CARIBBEAN DEVELOPMENT BANK

TWO HUNDRED AND SEVENTY-SECOND MEETING OF THE BOARD OF DIRECTORS

TO BE HELD IN BARBADOS

JULY 21, 2016

PAPER BD 99/16

STREET LIGHT RETROFITTING PROJECT – ANTIGUA AND BARBUDA
(President's Recommendation No. 926)

The attached Report appraises a proposal by the Government of Antigua and Barbuda (GOAB) for funding to replace all of its high pressure sodium and mercury vapour street lamps (approximately 14,365) with high efficiency light-emitting diode (LED) lamps. The expected outcome of the project is a reduction of Antigua and Barbuda's street light energy consumption and associated greenhouse gas emissions. The project will be implemented by the Antigua Public Utilities Authority (APUA). The project is estimated to cost approximately USD7.898 mn, with counterpart contribution from GOAB and APUA of the equivalent of USD0.905 mn.

2. On the basis of the Report, I recommend:

(a) a loan to GOAB from the Ordinary Capital Resources (OCR) of the Caribbean Development Bank (CDB) of an amount not exceeding the equivalent of five million nine hundred and eighty-one thousand United States dollars (USD5,981,000) (the Loan) comprising:

(i) an amount not exceeding the equivalent of two million and eighty-one thousand United States dollars (USD2,081,000) allocated from CDB's Equity and Market resources; and

(ii) an amount not exceeding the equivalent of three million, nine hundred thousand United States dollars (USD3,900,000) allocated from resources provided by European Investment Bank (EIB) to CDB under the EIB Climate Action Line of Credit (CALC) Finance Contract (the EIB CALC resources); and

(b) a grant to GOAB from CDB's Special Funds Resources (SFR) comprising:

(i) an amount not exceeding the equivalent of thirty thousand United States dollars (USD30,000) allocated from resources provided by EIB to CDB under the EIB Grant Facility for Climate Action Support (the EIB CAS resources);

(ii) an amount not exceeding the equivalent of five hundred and twenty-nine thousand Euros (EUR529,000) allocated from resources provided by the European Union (EU) Caribbean Investment Facility (CIF) to CDB under the EU Contribution Agreement for the implementation of the action entitled: "Sustainable Energy for the Eastern Caribbean (SEEC) Programme" (the EU-CIF SEEC resources); and

(iii) an amount not exceeding the equivalent of two hundred and ninety-one thousand Pounds Sterling (GBP291,000) allocated from resources provided by the Government of the United Kingdom (UK) of Great Britain and Northern Ireland through its Department for International Development (DFID) to CDB under the Memorandum of Understanding to support the SEEC Programme (the DFID SEEC resources),

on the terms and conditions set out and referred to in Chapter 7 of the attached Report.

3. I also recommend:

(a) This information is withheld in accordance with one or more of the exceptions to disclosure under the Bank's Information Disclosure Policy.

; and

(b) where EIB CALC and EU-CIF SEEC resources are being used together with CDB's Equity and Market resources for the supply and installation of LED street lamps and disposal of the removed fixtures, a waiver of CDB's Guidelines for Procurement (January 2006) to extend eligibility for procurement to countries eligible for procurement under EIB and EU-funded projects which are not CDB Member Countries.

4. Funds are available within CDB's existing resources and/or borrowing programme for the relevant disbursement period.

This information is withheld in accordance with one or more of the exceptions to disclosure under the Bank's Information Disclosure Policy.

CARIBBEAN DEVELOPMENT BANK

STREET LIGHT RETROFITTING PROJECT – ANTIGUA AND BARBUDA

Considered at the Two Hundred and Seventy-Second Meeting
of the Board of Directors on July 21, 2016

Paper BD 99/16

Director *Projects Department*	*Daniel Best*
Division Chief (Ag) *Economic Infrastructure*	*Merlvn Combie*

JULY 2016

This Report was prepared by an Appraisal Team comprising:

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CURRENCY EQUIVALENT

Dollars ($) throughout refer to Eastern Caribbean Dollars (XCD) unless otherwise stated.

USD1.00 = XCD2.70
XCD1.00 = USD0.37

ABBREVIATIONS

APC	-	Antigua Power Company
APUA	-	Antigua Public Utilities Authority
BMCs	-	Borrowing Member Countries
BOD	-	Board of Directors
CALC	-	Climate Action Line of Credit
CAS	-	Climate Action Support
CDB	-	Caribbean Development Bank
CG	-	Central Government
CIF	-	Caribbean Investment Facility
CRI	-	Colour Rendering Index
CRS	-	Climate Risk Screening
DOE	-	Department of Energy
DFID	-	Department for International Development
ECCB	-	Eastern Caribbean Central Bank
ECCU	-	Eastern Caribbean Currency Union
EE	-	Energy Efficiency
EIB	-	European Investment Bank
ESMP	-	Environmental and Social Management Plan
ERR	-	Economic Rate of Return
ESPS	-	Energy Sector Policy and Strategy Study
EU	-	European Union
EUR	-	Euros
GBP	-	Pounds Sterling
GDP	-	Gross Domestic Product
GOAB	-	Government of Antigua and Barbuda
HDI	-	Human Development Index
HPS	-	High Pressure Sodium
IDC	-	Interest During Construction
IWG	-	Interagency Working Group
km	-	kilometres
LED	-	Light-emitting Diode
m	-	metres
MDGs	-	Millennium Development Goals
ml	-	million litres per day
mn	-	million
MOU	-	Memorandum of Understanding
MTEDIE	-	Ministry of Tourism, Economic Development, Investment and Energy
MV	-	Mercury Vapour
MW	-	Megawatt
NEP	-	National Energy Policy

NSPP	-	National Social Protection Policy
OCR	-	Ordinary Capital Resources
O&M	-	Operations and Maintenance
ORM	-	Office of Risk Management
p.a.	-	per annum
PC	-	Project Coordinator
PCR	-	Project Completion Report
PE	-	Project Engineer
PPA	-	Power Purchase Agreement
PPES	-	Project Performance Evaluation System
PV	-	Photovoltaic
RE	-	Renewable energy
SCC	-	Social Cost of Carbon
SDG	-	Sustainable Development Goals
SEAP	-	Sustainable Energy Action Plan
SEEC	-	Sustainable Energy for the Eastern Caribbean
SFR	-	Special Fund Resources
TA	-	Technical Assistance
TOR	-	Terms of Reference
UNFCCC	-	United Nations Framework Convention for Climate Change
USD	-	United States Dollar
WIOC	-	West Indies Oil Company
XCD	-	Eastern Caribbean Dollar

MEASURES AND EQUIVALENTS

1 hectre (ha)	=	2.47 acres
1 kilometre (km)	=	0.621 mile (mi)
1 square kilometre (km^2)	=	0.386 square mile (mi^2)
1 metre	=	3.281 feet (ft)
2 millimetre (mm)	=	0.039 inch (in)
1 square metre (m^2)	=	10.756 square feet (ft^2)

TABLE OF CONTENTS

APPENDICES

COUNTRY DATA: ANTIGUA AND BARBUDA

	2010	2011	2012	2013	2014	2015
PER CAPITA GDP (current market prices: US$)	13,017.3	12,817.8	13,525.6	13,342.1	13,500.0	14,359.4
GROSS DOMESTIC PRODUCT (GDP)						
GDP at Current Market Prices ($mn)	3,066.0	3,050.8	3,252.7	3,241.6	3,296.6	3,502.7
Demand Components:						
Consumptions Expenditure	2,612.7	2,693.5	2,954.2	2,957.7	2,925.4	2,839.5
Gross Domestic Investment	872.1	637.1	716.6	757.0	780.4	847.4
Exports of Goods and Non-Factor Services	1,414.4	1,451.9	1,477.4	1,473.0	1,595.4	1625.92
Imports of Goods and Non-Factor Services	1,833.1	1,731.7	1,895.4	1,946.1	2,004.6	1810.12
Gross Domestic Savings Ratio (%)	14.8	11.7	9.2	8.8	11.3	18.9
Sectoral distribution of current GDP (%)						
Agriculture	1.0	1.1	1.0	1.1	1.2	1.1
Mining and Quarrying	1.0	0.8	0.8	1.1	1.1	0.9
Manufacturing	2.5	2.6	2.4	3.0	3.0	3.1
Electricity and Water	4.3	5.0	4.1	4.3	4.3	4.5
Construction	11.3	8.6	9.4	9.7	9.6	9.9
Transport, Storage and Communications	12.8	12.3	12.0	10.7	10.8	10.9
Hotels and Restaurants	12.7	13.4	13.1	12.5	12.4	12.2
Wholesale and Retail Trade	14.9	14.2	15.0	14.7	14.5	15.5
Financial Intermediation	10.0	10.6	9.9	9.1	9.1	8.8
Government Services	9.1	9.1	9.0	9.4	9.3	9.0
Other Services	17.1	18.6	20.3	21.9	21.1	20.6
Less: Imputed Service Charges	3.4	3.5	3.1	2.7	2.8	2.7
GDP at Current Factor Cost ($mn)	2,628.1	2,613.1	2,775.1	2,817.9	2,848.9	3,016.8
GDP at Constant 2006 Prices ($mn)	2,351.4	2,307.5	2,390.8	2,427.5	2,529.6	2,613.5
Annual rate of growth in GDP (%)	**(8.5)**	**(1.9)**	**3.6**	**1.5**	**4.2**	**3.3**
MONEY AND PRICES ($mn)						
Consumer prices (end of period % change)	2.9	4.0	1.8	1.1	1.33	0.9
Money supply (M1; annual % change)	-1.8	-2.6	-0.08	7.8	5.9	9.8
Total domestic credit (net)	2,947.9	2,861.8	2,711.7	2,684.3	2,610.9	2,250.5
Private sector credit (net)	2,544.3	2,442.3	2,376.2	2,269.5	2,151.6	1,908.8
Public sector (net)	403.6	419.5	335.5	414.8	459.3	341.6

COUNTRY DATA: ANTIGUA AND BARBUDA

	2010	2011	2012	2013	2014	2015
CENTRAL GOVERNMENT FINANCES ($mn)						
Current Revenues	654.4	599.3	648.9	599.1	665.8	848.8
Current Grants	31.9	0.0	0.0	0.0	0.0	0.0
Current Expenditures	639.6	596.3	646.6	597.8	664.4	783.0
Current Account Surplus/(Deficit)	-43.0	-118.4	-24.8	-102.8	-54.0	29.7
Capital Revenue and Grants	27.8	25.8	2.2	1.3	15.2	87.0
Capital Expenditure and Net Lending	53.6	67.5	20.9	43.1	55.1	51.4
Overall Surplus/(Deficit)	-36.9	-160.1	-43.5	-144.6	-93.9	65.3
BALANCE OF PAYMENTS (USD mn)						
Merchandise Exports (f.o.b)	123.4	151.6	169.9	182.9	149.0	147.58
Merchandise Imports (c.i.f)	1,225.5	1,162.2	1,329.3	1,358.3	1,349.7	1,350.86
Trade balance	(1,102.05)	(1,010.59)	(1,159.35)	(1,175.37)	(1,200.68)	(1,203.28)
Net Balance on service account	683.3	730.8	741.4	713.8	736.1	729.90
Income (net)	(85.0)	(106.6)	(137.9)	(83.5)	(100.4)	(114.71)
Transfers (net)	52.6	69.3	81.9	70.7	77.1	77.45
Current Account Balance	(451.2)	(317.0)	(473.9)	(474.4)	(487.9)	(510.64)
TOTAL PUBLIC DEBT ($mn)						
Total Public Debt	2,709.4	2,842.1	2,840.6	3,223.9	3,380.2	3,071.8
Domestic debt outstanding	1,544.4	1,582.5	1,639.0	1,666.9	1,869.1	1,519.6
Long term	…	…	…	…	…	
Short term	…	…	…	…	…	
External debt outstanding	1,165.0	1,259.6	1,201.6	1,557.0	1,511.1	1,552.2
Debt service	228.9	176.6	226.0	232.2	228.8	415.9
Amortisation	…	…	…	…	…	
Interest Payments	…	…	…	…	…	
External debt service as % exports of goods and services	6.8	4.5	4.2	5.0	8.6	8.0
Total debt service as % of current revenue	35.0	29.5	34.8	38.8	34.4	49.0
AVERAGE EXCHANGE RATE						
Dollar(s) per US dollar	2.7	2.7	2.7	2.7	2.7	2.7

Sources: ECCB and Ministry of Finance.

Notes:

COUNTRY DATA: ANTIGUA AND BARBUDA

	2010	2011	2012	2013	2014	2015
POPULATION						
Mid-year Population (000's)[1]	84.35	85.57	86.79	88.07	89.39	90.44
Population Growth Rate (%)	…	1.40	1.44	1.48	1.50	1.20
Crude Birth Rate	…	14.78	14.67	14.57	14.48	…
Crude Death Rate	…	5.63	5.61	5.63	5.72	…
Infant Mortality Rate	…	20.72	17.15	14.28	11.98	…
INDICATORS OF HUMAN DEVELOPMENT						
Life Expectancy at Birth (years)						
Male		73.49	73.98	74.30	74.47	…
Female		80.24	80.92	81.30	81.43	…
Dependency Ratio						
Male		47.94	47.19	46.46	45.78	…
Female		44.52	44.01	43.52	43.07	…
Human Development Index (value)	0.778	0.772	0.773	0.774	0.783	…
Tourism						
Total Stay-Over Visitors ('000)	229.94	241.33	246.93	243.23	249.32	250.45
Cruise Ship Visitors	557.64	606.50	572.15	533.99	522.34	644.31

Source: Statistics Division, Government of Antigua and Barbuda.

1. Census data indicates the population stood at 88,411 in 2011.

LOAN AND PROJECT SUMMARY

Financial Terms and Conditions			
Borrower:	Government of Antigua and Barbuda (GOAB)	**Amortisation Period:**	Ordinary Capital Resources (OCR): 10 years - (excluding grace period)
Executing Agency:	Antigua Public Utilities Authority (APUA)	**Grace Period:**	OCR: 3 years
		Disbursement Period:	First Disbursement Date: December 31, 2016 Terminal Disbursement Date: December 31, 2018

Source	Amount (USD'000)		
OCR Loan: Equity and Market (E&M) Tranche	2,081	**Interest Rate: E&M Tranche**	2.97 % per annum (p.a.) variable
OCR Loan: European Investment Bank (EIB) Climate Action Line of Credit (CALC) Tranche	3,900	**Interest Rate: EIB CALC Tranche**	1.89 % p.a. (indicative)
Sub-Total Loan	5,981	**Commitment Fee:**	1% p.a. on the undisbursed balance of the Loan, commencing from the 60th day after the date of the Loan Agreement.
Special Fund Resources (SFR) Other Special Funds (OSF) Grant:			
EIB –Climate Action Support (EIB CAS)	30		
European Union –Caribbean Investment Facility (EU-CIF) Sustainable Energy for the Eastern Caribbean (SEEC)	588[1]		
Department for International Development (DFID) SEEC	393[2]		
Sub-Total Grant	1,011		
Counterpart	905		
TOTAL:	7,898		

Risk Management			
Country Rating: [redacted]		Overall Entity Score:	[redacted]
Outlook: [redacted]			
(as at March 31, 2016)		**(USD)**	
Approvals		This information is withheld in accordance with one or more of the exceptions to disclosure under the Bank's Information Disclosure Policv.	
Disbursements			
Repayments			
Undisbursed:		33,022,214	
Outstanding Loans:		96,362,232	
Exposure (Outstanding + 50% Undisbursed):		[redacted]	
Availability:		[redacted]	
Incremental Capital Adequacy Charge: [redacted]			

This information is withheld in accordance with one or more of the exceptions to disclosure under the Bank's Information Disclosure Policy.

[1] EU-CIF SEEC grant amount is EUR529,000 converted to USD at June 30, 2016

[2] DFID SEEC grant amount is GBP 291,000 converted to USD at June 30, 2016

Office of Risk Management (ORM) Commentary:

This information is withheld in accordance with one or more of the exceptions to disclosure under the Bank's Information Disclosure Policy.

Project Summary

Project Outcome and Description:

The expected outcomes of the Project are: (a) reduced street lighting energy consumption and greenhouse gas emissions associated with reduction in energy consumption; and (b) enhancement of APUA's capacity in climate change planning. The proposed project consists of the following components:

(a) Project Preparation;

(b) LED Street Lamp Supply & Installation;

(c) Supervision Consultant;

(d) Climate Risk Screening; and

(e) Project Management.

Exceptions to Caribbean Development Bank (CDB) Policies:

(a) [redacted]

(b) where EIB CALC and EU-CIF SEEC resources are being used together with CDB's Equity and Market resources for the supply and installation of LED street lamps and disposal of the removed fixtures, a waiver of CDB's Guidelines for Procurement (January 2006) to extend eligibility for procurement to countries eligible for procurement under EIB and EU-funded projects which are not CDB Member Countries. . [redacted]

CDB Country Outcomes – Key Outputs:

CDB's Results Framework:

No	Indicator	2016	2017	2018	2019
1.	Energy savings as a result of Energy Efficiency /Renewable Energy interventions (/MWh/year)	0	1,200	3,700	4,900

Gender Marker Summary:

Gender Marker	Analysis	Design	Implementation	Monitoring and Evaluation	Score	Code
	0.25	0	0	0	0.25	**NO**[3]

This information is withheld in accordance with one or more of the exceptions to disclosure under the Bank's Information Disclosure Policy.

[3] NO: no contribution to gender equality, it is not reflected in the project, or appears as a formal reference only

1. STRATEGIC CONTEXT AND RATIONALE

LOAN REQUEST

1.01 By letter dated June 6, 2016, GOAB requested financing from CDB to replace all of its high pressure sodium (HPS) and mercury vapour (MV) street lamps (approximately 14,365) with high efficiency light-emitting diode (LED) street lamps.

MACROECONOMIC CONTEXT

1.02 Fueled by tourism industry, economic activity has been recovering from overall weak growth since 2008. During 2015, growth stood at 3.3% compared with 4.2% during 2014. The slower pace resulted from weak performance in the hotel and restaurant sector during the first half of the year and a decline in construction activity. Growth in real output is likely to increase during 2016 as tourism activity picks up pace. Lower international oil prices continued to result in low overall inflation, which was recorded at 0.9% during 2015 and 1.3% during 2014, compared with a long run trend of between 2.0% and 2.5%. With international fuel prices slowly recovering and with no further declines anticipated, inflation is expected to return to the long run trend during 2016.

1.03 Central Government's (CG's) performance improved markedly during 2015 when a primary surplus of 4.8% was recorded compared with a deficit of 0.2% during the previous year. An overall surplus of 1.9% was recorded, compared with an overall deficit of 2.9% during 2014. The improved performance largely reflected better revenue performance with receipts growing by more than 25.0% much of which was due to a large increase in revenue yields under the citizenship by investment programme. Costs associated with the resolution of the ABI Bank are expected to result in a significant deterioration in fiscal performance during 2016. Thus, an overall surplus of 0.3% is anticipated, while the primary balance is expected to amount to 2.6% of GDP. However, the CG's revenue performance during 2016 is expected to improve, while growth in other elements of recurrent expenditure is expected to decline marginally. Capital expenditure is projected to more than double to $107 mn (2.9% of GDP), but it is anticipated that much of it will be funded from grants including USD20 mn under the UKCIF being administered by CDB. The improvement in fiscal performance during 2015 and the core improvement anticipated during 2016 reflects concerted effort by GOAB to correct fiscal imbalances with which the country has been plagued over the last decade. Appendix 1.1 provides further details on the economic performance of Antigua and Barbuda.

SOCIAL CONTEXT

1.04 Antigua and Barbuda comprises the islands of Antigua, Barbuda and the uninhabited island of Redonda. It has a total area of 441.6 square kilometres (km^2), with Antigua measuring 280 km^2, Barbuda 160 km^2 and Redonda 1.6 km^2. The county's population stood at 88,411 (2011 Census), of which 42,565 were males and 45,846 females. The 2011 Census indicated significant population increase in the last 20 years. On average, the population grew at about 4% per annum between the 2 intercensal periods from 1991 to 2011. An average annual growth rate of 2% was recorded between 2001 and 2011. The increased population was attributed mainly to reduced death rates and high immigration, and accompanied by changes in its structure and composition. Improvements in health and sanitation services and the overall quality of life have contributed to increased life expectancy at birth and, consequently, to an increased proportion of older persons in the population.

1.05 Despite general improvements in the quality of life over the years, issues of poverty and social vulnerability remain. The latest available data (2006) shows that 18.3% of the population is poor and 10% vulnerable to poverty. This situation has become more acute since the onset of the global economic

recession in 2008 and its attendant lingering impacts on the country. The lingering impacts of the crisis exacerbated this vulnerability evidenced by an increase in the number of applications from poor households (predominantly female-headed) for government-provided social assistance, which is a reliable proxy demonstrating that segments of the vulnerable cohort of the population would have experienced increased hardship and deprivation. The level of inequality in the country, as measured by the Gini Coefficient[4] of 0.48 is also of concern. This translated into the richest 20% of the population accounting for about 56% of total consumption of goods and services, while those in the poorest 20% consume less than 5%.

1.06 Antigua and Barbuda registered a Human Development Index (HDI)[5] value of 0.783 in 2014, and was ranked in the high human development category. This positioned the country at 58 out of 188 countries and is above the average of 0.744 for countries in the high human development group, and above the average of 0.748 for countries in Latin America and the Caribbean.

ENERGY SECTOR ANALYSIS

Organisation, Structure and Regulation

1.07 APUA is a statutory corporation established under Public Utilities Act No. 10 of 1973 (the Utilities Act). Formed as a tripartite statutory authority comprising the Electricity, Water and Telephone Departments, APUA provides electricity, water, and communication services to both islands. The Utilities Act provides for :

(a) APUA's exclusive right to generate, distribute, supply and sell electricity and the right to grant licenses to others to generate and supply electricity.

(b) Utility tariffs charged by APUA which must be in accordance with tariffs fixed by the Cabinet.

(c) APUA's right to make regulations regarding the methods of making application for supply of electricity, and the prevention of misuse or waste of electrical energy.

(d) The Minister's right, after consultation with APUA, to make regulations on tariffs and the system and mode of electricity supply.

1.08 APUA is regulated and overseen by the Ministry of Public Utilities, Civil Aviation and Transportation. Furthermore, APUA's role and operations are guided by the Ministry of Tourism, Economic Development, Investment and Energy (MTEDIE) which sets out the National Energy Policy (NEP). The Ministry of Finance and Corporate Governance is responsible for the creation of tax incentives and energy sector subsidies, and the Ministry of Foreign Affairs and International Trade sets policy and regulates the import of oil products through the West Indies Oil Company which supplies APUA with its fuel.

[4] The Gini Coefficient measures income distribution on a scale of 0 to 1, with 1 indicating absolute inequality. Gini coefficients in other BMCs range from 0.23 in The British Virgin Islands to 0.57 in The Bahamas.

[5] The HDI is an average measure of basic human development achievements of a country. It takes into account the following indicators: life expectancy at birth; expected years of schooling; mean years of schooling; and Gross National Income per capita.

Energy and Electricity Supply

1.09 Antigua and Barbuda, like many of CDB's Borrowing Member Countries (BMCs), exhibits a high dependence on imported petroleum products to power its economy. It also has the highest per capita consumption of electricity of all Eastern Caribbean states.[6] Nearly 100% percent of the total energy supply of 5,076 barrels of oil equivalent[7] is imported, utilising significant foreign exchange earnings and making it vulnerable to external shocks. The national fuel bill in Antigua and Barbuda represents as much as 12% of gross domestic product[8], and 40% of the fuel supply is used to generate electricity.

1.10 APUA owns and operates two generation plants, but the majority of electricity is generated under license from APUA, from the privately owned, Antigua Power Company (APC) through a Power Purchase Agreement (PPA). APC supplies power at lower cost than APUA due to the higher efficiency of its units. Despite the current downward pressure on oil prices, electricity costs to the consumer, remain relatively high, adversely influencing economic development. GOAB electricity consumption, including street lighting, accounts for approximately 11%[9] of nationwide consumption and amounted to around $37 million in 2014.[10]

Renewable Energy (RE) and Energy Efficiency Deployment

1.11 GOAB plans to generate 15% of its energy needs from renewable sources by 2030[11]. To date approximately 4MW RE capacity has been installed, which is distributed between a 3MW photovoltaic (PV) plant at V. C. Bird International Airport and small-scale distributed PV systems. Additional RE systems including wind and PV plants are planned for installation within the next few years. In addition, GOAB embarked on some energy efficiency (EE) programmes to enhance energy efficiency in public buildings.

Street Lighting Service

1.12 Antigua and Barbuda's street lighting system consists of approximately 14,365 lamps nation-wide, of which 450 lamps are installed in Barbuda. The majority of the lamps are HPS. Approximately 100 additional lamps per year are installed based on individual requests or street upgrades. APUA decides on individual street lighting requests after a verification visit and plans and installs requested lamps accordingly. Damaged street lamps are identified during routine inspections or through reports by citizens for the Utility's attention.

1.13 APUA is charged with responsibility for the purchase, installation, operation and maintenance of street lamps. For its service, APUA bills GOAB according to the street lighting tariff, currently set at $1.05/kWh. This covers the cost for electricity including the fuel variation charge as well as the maintenance costs. Being controlled by photocells, street lamps work autonomously from dusk till dawn. Based on the average operation time of 4,380 hours per year per lamp and the technical specification of the lamps, the energy consumption of the entire network is calculated and used to determine the operating costs of the network for billing purposes. Metered consumption data is available for around 1,800 street lamps.

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[6] IDB Challenges and Opportunities for the Energy Sector in the Eastern Caribbean, 2015
[7] IDB Challenges and Opportunities for the Energy Sector in the Eastern Caribbean, 2015
[8] Energy Snapshot: Antigua and Barbuda; Energy Transition Initiative 2015
[9] Government of Antigua and Barbuda: Sustainable Energy Action Plan
[10] APUA Financial Statements
[11] Government of Antigua and Barbuda: National Energy Policy

COUNTRY SECTOR STRATEGY

1.14 The National Energy Policy (NEP) of Antigua and Barbuda was approved in 2011[12] and elaborates the Government's strategy to enable access to affordable, efficient, socially responsible and reliable forms of energy. The NEP is guided, among others, by the themes of energy cost reduction, diversification of energy source, and environmental protection. It also articulates the Government's target to reduce energy consumption of public facilities by 30% by 2025, which includes street lighting. This direction has been established in the Sustainable Energy Action Plan (SEAP), 2013, which emphasises the importance of energy efficiency programmes in the public sector.[13] In relation to climate change mitigation, GOAB Intended National Determined Contribution[14] under the United Nations Framework Convention for Climate Change, set a conditional target of a 100% RE supply in the water sector by 2030.

1.15 In addition, GOAB enacted the Renewable Energy Act in 2015[15] to provide the necessary regulatory framework for greater deployment of RE. These activities and the rollout of SEAP are part of the Government's effort to achieve its 15% target of renewable power supply by 2030 and a reduction of energy intensity by 10% by 2020.[16]

LINKAGES TO CDB'S COUNTRY AND SECTOR STRATEGY AND POVERTY GOALS

1.16 CDB's commitment to Climate Change and Sustainable Energy agendas, as elaborated in its Strategic Plan 2015-2019, and Energy Sector Policy and Strategy (2015) (ESPS), highlights promotion of EE and RE as priority areas for support by CDB, ultimately contributing to the climate mitigation focus. Energy security is also adopted as a cross-cutting theme in the Bank's work. Providing appropriate financing to incentivise investment in both EE and RE has been occupying the attention of the Bank since its last strategic plan period. CDB is therefore keen to support this initiative, which will have a regional demonstration effect.

1.17 The Project is consistent with the United Nation's Sustainable Development Goals (SDG) in particular Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all. The Project contributes to SDG targets of an improved rate of energy efficiency and increased share of renewable energy. The Project is also consistent with:

(a) CDB's Strategic Objective of "supporting inclusive and sustainable growth and development".

(b) CDB's Corporate Priority to "promote environmental sustainability" and the cross-cutting theme of energy security.

(c) CDB's ESPS which has as one of its areas of focus "promoting Energy Efficiency for more affordable and stable energy costs, and for establishment of a green economy".

(d) Antigua and Barbuda 2015-2018 Country Strategy Paper outcome of Reduced Cost of Energy and Cleaner Energy.

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[12] Government of Antigua and Barbuda: National Energy Policy

[13] Government of Antigua and Barbuda: Sustainable Energy Action Plan

[14] Communicated to the UNFCCC on October 15, 2015

[15] http://ablp.ag/the-renewable-energy-act-2015-by-hon-asot-michael/

[16] Government of Antigua and Barbuda: National Energy Policy

RATIONALE FOR PROJECT

1.18 GOAB has shown strong progress in recent years in creating an enabling environment for RE and has identified EE as a major tool to reduce energy consumption. Supported by Antigua and Barbuda's NEP, clean and sustainable energy technologies are being prioritised to transition to a lower carbon intense economy, and to contribute to climate change mitigation. The Project will advance these objectives and broaden the appeal of EE as an effective tool for climate change mitigation in CDB's BMCs.

1.19 Street lighting is an important national service, facilitating the personal safety of both residents and non-residents. Adequate service is particularly critical in areas that are hosts to many visitors during the tourist season. The tourism sector is the major revenue and foreign exchange earner for Antigua and Barbuda. Safe operation of the transportation sector, as well as the security of private and public property are also dependent on adequate street lighting. GOAB street lighting service consumes around 9,700 MWh per year which represents around 21% of the GOAB total electricity consumption[17]. This makes street lighting a substantial contributor to greenhouse gas emissions and climate impacts, given Antigua and Barbuda's reliance on fossil fuels for electricity generation. In addition, the high energy costs associated with the operation of street lamps negatively impact GOAB's finances and limits the country's ability to address critical development needs. Investment in EE also reduces risks associated vulnerability to volatile oil prices and increasing demands placed on scarce foreign exchange.

1.20 Although GOAB and APUA are taking a proactive approach to RE/EE, the vulnerability of APUA's production and transmission facilities to climate change has not been adequately assessed. Technical assistance is therefore required to assist the utility in systematically examining its vulnerability to projected climate change impacts, and to assist in its long-term infrastructure development planning.

[17] According to APUA's financial statement

2. PROJECT DESCRIPTION

PROJECT OUTCOME

2.01 The expected outcomes of the Project are: (a) reduced street lighting energy consumption and associated greenhouse gas emissions; and (b) enhancement of APUA's capacity in climate change adaptation planning. A Design and Results Monitoring Framework Matrix is presented at Table 2.1. Details of the project are provided at Appendix 2.1.

PROJECT DESCRIPTION

2.02 The proposed project consists of the following components:

(a) Project Preparation: These included a pilot testing undertaken to test 100 LED street lamps in the field, demonstrate their efficiency and suitability and gain experience.

(b) LED Street Lamp Supply and Installation: this includes supply of LED street lamps and consumption monitoring equipment, installation by APUA crews, and the disposal of the old street lamp fixtures.

(c) Supervision Consultant: this will include consultancy services to supervise project implementation, including support for the tendering process and to certify payment requests.

(d) Climate Risk Screening (CRS) (Appendix 2.2): consultancy services to assess the vulnerability of APUA's infrastructure and to provide recommendations to increase its resilience.

(e) Project Management: this will include the assignment of management and administrative staff, along with communications to raise public awareness in relation to the Project.

TABLE 2.1: DESIGN AND RESULTS MONITORING FRAMEWORK MATRIX

Narrative Summary	Performance Indicators/Targets	Data Sources/Reporting Mechanisms	Assumptions
1. IMPACT: To contribute to Antigua & Barbuda target to reduce energy intensity of the economy by 10% by 2020 and improving national energy security.	Annual reduction of 250,000 imperial gallons of diesel and heavy fuel oil imported by 2020.	APUA's and APC's production records	**Assumptions for Achieving Goals** Transformation and production efficiency of the fossil fuel plant remains as projected.
2. OUTCOME: 1. Reduced street lighting energy consumption and reductions in greenhouse gas emissions associated with reduction in energy consumption. 2. Enhanced capacity of APUA in climate change adaptation planning.	1. Annual reduction in street lighting energy consumption by 4,900 MWh by December 31, 2019. 2. Annual reductions in CO_2 emissions of 3,200 tonnes by December 31, 2019. 3. Agreed recommendations of CRS implemented by APUA by December 31, 2018.	1. APUA's production records. 2. APUA's management reports. 3. GOAB electricity bills.	**Assumptions for Achieving Purpose** 1. Energy mix determining the CO_2 conversion factor remains constant. 2. APUA has sufficient resources to implement recommendations of CRS.
3. OUTPUTS: 1. Fully installed and commissioned LED street lamps. 2. CRS with recommendations.	1. 14,365 LED lamps installed by December 31, 2018. 2. CRS accepted by December 31, 2017.	1. Project Completion Report (PCR). 2. APUA's records. 3. Consultant's monthly reports. 4. Climate Risk Screening Study consultant reports.	**Assumptions for Achieving Project Outputs** No adverse weather conditions
4. INPUTS		1. Monthly Progress Reports from the Project Coordinator (PC). 2. Quarterly Reports on Investment Cost of the Project. 3. CDB distribution records. 4. CDB supervision visits and Reports.	**Assumptions for Provision of Inputs** 1. GOAB and APUA are able to provide counterpart resources as required in a timely manner.

Item	CDB ('000)	GOAB/APUA ('000)	Total ('000)
Project Preparation		200	200
LED Street Lamp Supply and Installation Supervision Consultant Climate Risk Screening Project Management	16,989	1,975	18,964
Contingencies IDC and Commitment Fees	1,891	269	2,160
Total Financing	**18,880**	**2,444**	**21,324**
USD Equivalent	**6,993**	**905**	**7,898**

TABLE 2.1: RESULTS MONITORING FRAMEWORK MATRIX

Item	(Baseline) 2016	Targets					Report and Frequency	Responsibility for Data Collection
		2017	2018	2019	2020	2025		
Project Impact Indicators:								
Annual reduction in imported diesel and heavy fuel oil (imperial gallons)	0	60,000	180,000	250,000	250,000	250,000	Annually	MTEDIE
Outcome Indicators:								
Annual reduction in street lighting energy consumption (MWh)	0	1,200	3,700	4,900	4,900	4,900	Annually	MTEDIE
Annual reductions in CO_2 emissions (tonnes)	0	800	2,400	3,200	3,200	3,200	Annually	MTEDIE
CRS Recommendations by APUA (Yes/No)	No	No	Yes	Yes	N/A	N/A		PC
Output Indicators:								
Total LED Street Lamps installed (number)	100	7,183	14,365	14,365	14,365	14,365	Quarterly	PC
CRS Report accepted by APUA (Yes/No)	No	No	Yes	N/A	N/A	N/A	CRS Consultant's report	PC

LESSONS LEARNED

2.03 The project design has been informed by lessons drawn from the experience of CDB and other development partners in the implementation of projects in the energy sector of CDB's BMCs. These are summarised in Table 2.2.

TABLE 2.2: LESSONS INCORPORATED INTO PROJECT DESIGN

No.	Description	Project Response
1.	The type of lamp must be chosen carefully to ensure it is appropriate for the use intended.	The LED lamps will be selected following rigorous verification of technical specifications and an assessment of reliability and robustness. The lamps will be tested to verify illumination and consumption levels.
2.	Effective measurement and monitoring is necessary to assess impact of efficiency improvements and verify reduction in energy consumption.	Consumption Monitoring Equipment has been included in the project to measure the actual energy consumption of a sample of the lamps in field conditions.
3	Public awareness of the replacement project must be ensured.	APUA's Customer Service and Engineering Department in collaboration with the MTEDIE will undertake a public awareness campaign before, during and after project implementation to inform the public about the Project and its benefits.

3. FINANCING STRUCTURE AND COSTS

PROJECT COSTS

3.01 The Project is estimated to cost $21.3 mn which will be financed with resources from CDB, GOAB and APUA. Cost estimates for the supply of the LED street lamp fixtures and monitoring equipment are based on unit rates derived from recent contracts in Antigua and Barbuda and in St. Lucia. Estimates of installation costs have been derived from prevailing rates for skilled labor and equipment rental in Antigua and Barbuda and anticipated installation productivity based on similar recent work in Antigua and Barbuda. Consultancy services are based on current rates for professional services. CDB staff are satisfied that adequate contingencies have been provided to ensure the completion of the proposed components. A summary of the Project Cost, Phasing and Financing Plan is shown in Table 3.1, and a detailed Project Cost, Phasing and Financing Plan is presented at Appendix 3.1.

TABLE 3.1: SUMMARY OF PROJECT COST, PHASING AND FINANCING PLAN ($'000)

Items	CDB						COUNTERPART		
	E&M Loan	EIB CALC Loan	EIB CAS Grant	EU-CIF SEEC Grant[18] (XCD equiv.)	DFID SEEC grant[19] (XCD equiv.)	Total	GOAB	APUA	Total
1. Project Preparation						-	200	-	200
2. LED Street Lamp Supply and Installation									
3. Supervising Consultant	4,809	9,450	81	1,588	1,061	16,989	180	1,795	18,964
4. Climate Risk Screening									
5. Project Management									
Base Cost	**4,809**	**9,450**	**81**	**1,588**	**1,061**	**16,989**	**380**	**1,795**	**19,164**
6. Physical Contingencies[20]	520	705				1,225	31	237	1,493
7. Price Contingencies[21]									
Total Project Cost	**5,329**	**10,155**	**81**	**1,588**	**1,061**	**18,214**	**411**	**2,032**	**20,657**
8. IDC and	291	376				667			667
9. Commitment Fee									
Total Financing	**5,620**	**10,531**	**81**	**1,588**	**1,061**	**18,880**	**411**	**2,032**	**21,324**
USD	**2,081**	**3,900**	**30**	**588**	**393**	**6,993**	**152**	**753**	**7,898**
Percentage Financing	**27**	**50**	**0**	**7**	**5**	**89**	**2**	**10**	**100**

3.02 The proposed supply and installation of LED street lamps and disposal of the removed fixtures conforms to the relevant eligibility criteria set out by EIB under the EIB Climate Action Line of Credit (EIB-CALC). It is proposed that an amount of USD3.9mn be allocated to the Project from the EIB-CALC resources provided by EIB to CDB under the EIB-CALC Finance Contract. In accordance with the EIB-CALC Finance Contract, the interest rate payable by recipients of the EIB-CALC resources shall consist of CDB's OCR rate minus the relevant interest rate subsidy applied to each disbursement made to CDB under the EIB-CALC Finance Contract, varying between 0% and 3% p.a. as calculated pursuant to Article 3.01 thereunder. The indicative interest rate subsidy is currently approximately 1.08%.

[18] EU-CIF SEEC grant amount is EUR529,000 converted to XCD at June 30, 2016

[19] DFID SEEC grant amount is GBP 291,000 converted to XCD at June 30, 2016

[20]

[21] This information is withheld in accordance with one or more of the exceptions to disclosure under the Bank's Information Disclosure Policy.

3.03 The services of consultants to undertake a rapid CRS of APUA's major infrastructure (the CRS Consultancy) conforms to the relevant eligibility criteria set out by EIB under the EIB Grant Facility for Climate Action Support (EIB CAS) Agreement. It is proposed that an amount of USD30,000 be allocated to the Project from the resources provided by EIB to CDB under the EIB CAS Agreement.

3.04 At its Two Hundred and Sixty-Eighth meeting held on October 15, 2015, the Board of Directors (BOD) of CDB considered Paper BD 99/15 entitled "Sustainable Energy for the Eastern Caribbean Programme: Ratification of Contribution by European Union–Caribbean Investment Facility and Contribution by the Government of the United Kingdom of Great Britain and Northern Ireland, through the Department for International Development" and:

(a) ratified the execution by CDB of the "EU Contribution Agreement with an International Organisation" dated June 10, 2015 in Brussels, for the purpose of financing the SEEC Programme in an amount of EUR4,450,000 (the EU-CIF SEEC resources); and

(b) approved CDB entering into a Memorandum of Understanding (MOU) with the Government of the UK, acting through DFID, for the purpose of financing the SEEC Programme in an amount of GBP2,500,000 (the DFID SEEC resources).

3.05 The MOU between CDB and DFID was executed on October 15, 2015. In the context of CDB's efforts to address energy security challenges of its BMCs, the SEEC Programme has been developed as a multi-donor loan and grant facility, providing grant and blended concessional loan resources. The SEEC Programme includes CDB loan and EU-CIF and DFID grant resources. A main focus of the SEEC Programme is enabling EE/RE investments in the public sector leading to reduced energy consumption and increased sustainability in the energy sector. The proposed supply and installation of LED street lamps and disposal of the removed fixtures conforms to the relevant eligibility criteria under the SEEC Programme. It is proposed that amounts of EUR529,000 and GBP291,000 be allocated to the Project from the EU-CIF SEEC and DFID SEEC resources, respectively.

3.06 The Project will be financed by:

(a) a loan to GOAB from CDB's OCR of an amount not exceeding the equivalent of USD5,981,000 comprising:

  (i) an amount not exceeding the equivalent of USD2,081,000 allocated from CDB's Equity and Market resources [the Equity & Market (E&M) Tranche]; and

  (ii) an amount not exceeding the equivalent of USD3,900,000 allocated from the EIB CALC (EIB CALC Tranche).

(b) a grant to GOAB from CDB's SFR comprising;

  (i) an amount not exceeding the equivalent of USD30,000 allocated from the EIB CAS resources;

  (ii) an amount not exceeding the equivalent of EUR529,000 allocated from the EU-CIF SEEC resources; and

  (iii) an amount not exceeding the equivalent of GBP291,000 allocated from the DFID SEEC resources.

(c) counterpart funding of $2,443,000 comprising:

(i) $411,000 from GOAB including Project preparation and the assignment of a project advisor; and

(ii) $2,032,000 from APUA including a portion of LED light supply and installation the assignment of a Project Manager and administrative support.

3.07 While the SEEC grant funds noted in 3.06 (b)(ii) and (iii) above will be disbursed in USD currency based on the actual exchange rate at the date of disbursement, the amounts are based on their currencies of origin (i.e. EUR and GBP, respectively) and are therefore subject to exchange rates fluctuations. The SEEC grant amounts shown in Table 3.1 above have been converted to USD based on exchange rates as at June 30, 2016 for consistency with other funding sources. The risk of exchange rate fluctuations related to the SEEC grant funds is borne solely by the beneficiary of the funds.

3.08 As discussed in paragraph 1.16, incentivising investment in both EE and RE has been occupying the attention of CDB since its Strategic Plan 2010-2014, as these are important means of reducing the carbon footprint of BMCs and enhancing energy security. However, high indebtedness and fiscal challenges have largely not allowed BMC governments to prioritise spending for EE investments. In light of this, CDB has sought to package its available resources with concessionary terms for the purpose of providing this incentive, including a larger proportion of loan financing, thereby reducing the cash counterpart contribution of the BMC.

3.09 Antigua and Barbuda is the second among BMCs seeking to accelerate the replacement of its entire network of street lamps, thereby realising early reductions in energy consumption and associated greenhouse gases and accruing substantial savings in expenditure by GOAB for street lighting. The replacement of an entire network of street lamps in less than two years is a significant undertaking for any electric utility and one that largely benefits the government and its climate change agenda. In the context of relatively small domestic markets, special incentives are required. Accordingly, a waiver of CDB's Lending Policies is requested to permit CDB to increase the proportion of lending from 70% to 77%, consistent with CDB's strategic objective of promoting energy security through incentivising EE in BMCs.

3.10 Both the E&M Tranche and EIB CALC Tranche will be repayable in 13 years, inclusive of a 3 year grace period. The interest rate on the E&M Tranche is 2.97% (variable). However, the EIB CALC Tranche attracts an interest rate subsidy which is currently estimated at 1.08% p.a., yielding an indicative interest rate of 1.89%, p.a. A commitment charge of 1% p.a. will be payable on the undisbursed balance of the Loan, commencing from the 60th day after the Loan Agreement.

4. PROJECT VIABILITY

TECHNICAL ANALYSIS

General

4.01 In keeping with GOAB strategy to decrease energy consumption in the public sector and reduce carbon emissions through avoided electricity generation, the Project was identified as a priority for energy efficiency improvements, as significant savings can be achieved with reasonable investments. In preparation for this Project, APUA conducted a pilot testing of LED lamps at Friars Hill Road in 2015. The aim of the pilot was to gain experience on technical quality of LED street lamps, their installation requirements, operation and potential benefits.

Street Light Retrofitting Options

4.02 For street lighting retrofit projects, there are two options, Induction and LED lamps. Induction lamps represent a more efficient alternative than existing HPS lamps, reducing energy consumption by approximately 30%. However, LED technology is a more efficient technology, achieving reduction in energy consumption of more than 50% in comparison with HPS lamps. Because of the lower efficiency and the mercury content of induction lamps, this solution was not considered. Within the past few years LED street lighting has become a mature technology and various countries in the region have embarked on replacement projects using LEDs. LED is recognised as the new standard for street lighting due to its high efficiency, flexible lighting design and robustness. Solar photovoltaic powered LED lamps were not considered as a viable solution because of the significant higher life-cycle costs and stringent maintenance requirements for batteries and panels. Studies have demonstrated that grid-tied LED streetlights are the more cost-effective option.

LED Street Lamps

4.03 To date, APUA has installed and operated around 100 LED street lamps during a recent pilot project to gain experience and verify their benefits. The main benefits of the LED street luminaires are:

(a) High efficiency, reducing energy consumption by more than 50% in comparison to HPS and Mercury Vapour (MV), leading to lower electricity costs and lower carbon emissions;

(b) Higher lighting quality and improved visibility of objects by higher Colour Rendering Index (CRI) (70 vs. 22 for HPS) and colour temperature of 5,000K, more uniform light distribution and adjustable distribution patterns;

(c) Long nominal lifetime of >100,000 hours, tool-less and modular design decreasing frequency of repair and maintenance costs; and

(d) Redundant design ensuring lighting in the event of a single LED failure.

Design Considerations

4.04 Dispersion patterns are typically part of the light engine module and will be selected according to the specific needs of the location to allow an optimal illuminance without compromising safety issues. Available dispersion patterns are described in Appendix 4.1. The new street lamps will be installed at the same location as the old ones, reusing existing street lighting poles and cabling. The risk of structural

damage by replacing the lamps is very low as LED luminaries have lower or similar weight to HPS lamps. The replacement of the existing lamps also gives APUA the opportunity to inspect the structural condition of poles and address potential issues. The pilot testing of the LED street lamps, has demonstrated compatibility with local power parameters and ensured that there are no power quality issues which could affect the operation negatively. As in the current networks, LED street lamps will be individually controlled by photocells.

4.05 The reduction in energy consumption are derived from the comparison of efficiency of the existing and the new lamps which is higher than 80 lm/W. To achieve similar or better illuminance levels, the intention is to replace the existing 250W, 175W and 100W HPS lamps with LED lamps having wattages lower than 145W, 100W and 60W, respectively. Based on these values an average reduction in energy consumption of 51% have been determined which is confirmed by the pilot project. It is planned to install monitoring devices on 100 lamps across the network to verify the calculated energy consumption and predicted reduction.

STREET LIGHTING TARIFF SAVING TO GOAB

4.06 GOAB's savings in electricity billing will be derived from the reduction in its street lighting electricity bill payable to APUA. The reduction in street lighting electricity costs will be based on the reduction in consumption of the new LED lamps as they are installed over the implementation period from Q3 2017 to Q4 2018. GOAB savings in electricity billings average approximately $5mn p.a. between 2017 and 2035. Key assumptions are found in Appendix 4.2, with details of the savings in Appendix 4.3.

ECONOMIC ANALYSIS

4.07 The economic benefits of the project are assessed based on a comparison of the "with project" and "without project" scenarios. Without the project, street-lighting would be provided by less energy efficient HPS lamps. With the project, the HPS lamps will be replaced with more efficient LED lamps over a period of approximately 18 months, reducing the electricity required to provide this service.

4.08 The economic benefits of the project include a reduction in fuel consumption, and operations and maintenance (O&M) costs, as well a decline in CO_2 emissions, as a result of the use of the more energy efficient lamps. It is estimated that an average of approximately 240,000 imperial gallons of Heavy Fuel Oil and diesel consumption p.a. between 2017 and 2035 will be forgone, based on an average annual reduction in electricity consumption of 4,726 MWh per year. In addition, an average of 3,049 tonnes of CO_2 emissions p.a. will be avoided during the analysis period.

4.09 Further, replacement of HPS lamps with LED lamps will result in maintenance cost savings through reduced material costs and maintenance visits over time. Even though the upfront cost of a new LED light is higher than an HPS light, the expected life of LED light components is longer. The expected life of LED light components is about 20 years, while the components of an HPS lamp range from 15 years for the fixture to only 6 years for the lamp. The analysis determined that the annualised maintenance cost for HPS lamps is $54.8/light/year, compared to $33.9/light/year for LED lamps.

4.10 In valuing the avoided carbon emissions, the analysis drew on the work of the United States Interagency Working Group (IWG), on the Social Cost of Carbon (SCC). SCC is a comprehensive estimate of climate change damage and includes agricultural productivity, human health and property damage from increased flood risk. IWG based these estimates on a linking of global climate and economic models, allowing for the valuation of economic damage associated with increasing CO_2 emissions and thereby enabling the damage caused by CO_2 to be monetised for incorporation into cost-benefit analyses. Based on this work, a value of USD40/tonne of CO_2 was used in this analysis.

Incremental Economic Rate of Return

4.11 The incremental rate of return is based on the assumptions listed in Appendix 4.4, with details of those calculations shown in Appendix 4.5. The project provides an estimated Economic Rate of Return (ERR) of 17%. This ERR is a conservative estimate of the benefits to the society, given that there are other qualitative benefits such as improved security to citizens and tourists. This project will also help to reduce Antigua and Barbuda's reliance on imported fuel, decreasing its exposure to fluctuations in fuel prices.

Sensitivity Analysis

4.12 A sensitivity analysis was carried out to determine the sensitivity of the ERR to changes in key variables. The results of this analysis are shown in Table 4.1 below. This analysis shows that the ERR of this project is more sensitive to changes in capital costs than it is to changes in any of the other variables reviewed. For all of the variables under review, the rate of return was above the threshold of 12% when they were varied by 10%. This analysis indicates that the project is resilient to changes in key variables likely to affect project outcomes.

TABLE 4.1: SENSITIVITY ANALYSIS

Scenario	ERR %		Switching value
	+10%	-10%	
1. Base Case	17%	17%	
2. Capital costs	15%	19%	30%
3. Reduction in forecasted energy consumption of LED lamps *vs*. HPS lamps	19%	15%	-26%
4. Fuel costs	18%	16%	-34%

4.13 For the ERR of this Project to fall to 12%, capital costs would have to increase by 30%, or the electricity savings of an LED light vs. an HPS light would have to be lower by 26%. However, as capital costs are based on known rates and include a physical contingency of 6%, the risk of the ERR falling below 12% due to 30% increase in this variable is relatively low. The empirical evidence provided by the pilot projects in Antigua and Barbuda, St. Lucia and St. Vincent and the Grenadines have confirmed the level of energy savings which can be achieved by replacing HPS with LED lamps. As such the probability of not achieving forecasted reductions in energy consumption is minimal. The cost of fuel is an important factor in determining the ERR of this project. As fuel costs increase, so too do the economic benefits realised by the project. In this analysis the unit fuel cost is assumed to be $0.43/kWh based on the average fuel price over the past 3 years and the 2015 efficiency [MWh/Ig] of the plant, corresponding to a crude oil price of approximately USD83/barrel. A crude oil price of USD70/barrel corresponds to a fuel cost of $0.39/kWh, and an ERR of 15%. To fall to the benchmark ERR of 12%, fuel costs would be $0.29/kWh, corresponding to an average crude oil price of around USD45/barrel over the analysis period. Recent trends suggest that fuel prices are expected to increase. The results of this analysis further confirm the robustness of the Project.

MACROECONOMIC IMPACTS ASSESSMENT

4.14 The project can be accommodated within the capital expenditure level of 2% of GDP and be funded by external loans, while GOAB remains on its path towards its 2030 debt to GDP target of 60%, as implied in the debt sustainability analysis. GOAB is expected to continue to manage and restructure its public debt towards reaching its debt target. The limiting factor to government borrowing is not an individual loan per se, but rather the overall level of new loans that can be accommodated that would allow the government to continue along a sustainable debt path, and at the moment GOAB overall borrowing plans are consistent with a sustainable debt path under the assumptions made in the debt sustainability analysis. Additionally, careful selection of capital projects to be funded through loans can contribute to national output growth or to improved fiscal performance that will in turn improve debt dynamics. In that regard, this project will contribute to improving fiscal performance, as central government expenditure declines or as transfers to APUA decline as a result of lower cost of electricity for street lighting that will result, as well as the resulting lower cost associated with maintenance and replacement of street lamps.

4.15 Further, the foreign exchange impact of the project is expected to be positive as subsequent debt service payments are likely to be outweighed by lower quantity of fuel imports that can be attributed to street lighting. Other positive impacts are also expected, though not significant, including a positive impact on employment in the short run as the project is implemented, as well as in the longer run emanating from the indirect positive impact on tourism as security improves and as reputational risks to the industry from security incidents declines.

ENVIRONMENTAL ASSESSMENT

4.16 The Project is categorised "B" based on CDB's Environmental and Social Review Procedures, as it will result in a limited number of specific environmental and social impacts which can be effectively mitigated if they are planned and monitored for compliance. There may be short-term disruption of vehicle and pedestrian traffic around the Project work sites. Potential occupational hazards/emergencies exist through falls and electric shocks. These impacts are manageable with proper planning and mitigation measures, including through the application of APUA's Health and Safety Manual. The main environmental issue is ensuring the appropriate disposal of the scrap fixtures, as the MV and HPS lamps contain very small amounts of mercury which is a hazardous material[22]. The National Solid Waste Management Authority does not have facilities to manage the appropriate disposal of hazardous substances and wastes, the scrap MV and HPS lamps will be exported to a country where they can be properly disposed of at a certified hazardous waste management facility. The Department of the Environment is currently developing regulations on pollution control to be gazetted by December 2016. It will be a condition of the Loan that GOAB shall, by March 31, 2017, enact pollution control regulations to regulate the disposal of prohibited waste under the Environmental Protection and Monitoring Act (EPMA).

4.17 An Environmental and Social Management Plan (ESMP), including a grievance mechanism, will be prepared by the Supervision Consultant in consultation with the Department of Environment and other stakeholders. The ESMP will include, among other things, arrangements for proper vehicular traffic control, pedestrian safety, use of appropriate personal protection equipment and instructions for safe handling and storage of the fixtures. The contract for the disposal of old street lamps and fixtures will specify the requirements for the safe dismantling, packing, shipment and ultimate disposal of the waste. As a condition precedent to disbursement in respect of the installation works, APUA will be required to

[22] Mercury is classified as prohibited waste under Schedule II of Antigua and Barbuda's Environmental Protection and Monitoring Act (EMPA), 2015.

submit to CDB, evidence in form and substance, acceptable to CDB, that it has obtained all permits necessary for the installation works, including permits for the disposal of hazardous waste, from the relevant authority(ies). During implementation, the Supervision Consultant will monitor APUA's operations, and the waste disposal contractor for conformance with the mitigation measures stipulated in the ESMP and in the contract documents.

SOCIAL AND GENDER ASSESSMENT

4.18 Net social development benefits are expected. The Project will benefit residents and non-residents of Antigua and Barbuda with the provision of improved street lighting quality because of a higher Colour Rendering Index and a more uniform light distribution. Some areas may experience improved luminosity.[23] Improved street lighting can contribute to enhanced citizen security in areas of personal safety, road safety for pedestrians and motorists, security of public and private property, and overall crime prevention. Further, the projected reduction in electricity expenditure in the medium to long term opens fiscal space for the country's sustainable development goals, inclusive of social sector targets.

4.19 The nature of the Project does not directly contribute to improving gender equality. Consequently, mainly men are expected to benefit from employment opportunities resulting from this Project. The Gender Marker Analysis is at Appendix 4.6.

[23] Luminous intensity measures the "quantity of visible light that is emitted in unit time per unit solid angle" (http://www.britannica.com/science/luminous-intensity).

5. RISK ASSESSMENT AND MITIGATION

5.01 A summary of key risks impacting the Project is outlined in Table 5.1.

TABLE 5.1: SUMMARY OF RISK ASSESSMENT AND MITIGATION

Risk Type	Description	Mitigation Measures
Implementation	Environmental: Occupational health and safety, risks during installation	APUA has established health and safety standards to which all of its staff and contractors must adhere. The Supervision Consultant will monitor compliance with APUA's Health and Safety Manual and the ESMP.
Implementation	Environmental: Pollution of the environment from inadequate disposal of its replaced street lamps.	The project design makes provision for the engagement of a qualified contractor to handle hazardous waste which will be packaged for exporting for final disposal at certified hazardous waste disposal facilities abroad.
Implementation	Resources: Implementation delays due to inadequate internal capacity to support timely execution of the Project	Direct implementation support will be provided by the DOE, and a Project Engineer to augment capacity at APUA will be funded by the Project. Provision has also been made for funding additional resources for the installation of the lamp fixtures.
Operational	Climate change impacts on APUA's infrastructure performance	APUA has committed to undertaking a CRS with a view towards improved climate resilience of its operations.

6. IMPLEMENTATION AND PROJECT MANAGEMENT

THE BORROWER AND THE EXECUTING AGENCY

6.01 The Borrower is GOAB and the Executing Agency is APUA. Details of the Borrower and Executing Agency are set out at Appendix 6.1.

PROJECT MANAGEMENT AND IMPLEMENTATION

Project Management

6.02 Project management will be undertaken by APUA's Customer Service and Engineering Department who are responsible for, among other things, street lighting, new service connections and disconnections, and fault findings and repairs and maintenance of the transmission and distribution network. APUA will assign project management staff, as required, to ensure the successful completion of the Project. It will be a condition precedent to first disbursement of the Loan that a PC is assigned by APUA from its staff, whose qualifications and experience are acceptable to CDB, to manage the Project. The responsibilities of the PC are set out at Appendix 6.2. The PC will be assisted by a Project Engineer (PE) who will be responsible for planning, scheduling and coordinating installation activities. The cost of these services will be financed by CDB. It shall accordingly be a condition precedent to first disbursement with respect to the installation works that APUA, in accordance with the procurement procedures applicable to the Loan, select and engage a PE. Terms of Reference (TOR) for PE are set out at Appendix 6.3. In addition, the Department of Energy (DOE) in the MTEDIE, will assign its Energy Officer who will provide support, feedback, guidance and facilitate stakeholder participation and inter-agency coordination during Project implementation. The Energy Officer has been appointed as the focal point for facilitation and implementation of the SEEC programme in Antigua and Barbuda and has played an important role in developing this Project. He will continue to work closely with CDB to support CDB's work in Antigua and Barbuda in the area of RE/EE. CDB staff are satisfied that the proposed project management and administrative arrangements are adequate to effectively execute the Project on behalf of GOAB. CDB staff are also satisfied that APUA has adequate capacity to install the LED lamp fixtures utilising its own work force.

6.03 Supervision Consultants will be engaged to assist APUA during project implementation. They will be required to certify the LED installation works and assist with the preparation and evaluation of tenders. It will therefore be a condition precedent to first disbursement of the Loan that APUA select and engage consultants, whose qualifications and experience are acceptable to CDB, to undertake the supervision services required during the implementation of the project. The costs of these services will be financed by CDB. The draft TOR for the Supervision Consultant is set out at Appendix 6.4. The Project Management Structure and a Project Implementation Support Plan are set out at Appendices 6.5 and 6.6, respectively.

Implementation Schedule

6.04 The Project is projected to be implemented over a period of 30 months commencing from Board approval. Installation works are estimated to take 18 months, commencing by April 2017. The proposed Project Implementation Schedule is presented in Appendix 6.7.

PARTICIPATION OF BENEFICIARIES AND STAKEHOLDERS

6.05 An ESMP will be developed by the Supervision Consultant after extensive consultations with key stakeholders including, but not limited to, the DOE, the National Solid Waste Authority, the Royal Police Force of Antigua and Barbuda, and Public Works. APUA's Customer Service and Engineering Department will post Project information on its website as well as on other media to inform stakeholders of Project progress and also use its existing customer complaints mechanism to deal with grievances related to the Project. GOAB has been proactive in using its public information systems to promote EE and RE, and will utilise this same medium to keep the general public and key civil society organisations informed about the project.

DISBURSEMENTS

6.06 Disbursement of the CDB Loan will be made in accordance with CDB's Guidelines for the Withdrawal of Loan Proceeds. It is expected that the first disbursement from the Loan and the Grant will be made by December 31, 2016. The Loan and the Grant is expected to be fully disbursed by December 31, 2018. An Estimated Quarterly Loan Disbursement Schedule is presented in Appendix 6.8.

PROCUREMENT

6.07 Procurement of goods, works and non-consultancy services shall be undertaken in accordance with CDB's Guidelines for Procurement (January 2006) except that, where EIB CALC and EU-CIF SEEC resources are being used together with CDB's E&M resources for the supply and installation of LED street lamps and disposal of the removed fixtures, a waiver of CDB's Guidelines for Procurement (January 2006) is requested to extend eligibility for procurement to countries eligible for procurement under EIB and EU-funded projects which are not CDB Member Countries. The value of the waiver is [redacted].

6.08 Procurement of consultancy services shall be undertaken in accordance with CDB's Guidelines for the Selection and Engagement of Consultants by Recipients of CDB Financing (October 2011). In respect of the CRS Consultancy, where EIB CAS resources are being utilised, consistent with the provisions of the EIB CAS Agreement:

(a) procurement of the CRS Consultant shall be undertaken in accordance with CDB's Guidelines for the Selection and Engagement of Consultants by Recipients of CDB Financing (October 2011); and

(b) consultants from both CDB Member Countries and countries eligible for procurement under EIB-funded projects, shall be eligible for procurement.

6.09 In accordance with the provisions of the EIB CALC Finance Contracts, procurement notices for the supply of LED street lamps and consumption monitoring equipment are required to be published in the Official Journal of the European Union and bidders for the contracts under the LED Street Lamp Supply and Installation component will be required to submit the "Covenant of Integrity" in the form attached in the Annex to the Procurement Plan at Appendix 6.9.

MONITORING AND REPORTING

6.10 The results of the Project will be measured in accordance with the indicators set out in the Design and Monitoring Framework at Table 2.1. It will be a condition of the Loan that APUA shall furnish or cause to be furnished to CDB, the Reports listed in Appendix 6.10 in such form or forms as CDB may require, not later than the times specified therein for so doing.

PERFORMANCE EVALUATION RATING

6.11 The composite performance rating based on CDB's Project Performance Evaluation System (PPES) has been estimated at 6.1. This is a 'highly satisfactory' rating, which suggests that there is a good probability that the Project will achieve its objectives. The details of PPES are presented in Table 6.1.

TABLE 6.1: PROJECT PERFORMANCE EVALUATION SYSTEM RATING

CRITERIA	SCORES	JUSTIFICATION
Strategic Relevance	7.0	The Project supports GOAB's policy objectives of becoming a low carbon economy with increased energy independence through the development of indigenous renewable energy sources. It is consistent with CDB's Strategic Objective of "supporting inclusive and sustainable growth and development", the Corporate Priority to "strengthen/modernise social and economic infrastructure" and the Cross-Cutting Theme of energy security. It is therefore accorded high strategic relevance.
Poverty Relevance	4.0	Socio-economic benefits directly related to poverty are not Immediate.
Efficacy	7.5	The Project is designed to significantly reduce GOAB's energy consumption over a relatively short space of time.
Cost Efficiency	6.5	ERR of 17% is based on conservative quantifiable benefits of fuel substitution and avoided maintenance cost. The avoided capacity benefits have not been quantified.
Institutional Development Impact	5.0	The climate risk screening assessment will provide APUA with a formal framework for assessing its climate resilience.
Sustainability	7.0	The Project will reduce APUA street lighting related maintenance costs. APUA has adequate capacity and arrangements in place for maintenance of the new street lamps. The Climate Risk Screening Consultancy will provide APUA with recommendations on measures to increase the resilience of its infrastructure to events related to climate change.
Composite Score	**6.1**	**Highly Satisfactory**

7. TERMS AND CONDITIONS

7.01 The proposed financing for the Project is as follows:

(1) a loan to GOAB from CDB's OCR of an amount not exceeding the equivalent of five million nine hundred and eighty-one thousand United States dollars (USD5,981,000) to assist GOAB in financing:

(a) the supply and installation of LED street lamps including the:

(i) supply of LED street lamps and consumption monitoring equipment;

(ii) installation by APUA crews of the supplied LED street lamps (Installation Works); and

(iii) disposal of the old street lamp fixtures

(the Supply and Installation Component);

(b) consultancy services to supervise project implementation, including support for the tendering process and to certify payment requests (the Supervision Consultancy); and

(c) project management

(the Loan Component); and

(2) a grant to GOAB from CDB's SFR to assist GOAB in financing the:

(a) Supply and Installation Component; and

(b) consultancy services to assess the vulnerability of APUA's infrastructure and to provide recommendations to increase its resilience (the CRS Consultancy)

(the Grant Component)

(together, the Project).

7.02 It is recommended that CDB lend to GOAB from CDB's OCR an amount not exceeding the equivalent of five million nine hundred and eighty-one thousand United States dollars (USD5,981,000) (the Loan) comprising:

(a) an amount not exceeding the equivalent of two million and eighty-one thousand United States dollars (USD2,081,000) allocated from CDB's Equity and Market resources (the Equity and Market Tranche); and

(b) an amount not exceeding the equivalent of three million, nine hundred thousand United States dollars (USD3,900,000) allocated from resources provided by EIB to CDB under the EIB CALC (the EIB CALC Tranche),

to assist GOAB in financing the Loan Component on CDB's standard terms and conditions and on the following terms and conditions:

(1) **Repayment**: Repayment of the Loan shall be made in forty (40) equal or approximately equal and consecutive quarterly instalments commencing three (3) years after the date of the Loan Agreement.

(2) **Interest**: Interest shall to be payable quarterly:

(a) at the rate of two decimal nine seven per cent (2.97%) p.a. (variable) on the Equity and Market Tranche withdrawn and outstanding from time to time; and

(b) at the rate of one decimal eight nine per cent (1.89%) p.a. (variable) on the EIB CALC Tranche withdrawn and outstanding from time to time.

(3) **Commitment Charge**: A commitment charge at the rate of one percent (1%) p.a. shall be payable on the amount of the Loan unwithdrawn from time to time. Such charge shall accrue from the sixtieth (60^{th}) day after the date of the Loan Agreement and shall be payable quarterly.

(4) **Disbursement**:

(a) The first disbursement of the Loan shall be made by December 31, 2016, and the Loan shall be fully disbursed by December 31, 2018, or such later dates as CDB may specify in writing.

(b) Except as CDB may otherwise agree:

(i) the Loan shall be used to finance the components of the Project allocated for financing by CDB as shown in the Project Cost, Phasing and Financing Plan for the Project at Appendix 3.1 up to the respective limits specified therein; and

(ii) total disbursements with respect to the Loan shall not exceed in the aggregate seventy-seven percent (77%) of the cost of the Project.

(c) The Loan shall not be used to meet any part of the cost of the Project which consists of identifiable Taxes and Duties.

(d) The Loan shall not be used to finance any activity set out in Appendix 7.1.

(5) **Procurement**:

(a) Except as provided in sub-paragraph (b) below, procurement shall be in accordance with the procedures set out and/or referred to in the Loan Agreement between CDB, GOAB and APUA, or such other procedures as CDB may from time to time specify in writing. The Procurement Plan approved by CDB is set out in Appendix 6.9. Any revisions to the Procurement Plan shall require CDB's prior approval in writing.

(b) In respect of procurement related to the Supply and Installation Component, where EIB CALC and EU-CIF SEEC resources are being used together with CDB's Equity and Market resources, eligibility for procurement shall be extended to countries eligible for procurement under EIB and EU-funded projects which are not CDB Member Countries. The EU eligibility rules are set out in Appendix 7.2.

(c) Procurement notices for the supply of LED street lamps and consumption monitoring equipment shall be published in the Official Journal of the European Union. Bidders for the contracts under the Supply and Installation Component must submit the "Covenant of Integrity" in the form attached in the Annex to the Procurement Plan at Appendix 6.9.

(6) **Conditions Precedent to First Disbursement of the Loan**:

(a) PC referred to in sub-paragraph 8(e)(vi) below shall have been assigned.

(b) The consultant(s) referred to in sub-paragraph 8(e)(vii)(bb) below shall have been engaged.

(7) **Conditions Precedent to Disbursement in relation to the Installation Works**:

CDB shall not be obliged to disburse any amount of the Loan in respect of the Installation Works until:

(a) the PE referred to in sub-paragraph 8(e)(vii)(aa) below shall have been engaged; and

(b) CDB shall be satisfied that APUA has received all requisite statutory, planning and environmental permits, licences and/or other approvals in respect of the Installation Works, including permits for the disposal of hazardous waste.

(8) **Other Conditions**:

(a) Except as CDB may otherwise agree, GOAB shall:

(i) execute the Loan Component through the Customer Service and Engineering Department of APUA;

(ii) make the proceeds of the Loan available to APUA for the purpose of executing the Loan Component; and

(iii) take all necessary steps to facilitate and ensure the performance by APUA of its obligations set out and referred to herein.

(b) As a condition of making the Loan available to APUA, APUA shall undertake to observe and perform the obligations on its part to be observed and performed as set out and referred to herein.

(c) Except as CDB may otherwise agree, Section 3.11 of the General Provisions shall not apply to this Loan.

(d) GOAB shall:

(i) contribute to the Project an amount of not less than the equivalent of four hundred and eleven thousand dollars ($411,000), which shall be expended in a timely manner on the components of the Project designated for financing by GOAB as shown in the Project Cost, Phasing and Financing Plan of the Project, unless CDB shall otherwise specify in writing;

(ii) if APUA is unable to meet its administrative and other operating expenses from its own resources, make adequate arrangements in a timely manner to enable APUA to do so;

(iii) for the duration of the Project, assign from among the staff of DOE, MTEDIE, assign the Energy Officer, appointed as the focal point for facilitation and implementation of the SEEC Programme in Antigua and Barbuda, to provide support, feedback, guidance and facilitate stakeholder participation and interagency coordination during Project implementation and work closely with CDB to support CDB's work in Antigua and Barbuda in the area of RE/EE;

(iv) use its public information systems to keep the general public and key civil society organisations informed about the Project; and

(v) GOAB shall, by March 31, 2017, enact pollution control regulations to regulate the disposal of prohibited waste under the EPMA.

(e) APUA shall:

(i) contribute to the Project an amount of not less than the equivalent of two million and thirty-two thousand dollars ($2,032,000), which shall be expended in a timely manner on the components of the Project designated for financing by APUA as shown in the Project Cost, Phasing and Financing Plan of the Project, unless CDB shall otherwise specify in writing;

(ii) ensure that the proceeds of the Loan are used exclusively for the Project;

(iii) carry out the Project at all times with due diligence and efficiency, with management personnel whose qualifications and experience are acceptable to CDB, and in accordance with sound technical, environmental, financial and managerial standards and practices;

(iv) institute and maintain organisational, administrative, accounting, and auditing arrangements for the Project acceptable to CDB;

(v) keep its staff at levels consistent with financial prudence and technical and administrative competence;

(vi) for the duration of the Project, assign from among its staff as PC, a person with qualifications and experience acceptable to CDB to manage the Project and carry out the duties and responsibilities set out in Appendix 6.2. The qualifications and experience of any person subsequently assigned to the position of PC shall be acceptable to CDB;

(vii) in accordance with the procurement procedures applicable to the Loan, select and engage:

(aa) a PE to provide the services set out in the TOR at Appendix 6.3;

(bb) consultant(s) to carry out the Supervision Consultancy in accordance with the TOR at Appendix 6.4; and

(cc) contractors to carry out the Supply and Installation Component;

(viii) post Project information on its website as well as on other media to inform stakeholders of Project progress and also use its existing customer complaints mechanism to deal with grievances related to the Project;

(ix) keep the lamps, fixtures and other infrastructure financed under the Project in good repair and condition and shall provide the financial and other resources required to adequately maintain the lamps, fixtures and other infrastructure financed from the Loan;

(x) except as CDB may otherwise agree, furnish to CDB, the reports listed in Appendix 6.10 in the forms specified, or in such form or forms as CDB may require, not later than the times/periods specified therein for so doing; and

(xi) unless CDB has given its prior consent in writing, retain title to, and possession of all or substantially all of, the assets comprising the Project or, as appropriate, replace and renew such assets and maintain the Project in substantially continuous operation in accordance with its original purpose, provided that CDB may withhold its consent only where the proposed action would prejudice CDB's interest as lender to GOAB or would render the Project ineligible for financing by CDB under the EIB CALC Finance Contract.

(f) GOAB and APUA shall:

(i) maintain in force all rights of way or use and all permits necessary for the execution and operation of the Project;

(ii) implement and operate the Project in compliance with all laws and regulations to which GOAB, APUA or the Project is subject and in particular, in compliance with applicable environmental laws and regulations, and international treaties;

(iii) warrant and undertake that it has committed, and no person to its present knowledge has committed, any of the following acts, and that it will not commit, and no person with its consent or prior knowledge will commit, any such act, that is to say:

(aa) the offering, giving, receiving or soliciting of any improper advantage to influence the action of a person holding a public office or function or a director or employee of a public authority or public enterprise or a director or official of a public international organisation in connection with any procurement process or in the execution of any contract in connection with those elements of the Project financed by the Loan; or

(bb) any act which improperly influences or aims improperly to influence the procurement process or the implementation of the Project financed under the Loan to the detriment of GOAB or APUA, including collusion between tenderers.

For the purposes of these sub-paragraphs, the knowledge of any employee of GOAB or APUA involved as a manager of the Project shall be deemed the knowledge of GOAB or APUA, respectively. GOAB and APUA undertake to inform CDB if it becomes aware of any fact or information suggestive of the commission of any such act;

(iv) acknowledge that CDB or EIB may be obliged to divulge such documents relating to GOAB or APUA and the Project to the Court of Auditors of the European Union (Court of Auditors), and/or European Anti-Fraud Office (OLAF) as are necessary for the performance of that party's tasks under European Union Law;

(v) permit persons designated by CDB or EIB or, as the case may be, authorised representatives of the Court of Auditors and/or the European Commission and/or OLAF, to visit the premises of GOAB and/or APUA and the sites, installations and works comprising the Project, and to conduct such checks as they may wish, and GOAB and APUA shall provide to them, or ensure that they are so provided, with all necessary assistance for this purpose;

(vi) arrange to maintain, in a single location, for inspection during six (6) years from the date of the Loan Agreement, the full terms of the Loan Agreement, as well as all material documents pertaining to the procurement process and to the execution of the contract and shall procure that CDB and EIB may inspect the contractual documents that the contractor is obliged to retain under its supply contract; and

(vii) except as CDB may otherwise agree, furnish or cause to be furnished to CDB within three (3) months of Project completion, a completion report on the implementation and on the early operation stage of the Project, including its climate action aspects, in content and in form as specified in Appendix 7.3, or otherwise as CDB may require.

(g) CDB shall be entitled to suspend, cancel or call in the Loan, or any part thereof, if the EU-CIF SEEC or the DFID SEEC resources, or any part thereof, is suspended, cancelled or required to be refunded.

7.03 It is also recommended that CDB make a grant to GOAB from CDB's SFR comprising:

(a) an amount not exceeding the equivalent of thirty thousand United States dollars (USD30,000) allocated from the EIB CAS resources ;

(b) an amount not exceeding the equivalent of five hundred and twenty-nine thousand Euros (EUR529,000) allocated from the EU-CIF SEEC resources; and

(c) an amount not exceeding the equivalent of two hundred and ninety-one thousand Pounds Sterling (GBP291,000) allocated from the DFID SEEC resources,

to assist GOAB in financing the Grant Component on CDB's standard terms and conditions and on the following terms and conditions:

(1) **Disbursement**:

(a) Except as CDB may otherwise agree, and subject to sub-paragraph (b) below, disbursement of the Grant shall be made periodically after receipt by CDB of:

(i) a request in writing from APUA for the funds; and

(ii) an account and documentation, satisfactory to CDB, in support of expenditures incurred by APUA in respect of, and in connection with, the Grant Component.

(b) CDB shall not be under any obligation to make:

(i) the first payment pursuant to paragraph (1)(a) above until CDB has received evidence, acceptable to CDB, that the condition precedent to first disbursement of the Grant set out in sub-paragraph (3) below has been satisfied;

(ii) the first payment in respect of the CRS Consultancy until CDB shall have received a copy of the signed contract between APUA and the consultant for the services in respect of the CRS Consultancy;

(iii) any payment in respect of the CRS Consultancy until CDB shall have received the requisite number of copies of the reports or other deliverables, in form and substance acceptable to CDB, to be furnished for the time being by the CRS consultant to GOAB, APUA, and CDB, respectively, in accordance with the TOR at Appendix 2.2; and

(iv) payments representing ninety percent (90%) of the amount of the Grant allocated to the CRS Consultancy, until CDB shall have received:

(aa) the requisite number of copies of the final reports or other deliverables, in form and substance acceptable to CDB, to be furnished by the CRS consultant to GOAB, APUA, and CDB, respectively, in accordance with the TOR at Appendix 2.2; and

(bb) a certified statement of the expenditures incurred by APUA in respect of and in connection with the CRS Consultancy.

(c) The first disbursement of the Grant shall be made by December 31, 2016, and the Grant shall be fully disbursed by December 31, 2018, or such later dates as CDB may specify in writing.

(2) **Procurement**:

(a) Subject to paragraph (b) below, procurement shall be in accordance with the procedures set out and/or referred to in the Grant Agreement or such other procedures as CDB may from time to time specify in writing. In respect of the CRS Consultancy where EIB CAS resources are being utilised, consistent with the provisions of the EIB CAS Agreement, consultants from both CDB Member Countries and countries eligible for procurement under EIB-funded projects, shall be eligible for procurement.

(b) In respect of procurement related to the Supply and Installation Component, where EIB CALC and EU-CIF SEEC resources are being used together with CDB's Equity and Market resources, eligibility for procurement shall be extended to countries eligible for procurement under EIB and EU-funded projects which are not CDB Member Countries. The EU eligibility rules are set out in Appendix 7.2.

(c) The Procurement Plan for the Project is set out in Appendix 6.9. Any revisions to this Plan shall require CDB's prior approval in writing.

(3) **Condition Precedent to First Disbursement of the Grant**:

The conditions precedent to first disbursement of the Loan shall have been satisfied.

(4) **Other Conditions**:

(a) Except as CDB may otherwise agree, GOAB shall:

(i) execute the Grant Component through the Customer Service and Engineering Department of APUA;

(ii) make the proceeds of the Grant available to APUA for the purpose of executing the Grant Component; and

(iii) take all necessary steps to facilitate and ensure the performance by APUA of its obligations herein.

(b) As a condition of GOAB making the Grant available to APUA, APUA shall undertake to observe and perform the obligations on its part to be observed and performed, as set out and required herein.

(c) APUA shall:

(i) in accordance with the procurement procedures applicable to the Grant, select and engage:

(aa) a consultant to carry out the CRS Consultancy in accordance with the TOR at Appendix 2.2; and

(bb) contractors to carry out the Supply and Installation Component; and

(ii) within a time frame acceptable to CDB implement such recommendations arising from the CRS consultancy, as may be acceptable to CDB.

(d) GOAB and APUA shall:

(i) explicitly acknowledge DFID Funding, in writing and verbal communications about activities related to the DFID Funding, to the public or third parties, including in announcements, and through use, where appropriate, of DFID's "UK aid – from the British people" logo ('UK aid logo') in accordance with DFID standards for use of the UK aid logo, unless otherwise agreed in advance by DFID or CDB and in all cases subject to security and safety considerations of CDB;

(ii) ensure that each deliverable produced by the consultant(s) under the Project contains the following statements:

"This technical assistance operation is financed under the second envelope of the Cotonou Agreement."

and

"The authors take full responsibility for the content of this report. The opinions expressed do not necessarily reflect the view of the European Investment Bank.";

(iii) facilitate and permit any authorised representative of CDB or EIB to communicate with and, if necessary, visit the CRS consultant in order to obtain all such information as CDB and EIB may require with regard to the progress of the Project;

(iv) permit CDB and EIB, or any person appointed thereby, to audit the expenditures financed by the Grant and their eligibility, prior to or after the relevant payments, and to provide CDB and EIB, or the appointed person with all reasonably required assistance, documents and information; and

(v) acknowledge that CDB may be obliged to divulge such documents relating to the Project and the consultant(s) to any competent European Union institution or body in accordance with the relevant mandatory provisions of European Union law.

(e) Except as CDB may otherwise agree GOAB and APUA shall:

(i) meet or cause to be met:

(aa) any amount by which the cost of the Grant Component exceeds the amount set out in the Project Cost, Phasing and Financing Plan at Appendix 3.1; and

(bb) the cost of any other items needed for the purpose of, or in connection with, the Grant Component; and

(ii) provide or cause to be provided, all other inputs that may be required for the punctual and efficient carrying out of the Grant Component not being financed by CDB.

(f) CDB shall be entitled to suspend, cancel or require a refund of the Grant, or any part thereof, if either

(i) the Loan, or any part thereof is suspended, cancelled, or called in; or

(ii) the EIB CAS, EU-CIF SEEC or the DFID SEEC resources, allocated for the Grant Component, or any part thereof, is suspended, cancelled or required to be refunded,

except that neither GOAB nor APUA shall be required to refund any amount of the Grant already expended in connection with the Grant Component and not recoverable by GOAB or APUA.

APPENDIX 1.1

MACROECONOMIC CONTEXT

1. The pace of growth slowed in Antigua and Barbuda during 2015 to an estimated 3.3% compared with growth of 4.2% during 2014. Growth in the vital hotel and restaurant sector, a proxy for tourism activity, slowed to 2.5% compared with 3.0% in the previous year, owing largely to weak performance during the earlier part of the 2015. The hotel and restaurant sector contributed 14.7% to gross value added during 2015. A decline in construction activity of 1.0% also contributed significantly to the overall slowing of growth in 2015. Growth in construction activity which contributed 9.4% to gross valued added, remained moderate during 2015 but declined to 4.9% compared with 7.0% during the previous year. Several significant eminent tourism development projects that are anticipated to boost construction activity did not get started during the year. Lower growth in the public administration sector and in the real estate sector, two significant contributors to GDP, also contributed to the overall drop in real output growth during 2015. Real output is however likely to accelerate during 2016 as tourism and general economic activity continues to recover from overall weak growth since 2008. Moreover, many of the long awaited tourism construction projects are expected to get started alongside some increase in public sector construction activity during 2016 and beyond. Lower international oil prices continued to result in low overall inflation, which was recorded at 0.9% during 2015 and 1.3% during 2014, compared with a long run trend of between 2.0% and 2.5%. With international fuel prices slowly recovering and with no further declines anticipated, inflation is expected to return to the long run trend during 2016.

2. Central government's performance improved markedly during 2015 when a primary surplus of 4.8% was recorded compared with a deficit of 0.2% attained during the previous year. An overall surplus of 1.9% was recorded, compared with an overall deficit of 2.9% during 2014. The improved performance largely reflected better revenue performance with receipts growing by more than 25.0% much of which was due to a large increase in revenue yields under the citizen by investment programme. Receipts for most revenue categories also increased. Cost associated with the resolution of the ABI Bank is expected to result in some deterioration in fiscal performance during 2016. Thus, an overall surplus of 0.3% is anticipated, while the primary balance is expected to amount to 2.6% of GDP. However, the central government's revenue performance during 2016 is expected to improve, while growth in other elements of recurrent expenditure is expected to decline marginally. Capital expenditure is projected to more than double to $107 mn (2.9% of GDP), but it is anticipated that much of it will be funded from grants including US20 mn under the UKCIF being administered by CDB.

3. The improvement in fiscal performance during 2015 and the core improvement anticipated during 2016 reflects concerted effort by GOAB to correct fiscal imbalance with which the country has been plagued over the last decade. GOAB fiscal efforts in that regard has required it to restrain spending and as a result capital expenditure fell to extremely low levels in 2015 amounting to less than 2.0% of GDP compared to past norms of over 4.0% of GDP. Fiscal adjustment efforts have resulted in lower debt with total public sector debt standing at 87.7% of GDP at the end of 2015, and projected to 83.6% by the end of 2016, assuming that a similar level of GDP growth is attained as in the previous year. Debt levels in the recent years exceeded 100% of GDP. GOAB remains committed to reducing total public sector debt towards the Eastern Caribbean Currency Union (ECCU) agreed target of 60% by 2030. A debt sustainability analysis indicates that doing so would require the government to sustain a primary surplus averaging 1.3% during the period, on the assumption that real growth averages about 2.7% of GDP annually during the period. The analysis assumes that: Capital expenditure would amount to about 2.0% annually throughout the period; and that growth in non-interest expenditure would decline to 18.5% of GDP by 2030, compared with 25.3% for 2016, 19.7% for 2017 and 20.1% for 2015. GOAB will therefore need to carefully prioritiSe its expenditure throughout the period, while access to concessionary resources will contribute to better debt dynamics.

APPENDIX 2.1

DETAILS OF THE PROJECT

PROJECT PREPARATION

1. The project preparation included a pilot implemented by APUA, which lead to the installation of 100 LED lamps in 2015. The pilot testing compared HPS and LED street lamps and demonstrated the efficiency and suitability of LED lamps. Furthermore, the pilot allowed APUA to gain operational experience and verify potential reduction in energy consumption from the replacement of HPS with LED street lamps.

Estimated Base Costs – [redacted]

LED STREET LAMP SUPPLY AND INSTALLATION

2. Elements of this component are:

(a) The purchase of 14,365 LED street lamps to replace existing street lamps including 5% spare LED fixtures to ensure quick replacement in case of failure. Recommended characteristics of the LED street lighting luminaries are described in the table below:

Characteristic	100 Watt HPS	175 Watt MV replacement	250 Watt
Power consumption	<60W	<100W	<145W
Color Temperature	4000K	4000K	4000K
Color Rendering Index	~70	~70	~70
Fixture Efficacy (Lm/W)	>83	>85	>80
Fixture Output (Lm)	5,000	8,520	11,720
LED L70 (Hours)	>100,000 hours	>100,000 hours	>100,000 hours

Consumption monitoring equipment will also be procured for 100 LED fixtures. This will enable APUA to capture energy consumption of the lamps in field conditions, allowing the validation of expected reduction in energy consumption and monitor operation.

(b) The proposed installation will be executed by APUA's work force. The work include the installation cost for the replacement of the 14,365 existing street lamps with the LED fixtures. LED luminaires will be mounted at the exact same location as the current HPS and MV lamps utilizing existing infrastructure (poles and wiring).

(c) The disposal of the scrap lamps and dismounted fixtures includes the collection and storage until the final disposal. The Project includes the cost to dispose the hazardous waste at certified waste disposal facilities located overseas. APUA with the assistance of the Supervising Consultant and in consultation with DOE will establish performance specifications and contract documents for safe disposal of the waste.

Estimated Base Costs – [redacted]

SUPERVISION CONSULTANT

3. An individual consultant will be engaged to support APUA during implementation. The services will include assistance to prepare tender documents and performance specifications; support the bid evaluation process; and prepare an ESMP. The Consultant will prepare an installation plan and report on planned versus actual progress. The Consultant will certify payment requests and be responsible for ensuring supplier and contractor compliance with contract documents.

Estimated Base Costs – [redacted]

CLIMATE RISK SCREENING

4. The Climate Risk Screening will assist the APUA in systematically examining the vulnerability of its facilities to projected climate change impacts.

Estimated Base Costs – [redacted]

PROJECT MANAGEMENT

5. Project management will be undertaken by APUA. APUA will assign project management staff, as required, to ensure the successful completion of the Project. The PC will be assisted by a Project Engineer (PE) who will be responsible for planning, scheduling and coordinating installation activities. In addition, the MTEDIE will assign a Liaison Officer, who will serve as advisor to the implementation team and liaison between APUA and MTEDIE. The project management includes also public awareness activities from APUA and MTEDIE to inform the public about the Project, its benefits and ensure stakeholder participation.

Estimated Base Costs – [redacted]

APPENDIX 2.2

DRAFT TERMS OF REFERENCE

CLIMATE RISK SCREENING OF APUA INFRASTRUCTURE

1. INTRODUCTION

1.01 The Government of Antigua and Barbuda (GOAB) has approached the Caribbean Development Bank (CDB) for funding for a street lighting replacement project. The project aims to replace approximately 14,365 street lamps across the island with high efficient LED models. The CDB is providing financing to the Government of Antigua and Barbuda (GOAB) for the project.

1.02 Streetlights in Antigua and Barbuda, and the accompanying infrastructure, are exposed to multiple natural hazards. This exposure could include vulnerability to heavy rainfall events, lighting strikes and strong winds.

1.03 It is proposed that a climate risk screening of the Antigua and Barbuda Public Utilities Authority (APUA) production and transmission infrastructure be undertaken to identify any vulnerable areas and to recommend resilient measures to address the issues identified through future activities.

2. COUNTRY CONTEXT

2.01 Antigua and Barbuda is already experiencing some of the effects of climate variability and change through damages from severe weather systems and other extreme events, as well as more subtle changes in temperatures and rainfall patterns. Modelled projections indicate that mean temperatures will increase up to 3.6oC in Antigua and Barbuda over the 21st century. The Global Climate Model (GCM) projections from a 15- model ensemble indicate that Antigua and Barbuda should warm by up to 1.2°C by the 2030s, 1.8°C by the 2050s, 2.1°C by the 2060s, 3.1°C by the 2080s; and 3.6°C by the 2090s, relative to the 1970-1999 mean.

2.02 Current climate and future projections relevant for Antigua and Barbuda show: (a) increasing hurricane intensity in the north Atlantic with larger peak wind speeds and more intense precipitation; (b) following global projections, sea-level rise of up to 0.56 m by 2090 depending on the model, and for the Caribbean, by 0.24 cm by mid-century; (c) for rainfall, a drying trend with decreasing one day maximum and 5 day maximum by the end of the century; and (d) both minimum and maximum temperatures increasing and expected to increase at a faster rate.

2.03 Disasters and the associated impacts threaten lives and the economic, social, developmental and environmental progress made in the Region over the past decades. Because of their role to provide safety especially during the active periods of hazard impacts and also as post-disaster assets, street lighting infrastructure deserves special attention.

3. OBJECTIVES

3.01 The objective of this work is to conduct a climate risk screening of APUA's major infrastructure and to provide APUA with recommendations on measures to increase its resilience.

4. SCOPE OF WORK

4.01 The consultant will undertake a rapid climate risk screening of the production and transmission infrastructure in Antigua and Barbuda:

(a) Based on secondary information provide a general classification and zoning of natural hazards and risk level of major electricity infrastructure for existing and future climate conditions.

(b) Identify resilience measures to address the impacts of the identified hazards such as expected wind gusts conditions for climate change scenarios that incorporate increase intensity of hurricanes (Category 4 and 5), flooding conditions, erosion susceptibility.

(c) Develop recommendations for the major geographical zones on actions to enhance resilience to climate related events.

4.02 The consultant should begin with a consultation with key stakeholders who may be knowledgeable of existing vulnerabilities in the system given the previous occurrence of extreme weather or climate related events. This would include identifying the key characteristics of the existing assets for street lighting, including their location.

5. REPORTING

5.01 The consultant would provide Climate and Natural Hazards Risk Classification of the key street lighting infrastructure in Antigua and Barbuda, including a corresponding map indicating the specific parts of the system that are vulnerable and require upgrading. The report would also include recommendations of measures to increase the resilience of the street lighting infrastructure.

6. QUALIFICATIONS AND EXPERIENCE

6.01 The Climate Change and Disaster Risk Specialist will conduct the climate vulnerability assessment. He/she will be responsible for collecting and analysing existing relevant information on climate change, including identifying the climate change parameters to be assessed; collection of relevant local and regional data; analysis of the available information and need for complementation. The consultant will also conduct the required tasks to assess natural hazards and to identify existing vulnerabilities, including characterisation and assessment of the related infrastructure. He/she will conduct interviews with relevant stakeholders and undertake site visits to inform the assessment. In addition, he/she will undertake the analysis that will link the climate change impacts with any design considerations. At least five years' work experience in the area of climate change impacts, adaptation and mitigation is required.

7. DURATION

7.01 The assignment should be completed in a period not to exceed 60 calendar days.

BUDGET

(USD)

This information is withheld in accordance with one or more of the exceptions to disclosure under the Bank's Information Disclosure Policy.

APPENDIX 3.1

PROJECT COST AND PHASING PLAN

($'000)

This information is withheld in accordance with one or more of the exceptions to disclosure under the Bank's Information Disclosure Policy.

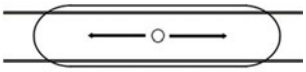
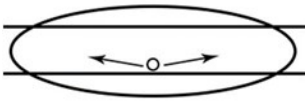
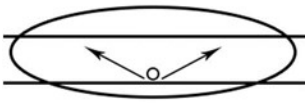
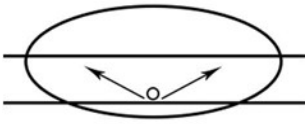
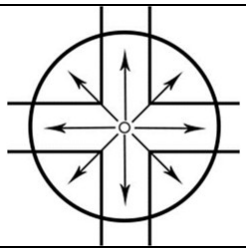
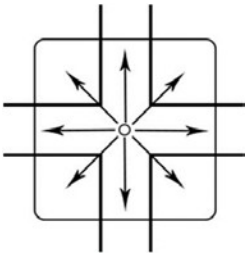
PROJECT COST AND PHASING PLAN

($'000)

This information is withheld in accordance with one or more of the exceptions to disclosure under the Bank's Information Disclosure Policy.

APPENDIX 4.1

AVAILABLE LED STREET LIGHT DISTRIBUTION TYPES

	The Type I distribution is good for lighting walkways, paths and sidewalks. This type of lighting is meant to be placed near the center of the pathway. This provides adequate lighting for smaller pathways. Type I is a two-way lateral distribution having a preferred lateral width of 15 degrees in the cone of maximum candlepower. The two principal light concentrations are in opposite directions along a roadway. This type is generally applicable to a luminaire location near the center of a roadway where the mounting height is approximately equal to the roadway width.
	The Type II distribution is used for wide walkways, on ramps and entrance roadways, as well as other long, narrow lighting. This type is meant for lighting larger areas and usually is located near the roadside. You'll find this type of lighting mostly on smaller side streets or jogging paths. Type II light distributions have a preferred lateral width of 25 degrees. They are generally applicable to luminaires located at or near the side of relatively narrow roadways, where the width of the roadway does not exceed 1.75 times the designed mounting height.
	The Type III distribution is meant for roadway lighting, general parking areas and other areas where a larger area of lighting is required. Type III lighting needs to be placed to the side of the area, allowing the light to project outward and fill the area. This produces a filling light flow. Type III light distributions have a preferred lateral width of 40 degrees. This distribution is intended for luminaires mounted at or near the side of medium width roadways or areas, where the width of the roadway or area does not exceed 2.75 times the mounting height.
	The Type IV distribution produces a semi-circular light meant for mounting on the sides of buildings and walls. It's best for illuminating the perimeter of parking areas and businesses. The intensity of the Type IV lighting has the same intensity at angles from 90 degrees to 270 degrees. Type IV light distributions have a preferred lateral width of 60 degrees. This distribution is intended for side-of-road mounting and is generally used on wide roadways where the roadway width does not exceed 3.7 times the mounting height.
	Type V produces a circular distribution that has the same intensity at all angles. This distribution has a circular symmetry of candlepower that is essentially the same at all lateral angles. It is intended for luminaire mounting at or near center of roadways, center islands of parkway, and intersections. It is also meant for large, commercial parking lot lighting as well as areas where sufficient, evenly distributed light is necessary.
	Type VS produces a square distribution that has the same intensity at all angles. This distribution has a square symmetry of candlepower that is essentially the same at all lateral angles. It is intended for luminaire mounting at or near center of roadways, center islands of parkway, and intersections. It is also meant for large, commercial parking lot lighting as well as areas where sufficient, evenly distributed light is necessary. Type VS is used where the light pattern needs a more defined edge.

APPENDIX 4.2

ASSUMPTIONS TO GOVERNMENT SAVINGS

REPLACEMENT OF EXISTING STREETLIGHTS

(a) There are currently 14,365 High Pressure Sodium (HPS) street lights installed in Antigua and Barbuda, each consuming a weighted average of 0.68 MWh/year of electricity.

(b) The HPS lights will be replaced by LED streetlights between Q3, 2016 and Q4, 2018. The LED lamps each consume a weighted average of 0.34 MWh/year of electricity.

SAVINGS

(a) Reduction of consumption is calculated as the difference between the consumption of electricity if the lighting replacement was not done *vs* consumption of electricity with the replacement of the HPS street lights with LED lights.

(b) The street lighting tariff is currently ($1.05/kWh) as per data submitted by APUA and for the purpose of this analysis has been fixed at this level. If the actual tariff is higher the savings shown in Appendix 4.3 would be even higher.

DECREASE IN GOVERNMENT STREET LIGHTING BILL

(a) The government's "base" street lighting bill will be on the assumption that the HPS lights were not replaced.

(b) The reduction to the government "base" street lighting bill will be electricity savings based on the number of existing HPS lights replaced with LED, and the reduced consumption of the new lights versus the existing.

APPENDIX 4.3

STREET LIGHTING COST - GOVERNMENT SAVINGS

Year	LED lights - proprtion of total (year end) (%)	# of LED lights at year end	Electricity Savings (MWh) (1)	Electricity Savings ($) (2)
2016	0%	0	0	0
2017	50%	7,183	1,247	1,309,603
2018	100%	14,365	3,742	3,928,810
2019	100%	14,365	4,989	5,238,413
2020	100%	14,365	4,989	5,238,413
2021	100%	14,365	4,989	5,238,413
2022	100%	14,365	4,989	5,238,413
2023	100%	14,365	4,989	5,238,413
2024	100%	14,365	4,989	5,238,413
2025	100%	14,365	4,989	5,238,413
2026	100%	14,365	4,989	5,238,413
2027	100%	14,365	4,989	5,238,413
2028	100%	14,365	4,989	5,238,413
2029	100%	14,365	4,989	5,238,413
2030	100%	14,365	4,989	5,238,413
2031	100%	14,365	4,989	5,238,413
2032	100%	14,365	4,989	5,238,413
2033	100%	14,365	4,989	5,238,413
2034	100%	14,365	4,989	5,238,413
2035	100%	14,365	4,989	5,238,413

Notes:

(1) Electricity savings (MWh) = average # of lights/year x 0.3473 MWh/light/year

(2) Electricity savings ($) = Electricity savings (MWh) x tariff ($1.05/kWh)

APPENDIX 4.4

ASSUMPTIONS TO THE ECONOMIC ANALYSIS

1. For the purpose of this analysis, benefits and costs are stated in constant 2016 prices.

2. The analysis was performed for a 20-year period of operation, aligned with the expected life of the new LED lights.

3. The financial costs of the capital works have been converted to their economic costs after excluding price contingencies and applying a conversion factor of 0.89 to adjust for price distortions. These calculations are shown in Table 1.

4. Conversion factors for the different price components are shown in Table 2 below.

TABLE 1: OVERALL CONVERSION FACTOR FOR THE PROJECT

Items	SpCF	Financial Costs	Economic Costs
1. Project preparation studies	0.77	200	155
2. LED street lamps	0.91	16,629	15,133
3. Consumption monitoring equipment	0.91	43	39
4. Installation costs	0.71	1,398	986
5. Waste disposal	0.71	676	477
6. Supervision Consultant	0.91	378	344
7. Project Management	0.91	946	861
Total Base Cost and Physical Contingency		**20,270**	**17,994**
Overall Conversion Factor			**0.89**

TABLE 2: CONVERSION FACTORS FOR COST ADJUSTMENT

Items	Shadow Rate	Standard Conversion Factor	Base Factor
Skilled Labour	1.00	0.91	0.91
Unskilled Labour	0.70	0.91	0.64
Materials Local	0.80	0.91	0.73
Materials Foreign	1.00	0.91	0.91
Equipment	1.00	0.91	0.91

Replacement of Existing Streetlights

5. There are currently 14,365 HPS and MV (1,822 250-Watt, 1,910 175-Watt and 10,633 100-Watt) streetlights installed in Antigua and Barbuda. Based on the wattage of the existing HPS/MV lamps and reference consumption data a weighted average electricity consumption of 0.68 MWh/year/lamp was determined. The weighted average electricity consumption of new LED street lights is estimated at 0.34MWh/year/lamp.

6. The HPS/MV lights will be replaced by LED lights between Q3, 2017 and Q4, 2018.

7. It is assumed, that the 250-Watt HPS lights will be replaced by 145-Watt LED lights, the 175-Watt MV lights will be replaced by 100-Watt LED lights and the 100-Watt HPS lights will be replaced by 60-Watt LED lights. Indicated LED-wattages are determined by minimum efficiency standards of new LED lamps.

Identification and Valuation of Economic Benefits

8. The main benefit of the project is the reduction in consumption of electricity of the LED street lights compared to the HPS or MV street lights. The valuation of this benefit is calculated based on the avoided cost of generation through fuel costs and operating and maintenance (O&M) costs. In addition, economic benefits from reduction in CO_2 emissions has been included in this analysis.

9. The following information was used in the calculation of the economic benefits related to energy production:

   (a) Fuel costs per kWh generated - $0.43/kWh, based on the fuel prices the past 3 years and production efficiency as at 2015 based on data supplied by APUA.

   (b) O&M costs per kWh generated - $0.07/kWh based on historical data from APUA.

10. In addition, the project will result in reduced street light maintenance costs. While the upfront cost of an LED light is higher than an HPS or MV light, the components of an LED light have a longer useful life than the components of an HPS or MV light. Therefore the annualised material costs for maintenance will be reduced, and the frequency of maintenance visits will also be lower, reducing labour costs.

11. The following information was used in the calculation of the economic benefits related to maintenance costs:

   (a) Maintenance cost - $52/visit. This is based on salary rates for a linesman, a crew of 4 assigned to the task plus the monthly cost of a bucket truck.

   (b) Warranty period: LED light – 10 years; HPS light – 0 years.

   (c) Landed cost and expected life of streetlight components is shown in Table 3 below.

TABLE 3: MAINTENANCE COST

Description	HPS/MV			LED		
	Cost of component	**Life (years)**	**# of replacements in 20-year cycle**	**Cost of component**	**Life (years)**	**# of replacements in 20-year cycle**
Lamp	27	5.7	3.5	213	20	1.0
Photocell	81	9.1	2.2	106	20	1.0
Power Supply	108	9.1	2.2	213	20	1.0
Fixture	189	15	1.3	531	20	1.0
Weighted average material cost per lamp over 20 years ($)	**760**			**1,063**		
Combination of maintenance trips	**30%**					
Number of maintenance trips in 20 years	**92,685**			**40,222**		
Maintenance costs (first 10 years) ($)	**7,875,861**			**1,047,348**		
Maintenance costs (11 – 20 years) ($)	**7,875,861**			**8,680,909**		
Maintenance cost per lamp per year	**54.8**			**33.9**		
Maintenance cost savings ($)	**21.0**					

12. The weighted average material cost is based on the cost of each component and the frequency of their replacement. The projections assume a linear failure rate of components. The number of maintenance visits is based on number of replacements for the components and assumes that 30% of those visits would involve replacement of more than one component. Total maintenance costs over the 20-year cycle are calculated based on material costs plus the cost of maintenance visits (i.e. the number of visits times the cost per visit). As LED lights have a 10-year warranty, they do not incur material costs over the first 10 years of their useful life.

13. Valuation of the CO_2 emissions avoided by the project was carried out using data from the Social Cost of Carbon (SCC) model. SCC is an estimate of the economic damage associated with a small increase in carbon dioxide (CO_2) emissions. SCC is used in benefit costs analyses by development agencies, and is used extensively in making regulatory decisions. Economists estimate the social cost of carbon pollution by linking together a global climate model and a global economic model. The resulting models are called Integrated Assessment Models (IAM). IAM allow economists to take a unit of carbon emissions and translate that into an estimate of the cost of the impact that emissions could have on health, property, and quality of life in monetary terms:

    (a) The social cost of carbon is USD40/tonne for 2016.

    (b) The replacement of these streetlights will reduce carbon emissions by an average of 3,049 tonnes of CO_2 p.a. between 2017 and 2035.

CALCULATION OF ECONOMIC RATE OF RETURN
('000)

PROJECT YEAR		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9-19**
	Unit	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025-2035**
Energy savings	MWh	-	1,247	3,742	4,989	4,989	4,989	4,989	4,989	4,989	4,989
Fuel savings	$'000	0	541	1,623	2,164	2,164	2,164	2,164	2,164	2,164	2,164
Generation (O&M) savings	$'000	0	81	243	324	324	324	324	324	324	324
Street light maintenance savings	$'000	0	75	226	301	301	301	301	301	301	301
Social cost of carbon avoided	$'000	0	99	298	398	398	398	398	398	398	398
Total Economic Benefits	**$'000**	**0**	**797**	**2,391**	**3,187**	**3,187**	**3,187**	**3,187**	**3,187**	**3,187**	**3,187**
Capital Expenditure	**$'000**	**166**	**16,340**	**1,487**							
Net Benefits		**-166**	**-15,543**	**903**	**3,187**	**3,187**	**3,187**	**3,187**	**3,187**	**3,187**	**3,187**

ERR= 17%

NPV= $4,255

APPENDIX 4.5

APPENDIX 4.6

GENDER MARKER ANALYSIS

Project Cycle Stage	Criteria	Score
Analysis: Introduction/ Background/ Preparation	Consultations with women/girls/men/boys and relevant gender-related or sector-related public or private organisations have taken place. Social analysis identifies gender issues and priorities. Macroeconomic analysis identifies gender issues and priorities.	0 0.25 0
Design: Project Proposal/ Definition/ Objective/ Description	To address the needs of women/girls and men/boys concrete interventions to reduce existing gender disparities have been designed. Effect on project outcome is direct. Project objective / outcome includes gender equality.	0 0
Implementation: Execution	Implementation arrangements (gender mainstreaming capacity building or gender expertise in implementing agency) to enhance the gender capacity of the implementing agency. Effect on project outcome is indirect. Terms of reference of project coordinating unit / project management unit include responsibilities of gender mainstreaming, especially at the levels of the project coordinator/director and the Monitoring and Evaluation (M&E) Officer.	0 0
M&E: Results-Monitoring-Framework (RMF)	Sex-disaggregated data included in the baselines, indicators and targets of the RMF. *Or* Collection of sex-disaggregated data required for M&E (stated and budgeted in Project) At least one gender-specific indicator at the outcome and/or output level in the RMF.	0 0
Maximum Score:		**0.25**
Scoring Code		
Gender Specific (GS) and Gender Mainstreamed (GM):: if 3 to 4 points **Marginally Mainstreamed (MM):** if 1.5 to 2.5 points. **NO:** if projects score zero or 1; if NO please give a justification why		

NO: no contribution to gender equality, it is not reflected in the project, or appears as a formal reference only.

THE BORROWER AND THE EXECUTING AGENCY

THE BORROWER

1. GOAB may, pursuant to Section 3(1) of the Loans (Caribbean Development Bank) Act (CAP. 252) 1992 Revised Edition of the Laws of Antigua and Barbuda, as amended [the Loans (CDB) Act], in such manner and on such terms and subject to such conditions as may be agreed with CDB, borrow, or guarantee the borrowing of, such sums from CDB as are required for the purpose of financing or promoting economic and social development in Antigua and Barbuda. An agreement between GOAB and CDB in respect of any amounts so borrowed must be made in the name of GOAB and may be signed on behalf of GOAB by the Minister responsible for Finance (the Minister) or by a person authorised thereto in writing by the Minister. A copy of the Agreement must be laid before the House of Representatives as soon as possible after it is concluded. All amounts required for the payment of any sums borrowed or guaranteed by GOAB under the authority of the Loans (CDB) Act, and the payment of all interest and other charges in respect of such sums, are charged upon and payable out of the Consolidated Fund.

THE EXECUTING AGENCY

Legal Status

2. APUA is a statutory corporation established under the Public Utilities Act, CAP. 359 of the Laws of Antigua and Barbuda (the PUA Act). According to Section 3 of the PUA Act, APUA is a body corporate with perpetual succession and a common seal with power to purchase, take, hold and dispose of land and other property, to enter into contracts, to sue and be sued in its said name and to do all things necessary for the purposes of the PUA Act. When the PUA Act came into operation on July 4, 1973, certain property, rights and liabilities of GOAB became vested in APUA. Pursuant to the PUA Act, APUA has the exclusive right to generate, distribute, supply and sell electricity within Antigua and Barbuda and to perform services incidental thereto. APUA also has the exclusive right to provide telephone services and supply water within Antigua and Barbuda.

3. Subject to the provisions of the PUA Act, APUA, for the purpose of carrying out its functions under the PUA Act, has the power to do anything or to enter into any transaction which in its opinion is calculated to facilitate the proper discharge of its functions or is incidental or conducive thereto, including all acts and things necessary for developing, controlling, generating, distributing and selling electricity for public and private purposes; and from time to time, to cause such lamp irons, lamp posts, standards or other lighting apparatus to be put or fixed upon or against the walls or palisades of any building or enclosure or to be put up or erected in such other manner as shall be deemed proper, and also to cause such number of lamps of such sizes and kinds to be provided and affixed and put on such lamp irons, lamp posts and standards as are necessary for lighting the streets.

Management

4. APUA is governed by a Board of Commissioners (BOC), constituted by nine persons appointed by the Governor-General (GG) based on qualifications and experience in the areas of trade, law, finance, science, administration or labour relations. The GG appoints one Commissioner to be the Chairman of the Authority who reports to the Minister responsible for public utilities, and a Deputy Chairman who may

perform the functions of the Chairman in the absence or inability of the Chairman. APUA also appoints a General Manager who has overall responsibility for the efficient administration, management and performance by APUA of its functions under the PUA Act. The Board of Commissioners may meet, at a duly convened meeting at which a quorum of five Commissioners, including the Chairman, Deputy Chairman or other Commissioner elected to act as Chairman is present, approve and authorise the transaction of business. The decisions of the BOC are made by a majority vote. All documents (other than those required by law to be under seal) made by APUA, and all decisions of APUA, may be signed by the Chairman or any member authorized to act on his behalf or the General Manager.

APPENDIX 6.2

DUTIES OF THE PROJECT COORDINATOR

The PC will be responsible for coordinating and monitoring all aspects of the implementation of the Project. Additional administrative, technical and clerical support will be provided by the Electrical Business Unit of APUA. PC's duties will include, but will not be limited to:

(a) preparation and submission to GOAB and CDB of work plans for the Project;

(b) M&E of the Project, in a manner consistent with the Project's M&E Framework;

(c) submission to GOAB and CDB of Consultant's Reports;

(d) supervision of all components, including ensuring that activities and procurement schedules are carefully planned and executed and that there is adherence to CDB's procurement procedures;

(e) develop close working relationships with all project participants and stakeholders to achieve a shared vision of the Project and its objectives;

(f) representation of APUA in all its dealings with all consultants, suppliers and contractors;

(g) expedition of the submission to CDB of claims for disbursement/reimbursement with regard to all components financed from the Loan;

(h) control the budget and introduce safeguards acceptable to CDB to prevent funds and assets misuse;

(i) advertise for, and assist, in the selection and engagement of the various consultants;

(j) ensure that all contractual obligation are adhered to and make all necessary arrangements to ensure implementation meets projected targets; and

(k) liaise with CDB on all relevant technical, financial and administrative aspects of the Project.

APPENDIX 6.3

DRAFT TERMS OF REFERENCE

PROJECT ENGINEER

1.01 The Project Engineer (PE) will report to the Project Coordinator (PC) and will mainly be responsible for assisting with the coordinating Antigua Public Utilities Authority (APUA) installation crews retrofitting the street lights. His/her duties will include, but will not be limited to:

(a) keep accounts on project-related expenditure and disbursement activities;

(b) planning, scheduling and coordinating installation activities;

(c) direct and supervise the day-to-day operations of the Project, guided by the project documents and the Installation Work Plans;

(d) advising PC on technical aspects and costs variations;

(e) management and administration of the implementation of the Supervision Consultancy.

(f) management and administration of the Light-emitting Diodes (LED) supply and waste disposal contracts;

(g) submission to the Caribbean Development Bank (CDB) (within three weeks after the end of each month), the monthly reports prepared by the engineering consultants on the progress of the works;

(h) submission to CDB, within four weeks after the end of each quarter, Quarterly Reports on the investment cost of the Project in the format shown in the Reporting Requirements presented in CDB's Appraisal Report or in such form or forms as may be specified by CDB, commencing with the quarter in which the first disbursement is made;

(i) preparation and submission to CDB of a Project Completion Report by the deadline specified in the Reporting Requirements contained in CDB's Appraisal Report. and

(j) any other duties assigned by PC.

1.02 Prospective candidates must be engineers with a minimum of the following qualifications:

(a) a Masters' Degree or equivalent in a relevant engineering discipline, Project Management, Construction Management or related subject together with a minimum of five years' experience in supervision of construction or installation works; or

(b) a Bachelors' Degree in civil engineering and a minimum of eight years of suitable experience in project supervision.

APPENDIX 6.4

DRAFT TERMS OF REFERENCE

CONSULTANCY SERVICES FOR THE SUPERVISION OF STREET LIGHT RETROFITTING PROJECT

1. BACKGROUND

10.1 The Government of Antigua and Barbuda (GOAB) has received financing from the Caribbean Development Bank (CDB) for retrofitting of street lights in the country. The Project aims to replace approximately 14,365 street lamps across the island with high efficient Light-emitting Diodes (LED) models. The installation will be undertaken by contractors certified by Antigua Public Utilities Authority (APUA) and APUA's own staff.

2. OBJECTIVES

2.01 The objective of this Consultancy is to support APUA during implementation. The services will include assistance to prepare tender documents including performance specifications. The Consultant will support the bid evaluation process and prepare an environmental management plan. The Consultant will prepare an installation plan and report on planned versus actual progress. The Consultant will certify payment requests and be responsible for ensuring supplier and contractor compliance with contract documents.

3. SCOPE OF WORK

3.01 The Engineering Consultant will undertake the following tasks:

(a) preparing bidding documents for the LED supply and waste disposal contracts to allow GOAB to solicit bids. In this regard, the consultant will be required to conform to CDB's Standard Bidding Documents or other suitable alternative documents;

(b) support the bidding process and bid evaluation to purchase LED street luminaires including but not limited to the verification of technical, electrical and illumination parameters, robustness, durability, installation and maintenance requirements and potential energy savings of proposed LED street lighting fixtures. Support should also be provided for the evaluation of the waste disposal contract;

(c) liaise with the Department of Environment and other key stakeholders and prepare an Environmental and Social Management Plan for the proper handling and storage of the light fixtures being disposed. Integrate appropriate hazardous waste handling and disposal protocols into the waste disposal contract document;

(d) preparation of a LED fixture installation plan. This should include: identifying personnel, equipment and material resource requirements to support the timely installation; make recommendations for the phased geographical role out of the installation with proposed timelines for each section or area and logistics required for installation on Barbuda;

(e) inspection of LED installation for compliance with the manufacturers' requirements;

(f) track actual installation productivity with the originally developed installation plan and identify where necessary requirements for incorporation of additional resources to ensure adherence to the Project Schedule;

(g) environmental monitoring during installation and removal;

(h) verification of force account activities and the waste disposal contract and prepare certification of payment;

(i) consultation and advice to APUA during installation.

(j) preparation of monthly reports on the progress of the installation works, indicating any difficulties affecting their efficient and timely execution, commencing one month after the start date;

(k) verification of installation completion and final completion of the waste disposal contract; and

(l) preparation of a Completion Report on the Project within three months after the date of issue of a certificate of practical completion of the waste disposal contract.

4. IMPLEMENTATION ARRANGEMENTS

4.01 APUA will appoint a Project Coordinator (PC). The PC will facilitate the work of the consultant(s) and make available all relevant studies, reports and data, relevant to completion of the exercise and will act as liaison between the consultant(s) and GOAB officials and stakeholders.

5. QUALIFICATIONS AND EXPERIENCE

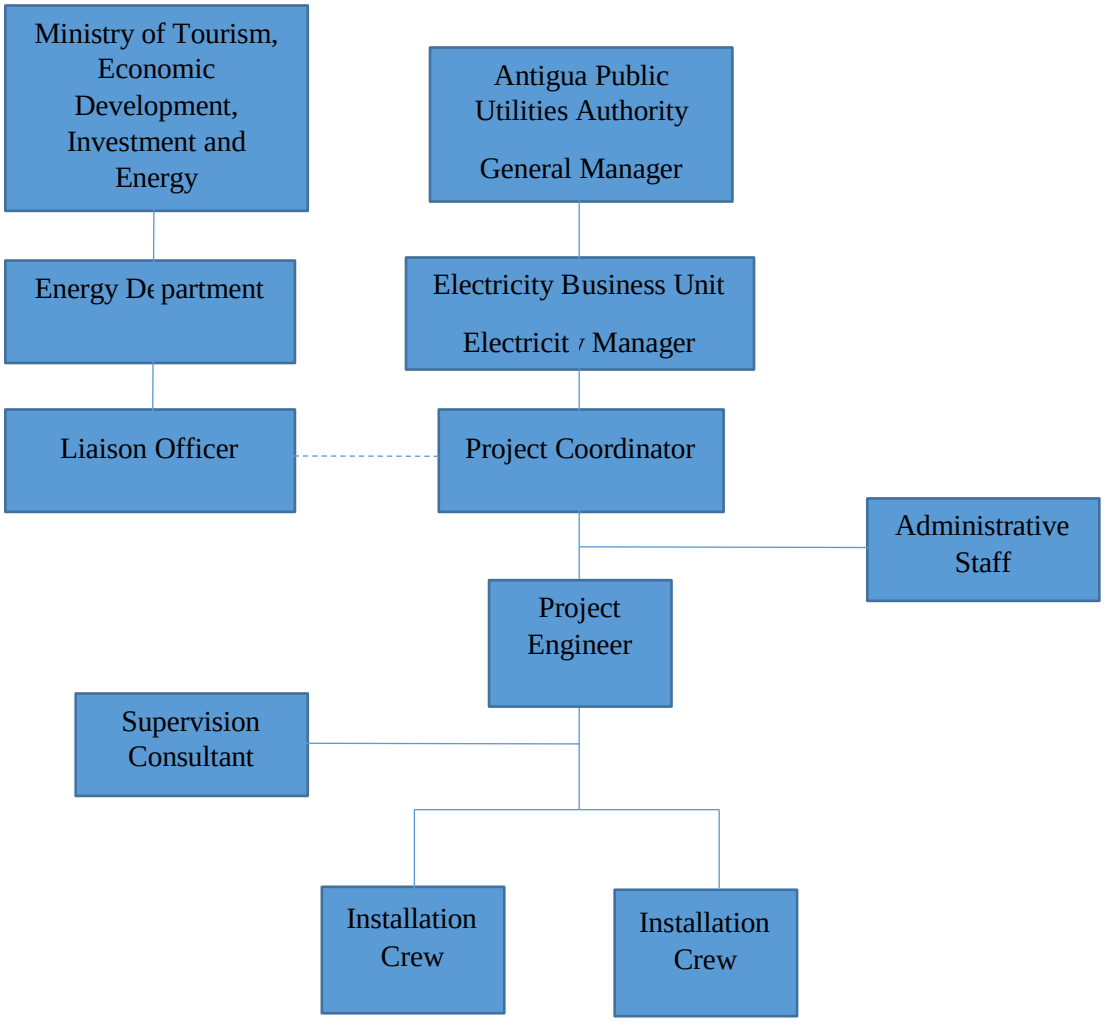
5.01 The consulting team should consist of persons having the appropriate professional and academic qualifications and a minimum of eight years relevant experience in engineering, project management, construction or installation supervision and management, and preparation and supervision of the Environmental Management Plan.

6. DURATION

6.01 The Consultancy is to be implemented intermittently over a period of 26 months.

APPENDIX 6.5

PROJECT MANAGEMENT STRUCTURE



APPENDIX 6.6

PROJECT IMPLEMENTATION SUPPORT PLAN

1. CDB has had considerable experience in the energy sector of BMCs within the Organisation of Eastern Caribbean States. This experience provides the basis for providing implementation support to GOAB and APUA. The implementation support will be provided as part of CDB's project supervision functions, and will include, among other things:

(a) reviewing implementation progress and achievement of project outcomes;

(b) addressing implementation issues;

(c) monitoring systems to ensure their continued adequacy through monitoring reports, audit reports, and field visits; and

(d) monitoring changes in risks and compliance with legal agreements, as needed.

2. The Implementation Support Plan (ISP) will be reviewed annually to ensure that it continues to meet the implementation support needs of the Project. In addition to reviewing implementation progress, ISP aims at providing technical support to Antigua and Barbuda in the achievement of the results.

3. The strategy for implementation support has been developed based on the design of the Project, its risk profile, and an assessment of the Borrower and Executing Agency - APUA. The strategy remains a flexible tool that may be amended during project implementation in response to the changing needs of the Project and the Borrower/Executing Agency.

Strategy and Approach for Implementation Support

4. Supervision of the Project will be undertaken by a team comprising the lead supervisor, supported by legal counsel and specialists in the areas of environment; procurement; financial analysis; and social analysis. Formal supervision and field visits will be undertaken at least semi-annually during the implementation phase of the Project.

5. PC will coordinate CDB's team to ensure that project implementation is consistent with the requirements as specified in the Procurement Plan, Terms and Conditions and other legal documents. The supervision team will prepare annual Project Supervision Reports identifying the status of project implementation and any issue requiring the resolution of management. On the completion of the Project, or after 90% of the funds have been disbursed, Staff will conduct an Exit Workshop to assess project results, discuss implementation issues, and identify lessons. A Draft Project Completion Report (PCR) will be prepared and discussed with the client during the Exit Workshop. The Final PCR will be validated by the Office of Independent Evaluation (OIE). Staff will prepare a management response to OIE's Validation Report. The Validation Report and management's response will be presented to the Audit and Post-Evaluation Committee.

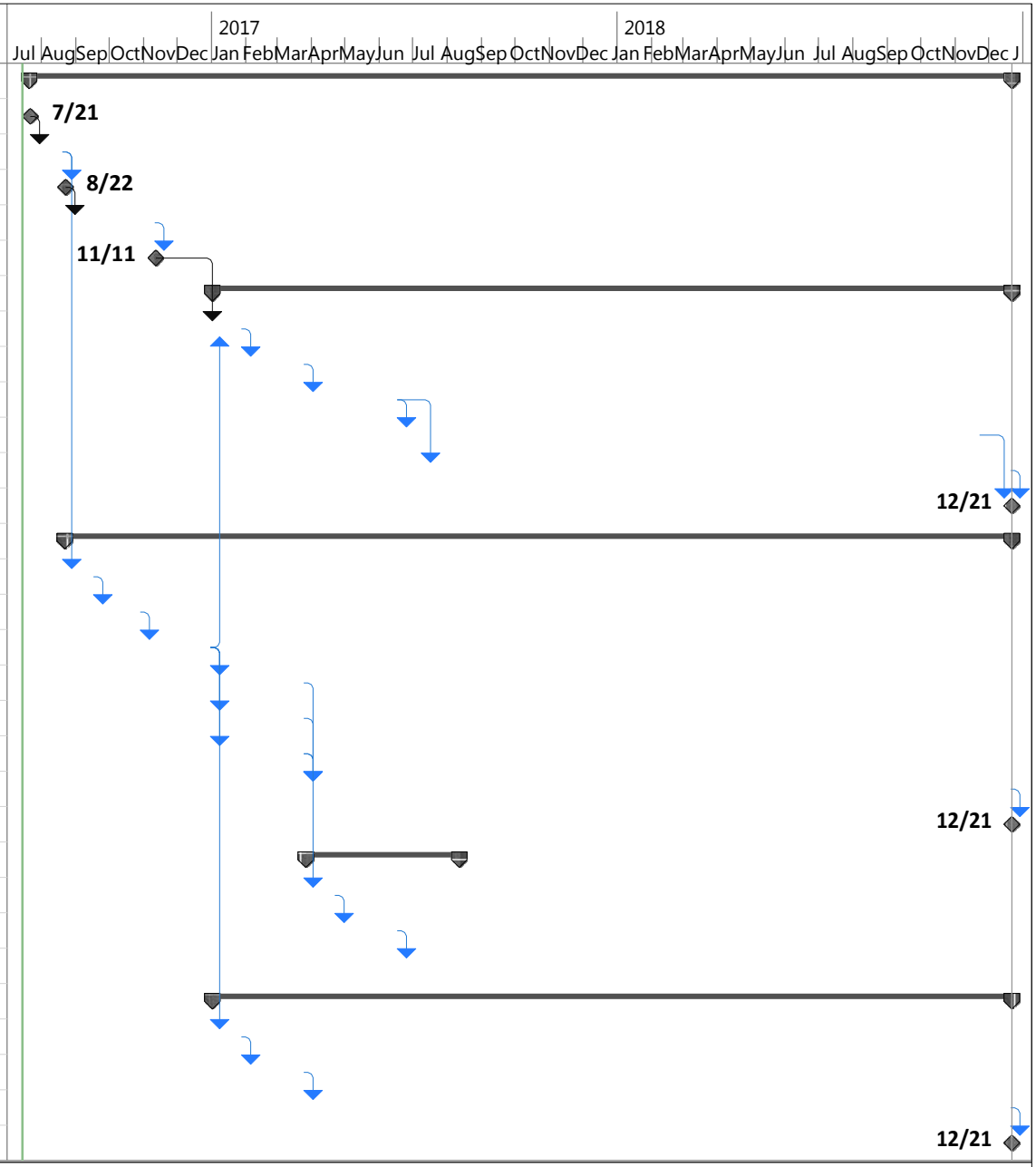
TABLE 1: STAFF SKILLS REQUIRED

Period	Focus	Skills and Resources Estimate	
August – December 2016	Specific 1. Support in satisfying Conditions Precedent. 2. Provide procurement support relating to draft procurement notices, resolving procurement bottlenecks. General 1. Monitor Project Budgeting and Allocations. 2. Monitor Project Physical Works progress and quality, including field trips. 3. Monitor Project Results Framework. 4. Provide technical support to PC and Executing Agency. 5. Preparation of annual Project Supervision Report. 6. Review and certification of requests for disbursement. 7. Review of TA reports. 8. Review of Monthly and Quarterly Reports.	Lead Project Supervisor Legal Counsel Financial Analyst Environmental Specialist Social Specialist Gender Specialist Procurement Specialist Administrative Assistant Divisional Secretary	6 weeks 1 week 1 week 1 week 1 week 0.5 weeks 1 week 2 weeks 1 week

Period	Focus	Skills and Resources Estimate	
January 2017 – December 2018	General 1. Monitor Project Budgeting and allocations. 2. Monitor progress of procurement and installation, including field trips. 3. Monitor Project Results Framework 4. Provide technical support to PC and Executing Agency. 5. Preparation of annual Project Supervision Report. 6. Review and certification of requests for disbursement. 7. Review of TA reports. 8. Review of Monthly and Quarterly Reports.	Lead Project Supervisor Legal Counsel Financial Analyst Environmental Specialist Social Specialist Gender Specialist Administrative Assistant Divisional Secretary	8 weeks 0.5 weeks 0.5 weeks 2 weeks 2 weeks 0.5 weeks 2 weeks 1 week

PROJECT IMPLEMENTATION SCHEDULE

ID	Task Name
1	**Street Light Retrofitting Project**
2	CDB Board Approval
3	Loan Agreement
4	Project Launch Workshop
5	Loan Conditions
6	Conditions Precedent Satisfied
7	**LED Street Lamp Supply & Installation**
8	Tendering
9	Evaluation & Award
10	Delivery
11	Installation
12	Disposal of Street Lights & Fixtures
13	Retrofitting Complete
14	**Supervision Consultant**
15	REOI
16	Evaluation & Award
17	Preparation of Bidding Documents
18	Tendering & Evaluation Assistance
19	Installation Planning
20	Preparation of EMP
21	Certification of Payment
22	Project Completion Report
23	**Climate Risk Screening**
24	REOI
25	Evaluation & Award
26	Study
27	**Project Management**
28	REOI (PE)
29	Evaluation & Award
30	Installation Management
31	Project Completion



Task Milestone Summary

APPENDIX 6.7

ESTIMATED QUARTERLY LOAN DISBURSEMENT SCHEDULE

YEAR	QUARTER	E&M LOAN	CALC LOAN	CALC GRANT	EU-CIF GRANT	DFID GRANT	FINANCE CHARGES	TOTAL	CUMULATIVE DISBURSEMENT
2016	**Q3**	0	0	0	0	0	0	0	0
	Q4	48	0	0	0	0	39	87	87
SUB-TOTAL		**48**	**0**	**0**	**0**	**0**	**39**	**87**	**87**
2017	**Q1**	3,141	7,529	81	1,177	787	66	12,781	12,868
	Q2	809	1,938	0	303	203	74	3,326	16,195
	Q3	143	344	0	54	36	76	652	16,847
	Q4	143	344	0	54	36	77	654	17,501
SUB-TOTAL		**4,236**	**10,155**	**81**	**1,588**	**1,061**	**293**	**17,414**	**17,501**
2018	**Q1**	261	0	0	0	0	79	340	17,841
	Q2	261	0	0	0	0	82	344	18,185
	Q3	261	0	0	0	0	85	346	18,531
	Q4	261	0	0	0	0	88	349	18,880
SUB-TOTAL		**1,045**	**0**	**0**	**0**	**0**	**334**	**1,379**	**18,880**
TOTAL		**5,329**	**10,155**	**81**	**1,588**	**1,061**	**666**	**18,880**	**18,880**

APPENDIX 6.8

APPENDIX 6.9

PROCUREMENT PLAN

A. **General**

1. **Project Information:**

Country: Antigua and Barbuda

Borrower: Government of Antigua and Barbuda

Project Name: Street Light Retrofitting Project

Project Executing Agency: APUA

2. **Bank's Approval Date of the Procurement Plan:** July 2016

3. **Period Covered By This Procurement Plan:** July 2016 to December 2017

B. Goods and Works and Non-Consulting Services

1. **Prior Review Threshold:** Procurement decision subject to prior review by the Bank as stated in Appendix 2 to the Guidelines for Procurement:

	Procurement Method	Prior Review Threshold (USD)	Comments
1.	ICB (Goods)	[redacted]	Tender Documents for works will be subject to prior review.
2.	NCB (Works)	[redacted]	Procurement procedures of APUA apply.

2. **Prequalification.** Yes

3. **Reference to Project Operational/Procurement Manual:** CDB's Guidelines for Procurement (2006).

4. **Any Other Special Procurement Arrangements:**

(a) Where EIB CALC and EU-CIF SEEC resources are being used together with CDB's E&M resources for the supply and installation of LED street lamps and disposal of the removed fixtures, a waiver of CDB's Guidelines for Procurement (January 2006) to extend eligibility for procurement to countries eligible for procurement under EIB and EU-funded projects which are not CDB Member Countries; and

(b) Bidders must submit the "Covenant of Integrity[1]" in the form attached hereto at the Annex.

[1] http://www.eib.org/attachments/thematic/procurement_en.pdf.

5. **Procurement Packages with Methods and Time Schedule:**

1	2	3	4	5	6	7	8
Ref No.	**Contract (Description)**	**Estimated Cost (USD '000)**	**Procurement Method**	**Prequalification (Yes/No)**	**Bank Review (Prior/Post)**	**Expected Bid-Opening Date**	**Comments**
1.	Supply of LED Street Lamp and Consumption Monitoring Equipment	[redacted]	ICB	No	Prior	January 2017	Procurement notice shall be published in the Official Journal of the European Union.
2.	LED Street Lamps Installation	[redacted]	NBF	No	N/A	N/A	Provision of equipment, installation crews, miscellaneous materials and spares
3.	LED Street Lamps Installation	[redacted]	FA	No	Post	N/A	Rental of equipment, additional personnel costs, transportation and accommodation (Barbuda), and miscellaneous materials.
4.	Disposal of Street Lamps & Fixtures	[redacted]	ICB	No	Prior	March 2017	-

C. **Consulting Services**

1. **Prior Review Threshold:** Procurement decision subject to prior review by the Bank as stated in Appendix 1 to the Guidelines for the Selection and Engagement of Consultants:

2. **Short list comprising entirely of national consultants**: N/A

3. **Reference to (if any) Project Operational/Procurement Manual**: CDB Guidelines for Selection and Engagement of Consultants (2011).

4. **Any Other Special Procurement Arrangements**: In respect of the CRS Consultancy, where EIB CAS resources are being utilised, eligibility for procurement will be extended to countries eligible for procurement under EIB-funded projects, which are not CDB Member Countries.

5. **Procurement Packages with Selection Methods and Time Schedule**:

1	2	3	4	5	6	7
Ref No.	**Assignment (Description)**	**Estimated Cost (USD '000)**	**Selection Method**	**Review by Bank**	**Expected Proposal Submission Date**	**Comments**
1.	Supervision Consultant	[redacted]	ICS	Prior	July 2016	-
2.	CRS Consultant	[redacted]	ICS	Prior	December 2016	Bidders must submit the "Covenant of Integrity" in the form attached hereto at the Annex.
3.	Project Engineer	[redacted]	ICS	Prior	December 2016	-

This information is withheld in accordance with one or more of the exceptions to disclosure under the Bank's Information Disclosure Policy.

D. **Implementing Agency Capacity Building Activities with Time Schedule**

PLW: Schedule to be coordinated with GOAB in the third quarter of 2016.

E. **Summary of Proposed Procurement Arrangement**

	CDB (USD'000)									NBF (USD'000)	Total Cost (USD'000)
	Primary	Secondary			Other						
Project Component	**ICB**	**LIB**	**RCB**	**NCB**	**Shopping**	**FBS**	**FA**	**QCBS**	**ICS**	**GOAB/APUA**	
Project Preparation											
LED Street Lamp Supply & Installation											
Supervision Consultant											
Climate Risk Screening Consultancy											
Project Management											
Physical Contingencies											
Price Contingencies											
IDC											
Commitment Fees											
Total											

This information is withheld in accordance with one or more of the exceptions to disclosure under the Bank's Information Disclosure Policy.

DC	Direct Contracting	NCB	National Competitive Bidding
FA	Force Account	QBS	Quality Based Selection
ICB	International Competitive Bidding	QCBS	Quality and Cost-Based Selection
LIB	Limited International Bidding	FBS	Fixed Budget Selection
NBF	Non-Bank Financed	ICS	Individual Consultant Selection

COVENANT OF INTEGRITY
to the Government of Antigua and Barbuda
from a Tenderer, Contractor, Supplier or Consultant to be attached to its Tender (or to the Contract in the case of a negotiated procedure)

"We declare and covenant that neither we nor anyone, including any of our directors, employees, agents, joint venture partners or sub-contractors, where these exist, acting on our behalf with due authority or with our knowledge or consent, or facilitated by us, has engaged, or will engage, in any Prohibited Conduct (as defined below) in connection with the tendering process or in the execution or supply of any works, goods or services for [*specify the contract or tender invitation*] (the "**Contract**") and covenant to so inform you if any instance of any such Prohibited Conduct shall come to the attention of any person in our organisation having responsibility for ensuring compliance with this Covenant.

We shall, for the duration of the tender process and, if we are successful in our tender, for the duration of the Contract, appoint and maintain in office an officer, who shall be a person reasonably satisfactory to you and to whom you shall have full and immediate access, having the duty, and the necessary powers, to ensure compliance with this Covenant.

If: (i) we have been, or any such director, employee, agent or joint venture partner, where this exists, acting as aforesaid has been, convicted in any court of any offence involving a Prohibited Conduct in connection with any tendering process or provision of works, goods or services during the five years immediately preceding the date of this Covenant; or (ii) any such director, employee, agent or a representative of a joint venture partner, where this exists, has been dismissed or has resigned from any employment on the grounds of being implicated in any Prohibited Conduct; or (iii) we have been, or any of our directors, employees, agents or joint venture partners, where these exist, acting as aforesaid has been excluded by the Caribbean Development Bank (CDB), the European Union institutions or any major Multi-lateral Development Bank (including World Bank Group, African Development Bank, Asian Development Bank, European Bank for Reconstruction and Development, European Investment Bank or Inter-American Development Bank) from participation in a tendering procedure on the grounds of Prohibited Conduct, we give details of that conviction, dismissal or resignation, or exclusion below, together with details of the measures that we have taken, or shall take, to ensure that neither this company nor any of our directors, employees or agents commits any Prohibited Conduct in connection with the Contract [*give details if necessary*].

In the event that we are awarded the Contract, we grant the Government of Antigua and Barbuda (GOAB), CDB, the European Investment Bank (EIB) and auditors appointed by any of them, as well as any authority or European Union institution or body having competence under European Union law, the right of inspection of our records and those of all our sub-contractors under the Contract. We accept to preserve these records generally in accordance with applicable law but in any case for at least six (6) years from the date of substantial performance of the Contract.

For the purpose of this Covenant, Prohibited Conduct includes[2]:

(a) **Corrupt Practice** is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

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[2] Most definitions are those of the IFI Anti-Corruption Task Force's Uniform Framework of September 2006.

(b) **Fraudulent Practice** is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;

(c) **Coercive Practice** is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of any party to influence improperly the actions of a party;

(d) **Collusive Practice** is an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party;

(e) **Obstructive Practice** is: (a) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or (b) acts intended to materially impede the exercise of CDB or the EIB's contractual rights of audit or access to information or the rights that any banking, regulatory or examining authority or other equivalent body of the European Union or of its Member States may have in accordance with any law, regulation or treaty or pursuant to any agreement into which the EIB has entered in order to implement such law, regulation or treaty;

(f) **Money Laundering** as defined in EIB's Anti-Fraud Policy;

(g) **Terrorist Financing** as defined in EIB's Anti-Fraud Policy;

(h) **Corrupt practices, fraudulent practices, collusive practices** and **coercive practices** as defined in CDB's Guidelines for Procurement; and

(i) **Project Owner** means GOAB.

Note: This Covenant must be sent to CDB and EIB together with the contract in the case of an international procurement procedure (as defined in CDB's Guidelines for Procurement). In other cases, it must be kept by APUA and made available upon request from CDB or EIB. The Covenant is not mandatory for contracts awarded prior to CDB or EIB involvement in the Project. Nevertheless, recipients of CDB financing who are seeking or may seek to utilise resources provided by EIB to CDB in a project, are advised to include it in order to promote integrity among the tenderers/contractors. This is particularly relevant in the case of a recipient of CDB financing who has already implemented a number of previous CDB-financed projects and is considering further CDB financing utilising resources provided by EIB to CDB.

Name: _____

In the capacity of: _____

Signed: _____

Duly authorised to sign the bid for and on behalf of: _____

Dated on: _____ day of _____

APPENDIX 6.10

REPORTING REQUIREMENTS

Report Implementation	Frequency	Deadline for Submission	Responsibility
1. Monthly progress reports on LED Street Lamps Installation by the Supervision Committee	Monthly	Within three weeks of the end of each calendar month commencing one month after engagement.	PC
2. Report on Investment Cost (Sample Guidelines in Annex 1)	Quarterly	Within six weeks of the end of each quarter commencing with the quarter following the assignment of PC, until installation is completed.	PC
3. Completion Report for Installation Works prepared by the Engineering Consultants		Within three months of the date of issue of a certificate of practical completion for infrastructure contract.	PC
4. APUA Project Implementation Completion Report		Within three months of practical completion.	PC

REPORT ON INVESTMENT COST OF PROJECT
($'000)

Elements of Project	Expenditure for this Quarter	Cumulative Expenditure to Date	Projected Expenditure for the Quarter			Estimated Expenditure to Complete Project	Latest Estimate of Expenditure	Project Estimate as per Appraisal Report	Variance Favourable/ (Adverse)	Comments/Reasons for adverse Variance and Financing Proposals to Meet Cost Overrun
			Ending	Ending	Ending					
(1)	(2)	(3)	(4)	(4)	(4)	(5)	(6)	(7)	(8)	(9)
Project Preparation										
LED Street Lights										
Consumption monitoring equipment										
Installation costs										
Waste disposal										
Climate Risk Screening										
Engineering Certification										
Project Management and Administration										
Base Cost										
Physical Contingencies										
Price Contingencies										
Sub-Total										
IDC										
Commitment Charge										
Total Project Costs										

GUIDELINES FOR COMPLETION OF REPORT ON PROGRESS OF INVESTMENT COST

1. Elements of Programme - The elements of the Programme as outlined in the Appraisal Report must be recorded in this column. If it becomes necessary to further sub-divide the main elements of the Programme, then the sub-elements should be grouped to facilitate the determination of the expenditure related to the main elements identified in the Appraisal Report.

2. Expenditure for this Quarter - The expenditure incurred in the quarter to which the report relates in respect of each element of the Programme must be recorded in this column.

3. Cumulative Expenditure to Date - The expenditure incurred in respect of each element of the Programme from the commencement of the Programme to the end of the quarter to which the report relates must be recorded in this column.

4. Projected Expenditure for Quarter - An estimate of the expenditure to be incurred in each of the next three quarters must be recorded in the columns 41, 42, and 43.

5. Estimate of Expenditure to complete Programme - This column should be completed only in respect of those elements of the Programme, construction/installation of which stretches beyond three quarters from the end of the quarter to which the report relates. Where a programme extends over more than one year - four quarters - an estimate of the expenditure to be incurred in the period subsequent to the year must be recorded in this column.

6. Latest Estimate of Expenditure - The amounts to be recorded in this column should be derived by adding columns 3, 4123, and 5. The amounts recorded in this column should be the best estimate of expenditure to be incurred in respect of each element of the Programme. These amounts may be less or greater than the appraised expenditure.

7. Programme Estimates as per Appraisal Report - The estimate of expenditure to be incurred in respect of each element of the Programme, as outlined in the Appraisal Report, must be recorded in this column.

8. Variance - The difference between columns 6 and 7 must be recorded in this column. Where the amount in column 6 is less than that in column 7, a favourable variance results. An adverse variance results where the amount in column 6 is greater than that in column 7.

9. Comments - An explanation should be given for each variance which is more than 10% of the programme estimates as per Appraisal Report.

EXCLUDED ACTIVITIES

GOAB shall not finance, with the proceeds of the Loan, any activity involving:

(a) ammunition and weapons, military/police equipment or infrastructure. Includes explosives and sporting weapons;

(b) projects which result in limiting people's individual rights and freedom, or violation of human rights, as per EIB's Statement of Environmental and Social Principles and Standards, in particular 6, 46 and 47;

(c) projects unacceptable in environmental and social terms, such as projects in protected areas, critical habitats and heritage sites or without adequate compensation/mitigation, as per EIB's Statement of Environmental and Social Principles and Standards, in particular 58, 71 and 72;

(d) ethically or morally controversial projects, such as sex trade and related infrastructure, services and media, animal testing, gambling and related equipment, hotels with in-house casinos or tobacco;

(e) activities prohibited by national legislation (only where such legislation exists); and

(f) projects with a political or religious content.

EUROPEAN UNION ELIGIBILITY RULES (EU-SEEC PROGRAMME)

PARTICIPATION IN PROCEDURES FOR THE AWARDING OF PROCUREMENT CONTRACTS OR GRANT CONTRACTS

1. Participation in procedures for the award of procurement contracts financed from the contribution by the European Union (EU) to the Caribbean Development Bank (the Bank) for the implementation of the activity entitled: "Sustainable Energy for the Eastern Caribbean (SEEC) Programme", is open to international organisations and all natural persons who are nationals of, or legal persons who are established in, an eligible country.

2. Eligible countries[1] are deemed to be:

(a) Caribbean Development Bank member countries:

Anguilla, Antigua and Barbuda, Barbados, Belize, British Virgin Islands, Canada, Cayman Islands, China, Columbia, Dominica, Germany, Grenada, Guyana, Haiti, Jamaica, Italy, Mexico, Montserrat, St Kitts and Nevis, Saint Lucia, St Vincent and the Grenadines, Suriname, The Bahamas, Trinidad and Tobago, Turks and Caicos Islands, the United Kingdom and Venezuela.

(b) Members of the "African, Caribbean and Pacific (ACP) Group of States"[2]:

Africa:

South Africa[3], Angola, Benin, Botswana, Burkina Faso, Burundi, Central African Republic, Cameroon, Cape Verde, Chad, Comoros Islands, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Equatorial Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mauritania, Mozambique, Namibia, Niger, Nigeria, Uganda, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, Sudan, Swaziland, Tanzania, Togo, Zambia and Zimbabwe.

Caribbean:

Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago.

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[1] Note some countries may be eligible by virtue of more than one category

[2] Cotonou Partnership Agreement of 23 June 2000 (as amended by the provisional application of Decision No 1/2000 of the ACP-EC Council of Ministers of 27 July 2000, Decision No 1/2000 of the ACP-EC customs cooperation committee of 18 October 2000, Decision No 1/2001 of the ACP-EC customs cooperation committee of 20 April 2001, Decision No 2/2001 of the ACP-EC customs cooperation committee of 20 April 2001, Decision No 3/2001 of the ACP-EC customs cooperation committee of 10 May 2001, Decision No 4/2001 of the ACP-EC customs cooperation committee of 27 June 2001, Decision No 5/2001 of the ACP-EC customs cooperation committee of 7 December 2001, Decision No 2/2002 of the ACP-EC customs cooperation committee of 28 October 2002, Decision No 1/2003 of the ACP-EC Council of Ministers of 16 may 2003, Council Decision (EC) of 19 December 2002, Decision No 1/2004 of the ACP-EC Council of Ministers of 6 may 2004, Decision No 2/2004 of the ACP-EC customs cooperation committee of 30 June 2004 and Decision No 4/2005 of the ACP-EC customs cooperation committee of 13 April 2005).

[3] Natural and legal South African persons are eligible to participate in contracts financed by the 10th/11th EDF. However, the 10th/11th EDF does not finance contracts in South Africa.

Pacific:

Cook Islands, East Timor, Fiji, Kiribati, Marshall Islands, Micronesia, Nauru, Niue, Palau, Papua New Guinea, the Solomon Islands, Western Samoa, Tonga, Tuvalu, Vanuatu.

Overseas Countries and Territories:

Anguilla, Antarctic, Netherlands Antilles, Aruba, British Indian Ocean Territory, British Virgin Islands, Cayman Islands, Falkland Islands (Malvinas), French Polynesia, French Southern Territories, Greenland, Mayotte, Montserrat, New Caledonia, Pitcairn, Saint Helena, Saint Pierre and Miquelon, South Georgia and South Sandwich Islands, Turks and Caicos, Wallis and Futuna Islands.

(c) A Member State of the European Union:

Austria, Belgium, Bulgaria, Croatia, Czech republic, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

An official candidate country of the European Union:

The Former Yugoslav Republic of Macedonia, Turkey, Iceland, Montenegro.

A Member State of the European Economic Area: Iceland, Lichtenstein, Norway.

(d) All natural persons who are nationals of, or legal persons who are established in, a Least Developed Country as defined by the United Nations:

Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Dem. Rep. Congo, Equatorial Guinea, Eritrea, Ethiopia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao PDR, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Djibouti, Solomon Islands, Somalia, South Sudan, Sudan, Tanzania, The Gambia, Timor-Leste, Togo, Tuvalu, Uganda, Vanuatu, Yemen, Rep. and Zambia.

(e) Participation in procedures for the award of procurement contracts or grants financed from the Facility shall be open to all natural persons who are nationals of, or legal persons established in, *any country other than those referred to in paragraph 1, where reciprocal access to external assistance has been established.* Reciprocal access in the Least Developed Countries as defined by the United Nations (UN) shall be automatically granted to the OECD/DAC members: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.

3. Services under a contract financed from the Facility may be provided by experts of any nationality, without prejudice to the qualitative and financial requirements set out in the Bank's procurement rules.

4. Supplies and materials purchased under a contract financed from the Facility must originate in a State that is eligible under paragraph 1. In this context, the definition of the concept of 'originating products' shall be assessed by reference to the Bank's prevailing procurement guidelines/procedures, and supplies originating in the EU shall include supplies originating in the Overseas Countries and Territories.

5. Whenever the Facility finances an operation implemented through an international organisation, participation in procedures for the award of procurement contracts or grants shall be open to all natural and legal persons who are eligible under paragraphs 1, care being taken to ensure equal treatment of all donors. The same rules apply for supplies and materials.

6. Whenever the Facility finances an operation implemented as part of a regional initiative, participation in procedures for the award of procurement contracts or grants shall be open to all natural and legal persons who are eligible under paragraph 1, and to all natural and legal persons from a country participating in the relevant initiative. The same rules apply for supplies and materials.

7. Whenever the Facility finances an operation co-financed with a third entity, participation in procedures for the award of procurement contracts or grants shall be open to all natural and legal persons eligible under paragraph 1, and to all persons eligible under the rules of the third entity. The same rules shall apply to supplies and materials.

Caveat: The Bank and EU eligibility requirements are subject to change by the Bank and the EU. The applicant is responsible for checking whether there have been any updates on the eligibility requirements, as well as the UN's list of Least Developed Countries.

APPENDIX 7.3

FORM OF PROJECT COMPLETION REPORT

1. Dispatch of information: designation of the person responsible:

The information below has to be sent to CDB under the responsibility of:

Company	
Contact person	
Title	
Function/Department	
Address	
Phone	
Fax	
Email	

The above-mentioned contact person(s) is (are) the responsible contact(s) for the time being. GOAB shall inform CDB immediately in case of any change.

2. Information on the end of works and first 12 months of operation:

GOAB shall deliver to CDB a completion report with the following information on project completion and initial operation after a year of the commissioning of the Project:

(a) a brief description of the technical characteristics of the Project as completed, explaining the reasons for any significant change;

(b) the date of completion of each of the main Project's components, explaining the reasons for any possible delay;

(c) the final cost of the Project explaining the reasons for any possible cost increases vs. initial budgeted cost;

(d) the number of new jobs created by the Project: both jobs during implementation and permanent new jobs created;

(e) a description of any major issue with impact on the environment;

(f) description of the Climate Action and/or CC resilience (adaptation) aspects of the Project and their implementation and level of success in operation to date.

(g) update on the Project's demand or usage and comments;

(h) any significant issue that has occurred and any significant risk that may affect the Project's operation; and

(i) any legal action concerning the Project that may be ongoing.