

The WBG will provide close institutional support to MOEP and MEPE. In addition, consultants will be hired to provide technical assistance and project management support.

The WBG will continue to provide advice and will mobilize technical assistance to assist MOE and MOEP in developing and implementing financial viability action plan in the power sector. Also, WBG will support increasing private sector participation in the gas-fired power generation and further commercialization of MEPE as the market operator in Myanmar.

<table><tr><th>Resp:</th><th>Stage:</th><th>Recurrent:</th><th>Due Date:</th><th>Frequency:</th><th>Status:</th></tr><tr><td>Client</td><td>Preparation</td><td>☑</td><td></td><td></td><td>In Progress</td></tr></table></td></tr>
<tr><td colspan="7">Overall Risk</td></tr>
<tr><td colspan="3">Preparation Risk Rating: Substantial</td><td colspan="4">Implementation Risk Rating: Substantial</td></tr>
<tr><td colspan="3">Comments:</td><td colspan="4">Comments:
The WBG will undertake intensive implementation support throughout the project implementation to ensure compliance with the mitigation measures outlined above.</td></tr>
</table>

Annex 5: Implementation Support Plan

MYANMAR: Electric Power Project

Strategy and Approach for Implementation Support

1. The project activities financed by the Myanmar Electric Power Project (MEPP) will start in November 2013 and will be completed in October 2017. The IDA Credit is scheduled to close on April 30, 2018.

2. The strategy for implementation support (IS) has been developed based on the nature of the project and its risk profile. It aims at making implementation support to the client flexible and effective, and will focus on implementation of the risk mitigation measures defined in the ORAF.

a) **Risks related to the sector policies, including fuel supply and pricing:** The Bank will support the borrower in addressing these important issues through its engagement in related analytical work and policy discussions. The Bank budget provides resources for policy dialog, complementing grant and credit financing of technical assistance and advisory services under the project. The main counterpart agencies for this work include Ministry of Finance, Ministry of Energy, and Ministry of Electric Power.

b) **Enhancing financial sustainability of MEPE:** In addition to the activities related to the fuel and electricity pricing and subsidies at the level of government agencies, the Bank will work with the project implementing agency (MEPE) to assist in developing strategies to implement investment projects (including through private sector investment) and strengthen their financial performance.

c) **Project Management:** The Bank task team will monitor the capacities of the project management teams in MOEP and MEPE throughout project implementation to ensure that they are adequate to implement the project. The Bank will provide additional training where needed in relation to the Bank fiduciary and reporting requirements, as well as in the areas of environmental and social safeguards management. Also, the Bank team will maintain regular contact with key officials of MOE, MOGE, HPGE, YESB and ESE, and with their management teams to ensure timely identification of any potential problems and their resolution.

d) **Procurement:** Implementation support will include: (i) reviewing of the Procurement Plan and providing suggestions; (ii) reviewing procurement documents and providing timely feedback; and (iii) monitoring procurement progress against the agreed Procurement Plan. More intensive support will be provided during the first 12 months to ensure the timely procurement and contracting of the big packages, particularly the Thaton CCGT plant.

e) **Financial Management:** Supervision of project financial management will be performed on a risk-based approach. Supervision will review the project's financial management system, including but not limited to, accounting, reporting and internal controls. The Bank team will assist MEPE in improving financial management and reporting. The financial management supervision will be conducted by financial management specialists.

f) **Environmental and Social Impact Management:** The Bank will provide support through the regular review of the semi-annual environmental monitoring and evaluation reports and will follow up any issues with MEPE and their consultants. Given the low institutional capacity and underdeveloped regulatory regime for environmental and social protection in the power sector, the Bank team, including environmental and social specialists, will provide regular (twice a year) support to MOEP and MEPE in developing, implementing, evaluating and updating its capacity building program under the Component 2 of MEPP.

g) **Implementation Progress:** The Bank will closely monitor the overall progress of project implementation by reviewing the semi-annually progress report, the execution of the Procurement Plan, the actual disbursement of the IDA credit etc. The Bank will provide support by regularly visiting the project, helping to identify arising issues, which impede project progress, and discussing and agreeing on actions to resolve critical issues.

Implementation Support Plan

3. The Bank team members for procurement, financial management, and safeguards will be based in EAP country offices (Bangkok, Vientiane, and Yangon) to ensure closer support to the client. Formal supervision and field visits will be carried out semi-annually. Detailed inputs from the Bank team are outlined below:

a) **Technical inputs**: Inputs of technical specialists will be required to review bid documents and associated technical specifications to ensure that adequate technical standards are observed and that they enable a fair competition. Technical specialists will also be needed to review bid evaluation reports and monitor implementation of the project during construction and commissioning.

b) **Fiduciary requirements and inputs**: The Bank team will help MOEP and MEPE to identify capacity building needs to strengthen its financial management capacity and to improve procurement management efficiency. Training will be provided by the Bank's financial management specialist and procurement before the commencement of, and during, project implementation to the extent needed. Both the financial management and the procurement specialist will be based in EAP country offices to provide timely support. Formal supervision of financial management will be carried out semi-annually, while procurement supervision will be carried out as required by the client and project implementation timeline.

c) **Safeguards**: Inputs from an environment specialist and a social specialist will be required, though the project's social and environmental impacts are limited. The support will focus on institutional capacity building for environmental and social safeguards at the MEPE level, as well as at the plant level in GT stations. Field visits will be based on the project needs and are expected to be semiannual during the first 18-24 month of project implementation.

d) **Financial review of MEPE financial performance**: Input will be required from a financial specialist for regular review of MEPE financial status to monitor its financial capability. This exercise will be combined with the supervision of other WB financed projects implemented by MEPE through semi-annual reviews.

e) **Sector policies**: The Bank will provide, through its staff and consultants as needed, experts that will engage in policy support to Ministry of Energy and Ministry of Electric Power, complementing the activities of other donors, as described under Component 2 in Annex 2. Given the early stage of the Bank re-engagement in the power sector and a complex reform agenda facing the Government in the sector, the Bank sector specialists are expected to visit the country more frequently (on a quarterly basis) during the first 18 months of the project implementation, and semiannually thereafter.

4. The main focus of implementation support is summarized below:

Time	Focus	Skills Needed
First twelve months	Monitor and assist in procurement of the main contracts, as appropriate	Procurement Technical
	Monitor implementation of institutional capacity building on environmental and social safeguards	Environment and Social
	Sector policies including financial viability of MEPE and other sector entities	Power Sector Policy Financial
12-48 months	Monitor project implementation (including construction progress)	Technical Procurement
	Monitor financial management and disbursement	Financial
	Monitor performance of environmental and social impact management plan Sector policies	Environmental/Social Energy sector strategy specialists Financial analyst
		Energy sector strategy specialists Financial analyst
	Sector Policies	Power Sector Policy

Skills Mix Required

Skills Needed	Number of Staff Weeks per Year	Number of Trips per Year	Comments
Procurement	8	2	Field based
Financial management	3	2	Field based
Technical	4	2	Field and HQ based
Environment	3	2	Field and HQ based
Social	3	2	Field and HQ based
Financial analyst	4	2	Field and HQ based
Sector Specialists	8	4	Field and HQ based
Others	6		Field and HQ based

Annex 6: Financial Situation of the Power Sector

MYANMAR: Electric Power Project

A. Main Financial Risks Facing Myanmar's Electricity Sector

1. **Large increase in the cost of electricity supply due to higher cost of fuels for electricity generation and investments in new assets.** Following the devaluation of the Myanmar kyat during FY2012/13, the cost of natural gas to MEPE had increased from 2.5 billion kyats (FY 2011/12) to an estimate of over 150 billion kyats in FY 2012/13. As a result, the prevailing electricity tariffs—both at the distribution level and the wholesale level—are below the cost of supply. Without further tariff increases or revenue subsidies from the Government, the electricity enterprises will incur financial losses in the coming years. Specifically for MEPE, the magnitude of potential losses in the coming five years is estimated at 20–90 billion kyats per year.

2. **Uncertainty on the cost of natural gas.** The nominal price of natural gas for electricity generation was temporarily reduced from US$ 11.2 to $ 5 per MMBtu during FY 2011/12 and continuing in FY 2013/14. There is uncertainty regarding the level of natural gas price in the coming years. Since the cost of gas is now the second largest cost category for MEPE—and could become the top category in the next five years—this uncertainty is a major financial risk for the sector.

3. **Dependence on tariff increases and/or revenue subsidies.** Without tariff increases and/or revenue subsidies from the State budget, MEPE, YESB and ESE will incur financial losses in the coming years. Unsustainable financial situation will complicate financial management, debt management and capital spending.

B. Options for Financial Risks Mitigation

4. **Selective tariff adjustment.** Electricity tariffs for most users should be adjusted to reflect the fundamental increase in the cost of supply. The Government may consider a time-bound tariff adjustment program with the goal of moving toward an overall cost-recovery tariff. For instance, in the first phase tariffs for public sector customers could be immediately raised to signal Government's commitment to fully cover its own electricity consumption. This could be followed by phased increases for other consumer groups. Specifically for household consumers, a block tariff structure that contains a small element of cross-subsidy between small and large consumers could be considered. The phased approach would help mitigate a sudden price shock in the economy, while ensuring that the fiscal burden from electricity subsidies is gradually reduced. In addition, this would allow electricity enterprises to gradually regain profitability, generate operating cash flow surplus, and expand capital base.

5. **More hydropower.** In the short term, the authorities could facilitate the purchase of more electricity from existing hydropower projects. The unit-cost of existing hydropower projects are around 20–30 kyats per kWh, which is around half the unit-cost of existing gas-fired power stations. In FY2011/2012 MEPE purchased about 7.6TWh of hydropower, which may be increased further. It is likely that the unit-cost from new hydropower projects will be higher than the prevailing tariffs;

nevertheless, the average hydropower tariffs are expected to remain more competitive than the tariff of gas-based electricity.

6. **Increase efficiency of thermal power generation.** As in the case of the Thaton CCGT power plant, the efficiency gain from the new CCGT unit will substantially reduce the unit cost of fuel for power generation. As an example, the unit cost of natural gas at Thaton could be reduced from about 60 kyats per kWh toward 35 kyats per kWh[14]. While a significant upfront investment is required, the cost savings over the life of the replacement project will be larger.

7. **Implement transmission and distribution loss reduction program.** This will substantially help reduce the financial cost of electricity transmission and distribution from the prevailing 25 percent combined T&D losses. For every 1 percent loss reduction, at least 100 GWh of electricity is saved based on most recent data.

8. **Cost-effective targeted subsidies for needy consumers.** International experiences have shown that underpriced electricity tariffs can lead to inefficient use of electricity, financial problems for electric utilities, and extraordinary cost on the government budget. The required subsidies from underpriced electricity are often regressive in nature, with higher income consumers —who usually consume more electricity— benefitting more from the subsidies than low income consumers. In addition, consumers could get used to receiving the subsidies, which will make future tariff adjustment politically and economically difficult to implement. If Myanmar authorities are considering subsidy options, it should study and design targeted electricity/energy subsidies that focus on the needy consumers, while gradually adjusting electricity tariffs toward cost recovery for other consumers. In parallel, the authorities could implement measures to systematically improve energy efficiency and reduce the cost of electricity supply in the medium to long-term, which would eventually translate into cost savings for consumers. This approach would encourage efficient use of electricity, while keeping the electricity bill for the country as low as practicable.

C. Overview of MEPE Recent Financial Performance

9. According to available information, the average MEPE's electricity selling tariff had been about 20 kyats (2.4 US cents) per kWh in the past five fiscal years ended in 2011-2012, while the average MEPE's cost of electricity supply ranged from 17.5-18.4 kyats (2.2 US cents) per kWh in the same period. This had resulted in considerable net profits for MEPE, ranging from 8.4-13.7 percent of revenue per year.

10. MEPE's total assets reached 708.8 billion kyats (US$ 834 million) in fiscal year 2011-2012. Assets were largely financed by government equity, totaling 685.9 billion kyats, and little debt financing. In this same year, total revenue—mostly electricity sales to distribution companies YESB and ESE—reached 187.2 billion kyats (US$ 220 million). MEPE recorded a net profit of 15.7 billion kyats (US$ 18 million), or a net profit margin of 8.4 percent, a return on assets of 2.2 percent and a return on equity of 2.3 percent.

[14] At the prevailing natural gas price to MEPE of US$ 5 per million Btu and the exchange rate of 900 kyats per 1 US dollar.

11. Regarding MEPE's cash flow, in 2011-2012 net operating cash flow deficit was 37 billion kyats (US$ 44 million), continuing a deficit trend of the prior four fiscal years. Although profit for the year was 15.7 billion kyats, all profit was largely transferred to the Treasury. Therefore, cash injection from the state budget was necessary in the past three years (298, 117 and 99 billion kyats, respectively), which helped finance new investment. Therefore, MEPE had a relatively large cash in transit outstanding of 167.6 billion kyats (US$ 197 million) at end of fiscal year 2011-2012, equaling 10 months of revenue in that year.

12. In terms of working capital management, MEPE had large outstanding receivables of 196.8 billion kyats or US$ 232 million at end of FY2011/2012. According to MEPE these receivables include customers' deposit for MEPE services recorded as unearned assets. As for payables, the outstanding amount was 20.8 billion kyats (US$ 24 million). Compared to external costs (e.g. cost of purchased electricity and cost of fuels), outstanding payables averaged about 2 months of external costs in 2011-2012, which was down from over 5 months in prior years. Other non-cash current assets and current liabilities were quite small.

13. The following tables reflect MEPE's financial statements for the fiscal years from 2007/08 to 2011/12:

Myanmar Electric Power Enterprise
Summary Financial Statements

Million Kyats	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
	Actual	Actual	Actual	Actual	Actual
Summary Income Statement					
Income					
Electricity sales	113,401	119,540	123,861	153,481	186,877
Other income	350	5,354	759	1,048	336
Total income	113,751	124,894	124,620	154,528	187,213
Expenses					
Generation, of which	81,645	87,965	89,705	110,309	142,772
Purchased electricity	*76,685*	*82,062*	*85,505*	*106,215*	*137,913*
Fuel consumption	*3,122*	*3,610*	*2,506*	*2,099*	*2,543*
Transmission	1,626	1,920	3,430	3,425	5,507
Distribution	70	68	66	63	64
Administrative, of which	9,640	10,517	11,446	14,545	16,461
Commercial taxes	*7,209*	*7,515*	*7,061*	*8,944*	*10,878*
Interest expenses	*18*	*18*	*12*	*34*	*6*
Loss/gain on FX (loans only)	0	0	0	0	0
Total Expenses	92,982	100,470	104,646	128,343	164,804
Taxes	6,231	7,327	5,992	7,856	6,723
Net income (after taxes)	14,539	17,097	13,982	18,330	15,687
Summary Cash Flow Statement					
Operations					
Changes in non-cash working capital	(11,815)	(16,079)	(54,672)	(64,944)	(41,251)
Operating cash flow, net	(14,798)	(15,165)	(53,481)	(62,996)	(37,055)
Investing					
Capital spending	(20,363)	(28,014)	(25,064)	(54,332)	(61,628)
Financing					
Loan disbursement & adjustment	0	0	0	0	0
Loan repayment	(45)	(36)	(16)	(59)	(15)
Fund from State budget	35,194	43,214	298,147	117,386	98,697
Financing cash flow, net	35,150	43,178	298,130	117,327	98,682
Change in cash flow for the year	(11)	0	219,585	(0)	0

Continued from the previous page:

Million Kyats	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
	Actual	Actual	Actual	Actual	Actual
Summary Balance Sheet					
Current assets, of which	40,261	60,291	333,650	406,638	420,032
Cash	-	-	219,585	138,566	167,586
Consumer's accounts	-	-	-	-	-
Non-current assets, of which	127,821	154,939	178,824	231,241	288,676
Net fixed assets	*13,510*	*17,242*	*24,467*	*42,164*	*96,859*
Work-in-progress	*114,312*	*137,697*	*154,357*	*189,077*	*191,817*
Total assets	**168,083**	**215,230**	**512,474**	**637,879**	**708,708**
Current liabilities, of which	37,536	41,488	40,590	48,634	20,778
Creditors (payables)	*37,536*	*41,488*	*40,590*	*48,634*	*20,778*
Current-portion of long-term loans	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
Non-current liabilities, of which	2,108	2,090	2,086	2,061	2,050
Loans	*2,108*	*2,090*	*2,086*	*2,061*	*2,050*
Total liabilities	39,644	43,578	42,675	50,695	22,828
Total equity	128,439	171,651	469,798	587,184	685,881
Total Liabilities + Equity	**168,083**	**215,230**	**512,474**	**637,879**	**708,709**
Financial & Other Indicators					
Electricity sales per kWh sold, kyat/kWh	20.0	20.0	20.0	20.0	20.0
Total expenses per kWh sold	17.5	18.0	17.9	17.7	18.4
Profitability					
EBITDA margin	19%	20%	17%	18%	14%
Net margin	13%	14%	11%	12%	8%
Return on equity	11%	10%	3%	3%	2%
Return on assets	9%	8%	3%	3%	2%
Effective tax rate, %	30%	30%	30%	30%	30%
Cashflow					
Debt service coverage	negative #	negative #	negative #	negative #	negative #
Self finance	-73%	-54%	-213%	-116%	-60%
Liquidity and leverage					
Current ratio	1.1	1.5	8.2	8.4	20.2
Receivable outstanding, # day of revenue	90	159	230	536	384
Payables outstanding, # day of external costs	172	177	168	164	54
Long-term debt to equity, times	0.0	0.0	0.0	0.0	0.0
Cash balance (# month of revenue)	-	-	21.1	10.8	10.7
Technical					
MEPE GWh sold	5,670	5,977	6,193	7,674	9,344
Transmission losses, GWh	396	357	529	669	759
Transmission loss rates, %	n/a	n/a	7.9%	8.0%	7.5%

Source: Myanmar Electric Power Enterprise (MEPE)

D. Projections of MEPE Financial Performance

14. Projections to assess MEPE's future financial position and performance have been carried out for the period 2012/13–2022/23. Further details are recorded in the project files.

15. In the *base scenario*, projections for future financial performance are based on the following key assumptions:

a) Natural gas price to MEPE remain at FY2012/13 level of US$ 5 per MMBtu. Hydropower tariff gradually increases toward 40 kyats per kWh on average.

b) Annual increases in the average tariff of 5 percent.

c) Long-term electricity energy demand growth of 10 percent per annum.

d) MEPE to add 750 MW of new gas-fired generation capacity and new IPPs to add 500 MW of gas-fired generation capacity.

e) Electricity transmission loss is assumed to decline toward 4 percent.

f) The existing MEPE's debts, which according to MEPE include largely Paris Club debt, are repaid over the next 15 years. The actual repayment schedule of Paris Club debt is uncertain.

g) New external financing (on top of cash generated from operations) is assumed to come from debt financing (such as IDA credit).

h) No change in foreign exchange rates.

16. The projections yield the following key results:

a) MEPE would be able to quickly generate positive operating cash flow in FY 2014/15 and subsequently turn a profit in FY 2017/18;

b) The positive operating cash flow would allow MEPE to service outstanding debts on its own, with *debt service coverage ratio* above 1;

c) The *average MEPE's sales tariff* would increase toward 60 kyat per kWh by FY 2022/23;

d) The projections also indicate that the enterprise could substantially fund new capital expenditures from internal cash flow, suggested by the *self-financing ratios*[15] of above 15 percent in multiple years (note that capital spending for the outer years could be higher than current estimates, resulting in lower ratios); and

e) In terms of debt leverage, the projected *long-term debt to equity* ratio would not exceed 2.5.

17. **Sensitivity of financial results.** MEPE's financial results are highly sensitive to the average selling tariffs.

[15] Self-financing ratio is estimated based on net operating cash flow after subtracting estimated long-term debt repayment.

a) **Scenario of no increase in the average selling tariff:** this would incur MEPE financial losses in every year. This also means lower ability to service debt obligations, with debt service coverage ratio falls below 1 in all years. Without recapitalization, MEPE's debt level would substantially increase and its equity reduced to zero.

b) **Scenarios of returning to profitability in three years:** The projection shows that at the prevailing natural gas price to MEPE of US$ 5 per MMBtu, a tariff increase of about 6.5 percent per year is required for MEPE to become profitable again in three years (FY 2016/17). If gas price to MEPE goes back up to US$11.2 per MMBtu, a higher tariff increase of about 22 percent per year will be required.

Wholesale electricity tariff as percentage of cost recovery in MEPE

	FY2010/11 Actual	FY2011/12 Average	FY2012/13 Estimate	As of May 2013	Export Parity
Unit cost of gas (kyat /MMBtu)	60.5	32.6	4,100	4,500	10,080
Unit cost of gas (US$ /MMBtu)	11.2	6.0	5.0	5.0	11.2
MEPE sales tariffs (kyats/kWh)	20.0	20.0	35.0	38.4	38.4
MEPE average cost (kyats/kWh)	17.7	18.4	67.6	42.2	64.2
MEPE tariff as percentage of cost recovery	**113%**	**109%**	**52%**	**91%**	**60%**

Base-case MEPE Financial Projection Results for FY 2012/13 to FY 2022/23

Million Kyats	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
	Actual	Estimates	Projections	Projections	Projections	Projections	Projections	Projections	Projections	Projections	Projections	Projections
Summary Income Statement												
Income												
Electricity sales	186,877	359,739	434,170	501,466	579,194	668,969	772,659	892,421	1,030,746	1,190,512	1,375,041	1,588,173
Other income	336	353	370	389	408	429	450	473	496	521	547	574
Total income	187,213	360,091	434,540	501,855	579,602	669,397	773,109	892,894	1,031,243	1,191,033	1,375,589	1,588,747
Expenses												
Generation, of which	142,772	337,244	395,202	440,373	516,622	596,988	618,521	690,690	780,616	855,948	965,200	1,088,468
Purchased electricity	*137,913*	*177,227*	*214,841*	*271,327*	*329,255*	*409,365*	*418,948*	*490,820*	*505,571*	*678,767*	*750,216*	*873,077*
Fuel consumption	*2,543*	*157,200*	*176,719*	*163,126*	*178,372*	*178,372*	*247,554*	*247,554*	*316,736*	*281,706*	*316,297*	*316,297*
Transmission	5,507	7,844	10,038	16,205	18,907	19,470	24,372	24,977	29,924	30,575	33,410	34,112
Distribution	64	64	64	64	64	64	64	64	64	64	64	64
Administrative, of which	16,461	31,966	38,108	45,243	51,590	58,789	67,371	76,037	86,040	96,063	108,378	122,574
Commercial taxes	*10,878*	*20,940*	*25,272*	*29,190*	*33,714*	*38,940*	*44,975*	*51,946*	*59,998*	*69,298*	*80,039*	*92,445*
Interest expenses	*6*	*4,514*	*5,453*	*7,123*	*7,884*	*9,068*	*10,074*	*10,825*	*11,068*	*10,662*	*10,663*	*11,101*
Loss/gain on FX (loans only)	0	309,238	26,320	0	0	0	0	0	0	0	0	0
Total Expenses	164,804	686,357	469,733	501,885	587,183	675,311	710,328	791,769	896,644	982,650	1,107,053	1,245,218
Taxes	6,723	0	0	0	0	0	18,834	30,338	40,379	62,515	80,561	103,059
Net income (after taxes)	15,687	(326,265)	(35,192)	(30)	(7,581)	(5,914)	43,947	70,788	94,219	145,868	187,975	240,471
Summary Cash Flow Statement												
Operations												
Changes in non-cash working capital	(41,251)	19,386	24,647	22,066	19,457	14,775	9,645	4,207	1,309	3,664	(4,713)	(7,271)
Operating cash flow, net	(37,055)	(300,159)	(751)	40,935	34,594	32,130	62,024	70,590	86,579	115,378	131,978	156,325
Investing												
Capital spending	(61,628)	(142,065)	(193,315)	(67,939)	(119,689)	(120,205)	(120,736)	(121,283)	(70,597)	(71,177)	(174,275)	(174,891)
Financing												
Loan disbursement & adjustment	0	309,238	208,211	48,878	107,144	110,324	96,205	93,781	33,388	10,826	100,971	78,911
Loan repayment	(15)	(20,753)	(20,753)	(20,753)	(20,753)	(20,753)	(35,764)	(41,091)	(47,064)	(52,363)	(55,598)	(56,792)
Fund from State budget	98,697	0	0	0	0	0	0	0	0	0	0	0
Financing cash flow, net	98,682	288,485	187,458	28,126	86,392	89,572	60,441	52,690	(13,676)	(41,538)	45,374	22,119
Change in cash flow for the year	0	(153,739)	(6,608)	1,122	1,296	1,497	1,729	1,996	2,306	2,663	3,076	3,553

Continued from the previous page:

Million Kyats	2011-2012 Actual	2012-2013 Estimates	2013-2014 Projections	2014-2015 Projections	2015-2016 Projections	2016-2017 Projections	2017-2018 Projections	2018-2019 Projections	2019-2020 Projections	2020-2021 Projections	2021-2022 Projections	2022-2023 Projections
Summary Balance Sheet												
Current assets, of which	420,032	271,945	243,152	227,496	218,356	214,954	216,748	223,398	234,743	250,775	271,638	297,608
Cash	167,586	13,851	7,242	8,364	9,660	11,157	12,885	14,882	17,187	19,851	22,926	26,479
Consumer's accounts	-	45,011	54,318	62,732	72,450	83,675	96,639	111,612	128,905	148,879	171,949	198,593
Non-current assets, of which	288,676	424,018	607,540	656,580	753,551	850,488	940,820	1,031,114	1,063,551	1,095,948	1,227,521	1,359,051
Net fixed assets	*96,859*	*186,045*	*272,159*	*537,391*	*633,862*	*627,783*	*820,083*	*807,330*	*992,954*	*973,521*	*1,053,246*	*1,030,411*
Work-in-progress	*191,817*	*237,974*	*335,381*	*119,189*	*119,689*	*222,705*	*120,736*	*223,783*	*70,597*	*122,427*	*174,275*	*328,641*
Total assets	**708,708**	**695,963**	**850,692**	**884,075**	**971,907**	**1,065,442**	**1,157,567**	**1,254,512**	**1,298,293**	**1,346,724**	**1,499,159**	**1,656,660**
Current liabilities, of which	20,778	66,564	69,027	74,315	83,337	108,225	123,262	138,097	153,744	174,012	188,280	204,476
Creditors (payables)	*20,778*	*45,812*	*48,275*	*53,563*	*62,584*	*72,461*	*82,171*	*91,032*	*101,380*	*118,414*	*131,488*	*146,635*
Current-portion of long-term loans	*n/a*	*20,753*	*20,753*	*20,753*	*20,753*	*35,764*	*41,091*	*47,064*	*52,363*	*55,598*	*56,792*	*57,841*
Non-current liabilities, of which	2,050	269,783	457,241	485,367	571,758	646,319	701,433	748,150	729,175	684,403	728,582	749,652
Loans	*2,050*	*269,783*	*457,241*	*485,367*	*571,758*	*646,319*	*701,433*	*748,150*	*729,175*	*684,403*	*728,582*	*749,652*
Total liabilities	22,828	336,347	526,268	559,682	655,095	754,543	824,695	886,246	882,918	858,415	916,862	954,128
Total equity	685,881	359,616	324,423	324,394	316,812	310,898	332,872	368,266	415,375	488,309	582,297	702,532
Total Liabilities + Equity	**708,709**	**695,963**	**850,692**	**884,075**	**971,907**	**1,065,442**	**1,157,567**	**1,254,512**	**1,298,293**	**1,346,724**	**1,499,159**	**1,656,660**
Financial & Other Indicators												
Electricity sales per kWh sold, kyat/kWh	20.0	35.0	38.4	40.3	42.3	44.5	46.7	49.0	51.5	54.0	56.7	59.6
Total expenses per kWh sold	18.4	66.8	41.5	40.4	42.9	44.9	44.0	45.1	46.8	47.4	49.0	50.6
Profitability												
EBITDA margin	14%	-87%	-5%	5%	4%	4%	13%	16%	18%	22%	23%	25%
Net margin	8%	-91%	-8%	0%	-1%	-1%	6%	8%	9%	12%	14%	15%
Return on equity	2%	-91%	-11%	0%	-2%	-2%	13%	19%	23%	30%	32%	34%
Return on assets	2%	-47%	-4%	0%	-1%	-1%	4%	6%	7%	11%	13%	15%
Effective tax rate, %	30%	0%	0%	0%	0%	0%	30%	30%	30%	30%	30%	30%
Cashflow												
Debt service coverage	negative #	(11.7)	0.2	1.7	1.5	1.4	1.6	1.6	1.7	2.0	2.2	2.5
Self finance	-60%	-226%	-11%	30%	12%	9%	22%	24%	56%	89%	44%	57%
Liquidity and leverage												
Current ratio	20.2	5.9	5.0	4.2	3.5	3.0	2.6	2.5	2.3	2.1	2.1	2.0
Receivable outstanding, # day of revenue	384	205	151	119	96	81	70	62	57	54	51	50
Payables outstanding, # day of external costs	54	50	45	45	45	45	45	45	45	45	45	45
Long-term debt to equity, times	0.0	0.8	1.4	1.5	1.8	2.1	2.1	2.0	1.8	1.4	1.3	1.1
Cash balance (# month of revenue)	10.7	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Technical												
MEPE GWh sold	9,344	10,278	11,306	12,437	13,680	15,048	16,553	18,209	20,029	22,032	24,236	26,659
Transmission losses, GWh	759	831	904	653	716	791	866	948	833	917	1,009	1,110
Transmission loss rates, %	7.5%	7.5%	7.4%	5.0%	5.0%	5.0%	5.0%	4.9%	4.0%	4.0%	4.0%	4.0%
Tariff changes, % from prior year			9.7%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%

Annex 7: Economic and Financial Analysis

MYANMAR: Electric Power Project

1. The power plant comprises two gas turbines and one steam turbine with a rated capacity of 106 MW (under Myanmar conditions) that will be implemented in two phases: Phase 1, composed of two gas turbines of 85 MW with air inlet chilling to be commissioned by early 2015; and Phase 2, comprising a steam turbine of 26 MW and converting the plant into a CCGT, scheduled for mid 2016. At the commissioning of Phase 1 the plant will have a thermal efficiency of 40.5 percent, and this efficiency will increase to 49.0 percent after the commissioning of Phase 2. The analysis shows whether the expected economic return to the project is positive, and whether this conclusion is robust to uncertainty about the projected values of the main evaluation variables.

2. **Load forecast.** The ideal approach to developing a load forecast is to first measure current demand, both peak demand and annual energy. When evaluating growth rates, the recommended approach would be to split the demand forecast into two sectors: (a) large industrial and commercial consumers; and (b) general demand. The growth rate for the first category should then be based on information of new large industrial and commercial projects under development, while the second category would be based partly on historic growth rates and partly on an analysis of the historic GDP growth rates and the electricity demand elasticity to the GDP growth rate.

3. Due to lack of data on future industrial developments in the country, estimations of the future load growth are based on historical load data. Also, historical data is not fully representative, as extensive load shedding has been practiced during high load months (April and May). The estimations carried out for Myanmar's monthly loads obtained a similar peak load value than MOEP's own estimation. Therefore, the value estimated for May 2012 of 1,850 MW has been used as a starting point for the load forecast analysis.

4. The load growth rate during the last 6 years has been in excess of 10 percent, while the growth during the last 3 years has been around 17 percent. Considering that Myanmar is going through a reform process, which is opening possibilities for large foreign direct investments, load growth is likely to be higher than the historical average of 10 percent. As there are not reliable data on GDP growth for Myanmar, it is considered that load growth estimations dependent of GDP elasticity are not reliable. Therefore, and given previous load growth figures in excess of 10 percent, the load growth estimates used in this economic model coincides with the actual load growth rate of 12.6 percent per year. Table 1 below compares MOEP's forecast based on 19 percent demand growth, but without available data to support their estimations, with the actual sector 12.6 percent growth:

Table 1. Load forecast

	Peak Demand (MW)	
	MOEP	MOEP Adj
2012	1 806	1 850
2013	2 155	2 083
2014	2 426	2 346
2015	2 732	2 641
2016	3 078	2 974
2017	3 477	3 349
2018	3 929	3 771
2019	4 442	4 246
2020	5 024	4 781
2021	5 686	5 383
2022	6 417	6 061
2023	7 244	6 825
2024	8 167	7 685
2025	9 214	8 653
2026	10 401	9 743
2027	11 747	10 971
2028	13 275	12 353
2029	15 009	13 910
2030	16 978	15 663

Projected Myanmar medium term electricity supply/demand balance

5. The power demand - supply balances established in this assessment are therefore based on the current plans on generation expansion as collected in March 2013. The capacity balances are established for the most critical part of the dry season (April–May) each year.

6. Reserve margin requirements are often expressed in terms of a specific percentage of installed capacity. In this case we have selected to deviate from this practice for the following reasons: (i) The dry season available capacity in hydropower plants is much lower than the installed capacity; and (ii) the generation statistics do not support a fixed percentage relationship between installed capacity and dry season available capacity for the different plants.

7. During the dry season several hydropower plants have surplus capacity (reserve units) that cannot be used for power production due to lack of water. On the other hand, units not in operation can serve as reserves in case units in operation become inoperable due to faults. Against this background, it has been introduced in the power balance sheets a reserve capacity requirement on the top of what is needed to secure supply during the dry season. The minimum reserve capacity requirement consists of two components: (i) A capacity component equal to the largest thermal power unit in order to cover unplanned outages of thermal generation units; and (ii) A capacity component equal to the load growth in a half year should the load grow faster than expected and forecasted. This represents a capacity component of 6.5 percent of the annual peak load.

8. Since the cost characteristics of future generation candidates are unknown, we are not able to select and conclude which projects should be included in the generation expansion plan in addition to the candidates identified for implementation by the authorities in Myanmar. Instead, we have quantified the power capacity deficit for each year of the study period, i.e. the target dry season capacity of new generation projects that are required for supply of the future forecasted load.

9. The base case scenario includes ongoing hydropower and thermal power projects as well as a number of planned thermal power projects (private investors) located in the Yangon area. One of the two large thermal power projects planned in the Yangon area (Tharkayta - BKB) is assumed to be delayed by two years. The delay will result in a continuous power deficit and load shedding. From 2017 the growth in power demand results in an increasing capacity deficit which necessitates implementation of substantial amounts of additional generation capacity. The Thaton CCGT power plant will of course improve the power balance and supply situation. However, the growing demand will in the future necessitate implementation of many other projects as well. Table 2 below shows the base case peak demand – supply balance.

Table 2. Peak Power demand - supply balance

	Total Power Production Existing & Committed - (MW)	Reserve Capacity (MW)	Annual Maximum Demand - Dry Season Peak (MW)	Generation Requirement - Dry Season (MW)	Power Surplus / Deficit Dry Season Balance - (MW)	Deficit (Target Capacity of New Projects) - Dry Season (MW)
2011	1 383	133	1 643	1 776	-260	-393
2012	1 473	146	1 850	1 996	-377	-523
2013	1 950	238	2 083	2 321	-133	-371
2014	2 253	296	2 346	2 642	-93	-389
2015	2 569	316	2 641	2 957	-72	-388
2016	2 926	337	2 974	3 311	-48	-385
2017	3 124	362	3 349	3 711	-225	-587
2018	3 384	389	3 771	4 160	-387	-776
2019	3 619	420	4 246	4 666	-627	-1 047
2020	4 019	455	4 781	5 236	-762	-1 217

Least cost justification

10. Myanmar does not have any updated power sector master plan, and the least cost option is therefore difficult to justify. In the long run, hydropower seems to be the least cost expansion option for Myanmar. Based on experience from Myanmar and from other projects developed in other countries during the last years, we estimate that the project cost of new hydropower plants with annual plant load factors in the 50-60 percent range will be above US$ 2 million per MW installed capacity, with expected economic unit costs of around 6–7 US cents per kWh depending on the annual plant load factor. However, developing new hydropower plants beyond those included in Myanmar's generation expansion plan is likely to take at least 6–8 years to reach commercial operation, and it therefore does not seem to be a viable alternative to gas power in the short to medium term.

Furthermore, most of the hydropower potential is in the north of the country. Substantial investments in the transmission grid would be required to deliver the power to the main load centers in the Yangon region. This would most likely result in a delivered cost to the load centers in the South of the country of around 8-9 US cents per kWh, which is not significantly lower than the cost of gas power.

11. Considering the fact that the hydropower generation in Myanmar has large seasonal variations, with the lowest generation in the dry season when the load is at its highest, Myanmar will need to retain an alternative source for base load generation for at least 20-30 percent of their load. Other renewable energy technologies, such as wind or photovoltaic solar power are not substantially lower and bring further challenges to grid connection and stability. We therefore conclude that gas power is the least cost option for base load generation in the long run for the Myanmar power network.

Assessment methodology

12. This section derives the economic return to the investment in power generation capacity under the Thaton CCGT power plant, based on a benefit/cost analysis. The economic costs and benefits are the power system costs and benefits attributable to the Thaton CCGT power plant. They are aggregated into a stream of net annual benefits that extends over the economic life of the investment, which is assumed of 30 years. All economic costs and benefits are expressed in constant 2013 price terms and exclude local direct duties and taxes.

13. The economic return to the project is computed from the stream of annual net economic benefits in terms of two parameters: (a) net present value (NPV) calculated at the estimated opportunity cost of capital (OCC) to Myanmar – which is taken to be 10 percent; and (b) the economic internal rate of return (EIRR). The criteria for a positive economic return are that the value of the NPV should exceed zero and the value of the EIRR should exceed the OCC.

14. This return is computed for a base case scenario that is formed from the expected values for the main evaluation parameters, including the cost of natural gas used in the project plant, the construction cost for the project plant, and the future growth rate of Myanmar power demand. Because of the considerable degree of uncertainty about the values of these variables, the sensitivity of the NPV and EIRR is tested in scenarios with different values for these variables from the values used in the base case scenario.

Results of project economic and financial analysis

15. **Economic benefits.** The economic benefits for the Thaton CCGT power plant are derived from the reduction of Energy Not Served (ENS) during periods of peak demand, measured in kWh, and the replacement of older and less efficient power generation during off-peak periods..

16. Since the generation capacity is varying with hydrological conditions and consequently with the time of the year, various load and generation profiles have been modeled to calculate the amount of energy not served (ENS) per month and per year. The aim of the model is to quantify the benefit of the Thaton CCGT power plant in terms of reduction in ENS. Furthermore, the model calculates an exact value of ENS per hour. For realistic calculation of the ENS volume, monthly generation

capacities have been reduced by 10 percent of the monthly peak loads in order to i) prepare for unexpected high evening peaks, and ii) avoid system collapse that otherwise could be the result.

17. The ENS reduction caused by the Thaton CCGT power plant in the base case is illustrated in table 3 below:

Table 3. Energy Not Served

Year	ENS Without Project GWh/year	ENS With Project GWh/year	ENS Difference GWh/year
2015	46	30	16
2016	68	24	44
2017	216	114	102
2018	435	270	165
2019	861	619	242
2020	994	758	236

18. The ENS has been modeled until the year 2020. The economic benefit from reducing ENS has been valued at a willingness to pay (WTP) of 23 US cents per kWh. This is derived from the estimated fuel cost of 20-25 US cents per kWh for using diesel generators in Myanmar. This is a conservative estimate of the WTP as this does not include operation and maintenance cost and also excludes capital costs. In a neighboring village in Mon state, where Thaton station is located, consumers are paying 60 US cents per kWh for off-grid electricity supply to local diesel generator operators that supply power to the village.

19. The power generation from Thaton CCGT power plant that exceeds the ENS covered by Thaton has been valued at the cost of new IPP gas powered plants in Myanmar. The estimated cost of generation from such plants is in the range of 12 – 15 US cents per kWh, at the opportunity cost of natural gas export. For the purpose of the analysis, it has been estimated on the conservative side at a price of 12 US cents per kWh for IPP power.

20. **Economic costs.** The economic costs are the capital investment costs associated with the project. For the base case this is US$ 130 million. Average annual operation and maintenance costs, including major overhauls every 3–4 years, are estimated at 2 percent of the overall investment cost.

21. Currently, the gas tariff applied by MOGE is US$5.00 per MMBtu for use in power generation. However, the price of gas exported to Thailand is US$12.35 per MMBtu, and therefore, the model includes the latter value as the opportunity cost of gas in the economic analysis.

22. **Economic returns.** Based on the approach and assumptions described above, the project base case NPV is estimated to be US$ 142 million, and the base case economic rate of return to the project is 22.7 percent, which exceeds the criteria for a positive economic return. Table 4 summarizes the detailed assumptions used for this computation.

Table 4. Summary of assumptions used in the economic evaluation – Base Case

Dates and time		
Initial construction (date)	2014-01-01	
Construction period Phase 1	12	Months
Construction period Phase 2	18	Months
COD Phase 1	2015-01-01	
COD Phase 2	2016-07-01	
Project Economic lifetime	30	Years
Technical data		
Plant load factor	90 %	
Thermal efficiency Phase 1	40.5 %	
Thermal efficiency Phase 2	49.0 %	
Installed Capacity Phase 1	85	MW
Installed Capacity Phase 2	106	MW
Benefits		
Annual generation Phase 1	670	GWh
Annual generation Phase 2	832	GWh
Willingness to Pay Energy not served	23.0	US cents / kWh
Willingness to Pay Energy other power	12.0	US cents / kWh
Costs		
Economic Opportunity cost of gas	12.35	USD/mmbtu
Operating costs	2.00 %	of construction cost
Total Project Cost	134	MUSD
Project cost Phase 1	90	MUSD
Project cost Phase 2	44	MUSD

23. A detailed sensitivity analysis has been carried out and Table 5 below shows selected results of sensitivity analysis of the project economic return due to changes to the base case assumptions.

Table 5. Sensitivity Analysis

Economic Sensitivities	EIRR	Ec. NPV (MUSD)	Economic Unit cost
Construction cost -20 %	28.6 %	172	10.49
Construction cost -10 %	25.4 %	157	10.70
Construction cost 10 %	20.4 %	126	11.10
Construction cost 20 %	18.5 %	111	11.30
Economic electricity price -20 %	4.2 %	-51	
Economic electricity price -10 %	14.4 %	45	
Economic electricity price 10 %	30.6 %	238	
Economic electricity price 20 %	38.2 %	334	
WtP all power at 12 USc/kWh	16.7 %	85	
Gas opportunity cost 8 USD/mmbtu	42.1 %	377	7.82
Gas opportunity cost 10 USD/mmbtu	33.2 %	269	9.23
Gas opportunity cost 12 USD/mmbtu	24.3 %	161	10.65
Gas opportunity cost 14 USD/mmbtu	15.0 %	52	12.07
Gas opportunity cost 16 USD/mmbtu	3.3 %	-56	13.48

24. Based on the abovementioned results, the project is considered economically robust, as it tolerates a 90 percent increase in construction cost or a tariff drop of 14 percent before it becomes unviable. Similarly, the gas tariff has to increase to almost US$15 per MMBtu to render the project unviable. In this case, however, it is likely that the willingness to pay would also increase since fuel prices tend to be correlated, so in reality the project would most likely tolerate higher gas prices than US$15 per MMBtu. In addition, the project would remain economically robust when all the electricity supplied from the project is valued at the low-end of the willingness to pay of 12 US cents per kWh.

25. The analysis also evaluated the EIRR under the assumption that Phase 2 is never implemented, and the plant remains an open cycle plant with an installed capacity of 85 MW and a thermal efficiency of 40.5 percent. In this case, the EIRR drops from 22.7 percent to 17.6 percent.

26. **Project financial feasibility.** The required financially viable tariff that would allow the project to generate a financial rate of return to equity of 8-10 percent is 4.3 US cents per kWh at the current gas tariff of US$5 per MMBtu. At a gas tariff of US$12 per MMBtu, the required tariff is 9.16 US cents per kWh.

Table 6 : Economic Return of Thaton CCGT Power Plant – Base Case

	Annual electricity generation (GWh)	Annual ENS reduction (GWh)	Total Economic benefit (MUSD)	Economic benefit ENS reduction (MUSD)	Capital costs & working capital (MUSD)	Fuel costs (MUSD)	Non fuel O&M cost (MUSD)	Total Economic cost (MUSD)	Net Economic benefit
2014	0	0	0.0	0.0	-90.0	0.0	0.0	-90.0	-90.0
2015	670	16	82.2	3.6	-32.4	-69.7	-2.7	-104.8	-22.6
2016	751	44	95.0	10.2	-16.0	-70.8	-2.7	-89.4	5.6
2017	832	102	111.0	23.4	-1.7	-71.6	-2.7	-76.0	35.1
2018	832	165	118.0	38.0	-0.8	-71.6	-2.7	-75.0	42.9
2019	832	242	126.5	55.7	-0.9	-71.6	-2.7	-75.2	51.3
2020	832	236	125.8	54.3	0.1	-71.6	-2.7	-74.2	51.6
2021	832	0	99.8	0.0	2.8	-71.6	-2.7	-71.4	28.4
2022	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2023	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2024	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2025	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2026	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2027	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2028	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2029	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2030	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2031	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2032	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2033	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2034	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2035	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2036	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2037	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2038	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2039	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2040	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2041	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2042	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2043	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2044	832	0	99.8	0.0	0.0	-71.6	-2.7	-74.3	25.5
2045	0	0	0.0	0.0	4.8	0.0	0.0	4.8	4.8
NPV	**142**								
EIRR	**22.7%**								

Source: Norconsult