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The World Bank Group

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Report No: PAD1026

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN
IN THE AMOUNT OF US$125 MILLION

AND A PROPOSED LOAN FROM THE CLEAN TECHNOLOGY FUND
IN THE AMOUNT OF US$23.95 MILLION

TO THE

OFFICE NATIONAL DE L'ELECTRICITE ET DE L'EAU POTABLE (ONEE)

WITH THE GUARANTEE OF THE KINGDOM OF MOROCCO

FOR A

CLEAN AND EFFICIENT ENERGY PROJECT

APRIL 3, 2015

Energy and Extractives Global Practice
Middle East and North Africa Region

CURRENCY EQUIVALENTS

Exchange Rate Effective February 28, 2015

Currency Unit	=	Moroccan Dirham (MAD)
9.65 MAD	=	US$1
US$1.42	=	SDR 1

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

ADEREE	*Agence Nationale pour le Développement des Énergies Renouvelables et de l'Efficacité Énergétique* (National Agency for Renewable Energy Development and Energy Efficiency)
AMI	Advanced Metering Infrastructure
BOT	Build-Operate-Transfer
CCGT	Combined Cycle Gas Turbine
CFL	Compact Fluorescent Lamp
CO_2	Carbon Dioxide
CPS	Country Partnership Strategy
CSP	Concentrated Solar Power
CTF	Clean Technology Fund
CTF IP	Clean Technology Fund Investment Plan
DPL	Development Policy Loan
DSM	Demand Side Management
EB	Electricity Branch
EIB	European Investment Bank
EPC	Engineering, Procurement, and Construction
ESIA	Environmental and Social Impact Assessment
ESMAP	Energy Sector Management Assistance Program
EU	European Union
FDE	*Fonds de Développement Energétique* (Energy Development Fund)
FM	Financial Management
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHG	Greenhouse Gas
GoM	Government of Morocco
GWh	Gigawatt hour
HFO	Heavy Fuel Oil
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
IEA	International Energy Agency
IMF	International Monetary Fund
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
KfW	*Kreditanstalt Für Wiederaufbau* (German Development Bank)

kWh	Kilowatt-hour
LCOE	Levelized Cost of Electricity
LED	Light Emitting Diode
MAD	Moroccan Dirhams
MASEN	Moroccan Agency for Solar Energy
MENA	Middle East and North Africa
MW	Megawatt
NPV	Net Present Value
O&M	Operations and Maintenance
OCP	*Office Chérifien des Phosphates* (Sharifian Phosphate Office)
ONE	*Office National de l'Électricité* (National Electricity Utility Company)
ONEE	*Office National de l'Électricité et de l'Eau Potable* (National Electricity and Water Utility Company)
ONEP	*Office National de l'Eau Potable* (National Water Utility Company)
PAD	Project Appraisal Document
PDO	Project Development Objective
PLL	Precautionary Liquidity Line
PPA	Power Purchase Agreement
PPG	Project Preparation Grant
PPP	Public-Private Partnership
R&D	Research and Development
RE	Renewable Energy
RFP	Request for Proposal
RPF	Resettlement Policy Framework
TOR	Terms of Reference
TSO	Transmission System Operator
USD	United States Dollar
WBG	World Bank Group

Regional Vice President:	Hafez M. H. Ghanem
Country Director:	Joelle Dehasse Businger (Acting)
Senior Global Practice Director:	Anita Marangoly George
Practice Manager:	Charles Joseph Cormier
Task Team Leader:	Roger Coma Cunill

KINGDOM OF MOROCCO

Clean and Efficient Energy Project

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PAD DATA SHEET

Kingdom of Morocco

Clean and Efficient Energy Project (P143689)

PROJECT APPRAISAL DOCUMENT

Middle East and North Africa

Energy and Extractives Global Practice

Report No.: PAD1026

Basic Information		
Project ID P143689	EA Category B - Partial Assessment	Team Leader Roger Coma Cunill
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints [ ] Financial Intermediaries [ ] Series of Projects [ ]	
Project Implementation Start Date 24-Apr-2015	Project Implementation End Date 30-May-2020	
Expected Effectiveness Date 23-Jul-2015	Expected Closing Date 30-Nov-2020	
Joint IFC No		

Practice Manager	Senior Global Practice Director	Country Director	Regional Vice President
Charles Joseph Cormier	Anita Marangoly George	Joelle Dehasse Businger	Hafez M. H. Ghanem

Borrower: Office National de l'Électricité et de l'Eau (ONEE)

Responsible Agency: Office National de l'Électricité et de l'Eau

Contact: Mr. Ali Fassi Fihri Title: Director General

Telephone No.: 212-52-220-5698 Email: fait@onee.ma

Project Financing Data(in USD Million)		
[X] Loan	[ ] IDA Grant	[ ] Guarantee
[ ] Credit	[ ] Grant	[ ] Other

Total Project Cost:	158.31	Total Bank Financing:	125.00
Financing Gap:	0.00		

Financing Source	**Amount**
Borrower	9.36
International Bank for Reconstruction and Development	125.00
Clean Technology Fund	23.95
Total	**158.31**

Expected Disbursements (in USD Million)

Fiscal Year	2016	2017	2018	2019	2020	2021
Annual	6.00	40.00	80.00	20.00	2.95	0.00
Cumulative	**6.00**	**46.00**	**126.00**	**146.00**	**148.95**	**148.95**

Institutional Data

Practice Area (Lead)

Energy & Extractives

Contributing Practice Areas

Cross Cutting Topics

[X] Climate Change
[ ] Fragile, Conflict & Violence
[ ] Gender
[ ] Jobs
[ ] Public Private Partnership

Sectors / Climate Change

Sector (Maximum 5 and total percent must equal 100)

Major Sector	Sector	percent	Adaptation Co-benefits percent	Mitigation Co-benefits percent
Energy and mining	Other Renewable Energy	50		100
Energy and mining	Transmission and Distribution of Electricity	50		100
Total		100		

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

Themes

Theme (Maximum 5 and total percent must equal 100)

Major theme	Theme	percent
Financial and private sector development	Infrastructure services for private sector development	10
Environment and natural resources management	Climate change	90
Total		**100**

Proposed Development Objective(s)

To improve the capacity of ONEE to supply and dispatch clean electricity and to meet the demand of targeted customers more efficiently in the project area.

Components	
Component Name	**Cost (MUS$)**
Component 1: Support to ONEE's Solar PV Program	129.70
Component 2: Planning and Dispatching of Renewable Energies	5.20
Component 3: Utility Demand-side Management and Revenue Protection Program	13.45
Component 4: Technical Assistance	0.60

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

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

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	**X**	
Natural Habitats OP/BP 4.04		**X**
Forests OP/BP 4.36		**X**
Pest Management OP 4.09		**X**
Physical Cultural Resources OP/BP 4.11		**X**
Indigenous Peoples OP/BP 4.10		**X**
Involuntary Resettlement OP/BP 4.12	**X**	
Safety of Dams OP/BP 4.37		**X**

Projects on International Waterways OP/BP 7.50		**X**
Projects in Disputed Areas OP/BP 7.60		**X**

Legal Covenants

Name	Recurrent	Due Date	Frequency
Schedule 2, Section 1. C.1. of the Loan Agreement	**X**		Continuous

Description of Covenant

The Borrower shall implement the Project in accordance with the ESMF, the RPF, the ESIAs, the EMPs and the RAPs, and shall not amend, suspend, abrogate, repeal or waive any provision of the ESMF, the EMPs, the RPF and the RAPs, without prior written approval of the Bank and subject to compliance with applicable consultation and public disclosure requirements of the Bank.

Name	Recurrent	Due Date	Frequency
Schedule 2, Section 1. C.2. of the Loan Agreement	**X**		Continuous

Description of Covenant

The Borrower shall ensure that all measures identified and described in the ESMF, the ESIAs, the EMPs, the RAPs and the RPF are taken in a timely manner.

Conditions

Source Of Fund	Name	Type
IBRD	Article IV 4.01(a)	Effectiveness

Description of Condition

The CTF Loan Agreement has been executed and delivered and all conditions precedent to its effectiveness (other than the effectiveness of this Agreement) have been satisfied or waived.

Source Of Fund	Name	Type
IBRD	Article IV 4.01(b)	Effectiveness

Description of Condition

Borrower has adopted the Project Operational Manual, in form and substance satisfactory to the Bank.

Source Of Fund	Name	Type
CCTF	Article V 5.01(a)	Effectiveness

Description of Condition

The IBRD Loan Agreement has been executed and delivered and all conditions precedent to its effectiveness (other than the effectiveness of this Agreement) have been satisfied or waived

Source Of Fund	Name	Type
CCTF	Article V 5.01(b)	Effectiveness

Description of Condition

Borrower has adopted the Project Operational Manual, in form and substance satisfactory to the World Bank.

Team Composition				
Bank Staff				
Name	**Role**	**Title**	**Specialization**	**Unit**
Roger Coma Cunill	Team Leader (ADM Responsible)	Energy Specialist	Task Team Leader	GEEDR
Abdoulaye Keita	Procurement Specialist	Senior Procurement Specialist	Senior Procurement Specialist	GGODR
Laila Moudden	Financial Management Specialist	Financial Management Analyst	Financial Management Analyst	GGODR
Abdoul Wahabi Seini	Team Member	Senior Social Development Specialist	Senior Social Development Specialist	GSURR
Africa Eshogba Olojoba	Safeguards Advisor	Lead Environmental Specialist	Lead Environment Specialist	GENDR
Aissatou Diallo	Team Member	Senior Finance Officer	Disbursements	WFALA
Arbi Ben Achour	Safeguards Specialist	Consultant	Consultant	GSURR
Fanny Kathinka Missfeldt-Ringius	Team Member	Senior Energy Economist	Senior Energy Specialist	GEEDR
Ishanlosen Odiaua	Team Member	Consultant	Environmental Safeguards	GENDR
Jean-Charles Marie De Daruvar	Counsel	Senior Counsel	Senior Counsel	LEGAM
John R. Butler	Safeguards Advisor	Lead Social Development Specialist	Lead Social Development Specialist	GSURR
Khadija Sebbata	Team Member	Program Assistant	Program Assistant (Administration)	MNCMA
Mark M. Njore	Team Member	Program Assistant	Program Assistant (Operations)	GEEDR
Najat Maalla M'Jid	Safeguards Specialist	Consultant	Consultant	MNCMA
Pedro Antmann	Team Member	Lead Energy Specialist	Lead Energy Specialist	GEEDR
Silvia Martinez Romero	Team Member	Sr. Renewable Energy Specialist	Solar Renewable Energy Specialist	GEEES
Suiko Yoshijima	Safeguards Specialist	Environmental Specialist	Environmental Safeguards	GENDR

Extended Team

Name	Title	Office Phone	Location
Alberto Cena	Power Engineer Consultant and CTF Independent Reviewer		Madrid
Manaf Touati	Financial Analyst and Energy Specialist		Rabat
Said Mikhail	Sr. Power Engineer		Washington DC
Tayeb Amegroud	Engineer and Finance consultant		Casablanca

Locations

Country	First Administrative Division	Location	Planned	Actual	Comments
Morocco	Souss-Massa-Draa	Zagora	**X**	**X**	
Morocco	Fes-Boulemane	Missour	**X**	**X**	
Morocco	Meknes-Tafilalet	Erfoud	**X**	**X**	

I. STRATEGIC CONTEXT

A. Country Context

1. **Morocco has made a major economic and social leap forward during the past 15 years.** While many countries in the region have witnessed stagnating economic growth, and indeed are currently under enormous economic turmoil, Morocco has been able to achieve respectable per-capita income growth and preserve political stability, which in turn allowed for significant improvement in many social indicators. Morocco's real per capita income approximately doubled since the 1990s; the poverty rate was twice halved during the period; average literacy rate among adults more than doubled; and Moroccans' life expectancy at birth soared to exceed 70 years. This performance was mainly due to the implementation of sound macroeconomic policies and structural reforms.

2. **However, Morocco has been adversely affected by the sovereign debt crises in neighboring Southern European countries and the subsequent slowdown of economic growth in Europe**. As a result, economic growth beyond the agricultural sector has decelerated to an average of 3.5 percent since 2009, compared to 4.7 percent during 2000-2008. Growth has been driven mostly by domestic demand, most notably by growing public expenditures. On the upside, the emergence of new growth drivers in higher value-added industries (such as car manufacturing and aeronautics) and the expansion of Moroccan companies in Western Africa are potentially creating the conditions for Morocco to become a regional hub for investments between Europe and Sub-Saharan Africa.

3. **In response to growing fiscal stress, the Government initiated the reform of the subsidy system and began to rein in other recurrent expenditures, while consolidating tax revenues.** Morocco's fiscal balance swung from a surplus of 0.4 percent of GDP in 2008 to the highest deficit in two decades, at 7.4 percent of GDP in 2012. However, the activation of a price indexation mechanism for fuel products helped cut subsidies by an impressive 24 percent (or almost two percentage points of GDP) in 2013. The full implementation of the fuel price-indexation mechanism helped cut further subsidies by 19.8 percent (or one percentage point of GDP) over the first 10 months of 2014. As a result of sound fiscal consolidation measures, Morocco reduced the budget deficit to below the target five percent of GDP set in the 2014 Budget Law.

4. **The International Monetary Fund (IMF) and the World Bank Group (WBG) support the Government's reform agenda.** In July, 2014, the International Monetary Fund (IMF) renewed the US$6.2 billion Precautionary Liquidity Line (PLL) for two additional years to support the Government's reform agenda aimed at achieving higher and more inclusive economic growth by providing a useful insurance against external shocks. On December 19, 2013, the World Bank Group approved a US$300 million Development Policy Loan (DPL) on inclusive green growth to support a package of reforms to enhance Morocco's institutional, regulatory, and fiscal framework to support a shift towards green growth. The second DPL in that series is under preparation.

5. **Morocco is positioning itself on a green growth path to become a model for the rest of Africa.** A sustainable and inclusive green growth is central to the Government's agenda. In the last five years, an array of sector strategies have been adopted in order to decrease pollution levels and reduce Morocco's reliance on imported fossil fuels through substantial investments in renewable energy and in energy efficiency, thus contributing to the reduction of greenhouse gases (GHG).

B. Sectoral and Institutional Context

6. **Morocco's fossil fuel import dependency exposes the country to volatile and expensive oil prices.** In 2013, the country met 96 percent of its primary energy demand through imported fossil fuels, which represented MAD 102.5 billion (about US$11 billion), up from MAD 19.1 billion (roughly US$2.3 billion) in 2002. Petroleum imports account for 20 percent of total imports and 50 percent of the current trade deficit. This posed a heavy burden on the Government's budget because of subsidies to petroleum products (gasoline, diesel, industrial fuel oil, butane, and fuel oil for power generation). In 2013 energy subsidies accounted for a total of MAD 36 billion, equivalent to roughly US$3.8 billion and 3.6 percent of GDP (against less than 1.5 percent of GDP in 2000). Subsidy outlays encourage the inefficient consumption of energy and compound energy dependence and environmental externalities by reducing incentives to investments in energy efficiency and renewable energy.

7. **Morocco continues to meet its substantive growth in electricity demand through imports of fossil-fuels and electricity.** Since 2002, the annual electricity demand has been increasing at a rate of about 7 percent per year to reach 32,015 GWh in 2013. Almost 70 percent of this demand growth has been covered with fossil fuel-based power plants and 18 percent with imports from Spain. Morocco has recorded a peak demand of 5,670 MW in the summer of 2014 in large part due to increased used of air-conditioning, which has reduced the power system's reserve margins closer to its totaled installed capacity of 6,892 MW. To improve the reserve margins, a new 1,320 MW coal plant in Safi is scheduled to be commissioned by 2017.

8. **To increase energy security, Morocco has adopted ambitious renewable energy targets and established a strong regulatory and institutional framework.** By 2020, Morocco expects that 42percent of its installed capacity comes from renewable sources, including 2 GW from solar, 2 GW from wind and 2 GW from hydro. Morocco has created a specialized solar agency, the Moroccan Agency for Solar Energy (MASEN) in charge of the implementation of the Morocco Solar Plan (2009), which is currently focused mainly on Concentrated Solar Power (CSP). In addition, Morocco has agreed to improve energy efficiency by 12 percent by 2020, and 15 percent by 2030.

9. **A concerted effort by both Office National de l'Electricité et de l'Eau Potable (ONEE) and MASEN is underway to achieve the Government objective of 14percent of installed capacity from solar energy by 2020.** ONEE solar PV strategy[1] aiming at developing decentralized mid-size solar PV plants will be complementary to the large-scale integrated solar

[1] In 2013, ONEE's Board, chaired by the Head of Government, approved a 400 MW solar photovoltaic (PV) strategy to complement the 2,000 MW of solar energy projects developed by MASEN.

program led by the MASEN. MASEN and ONEE have been coordinating their work on solar projects at management and technical levels[2] to achieve the national target.

10. **Solar PV is a promising clean technology that could serve as an alternative to fossil fuels to meet the peak load arising during the day due to sustained economic growth and increased use of air conditioning.** Morocco is one of those countries where electricity demand has evolved into a diurnal peak: (i) one peak during the day arising from general economic activity compounded by the rise in air conditioning use, which is especially pronounced during spring and summer, and (ii) a second evening peak arising from high domestic consumption of electricity. The challenges of meeting this diurnal demand are substantial, as the peak demand has grown 8 percent in 2012. With regard to meeting energy demand arising from the evening peak, CSP with thermal storage is a good substitute for conventional fossil fuel generation. With regard to meeting the peak energy demand during the day, solar PV is a promising clean technology option. As World Bank Group studies have shown[3], solar PV technology is preferred for achieving Moroccan renewable energy's capacity targets at least cost, and is close to grid parity. In the long term, the development of CSP with thermal storage can contribute to firm-up PV variable generation, reducing the overall cost of solar generation while maintaining high levels of reliability.

11. **As a priority, ONEE also needs to reduce substantially its network losses, which would serve to improve its revenue base.** Losses in the transmission and distribution grid are estimated[4] at 11.3 percent, slightly higher than in Egypt and lower than Jordan[5]. This is partly attributed to a rapid expansion of the grid, at the expense of investments in systems optimization. Indeed, a successful rural electrification program increased access to electricity from 55 percent to 98 percent of the population in the last decade. Also, transmission lines are increasingly loaded due to increasing electricity demand, in some cases beyond levels that would be considered efficient from a reliability and system security perspective. As a result, energy losses are increasing while interruptions and voltage drops are increasingly frequent. The increase of technical losses and use of expensive heavy-fuel oil for power generation aggravates the delicate financial situation of the national electricity utility, ONEE.

12. **The Bank continues to assist Morocco's transformational efforts in the energy sector**. The proposed project strengthens the Bank's support to implement Morocco's energy strategy, which has focused so far in: (i) increasing the share of renewable energies in the energy mix with the support to the 500 MW Noor Solar Complex implemented by MASEN; (ii) incentivizing policy change by providing a Green Growth DPL; and (iii) providing infrastructure and energy efficiency support to ONEE by combining transmission infrastructure investments and energy efficiency pilots such as the introduction of CFLs. In July 2014, the World Bank Group

[2] ONEE's experts, for example, have been working closely with MASEN in site and technology selection for developing the Noor complex in Ouarzazate.

[3] World Bank Group/ESMAP/Mercados: Morocco: Analysis of Low Carbon Development Options in the Power Sector, May 2013.

[4] ONEE's share of distribution is 50 percent and the overall 2012 transmission and distribution losses acknowledged by ONEE are at 11.26 percent

[5] Jordan (2010): distribution losses estimated at 12.1 percent and transmission at 2 percent. Egypt (2010): distribution losses estimated at 8 percent and transmission at 4.2 percent.

approved IBRD and Clean Technology Fund (CTF) loans in the amount of US$400 million and US$119 million respectively to support the Morocco Noor CSP Project.

ONEE: A key player in the energy sector

13. **The national utility company "*Office National de l'Électricité et de l'Eau Potable*" (ONEE) is a historical actor which is undertaking a number of reforms.** ONEE is the state-owned company resulting from the recent merger (*regroupement*) between the country's water and electricity utilities, which is an important reform aimed at optimizing synergies and lowering costs. The strategy of ONEE's electricity branch has four main components (i) supply of electricity at the lowest possible cost, (ii) diversification of generation capacity, (iii) providing access to electricity, and (iv) expanding its services to third countries, mainly in sub-Saharan African countries. To achieve these goals, ONEE focuses on improving its operational performance by implementing several measures including, optimized planning of its investments and energy efficiency programs[6]. To diversify its primary energy mix, ONEE develops the hydro, wind and solar potential of the country.

14. **The private sector has a major role in Morocco's electricity sector.** Since 1994, the sector has been gradually opening up to private sector participation in the generation and distribution of electricity, while ONEE has kept the monopoly in transmission. Independent Power Producers (IPP), selling power to ONEE through power purchase agreements (PPAs), represent 26 percent of the total installed capacity (see Figure 1 below). The distribution of electricity to retail customers is the responsibility of ONEE (for most of the country), seven local municipal authorities, also known as "*Régies*" (Marrakech, Fès, Meknes, Kenitra, Safi, El Jadida-Azemmour and Larache-Ksar El Kébir) and four private companies, also known as "*Gestionaires délégués*" (Lydec, Redal, Amendis Tanger and Amendis Tetouan). ONEE is the transmission system operator in charge of transporting the electricity at national level. ONEE owns the transmission grid consisting of 21,434 km of 400 kV, 225 kV, 150 kV and 60 kV lines.

15. **Private sector participation in the country's power generation allows ONEE to seek the best cost-effective options to implement its projects.** While ONEE plans to evaluate investment decisions on a case-by-case basis, the latest figures on power supply and generation expansion planning show that private producers will assume an even larger role. By 2020, the private sector is expected to supply 70 percent (40 percent in 2013) of power demand and operate more than 50 percent (26 percent in 2013) of installed capacity with half of private production from renewables.[7] These will be achieved since 85 percent of planned additional capacity will be contracted to private producers.

16. **ONEE's delicate financial situation is aggravated by the use of expensive heavy-fuel oil for power generation and increase in transmission and distribution losses**. Morocco's electricity demand growth decreased from eight percent in 2012 to three percent in 2013 due to

[6] ONEE has been a key stakeholder for implementing energy conservation measures in Morocco, such as the installation of 5 million CFL lamps under a project financed by the World Bank Group in 2008. Moreover, ONEE aims to reduce peak demand by implementing a demand-side management program, which includes the roll-out of smart meters to its consumers with high consumption levels.

[7] Private producers are expected to commission 85 percent of the capacity additions between now and 2020.

the global economic crisis and abundant rains, which reduced electricity demand in the agriculture sector used for water pumping. This situation had a positive impact on an already extremely fragile ONEE's financial situation reducing its financial losses from -4.3 billion MAD in 2012 to -2.8 billion MAD in 2013.

17. **In early 2014, the Government decided to cease the subsidies to most petroleum products[8], except for those used by ONEE for electricity generation.** The Government decided to substantially reduce or remove all subsidies to unleaded gasoline, diesel and fuel-oil No. 2, which represented 76 percent of the total amount (US$2.71 billion[9]) that the Government paid in subsidies to petroleum products in 2013. The subsidies for the fuel used by ONEE for electricity generation totaled US$624 million, representing 23 percent of total subsidies to petroleum products in 2013. Subsidies to ONEE's fuel were one of the main topics discussed in the framework of the recently approved Framework contract between ONEE and the State[10], with the Government to remove them completely before 2018.

18. **ONEE and the Government agreed on a Framework contract in view of improving ONEE's financial sustainability.** Morocco's Government subsidized ONEE directly, i.e. regular capital increases, and indirectly, i.e. subsidies to distributors of fuel for electricity production (5 billion MAD in 2013 and 7 billion MAD in 2012). ONEE and the Government have recently agreed on a Framework contract, which will overhaul the subsidy system in view of improving ONEE's financial sustainability. The Framework contract 2014-2017 established obligations for both parties and included mainly the following measures:

a) Progressive increase of electricity tariffs over four years, except for low-income consumers[11];

b) ONEE's capital increase of 2 billion MAD over four years (there was a one billion MAD top up of capital in 2012);

c) Government's payment of debt owed to ONEE on behalf of the debtor (2 billion MAD) (Former local municipal authorities, public administrations, municipalities);

d) A lump-sum payment to ONEE as a flat subsidy for fuel used in electricity production (14 billion MAD over four years);

e) ONEE's commitment to achieve defined objectives in terms of the power system performances (Generation, Transmission, and Distribution).

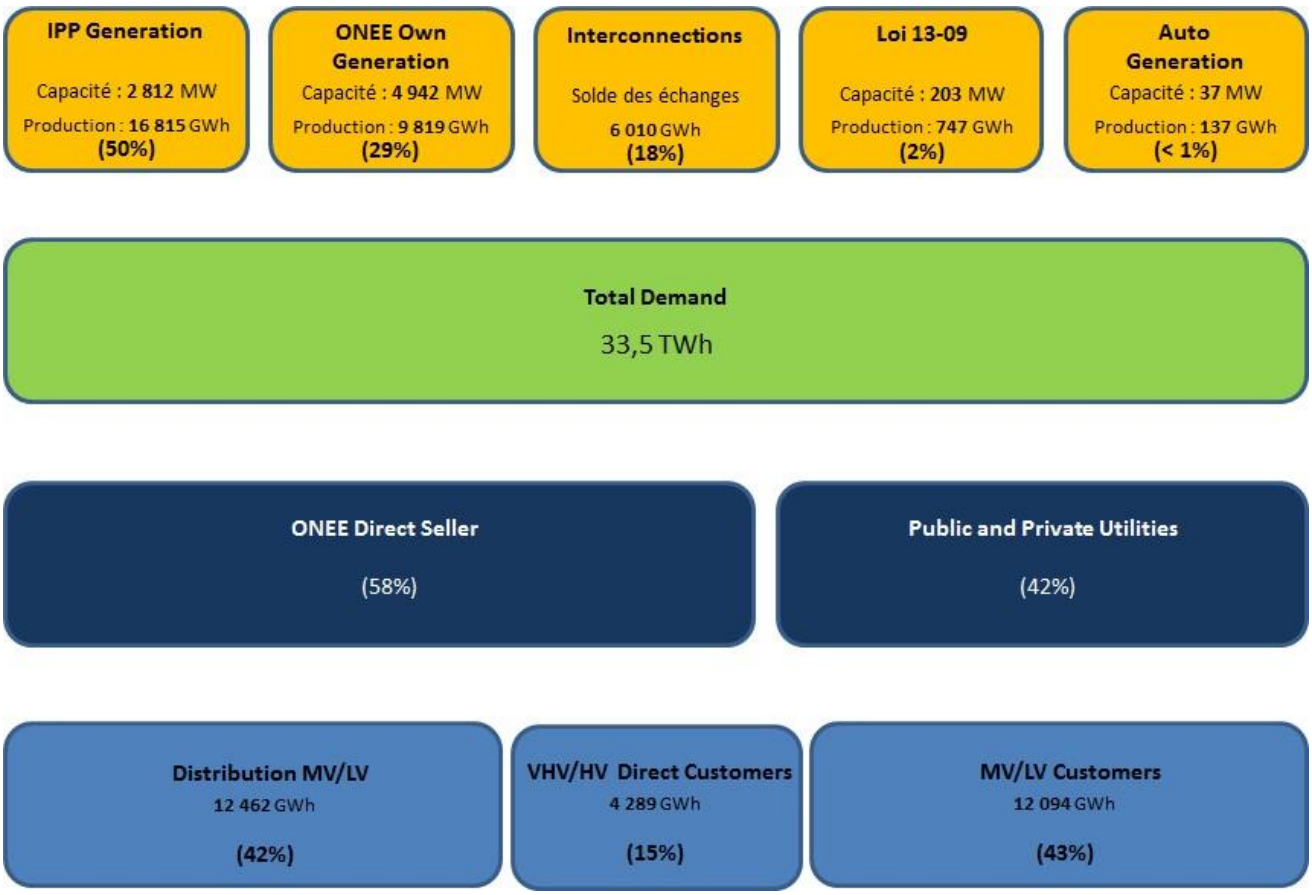
[8] The Compensation fund, in French "Caisse de compensation", is a public agency under the authority of the Head of Government, which subsidizes petroleum products for transport and electricity generation. Subsidized petroleum products included fuel for electricity generation such as "fuel ONEE normal" and "special fuel ONEE", as well as unleaded gasoline, Diesel, Gasoil for coastal fishing and No. 2 fuel-oil. The subsidy amount of these products is fixed on the 1st and 16th of each month by the Ministry of Energy and Mines on the basis of Brent crude oil on the international market Rotterdam.

[9] 22,102 billion Moroccan Dirhams. Source: Morocco Compensation Fund, Activity Report – February 2014: http://www.cc.gov.ma/images/telechargement/Rapport-site/rapportpercent20FR-percent2002-14.pdf

[10] The Program-Contract between ONEE and the State 2014-17 defines the paths to improve ONEE's financial position, specifies the commitments of all parties in the implementation of the strategy and allocate financial resources.

[11] Arrêté n° 2451-14 establishing new electricity tariffs.

Figure 1 – Balance of supply-demand 2014



Source: ONEE

19. **As the operator of the electricity grid in Morocco, ONEE intends to increase its efforts to modernize the grid to ensure its effective and reliable operation as large shares of clean variable generation are integrated into the system.** ONEE's interest in the current project co-financed by IBRD and the CTF funds is a first step towards that modernization. The proposed project will facilitate clean energy generation closer to the end users and hence reduce current electricity losses, improve the quantity and quality of power supply to the selected areas, and facilitate the dispatching of large shares of renewable energy in the grid. Once it has gathered experience in the planning, design, construction and operation of solar PV technology, ONEE intends to develop a strategy to attract private sector financing in further deploying solar PV technology**.**

C. Higher Level Objectives to which the Project Contributes

20. **The proposed project has a strong country ownership and is fully in line with the World Bank Group's Country Partnership Strategy (CPS) for the Kingdom of Morocco**

2014-2017 (Report 86518-MA). The project will contribute to achieving the CPS strategic outcome 2.2 "increase renewable energy generation and enhance energy efficiency" by developing the first phase of the 400 MW solar PV strategy, installing a Renewable Energy dispatch center to integrate solar and other intermittent generation and implementing a utility demand-side management and revenue protection program. The project is therefore supportive of the Government's top priority of developing the country's vast renewable energy resource potential to reduce its dependence on fossil fuels. The project supports the World Bank Group's strategic goals of ending extreme poverty and boosting shared prosperity in a sustainable manner since it will have significant co-benefits for underprivileged communities. Finally, the project is also aligned with MENA's Regional Strategy, supporting the pillar on accelerating sustainable growth.

II. PROJECT DEVELOPMENT OBJECTIVE

A. PDO

21. The Project's PDO is to improve the capacity of ONEE to supply and dispatch clean electricity and to meet the demand of targeted customers efficiently in the Project Area.[12]

B. Project Beneficiaries

22. **The project will have several beneficiaries at local, regional and global level.** At local level, the first phase of ONEE's solar PV program will provide reliable green energy to inhabitants of pre-identified areas in Erfoud, Missour and Zagora, in Morocco's south eastern region. Also, the solar PV plants will have positive impacts on the economy, health, and quality of life of citizens living in these areas. The project will also benefit the citizens living in households where the time-of-use meters will be installed. The total number of direct beneficiaries is estimated at 412,056.

23. **The poverty level in project beneficiary areas is between 11.3 percent to over 30 percent according to data from the national poverty map**[13] **(see Annex 7).** The solar PV plants will contribute to unlock the economic potential of these regions by providing green power with adequate quality for agricultural, tourism and craft industries' projects.[14] These areas also benefit from cross-sectoral projects sponsored under several national programs, such as National

[12] The Regions of Chaouia-Ouardigha, Doukkala-Abda, Fès-Boulemane, Gharb-Chrarda-Beni Hssen, Grand Casablanca, Marrakech-Tensift-Al Haouz, Meknès-Tafilalet, Oriental, Rabat-Salé-Zemmour-Zaër, Souss-Massa-Drâa, Tadla-Azilal, Tanger-Tétouan, Taza-Al Hoceima-Taounate, of the Kingdom of Morocco, and the Provinces of Tan-Tan, Tata and Guelmin of the Kingdom of Morocco.

[13] 11.3 percent in Erfoud; 12.4 percent in Missour and over 30 percent in Zagora. Source: High Planning Commission, Poverty Map, 2007: http://omdh.hcp.ma/Carte-de-la-pauvrete-2007_a185.html

[14] The project will open up these regions and will be the backbone of the government's plans for their sustainable development. In the region of Missour, the project will facilitate the implementation of a large animal breeding project under the current Fes-Bousselmane Regional Agricultural Program. In the region of Erfoud, the project will bring enough power to respond to the demand of an additional twenty new touristic projects and one new crafts neighborhood. In the region of Zagora, the project will provide clean power to improve the productivity of twenty-three dairy farms currently using expensive gasoil.

Initiative for Human Development (NIHD)[15], the Communal Development Plans (CDP) and the Green Morocco Plan.[16]

24. **According to a World Bank Group study on the impacts of the solar PV plants on these local communities[17], particularly women,** the Project is also expected to have the following indirect positive impacts:

(i) *Health sector*: an improved electricity supply will reduce the failures in hemodialysis, radiography and ultrasound equipment in regional hospitals due to voltage drops and the need for expensive back-up diesel generators. The failure of this equipment entails postponement of surgical interventions and relocations of patients to far-away hospitals.

(ii) *Education sector*: an improved electricity supply will reduce the negative impacts on schoolchildren suffering from severe cold in winter and very high temperatures in summer. Schoolchildren, particularly in poor areas, have a hard time to do homework regularly in the evening and to use computers in normal conditions due to voltage fluctuations. Improvements in electricity supply could mitigate these negative impacts.

(iii) *Gender and quality of life*: an improved electricity supply will reduce the power cuts and voltage drops that currently affect these areas (4-5 monthly power cuts and daily voltage drops). This improvement will particularly benefit women who are the main household electricity consumers and suffer from inadequate refrigeration and regular appliance's breakdown.

25. At regional level, Morocco will become a reference for the development of grid-connected decentralized mid-sized solar PV plants providing critical learning effects for scaling-up this technology at utility-scale. At global level, the project is expected to have positive impacts such as avoiding 78,018 tons of CO_2 equivalent of greenhouse gas emissions per year and 1.95 million tons over the lifetime of the project.

C. PDO Level Results Indicators

26. The PDO level results indicators are:

(i) Generation Capacity of Renewable Energy (other than hydropower) constructed (Megawatt) - (Core)

(ii) Generation capacity of renewable energy constructed - solar (MW) (Core)

(iii) Renewable Energy dispatch system installed and operational (Yes/No)

[15] In French, Initiative Nationale de Développement Humain (INDH). National Program against poverty, insecurity and exclusion, based on a participatory and inclusive approach taking into consideration gender, launched in 2005 by the King with the support of the World Bank Group.

[16] In French, Plan Maroc Vert (PMV). The Green Morocco Plan, initiated by the Ministry of Agriculture aims to increase agricultural productivity, farmers' incomes and agricultural employment.

[17] World Bank Group, Clean and Efficient Energy Project (P143689), "Review of social issues", March 2014, internal document.

(iv) Direct project beneficiaries[18] (Number) - (Core)

(v) Direct project beneficiaries (Number), of which female (percent) (Core)

(vi) Avoided GHG emissions (Metric Tons)

III. PROJECT DESCRIPTION

A. Project Components

27. **The project will increase the ability of ONEE to supply and efficiently dispatch clean energy and meet demand more efficiently.** These three complementary areas of action (Generation, Transmission and Distribution) form the components of the project, which are detailed herewith:

28. **Component 1 – Support to ONEE's Solar PV Program US$124.67 (US$94.45 million from IBRD, US$23.95 million from CTF and US$6.27 million from ONEE):** In December 2013, ONEE adopted a 3-phase corporate strategy to develop 400 MW of grid-connected decentralized solar PV in 16 sites located at the end of high-voltage transmission lines. The Government strongly supports the implementation of this strategy, which will contribute to achieve the ambitious national renewable energy targets established by 2020 (42 percent in installed capacity, including 14 percent of solar energy). The strategy is also expected to have important local benefits in terms of improved quantity and quality of electricity supply in communities with significant poverty rates where economic activities, i.e. agriculture, tourism, crafts, and quality of life of households are affected by voltage drops and regular outages. As part of Morocco's national energy strategy, ONEE's solar PV strategy complements the 2,000 MW solar plant under implementation by MASEN.

29. This component will finance the first phase of ONEE's solar PV program as public investment and will assist ONEE in transitioning towards private sector financing of solar PV plants in subsequent phases of its program based on lessons learned. The experience of the unsuccessful 200-360 MW wind Build-Operate-Transfer (BOT) tender launched by ONEE in 2002 led the national utility to adopt a cautious strategy when introducing new generation technologies in the country such as solar PV.[19]

30. The project integrates a Technical Assistance activity (Subcomponent 1.2) to support ONEE in the transition from a public to an IPP model for developing solar PV plants in the country.

[18] Direct project beneficiaries are (i) local population (as per 2014 census) in the regions of Zagora (64,633), Missour (25,584) and Erfoud (29,279) benefiting from the PV component, (ii) the workforce to be employed during the periods of construction and operation of the PV plants, and (iii) 292,560 inhabitants benefiting from the installation of 63,600 bi-hourly meters (292,560 = 63,600 * 4.6 which is the national household size average).

[19] In 2002, ONEE (formerly ONE) launched a tender (ref. SP40024) for the development, financing, construction and operation of wind farms in Tangier (140 to 200MW) and Tarfaya (60 to 160MW). After opening the financial offers in May 2002, ONEE declared the tender "unsuccessful".

31. **Subcomponent 1.1: First phase of ONEE's Solar PV Program ("the Noor-Tafilalt" Project) in the Project Area (US$94 million from IBRD, US$23.95 million from CTF and US$6.27 million from ONEE):**

a) EPC and O&M: For the 1st phase of its solar PV program, ONEE has identified three sites near the towns of Erfoud, Zagora and Missour to develop a 25 MW solar PV plant in each of them. ONEE intends to launch an international competitive tender for an EPC and a 5-year O&M contract to design, construct, operate and maintain the three plants. IBRD and CTF will finance the EPC of these solar PV plants, while ONEE will finance the O&M. For the 2nd phase, ONEE has approached the European Investment Bank (EIB) and the *Kreditanstalt Für Wiederaufbau* (KfW) to secure the financing for installing 200 MW in eight sites. The 3rd phase is still at a conceptual stage.

b) Evacuation lines: The IBRD loan will finance the construction of transmission lines to evacuate power from the three solar PV plants to the national power grid. The Erfoud solar PV plant will be connected either directly to the existing nearest 60 kV line or to the nearest 60/22 kV substation located at 9km from the site. The Missour solar PV plant will be connected either directly to the existing nearest 60 kV line (8km) or the nearest 60/22 KV substation (26 km) and the Zagora solar PV plant will be connected either to the nearest existing 60kV line (5km) or to the nearest existing 60/22 KV substation (14 km). The transmission lines are part of the project's associated facilities.

c) Access roads: ONEE will finance the construction of access roads to the three solar PV plants. The three sites are located near roads or existing tracks. The precise route of the access roads will be determined by an on-going feasibility study. The access roads are part of the project's associated facilities.

32. **Subcomponent 1.2: Enabling environment for private participation in distributed PV generation** (**US$450,000 from IBRD**)**.** This sub-component will finance a study, technical advisory services, training, and international study tours for ONEE staff related to solar PV development. This sub-component will be composed of:

a) A benchmark study to assess the enabling environment for private sector participation in solar PV projects. The study will include international experiences on bidding processes, contractual structures, and a market sounding analysis to test private sector interest for investing in grid-connected solar PV in Morocco.

b) Strengthening the technical capacities of selected ONEE staff regarding solar PV development and the setting up of partnerships with private sector in such area, through the provision of technical advisory services, training, and carrying out of international study tours.

33. **Component 2 – Planning and dispatching of Renewable energies (US$5.2 million from IBRD):** Transmission System Operators (TSO) such as ONEE are responsible for managing the electrical system under strict safety and quality parameters. TSOs control key variables such as the voltage at the local nodes and the frequency for the whole system. Both variables, voltage and frequency, should be kept within predefined range of values all the time. Thus, ONEE

programs daily the production of the power plants connected to the high voltage grid to cover the forecasted demand at the minimum possible cost.

34. Meeting the country's renewable energy goals require a transformation in the way the power system and the grid are operated. TSO's worldwide have transformed their operational practices to manage the increasing penetration of variable wind and solar energies. This transformation importantly includes the creation of specialized dispatch centers to have a closer control of renewable energy power plants.[20] The scattered location of renewable energy installations throughout a country, even connected to medium voltage grids, has also favored the global trend of creating centralized control centers to coordinate different power supply units and to avoid local problems such as grid congestions.

35. **Sub-component 2.1: Renewable Energy dispatch center in the Project Area (US$5 million from IBRD):** This sub-component will finance setting up a renewable energy dispatch center consisting of software and hardware, co-located with ONEE's existing national load dispatch center in Casablanca, to ensure optimal power dispatch and protection of the national power grid. Solar and wind energy production is characterized by its non-controllable variability and limited predictability in addition to its dependency on resources that are site-dependent. These features create distinct challenges for owners of generating plants and grid operators in integrating wind and solar generation[21], where forecasts for wind and solar are crucial for system balancing.

36. The proposed Renewable Energy dispatch center consists of Supervisory Control and Data Acquisition (SCADA) software and hardware, which will provide more opportunities to ONEE, the transmission system operator, to optimally adjust supply and demand resources. Dispatch optimization will be carried out according to supply/demands forecasts and hence, reduce investment needs in generation and transmission. The dispatch center will be co-located with the existing National load dispatch center in Casablanca and integrated with real time measurement and information flow.

37. The Renewable Energy dispatch center would include the following functions:

(i) Forecasting of renewable energy generation on month-ahead, week-ahead, day-ahead and hour-ahead basis.

(ii) Real time tracking of generation from renewable energy sources.

(iii) Geo-spatial visualization of renewable energy generation.

(iv) Close coordination with the national load dispatch center for renewable energy generation and control and weather stations for smooth grid operation.

(v) Single source information repository and coordination point for renewable energy penetration.

[20] This is specially the case when renewable energy plants contribute over 10-20 percent in the generation of a particular system.

[21] I. Perez-Arriaga: Managing Large Scale Penetration of Intermittent Renewables, MITEI Symposium on Managing Large-Scale Penetration of Intermittent Renewables, Cambridge/U.S.A, 20 April 2011.

38. **Sub-component 2.2: Increasing ONEE's capacity to perform long-term power planning incorporating energy efficiency and technological improvement (US$200,000 from IBRD).** This sub-component will finance the purchase state of the art demand forecasting tools and will provide training and technical assistance to strengthen ONEE's planning department capabilities. The development of the skills required to update the current demand projections and incorporate them adequately in the planning models is key to adequately assess future investments in power plants. This sub-component will complement the on-going activities financed by AFD, which support the purchase of software and training for long-term planning including renewables in the energy mix. As input for the planning tools, long-term electric peak-load forecasting, as well as estimated daily and monthly demand profiles are critical for an effective and efficient planning.

39. **Component 3 – Utility Demand-side Management and Revenue Protection program (US$13.13 million from IBRD):** ONEE plans to install smart-meters and advanced metering infrastructure (AMI) to its extra-high, high and medium voltage customers, as well as time-of-use meters -with integration capabilities to the AMI- to its low voltage top-consuming households[22], agricultural, industrial and commercial clients. The two main objectives are: (i) to keep non-technical losses (unmetered consumption) in electricity supply low systematically and, hence, increase the company's billing revenues; and (ii) incentivize customers with time-of-use meters to subscribe to a time-of-use tariff and reduce their consumption during expensive peak hours. The advanced metering infrastructure will initially be deployed to cover all of ONEE's high voltage clients (Distributors and Direct large clients) and all of its medium voltage clients. This category of users represents 0.42 percent of the total number of clients and accounts for 76.3 percent of energy sales. The time-of-use meters will be installed at 63,600 low-voltage client sites representing only 1.30 percent of ONEE's clients, but 10 percent of total consumption of ONEE's low voltage users.

40. **Subcomponent 3.1: Smart Meters Program in the Project Area (US$12,68 million from IBRD):** This sub-component includes the following:

a) Acquisition of 63,600 time-of-use meters for low voltage customers, and of 21,600 smart meters for extra-high, high and medium voltage customers and related metering control equipment, financed by IBRD.

b) Installation of the time-of-use meters and smart meters, financed by ONEE.

41. The rollout of 63,600 time-of-use meters constitutes the first phase of ONEE's time-of-use program. Time-of-use meters will allow ONEE to introduce a time-of-use tariff[23] for the highest consumers among its low voltage clients following its success with extra-high and high voltage large industrial customers[24]. The expected change in behavior of customers from peak to

[22] Consuming over 500 kWh/month.

[23] This time-of-use tariff was adopted by the Government in February 2009, but could not be implemented because of the absence of appropriate meters. Starting from 1st January 2016, time-of-use tariffs will automatically apply to all LV customers with monthly consumption above 500kWh.

[24] Since 1996, ONEE has been testing different tariff structures through the introduction of new tariffs to further stimulate energy savings while conveying the actual cost of energy production and effectively meet customers' needs. In 1996, ONEE negotiated with the Government the approval of a three-hourly kWh tariff for very large industrial customers (HV and EVH),

off-peak hours will largely depend on the effectiveness of an awareness and communications campaign. The time-of-use meters will include compatibility features to allow their integration with an Advanced Metering Infrastructure (AMI).

42. In parallel, ONEE will develop a Revenue Protection Program with the rollout of 21,600 smart-meters to high and medium voltage customers. The Revenue Protection Program will include an Advanced Metering Infrastructure (AMI) comprising the installation of communication devices, software (MDMS) and a Metering Control Center (MCC). This infrastructure will allow ONEE to implement a revenue protection program by ensuring that all the amount of energy actually consumed is metered and billed on a permanent manner, therefore controlling or reducing non-technical losses. The functionalities of the Advanced Metering Infrastructure and Monitoring Control Center include: revenue protection (detection of theft, frauds, etc.), automatic meter reading, remote disconnection/ reconnection, time of use (TOU) rates, load control and outage detection.

43. **Subcomponent 3.2: Deepening and identifying additional opportunities for utility-implemented energy efficiency and demand side management programs (US$450,000 from IBRD).** This sub-component will finance a study regarding energy demand, which shall identify options, define priorities, and set forth an action plan for selected energy efficiency and demand side management programs to be implemented by ONEE.

44. This study will help ONEE to support the national goals on energy efficiency, which include reducing energy consumption by 12 percent in 2020. The study will include the following two phases:

a) The first phase will help understanding energy demand drivers:
   i. Analysis of collected data on energy consumption of clients monitored by the AMI platform to be deployed as part of Component 3.1;
   ii. Conduct a survey on household equipment and appliances;
   iii. Conduct a measurement survey from a representative panel of households with the objective to assess the energy consumption of common appliances, and their usage patterns;
   iv. Collect load curves for business customers and develop sector-type load curves;
   v. Identify user profiles and establish reference load curves for each user.

b) The second phase will focus on analyzing results from the first phase:
   i. Identify opportunities and actions plan for selected energy efficiency and demand side management programs to be driven and implemented by ONEE:

and a year later the time-of-use tariffs were extended to MV clients. More recently, in 2008, ONEE introduced a super-peak tariff for the two-hour evening peak to motivate large industrial customers to further lower their load during this period. While the super-peak tariff was optional, many large customers opted for it, especially cement factories and steelworks. ONEE estimates that by end 2013, industries benefiting from this tariff were able to shave 102.5 MW from the system peak demand.

- Help with the appropriate communication campaigns to increase the effectiveness of energy conservation measures.
- Design optimal tariff policies to spur energy efficiency amongst consumers.

ii. Establish an action plan to implement identified demand side management measures.

45. **Component 4 – Technical Assistance (US$600,000 from IBRD):** This component will aim at strengthening the technical capacities of selected ONEE staff through the provision of training and technical advisory services in the following areas: (i) best practices by system operators to manage large shares of renewable energy at the wholesale and distribution level; (ii) new technology trends in control and performance capabilities of renewable energy technologies and interconnection standards; (iii) preparation of standard bidding and contractual documents covering technical, legal and procurement aspects in the field of renewable energy; (iv) best practices in the development, operations and maintenance of solar PV, wind and other renewable energy projects; (v) emerging regulatory practices for private participation in renewable energy project; and (vi) technology trends and best practices in smart meters and smart grids.

B. Project Financing

Lending instruments

46. The proposed project will be financed by an Investment Project Financing (IPF) in the amount of US$125 million IBRD loan and a US$23.95 million CTF concessional loan to ONEE. The CTF loan will be used for Component 1 – Support to ONEE's Solar PV Program: 1st phase - "Noor-Tafilalt" project. IBRD and CTF loan will co-finance Component 1.1 in a parallel manner. The CTF loan has a 40 year maturity, a 10 year grace-period, a service charge of 0.25 percent per annum and a management fee of 0.18percent per annum on the unwithdrawn loan balance.

47. The IBRD loan will be used for all four components, i.e. to finance the EPC and O&M (optional) contract for the construction, operation and maintenance of three 25 MW solar PV plants (Component 1); to finance the contract to supply a Renewable Energy dispatch center (Component 2); to finance the contract to supply 85,200 smart meters and associated Advance Metering Infrastructure (Component 3); and to finance a Technical Assistance, including training, capacity building and knowledge exchange, to assist ONEE in project implementation (Component 4).

C. Project Cost and Financing (million USD)

Project Components	Project cost	IBRD	%	CTF	%	ONEE	%
Component 1: Support to the ONEE's Solar PV Program in the Project Area							
Subcomponent 1.1: First Phase of ONEE's Solar PV Program	124.22	94.00	75.67	23.95	19.28	6.27[25]	5.05

[25] ONEE's contribution will cover costs of land acquisition, access roads and environmental and social monitoring.

Project Components	Project cost	IBRD	%	CTF	%	ONEE	%
(the "Noor-Tafilalt Project")							
Subcomponent 1.2: Enabling Environment for Private Participation in Distributed PV Generation	0.45	0.45	100	0	0	0	0
Component 2: Planning and Dispatching of Renewable Energies							
Subcomponent 2.1: Renewable energy Dispatch Center in the Project Area	5.00	5.00	100	0	0	0	0
Subcomponent 2.2: Increasing ONEE's Capacity to Perform Long-Term Power Planning Incorporating Energy Efficiency and Technological Improvement	0.20	0.20	100	0	0	0	0
Component 3: Utility Demand-Side Management and Revenue Protection Program							
Subcomponent 3.1: Smart Meters Program in the Project Area	12.680	12.68	100	0	0	0	0
Subcomponent 3.2: Deepening and Identifying Additional Opportunities of Utility-Implemented Energy Efficiency and Demand-Side Management Programs	0.45	0.45	100	0	0	0	0
Component 4: Technical Assistance	0.60	0.60	100	0	0	0	0
Contingencies (10%)	14.39	11.30	78.52	0	0	3.09	21.48
Total Project Costs without contingencies	143.92						
Total Project Costs	**158.31**						
Front-End Fees	0.31						
Total Financing Required	**158.31**						

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

48. **Executing Agency:** The *Office National de l'Électricité et de l'Eau Potable* (ONEE) was created in April 2012 by Law 40/09 as a result of the merger (*regroupement*) between the "*Office National de l'Électricité*" (ONE) and the "*Office National de l'Eau Potable*" (ONEP). ONEE is the borrower (with a guarantee provided by the Kingdom of Morocco) and the executing agency of the project. ONEE operates under the technical supervision of the Ministry of Energy, Mines, Water and Environment and the financial supervision of the Ministry of Economy and Finance (MEF).

49. During project preparation, attention was given to ONEE's technical and implementation capabilities. ONEE has qualified personnel to: (a) prepare, implement and operate the generation, transmission and distribution infrastructure to be financed under the proposed project, and (b) prepare, supervise and ensure the quality control of all studies and activities to be carried out under the Technical Assistance sub-components. ONEE's organization chart is presented in Annex 3.

50. Attention was also given to anti-corruption measures adopted by ONEE within its own organization and in its dealing with consultants and other suppliers. It was noted that all contracts between ONEE and its suppliers include anti-corruption language to be signed by the contractors. ONEE procedures are in agreement with the provisions of the Bank's Anti-corruption Guidelines applicable to the project.

51. **Project Management**: The Electricity Branch (EB) Financing Department has overall responsibility for project implementation and collaborates closely with the responsible manager for each component to achieve the agreed results: The Head of the Solar PV Strategic Project "Noor-Tafilalt" is responsible for the implementation of ONEE's Solar PV Program and the "Noor-Tafilalt" project (Component 1);

i. The Director of the Transmission System Operator (TSO) is responsible for the implementation of the Renewable energy dispatch center (Component 2.1);

ii. The Planning Director is responsible for the implementation of the technical assistance to increase ONEE's capacity to perform long-term power planning (Component 2.2);

iii. The Director of the Commercial and Marketing Department is responsible for the implementation of the Utility Demand-side Management and Revenue Protection Program in coordination with the Director Central Distribution(Component 3);

iv. The Director of ONEE-EB's Financing Department is responsible for the implementation of the Technical Assistance under Component 4.

B. Results Monitoring and Evaluation

52. Annex 1 provides a full description of the project's Results framework and monitoring.

53. The Director of ONEE's Electricity Branch (EB) Financing Division ONEE's and the project management unit (PMU) will be responsible for compiling the relevant data for each indicator and communicated it to the Bank prior to each supervision mission.

54. The outputs will be monitored at least twice a year during Bank's supervision missions based on the implementation schedule proposed by ONEE and agreed by the Bank.

C. Sustainability

55. The difficult financial situation of ONEE could undermine the achievement and sustainability of the PDO. However, the recent signature of the Contract-Program 2014-2017 between ONEE and the State is expected to restore the company's financial health by 2017 (see Annex 5) through a combination of measures, including progressive tariff increases and improved network efficiencies. The successful implementation of the Contract-Program will therefore ensure the project's sustainability.

56. The Operations and Maintenance (O&M) of the three solar PV plants (Component 1) represents the main concern for the sustainability of the PDO due to ONEE's lack of experience in this area. However, the solar PV plants' O&M risk will be addressed by contracting the service to an experienced private company. ONEE will follow the World Bank Group's procurement guidelines for the selection process of a consortium to develop the solar PV plants. The World Bank Group will therefore monitor closely the key milestones of the Engineering, Procurement, Construction (EPC) and Operations & Maintenance (O&M) contract.

V. KEY RISKS

Overall Risk Rating and Explanation of Key Risks

57. **The overall risk rating is Moderate. There are four main risks associated with this operation.** With regards to macroeconomic risks (moderate), for instance related to unfinished implementation of key fiscal and structural reforms, unfavorable external conditions in main trading partners; and geopolitical risks related the Middle East, that could have an adverse effect on Morocco's current account and fiscal deficit, it is understood that Morocco needs to continue with its ongoing structural reforms to improve the competitiveness of the economy, including a more flexible exchange regime, in addition to the subsidy, pension and other fiscal reforms aimed at maintaining Morocco's macroeconomic sustainability.

58. With regard to the Technical Design of the Project (Moderate**),** the technical design of the project is robust and presents a moderate risk to have an impact on the project's PDO as the technologies and practices are successfully deployed in a number of other countries. The Procurement risk is high because of the unfamiliarity of ONEE's heads of each project sub-components: solar PV program, RE Dispatch and Smart Meters with the Bank's procurement policies. However this is mitigated by the fact that ONEE's procurement department is familiar with Bank's procurement policies, and the project contains a number of capacity building activities. Finally, any delay in improving ONEE's performance, such as the reduction of network losses in the framework of the Program-Contract with the State 2014-2017 may negatively impact the achievement of the PDO.

59. **Overall Risk Rating Explanation**: The moderate overall risk recognizes the Governance, Macroeconomic, Sector Strategies, Technical Design and Fiduciary risks that could have an impact on the project's PDO. The overall risk includes the potential procurement risks related to limited experience on large solar PV contracts.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

60. The economic and financial analysis are structured in two parts: first, an analysis for the first phase of ONEE's solar PV program (subcomponent 1.1), which is co-financed by IBRD and the Clean Technology Fund (CTF), and second, an analysis for the overall Clean and Efficient Energy Project, which includes a cost-benefit analysis of the first phase of ONEE's solar PV program (subcomponent 1.1) together with the Smart-Meters program (subcomponent 3.1).

61. The primary quantifiable **economic benefits** of the project include: (i) reduction of GHG emissions through savings in fossil fuels and reduced transmission losses, (ii) sales of solar PV generated energy, (iii) reduced transmission losses, (iv) improved power systems reliability and power quality, (v) reduced fossil fuel consumption through clean energy generation and peak shaving, and (vi) reduced non-technical losses.

62. The primary quantifiable **economic costs** are the total investment costs and the O&M costs.

A.1 Economic analysis

1.1 First phase of ONEE's Solar PV program

63. The ERR of the PV project is 9.80 percent which shows that the project is economically viable with an ERR well above the assumed economic opportunity cost of capital at 6 percent. The resulting levelized (economic) cost of energy (LCOE) is 7.28 USc/kWh, i.e. 1.24 cents/kWh below the gas-CCGT levelized cost of electricity at the assumed flat gas price of US$11/mm BTU26. Table 1 below presents a breakdown of the results.

[26] Natural gas used for power generation in Morocco is exclusively purchased from Algeria at the same price as for Algerian gas exports to Spain. The reference price was obtained from ONEE and is in line with European gas prices and IEA forecasts.

Table 1 - Economic Analysis for 75MW PV Project (in US$, NPV at 6%)

Costs & Benefits	Present Value in $USm (6% discount rate)
Benefits	
Avoided CCGT costs (Fuel, O&M …)	111,6
Avoided GHG Emissions	23,8
Avoided T&D Losses	11,1
Avoided Outages	11,4
Total Benefits	158,0
Costs	
Total Costs (Capex & Opex)	128,7
Project NPV	29,3
ERR	9,80%

Sensitivity analysis

64. Stress test of the PV component shows that its economic viability is also guaranteed under assumptions of 20 percent increase in capital costs or 20 percent decrease in gas prices. The recent trend of decreasing capital cost of PV is likely to continue and the actual costs arising from an EPC tender scheduled during the second semester of 2015 are likely to be in line with present projected values (baseline cost). Please see Table 3 in Annex 5 for a summary of stress tests for the PV component.

65. The detailed switching values analysis can be summarized as follows:

i. *CAPEX*: to drop below the 6 percent hurdle ERR rate, CAPEX would need to be above 128 percent of the baseline price, i.e. 1980 US$/kW. Given the recent trend of decreasing capital costs of utility-scale PV projects, the risk of exceeding this value is considered to be low.

ii. Gas price: the gas price would have to drop below US$7.7/mmBTU for the projects ERR to be below the 6 percent hurdle rate. This switching value is well below the price paid by ONEE for gas purchased from Algeria for the Ain Beni Mathar CCGT plant under a gas purchase agreement which includes a price floor of US$10/mmBTU.

1.2 Clean and Efficient Energy Project (including Components 1 and 3)

66. The economic analysis of the overall Clean and Efficient Energy project focused on the contribution of Components 1 (PV project) and 3 (Smart meters) because they account for more than 90 percent of the project total budget and since fairly accurate estimates for expected economic benefits for both components can be provided.

67. The Overall Project Economic Analysis (Component 1 and 3) results in an ERR of 23.90 percent which shows that the project is economically viable.

68. The robust ERR of combined investment in both components 1 and 3 is due to the strong return of the Smart meters component, which drives its benefits from financial economies resulted from a reduced reliance on expensive Heavy Fuel Oil (HFO).

A.2 Financial analysis

69. The financial analysis compares the financial costs of the project components with the financial benefits of selling the produced energy at the average power consumer price or, in the case of time-of-use/smart meters, the financial benefits from fuel displacement and additional revenues as a result of a reduction in non-technical losses. The calculations are in real US$. The CO_2 price has been assumed at US$0.19/ton, which is the current trading value of certified emission reductions.[27]

2.1 First phase of ONEE's Solar PV program

70. The PV Project Financial Analysis results in a FIRR of 8.09 percent. Although the estimated financial return indicates that ONEE has an incentive to carry out the PV subproject, the analysis also shows that the project is sensitive to changes in cost, solar resource and costs of capital.

71. An analysis has been undertaken to estimate the impact of CTF financing and to justify the need for softer CTF concessional financing. For this purpose, the cash-flows of the project have been assessed under three scenarios: (i) 100 percent commercial financing, (ii) 100 percent IBRD financing, and (iii) CTF and IBRD financing. As shown in Table 2 below, the plant levelized cost of electricity (LCOE) improves substantially under the IBRD and CTF financing scenarios.

Table 2 – Impact of Financing on LCOE

Financing	LCOE cUS$/kWh
100% Domestic Financing	8,69
100% IBRD	7,42
IBRD + CTF 20y	7
IBRD + CTF 40y	6,79

2.2 Clean and Efficient Energy Project (including Components 1 and 3)

72. Table 3 below shows the overall Project FIRR and NPV under different financing assumptions:

[27] Future CER trades at 0.14 Euro or US$0.19: https://www.theice.com/emissions.jhtml

Table 3 – Overall Project Financial Analysis

Costs & Benefits	Present Value in $USm (6% discount rate)
Benefits	
PV Benefits (Energy Sales)	159,8
Time of Use and AMI Benefits (Fuel sav	175,3
Total Benefits	335,1
Costs	
PV Costs (Capex & Opex)	139
Time of Use and AMI Costs	113,1
Total Costs (Capex & Opex)	252,1
Project NPV	83,0
Project FIRR	14,12%
PV Project FIRR	8,09%
Smart Meters Project FIRR	42,51%

B. Technical

73. The implementation of the proposed project does not involve complex nor challenging technologies. Construction of solar PV plants, extension of evacuation lines, and installation of time-of-use/smart meters or implementing a renewable energy dispatch center are standard. ONEE has developed a number of more complex projects including large power facilities, extended transmission and distribution infrastructure, and implemented a state of the art control center of the whole power system.

74. The solar technology that is expected to be used in the proposed project, crystalline-silicone PV, is the most commonly used in large-scale solar farms worldwide. This technology has also been used in a pilot grid-connected solar power plant under operation (800 kWp) in Morocco, proving that it is well suited for the area. The selection of this mature technology would allow ONEE to significantly raise the interest from numerous bidders and contractors worldwide with attractive bidding prices under keen competitions.

75. Detail designs, civil works, procurement of equipment, and installation of the solar PV plants will be done as a single package by an EPC Contractor selected through an international competitive bidding process. The technical risks on the project construction, including delay of construction, would also be minimized by selecting a competent contractor.

76. Moreover, ONEE has selected a technical advisor to assist in drafting project documents, including technical functional specifications and carry the required technical due diligence and preliminary technical studies that would allow the selected private partner to construct, operate and maintain the proposed solar power generation facility in an efficient, economic, reliable, safe and environmentally-sound manner.

C. Financial Management

77. **The financial management system of the ONEE, and specifically the Finance Division in the financial department,** was appraised to determine if it complies with the requirements of the Bank in respect to OP/BP10.00. The financial management evaluation of the ONEE covered the areas of accounting and financial management, as well as the reporting and auditing process of the project. The financial management system, including necessary arrangements to respond to the needs of the financial monitoring of the project, satisfies the requirements of the Bank.

78. **The financial management system presents a low fiduciary risk.** The project will be carried out while being based on the procedures and the accounting and financial organization of the ONEE, which has a financial management system considered to be satisfactory. ONEE is a state-owned commercial and industrial enterprise with financial autonomy (*Etablissement public à caractère industriel et commercial*). Accordingly, it operates as a private sector entity and the systems in place are based on the principles and procedures of the commercial law of the Kingdom of Morocco. ONEE has a Managing Director and a Board chaired by the Chief of Government and composed of representatives of various ministries. ONEE issues year-end financial statements that are audited by external independent auditors with the required qualifications and experience. The accounting is centralized at Headquarters. ONEE's Financial Department is well structured, and it has an adequate staff with proven experience in donor-financed projects. ONEE already has significant experience managing Bank-financed projects.

79. **The financial management will be ensured by the Finance Division within the financial department of the ONEE,** in coordination with the concerned technical departments. Interim unaudited financial report, which will cover all the activities and sources of funds of the project, will be prepared biannually by the ONEE and transmitted to the World Bank Group not later than forty five (45) days after the end of each calendar semester, covering the semester, in form and substance satisfactory to the World Bank Group.

80. **The ONEE shall have its Financial Statements for the project audited** in accordance with the provisions of Section 2.07 (b) of the Standard Conditions.

D. Procurement

81. **The Financing Department of ONEE's Electricity Branch (EB) has experience in implementing World Bank Group financed projects (ONE Support project - P104265) and with the successful implementation of a project operational manual acceptable to the Bank.** The capacity assessment was carried out during project preparation. It showed that except the Financing Department of ONEE-EB, all the departments/units mentioned above and responsible for the implementation of specific components, have limited experience in implementing Bank-financed projects. However, under the coordination of the Financing Department of ONEE-EB, each of these departments/units mentioned will benefit from the support of ONEE's Procurement department and other functional units such as environment and social safeguards, financial transactions and disbursement. ONEE's Procurement department has good experience in Bank funded project and is familiar with complex procurement processed using Bank procedures (ONE Support project - P104265). ONEE-Electricity Branch has a good organization in place, which

includes: detailed procurement procedures and standard documents to be used, an internal audit unit, and a procurement department with dedicated staff, generally experienced with Bank procedures.

82. **Given the complex procurement package to be financed, e.g. EPC, dispatching desk and the limited experience of the departments and units responsible for the implementation of specific components, the overall risk for procurement is substantial**. To help mitigate the risk, the following set of actions is recommended:

i. Standard bidding documents (SBD) for NCB for Works, Goods and Non-consulting services will be prepared and submitted to the Bank for approval. They will include all the adjustment clauses for NCB in Morocco as well as the Audit Clause and the Fraud and Corruption clauses (AFCC). Any future change after approval of these SDB will be submitted to the Bank for approval, in compliance with the loan agreement;

ii. Adoption of an Operational Manual. This manual will clearly describe procurement arrangements including procedures, responsibility sharing and document flow among the parties involved in Project implementation. The manual should comprise an annex with all standard bidding documents that will be used under the project. This action needs to be completed before the effectiveness of the project.

iii. Preparation of the initial procurement plan (dated March 20, 2015) for the first eighteen (18) month has been completed. The Procurement plan will be updated as often as necessary and minimum once a year and submitted to the Bank for no objection;

iv. Training in Bank procurement procedures will be organized for all staff involved in project implementation at least once a year, over the duration of the project. In particular, a well-tailored training will be conducted before project effectiveness or at the beginning of the activities.

v. Regular ex-post reviews will be conducted (once a year). It will allow identifying the main issues and providing the necessary recommendations to help improve the quality of procurement and overall the project implementation.

83. These measures are not limitative and will be complemented as needed, during project implementation, based on the performance and result achieved.

E. Social (including Safeguards)

84. **OP 4.12 is triggered because of land acquisition for three solar PV plants, power lines and access roads.** No physical displacement and no resettlement of persons is expected under the project. Upon identification and approval of the sites of the solar Plants, three site-specific RAPs consistent with OP.4.12 policy requirements and in line with the Borrower's legal and regulatory framework were prepared, approved on February 17, 2015 and published on ONEE website and Infoshop on February 18, 2015. A Resettlement Policy Framework (RPF) consistent with OP.4.12 policy requirements and with the Borrower's legal and regulatory framework, for the power lines and the access roads that have not been yet identified, was

prepared, approved on February 17, 2015, and published on ONEE website and Infoshop on February 18, 2015. Before the end of April 2015, compensation funds will be disbursed to the Rural Affairs Division of the Ministry of the Interior *(Division des Affaires Rurales - DAR),* prior to the taking of the land and the launch of civil works. The Operational Manual that will be established before the effectiveness of the Project, will describe the procedures and the responsibilities regarding the follow up of land acquisition and compensation. The ONEE shall be responsible to implement, follow up and monitor the RAPs and will report on land acquisition and compensation process and activities, in the reports submitted to the World Bank Group at the end of each semester.

85. **In March 2014, the World Bank Group undertook a "Social and Gender study" to assess the potential social impact of the Project on local populations, particularly women** and make recommendations to the borrower, ONEE, to take into account the needs and expectations of local populations during project implementation to maximize its positive impact. The study included twenty interviews to local authorities, community representatives, local associations and ten focus groups with local women (10 women on average per focus group) from the three sites pre-identified by ONEE: Erfoud, Missour and Zagora.

86. The **main conclusions** of the study were the following:

- **Social impacts due to land sale**: Potential beneficiary communities, including women, have clearly expressed their consent to sell the land for the project given their high poverty rates (poverty rates of these municipalities vary from 11, 3 percent - Erfoud, 12.4 percent - Ouizeght-Missouri, more than 30 percent - Tamegroute Zagora)and expected compensation for the land sale that could assist the community in:

  (i) Improving their living conditions through improved housing, access to basic infrastructure (roads, public lighting, drinking water, sanitation), the creation of high-schools and kindergartens;

  (ii) Improving their standards of living, through the strengthening or creation of income-generating activities for women and youth, and agricultural cooperatives;

  (iii) Strengthening local associations (women's associations, local development associations and sustainable development, cultural and sports associations) through technical and financial support.

- **Social impacts due to improved electricity supply**:

  (i) *Improving access to health by*: avoiding postponement of surgical interventions, relocations of patients to far-away hospitals, better delivery conditions during night in the rural health facilities.

  (ii) *Improving household's quality of life, in particular women:* Women will benefit mostly from the project because they are the main electricity consumers in the household and suffer from inadequate refrigeration and regular appliance's breakdowns.

(iii) *Improving income-generation activities*: better refrigeration of dates and access to electric water pumps for irrigation.

(iv) *Increased safety* through: extension of municipal street lighting particularly in the suburban and rural areas districts (benefit sharing).

F. Environment (including Safeguards)

87. The project is expected to avoid an equivalent of 1.95 million tons of CO_2 emission during 25 years, or the equivalent to removing the annual emissions from 16,000 cars. In terms of impact, solar PV power generation does not produce any pollutant. The panels of some solar PV sub-technologies, however, contain chemicals such as cadmium which might require particular attention in their replacement and discarding process in case of damage. The main concern is expected to be on workers safety issues. Such impacts will be of small scale and site-specific, and can be readily avoided/mitigated with good construction specifications and operational management rules.

88. The type of solar PV technology (Crystalline silicon or Thin-Film) is not decided yet. ONEE will take a decision based on the recommendations of the on-going feasibility study. Three site-specific Environmental and Social Impact Assessments (ESIA) were prepared for each of the three sites in January, 2015 and were disclosed in-country and on Infoshop on February 18, 2015. Each ESIA provides details on the status of the baseline environment, a description of the potential impacts of project activities and a detailed Environmental and Social Management Plan (ESMP). The Head of Strategic Project 'Noor-Tafilalt" will be in charge of monitoring the implementation of the Environmental Management Plan in coordination with relevant departments. An Environmental and Social Management Framework (ESMF) for the associated facilities, i.e. evacuation lines and access roads, was disclosed in-country and on Infoshop on February 18, 2015. The route of the associated facilities will be confirmed by the on-going feasibility study.

G. World Bank Group Grievance Redress Mechanism

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

Annex 1: Results Framework and Monitoring

Kingdom of Morocco
Clean and Efficient Energy Project (P143689)
Results Framework

Project Development Objectives

PDO Statement

To improve the capacity of ONEE to supply and dispatch clean electricity and to meet the demand of targeted customers more efficiently in the project area.

These results are at Project Level

Project Development Objective Indicators

Indicator Name	Baseline	Cumulative Target Values					
		YR1	YR2	YR3	YR4	YR5	End Target
Generation Capacity of Renewable Energy (other than hydropower) constructed (Megawatt) - (Core)	0.00	0.00	0.00	25.00	75.00	75.00	75.00
Generation Capacity of Renewable Energy constructed-Solar (Megawatt - Sub-Type: Breakdown) - (Core)	0.00	0.00	0.00	25.00	75.00	75.00	75.00
Renewable Energy dispatch system installed and operational (Yes/No)	No	No	No	Yes	Yes	Yes	Yes
Direct project beneficiaries (Number) - (Core)	0.00	46,000	292,860	318,144	412,056	412,056	412,056
Female beneficiaries (Percentage - Sub-Type: Supplemental) - (Core)	0.00	0.00	50.00	50.00	50.00	50.00	50.00
Green-House Gas (GHG) emissions avoided (Metric ton)	0.00	0.00	0.00	26,006	78,018	78,018	78,018

Intermediate Results Indicators

Indicator Name	Baseline	Cumulative Target Values					
		YR1	YR2	YR3	YR4	YR5	End Target
Number of Solar PV Plants commissioned (Number)	0.00	0.00	0.00	1	3	3	3
Lessons on operating grids with large RE shares or other	No	No	No	Yes	Yes	Yes	Yes

topics of relevance for ONEE RE development documented and applied (following training/study tours) (Yes/No)							
Grievances registered related to delivery of project benefits addressed (%) (Percentage) - (Core)	0.00	70	75	80	90	100	100
Grievances related to delivery of project benefits that are addressed (number) (Number - Sub-Type: Supplemental) - (Core)	0	0	0	0	0	0	100.00
Completed awareness campaign on Smart Meters (Yes/No)	No	No	Yes	Yes	Yes	Yes	Yes
Number of clients equipped with Time-of-Use Meters (Number)	0.00	10,000	63,600	63,600	63,600	63,600	63,600
Ratio of readjusted original bills for customers with Smart Meters (Percentage)	1.33	1.33	1.33	1.25	0.75	0.75	0.25
Feedback from customers with smart meters collected (Yes/No)	No	No	No	Yes	Yes	Yes	Yes
Volume of direct finance leveraged through CTF funding (Amount(USD))	0.00	129,000,000	129,000,000	129,000,000	129,000,000	129,000,000	129,000,000
Reduction of ONEE's total electricity losses (Percentage)	0.00	11.50	11.50	11.25	11.00	10.75	10.75
Benchmark study on private sector participation in Solar PV projects completed. (Yes/No)	No	No	No	Yes	Yes	Yes	Yes
Study on additional energy efficiency and demand-side management programs completed. (Yes/No)	No	No	No	Yes	Yes	Yes	Yes

Indicator Description

Project Development Objective Indicators

Indicator Name	Description (indicator definition etc.)	Frequency	Data Source / Methodology	Responsibility for Data Collection
Generation Capacity of Renewable Energy (other than hydropower) constructed	This measures the capacity of renewable energy (other than hydropower) constructed under the project. The TTL should specify the type of renewable power (i) wind; (ii) geothermal; (iv) solar; or (iv) other. For hydropower refer to code Hydropower (LH). The baseline value for this indicator will be zero.	Bi-Annually	Implementation agency report	ONEE
Generation Capacity of Renewable Energy constructed-Solar	This measures capacity of solar energy constructed under the project.	Same as Above	Same as Above	Same as Above
Renewable Energy dispatch system installed and operational	Self-explanatory	Bi-Annually	ONEE Reports	ONEE
Direct project beneficiaries	Direct beneficiaries are people or groups who directly derive benefits from an intervention (i.e., children who benefit from an immunization program; families that have a new piped water connection). Please note that this indicator requires supplemental information. Supplemental Value: Female beneficiaries (percentage). Based on the assessment and definition of direct project beneficiaries, specify what proportion of the direct project beneficiaries are female. This indicator is calculated as a percentage.	Bi-annually	Implementation agency report	ONEE
Female beneficiaries	Based on the assessment and definition of direct project beneficiaries, specify what percentage of the beneficiaries are female.	Bi-Annually	Implementing Agency Report	ONEE
Green-House Gas (GHG) emissions avoided	The Bank guidelines for estimation of GHG emissions are used. Avoided GHG emissions = emission factor * (generated energy from PV plants + avoided transmission losses), and emission factor = 75% * Operating Margin + 25% * Build Margin. (Operating Margin = 662 g/kWh, and Build Margin = 354 g/kWh)	At the end of project implementation	Implementing Agency Report	ONEE

Intermediate Results Indicators

Indicator Name	Description (indicator definition etc.)	Frequency	Data Source / Methodology	Responsibility for Data Collection

Number of Solar PV Plants commissioned	Self-explanatory	Bi-Annually	Implementing Agency Report	ONEE
Lessons on operating grids with large RE shares or other topics of relevance for ONEE RE development documented and applied (following training/study tours)	Self-explanatory	Bi-Annually	Implementing Agency Report	ONEE
Grievances registered related to delivery of project benefits addressed (percent)	This indicator measures the transparency and accountability mechanisms established by the project so the target beneficiaries have trust in the process and are willing to participate, and feel that their grievances are attended to promptly. It is understood that local sensitivities and tensions will not allow grievance or redress mechanisms to be established in all projects.	Bi-Annually	Implementing Agency Report (Percentage of grievances solved over grievances registered.)	ONEE
Grievances related to delivery of project benefits that are addressed (number)	Self-explanatory	Bi-Annually	Implementing Agency Report (Percentage of grievances solved over grievances registered.)	ONEE
Completed awareness campaign on smart meters	Self-explanatory	Bi-Annually	Implementing Agency Report	ONEE
Number of clients equipped with Time-of-use Meters	Self-explanatory	Bi-Annually	Implementing Agency Report	ONEE
Ratio of readjusted original bills for customers with Smart Meters	The indicator will monitor the number of claims from customers as a result of billing errors.	Bi-Annually	Implementing Agency Report	ONEE
Feedback from customers with smart meters collected	Self-explanatory	Bi-Annually	Implementing Agency Report	ONEE
Volume of direct finance leveraged through CTF funding	Self-explanatory	Bi-Annually	Implementing Agency Report	ONEE
Reduction of ONEE's total electricity losses	This indicator will only account for total losses in the portion of the network operated by ONEE.	Bi-Annually	Implementing Agency Report	ONEE

Annex 2: Detailed Project Description

Kingdom of Morocco: Clean and Efficient Energy Project

Component 1 – Support to ONEE's Solar PV Program US$124.67 (US$94.45 million from IBRD, US$23.95 million from CTF and US$6.27 million from ONEE)

1. In December 2013, ONEE adopted a three-phase program to develop 400 MW of solar photovoltaic (PV) technology by 2020. This component will help ONEE in developing the first phase of this strategy while ensuring an adequate phasing to ensure a successful penetration of private sector financing in future projects. IBRD and CTF financing will pave the way for development of solar PV in the country (no similar plants are currently in operation). The first phase will provide a valuable opportunity to draw the attention of major players in the PV industry to Morocco, and as a result, obtain valuable lessons for the next two phases such as: (i) cost per installed MWp in Morocco, (ii) local risk assessment by the industry (country, legal, institutional, etc.), (iii) share of local procurement, and (iv) job creation potential.

2. While ONEE and the Government are strongly committed to enhance the role of private sector in the country's power generation strategy[28], ONEE intends to develop the first phase as a public project[29] because of its need to learn about the technology and to understand its interaction and impact on the grid and the whole power system. ONEE was keen in adding subcomponent 1.2, which will provide ONEE with information about forms of private sector participation, design of power purchase agreements including proper risk distribution and best practices for bidding projects.

3. **Subcomponent 1.1: First phase of ONBEE's Solar PV Program (the "Noor-Tafilalt" project) in the Project Area (US$94 million from IBRD, US$23.95 million from CTF and US$6.27 million from ONEE):** This subcomponent intends to implement the first phase - 75 MW of installed capacity - of ONEE's solar PV program in three pre-identified sites near the towns of Erfoud, Missour and Zagora located in Morocco's south eastern region, i.e. 25 MW of installed capacity in each site.

a) EPC and O&M: For the 1st phase of its solar PV program, ONEE has identified three sites near the towns of Erfoud, Zagoura and Missour to develop a 25 MW solar PV plant in each of them. ONEE intends to launch an international competitive tender for an EPC and a 5-year O&M contract to design, construct, operate and maintain the three plants. IBRD and CTF will finance the EPC of these solar PV plants, while ONEE will finance the O&M. For the 2nd phase, ONEE has approached EIB and KfW to secure the financing for installing 200 MW in eight sites. The 3rd phase is still at a conceptual stage and include the development of 125 MW in five sites.

[28] While ONEE plans to evaluate investment decisions on a case-by-case basis, the latest figures on power supply and generation expansion planning show that private producers will assume an even larger role. By 2020, the private sector is expected to supply 70percent (43percent in 2012) of power demand and operate more than 50percent (28percent in 2012) of installed capacity with half of private production from renewables.

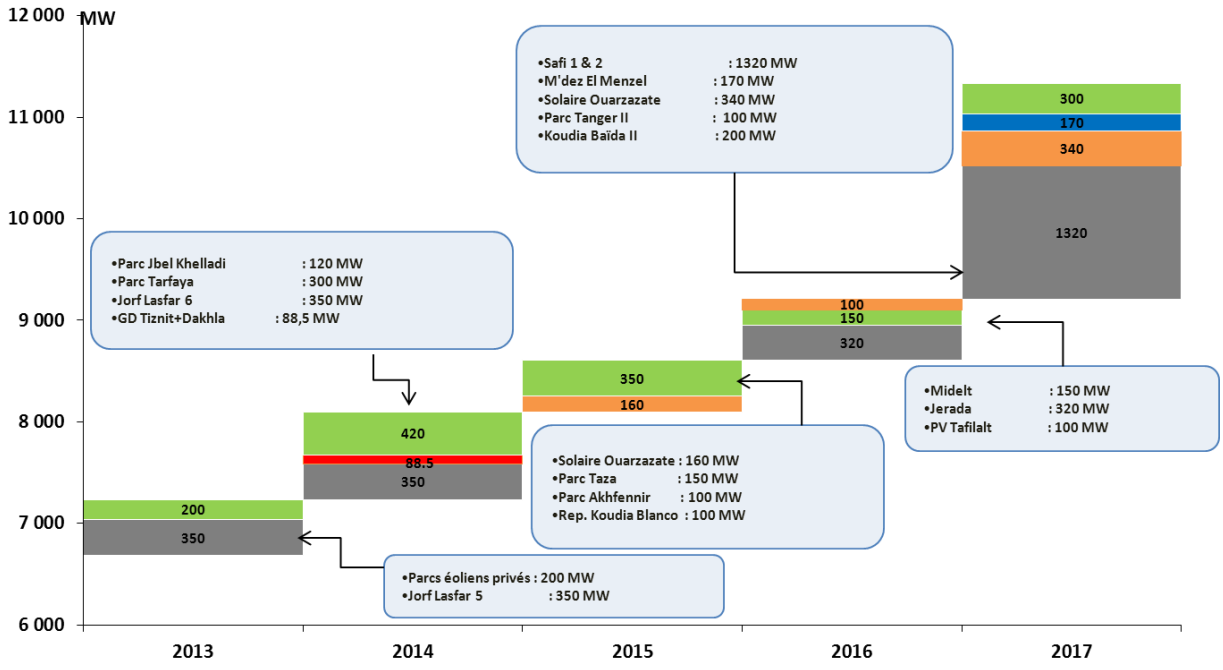
[29] ONEE is considering outsourcing the O&M to a private sector operator.

b) Evacuation lines: The IBRD loan will finance the construction of transmission lines to evacuate power from the three solar PV plants to the national power grid. The Erfoud solar PV plant will be connected either directly to the existing nearest 60 kV line or to the nearest 60/22 kV substation located at 9km from the site. The Missour solar PV plant will be connected either directly to the existing nearest 60 kV line (8km) or the nearest 60/22 KV substation (26 km) and the Zagora solar PV plant will be connected either to the nearest existing 60kV line (5km) or to the nearest existing 60/22 KV substation (14 km). The transmission lines are part of the project's associated facilities.

c) Access roads: ONEE will finance the construction of access roads to the three solar PV plants. The three sites are located near roads or existing tracks. The precise route of the access roads will be determined by an on-going feasibility study. The access roads are part of the project's associated facilities.

4. As shown in Figure 2 below, the solar PV plants are part of ONEE's capacity expansion plan. These three plants will integrate all communications and control devices required for its integration in the Renewable Energy Dispatch Center also financed by the Project under Component 2. The proposed solar PV project will be the first of its kind in the MENA region and will pave the way for the penetration of solar PV technology in the country.

Figure 2 – ONEE's capacity expansion plan



Source: ONEE, 2014

5. This subcomponent aims at exploiting the optimal untapped solar resources of the country and contributing to the country's renewable energy targets to increase energy security. Additional benefits of the proposed investment include (i) the improvement of the quality of

electrical energy supplied in the areas around the three pre-identified sites and (ii) the reduction of transport and distribution losses in the project area.

6. Local communities around the three pre-identified sites near the towns of Erfoud, Missour and Zagora are affected by frequent voltage drops due to their distance with the generation plants located in the north and western shores of Morocco. The proposed project will provide a renewable energy source closer to these remote loads, not only for providing electricity, but also for enhancing their voltage and hence improving the quality of supply. Also, solar PV plants are nowadays able to control permanent and transitory events due to the advanced power electronics that they include in their configuration, which contribute to improve the voltage. The PV plants have the ability to increase the voltage to adequate levels. ONEE will ensure that voltage levels are within an acceptable range during the operation of the PV power plants. The impacts of this scheme will be very positive for the inhabitants near the pre-identified sites, which will be expected to experience less burn-out in household appliances and consumer electronic equipment.

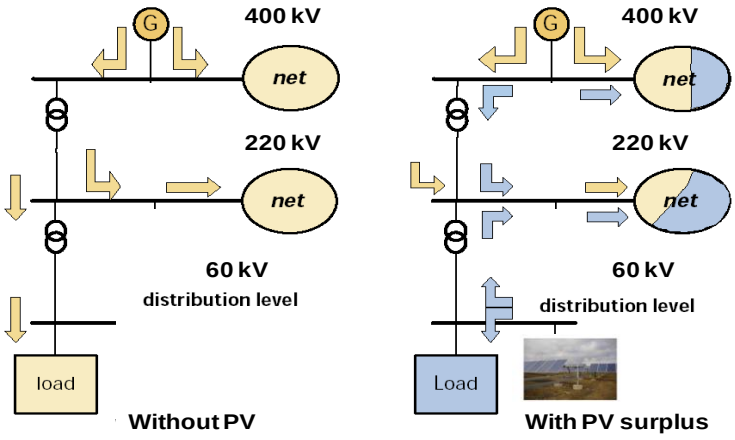
Table 4 – Voltage levels of the 60 kV System without solar PV in three pre-identified sites

	Without solar PV
Erfoud	56.5 kV
Missour	56.7 kV
Zagora	52.7 kV

Source: ONEE, 2013.

7. **Distributed generation with solar PV plants will also have additional benefits in avoiding 12GWh per year of electrical losses on the transmission lines**. Electrical losses are reduced because the generation is closer to the load and the current has to move smaller distances along the lines. The changes in the load flow introduced by the proposed distributed generation concept in Morocco's electrical system are shown in the Figure 3 below.

Figure 3 – Morocco's transmission network (60, 220 and 400 kV) with and without solar PV project



8. **Subcomponent 1.2: Enabling environment for private participation in distributed PV generation** (**US$450,000 from IBRD**)**.** This sub-component will finance a study, capacity building and study tours internationally for ONEE staff related to solar PV development. This sub-component will be composed of:

a) A benchmark study to assess the enabling environment for private sector participation in solar PV projects. The study will include international experiences on bidding processes, contractual structures, and a market sounding analysis to test private sector interest for investing in grid-connected solar PV in Morocco. Based on experience, best practices, and an assessment of conditions in Morocco, this component will produce recommendations on regulatory and contractual instruments for enabling efficient private sector participation in the PV market. With the establishment of an enabling environment and as PV becomes even more competitive, it is expected that the private sector will gradually help complement investment in PV generation.

b) Strengthening the technical capacities of selected ONEE staff regarding solar PV development and the setting up of partnerships with private sector in such area, through the provision of technical advisory services, training, and carrying out of international study tours.

Component 2 – Planning and dispatching of Renewable energies (US$5.2 million from IBRD)

9. The national utility ONEE has a modern dispatch center with SIEMENS technology[30] in Casablanca to fulfill its role as a transmission system operator (TSO). The National Dispatch controls all generation plants connected to ONEE's High Voltage nodes and all exchanges with the Iberian system and with Algeria.

10. ONEE programs the production of all power plants for the following day according to the forecasted power demand. For this programming, ONEE also takes into account the hourly forecast of the wind power production of the existing wind plants, a total of around 500 MW, connected in different nodes of the electrical system. The National Dispatch control room is operated 24/7 with three technicians on every shift, who monitor the normal operation of the electrical system. In case of emergency or in deviations of certain variables of the electrical system, mainly node voltages, the control room sends orders to generation plants and large electricity consumers such as steel/iron industries and the national Moroccan phosphates company, OCP. The connection to the strong Iberian system makes frequency very stable and primary regulation of Moroccan power plants helps to control its short-time variations.

11. However, the existing National Dispatch center, similarly to other installations in the world, can only control few large installations connected to HV transmission lines through strict protocols. The National Dispatch center is therefore not prepared for a more flexible grid operation with smaller installations such as renewable energy power plants with different technical and operational characteristics to conventional power plants.

[30] SIEMENS has been the supplier of the SCADA (Supervisory Control and Data Acquisition) system installed in the National Dispatch located in Casablanca.

12. **Sub-component 2.1: Renewable Energy dispatch center in the Project Area (US$5 million from IBRD):** This sub-component will finance setting up a renewable energy dispatch center consisting of software and hardware, co-located with ONEE's existing national load dispatch center in Casablanca, to ensure optimal power dispatch and protection of the national power grid. ONEE has also requested World Bank Group World Bank Group and CTF support to finance a reputed consultant to assist ONEE in drafting the technical specifications for the RE Dispatch center. On February 6, 2014, the Clean Technology Fund Trust Fund Committee approved a US$1 million project preparation grant for the Clean and Efficient Energy Project. ONEE and the World Bank Group are finalizing the selection process of the consultant.

13. ONEE plans to request existing and future renewable energy installations to provide the forecasted generation for the following day in order to integrate it in the general dispatching models[31]. The extensive use of forecasting tools in wind and solar installations has been key in optimizing the use of balancing power and spinning reserve of conventional power plants worldwide.

14. The large amount of renewable energies planned to be installed in Morocco by 2020[32] represent a significant challenge for the future sound operation of the Moroccan electrical system. Despite the technical benefits of the connection with the European system through Spain[33] and the advanced technical features of modern PV installations and wind turbine generators, a dedicated Renewable Energy dispatch center will be instrumental for sustaining Morocco's green future.

15. ONEE's renewable energy dispatch center would include the following features:

i) Forecasting of renewable energy generation on day-ahead, hour-ahead, week-ahead, month-ahead basis.

ii) Real time tracking of generation from Renewable energy sources.

iii) Geo-spatial visualization of Renewable energy generation.

iv) Close coordination with the National load dispatch center for Renewable energy generation and control to smooth grid operation.

v) Single source information repository and coordination point for Renewable energy penetration.

16. While there is no study available on the impact of the Renewable Energy dispatch center in Morocco, some regional or local integration cost studies[34] have found that the costs of integrating renewables are lower in areas with faster, flexible scheduling and dispatch. Integration studies conducted in ISO (Independent System Operator) areas with 5 or 10-minute

[31] In Spain these programs are submitted to the Economic Market Operator (OMIE) while the TSO, Red Eléctrica (REE) has its own prediction tool to combine/compare with these programs.

[32] Morocco plans an almost tenfold increase in installed capacity of wind and solar energies, from around 500 MW to over 4,000 MW by 2020.

[33] The connection through Spain ensures primary load/frequency control to balance electricity supply and demand.

[34] D. Lew, G. Brinkman, E. Ibanez, B.-M. Hodge, J. King "The Western Wind and Solar Integration Study Phase 2", Preprint National Renewable Energy Laboratory, http://www.nrel.gov/docs/fy12osti/56217.pdf , site visited 17 May 2014.

dispatch had integration costs of US$0-US$4/MWh, while areas with hourly scheduling and dispatch had integration costs of about US$8-US$9/MWh or higher. The same studies found that using advanced wind and solar forecasts in the day-ahead unit commitment process would reduce system operating costs by US$10-US$17/MWh of renewable energy, compared to not considering renewables in the unit commitment process.

17. **Subcomponent 2.2: Increasing ONEE's capacity to perform long-term power planning incorporating energy efficiency and technological improvement (US$200,000 from IBRD).** This sub-component will finance the purchase state of the art demand forecasting tools and will provide training and technical assistance to strengthen ONEE's planning department capabilities. The development of the skills required to update the current demand projections and incorporate them adequately in the planning models is key to adequately assess future investments in power plants. This sub-component will complement the on-going activities financed by AFD, which support the purchase of software and training for long-term planning including renewables in the energy mix. As input for the planning tools, long-term electric peak-load forecasting, as well as estimated daily and monthly demand profiles are critical for an effective and efficient planning.

Component 3 – Utility Demand-side Management and Revenue Protection program (US$13.13 million from IBRD)

18. **Subcomponent 3.1: Smart Meters Program in the Project Area (US$12.68 million from IBRD):** This sub-component includes the following:

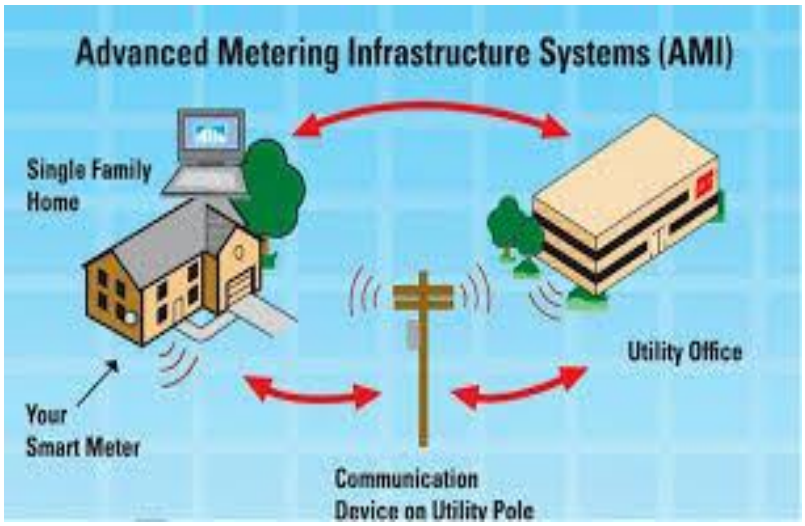
a) Acquisition of 63,600 time-of-use meters for low voltage customers, and of 21,600 smart meters for extra-high, high and medium voltage customers and related metering control equipment, financed by IBRD.

b) Installation of the time-of-use meters and smart meters, financed by ONEE.

19. ONEE has decided to install 63,600 time-of-use meters in order to apply the time-of-use tariff instituted by the Government of Morocco in February 2009. This would be the first undertaking of its kind to replace all old electro-mechanical meters for large Residential customers (with consumption >500 kWh/month) and all large agricultural and industrial customers (LV supplied), with the so called "Smart Meters" for ONEE service area.

20. A Smart Meter is an electronic device or advanced meter that records electrical energy consumption in more detail than a conventional meter, in intervals of an hour or less. The Smart Meter communicates that information at least daily back to the utility, ONEE in this case, for monitoring and billing purposes. The technology of Smart meters is far more advanced than the current meters as it enables two way communication between the meter and a central system at the power company as illustrated in Figure 4 below.

Figure 4– Smart meters systems



21. Time-of-use meters have existed for years, and have been installed to measure commercial and industrial customers' consumption, but "Smart Meters" involve real-time sensors, power outage notification, and power quality monitoring such as voltage drop, voltage surge, harmonic distortion and frequency changes, allowing diagnosis of power quality problems. These additional features are more than simple automated meter reading.

22. In addition to promoting time-of use tariffs with the introduction of this technology, ONEE's objective is to maximize efficiency, start looking into charging the true cost of energy generation and provide reliable and quality supply. Therefore a major novelty of this component is the introduction of advanced metering infrastructure systems (AMI) in order to start the implementation of the first stage of the roadmap for smart grid for power distribution. The component will assist to optimize distribution system configuration by providing valuable data and processed information from demand side. The component will include the infrastructure for load profiling and customer two-way communication that will enable efficient pricing of electricity (adequate time of use tariff structure) and demand response programs to encourage reductions in electricity consumption. These, in turn, should lead to reduction in investments in the distribution system, decrease in operating costs, improve reliability and quality of distribution services, and avoid GHG emissions associated with avoided thermal power generation.

23. Under this subcomponent, the proposed AMI includes the following types of investments: (i) 21,600 Multifunctional electronic meters or smart meters; (ii) Meter data management system (MDMS); and (iii) a Meter Control Center (MCC). These investments will provide data (in real-time or short term near real time) on the state of the distribution system and consumption, to be analyzed and presented in a way that is useful for ONEE to remotely control and respond to events and optimize the operation of the distribution system, as well as to incorporate consumers' response. The adoption of this smart grid technology will contribute to improving ONEE's operating efficiency and optimizing the configuration of the distribution network to reduce overloads (loss reduction); increasing the accuracy of billing, avoiding loss of revenue (revenue protection); enabling the load profiling of electricity consumers to improve

load forecasting, optimize generation dispatch, enhance demand response programs and efficiency signals in tariffs to promote efficient use of electricity.

24. From the consumer perspective, smart metering offers potential benefits to householders. These include: a) an end to estimated bills, which are a major source of complaints for many customers; b) a tool to help customers better manage their energy use and reduce their energy bills and carbon emissions. Electricity pricing peaks at certain predictable times of the day and the season. Billing customers by time-of-day will encourage consumers to adjust their consumption habits to be more responsive to market prices and hopefully these "price signals" could delay the construction of additional generation or at least the purchase of energy from higher priced sources, thereby controlling the steady and rapid increase of electricity prices. An academic study based on existing trials showed that homeowners' electricity consumption on average is reduced by approximately three to five percent.[35]

25. Smart Meters will change the way utilities, in general, carry out system planning studies and load forecasting as these two areas depend heavily on system data that was not available prior to the introduction of Smart Meters. Smart Meters will also contribute significantly in reducing arrears for none payment of electricity bills and non-technical losses as the Smart Meters have the capability of cutting off the power supply in case of non-payment and offer unparalleled consumption details to detect fraudsters. This is a considerable side benefit for many utilities in developing countries.

26. **Subcomponent 3.2: Deepening and identifying additional opportunities for utility-implemented energy efficiency and demand side management programs (US$450,000 from IBRD).** This sub-component will finance a study regarding energy demand, which shall identify options, define priorities, and set forth an action plan for selected energy efficiency and demand side management programs to be implemented by ONEE.

27. These programs could include direct load control program, facilitation of appliance replacement programs, direct load control and voltage control programs at the distribution level among other. This study will help ONEE to support the national goals on energy efficiency, which include reducing energy consumption by 12 percent in 2020.

28. **Component 4 – Technical Assistance (US$600,000 from IBRD):** This component will aim at strengthening the technical capacities of selected ONEE staff through the provision of training and technical advisory services in the following areas: (i) best practices by system operators to manage large shares of renewable energy at the wholesale and distribution level; (ii) new technology trends in control and performance capabilities of renewable energy technologies and interconnection standards; (iii) preparation of standard bidding and contractual documents covering technical, legal and procurement aspects in the field of renewable energy; (iv) best practices in the development, operations and maintenance of solar PV, wind and other renewable energy projects; (v) emerging regulatory practices for private participation in renewable energy project; and (vi) technology trends and best practices in smart meters and smart grids.

[35] McKerracher, C. and Torriti, J. (2013) Energy consumption feedback in perspective: integrating Australian data to meta-analyses on in-home displays. Energy Efficiency, Volume 6 (2). pp 387-405

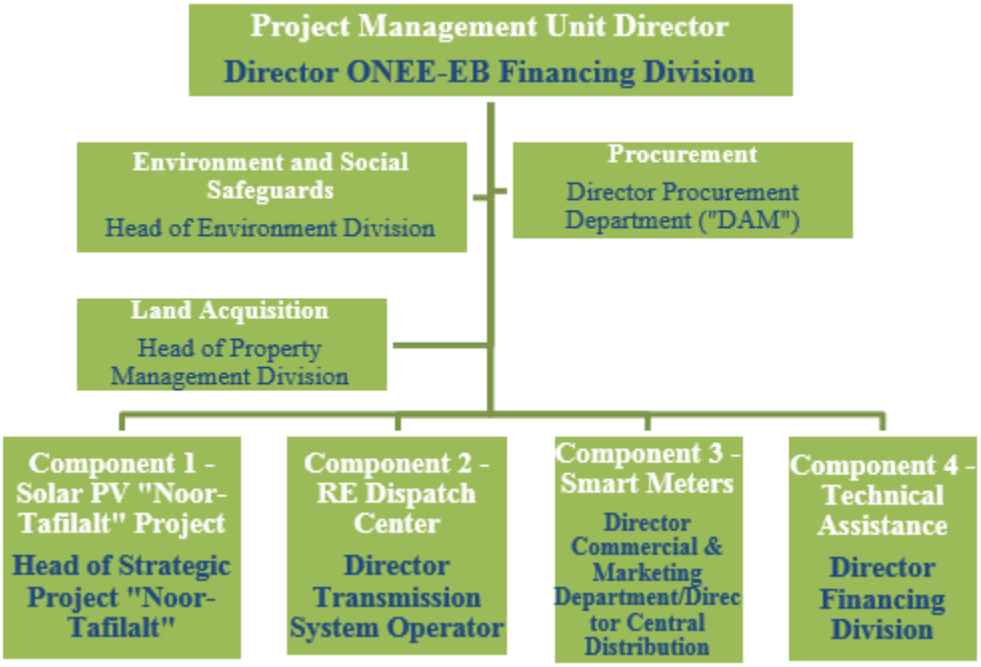
Annex 3: Implementation Arrangements

Kingdom of Morocco: Clean and Efficient Energy Project

Project Institutional and Implementation Arrangements

1. ONEE is the borrower and the executing agency of the project. Attention was given during the evaluation of the project to its technical and implementation capabilities. It has qualified personnel to: (a) prepare and implement the infrastructure to be financed under the proposed project; and (b) prepare, supervise and ensure the quality control of all studies and activities to be carried out under the TA component. The organization chart of ONEE's project management unit is presented in Figure 5 below.

Figure 5 – ONEE's Project Management Unit



2. **Project Management**: The Electricity Branch (EB) Financing Department has overall responsibility for project implementation and collaborates with the responsible manager for each component to achieve the agreed results (*see Figure 5 above*):

- The Head of the Solar PV Strategic Project "Noor-Tafilalt" is responsible for the implementation of ONEE's Solar PV Program and the "Noor-Tafilalt" project (Component 1);
- The Director of the Transmission System Operator (TSO) is responsible for the implementation of the Renewable energy dispatch center (Component 2.1);
- The Planning Director is responsible for the implementation of the technical assistance to increase ONEE's capacity to perform long-term power planning (Component 2.2);

- The Director of the Commercial and Marketing Department is responsible for the implementation of the Utility Demand-side Management and Revenue Protection Program in coordination with the Director Central Distribution (Component 3);
- The Director of ONEE-EB's Financing Department is responsible for the implementation of the Technical Assistance under Component 4.

3. Under the coordination of the Director of ONEE's Electricity Branch (EB) Financing Department, each responsible manager will be supported by different functional directions involved in the project such as:

i) The "*Direction Approvisionement et Marchés*" (DAM) assists each manager in the procurement process related to the projects following World Bank Group guidelines.

ii) The "*Division Environnement*" is in charge of monitoring the implementation of the Environmental Management Plan and the Resettlement Policy Framework, in coordination with relevant entities.

iii) The "*Division Patrimoine*" is in charge of land purchases for the project according to national procedures and World Bank Group guidelines.

iv) The "*Division Financements*" ensures monitoring of the validation process of invoices in SAP. Once invoices are validated, the Division ensures loan disbursements via the client connections system.

Financial Management, Disbursements, and Procurement

Financial Management

General framework

4. The Bank's experience in Morocco and the main conclusions of the 2009 PEFA assessment indicate that the Moroccan public finance system is governed by a solid legal and regulatory framework. It also contains strong reliability and transparency safeguards. The system is based on the principle of strict separation between authorizing officers and accounting officers. Moreover, the system includes (a) prior authorization of expenditures and supervision and (b) internal and external audits.

5. The reform of the public sector financial control was initiated under Law 69-00 of 11 November 2003 modifying Dahir of 14 April 1960, modified in 1962. The reform intended to enhance the management of public institutions.

6. The financial management risk of the Moroccan public finance system is considered **low.**

7. The ONEE operates as an autonomous entity and has a long experience of managing externally funded projects. The on-going ONEE support project provided the Bank with previous experience working with ONEE.

8. An assessment of the financial management system in place at ONEE was carried out to determine if it complies with the Bank minimum requirements for the project management in respect to the OP/BP10.00. ONEE will be responsible for managing the project funds and all related financial transactions. ONEE is an autonomous public state owned agency. Accordingly, it operates as a private sector entity and the systems in place are based on the principles and procedures of the commercial law of the Kingdom of Morocco.

9. Given all the measures to be taken to reduce the level of exposure, to manage and to reduce the risks and weaknesses identified, the risk of residual financial management at this stage is considered **low.**

Financial Management System

10. The ONEEs financial management system is based on principles and procedures defined by the legal framework applicable to the public sector enterprises, more precisely, to the principles applicable to government institutions and public agencies. According to provisions of law 69-00 of November 11, 2003, ONEE is subject to "Performance Control" (*contrôle d'accompagnement)*. In addition, the internal audit function is performed by the audit and organization department, directly attached to the general manager's office. ONEE is also subject to controls by Ministry of Finance General Inspection (IGF) and the Court of Auditors. ONEE's accounts are also subject to an annual external financial and accounting audit.

Staffing

11. The existing human resource capacity is adequate to carry out the financial management tasks of the project. At this stage therefore, there is no need for change in quantity and quality of the existing staff to meet Bank and ONEE financial reporting requirements. It is however expected that the staffing will be monitored closely so as to anticipate any capacity gap which could occur and agree with ONEE on a capacity-building program in a timely manner.

Accounting System, Accounting Policy and Procedures

12. ONEE's accounting system is governed by rules applicable to autonomous public state owned agencies (Decree of 10 November 1989). Moreover, ONEE maintains an accounting system in line with corporate and commercial law. Project statements will be issued based on ONEE's accounting system. The accounting function at ONEE is performed by the central accounting division in the financial department. A cursory review of ONEE's internal control system indicated satisfactory levels of segregation of duties. Reporting is adequate and timely.

Budgeting

13. ONEE has a reliable integrated information system (SAP), installed both at the central level and at the regional level. It makes possible to follow expenditure from its budgeting to the payment to supplier. The project annual budget process will follow the ONEE budget cycle which is mainly as follows:

i. May-June: Preparation by the Management Control Department of a draft letter of Orientation to the Investment Budget Committee and circulation to all departments.

ii. September: Consolidation and Validation by all departments.

iii. End October: Consolidation by the Management Control Department for arbitration and validation

iv. September-December: Internal negotiations and validation of the draft budget and presentation to the Direction of Public Enterprises and Privatization.

v. December: Board approval of the draft budget

Project Reporting System

14. The financial monitoring of projects is ensured by the service for long and medium term financing within the finance and treasury division (financial department), in coordination with the concerned technical departments. ONEE's financial department is well structured and has the use of an updating manual of procedures which defines disbursements and financial management procedures.

15. The Financing Department (*Division Financements*) will be responsible for the preparation of the interim unaudited Financial reports (IFRs).

16. ONEE will produce, on a semester basis, interim unaudited Financial Reports for the project and submit them to the Bank as part of the Project reports, or separately. These reports will consist of: (i) statement on sources and uses of funds for the reporting period and with cumulative figures; (ii) a statement of use of funds by component and expenditure type; and (iii) a variance analysis indicating budgeted amounts versus actual and explanation of variances for the period covered by the Interim unaudited Financial Report. The Financial Management team of the project will review the IFRs and share eventual comments for ONEE's consideration.

17. These reports should be remitted to the Bank within 45 days from the end of the period. The format and content of the FMRs have been agreed to.

Audited Project Financial Statements

18. In addition to the semester financial reports related to project activities, ONEE will produce its customary annual financial statements. These project annual financial statements will be composed of:

i. A Statement of Sources and Applications of Funds reflecting the year expenditures plus cumulative amounts disbursed to date;

ii. A use of funds by project categories/activities, reflecting the year expenditures plus cumulative amounts disbursed to date;

iii. An SOE withdrawal schedule, listing individual withdrawal applications relating to disbursement through the SOE, by reference number, date and amount;

iv. Notes on significant accounting policies and accounting standards adopted for the preparation of the accounts; and any supplementary information or explanation that may be deemed appropriate by Management to enhance understanding of the financial situation of the project.

Internal controls

19. The internal control system set within ONEE is in line with existing country internal control framework. It is considered satisfactory by the Bank. Actually, an adequate system of internal control is in place. It makes it possible to guarantee the segregation of duties through three levels of control: (a) the control ex ante of the expenditure at the stage of their engagement; (b) the centralization of the payments on the level of the Financial Department; and (c) the second ex ante control at the stage of their effective payment by the agency of control (ACO) according to the system of the double signature.

20. Thus, pursuant to 2003 Law Nr. 69-00 related to Government financial control of public agencies and other institutions, regarding its capacity and performance, ONEE is benefiting from a control system which is performance control (*contrôle d'accompagnement*). ONEE has a manual of procedures describing all management rules applicable to all major processes.

Flow of funds

21. The project is co-financed by the IBRD, CTF, and ONEE. The IBRD and CTF loans will co-finance component 1 "ONEE's Solar PV Program" in the amounts of US$105.3 million including contingencies, and US$23.95 million, respectively. The IBRD loan will also finance all other projects' components for US$19.7 million.

Financing Plan

	Total	**IBRD**	**CTF**	**ONEE**
Component 1 – ONEE's Solar PV program	124.67	94.45	23.95	6.27[36]
Component 2 – Planning and dispatching of Renewable energy	5.20	5.20	0.00	0.00
Component 3 – Utility Demand-side Management and Revenue Protection Program	13.13	13.13	0.00	0.00
Component 4 - Technical Assistance	0.60	0.60	0.00	0.00
Contingencies	14.39	11.30	0.00	3.09
Front end fee	0.31	0.31	0.00	0.00
Total (MUS$	**158.31**	**125.00**	**23.95**	**9.36**

22. Financial flows will come from the IBRD and CTF loans, and counterpart funds financed by ONEE. Flows of funds between the IBRD, CTF, ONEE and contractors will be organized according to traditional disbursement procedures of the Bank.

Internal Audit

23. According to the provisions of Law no 69-00 of November 11 2003, ONEE is subject to performance control (*contrôle d'accompagnement*). The internal audit function is performed by the audit and organization department, directly attached to the general manager's office. This

[36] ONEE's contribution will cover costs of land acquisition, access roads and environmental and social monitoring.

department has a well-established statement of mission objectives which includes in particular, the respect of the manual of procedures.

24. ONEE will put in place procedures to make sure that the assets of the projects are subject to a permanent inventory, annual stocktaking, and sufficient insurances to protect these assets against usual risks are taken out.

External Audit

25. ONEEs' financial statements have been audited for several fiscal years by independent external auditors. The financial statements of ONE are subjected to an annual external audit. No significant issues have been raised in audit reports received covering the project managed by ONEE for year 2012. ONEE is compliant in terms of submission of the audit reports and management letter.

26. During project's implementation, ONEE will submit its annual audited financial statements, conducted by an external independent auditor, to the Bank after its approval by ONEE's Board of Directors (*Conseil d'administration)*. Each submission shall include financial audits as well as management letter.

27. The records and financial statements of the project will also be separately audited on an annual basis, in accordance with international audit standards, by the same independent auditor. The audit would include a comprehensive review of all statements of expenses (SOEs). In addition to the audit report, the auditor will issue a management letter including recommendations on project controls and recommending enhancements if any weaknesses are identified. The audit report shall be submitted to the Bank no later than six months after the closing of each fiscal year.

Supervision Planning

28. Supervision activities will include review of semester interim unaudited financial reports, review of annual audited financial statements and management letters as well as timely follow up on issues which have arisen, and participation in Bank project supervision missions, as appropriate. There will be two financial management supervision missions each year to review financial management practices, procurement methods, payment procedures, and documentation.

Project Reports

29. The Borrower will report on the project execution bi-annually. The reports will include detailed progress on project's physical execution, achievement of targets as agreed in results framework (Annex 1) and compliance with safeguards requirements.

Disbursements

30. Method of disbursements: The proceeds of the loan would be disbursed in accordance with the *World Bank Group Disbursement Guidelines for Projects*, dated May 2006, and will be used to finance project activities through the disbursement procedures currently in use: i.e. Withdrawal Applications (WAs) for direct payment, advances, reimbursement and special

commitments accompanied by appropriate supporting documentation (e.g. records evidencing eligible expenditures, e.g., copies of receipts, supplier invoices). ONEE's Electricity Branch Financing Department will be responsible for submitting WAs.

31. Designated Account: a pooled designated account will be opened for two loans (IBRD and CTF) in a financial institution acceptable to World Bank Group. Upon effectiveness, an initial advance equivalent to the cash forecast for two quarters will be disbursed to the DA. Subsequent advances will be made upon submission of quarterly IFRs which document the use of the funds for eligible expenditures.

32. *Use of unaudited quarterly Interim Financial Reports (IFRs):* Applications to withdraw proceeds from the loan and advance to the DA will be documented on the basis of IFRs. Documentation supporting expenditures claimed against IFRs will be retained by ONEE and will be available for review when requested by Bank supervision missions and project auditors. All disbursements will be subject to the conditions of the Loan Agreement and the procedures defined in the Disbursement letter.

33. *Table of eligible expenditures.* The financing proceeds will be disbursed in line with the following disbursement tables specified in the respective loan agreements for IBRD and CTF:

For IBRD:

Category	Amount of the Loan Allocated (expressed in USD)	Percentage of Expenditures to be financed (exclusive of Taxes)
(1) Goods, works, non-consulting services, and consultants' services under Part I. 1(a) of the Project	105,300,000	100 percent
(2) Goods, works, non-consulting services, consultants' services and Training under Parts I. 1(b), I.2, II, III.1 (a), III.2 and IV of the Project	19,387,500	100 percent
(3) Front-end Fee	312,500	Amount payable pursuant to Section 2.03 of this Agreement in accordance with Section 2.07 (b) of the General Conditions
(4) Interest Rate Cap or Interest Rate Collar premium	0	Amount due pursuant to Section 2.08(c) of this Agreement
TOTAL AMOUNT	**125,000,000**	

For CTF:

Category	Amount of the Loan Allocated (expressed in USD)	Percentage of Expenditures to be Financed (exclusive of Taxes)
Goods, works and non-consulting services under Part I.1(a) of the Project	23,950,000	100 percent
TOTAL AMOUNT	**23,950,000**	

34. *Retroactive Financing:* Approval is sought for retroactive financing for withdrawals, up to an aggregate amount not to exceed US$25 million for the IBRD Loan and US$4.79 million for

the CTF Loan, made for payments made prior to the signature date the loan agreements but on or after April 1, 2015, for Eligible Expenditures under Categories (1) and (2).

Procurement

Guidelines and Standard Bidding Documents

35. Procurement for the proposed project would be carried out in accordance with (i) the World Bank Group's Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants, known as the 'Anti-Corruption Guidelines' dated on October 15, 2006 and revised in January, 2011; (ii) the 'Guidelines: Procurement of Goods, Works, and non-consulting services under IBRD Loans and IDA Credits and Grants by World Bank Group Borrowers' (known as Procurement Guidelines) published by the Bank in January 2011 and revised in July, 2014; (iii) the 'Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits and Grants by World Bank Group Borrowers,' (known as Consultant Guidelines) dated January 2011 and revised in July, 2014; and (iv) all the accompanying standard bidding documents for any new procurement and the provisions stipulated in the loan Agreement. The various items under different expenditure categories are described in general below. For each contract to be financed by the loan, the different procurement methods or consultant selection methods, the estimated costs, prior review requirements, and agreed time frame are set out in the Procurement Plan.

36. National Competitive Bidding (NCB) procedures adjusted as indicated below could be used for Goods and Non-consulting services contracts estimated to cost the equivalent of three millions US dollars (US$3,000,000) or less and for Works, contracts estimated to cost the equivalent of fifteen millions US dollars (US$15,000,000) or Less.

Necessary adaptations to the National Competitive Bidding procedures:

37. To ensure broad consistency with the Procurement Guidelines, the following provisions will apply when using NCB under this project. Said procedures shall ensure that, inter alia:

i. The bidding documents include explicitly the bid evaluation method, award criteria and bidder qualification criteria;

ii. Technical, administrative and financial envelopes are opened immediately after the bid opening session has started and prices are read aloud;

iii. The bids are evaluated on the basis of the price and any other criteria expressed either in pass/fail terms or in monetary terms and disclosed in the bidding documents;

iv. Contracts are awarded to the qualified bidder who has submitted the least-cost evaluated and substantially responsive bid as stipulated in the bidding document; and

v. Standard bidding documents and bid evaluation reports found acceptable by the Bank are used.

38. Standard bidding documents (SBD) for NCB for Works, Goods and Non-consulting services will be prepared and submitted to the Bank for approval. They will include all the adjustment clauses for NCB in Morocco as well as the Audit Clause and the Fraud and

Corruption clauses (AFCC). Any future change after approval of these SDB will be submitted to the Bank for approval, in compliance with the loan agreement.

39. Moreover, it has been agreed with the borrower that each contract financed from the proceeds of this loan shall provide that suppliers, contractors and subcontractors shall permit the Bank, at its request, to inspect their accounts and records relating to the bid submission and performance of the contract and to have said accounts and records audited by auditors appointed by the Bank. The deliberate and material violation by the supplier, contractor or subcontractor of such provision may amount to "obstructive practice". Prior to issuing the first call for bids, a draft standard bidding document to be used under National Competitive Bidding must be submitted to the Bank and found acceptable by the latter.

Advertisement, Publication of Results and Debriefing

40. In addition to advertising pertaining to each contract, a *General Procurement Notice (GPN)* will be published in *DG-Market,* in *United Nations Development Business,* and in at least two national newspapers. The GPN will be published after project is approved by the Bank and prior to Effectiveness. The GPN will provide a description of the project and information on related procurement.

41. Online (DG Market, UN Development Business, and /or Client Connection) publication of contract awards would be required for all ICB, Direct Contracting, and the Selection of Consultants for contracts exceeding a value of US$300,000. In addition, where prequalification has taken place, the list of prequalified bidders will be published. With regard to ICB and large-value consulting contracts, the Borrower would be required to assure publication of contract awards as soon as the bank has issued its "no objection" notice to the recommended award in UN Development Business (UNDB) online and dgMarket. All consultants competing for an assignment involving the submission of separate technical and financial proposals, irrespective of its estimated contract value, should be informed of the result of the technical evaluation (number of points that each firm received) before the opening of the financial proposals. The borrower would be required to offer debriefings to unsuccessful bidders and consultants should the individual firms request such a debriefing.

42. **Procurement of Works and Supply and Installation of Plant and Equipment**: Works and Supply and Installation of Plant and Equipment procured under this project would include the EPC and a 5-year O&M contract to design, construct, operate, and maintain three solar PV plants. The procurement will be done using the Bank's Standard Bidding Documents (SBD) for all ICB. For other small works contracts, the procurement will agreed NCB procedures, using SBD approved by the Bank:

- International Competitive Bidding (ICB): Contracts for civil works and Supply and Installation of Plant and Equipment, estimated to cost more than the equivalent of US$15,000,000 per contract shall be procured on the basis of the International Competitive Bidding (ICB) procurement method, using the applicable World Bank Group Standard Bidding Documents.
- National Competitive Bidding (NCB): Each package of civil works estimated to cost the equivalent of US$15,000,000 less than may be procured on the basis of National

Competitive Bidding procedures. Standard Bidding Documents acceptable to the World Bank Group will be used.

43. **Procurement of Goods and Non-consulting services:** Goods and Non-consulting services procured under this project would mainly include the following: provision of software, hardware and equipment for the creation of a specialized dispatch centers for a closer control of renewable energy power plants, provision and installation of smart-meters and advanced metering infrastructure (AMI) for Utility Demand-side Management and Revenue Protection program, acquisition of 60,000 time-of-use meters as part of the Smart Meters Program, provision and installation of communication devices, software (MDM) and a Metering Control Center (MCC) and acquisition of modern planning tools. The procurement will be done using the Bank's SBD for ICB and National SBD agreed with and satisfactory to the Bank:

- International Competitive Bidding (ICB): Goods and Non-consulting services contracts estimated to cost more than the equivalent of US$3,000,000 per contract shall be procured on the basis of International Competitive Bidding (ICB). Applicable Bank Standard Bidding Documents shall be used.
- National Competitive Bidding (NCB): Each package Goods or Non-consulting services estimated to cost the equivalent of US$3,000,000 or less may be procured on the basis of NCB procedures as found acceptable by the Bank. Bidding documents acceptable to the Bank will be used.

44. **Shopping:** Goods and Non-consulting services estimated to cost **US$200,000** or less and Works estimated to cost **US$300,000** or less, may be procured using Shopping procedures.

45. **Direct Contracting:** Under circumstances which meet the requirements of paragraph 3.6 of the Procurement Guidelines, goods, and works may be procured in accordance with the paragraph 3.7 of the Procurement Guidelines using the Direct Contracting procurement method.

46. **Selection of Consultants:** Consultants services comprise mostly technical assistance and advisory services to ONEE-Electricity Branch for the development of the Noor-Tafilalt solar PV project, capacity building, knowledge and best practices sharing, studies and analysis on Smart meters program and various other technical assistance activities including training, knowledge exchange and study tour on best practices in various areas related to renewable energy: technology, performance, control, distribution, private sector participation, best practices for bidding projects, new emerging regulatory practices for private participation in renewables, access to transmission networks, etc. The selection of consultants will only apply for activities to be financed under the IBRD loan.

47. The following Bank methods and corresponding standard documents will be used:

- **Quality & Cost Based Selection (QCBS)** for technical assistance, capacity building and audits as well as contracts for consultants services above US$200,000 equivalent per contract. Standard Bank procedures and documents will be used.
- **Selection under a Fixed Budget (FBS)** Services for assignments which meet the requirements set forth in section 3.5 of the Consultant Guidelines may be procured

using the Quality-based Selection method in accordance with the provisions of paragraphs 3.1 and 3.5 of the Consultant Guidelines.

- **Least-cost Selection.** Services for assignments which meet the requirements of paragraph 3.6 of the Consultant Guidelines may be procured using the Least-cost Selection method in accordance with the provision of paragraphs 3.1 and 3.6 of the Consultant Guidelines.
- **Selection Based on Consultant's Qualifications (CQS).** Services estimated to cost less than US$100,000 equivalent per contract may be procured in accordance with the provisions of paragraphs 3.1, 3.7 and 3.8 of the Consultant Guidelines.
- **Single Source Selection.** Under circumstances which meet the requirements of paragraph 3.10 of the Consultant Guidelines for Single Source Selection, consultant services may be procured in accordance with the provisions of paragraph 3.9 through 3.13 of the Consultant Guidelines, with the Bank's prior agreement.
- **Individual Consultants (IC).** Services for assignments that meet the requirements set forth in the paragraph 5.1 of the Consultant Guidelines may be procured under contracts awarded to individual consultants in accordance with the provision of paragraph 5.2 and 5.3 of the Consultant Guidelines. Under the circumstances described in paragraph 5.4 of the Consultant Guidelines, such contracts may be awarded to individual consultants on a sole-source basis.

48. Short lists may be composed entirely of national consultants for contracts of less than US$300,000 equivalent per contract in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines, complying with the remarks mentioned above.

Fraud, Coercion, and Corruption

49. All procuring entities, as well as bidders, suppliers, and contractors shall observe the highest standard of ethics during the procurement and execution of contracts financed under the project in accordance with paragraphs 1.14 & 1.15 of the Procurement Guidelines and paragraphs 1.22 & 1.23 of the Consultants Guidelines.

Procurement Plan

50. A Procurement Plan dated March 20, 2015 in a format acceptable to the Bank was prepared for the first eighteen (18) month period. The procurement plan indicates which contracts are subject to Bank's prior review. All other contracts shall be subject to Post Review. The Procurement Plan will be updated at least once a year and as required, to reflect the actual project implementation needs and improvements in institutional capacity. The procurement plan will be available in the project's database and in the Bank's external website.

Frequency of Procurement Supervision

51. Supervision of Procurement by the World Bank Group is an integral part of Project supervision and implementation monitoring. The evaluation of existing procurement systems considers the overall risk assessment of procurement implementation for this project to be substantial. On that basis, a procurement review will be carried out ex-post and will concern

about fifteen percent to 20 percent of contracts not submitted to prior review. This percentage will be adjusted during Project implementation as a function of the performance of the implementing agencies and the results of reviews.

52. Based on the risk associated with procurement (substantial), as mitigation measures, the following actions need to be implemented:

a) Standard bidding documents (SBD) for NCB for Works, Goods and Non-consulting services will be prepared and submitted to the Bank for approval. They will include all the adjustment clauses for NCB in Morocco as well as the Audit Clause and the Fraud and Corruption clauses (AFCC). Any future change after approval of these SDB will be submitted to the Bank for approval, in compliance with the loan agreement.

b) Adoption an Operational Manual. This manual will clearly describe procurement arrangements including procedures, responsibility sharing and document flow among the parties involved in Project implementation. The manual should comprise in annex, all standard bidding documents that will be used under the project. The World Bank will need to receive and accept this manual prior to effectiveness of the project;

c) Update the Procurement plan approved on March 20, 2015 as often as necessary and minimum once a year and submitted to the Bank for no objection;

d) Training in Bank procurement procedures will be organized for all staff involved in project implementation at least once a year, over the duration of the project. In particular, a well-tailored training will be conducted before project effectiveness or at the beginning of the activities;

e) Regular ex-post reviews will be conducted (once a year). It will allow identifying the main issues and providing the necessary recommendations to help improve the quality of procurement and overall the project implementation.

53. These measures are not limitative and will be complemented as needed, during project implementation, based on the performance and result achieved.

Environmental and Social (including safeguards)

54. The Project is assigned a Category B based on the nature of the activities that will be financed. The Project will support the following activities: design, procurement and construction of three solar PV plants with a total capacity of 75 MW; supply and installation of a Renewable energy dispatch center; supply and installation of smart meters and Advanced Metering Infrastructure. These activities are unlikely to produce adverse and significant environmental impacts. The Environmental Assessment (OP/BP 4.01) and the Involuntary Resettlement (OP/BP 4.12) safeguards policies were triggered. Accordingly, the following safeguards instruments were prepared: three site-specific Environmental and Social Impact Assessments (ESIAs), including Environmental and Social Management Plans (ESMPs), an Environmental and Social Management Framework (ESMF) for the associated facilities, site-specific Resettlement Action Plans (RAPs) and a Resettlement Policy Framework (RPF) for the associated facilities, i.e. evacuation lines.

55. The Head of the Strategic Project "Noor-Tafilalt" will be responsible for monitoring the implementation of the site-specific ESIAs as well as their Environmental and Social Management Plans in coordination with the relevant departments. ONEE will provide updates on safeguards to the Bank, which will be included in the bi-annual project progress report.

56. **Consultations.** Consultation activities (interviews, focus group discussions, and public hearing) were held with various stakeholders and members of communities in the three pre-selected sites. Formal consultations here held on December 16, 2014 in Zagora, December 17, 2014 in Erfoud and December 18, 2014 in Missour. These consultations were in compliance with World Bank Group policies related to disclosure and public consultation (BP 17.50 and OP 4.01). Throughout the various consultation activities, ONEE and the Bank teams recorded a widely significant public acceptance by the communities and governmental stakeholders towards the proposed project.

Monitoring & Evaluation

57. The Project will be monitored and evaluated on the basis of the indicators and targets defined in the results framework included in Annex 1. The Bank will carry out at least bi-annual implementation support missions during which project progress will be reviewed. Moreover, ONEE's Financing Division, in coordination with the relevant departments, will be responsible for monitoring the progress of project implementation and achievement of the performance indicators in Annex 1 and accordingly report to the Bank. ONEE's Financing Division will be required to submit comprehensive progress reports on implementation aspects bi-annually that would include reporting on procurement, financial management, physical implementation and environmental aspects among others.

Annex 4: Implementation Support Plan

Kingdom of Morocco: Clean and Efficient Energy Project

Strategy and Approach for Implementation Support

1. The project consists mainly in the procurement of contracts through International Competitive Bidding (ICB), including a large contract for the Engineering, Procurement, Construction and Operations and Maintenance (EPC and O&M) of three solar PV plants with a total capacity of around 75 MW.

2. The project involves a framework approach to safeguards, which will require site-specific safeguards documents to be developed during early stage of project implementation requiring careful review and subsequent supervision by the Bank safeguards team. In addition, most of the procurement activities and contracting will be carried out in early period of the project implementation. Therefore the first two years of the project implementation would require efforts to review technical, procurement and safeguard documents. The detailed support from the Bank team during project supervision is outlined below:

a) **Environmental and social safeguards**: The Bank safeguards team will provide implementation support for: (a) preparation of site specific safeguards documents for the three solar PV plants, (b) implementation of safeguards requirements through regular supervision missions, including visits to the project sites, (c) reviewing of environmental monitoring reports and following up on any safeguards issues that may arise during to project implementation with ONEE and relevant government authorities, and (d) training on safeguards to ONEE staff.

b) **Procurement and technical:** The Bank team will provide implementation support for: a) reviewing procurement documents including technical specifications and providing timely feedback and no objection; and (b) monitoring procurement progress against the Procurement Plan developed by ONEE.

c) **Financial management**: The Bank team will provide implementation support for reviewing the project's financial management system, including but not limited to accounting, reporting, and internal controls.

d) **Implementation Progress:** The Bank will closely monitor the overall progress of project implementation, including construction of the three solar PV plants, installation of the Renewable Energy Dispatch Center, smart meters and Advanced Metering Infrastructure (AMI).

Implementation Support Plan

1. The proposed implementation support requirements are as follows:

Implementation Support Focus and Resource Requirements

Time	Focus	Skills Needed	Resource Estimate	Partner Role
Years 1 to 4	Monitor and assist in the procurement of main contracts	Procurement specialist	2	None. All Procurement will follow World Bank Group Guidelines.
		Solar PV engineer	1	
		Transmission and distribution engineer	2	
	Monitor FM implementation and disbursement	Financial Management Specialist	2	None.
	Support preparation of site-specific safeguards documents and supervise safeguards implementation	Environmental and Social Safeguards Specialists	2	None. World Bank Group Safeguard policies will apply.
	Monitor project management and supervise project implementation progress	Project Manager	1	None.
		Engineer	1	
		Operations Officer	1	

Skills Mix Required

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Team Leader	10	2	HQ
Solar PV Engineer	5	2	HQ
T&D Engineer	5	2	HQ
Procurement Specialist	8	0	Country-based
Financial Management Specialist	4	0	Country-based
Environmental Specialist	6	2	HQ
Social Specialist	6	2	HQ
Operations Analyst	8	2	HQ
Total	52	12	

Annex 5: Economic and Financial Analysis

Kingdom of Morocco: Clean and Efficient Energy Project

A. Project Overview:

1. The overall objective of the project is to assist Morocco in meeting its increased power demand by facilitating efficient and clean energy generation closer to the end users and hence reduce current electricity losses, improve the quantity and quality of power supply to the selected areas, and decrease the country's oil consumption for power generation.

2. The project has four components:

(i) *ONEE's Solar PV Program:* This component includes the subcomponent 1st Phase - "Noor-Tafilalt" project (Component 1), jointly co-financed by CTF and IBRD, for the supply, installation, connection, testing and commissioning of several mid-size solar photovoltaic (PV) plants in Morocco's east and southern regions of Missour, Erfoud and Zagora with a total installed capacity of 75 MW.

(ii) *Planning and Dispatching of Renewable Energy (Component 2):* This component includes the subcomponent Renewable energy dispatch center, financed by IBRD with CTF grant support for preparation studies, comprising the supply and installation of software and hardware to ensure optimal power dispatch and electric power system protection in view of the planned integration of intermittent large-scale renewable energy sources by 2020.

(iii) *Utility Demand-side management and Revenue protection program (Component 3)* to be financed by IBRD. This component will support the installation of smart meters to all ONEE clients consuming more than 500 kWh/month (49,000 residential and 11,000 small commercial/agricultural clients) and associated to an Advanced Metering Infrastructure to control non-technical losses and also to contribute to shave the national peak load and demand-side management.

(iv) *A Technical assistance (Component 4)* to assist ONEE in training, capacity building, knowledge exchange, and study tour activities.

B. Economic Analysis

3. The economic analysis is structured in two parts: first, an economic analysis has been undertaken for the first phase of ONEE's solar PV program (subcomponent 1.1), which is co-financed by the Clean Technology Fund (CTF); second, an economic analysis has also been calculated for the overall Clean and Efficient Energy Project, which includes a cost-benefit analysis of the first phase of ONEE's solar PV program (subcomponent 1.1) together with the Smart-Meters program (subcomponent 3.1). The assumptions taken for the analysis are the following:

Basic Assumptions

4. The following assumptions for the first phase of ONEE's Solar PV program (subcomponent 1.1) are made for the economic analysis:

- Investment costs:

  Economic life: 25 years after a two year construction period,

  Total capital expenditure (Capex): US$116.25million for 75MW, based on estimated cost of US$1,550 per installed kWp.[37]

- Operating assumptions:

  Operating expenditure (Opex): US$34per kW per year.

  Net output: 127.5 GWh/y, with a 0.5 percent annual degradation factor[38].

5. The following assumptions for the Smart meters program (subcomponent 3.1) are made for the economic analysis:

- Investment costs:

  Economic life: 15 years after a two year construction period,

  Total capital expenditure (Capex): US$13million for 60,000 time-of-use meters and the Advanced Metering Infrastructure.

Discount Rate

6. The value used for this project economic analysis is 6 percent. The value is in line with long term cost of borrowing of the Moroccan Government[39] and the cost of borrowing for Morocco's state owned National Phosphates Company, OCP[40]. As such, a discount rate of 6 percent for modeling purposes seems reasonable.

GHG Emission Factors

7. Estimates of the avoided GHG emissions of solar PV plants are based on the emission factor for electricity generation in Morocco of 0.585 ton CO2/MWh, using the UNFCCC simplified methodology. While this may well be the basis for estimating CER revenue, in reality what is displaced by the PV generated energy is mainly natural gas generation in CCGTs, whose emissions per kg are much lower.

[37] Bloomberg New Energy Finance, "2015 Factbook Sustainable Energy in America"

[38] Source: ONEE, 2014.

[39] Morocco issued US$500 million, 10-year 144a/Regulation S bonds in December 2012 at a coupon of 5.5 percent. The issue was reopened in May 2013 to increase the issue to US$750 million for a tap of 237.5 bp over US Treasuries, and is currently trading at a discount (.

[40] OCP *(Office Cherifien de Phosphates)* recently issued $300 million of 30-year debt to yield 7.375 percent, or 3.9 percentage points more than US Treasuries.

8. In short, when we compare solar PV with a gas CCGT in economic analysis, the appropriate emission factor is that for a new gas CCGT (the thermal generation that PV in fact would replace), not the "average grid factor" of the UNFCCC methodology. In a financial analysis that includes actual calculations of CER revenue, and then of course the relevant numeracies is indeed as per the UNFCCC methodology since that would determine the CERs available for sale and the actual financial impact.

Avoided Social Cost of Carbon

9. The estimated monetary benefits from reduced CO_2 emissions vary widely, reflecting differences in estimation methodologies and uncertainties related to the impact of climate change. Based on the World Bank Group Guidelines for the social value of carbon, the economic model assumes a price of carbon dioxide which starts at US$30/ton in 2015 and increases to US$70/ton in real terms by the end of the project lifetime.[41]

Project Benefits

10. The analysis takes into account six major benefits derived from the proposed investment. These benefits are explained below:

- Reductions in carbon emissions
- Sales of solar PV generated energy: Investment in solar PV plants would result in production of an annual 127.5 GWh of clean energy. This generated electricity is valued at the cost of replaced energy (gas-CCGT in case of the economic analysis) or at the current average electricity price charged by ONEE to residential customers, which is US$9.4 cents/kWh.
- Reduction in energy loss: Investment in distributed energy generation would reduce energy losses resulting from electricity transmission over long distances. Avoided energy losses, estimated at 12GWh per year, were calculated on the basis of ONEE's load flow analysis of the power system.
- Improved utility system reliability and power quality: Decentralized energy generation can provide additional economic value beyond clean energy production such as improving service reliability by reducing the number of system outages, improving power quality. Such PV systems can relieve thermal overloads and participate in voltage support. The methodology used to calculate these benefits is based on an estimation of the expected number of hours of avoided power outages as a result of the PV plant which is around three hours per year.[42] The economic value of these avoided outages is

[41] IPCC Fourth Assessment Report Working Group II report, 2007 World Bank Group, *Guidance note on social value of carbon in project appraisal*, 14th July 2014

[42] Data provided by ONEE shows that the region of Erfoud experienced at least 36 hours of unplanned power outages in 2014. ONEE estimates that while a number of problems on the local network cannot be addressed by the PV plants since they are caused by accidents such as falling trees on wires, natural disasters or vandalism, a reduction in overloading can help reduce the frequency of unplanned interruptions and maintenance periods. Based on ONEE's experience, it has been estimated that around 30 percent or 11 hours of the total annual time outages (36 hours) in the beneficiary regions could be reduced by the PV project. Since PV plants only generate power during daylight hours (8 hours/day the equivalent of one third of a day), it has been estimated that the number of hours of avoided outages corresponds to one third of 11 hours, or three hours.

calculated using the cost of unserved energy which is US$ 4/kWh[43] and the average power demand (80 percent of peak power) during daylight hours.[44]

- Reduction in fuel oil consumption: Investment in smart meters and deployment of a time-of-use tariff structure would encourage customers to adjust their load profile and shift consumption from peak to off-peak hours, hence reducing use of expensive generation capacity. The economic benefits are estimated by comparing financial savings from reductions in peak-hour generation (oil-fired plants), cost of additional off peak generation from gas and coal fired plants, and losses of revenues from energy sales. A conservative value of 60 MW was considered for the displaced peak load, which translates to a five hours 60 MW reduction of peak generation and a uniform 15.8 MW increase of generation during off-peak 19 hours.
- Reduction in non-technical losses: Investment in an advanced metering infrastructure would enable ONEE to account and charge for every energy unit consumed by medium and high voltage customers. The economic benefits are estimated by taking the conservative assumption that the deployment of the infrastructure will result in a reduction in non-technical losses equivalent to 1percent of billed energy consumption per year. ONEE could therefore recover additional revenues equivalent to 53 GWh consumption per year.[45]

Alternatives to the solar PV Program

11. The Bank's economic analysis guidelines requires to compare the project with a set of mutually exclusive project alternatives to determine that the project is the least cost solution among the alternatives.

12. Table 1 below shows a set of potential generation alternatives to the proposed PV project. The assumptions for the Combined Cycle Gas Turbine (CCGT) and Steam Plants are taken from data tables used by ONEE to run WASP long term generation expansion planning analysis. The assumptions for a Wind plant are based on cost estimations used in the CTF-financed 850MW Moroccan Wind Program. Assumptions for solar PV are taken from International Renewable Energy Agency (IRENA) statistics.

13. Under the above assumptions, Table 1 shows the levelized cost of energy for PV and its main alternatives. This analysis shows PV to have a higher cost than the least-cost wind energy and the second least-cost CCGT option. The highest cost is for a new HFO project, and such plants are indeed not considered as candidates in the ONEE expansion plan.

[43] The ratio of gross domestic product (GDP) per unit of electricity (kWh) consumed is used to estimate the value of production lost as a result of an outage. Morocco's 2014 GDP was US$114.3 billion, and total power sales was 28,500 GWh which results in a cost of US$4/kWh.

[44] Average power demand in the region has been calculated as 80 percent of peak demand with an annual increase of 6 percent over the project lifetime (25 years). Annual increase of energy demand in Morocco over the last 30 years was in excess of 6 percent, and demand in the Erfoud-Missour-Zagoura regions is expected to outstrip national average demand in the coming years.

[45] AMI economic benefits will likely be more than that, but because of absence of a reliable estimation of non-technical losses it is difficult to calculate an accurate projection of the associated economic benefits.

14. The Wind energy alternative, however, has been discarded because wind energy cannot provide the same energy during the day when the demand in the pre-selected areas is high (wind load does not match the local load curve as PV does). Therefore, the only relevant alternative to the proposed project is a gas-fired CCGT plant

Table 1 – LCOE for PV and alternatives

			CCGT	Steam Plant	Wind	PV
1	Fuel		Natural Gas	HFO		
2	Installed Capacity	[MW]	450	350	100	75
3	Operating Life	years	25	30	20	25
4	Overnight construction cost	US$/kW	900	1200	2000	1550
5	construction period	years	3	4	2	0,83333
6	Construction period adjustment factor	[…]	1,131	1,146	1,092	1,060
7	Total economic cost	US$/kW	1018	1375	2184	1643
8	capital recovery factor	[…]	0,078	0,073	0,087	0,078
9	annualized capital cost	US$/kW/y	79,63	99,89	190,38	128,53
10	fixed O&M	US$/kW/y	19,2	12	45	31
11	total fixed cost	US$/kW/y	98,8	111,9	235,4	159,5
12	**variable cost**					
13	efficiency	%	56%	35%		
14	heat rate	BTU/kWh	6107	9715		
15	fuel cost	US$/mmBTU	11	19,74		
16		US$/kWh	0,067	0,192		
17	non-fuel variable O&M	US$/kWh	0,0015	0,0015	0,001	
18	total variable cost	US$/kWh	0,069	0,193	0,001	
19	**total cost**					
20	capacity factor	%	75%	80%	38%	19%
21	annual generation	[kWh/year/kW]	6570	7008	3328,8	1700
22	**total cost/kWh**	US$/kWh	0,084	0,209	0,072	0,094
23	incremented cost over CCGT	US$/kWh		0,126	-0,012	0,010

Baseline Economic Returns of the First phase of ONEE's Solar PV program

15. The ERR of the PV project is 9.80 percent which shows that the project is economically viable with an ERR well above the assumed economic opportunity cost of capital at 6 percent. The resulting levelized (economic) cost of energy (LCOE) is 7.28 USc/kWh, i.e. 1.24 cents/kWh below the gas-CCGT levelized cost of electricity at the assumed flat gas price of US$11/mm BTU46. Table 2 presents a breakdown of the results.

16. Note that the LCOE is a function of the discount rate: the lower the discount rate, the lower is the LCOE – but that is also true for the LCOE of the alternative CCGT – though with the bulk of CCGT costs in OPEX, the impact of lower discount rates is much smaller.

Table 2 - Economic Analysis for 75MW PV Project (in US$, NPV at 6 percent)

[46] Natural gas used for power generation in Morocco is exclusively purchased from Algeria at the same price as for Algerian gas exports to Spain. The reference price was obtained from ONEE and is in line with European gas prices and IEA forecasts.

Costs & Benefits	Present Value in $USm (6% discount rate)
Benefits	
Avoided CCGT costs (Fuel, O&M …)	111,6
Avoided GHG Emissions	23,8
Avoided T&D Losses	11,1
Avoided Outages	11,4
Total Benefits	158,0
Costs	
Total Costs (Capex & Opex)	128,7
Project NPV	29,3
ERR	9,80%

Sensitivity analysis

17. Stress test of the PV component shows that its economic viability is also guaranteed under assumptions of 20 percent increase in capital costs or 20 percent decrease in gas prices. The recent trend of decreasing capital cost of PV is likely to continue and the actual costs arising from an EPC tender scheduled during the first semester of 2015 are likely to be in line with present projected values (baseline cost). Table 3 below summarizes the results of stress tests for the PV component.

Table 3 – Sensitivity Analysis of 1st Phase Solar PV -"Noor-Tafilalt" project (Component 1)

Capital Cost	ERR	NPV mln US$	LCOE cUS$/kWh
-20,00%	14,36%	50,1	5,84
-10,00%	11,77%	39,7	6,56
0,00%	9,80%	29,3	7,28
10,00%	8,23%	18,9	8,00
20,00%	6,93%	8,6	8,72
ias Price ($/mmBTU	ERR	NPV mln US$	LCOE cUS$/kWh
8	6,40%	2,9	7,28
9	7,56%	11,7	7,28
10	8,69%	20,5	7,28
11	9,80%	29,3	7,28
12	10,90%	38,1	7,28
13	11,97%	46,9	7,28
14	13,04%	55,7	7,28
Solar Resource	ERR	NPV mln US$	LCOE cUS$/kWh
-15%	6,95%	7,3	8,86
-7,5%	8,37%	18,3	8,01
0,0%	9,80%	29,3	7,28
7,5%	11,26%	40,3	6,66
15%	12,77%	51,3	6,12

18. The detailed switching values analysis can be summarized as follows:

- *CAPEX*: to drop below the 6 percent hurdle ERR rate, CAPEX would need to be above 128 percent of the baseline price, i.e. 1980 US$/kW. Given the recent trend of decreasing capital costs of utility-scale PV projects, the risk of exceeding this value is considered to be low.
- Gas price: the gas price would have to drop below US$7.7/mmBTU for the project's ERR to be below the 6 percent hurdle rate. This switching value is well below the price paid by ONEE for gas purchased from Algeria for the Ain Beni Mathar CCGT plant under a gas purchase agreement which includes a price floor of US$10/mmBTU.

19. In sum, the PV project is economically viable under various assumptions while offering other important advantages (i) avoided dependence on imported natural gas, (ii) advancement along the learning curve of solar PV technology, (iii) establishment of new industries with additional employment, (iv) deferments of new or upgraded transmission and distribution infrastructure, and (v) transmission capacity release.

Baseline Economic Returns of the Project (including Components 1 and 3)

20. The economic analysis of the overall Clean and Efficient Energy project focused on the contribution of Components 1 (PV project) and 3 (Smart meters) because they account for more than 90 percent of the project total budget and since fairly accurate estimates for expected economic benefits for both components can be provided.

21. Based on the above benefits and costs, the economic rate of return (ERR) and net present value (NPV) for the project are estimated and summarized in Table 4 below.

Table 4 – Project's Economic Analysis (in US$, NPV at 6 percent)

Costs & Benefits	Present Value in $USm (6% discount rate)
Benefits	
Avoided CCGT costs (Fuel, O&M …)	111,6
Avoided GHG Emissions (from PV)	23,8
Avoided T&D Losses	11,1
Avoided Outages	11,4
Fuel Savings (ToU Meters)	102,8
Avoided GHG Emissions (ToU Meters)	5,2
Total Benefits	266,0
Costs	
PV Costs (Capex & Opex)	128,7
Time of Use and AMI Costs	12,2
Total Costs (Capex & Opex)	140,9
Project NPV	125,1
ERR	23,90%

22. The Overall Project Economic Analysis (Component 1 and 3) results in an ERR of 23.9 percent which shows that the project is economically viable.

23. The robust ERR of combined investment in both components 1 and 3 is due to the strong return of the Smart meters component, which drives its benefits from financial economies resulted from a reduced reliance on expensive HFO.

24. Assuming a lifespan of 15 years for the Smart Meters and using the unsubsidized cost of HFO, the ERR for the Smart Meters Program (Component 3) is 70.2 percent and its Net Present Value (NPV) is US$95.7 million.

Table 5 – Economic Analysis by component (NPV at 6 percent)

Component	Total Costs	Total Benefits	Net Benefits	ERR
PV	128,7	158	29,3	9,80%
Smart meters	12,3	108	95,7	70,21%

Sensitivity analysis

25. The project remains economically viable under stress tests assuming 20 percent increase in capital costs of the PV component or 20 percent decrease in gas prices. Table 6 below summarizes the results of stress tests.

Table 6 – Sensitivity analysis of key parameters

Capital Cost	ERR	NPV mln US$
-20,00%	33,49%	150,9
-10,00%	28,05%	138
0,00%	23,90%	125,1
10,00%	20,59%	112,3
20,00%	17,88%	99,4
Gas Price ($/mmBT	ERR	NPV mln US$
8	22,71%	108,9
9	23,12%	114,3
10	23,51%	119,7
11	23,90%	125,1
12	24,27%	130,6
13	24,64%	136
14	25,00%	141,4
Solar Resource	ERR	NPV mln US$
-15%	20,67%	103,2
-7,5%	22,25%	114,1
0,0%	23,90%	125,1
7,5%	25,61%	136,1
15%	27,40%	147,1

C. Financial analysis

26. The financial analysis compares the financial costs of the project components with the financial benefits of selling the produced energy at the average power consumer price or, in the case of time-of-use/smart meters, the financial benefits from fuel displacement and additional revenues as result of a reduction in non-technical losses. The calculations are in real US$. The CO2 price has been assumed at US$0.19/ton, which is the current trading value of certified emission reductions.[47]

27. In the absence of financing from CTF, IBRD or other international financial institution, it has been assumed that the project would be financed by the Moroccan banking system.

First phase of ONEE's Solar PV program

28. A financial analysis of the PV subproject from the ONEE perspective was undertaken, by valuing incremental revenues and costs at the estimated tariff for 2013 based on the actual average tariff applied by ONEE. The following cost assumptions were made: (i) capital costs are baseline costs; (ii) power purchase prices at the connection point of the distribution system are estimated as average current purchase price of high voltage customers plus estimated losses to the point; power purchase prices are assumed to remain constant throughout the period; (iii) inflation is estimated at 2 percent; and (vii) weighted average cost of capital for ONEE is 6 percent.

29. The PV Project Financial Analysis results in a FIRR of 8.09 percent. Although the estimated financial return indicates that ONEE has an incentive to carry out the PV subproject, the analysis also shows that the project is sensitive to changes in cost, solar resource and costs of capital.

30. The PV project's financial package involves approximately US$119.25 million in loans from CTF and the Bank to finance construction of the plant. Funds from these institutions are lent to ONEE as the borrower to cover the project's costs. As the bidding for the project constructor will be based on the proposed kilowatt-hours price for PV generated electricity, the financial analysis at project level is focused on the LCOE for the plant.

31. An analysis has been undertaken to estimate the impact of CTF financing and to justify the need for softer CTF concessional financing. For this purpose, the cash-flows of the project have been assessed under three scenarios: (i) 100 percent commercial financing, (ii) 100 percent IBRD financing, and (iii) CTF and IBRD financing. As shown in Table 7 below, the plant LCOE improves substantially under the IBRD and CTF financing scenarios.

Table 7 – Impact of Financing on key parameters

	100% Domestic Financing	100% IBRD	IBRD + CTF 20y	IBRD + CTF 40y
LCOE cUS$/kWh	8,69	7,42	7	6,79

[47] Future CER trades at 0.14 Euro or US$0.19: https://www.theice.com/emissions.jhtml

32. When comparing between hard and soft CTF financing terms, the difference in cash flows is US$3.7 million. This potential additional revenue is deemed to be important as a hedge against an increase of capital or operational costs, or in a lower solar radiation than expected. In conclusion, CTF soft financing terms are critical to make the solar PV project component possible and financially sound.

Clean and Efficient Energy Project (including Components 1 and 3)

33. Table 8 below shows the results of overall project financial analysis:

Table 8 – Overall project Financial Analysis (NPV at 6 percent)

Costs & Benefits	Present Value in $USm (6% discount rate)
Benefits	
PV Benefits (Energy Sales)	159,8
Time of Use and AMI Benefits (Fuel sav	175,3
Total Benefits	335,1
Costs	
PV Costs (Capex & Opex)	139
Time of Use and AMI Costs	113,1
Total Costs (Capex & Opex)	252,1
Project NPV	83,0
Project FIRR	14,12%
PV Project FIRR	8,09%
Smart Meters Project FIRR	42,51%

34. The high FIRR and important cash flows generated by the overall project are mainly due to the impact of the smart meters component and the expected sizeable economies in fuel consumption and additional revenues as a result of reduction in non-technical losses.

D. ONEE's Financial Analysis

35. The following analysis provides details of ONEE's financial situation prior and after the merger (*regroupement*) of the electricity utility ONE and the water utility ONEP into ONEE, which took place in April 2012.[48] The analysis looks at the financial situation of ONEE. When possible, the impact of the Electricity Branch (ONEE EB) on the overall financial health of the Borrower is underlined.

36. In the following section, the (A) Profit and Losses statement, (B) Balance Sheet, and (C) Cash flows of the Borrower are analyzed.

[48] The financial statements from 2009 to the first quarter of 2012 are those of the electricity utility ONE, while those of 2012 (Q2 to Q4) and 2013 are of the new entity ONEE and result from the consolidation of the accounts of the utilities ONE and ONEP

37. The Contract Program (see Table 15 for details) signed by ONEE with the Government of Morocco in May 2014 is expected to restore ONEE's financial health by 2017 as shown in this Annex.

A. Profit and Losses Statement Analysis

Table 9. P&L Statement in million MAD, 2010 - 2017(e)

Profit and Losses Statement	*10*	*11*	*12*	*13*	*14(e)*	*15(e)*	*16(e)*	*17(e)*
1) Operating Income	21,522	22,894	28,536	30,093	35,788	41,066	43,845	42,821
2) Operating Expenses	20,492	24,926	32,583	32,324	38,451	40,933	42,216	40,076
3) Operating Result	1,030	-2,032	-4,047	-2,230	-2,661	133	1,629	2,744
4) Financial Income	896	948	2,624	1,682	1,446	1,316	1,261	1,260
5) Financial Expenses	1,894	2,035	3,705	2,736	3,247	3,531	4,030	4,308
6) Financial Result	-998	-1,086	-1,081	-1,053	-1,801	-2,216	-2,769	-3,047
7) Current Result	32	-3118	-5128	-3284	-4462	-2083	-1140	-303
8) Non-Current Income	2,040	2,513	4,569	2,511	2,643	3,364	8,962	2,183
9) Non-Current Expenses	2,462	3,046	3,767	1,947	2,305	2,816	8,387	1,679
10) Non-Current Result	-422	-533	803	564	338	548	575	504
11) Result Before Taxes	-391	-3,652	-4,325	-2,720	-4,124	-1,535	-565	201
12) Income Taxes	61	67	84	90	80	128	132	120
Net Result	**-452**	**-3,718**	**-4,409**	**-2,810**	**-4,206**	**-1,662**	**-697**	**81**

Table 10. Main ratios, 2010-2017(e)

Main Ratios	*10*	*11*	*12*	*13*	*14(e)*	*15(e)*	*16(e)*	*17(e)*
Annual growth of revenues	8%	8%	19%	4%	11%	11%	8%	8%
Annual growth of expenses	-3%	29%	19%	-6%	32%	10%	4%	-9%
Annual growth of EBITDA	58%	-50%	36%	58%	-15%	55%	21%	15%
EBITDA/Revenues	24%	11%	13%	19%	15%	21%	23%	25%
EBIT/Revenues	29%	2%	-2%	11%	6%	21%	28%	32%
Net Income/Revenues	-2%	-16%	-16%	-10%	-14%	-5%	-2%	0%

Revenues:

38. ONEE revenues are expected to double from 2010 to 2017, from 21.5 to 42.8 billion MAD. Such a significant increase in a relatively short time can be explained by (i) a sharp expected increase in electricity sales (+40 percent, from 23.8 to 32.9 TWh), (ii) a progressive increase (+4.4 percent per annum, see table below) in electricity tariffs between 2014 and 2017 as planned in the framework agreement between ONEE and the Government of Morocco (see Table 15, and (iii) the revenue impact of the water utility (ex ONEP) in the context of the 2012 merger (*regroupement*) (around +6 billion MAD).

Table 11a. ONEE EB's Average Electricity Tariff, 2013-2017(e)

ONEE EB Average Tariff	*13*	*14(e)*	*15(e)*	*16(e)*	*17(e)*
Electricity Sales Revenues (MAD million)	21,939	23,311	25,928	28,165	30,897
Generation Sales (GWh)	27.80	28.90	30.26	31.43	32.94
Average Tariff (MAD/kWh)	**0.79**	**0.81**	**0.86**	**0.90**	**0.94**
Average Tariff Increase (percent)	*0.6%*	*2.2%*	*6.2%*	*4.6%*	*4.7%*

Operational costs:

39. ONEE EB's purchases are expected to increase by 45 percent in only five years, from 2013 to 2017, due to the planned significant increase in purchases from IPPs (see Table 3b below). Purchases of energy input, however, are expected to be relatively stable over this period, as ONEE has committed to rely less on the now unsubsidized heavy fuel oil.[49] Indeed, purchases of electricity from third parties are expected to soar by 2017, due to the commissioning of various IPPs that are vital to keep satisfying the demand: Jorf Lasfar 5&6 and Safi (coal), Taza (wind), and Noor Ouarzazate I (solar).

Table 11b. ONEE EB's purchases of fuel and electricity from third parties, in million MAD, 2013-2017(e)

EB's Fuel and Electricity Purchases	*13*	*14(e)*	*15(e)*	*16(e)*	*17(e)*
Purchases of energy input	**7,647**	**10,503**	**12,187**	**12,236**	**7,109**
Coal	806	1,002	938	1,004	1,137
Heavy Fuel Oil	2,774	5,648	7,545	7,535	2,789
Natural Gas	3,901	3,710	3,604	3,597	3,084
Diesel	166	143	100	100	100
Purchases of electricity from third parties	**9,260**	**12,027**	**13,158**	**14,317**	**17,022**
Spain	3,247	3,270	3,506	3,881	2,955
Other Third Parties	6,013	8,757	9,652	10,436	14,067
Total	**16,907**	**22,530**	**25,345**	**26,552**	**24,131**

Earnings before Interests, Taxes, Depreciation and Amortization (EBITDA):

40. ONEE's EBITDA recovered from the 2011 crisis - a year marked by an EBITDA melting by 50 percent - with consecutive substantial increases in 2012 and 2013 (+36 percent and +58 percent respectively), reaching 5.4 billion MAD. Such increase is not only due to the ONE/ONEP merger (*regroupement*), but also to a combined scissor effect: increased revenues (+4percent in 2013) with mastered expenses (-6 percent in 2013). It is also worth noticing that such an EBITDA level has only been reached once by the Borrower, back in 2010.

41. Over the length of the ONEE/Government Framework Contract, ONEE's EBITDA is expected to almost double, from 5.4 to 10 billion MAD. Moreover, the EBITDA is also to

[49] Heavy fuel oil subsidies have been eliminated in August 2014 and replaced by progressively decreasing direct financial support by the State of Morocco.

represent a larger share of the revenues, i.e. 25 percent in 2017, to be compared to a 19 percent margin in 2013. Should these projections be realized, such margin levels would be clear indicators of a recovered financial health.

Net income:

42. Despite the merger (*regroupement*), ONEE could not avoid a net loss of 2.8 billion MAD in 2013, although reduced by 35 percent compared to the 2012 results. The ONEE Framework Program signed with the Government will support the utility in its financial recovery, with the aim to reach a zero net income by 2017.

B. Balance Sheet Analysis

ONEE Balance Sheet	*10*	*11*	*12*	*13*	*14(e)*	*15(e)*	*16(e)*	*17(e)*
ASSETS	73246	74296	115161	113386	110692	112563	114851	116019
Net Fixed Assets	59610	59730	93085	92138	92048	92376	93089	93498
Current Assets	12347	13347	16688	17288	18382	19276	21091	21929
Treasury	12347	13347	16688	17288	18382	19276	21091	21929
LIABILITIES	73246	74296	115161	113386	110692	112563	114851	116019
Permanent Equity	60161	59054	90794	90453	90540	93120	94992	97477
Equity	*4805*	*1271*	*-2568*	*-3909*	*-7468*	*-8130*	*-8826*	*-8744*
Quasi-Equity	*8540*	*8386*	*23443*	*23712*	*24841*	*25016*	*24856*	*24433*
Long Term Debt	*30912*	*32411*	*51622*	*52312*	*53771*	*56378*	*65195*	*67228*
Provisions for Risks and Charges	*15772*	*16832*	*18130*	*18037*	*18967*	*19408*	*13352*	*14189*
Currency translation	*132*	*155*	*168*	*302*	*414*	*337*	*304*	*259*
Liaison Accounts	*0*	*0*	*0*	*0*	*15*	*111*	*111*	*112*
Current Liabilities	9248	10083	16037	16080	10659	11088	11449	10948
Treasury	3837	5160	8330	6854	9493	8353	8409	7595

Debt to Equity Ratio

43. A debt to equity ratio was included as a financial covenant in the loan agreement of the on-going Support to ONEE project (P104265, approved in 2008). At that time, financial covenants were not required as a loan repayment guarantee, but to ensure the gradual improvement of the financial viability ONEE and therefore enhance the sustainability of the project development objectives. The same covenant was subsequently used in other World Bank Group projects in the electricity and water sectors as a temporary measure until a stronger engagement for reform was shown by ONEE and the Government.

44. ONEE's context has, nevertheless, significantly changed. Since May 2014, a 4-year "Program Contract" between ONEE and the State commits the national utility to performance improvements. The Clean and Efficient Energy project will be the first project with ONEE to be submitted to the World Bank Group's Executive Board of Directors after the implementation start of the "Program Contract". ONEE's financial situation shows recovery signs due to a gradual tariff increase (August 2014), costs contention, together with current favorable oil markets. ONEE's financial projections show that the national utility would achieve financial equilibrium by 2017, while the Government is committed to assist ONEE to reach its goals. In

light of the efforts made by the Government of Morocco, the original rationale behind the introduction of the financial covenant does no longer exist. Thus, this project does not contain financial covenants.

45. The project will have a limited impact on the level of indebtedness of ONEE. The IBRD and FTP loans for this project will increase the level of debt in the long term around 2 percent.

Table 12. Debt to Equity Ratio, 2010-2017(e)

D/E Ratio	*10*	*11*	*12*	*13*	*14(e)*	*15(e)*	*16(e)*	*17(e)*
Long Term Debt	30,912	32,411	51,622	52,312	53,771	56,378	65,195	67,228
Short Term Debt	9,233	10,054	16,000	16,045	10,659	11,088	11,449	10,948
Total Debt	40,145	42,465	67,622	68,357	64,430	67,466	76,644	78,176
Equity	4,805	1,271	-2,568	-3,909	-7,468	-8,130	-8,826	-8,744
Quasi-Equity	8,540	8,386	23,443	23,712	24,841	25,016	24,856	24,433
Total Equity	13,345	9,656	20,875	19,803	17,373	16,886	16,030	15,689
D/E Ratio[50]	**3.01**	**4.40**	**3.24**	**3.45**	**3.71**	**4.00**	**4.78**	**4.98**
D/E Ratio (New Definition)	**2.32**	**3.36**	**2.47**	**2.64**	**3.10**	**3.34**	**4.07**	**4.29**

Debt Service Coverage Ratio

46. The Borrower's debt coverage capacity has slightly improved in 2013 and is expected to continue improving over time, and to ultimately reach satisfactory levels (above 1.1) from 2016 onwards. As mentioned earlier in the analysis, ONEE's rapid evolution is impressive, as in only eight years, both EBITDA and debt service levels are expected to double.

Table 13. Debt Service Coverage Ratio, 2010-2017(e)

DSCR	*10*	*11*	*12*	*13*	*14(e)*	*15(e)*	*16(e)*	*17(e)*
EBITDA	5116	2547	3455	5456	4662	7217	8733	10056
Interest Payment	1111	1095	1631	1880	2097	2403	2942	3125
Principal Repayment	2998	2702	3219	4283	4418	4492	5210	5010
Total Debt Service	4109	3797	4850	6163	6515	6895	8152	8135
DSCR	***1.2***	***0.7***	***0.7***	***0.9***	***0.7***	***1.0***	***1.1***	***1.2***

C. Free Cash Flow Analysis

Free Cash Flow (FCF)

47. Free cash flow represents the cash that a company is able to generate after laying out the money required to maintain or expand its asset base. In the case of the Borrower, free cash flows are expected to be strictly negative until the end of the Framework Agreement with the State.

[50] As defined in Loan Agreement of "Support to ONEE" Project (P145649).

48. It is important to note that negative cash flow is not a negative indication. In this specific case, it is the sign that the Borrower is making large investments. In fact, ONEE's capital expenditures will vary between 8 to 9 MAD billion annually between 2014 and 2017, or triple the 2010 levels, as Morocco needs to keep up with higher-than-ever generation capacity in its history.

Table 14: Free Cash Flows, 2010-2017(e)

FCF	*10*	*11*	*12*	*13*	*14(e)*	*15(e)*	*16(e)*	*17(e)*
EBIT	1030	-2032	-4047	-2230	-2663	133	1629	2745
- Corporate Tax on Operating Profit	-61	-67	-84	-90	-80	-128	-132	-120
+Depreciation and Amortization	4088	4581	7504	7689	7325	7084	7104	7311
-Change in Working Capital	-145	-165	2613	-557	-6515	-465	-1454	-1339
-Capital Expenditures	-2524	-4314	-4981	-7512	-8040	-8308	-8979	-8855
Free Cash Flows	**2388**	**-1997**	**1005**	**-2700**	**-9973**	**-1684**	**-1832**	**-258**

Table 15: ONEE Framework Agreement Main Features

The recently approved ONEE-State Contract-Program 2014-17 included provisions to remove the current subsidy scheme to ONEE's fuel-oil. Instead, ONEE will receive a direct fixed subsidy for its consumed fuel-oil limited for four years. This Framework contract 2014-2017 between ONEE and the Government established obligations for both parties and included among others the following measures:

a) Progressive increase of electricity tariffs over four years, except for low-income consumers[1];

b) ONEE's capital increase of 2 billion MAD over four years (there was a one billion MAD top up of capital in 2012);

c) Government's payment of debt owed to ONEE on behalf of the debtor (2 billion MAD) (Former "*Regies*", public administrations, municipalities …);

d) A lump-sum payment to ONEE as a flat subsidy for fuel used in electricity production (14 billion MAD over four years);

e) ONEE's commitment to achieve defined objectives in terms of the power system performances (Generation, Transmission, and Distribution).

Annex 6: Clean Technology Fund (CTF) Annex

Kingdom of Morocco: Clean and Efficient Energy project

Results Framework

Indicator	CTF/IBRD-funded Clean and Efficient Energy Project	ONEE Solar PV Program
1. Installed solar PV for power generation [MW]	75	400
2. Power Generation [GWh/yr]	127.5[51]	680
3. Tons of GHG emissions reduced or avoided		
Tons per year [tCO_{2eq}/yr]	78,018[52]	416,096
Tons over lifetime of the project [tCO_{2eq}]	1.95 million	10.40 million
4. Financing leveraged through CTF funding [$ million]		
CTF	23.95	23.95
IBRD	125	125
ONEE	4.05	16
Other (Commercial banks, IFIs…)	-	475
5. CTF leverage ratio	1:5	1:25
6. Cost effectiveness		
CTF cost effectiveness [$\$_{CTF}/tCO_{2eq}$ avoided over lifetime of the project]	12.31	n.a
Total project cost effectiveness [$\$_{Total\ Project}/tCO_{2eq}$ avoided over lifetime of the project]	78.5	n.a

Other co-benefits:

The project is expected to reduce power losses, improve quality of supply and hence reduce the likelihood of power interruptions in the beneficiary areas during the day. This will improve household's quality of life, in particular women. The project will increase power availability to communities with significant poverty rates where economic activities, i.e. agriculture, tourism, crafts, and household's life quality are affected by voltage fluctuations and regular outages. In addition, the project will increase energy security from lower dependency on imported fossil fuels for power generation.

I. Introduction

a) Country and sector background

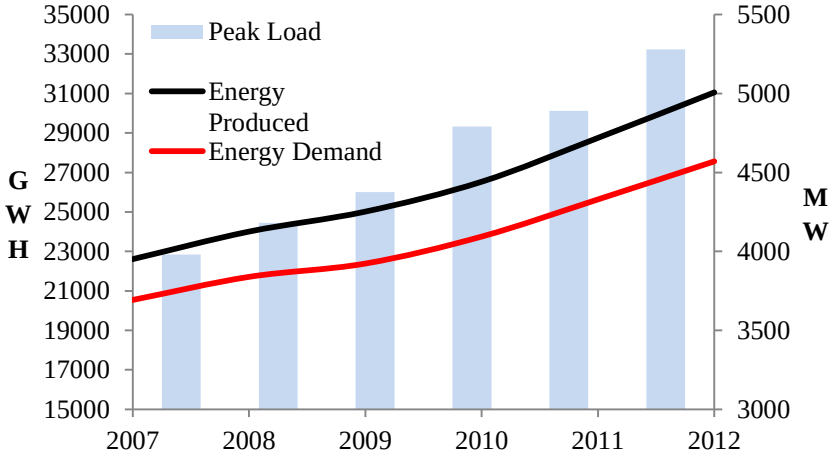
1. **Electricity demand in Morocco has been increasing rapidly at around 7 percent per year and it is expected to continue growing at a similar rate.** Peak demand has followed a similar trend and experienced an 8 percent increase in 2012, thus outpacing economic growth. Morocco is largely dependent on imported fossil fuels (96 percent) to satisfy its energy demand, in particular petroleum products which represent 62 percent of the country's energy needs. As a result, Morocco is highly exposed to international oil price fluctuations, which have a strong impact on the country's public finances and balance of payment. Power generation in Morocco is

[51] The estimated annual PV energy production was based on a 19.4 percent load factor or 1,700 hours per year.

[52] The GHG estimate includes 74,587 ton CO_2 eq. per year avoided as a result of 127.5 GWh/year clean energy production, and 3,430 ton per year for avoided energy transmission losses.

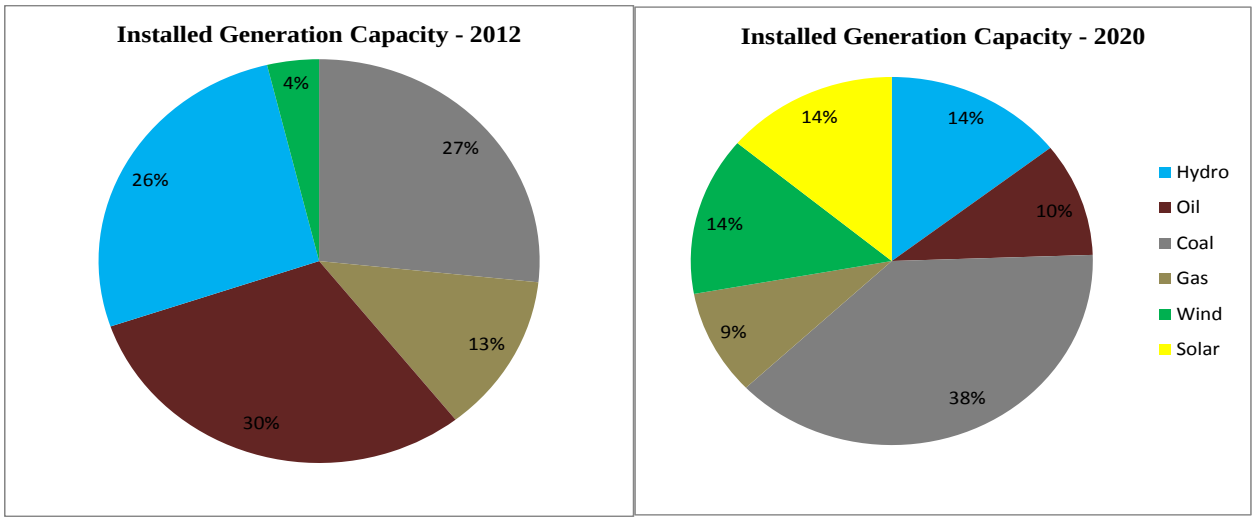
dominated by thermal generation (installed capacity in 2012: coal 38 percent; fuel and gasoil 18 percent; and natural gas 20 percent), which makes Morocco a CO_2 intensive country, with CO_2 emissions per kWh generated, 30 percent higher than the world average despite a low total CO_2 per capita.

Figure 1 - Peak Power, Energy Production and Demand in Morocco 2007-2012



2. **To reduce fossil-fuel dependency and enhance energy security, the Government has adopted a national target to increase the share of renewables (hydro, wind and solar) in the energy mix to 42 percent (*see Figure 2 below*) and to reduce energy consumption by 12 to 15 percent by 2020**. The development of the renewable energy and energy efficiency potential has become a national priority, which aims to position the country on a green growth path. So far, Morocco has 280 MW of wind energy capacity and 20 MW of Concentrated Solar Power (CSP) in operation. The Moroccan wind and solar plans (2,000 MW of installed capacity each) have been launched to develop the country's vast unexploited wind and solar resources. To achieve these objectives, the government strengthened the regulatory framework by adopting key pieces of legislation, e.g. Renewable Energy law 13-09, and creating specialized institutions, e.g. Moroccan Agency for Solar Energy (MASEN) and the National Agency for the Development of Renewable Energy and Energy Efficiency (ADEREE).

Figure 2 – Morocco's share of renewables in the energy mix by 2020



3. **The Board of directors of ONEE, chaired by the Head of Government, recently approved ONEE's solar strategy, which complements the large-scale integrated solar program under implementation by MASEN**. So far, private and public sectors have committed investments of around US$2 billion to develop the Moroccan wind and solar plans, which have an estimated total cost of US$12.5 billion. The current share of installed renewable energy is 25percent due to the large installed hydroelectric capacity, but planned investments in solar and wind energy are expected to be the main driver to reach the 42percent target by 2020.

b) Morocco's CTF Investment Plan

4. **In October 2009, the Trust Fund Committee (TFC) of the Clean Technology Fund (CTF) approved an Investment Plan (IP) for Morocco, which was subsequently updated in January 2014**. The TFC agreed to allocate US$150 million to support the country's Energy Development Fund *(Fonds de Développement de l'Energie - FDE*), with a focus on increasing penetration of renewable energy into Morocco's electricity generating portfolio (wind and solar power).

5. **The Morocco IP Update of January 2014 reallocated US$25 million, out of US$150 million allocated to the CTF IP for Morocco, to support the Clean and Efficient Energy project, which includes the deployment of the first mid-size solar PV plant in the country**. The CTF Trust Fund Committee has already committed US$125 million of CTF funds for the Wind Energy Program (WEP) project which is being implemented by the AfDB.

c) Brief Project Description

6. **The objective of the Clean and Efficient Energy Project is to improve the capacity of ONEE to supply and dispatch clean electricity and to meet the demand of targeted customers more efficiently**. The project will facilitate clean energy generation closer to the end users and hence reduce current electricity losses, improve the quantity and quality of power supply to the selected areas, and decrease the country's oil consumption for power generation.

7. **The project has four components: (i) ONEE's Solar PV Program: 1st phase – "Noor-Tafilalt" project (CTF co-financing US$23.95 million, 0.9 million PPG and 0.05 million for**

World Bank Group supervision), which includes the supply, installation, connection, testing and commissioning of several mid-size solar photovoltaic (PV) plants in Morocco's south and eastern regions of Missour, Erfoud and Zagora with a total installed capacity of 75 MW; (ii) Planning and Dispatching of Renewable Energy, which finances the installation of a Renewable Energy dispatch center (CTF PPG funding of 0.1 million). This component includes the supply and installation of software and hardware to ensure optimal power dispatch and electric power system protection in view of the planned integration of intermittent large-scale renewable energy sources by 2020; (iii) Utility demand-side management and Revenue protection program, which includes the roll out of a Smart-meters program (IBRD financing). This component will support the installation of smart meters to all ONEE clients consuming more than 500 kWh/month (49,000 residential and 11,000 small commercial/agricultural clients) to control non-technical losses and also to contribute to shave the national peak load; and (iv) Technical assistance (IBRD financing): this component will include training opportunities for ONEE staff.

8. **Despite the rapid decline of solar PV capital costs, power generation from mid-size solar PV projects is still more expensive than from comparable alternatives in Morocco.** However, the coincidence of the solar PV generation with the daily peak-demand hours when the marginal cost of generation is higher will bring the generation costs close to grid parity. CTF funding will bring down generation costs to cover almost all the incremental cost of the technology. The CTF contribution will be key for completing ONEE's 400 MW solar PV strategy. The support to the 75 MW first phase of the strategy under the World Bank Group-led Clean and Efficient Energy Project, will allow ONEE and local subcontractor companies to gain the experience and know-how necessary in subsequent phases. Moreover, CTF funding will allow the Government of Morocco (GoM) to obtain important expertise and know-how, i.e. technical, financing, through the project, which will set a sound basis for opening up the Medium voltage (MV) grid to private sector operators.

9. **The use of CTF funding will also support the creation of a renewable energy dispatch center, which will be a key instrument to optimize and control the large amounts of renewable energies expected in Morocco's grid by 2020.** This component includes the supply and installation of SCADA software and hardware to ensure optimal power dispatch and system protection. This tool would allow for the integration of intermittent large-scale renewable energy sources in the power system, provide the grid operator with a reliable tool to support its decision-making process and to ensure optimal management of the national electricity system within highest safety conditions

II. Assessment of Proposed Project with CTF Investment Criteria

a) Potential for GHG Emission Savings

10. **The proposed project aims to develop distributed mid-size renewable energy projects and improve the efficiency in the power sector while reducing its carbon emissions.** The additional CO_2 emissions reduction[53] due to the CTF project is estimated to be 78,018 tons per year for the first phase (75 MW), and approximately 416,096 per year for the total planned

[53] Estimates of the avoided GHG emissions of the PV projects are based on the emission factor for electricity generation in Morocco of 0.585 ton CO2/MWh, using the UNFCCC simplified methodology.

400 MW of PV plants. Over the 25 year-lifetime of a PV plant, the cumulative emissions reduction of CO_2 is an estimated 1.95 million tons for the 75 MW first tranche and 10.40 million tons for the total planned 400 MW.

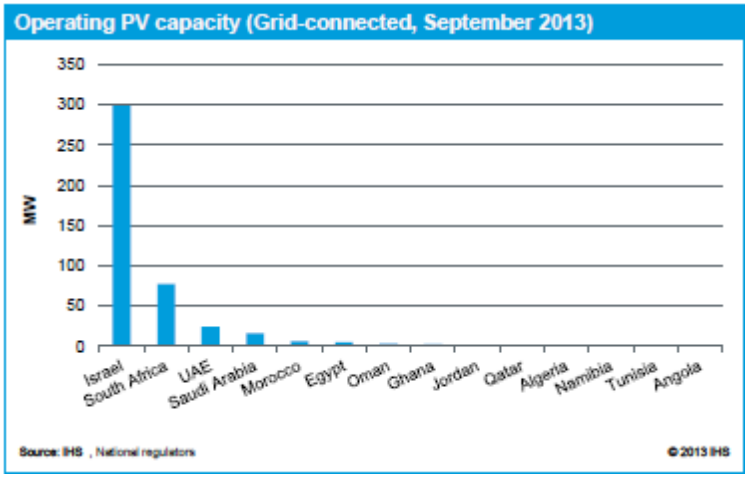
11. **Technology development status**: PV Solar plants are a widely used commercial technology and have high mitigation potential. In the last five years (*see Figure 3 below*), levelized costs of generation for crystalline silicon PV and thin-film PV fell by 53 percent and 34 percent respectively. This reflects a combination of technology improvements, economies of scale in module manufacturing, strong competition for market share among manufacturers, cost efficiencies in inverters and in balancing of plant items such as mounting systems and cables, and improved productivity in rooftop installation and utility-scale PV project construction. On the other hand, a faster implementation of PV projects the MENA region and Africa is being impeded by still relatively high costs (*see Figure 4 below*). The concessionary nature of CTF financing will be able to reduce the financial costs and pave the way for the penetration of solar PV technology.

Figure 3 – percent change in levelized cost per MWh from 2009-2014

PV - c-Si	-52.7
PV - c-Si tracking	-49.2
PV - thin film	-33.9
Biomass - gasification	-27.6
Wind - onshore	-14.7
Municipal solid waste	-7.8
Landfill gas	-4.4
Biomass - anaerobic digestion	-4.2
STEG - parabolic trough	-3.8
Biomass - incineration	-3.3
Geothermal - flash plant	18.4
Marine - wave	36.8
Geothermal - binary plant	38.1
Wind - offshore	40.6
Marine - tidal	46.2

Source: Bloomberg

Figure 4 Operating PV Capacity in Africa and MENA Region



Source: HIS

b) Cost-Effectiveness

12. Considering CTF support for the proposed project and the projected emissions savings of about 1.95 million tons of CO2 over its lifetime, the cost of each ton of CO2 saved would amount to approximately US$12.31 of CTF funding and US$78.5 of the project total cost.

13. **Marginal abatement cost.** During the update of the Morocco Investment Plan Update from January 2014, the CTF Trust Fund Committee required justification for why the marginal abatement cost for the project is expected to be below the 100 US$/t$CO_2$ threshold. Based on 1.95 million tons of CO_2 savings over the lifetime of the project and total project cost of US$153 million, the project cost effectiveness is US$78.5 per ton of CO_2. Since total project cost effectiveness is US$78.5 per ton of CO_2, the marginal abatement cost – which is calculated as net incremental cost for reducing one ton of CO_2 – is certainly less than US$78.5 per ton of CO_2.

c) Demonstration Potential at Scale

14. **The proposed project supports distributed mid-size PV projects to develop untapped optimal solar resources in line with the Government's and ONEE's priorities**. The proposed project will also help the grid operator understand and better integrate solar and other renewable power projects to the grid at a larger-scale. The Clean Energy and Efficient Project will pave the way for the implementation of ONEE's 400 MW solar PV program.

15. **The project will introduce the first mid-size grid-connected solar PV in Morocco and will be key for rolling out ONEE's solar PV strategy, which will avoid around 10 million tons of CO_2 by 2042.** CTF support to the first phase of the strategy will develop the necessary technical capacities at government and private sector for further penetration of solar PV technology in the country, such as understanding (i) costs of developing large PV projects in the country (ii) impact of PV production on the grid (iii) best practices in developing, construction and operation of PV plants. An even wider deployment of PV is expected after the government authorization –under discussion- to allow private sector operators to sell their solar PV-generated power directly to the MV grid. CTF financing will contribute to bring down generation costs of the project and act as a catalyst for further penetration of solar energy in

Morocco's energy mix. Besides the on-going CTF contribution to the Morocco's Wind Energy Program, the proposed project will allow the country to develop an unexploited market segment in solar technology. Moreover, CTF will support a critical management tool to increase the grid operator's capacity, ONEE, to maximize the integration of all renewable energies planned by 2020, i.e. 2000 MW of solar and 2000 MW of wind, in the electricity system.

d) Development Impact

16. **The development of solar energy will have significant benefits in terms of the reliability and security of electricity supply to Moroccan consumers, which is a high development priority for the Government**. Tapping the country's huge solar resources will help reducing the carbon intensity of power generation (the full 400 MW PV plan would reduce CO_2 emissions by almost 397,800 tons per year).

17. **The proposed project is also expected to strengthen the power system by strengthening its management and expanding the automation of control to maintain grid stability, especially in the case of large-scale integration to intermittent renewable resources**. As a result, the project is expected to contribute to more efficient and reliable power supply and reduced emissions associated with power generation. In terms of energy security, further development of renewable resources will increase energy security in a country that imports 15 to 18 percent of its electricity from Spain and is overall 97 percent dependent on imports. Diversity will also strengthen the resilience of the power sector to future shocks such as fuel price spikes or increased variability of hydro power generation due to climate change.

18. **According to a World Bank Group study on the impacts of the solar PV plants on these local communities[54], particularly women,** the Project is also expected to have the following indirect positive impacts:

(i) *Health sector*: an improved electricity supply will reduce the failures in hemodialysis, radiography and ultrasound equipment in regional hospitals due to voltage drops and the need for expensive back-up diesel generators. The failure of this equipment entails postponement of surgical interventions, relocations of patients to far-away hospitals and other problems.

(ii) *Education sector*: an improved electricity supply will reduce the negative impacts on schoolchildren suffering from severe cold in winter and extreme summer heat. Schoolchildren, particularly in poor areas, have a hard time to do homework regularly in the evening and to use computers because they are often broken due to voltage fluctuations. Improvements in electricity supply could mitigate these negative impacts.

(iii) *Gender and quality of life*: an improved electricity supply will reduce the power cuts and voltage drops that currently affect these areas (4-5 monthly power cuts and daily voltage drops). This improvement will particularly benefit women who are the main

[54] World Bank Group, "Clean and Efficient Energy Project (P143689) – *"Revue des aspect sociaux"*, March 2014, internal document.

household electricity consumers and suffer from: inadequate refrigeration and regular appliance's breakdown.

e) Implementation Potential

19. **Public policies and the institutional set-up in Morocco are very supportive for this project**. The Government has in recent years undertaken a substantial effort to promote renewable energy, establish an adequate legal framework, set up a dedicated agency for energy efficiency and renewable energy development, and set up an institution specifically dedicated to implementing the Solar Plan (MASEN).

20. A renewable law 13-09 was approved in 2010. It provides a legal framework for the creation and operation of facilities producing electricity from renewable energy sources. It allows public and private corporations to compete with ONEE, the publicly owned utility, in the production of electricity from renewable energy and have access to the electricity transmission system operated by ONE.

21. The Government is also undertaking extensive efforts to implement cost-reflective energy pricing and is launching energy conservation programs that will ease the transition to cost-reflective pricing by keeping consumer electricity expenditures steady.

22. In addition, the World Bank Group is engaged with the Government to enhance the overall sector policy framework and advance reforms aimed at improving the sector's commercial environment and sustainability. In December 2013, the World Bank Group approved a US$300 million "Morocco-Inclusive Green Growth Development Policy Loan" to support a set of measures aimed at reducing the country's pollution levels, dependence on fossil fuels, and the total envelope allocated to energy subsidies. Among those measures is the adoption of a legal framework to allow and promote on-grid distributed renewable energy. A study aimed at proposing a cost-reflective structure for electricity tariffs has been launched. In parallel, a study was also launched to define the missions of a new regulatory authority to be created.

23. ***Leveraging of Co-financing*:** the project investments would be funded through a mix of CTF (US$23.95 million), IBRD (US$125 million) and ONEE financing (US$4.05 million). IBRD and ONEE contributions on the CTF-funded component 1 "ONEE's Solar PV Program" are respectively US$91 million and US$4 million. The CTF leverage ratio will be 1 to 5. Further, the investments under this project would facilitate continued expansion of renewable energy capacity that would invite more private sector investments in additional wind and solar capacity.

24. More importantly, investor confidence and private sector participation in clean technology development in Morocco would be further boosted given the international support mobilized by CTF.

III. CTF Additionality

25. Despite the rapid decline of solar PV capital costs, power generation from mid-size solar PV projects is still more expensive than from comparable alternatives in Morocco. However, the coincidence of the solar PV generation with the daily peak-demand hours when the marginal cost of generation is higher will bring the generation costs close to grid parity. The CTF funding will

bring down generation costs to cover the remaining gap and make the technology competitive. The CTF contribution will be key for completing ONEE's 400 MW solar PV strategy. The support to the first phase of the strategy will allow ONEE and local subcontractor companies to gain the experience and know-how necessary in subsequent phases.

26. Moreover, CTF funding will allow the Government of Morocco (GoM) to obtain important expertise and know-how, i.e. technical, financing, through the project, which will set a sound basis for scaling-up.

27. The financial analysis and the sensitivities developed show that the CTF contribution will have a substantial impact in making the solar PV project happen and bringing down its generation cost. As shown in the table below, if the project had to be financed with commercial domestic financing, the project LCOE would be US$0.0869/kWh. If the CTF contribution was replaced by conventional IBRD funding, the project's LCOE will still be US$0.0679/kWh.

	100% Domestic Financing	100% IBRD	IBRD + CTF 20y	IBRD + CTF 40y
LCOE cUS$/kWh	9,52	8,2	7,75	7,45

28. When comparing between hard ("CTF 20 years") and soft ("CTF 40 years") CTF financing terms, the difference in cash flows is US$5 million. This potential additional revenue is deemed to be important as a hedge against an increase of capital or operational costs, or in a lower solar radiation than expected.

29. Without the CTF concessional financing under the project, construction of mid-size PV plants in the pre-identified areas would be delayed by several years because of the perceived expensive costs of PV energy generation. Also, high costs would place pressure on an already financially fragile ONEE or burden electricity consumers in the unlikely case where additional costs could be passed on to consumers. A scenario without CTF concessional financing support would certainly delay the development of about 400 MW of solar power projects beyond 2020.

30. In conclusion, CTF soft financing terms are critical to make the solar PV project component possible and financially sound

IV. Implementation Readiness

31. **To achieve the 42percent renewable energy target by 2020, the Moroccan Government strengthened the regulatory framework by adopting key pieces of legislation such as the Renewable Energy law 13-09, and creating specialized institutions such as the Moroccan Agency for Solar Energy (MASEN).** MASEN's mission is to develop integrated solar projects with a total capacity of 2,000 MW. This mission does not preclude the national utility ONEE to pursue its own capacity expansion investments in clean energy and innovative solutions to ensure the power system reliability. ONEE's solar strategy targets mid-size PV plants to respond to inefficiencies in the grid and to bring electricity generation sources near demand centers and is therefore complementary to MASEN's large-scale solar projects. So far, the private and public sectors have committed investments of around US$2 billion to develop the Moroccan wind and solar plans, which have an estimated total cost of US$12.5 billion. The

current share of installed renewable energy is 25percent due to the large installed hydroelectric capacity, but planned investments in solar and wind energy are expected to be the main driver to reach the national renewable energy target.

32. On April 2012, the Government of Morocco merged the water and electricity utilities (Law 40/09) into the integrated company *Office National de l'Eau et de l'Electricité* (ONEE). The move aimed at improving the management of both utilities and increase cross-sector synergies. However, the company's financials are fragile, mainly due to tariffs that do not allow for cost recovery and high fuel prices. The Government and ONEE are in discussions to improve the company's financial health.

33. The process of hiring a technical advisor for the PV project and independent experts to carry environmental and social studies is underway. CTF investments will be able to be made alongside IBRD investments when the Project becomes effective.

34. ONEE is familiar with World Bank Group's policies and guidelines following the preparation of several projects including the GEF-financed Integrated Solar Combined Cycle Project near the town of Ain Beni Mathar. This pioneering project integrated a combined-cycle power plant with a 20 MW solar field using concentrated solar power (CSP) technology, the only experience that ONEE has in solar energy.

Annex 7: Poverty Mapping of Targeted Areas

Kingdom of Morocco: Clean and Efficient Energy Project

1. Morocco's economy has been performing relatively well with an average growth rate of nearly five percent over the past few years, despite successive external shocks due notably to the Eurozone crisis and a highly volatile global market. This economic growth has greatly contributed to reducing poverty and boosting shared prosperity. Extreme poverty has practically been eradicated, dropping from 2 percent to 0.28 percent over the same period.[55] Relative poverty also declined, from 15.3 percent to 6.2 percent, and population vulnerability (those living just above the poverty line) decreased from 22.8 percent to 13.3 percent[56].

2. However, inequality, poverty and vulnerability remain important challenges. Morocco's Gini coefficient of 0.41 reflects stubbornly high level of inequality in incomes and access to services. With 13.3 percent of the population still living just above the poverty line, it also means that 20 percent of Morocco's population (6.3 million people) still live either in poverty or just above the poverty line. In the context of an economy remaining largely dependent on the performance of the agricultural sector, rural populations make up two-thirds of the poor, largely employed in informal agricultural. Disparities in poverty rates across regions provide one measure of this inequality: poverty rates are highest in rural areas. Ten percent of Morocco's 13.4 million rural residents lived below the poverty line and accounted for two-thirds of the poor in Morocco in 2011.[57]

3. In the areas targeted by the Project, the poverty rates are 11,3 percent in Erfoud, 12,4 percent in Missour-Ouaouizegt, and 30 percent in Tamegroute-Zagora[58] ; these rates are mainly in Zagora, higher than the national poverty rate, which is 9, 5 percent (see poverty maps below) .

[55] Extreme poverty refers to the population living on less than US$1 PPP/day. The drop is based on the national poverty threshold, corresponding to the equivalent of US$2.15 PPP in 2007.

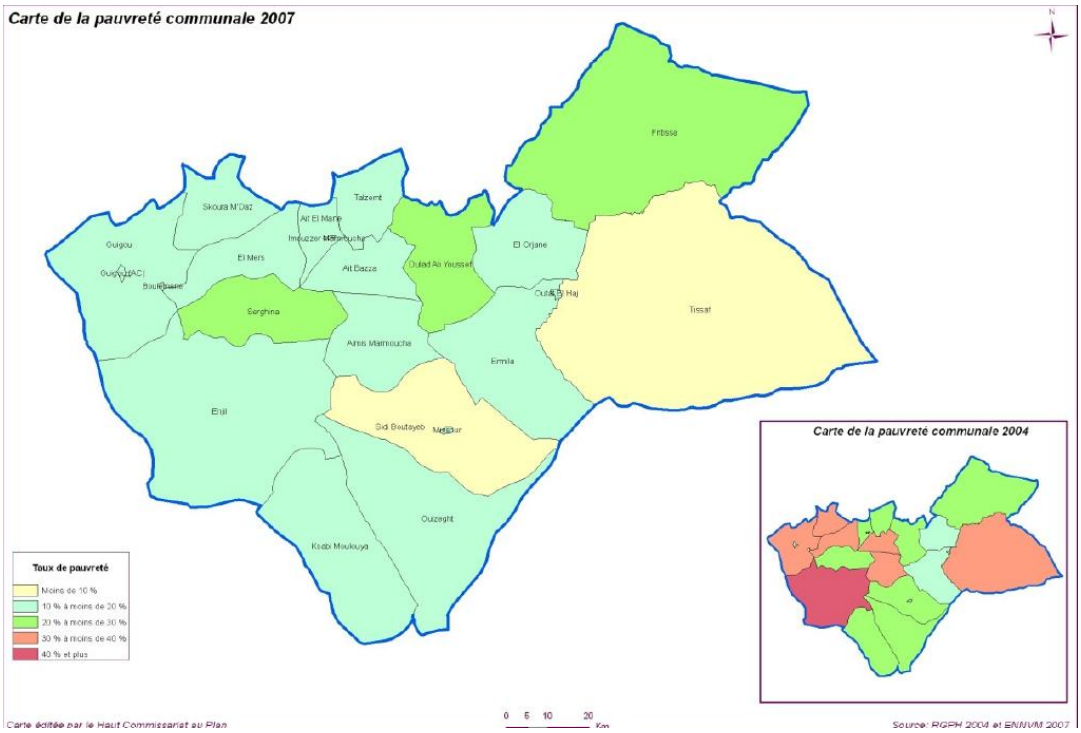
[56] Alternative poverty measurements confirm this decline. The Alkire-Foster multidimensional poverty rates declined from 28.5 percent in 2004 to 8.9 percent in 2011

[57] Cf. Country Partnership Strategy for the period 2014-2017 for the Kingdom of Morocco, The World Bank Group, 2014

[58] HCP : carte de pauvreté 2007 : http://omdh.hcp.ma/Carte-de-la-pauvrete-2007_a185.html

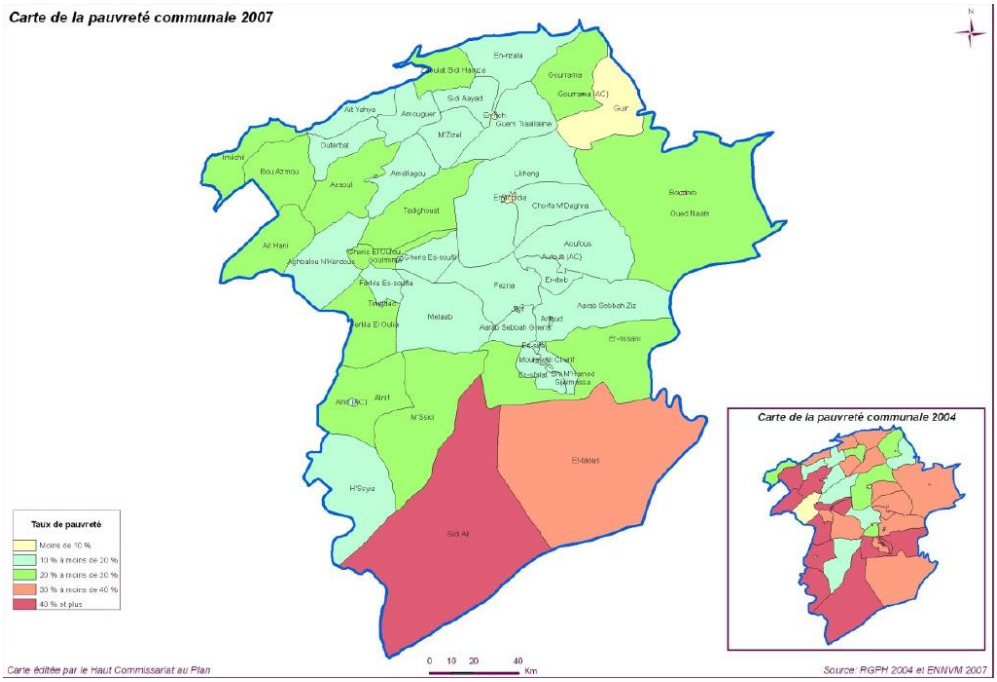
Poverty Map 1 – Boulemane Province (Missour)

Source : Maroc, Haut-Commissariat au Plan, 2007



Poverty Map 2 – Errachidia Province (Erfoud)

Source : Maroc, Haut-Commissariat au Plan, 2007



Poverty Map 3 – Zagora Province (Zagora)

Source : Maroc, Haut-Commissariat au Plan, 2007