Document of
The World Bank

STRICTLY CONFIDENTIAL

Report No: PAD1007

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF EUR234.50 MILLION AND US$80 MILLION
(US$400 MILLION EQUIVALENT)

AND

A PROPOSED LOAN FROM THE CLEAN TECHNOLOGY FUND

IN THE AMOUNT OF US$119 MILLION

TO THE MOROCCAN AGENCY FOR SOLAR ENERGY
WITH GUARANTEE FROM THE KINGDOM OF MOROCCO

FOR THE

NOOR-OUARZAZATE CONCENTRATED SOLAR POWER PLANT PROJECT

September 4, 2014

Energy & Extractives Global Practice
Middle East & North Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective June 30, 2014)

Currency Unit = Moroccan dirham
US$ 1 = €0.733

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AFD	Agence Française de Développement
AfDB	African Development Bank
APO	ACWA Power Ouarzazate
bbl	Barrels of Oil
BMU	German Federal Ministry of the Environment, Nature Conservation, Building and Nuclear Safety
BP	Bank Procedure
BUB	Back-Up Boiler
CAPEX	Capital Expenditures
CCGT	Combined-cycle, Gas-fired Turbine
CBA	Cost benefit analysis
CO_2	Carbon dioxide
COA	Court of Account
COP	Conference of the Parties
CPS	Country Partnership Strategy
CSP	Concentrated Solar Power
CTF	Clean Technology Fund
DAR	Direction Des Affaires Rurales
DBOOT	Design, Build, Own, Operate, and Transfer
DNI	Direct Normal Irradiance
DSCR	Debt Service Coverage Ratio
EC	European Commission
EIB	European Investment Bank
EPC	Engineering, Procurement, and Construction
ERR	Economic Rate of Return
ESIA	Environmental & Social Impact Assessment
FEED	Front-End Engineering and Design
FESIA	Framework Environmental and Social Impact Assessment
FESMP	Framework Environmental and Social Management Plan
FI	Fraunhofer Institute
GAU	General Affairs Unit
GDP	Gross Domestic Product
GEF	Global Environment Facility
GW	Gigawatt
GHG	Greenhouse Gas
GoM	Government of the Kingdom of Morocco
GP	Global Practice
Ha	Hectare
HSSE	Health, Safety, Security and Environment
HTF	Heat Transfer Fluid
HVDC	High-Voltage Direct Current
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
IDA	International Development Association
IFIs	International Financial Institutions
IEA	International Energy Agency
IGF	General Inspectorate of Finance
IFC	International Finance Corporation
IMF	International Monetary Fund
IP	Implementation Progress
IPCC	Intergovernmental Panel on Climate Change

ESMAP	Energy Sector Management Assistance Programme
ESMP	Environmental and Social Management Plan
EU	European Union
Km	kilometer
kWh	Kilowatt hours
Kv	Kilovolt
LAP	Land Acquisition Plan
LCOE	Levelized Economic Cost of Energy
LNG	Liquefied Natural Gas
LR	Learning rate
MAC	Marginal Abatement Cost
MAD	Moroccan Dirham
MASEN	Moroccan Solar Energy Agency
MED	Mansour Eddahbi Dam
MENA	Middle East and North Africa Region
MSF	Molten Salt Fluid
MFS	Minimum Functional Specifications
Mm	Millimeter
MOI	Ministry of Interior
MSP	Moroccan Solar Plan
MW	Megawatt
MWh	Megawatt hour
NIF	Neighborhood Investment Facility
NPV	Net Present Value
MFS	Minimum Functional Specifications
MSF	Molten Salt Fluid
ONEE	National Office for Electricity and Water
OP	Operational Policy
ORAF	Operational Risk Assessment Framework
PDAIRE	Development Master Plan for Integrated Water Resources
IWGSCC	United States Interagency Working Group on the Social Cost of Carbon
KfW	Kreditanstalt für Wiederaufbau
PDO	Project Development Objective
PPA	Power Purchase Agreement
PPP	Public-Private Partnerships
PR	Progress ratio
PV	Photovoltaic
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
R&D	Research and Development
SESIA	Site-specific Environmental and Social Impact Assessment
SDP	Social Development Plan
SESMP	Specific Environmental and Social Management Plan
SPV	Special Purpose Vehicle
TES	Thermal Energy Storage
Toe	Tons of oil equivalent
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollars
WBG	World Bank Group

Regional Vice President:	Inger Andersen
Country Director:	Simon Gray
Senior Global Practice Director:	Anita George
Practice Manager:	Charles Cormier
Task Team Leaders:	Fanny Missfeldt-Ringius/Sameh Mobarek

KINGDOM OF MOROCCO
NOOR-Ouarzazate Concentrated Solar Power Plant Project

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PAD DATA SHEET

Kingdom of Morocco

NOOR-Ouarzazate Concentrated Solar Power Plant Project (P131256)

PROJECT APPRAISAL DOCUMENT

MIDDLE EAST AND NORTH AFRICA

GEEDR

Report No.: PAD1007

Basic Information			
Project ID P131256	EA Category A - Full Assessment		Team Leader Fanny Missfeldt-Ringius and Sameh Mobarek
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints [ ]		
	Financial Intermediaries [ ]		
	Series of Projects [ ]		
Project Implementation Start Date 30-Sept-14	Project Implementation End Date 30-Jun-2020		
Expected Effectiveness Date 01-Jan-2015	Expected Closing Date 30-Jun-2020		
Joint IFC No			
Practice Manager Charles Cormier	GP Senior Director Anita M. George	Country Director Simon Gray	Regional Vice President Inger Andersen

Borrower: MASEN

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

Total Project Cost:	2,677.00	Total Bank Financing:	400.00
Financing Gap:	0.00		

Financing Source	Amount
Borrower	357
International Bank for Reconstruction and Development	400
African Development Bank	135
Clean Technology Fund (managed by IBRD+AfDB)[1]	238
EC European Commission	122
EC European Investment Bank	473
FRANCE French Agency for Development	68
GERMANY KREDITANSTALT FUR WIEDERAUFBAU (KFW)	884
Total	2,677

Expected Disbursements (in USD Million)

Fiscal Year	2015	2016	2017	2018	2019	2020			
Annual	6.50	81.10	100.30	156.00	56.10	0.00			
Cumulative	6.50	87.60	187.90	343.90	400.00	400.00			

Proposed Development Objective(s)

PDO is to increase (a) installed capacity (megawatt) and (b) electricity output (megawatt-hour), especially during peak hours, of the Noor-Ouarzazate Solar Complex

Components

Component Name	Cost (USD Millions)
Component 1 - Financing for the Initial Investment	2,377
Component 2 – Cost Mitigation Mechanism	299

Institutional Data

Sector Board

Energy and Mining

Sectors / Climate Change

Sector (Maximum 5 and total % must equal 100)

[1] Soft CTF loan terms apply.

Major Sector	Sector	%	Adaptation Co-benefits %	Mitigation Co-benefits %
Energy and mining	Other Renewable Energy	95	25	70
Public Administration, Law, and Justice	Public administration-Energy and mining	5		
Total		100		

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

Themes

Theme (Maximum 5 and total % must equal 100)

Major theme	Theme	%
Financial and private sector development	Infrastructure services for private sector development	15
Environment and natural resources management	Climate change	60
Trade and integration	Regional integration	10
Trade and integration	Technology diffusion	15
Total		100

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 [X]	No [ ]
Is approval for any policy waiver sought from the Board?	Yes [ ]	No [X]
Does the project meet the Regional criteria for readiness for implementation?	Yes [ ]	No [X] [2]

[2] The proposed Project is presented to the Board before the complex procurement process to competitively-select private sector sponsors to implement the two solar facilities financed by the IBRD and CTF loans has been completed. As such, implementation will begin after this procurement process has concluded, the sponsors selected, and the solar facilities reach financial close, which is expected to be in the first half of 2015. This approach has been adopted to ensure that the financing package for the solar facilities is finalized ahead of agreement between the Borrower and the private sector sponsors on the terms of the on-lending arrangements for the financing proceeds to reach financial close, and to give the Borrower and the bidders comfort that the CTF financing, which is critical to the economics of the facilities, is secured.

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 I(A)(6)	Yes	N/A	Not later than 9 months after the Effectiveness Date

Description of Covenant

Not later than nine months after the Effective Date, the Borrower shall contract an independent verification expert satisfactory to the Bank, under terms of reference satisfactory to the Bank, to carry out technical audits and prepare the technical audit reports regarding the implementation of Part 1.A and Part 1.C of the Project, and of the Second Plant EPC Contract and the Third Plant EPC Contract referred to in Section II.B.3 of this Schedule 2 to this Agreement.

Schedule 2, Section I(B)(1)	Yes	N/A	At the time of first disbursement under Part 1.A of the Project

Description of Covenant

To facilitate the carrying out of Part 1.A of the Project by the Second Plant Project Implementing Entity, the Borrower shall make the proceeds of the Loan allocated from time to time to Category 1 of the table set forth in Section IV.A.2 of this Schedule and the proceeds of the AfDB Second Plant Co-financing I, the AfDB Second Plant Co-financing II, the EIB Second Plant Co-financing, and the KfW Second Plant Co-financing I available to the Second Plant Project Implementing Entity as a loan or loans under one or more subsidiary loan agreements between the Borrower and the Second Plant Project Implementing Entity, under terms and conditions approved by the Bank ("Second Plant Subsidiary Loan Agreements"), including the commitments of the Second Plant Project Implementing Entity set forth or referred to in this Agreement and the right of the Borrower to suspend disbursements under such Second Plant Subsidiary Loan Agreements in case of non-compliance by the Second Plant Project Implementing Entity.

Schedule 2, Section I(B)(2)	Yes	N/A	Ongoing

Description of Covenant

The Borrower shall exercise its rights and shall cause the Second Plant Project Implementing Entity to exercise its rights under the Second Plant Subsidiary Loan Agreements in such manner as to accomplish the purposes of the Loan. Except as the Bank shall otherwise agree, the Borrower shall: (i) not assign, abrogate or waive any of the Second Plant Subsidiary Loan Agreements or any of their respective provisions; (ii) cause the Second Plant Project Implementing Entity not to assign, abrogate or waive any of the Second Plant Subsidiary Loan Agreements or any of their respective provisions. The Borrower shall not amend, and shall cause the Second Plant Project Implementing Entity not to amend any of the Second Plant Subsidiary Loan Agreements or any of their respective provisions without the prior approval of the Bank. Such prior approval shall be deemed to have been granted by the Bank in the absence of response from the Bank within fifteen (15) days from the date on which a request for prior approval shall have been communicated by the Borrower to the Bank.

Schedule 2, Section I(B)(3)	Yes	N/A	At the time of first disbursement under Part 1.C of the Project

Description of Covenant

To facilitate the carrying out of Part 1.C of the Project by the Third Plant Project Implementing Entity, the Borrower shall make the proceeds of the Loan allocated from time to time to Category 2 of the table set forth in Section IV.A.2 of this Schedule and the proceeds of the AFD Co-financing, the AfDB Third Plant Co-financing I, the AfDB Third Plant Co-financing II, the EIB Third Plant Co-financing, and the KfW Third Plant Co-financing available to the Third Plant Project Implementing Entity as a loan or loans under one or more subsidiary loan agreements between the Borrower and the Third Plant Project Implementing Entity, under terms and conditions approved by the Bank ("Third Plant Subsidiary Loan Agreements"), including the commitments of the Third Plant Project Implementing Entity set forth or referred to in this Agreement and the right of the Borrower to suspend disbursements under such Third Plant Subsidiary Loan Agreements in case of non-compliance by the Third Plant Project Implementing Entity.

Schedule 2, Section I(B)(4)	Yes	N/A	Ongoing

Description of Covenant

The Borrower shall exercise its rights and shall cause the Third Plant Project Implementing Entity to exercise its rights under the Third Plant Subsidiary Loan Agreements in such manner as to accomplish the purposes of the Loan. Except as the Bank shall otherwise agree, the Borrower shall: (i) not assign, abrogate or waive any of the Third Plant Subsidiary Loan Agreements or any of their respective provisions; (ii) cause the Third Plant Project Implementing Entity not to assign, abrogate or waive any of the Third Plant Subsidiary Loan Agreements or any of their respective provisions. The Borrower shall not amend, and shall cause the Third Plant Project Implementing Entity not to amend any of the Third Plant Subsidiary Loan Agreements or any of their respective provisions without the prior approval of the Bank. Such prior approval shall be deemed to have been granted by the Bank in the absence of response fro1n the Bank within fifteen (15) days from the date on which a request for prior approval shall have been communicated by the Borrower to the Bank.

Schedule 2, Section I(D)(1)	Yes	N/A	Ongoing

Description of Covenant (Safeguards):

The Borrower shall: (i) maintain within the Project Management Unit, an environmental and social safeguards unit, including an environmental and social safeguard coordinator with terms of reference and qualifications, budget and material support adequate to supervise the implementation of, and compliance with the FESIA; and (ii) cause each of the Second Plant Project Implementing Entity and the Third Plant Project Implementing Entity to establish and maintain an environmental and social unit adequate to supervise the preparation of the relevant SESIAs, further implement the relevant SESMP and report to the Borrower on implementation of all mitigation measures, including health and safety.

Schedule 2, Section I(D)(2)	Yes		Prior to Construction

Description of Covenant (Safeguards):

The Borrower shall cause each of the Second Plant Project Implementing Entity and the Third Plant Project Implementing Entity: (i) not to authorize any commencement of civil works to build the Second Plant or Third Plant, as applicable, before the relevant SESIA is prepared, adopted and disclosed in accordance with the FESIA; (ii) to disclose all relevant safeguard-related documentation regarding Part 1 of the Project, including the SESIAs; (iii) to construct and operate the Second Plant and the Third Plant at all times in compliance with the relevant SESIAs and the Plant-site LAPs; and (iv) not to amend, suspend, abrogate, repeal or waive any provision of the SESIAs, the Plant-site LAPs or any Associated Facility ESIAs, if applicable, without prior consultation with, and approval of the Bank.

Schedule 2, Section I(D)(3)	Yes	N/A	Ongoing

Description of Covenant (Safeguards):

The Borrower shall (i) disclose all relevant safeguard-related documentation regarding Part 1 of the Project, including the Common Infrastructure ESIAs, the SESIAs, the SESMPs, and any mitigation measures and/or environmental management plans, as appropriate, for any of the Second Plant Associated Facilities and Third Plant Associated Facilities; (ii) construct and operate the Second Plant and the Third Plant at all times in compliance with the relevant Common Infrastructure ESIAs and the Plant-site LAPs; and (iii) not amend, suspend, abrogate, repeal or waive any provision of the Common Infrastructure ESIAs or the Plant-site LAPs without prior consultation with, and approval of the Bank.

Schedule 2, Section I(D)(4)	Yes	N/A	Prior to construction

Description of Covenant (Safeguards):

The Borrower shall: (i) cause Associated Facilities ESIAs including environmental management plans for any Second Plant Associated Facilities and the Third Plant Associated Facilities to be developed in a manner consistent with the provisions of the FESIA; (ii) provide the Bank with the relevant draft Associated Facilities ESIA for its comments and feedback on such documents; and (iii) inform the Bank about the status of the preparation and adoption of the final Associated Facilities ESIA, including any mitigation measures and/or environmental management plan as appropriate, for any of such Second Plant Associated Facilities or the Third Plant Associated Facilities.

Schedule 2, Section I(D)(5)	Yes	N/A	Prior to construction

Description of Covenant (Safeguards):

The Borrower shall ensure that due diligence is carried out to assess any need for land acquisition and/or involuntary resettlement for a particular activity prior to commencing civil works for such activity. In case land acquisition and/or involuntary resettlement would be required for any Second Plant Associated

Facilities or the Third Plant Associated Facilities or for any activity related to the Second Plant or the Third Plant, the Borrower shall:

(a) ensure that LAPs be prepared either (i) in case of involuntary resettlement, in compliance with the requirements and procedures set forth in the RPF; or (ii) in case of voluntary land acquisition, including supporting documentary evidence proving the voluntary nature of the transaction;

(b) provide the Bank with copies of such LAPs for its review and concurrence before the commencement of any related civil works;

(c) ensure that prior to commencing civil works for the relevant Second Plant Associated Facility, Third Plant Associated Facility, or any relevant activity related to the Second Plant or to the Third Plant, all resettlement measures set forth in the relevant LAP in relation to the specific civil work shall have been fully executed, including the full payment of compensation; and

(d) in case of involuntary land acquisition, ensure that such LAPs are adopted and disclosed by the relevant parties.

Schedule 2, Section I(D)(6)	Yes	N/A	Ongoing

Description of Covenant (Safeguards):

The Borrower shall ensure that (i) the Second Plant Associated Facilities and the Third Plant Associated Facilities shall be constructed, operated and implemented in accordance with the RPF, the Associated Facility ESIAs (including any mitigation measures and/or environmental management plans), and the Associated Facility LAPs, as applicable; and (ii) no provision of the RPF, the Associated Facility ESIAs (including any mitigation measures and/or environmental management plans), and the Associated Facility LAPs, shall be amended, suspended, abrogated, repealed or waived without prior consultation with, and approval of the Bank.

Schedule 2, Section I(D)(7)	Yes	Bi-annual	Ongoing

Description of Covenant (Safeguards):

The Borrower shall: (i) cause each of the Second Plant Project Implementing Entity and the Third Plant Project Implementing Entity to prepare and submit to the Borrower an environmental and social management report on a bi-annual basis during the construction of the Second Plant and the Third Plant, and on an annual basis during operation of the Second Plant and the Third Plant; and (ii) include a summary of such reports in the Project Reports referred to in Section II.A of this Schedule 2.

Schedule 2, Section I(D)(8)	No	Not later than six (6) months after the Effective Date	Once

Description of Covenant (Safeguards):

Not later than six (6) months after the Effective Date, the Borrower shall prepare a progress report on the implementation of the SDP and provide such report to the Bank for its comments and recommendations.

Schedule 2, Section V(A)	Yes	Commencing with Borrower's FY15	Ongoing

Description of Covenant:

Except as otherwise agreed by the Bank, the Borrower's Equity shall remain positive on a yearly basis commencing with the Borrower's fiscal year 2015, as evidenced by the Borrower's yearly audited

financial statements.			
Schedule 2, Section V(B)	Yes	Commencing with Borrower's FY15	Ongoing

Description of Covenant:

Before the end of each fiscal year commencing with the Borrower's fiscal year 2015, the Borrower shall furnish to the Bank a copy of the business plan and financial projections (which shall include projected consolidated balance sheet, income statement and cash flow statement), of the Borrower and its subsidiaries for each upcoming fiscal year, as adopted by the Management Board (*Directoire*) of the Borrower and prepared in accordance with consistently applied accounting standards acceptable to the Bank, in a form and substance agreed by the Borrower and the Bank.

Conditions

Source Of Fund	Name	Type
CTF	Schedule 2, Section IV(B)(1)	Disbursement

Description of Condition

(a) Notwithstanding the provisions of Part A of this Section, no withdrawal shall be made from the Loan Amount until the World Bank has received payment in full of the Management Fee.

(b) Notwithstanding the provisions of Part A of this Section, for payments made prior to the date of this Agreement, except that withdrawals up to an aggregate amount not to exceed US$24,000,000 may be made for payments made prior to this date but on or after January 15, 2015, for Eligible Expenditures under Categories (1) and (2).

IBRD	Schedule 2, Section IV(B)(1)(a)	Disbursement

Description of Condition

For payments made prior to the date of this Agreement, except that withdrawals up to an aggregate amount not to exceed €46,900,000 and $16,000,000 may be made for payments made prior to this date but on or after January 15, 2015, for Eligible Expenditures under Categories (1) and (2).

CTF+IBRD	Schedule 2, Section IV(B)(1)(c)(i) (CTF) Schedule 2, Section IV(B)(1)(b)(i) (IBRD)	Disbursement (Category 1 – for Noor II construction)

Description of Condition

(A) The Second Plant Project Implementing Entity has been legally established in a manner satisfactory to the Bank.

(B) The Second Plant Project Implementing Entity has established an accounting and financial management system satisfactory to the Bank.

(C) The Second Plant Project Implementing Entity has adopted the Second Plant Financial Management and Disbursement Manual, satisfactory to the Bank and the Co-financiers.

(D) The Second Plant Project Implementing Entity has adopted the Second Plant Governance Framework, satisfactory to the Bank.

(E) The Second Plant Subsidiary Loan Agreements have been executed on behalf of the Borrower and the Second Plant Project Implementing Entity and all conditions precedent to their effectiveness and to the right of the Second Plant Project Implementing Entity to make withdrawals under them (other than the effectiveness of this Agreement) have been satisfied or waived.

(F) All conditions precedent to the right of the Borrower to make withdrawals under Category (1) in the table in Section IV of Schedule 2 to the CTF Loan Agreement have been satisfied or waived.

(G) The Borrower and the Kingdom of Morocco have entered into the Second Plant Specific Convention.

(H) Execution and satisfaction or waiver of all conditions precedent to the effectiveness and, to the extent applicable, to the right of the Borrower to make withdrawals under them (other than the effectiveness of this Agreement), of all the following agreements:

1. the AfDB Second Plant Co-financing Agreements;
2. the EC Second Plant Co-financing Agreement;
3. the EIB Second Plant Co-financing Agreement; and
4. the KfW Second Plant Co-financing Agreement.

(I) Execution and satisfaction or waiver of all conditions precedent to the effectiveness and, to the extent applicable, to the right of the Borrower or of the Second Plant Project Implementing Entity to make withdrawals under them (other than the effectiveness of this Agreement), of all other agreements, to be found satisfactory by the Bank in form and substance within reasonable time, required to finance, construct, own, and operate the Second Plant, including, but not limited to:

1. the Second Plant EPC Contract;
2. the Second Plant Operation and Maintenance Agreement;
3. the Second Plant Power Purchase Agreement;
4. the Second Plant Power Sale Agreement; and
5. the Second Plant Shareholders' Agreement.

CTF+IBRD	Schedule 2, Section IV(B)(1)(c)(ii) (CTF) Schedule 2, Section IV(B)(1)(b)(ii) (IBRD)	Disbursement (Category 1 – for Noor II construction)

Description of Condition

The Bank has been furnished with opinions satisfactory to the Bank of counsels acceptable to the Bank, showing that the Second Plant Subsidiary Loan Agreements have been duly authorized or ratified by the Borrower and the Second Plant Project Implementing Entity, and are legally binding upon the Borrower and the Second Plant Project Implementing Entity in accordance with their terms.

CTF+IBRD	Schedule 2, Section IV(B)(1)(c)(iii) (CTF) Schedule 2, Section IV(B)(1)(b)(iii) (IBRD)	Disbursement (Category 1 – for Noor II construction)

Description of Condition

The Bank has been furnished with opinions satisfactory to the Bank of counsels acceptable to the Bank, showing that each of the agreements referred to in paragraph (b) (i) (I) [(c)(i)(I) with respect to the CTF Agreement] above has been duly authorized or ratified by each of the parties thereto, and is legally binding upon each of the parties thereto in accordance with its terms.

CTF+IBRD	Schedule 2, Section IV(B)(1)(c)(iv) (CTF) Schedule 2, Section IV(B)(1)(b)(iv) (IBRD)	Disbursement (Category 1 – for Noor II construction)

Description of Condition

The Borrower shall have provided to the Bank, with respect to each withdrawal application, the relevant interim unaudited financial report for the Project, including the report referred to in Section II.B.3 of this Schedule 2 to this Agreement, in form and substance satisfactory to the Bank.

CTF+IBRD	Schedule 2, Section IV(B)(1)(d)(i) (CTF) Schedule 2, Section IV(B)(1)(c)(i) (IBRD)	Disbursement (Category 2 – for Noor III construction)

Description of Condition

(A) The Third Plant Project Implementing Entity has been legally established in a manner satisfactory to the Bank.

(B) The Third Plant Project Implementing Entity has established an accounting and financial management system satisfactory to the Bank.

(C) The Third Plant Project Implementing Entity has adopted the Third Plant Financial Management and Disbursement Manual, satisfactory to the Bank and the Co-financiers.

(D) The Third Plant Project Implementing Entity has adopted the Third Plant Governance Framework, satisfactory to the Bank.

(E) The Third Plant Subsidiary Loan Agreements have been executed on behalf of the Borrower and the Third Plant Project Implementing Entity and all conditions precedent to their effectiveness and to the right of the Third Plant Project Implementing Entity to make withdrawals under them (other than the effectiveness of this Agreement) have been satisfied or waived.

(F) All conditions precedent to the right of the Borrower to make withdrawals under Category (2) in the table in Section IV of Schedule 2 to the CTF Loan Agreement have been satisfied or waived.

(G) The Borrower and the Kingdom of Morocco have entered into the Third Plant Specific Convention.

(H) Execution and satisfaction or waiver of all conditions precedent to the effectiveness and, to the extent applicable, to the right of the Borrower to make withdrawals under them (other than the effectiveness of this Agreement), of all the following agreements:

1. the AFD Co-financing Agreement;
2. the AfDB Third Plant Co-financing Agreements;
3. the EC Third Plant Co-financing Agreement;
4. the EIB Third Plant Co-financing Agreement; and
5. the KfW Third Plant Co-financing Agreement.

(I) Execution and satisfaction or waiver of all conditions precedent to the effectiveness and, to the extent applicable, to the right of the Borrower or of the Third Plant Project Implementing Entity to make withdrawals under them (other than the effectiveness of this Agreement), of all other agreements, to be found satisfactory by the Bank in form and substance within reasonable time, required to finance, construct, own, and operate the Third Plant, including, but not limited to:

1. the Third Plant EPC Contract;
2. the Third Plant Operation and Maintenance Agreement;
3. the Third Plant Power Purchase Agreement;
4. the Third Plant Power Sale Agreement; and
5. the Third Plant Shareholders' Agreement.

CTF+IBRD	Schedule 2, Section IV(B)(1)(d)(ii) (CTF) Schedule 2, Section IV(B)(1)(c)(ii) (IBRD)	Disbursement (Category 2 – for Noor III construction)

Description of Condition

The Bank has been furnished with opinions satisfactory to the Bank of counsels acceptable to the Bank, showing that the Third Plant Subsidiary Loan Agreements have been duly authorized or ratified by the Borrower and the Third Plant Project Implementing Entity, and are legally binding upon the Borrower and the Third Plant Project Implementing Entity in accordance with their terms.

CTF+IBRD	Schedule 2, Section IV(B)(1)(d)(iii) (CTF) Schedule 2, Section IV(B)(1)(c)(iii) (IBRD)	Disbursement (Category 2 – for Noor III construction)

Description of Condition

The Bank has been furnished with opinions satisfactory to the Bank of counsels acceptable to the Bank, showing that each of the agreements referred to in paragraph (c) (i) (I) [(d)(i)(I) with respect to the CTF Agreement] above has been duly authorized or ratified by each of the parties thereto, and is legally

binding upon each of the parties thereto in accordance with its terms.		
CTF+IBRD	Schedule 2, Section IV(B)(1)(d)(iv) (CTF) Schedule 2, Section IV(B)(1)(c)(iv) (IBRD)	Disbursement (Category 2 – for Noor III construction)
Description of Condition The Borrower shall have provided to the Bank, with respect to each withdrawal application, the relevant interim unaudited financial report for the Project, including the report referred to in Section II.B.4 of this Schedule 2 to this Agreement, in form and substance satisfactory to the Bank.		
IBRD	Schedule 2, Section IV(B)(1)(d)	Disbursement (Category 3 – for Noor I cost mitigation)
Description of Condition Under Category (3), until the Borrower shall have provided to the Bank: (i) evidence satisfactory to the Bank that the First Plant is fully commissioned and operational; and (ii) with respect to each withdrawal application, the relevant interim unaudited financial report for the Project, including the report from the independent verification expert referred to in Section II.B.5 of this Schedule 2 to this Agreement.		
IBRD	Schedule 2, Section IV(B)(1)(e)	Disbursement (Category 4 – for Noor II cost mitigation)
Description of Condition Under Category (4), until the Borrower shall have provided to the Bank: (i) evidence satisfactory to the Bank that the Second Plant is fully commissioned and operational; and (ii) with respect to each withdrawal application, the relevant interim unaudited financial report for the Project, including the report from the independent verification expert referred to in Section II.B.5 of this Schedule 2 to this Agreement.		
IBRD	Schedule 2, Section IV(B)(1)(f)	Disbursement (Category 5 – for Noor III cost mitigation)
Description of Condition Under Category (5), until the Borrower shall have provided to the Bank: (i) evidence satisfactory to the Bank that the Third Plant is fully commissioned and operational; and (ii) with respect to each withdrawal application, the relevant interim unaudited financial report for the Project, including the report from the independent verification expert referred to in Section II.B.5 of this Schedule 2 to this Agreement.		

Team Composition

Bank Staff

Name	Title	Specialization	Unit
Fanny Missfeldt-Ringius	Sr. Energy Economist	Task Team Leader, Economist	GEEDR
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Name	Title	Office Phone	City
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Rafael Ben	Consultant	Renewable Energy	Washington, D.C.

Locations

Country	First Administrative Division	Location	Planned	Actual	Comments
Morocco	Souss-Massa-Draa	Ouarzazate	X	X	Noor-Ouarzazate II & III

I. STRATEGIC CONTEXT

1. **In 2009, Morocco made the strategic decision to maximize use of its domestic renewable resources to increase its energy security, reduce its dependence on imported fossil fuels, and limit carbon dioxide (CO_2) emissions within the framework of its overall domestic industrial integration policies.** Morocco is currently the largest energy importer in the Middle East, depending on non-domestic sources for over 97 percent of its domestic energy demand. As a result, the country adopted a progressive energy sector development plan that committed to increasing the country's share of renewable energy generation to 42 percent of national capacity by 2020, and to improving energy efficiency by 12 percent by 2020 and 15 percent by 2030, thus reducing greenhouse gas (GHG) emissions. Morocco plans to meet this renewable energy target by developing 2,000 megawatts (MW) of solar capacity, under the Moroccan Solar Plan (MSP – now referred to as 'Noor'), 2,000 MW of wind capacity and 2,000 MW of hydro, to take advantage of the country's excellent renewable energy resources.

2. **Morocco has been one of a growing number of countries that have made a significant commitment to Concentrated Solar Power (CSP) technology, and is actively pursuing a successful program to increase its penetration within its borders**. The technology is particularly useful in Morocco because it can provide carbon-neutral, firm capacity that can be dispatched during the country's evening peak electricity demand. Advancing development of this technology requires public investment that so far Morocco and a few other countries have been willing to make. More broadly, recent trends demonstrate a clear shift of investment patterns in renewable energy technologies over the past several years, increasingly in emerging markets as such countries recognize the linkages between low-carbon green economies and a future of energy access and security. Support from developed countries for technology investments in emerging markets has come mostly in the form of vital concessional bilateral and multilateral financing for projects similar to the proposed Project herein.

3. **Morocco's investment in CSP will contribute to the global public good of developing CSP technology.** Although the choice of CSP technology could yield additional significant returns from developing the country's local manufacturing capacity and from opening markets in Europe for green energy in the medium to long-term, these benefits, by themselves, are insufficient to justify CSP's economic costs to the country using the Bank's traditional project-level analysis. However, the country's focus on CSP is a choice with broader implications to the global public interest in developing this technology, which is one of the few carbon-neutral technologies that can provide base load power. One of the significant challenges of climate change is the need to develop and deploy low carbon technologies at an accelerated pace, so that the global greenhouse gas emissions peak within a decade, and significantly decrease thereafter. Morocco's investment in this project, and the Morocco Solar Plan, contributes to global knowledge of CSP technology and to lowering its deployment costs.

4. **Based on the Bank's analysis for the proposed Project, CSP's average capital costs could fall by approximately 48 percent as a result of Morocco's and other countries' investments in CSP in the next few years.** Such reduction would make the technology globally competitive with traditional technologies by 2030, with significant global benefits. The economic rationale for the proposed Project rests on the following: (i) the project will contribute

to the global public good related to lowering the costs of CSP and (ii) Morocco stands to benefit from lower costs in future CSP projects.

5. **Morocco is fully committed to its solar program and is moving forward despite insufficient global climate finance to pay the incremental costs.** The Project is consistent with the World Bank Group's Energy Directions Paper, which indicated that the Bank "is open to providing support for higher-cost projects with smaller environmental footprints" contingent on (a) availability of concessional financing to cover the incremental costs of clean energy projects or (b) strong client demand and ownership based on close alignment with national development objectives.[3] The strategy acknowledged that "some client countries may be willing to pay the incremental costs of cleaner energy if other significant developmental co-benefits exist, such as enhancing the security of supply, job creation, and seizing first-mover advantages." As discussed further below, the proposed Project has gathered significant concessional finance and Morocco is fully committed to its solar program, which forms part of its national development objectives.

A. Global, Regional, and Country Context

A-1 Global Context

6. **Solar technology – and more specifically concentrating solar power (CSP) with storage - is one of the emerging key supply-side technologies that could serve as a substitute to fossil fuels and demonstrate the critical role of energy technologies in significantly reducing global GHG emissions.** Although Photovoltaic (PV) solar technology has some critical applications, the International Energy Agency (IEA) noted that CSP "has strong potential to be a key technology for mitigating climate change."[4] The IEA also noted that its flexibility enhances grid reliability, indicating that "[u]nlike solar [PV], CSP has an inherent capacity to store heat energy for short periods of time for later conversion to electricity," thus providing "reliable electricity that can be dispatched to the grid when needed, including after sunset to match late evening peaking demand or even around the clock to meet base-load demand."[5] Moreover, CSP "can also be seen as an enabling technology to help integrate on grids larger amounts of variable renewable resources such as solar PV or wind power."[6]

7. **Deployment of CSP technologies has reached 3.4 Gigawatt (GW) as of 2013 and is gaining momentum.** CSP's flexibility in the generation mix was recognized in many countries that announced ambitious solar programs that included a significant amount of CSP generation. India, for example, announced the three-phase Jawaharlal Nehru National Solar Mission in 2010 that targets development of 20 GWs of on-grid and two GWs of off-grid solar capacity by 2022. A significant portion of this program includes implementation of large-scale CSP generation. China also announced a program to develop one GW and three GW of CSP generation by 2015

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[3] *Toward a Sustainable Energy Future for All: Directions for the World Bank Group's Energy Sector* (July 2013) (*available at* http://www.worldbank.org/content/dam/Worldbank/document/SDN/energy-2013-0281-2.pdf).

[4] *See* International Energy Agency, *Technology Roadmap: Concentrating Solar Power*, p.7 (2010).

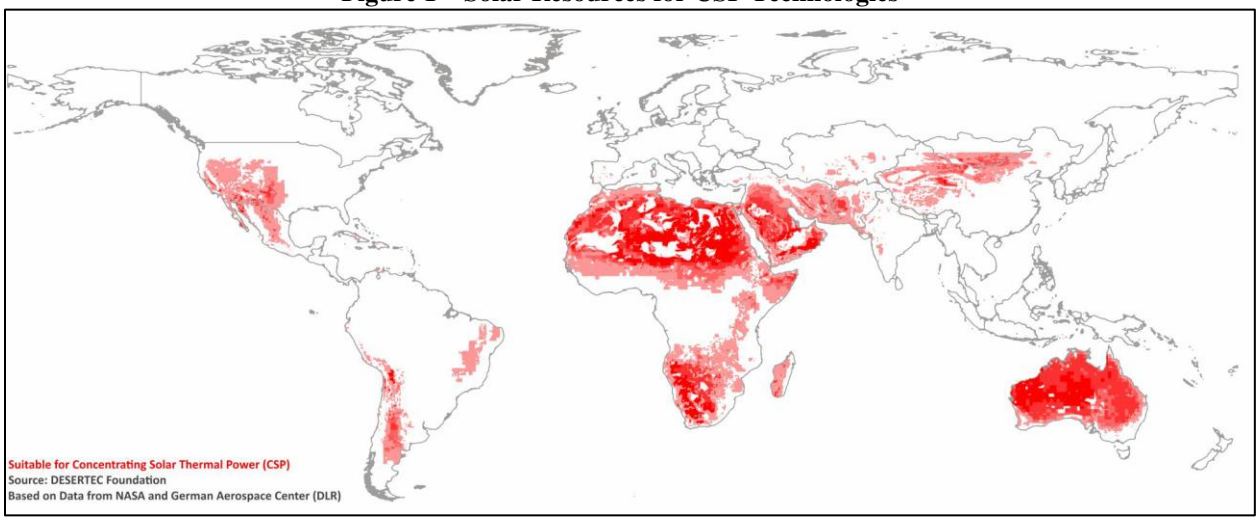
[5] *Id.*

[6] *Id.*

and 2020, respectively, and South Africa is actively pursuing development of one GW of CSP generation by 2030. Other countries (e.g., Botswana, Mexico, Chile, and Brazil) are pursuing individual CSP project developments (standalone and hybrid configuration) for training and demonstration purposes.

8. **CSP has the potential of producing enough clean electricity and fuel to satisfy electricity global demand in the Middle East and North Africa Region.** The technology is most effective in areas where the direct normal irradiance (DNI) of solar energy is at its peak. Although there are several regions around the world where the DNI numbers are favorable for CSP deployment (see Figure 1), the IEA recognized the technology's substantial prospects, in particular, in the MENA region, noting that the potential for CSP applications in the region "would cover about 100 times the current consumption of the Middle East, North Africa, and the European Union combined."[7] In short, the agency concluded that "CSP would be largely capable of producing enough no-carbon or low-carbon electricity and fuels to satisfy global demand." As such, there is a global public good in further developing this technology to realize its benefits and maximize its impact on reducing the anthropogenic sources of GHG emissions.

Figure 1 – Solar Resources for CSP Technologies



9. **More investments in the technology's development are needed to continue the downward trend of its learning curve and costs.** While CSP generation presents clear benefits to grid operations and system costs, the technology's **development remains below the** IEA's '450 Scenario' targets.[8] Despite a sharp increase in the past few years, global investments in the technology's development remain low in comparison to PV and wind. In 2011, for example, global CSP investments were US$13 billion, while investments in PV and wind were US$125 billion and US$84 billion, respectively. CSP's relatively higher capital costs, when compared to PV, wind, and traditional fossil fuel technologies, present some practical financing challenges. These challenges have been addressed so far through public funding or subsidies, and

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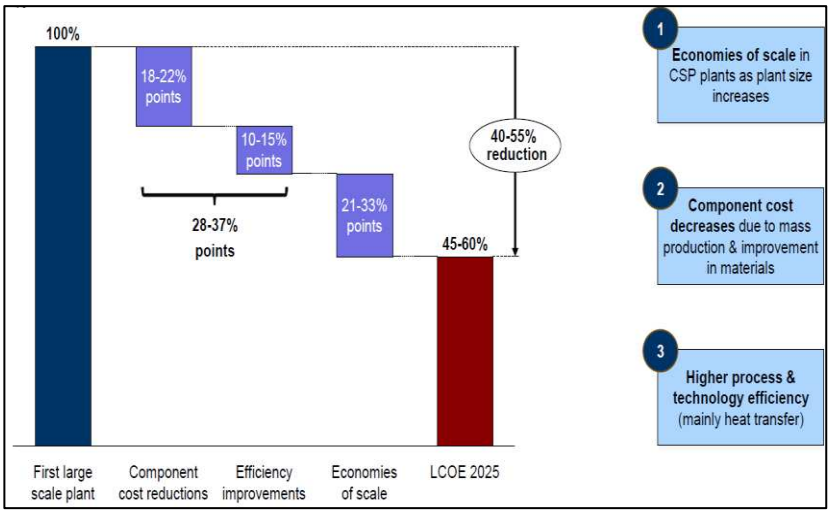
7 *Id.* at 10.

8 The IEA describes this scenario as one "presented in the *World Energy Outlook* that sets out an energy pathway consistent with the goal of limiting the global increase in temperature to 2°C by limiting concentration of greenhouse gases in the atmosphere to around 450 parts per million of CO_2."

concessional financing. Although these costs are expected to decline by 40 to 55 percent over the next 10 years (see Figure 2),[9] the technology still needs significant support to continue its global development, much in the same way as was needed for PV and wind technologies in early stages of their development.

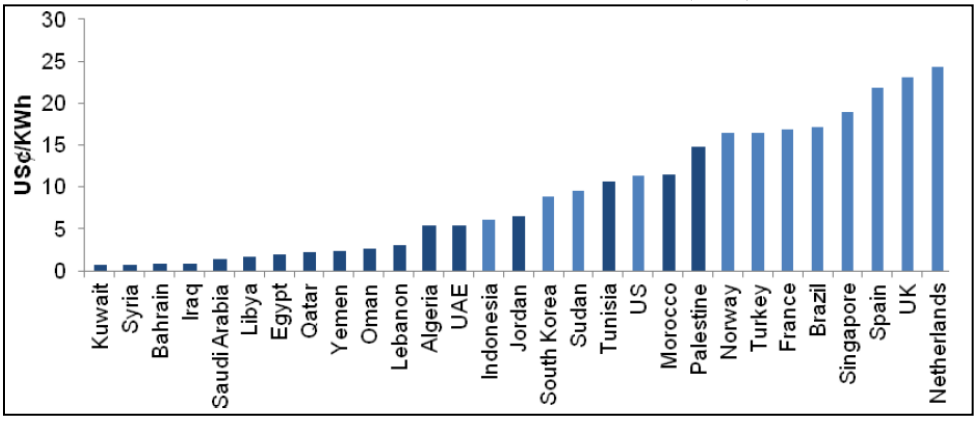
Figure 2 – IPCC's Expected Decline for the CSP's Levelized Cost of Energy (2012-2025)



Source: SBC Energy Institute (2013)

A-2 Regional Context

Figure 3 – Cross-Country Comparison of Average Residential Electricity Prices in Selected MENA and non-MENA Countries (2008)[10]



10. **Historically, energy was perceived in the MENA region as a public good.** The political economy of the climate change debate invariably turns on decidedly domestic national priorities. Although climate change initiatives garnered attention in some Middle East capitals as part of long-term public policy, low-cost energy was and, to a large extent, continues to be

[9] In fact, the capital costs bid for Noor I (as defined in paragraph 21 below) were 30 percent lower than prevailing market prices at the start of the project's procurement process, thus confirming the downward trajectory of future CSP costs.

[10] *See* Laura El-Katiri, *A Roadmap for Renewable Energy in the Middle East and North Africa*, p.9 (2014).

viewed in many countries in the region as a key driver of short- to medium-term economic growth. The region has long been recognized for abundance of its energy resources that has made it a global energy supplier. Its energy wealth stimulated rapid development of energy-intensive industries in some countries, but, at the same time, spurred domestic energy consumption growth rates that dwarfed global averages. Much of these developments were caused by domestic policies that identified energy as a public good to be provided by governments, if not for free, then at prices that were, in many cases, far below its market value. These policies involved both implicit and explicit subsidies across different fuel types and electricity at all levels of production (wholesale supply, distribution, and retail). Only Morocco and the Palestinian territories had electricity tariffs that were close to levels in the European Union (see Figure 3), though both subsidize electricity, implicitly and explicitly, suggesting that the actual cost of generation may well exceed these already high prices.

11. **Renewable energy development is an economic imperative for net energy exporters.** Traditionally, many countries in the MENA region viewed the cost of energy in terms of subsidized long-run marginal cost of production per unit of energy, not in terms of the opportunity cost of this unit when priced at its economic value in the international market. The resulting distortion made fossil-fuel generation a favored incumbent that was difficult to replace with any other form of generation. While net energy exporters in MENA may have been able to support these policies in the past, their rapidly growing population and its attendant substantial increase in domestic energy consumption have made the economic costs of such distortions increasingly evident. The problem became even more acute as global oil prices significantly increased starting in 2000 and transformed the traditional environment where the historical social pacts between governments and their citizens were struck.[11] As a result, even energy-rich countries like Saudi Arabia, Qatar, Bahrain, and Kuwait began to consider developing renewable sources of electricity generation as an economic alternative to ever-increasing pressures on the countries' hydrocarbon resources. Saudi Arabia alone announced a plan to develop 41 gigawatts (GWs), consisting of 25 GWs of CSP plants and 16 GWs of PV plants, by 2032. The United Arab Emirates has already commissioned its first CSP plant and plans a number of others in the next several years.

12. **Renewable energy development is a tool to ensure energy security for net energy importers.** Net energy importers (e.g., Morocco, Tunisia, and Jordan), on the other hand, faced a different problem. While net energy exporters had to contend with the negative implications of the opportunity costs of subsidizing domestic energy consumption, net energy importers had to actually fund the subsidy from the public budget. As domestic consumption increased, so did the fiscal pressure from their domestic energy pricing policies. Increases in both absolute global oil prices and levels of price volatility since 2000 made this problem even more acute. Even as some of these net energy importers started to reform their domestic energy pricing strategies to focus more on targeted subsidies and reduce their overall fiscal impact on their national budgets, exposure to price shocks and risks to their energy security (i.e., access to secure energy supplies at affordable prices) only transferred to the broader economy. These risks manifest themselves in much higher costs of energy that raise affordability issues to final consumers and

[11] By 2011, total annual pre-tax subsidies in the region, when calculated as the difference between the value of consumption at world and domestic prices, amounted to US$236.7 billion, representing 8.6 percent of regional GDP and half of global energy subsidies.

competitiveness issues to the broader industrial and commercial sectors. Consequently, aggressive renewable energy strategies, as a hedge to exposure to oil price shocks and a key to energy security, seemed reasonable.

A-3 Country Context

13. **Morocco is strategically located but energy constrained.** Morocco is strategically located in North Africa with a population of 32.7 million (2013 est.) covering a land mass slightly larger than California. Its population is relatively young, with over 45 percent under 24 years old, and has a growth rate of 1.04 percent. The country has capitalized on its proximity to Europe and relatively low labor costs to build a diverse, open, market-oriented economy with low inflation rates (< two percent). The economy, composed mainly of a robust services (51.3 percent) and industrial (28.1 percent) sectors, grew at an estimated 4.4 percent in 2013. Imports in 2013 are estimated to be approximately 49 percent of GDP while exports stood at 34 percent of GDP. The country's current account stands at an estimated deficit of approximately 7.6 percent of GDP in 2013, resulting, in part, from higher prices for imported fuel.

14. **Morocco is largely dependent on fossil fuel imports for its primary energy use and is the largest energy importer in MENA.** Morocco imports over 97 percent of its domestic energy needs, making it the largest energy importer in the MENA region.[12] Despite having a per capita energy consumption rate that is less than a third of the world average,[13] Morocco's future economic development, which is heavily focused on energy-intensive industries (e.g., chemicals, construction, etc.), building its infrastructure base, and tourism, will likely increase its long-term energy needs. As a result, Morocco is particularly vulnerable to fluctuations in international energy prices and to supply shocks that could range from availability of supply and political externalities to logistical issues such as late deliveries, pipeline disruptions, and bad weather.

15. **Morocco has engaged in reforms to reduce the fiscal burden of the country's domestic energy pricing policies.** Until recently, Morocco, like many countries in the MENA region, followed a domestic energy pricing policy that universally subsidized end-users. Prices were historically fully indexed to market rates until 2000 when energy markets experienced significant increases and volatility. Since then, the Government of the Kingdom of Morocco (GoM) adopted an administrative pricing policy that fixed the domestic costs of energy and covered the difference between this price and cost-recovery rates from the national budget. However, as illustrated in Figure 3, the GoM adopted administrative prices, particularly for electricity, that were close to levels in the European Union, and, as a result, Morocco had one of the lowest subsidy rates in the MENA region (see Figure 4). Nonetheless, the fiscal impact of

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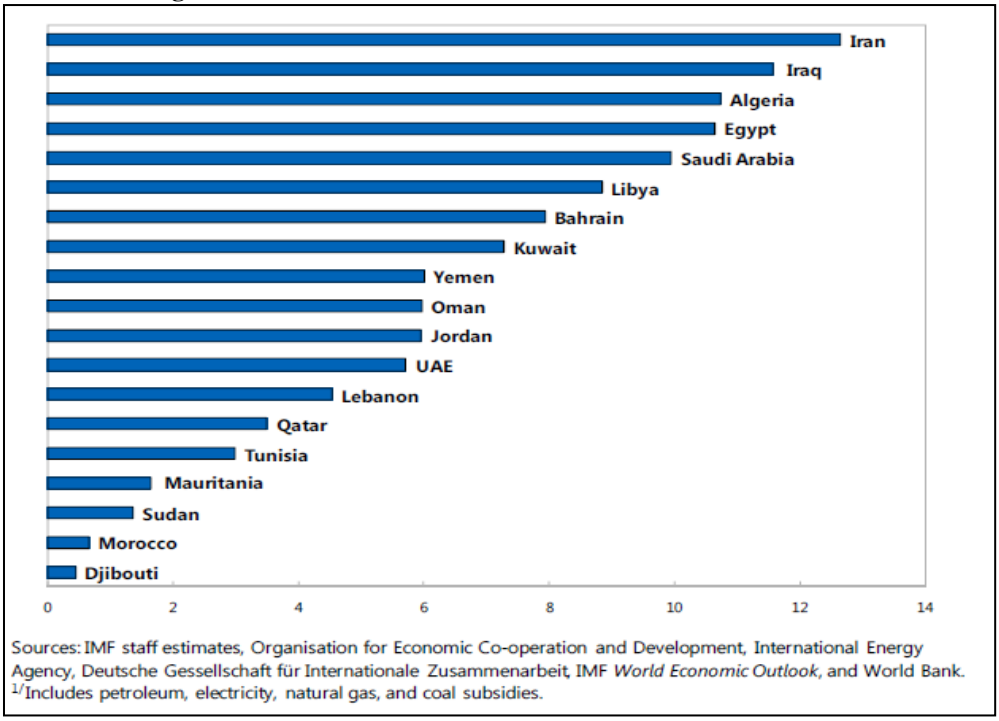
[12] Morocco's oil and natural gas reserves stand at 680,000 barrels of oil (bbl) and 1.444 million cubic meters (cu. m.) (2013 est.), respectively, with domestic production standing at 5,057 bbl/day (2012 est.) of oil and 60 million cu. m. (2010 est.) of natural gas. Although the country has some coal reserves, it made the decision in 2000 to close its domestic mines for environmental reasons and currently relies on imported coal. Domestic oil and gas consumption stands at 123,000 bbl/day (2010 est.) and 560 million cu. m. (2010 est.), respectively.

[13] 0.52 tons of oil equivalent (Toe) (2011 est.) compared to a world average of 1.7 Toe (2011 est.).

this subsidy policy continued to exert pressure on the national budget and, in 2014, the GoM instituted reforms that aimed to reduce this pressure through partial indexation of fuel prices.[14]

Figure 4 – MENA 2011 Pre-Tax Subsidies as Percent of GDP



Sources: IMF staff estimates, Organisation for Economic Co-operation and Development, International Energy Agency, Deutsche Gessellschaft für Internationale Zusammenarbeit, IMF *World Economic Outlook*, and World Bank.
1/Includes petroleum, electricity, natural gas, and coal subsidies.

B. Sectoral and Institutional Context

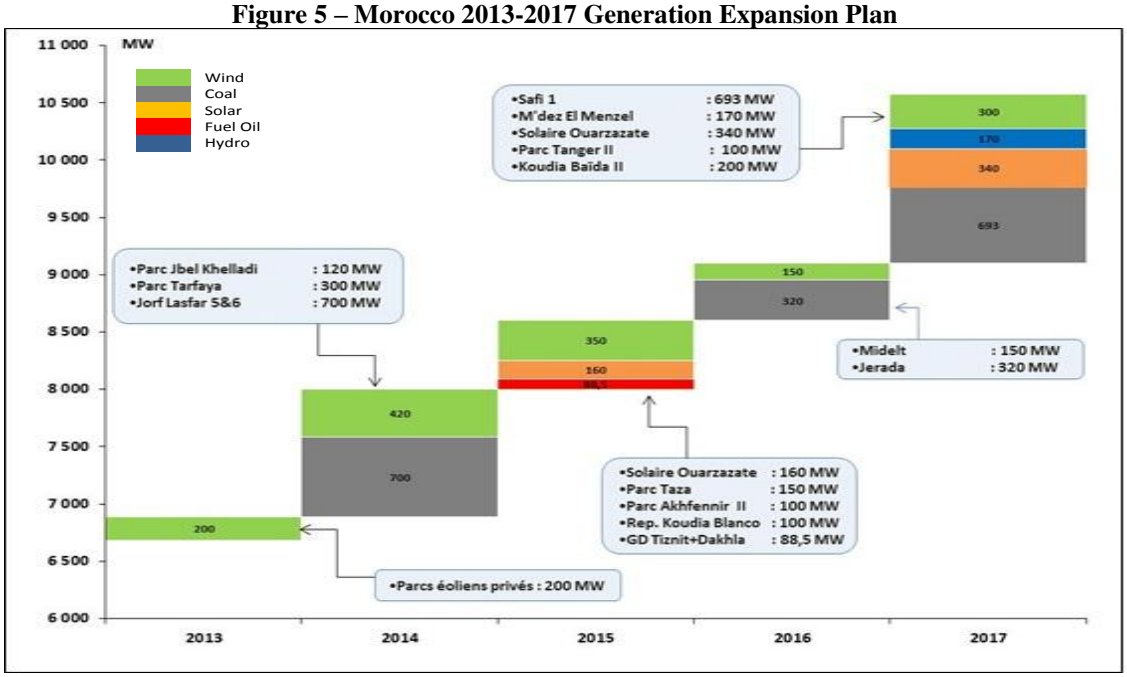
16. **Morocco's power sector is dominated by l'Office National de l'Electricité et de l'Eau Potable (ONEE).** ONEE was originally established in 1963 as a legally and financially autonomous public entity, responsible for electricity service in the country. With the exception of renewable energy produced under the framework of Law 13/09, ONEE acts as the single buyer in the sector, owns and manages the entirety of the transmission system, generates 41.2 percent (2013) of the power in the country, and distributes 58 percent of the electricity to 4.5 million customers. The country's 6,892 MW (2013) of generation capacity consists predominantly of thermal generation. Electricity not supplied by ONEE comes from Independent Power Producers (40 percent (2013)) and imports from Spain (16.8 percent (2013)).[15] Electricity demand grew by approximately 8 percent in 2011-2013 and amounted to 32 terawatt-hour (TWh) in 2013; forecasts point to doubling of demand by 2020 and tripling by 2030. Although ONEE and the relevant stakeholders in the GoM are acutely aware of the need

[14] These reforms were part of a multi-year program the GoM agreed to with the International Monetary Fund (IMF) to improve the country's long-term macroeconomic performance. In December 19, 2013, the World Bank 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.

[15] In some important cities (i.e., Rabat, Casablanca, Tanger, and Tetouan) as well as in some geographically limited public utility distribution areas, private municipal concessions were established to manage retail electricity supply to customers within the concession areas.

to curb this growth and are considering demand-side management and energy efficiency initiatives, there is still a need for a rapid build-up of the country's generation capacity (see Figure 5).

Figure 5 – Morocco 2013-2017 Generation Expansion Plan



17. **In 2009, Morocco made the strategic decision to maximize use of its domestic renewable resources to increase its energy security, reduce its dependence on imported fossil fuels, and limit carbon dioxide (CO2) emissions within the framework of its overall domestic industrial integration policies.** The country adopted a progressive energy sector development plan that committed to increasing the country's share of renewable energy generation to 42 percent of national capacity by 2020, and to improving energy efficiency by 12 percent by 2020 and 15 percent by 2030, thus reducing greenhouse gas (GHG) emissions. Morocco plans to meet this renewable energy target by developing 2,000 megawatts (MW) of solar capacity, under the Moroccan Solar Plan (MSP), 2,000 MW of wind capacity and 2,000 MW of hydro, to take advantage of the country's excellent renewable energy resources. The Moroccan Solar Energy Agency (MASEN or the "Company") was established by Law 57/09 to develop and manage the 2,000 MW of solar power facilities. The GoM committed to financially support MASEN during implementation of the MSP in a General Convention signed at MASEN's inception.

18. **PV presents a lower cost alternative to CSP on a *capital costs* basis.** The first solar complex in MASEN's 2,000 MW program was originally called the Ouarzazate Solar Complex because it was located near the city of Ouarzazate in central Morocco. However, it was later dubbed the 'Noor-Ouarzazate' Solar Complex (hereinafter referred to as the "Noor-Ouarzazate Complex" or the "Noor-Ouarzazate Solar Complex") by King Mohammed VI when he inaugurated start of construction of the first 160 MW phase (hereinafter referred to as 'Noor-

Ouarzazate I') of the 500 MW complex.[16] The Bank commissioned a study by Mercados in 2013 to analyze the optimal least-cost expansion choice of renewable energy technologies in ONEE's transmission system.[17] Of particular interest in this analysis was the choice between CSP with storage and PV, which would yield similar GHG emission reductions at lower capital costs. The study took into account the anticipated load growth in Morocco, fuel costs, capital costs for generation and transmission facilities, capacity factors and availability of plants using different technologies, discount rates, reliability standards, among others. These aspects were modeled by Mercados by minimizing the total system cost of meeting electricity demand, taking into account various constraints, including the renewable energy policy objectives as expressed in the MSP. The study found that, if renewable energy targets are expressed in capacity terms, as in the MSP, PV plants would be a better choice, yielding the least cost to the system. This result seemed logical because *capacity* targets lead the least-cost planning model to minimize costs by introducing the cheapest technology on the basis of capital costs.

19. **Grid integration costs are higher for variable renewable sources of energy (i.e., PV) than for CSP.** When the penetration of variable renewable energy is high, the grid needs more operational reserves, such as fast-starting plants (e.g., gas turbines or reciprocating engines), to provide the necessary grid reliability to maintain firm supply. In Morocco's case, this would mean continuing to rely on imported gas or liquid fuels to provide the additional capacity and energy for the necessary reserves to maintain system stability and security of supply when the PV plants are not generating. It also means that, aside from the extra cost of adding and maintaining such spinning reserves, and the need to continue to rely on imported fuels to meet the country's energy needs, these fossil fuel based reserves increase the GHG emissions from the system.

20. **CSP plants with storage are dispatchable and more flexible than PV, thus better able to contribute to system reliability and security without unnecessarily increasing system integration costs.** If the analysis is made on an *energy* basis (i.e., where renewable energy penetration targets are defined on the basis of *energy* generated (i.e., in kWh)), the least-cost planning model minimizes system cost by prioritizing technologies with high capacity factors that are able to produce energy when required. CSP plants can optimize their output by increasing their solar multiple (i.e., increasing the size of the solar field) and using thermal storage to extend their operating hours into the evening when Morocco's electricity demand peaks, thus yielding a much higher capacity factor than PV plants. CSP plants could also provide reserve capacity and other ancillary services to mitigate system regulation issues and imbalances caused by intermittent plants (e.g., PV and wind). Accordingly, the study concluded that, if the policy objectives for renewable energy penetration are expressed in energy terms, CSP generation with an adequate amount of thermal storage is the optimal choice.

21. **CSP's relatively higher capital costs still present challenges that require public support.** Although CSP's capital costs are expected to decrease over the next decade as global

[16] For the avoidance of doubt, "Noor-Ouarzazate Solar Complex" means the First Plant, the Second Plant and the Third Plant, as well as the First Plant Associated Facilities, Second Plant Associated Facilities and Third Plant Associated Facilities, as each such capitalized term is defined in the CTF and IBRD loan agreements.

[17] Mercados, *Morocco: Analysis of Low Carbon Development Options in the Power Sector* (2013).

investments continue to support advancements in the technology's learning curve, financing of CSP projects will continue to be challenging without explicit or implicit public support. Governments had typically adopted targeted programs that helped reduce project costs or increase project revenue to support the higher debt levels needed to finance these costs.[18]

22. **The GoM secured approximately US$800 million of financing at preferential rates to reduce the financing costs of Noor-Ouarzazate I, which is currently under construction and set to be commissioned in mid- to late 2015.** The GoM adopted a combination of programs to support its CSP investment in Noor-Ouarzazate I. The government sought and secured concessional financing to cover the entirety of the debt required for construction. The Bank participated in this financing, along with the European Investment Bank (EIB), l'Agence Française de Développement (AFD), African Development Bank (AfDB), Kreditanstalt für Wiederaufbau (KfW), the German Federal Ministry of the Environment, Nature Conservation, Building and Nuclear Safety (BMU), and the European Commission (EC) under the Ouarzazate I Concentrated Solar Power Project (P122028) approved by the Bank Board of Executive Directors in November 2011 (Noor-Ouarzazate I Bank Project). A key element of this project is support under the MENA CSP Program provided by the Clean Technology Fund (CTF) that made available US$197 million financing with heavily concessional terms. The concessionality of this funding helped minimize the plant's financing costs, thus reducing the additional subsidy burden that the GoM will have to cover. Moreover, the International Finance Corporation (IFC) is currently contemplating investing approximately US$20 million in the equity of the competitively-selected SPV that will implement Noor-Ouarzazate I.

23. **Annual cash subsidies may initially be off-set by reductions in fuel oil subsidies, in the short- to medium-term, and developing local manufacturing potential, in the medium- to long-term.** MASEN buys high-cost CSP production and sells it to ONEE at a price equivalent to the currently lower coal generation cost; however, the gap between the two prices is covered by law by GoM, which guarantees financial sustainability of the MSP on a plant-by-plant basis. As solar energy develops, along with other renewables, the State budget allocation to cover subsidies for fossil fuels will decline, as the economy becomes less dependent on imported fossil fuels, freeing additional financial resources to subsidize solar energy if still needed. Indeed, for Noor-Ouarzazate I – and as long as heavy fuel oil continues to be subsidized – there is an annual net reduction of subsidies in the order of US$10 million due to the operation of Noor-Ouarzazate I when compared with its alternative, which is plant operated by heavy fuel oil.

24. **The GoM has committed to support MASEN's financial viability.** In addition to the General Convention the GoM signed with MASEN and ONEE at MASEN's inception that sets out the Government's obligations to MASEN, the GoM also signed a Specific Convention for Noor-Ouarzazate I that provided for its commitment to support MASEN's financial obligations in relation to the plant. As such, the Government is expected to provide MASEN annual cash

[18] For example, programs adopted in the past to target reduction of projects costs included maximizing the use of grant or concessionary financing to reduce financing costs; loan guarantees; investment tax credits; tax credit bonds; mezzanine financing; etc. Other programs adopted to increase project cash flows included feed-in tariffs, green tariff premia, income tax exemptions, production tax credits, etc. In many cases, governments sought to use a combination of these programs in order to minimize their overall fiscal costs on public budgets and offer some flexibility to project developers to customize the support needed.

subsidies to cover the difference in the costs of power MASEN has to pay to Noor-Ouarzazate I's private sector sponsors and the revenue it expects to receive from selling this power to ONEE.[19] To align the GoM's climate change strategy with its broader industrial development agenda and to help mitigate some of the fiscal impact of these subsidies, MASEN's program was developed within the Government's overall industrial integration framework that seeks to develop Moroccan industries and the country competitiveness as a regional 'early mover' of green technology and knowhow. A 2011 report on the local CSP manufacturing potential in the MENA region found significant potential economic gains from developing a regional industrial base.[20] The report indicated that these benefits could reach US$14.3 billion from industrial and commercial developments and US$9.6 billion from foreign trade and equipment exports to support projects outside the MENA region until 2025.[21]

25. **There continues to be a potential for developing a market for green energy exports into Europe.** In addition, in order to increase project revenues, MASEN wishes to develop an export market in Europe for green energy from the Company's 2000 MW program.[22] This energy would be sold at a price at least equivalent to MASEN's cost of production. Germany, in particular, had expressed strong interest in purchasing energy from Noor-Ouarzazate I, partly to meet the country's EU renewable energy targets and partly to support development of a legal and commercial framework to facilitate cross-border renewable energy trades between the MENA region and Europe. Although efforts to develop such a market are ongoing and continue to enjoy strong political support on both sides of the Mediterranean, the economic slow-down in Europe made its near-term impact on Noor-Ouarzazate I's financial performance and the GoM's subsidy burden unpredictable. It is, nonetheless, expected that such a market would play, in the medium- to long-term, a pivotal role in developing the renewable energy sector in Morocco and elsewhere in the MENA region.

C. Higher Level Objectives to which the Project Contributes

26. **The Proposed Project is in line with Bank's 2013 Energy Directions Paper, and the Bank's corporate objective to support climate change mitigation and sustainability while pursuing the twin-goals of ending extreme poverty and boosting shared prosperity.** As

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[19] The Bank is supporting this government obligation, under the Noor-Ouarzazate I Bank Project, through US$200 million financing from IBRD that is structured like a standby facility to disburse only when needed.

[20] *See* Ernst & Young and Fraunhofer Institute, *Middle East and North Africa (MENA) Region Assessment of the Local Manufacturing Potential for Concentrated Solar Power (CSP) Projects*, The World Bank and ESMAP (2011) (hereinafter referred to as the "Local Manufacturing Assessment").

[21] MASEN invited bidders to voluntarily propose project implementation approaches that sought to inject local content into Noor-Ouarzazate I equivalent to at least 30 percent of the project's costs. ACWA Power Ouarzazate (APO), which was awarded Noor-Ouarzazate I, currently does not anticipate any difficulties meeting this target, and has been working with Moroccan manufacturers to facilitate joint ventures with European firms that can bring the necessary technical knowhow to improve local manufacturing capabilities to meet the project's needs. As MASEN's program matures, it is envisaged that Moroccan industries will be able to provide assembly and production of certain components, as well as related services, of CSP projects.

[22] In 2009, Article 9 of the European Union's (EU) Renewable Energy Directive was crafted to allow the import of renewable energy in principle alongside subsidies of domestic power generation from outside the EU up to 2020. Since then, key governments, with Germany and France in the lead, have declared their support for solar energy imports and have begun work on putting in place an agreement to allow for physical trade.

noted above, the World Bank Group's Energy Directions Paper (Report No. 79597) has a strong focus on renewable energy and encourages Bank support to high-cost projects with smaller environmental footprints if concessional financing is available to help defray some of the incremental project costs.[23] It also promoted this support if there is strong client demand and ownership based on close alignment with national development objectives. Morocco has demonstrated its commitment to the MSP and recognized the potential linkages of this green energy policy with enhancing the country's security of supply, job creation, and seizing first-mover advantages. The proposed Project satisfies the Bank strategy's call to support such an ambitious undertaking.

27. **The Project's objectives are closely aligned with Moroccan national priorities.** Morocco's energy policy prioritizes security of energy supply through diversification of sources and resources, and optimization of the country's energy balance. The policy also stresses sustainable development through promoting renewable energy generation, strengthening the competitiveness of its productive sectors, and environmental protection through the use of climate friendly technologies. Towards that end, Morocco developed its MSP, in general, and MASEN's mission, in particular, in conjunction with the country's industrial development priorities to promote and expand local manufacturing capacity. Rather than subsidize development of this capacity, Morocco is willing to pay the incremental costs of CSP generation to allow its manufacturing base to develop within a competitive environment. This is expected to expand the country's industrial and innovation base, thus creating jobs and increasing the labor force's capacity.

28. Moreover, Morocco stands at the forefront of climate-friendly policies in the region and well-positioned to benefit from its first-mover advantage as other regional powers contemplate and operationalize their own renewable energy programs. In fact, there are already signs that both Moroccan and non-Moroccan firms are investing in manufacturing capacity in the country to enhance their ability to compete for and participate in construction of Noor-Ouarzazate II and III (as defined and discussed in more details in Section III below) and manufacturing of related plant components as well as future projects in MASEN's program.

29. **The Project will contribute directly to results area 2.2 of the World Bank Group's Country Partnership Strategy (CPS) for Morocco's FY2014-2017 (Report 86518-MA), namely to "increase renewable energy generation and enhance energy efficiency."** Morocco's renewable energy strategy is part of its effort to reduce its dependence on fossil fuels, protect against excessive fluctuations of prices from fossil fuels, and develop the country's vast renewable energy resources. Morocco's new strategy targets a renewable energy capacity of 42 percent by 2020. The Project will add approximately six percent of this planned capacity expansion, which translates to 700,000 tons of annual avoided GHG emissions. Furthermore, an analysis by the Fraunhofer Institute (2014)[24] indicates that CSP's local manufacturing potential in Morocco could lead to US$1.8-5.3 billion of total economic impact from construction, operations, and equipment manufacturing. The potential local CSP industry

[23] *See* footnote 3.

[24] *Fraunhofer ISE*, Analysis of potential economic benefits of developing a CSP industry in North Africa (2014).

could employ 2,000-5,000 people by 2020 and 2,000-10,000 by 2025, depending on the size of the CSP market. Also by 2025, the Fraunhofer Institute estimates that 26,000-73,000 full-time equivalent jobs could be cumulatively created in Morocco by CSP developments. Given that many of these jobs are likely construction and skilled/unskilled labor related, there is high potential for boosting the income of the bottom 40 percent.

30. **The proposed Project is expected to accelerate global development and deployment of CSP as a viable alternative to traditional, fossil-based technologies.** Morocco is currently at the forefront of CSP development in the MENA region, and, along with the United States, South Africa, India, and China, represents a significant share of the CSP market in the short- to medium-term. Although other countries in the region (e.g., Saudi Arabia) have announced plans for their own ambitious CSP programs, Morocco's program is more advanced and has already begun showing concrete successes with the start of Noor-Ouarzazate I's construction and the launch of Noor-Ouarzazate II and III's procurements in 2013. As further discussed in the economic analysis, Noor-Ouarzazate Complex could reduce the global CSP technology cost curve by three percent – assuming a learning rate of 19.5 percent for CSP and using 2012 as the baseline. If the entire 2,000 MW of MSP is developed, the global technology cost curve could decrease by 13 percent.

31. **The proposed Project is an integral component of the MENA CSP Program and aligned with the MENA Regional Strategy supporting the pillar of sustainable growth.** The proposed Project is also consistent with the MENA CSP Program that is "motivated by objectives of energy security, climate change mitigation, and regional integration in the Mediterranean," which are at the heart of the GoM's policy agenda supported by the proposed Project.[25] The GoM and MASEN, in conjunction with European partners, continue to develop the export market for green energy from Morocco into Europe. Such a market is expected to develop in the medium- to long-term, and, as noted above, play a pivotal role in supporting development of renewable energy capacity in Morocco and the MENA region.

II. PROJECT DEVELOPMENT OBJECTIVES

A. Project Development Objective (PDO)

32. The Project's PDO is to increase (a) installed capacity (megawatts) and (b) electricity output (megawatt-hours), especially during peak hours, of the Noor-Ouarzazate Solar Complex.

B. Project Beneficiaries

33. **The project has a variety of beneficiaries at local and global level.** Moroccans are expected to benefit through the future supply of reliable green energy. Morocco will also be able to increase its energy security, gradually develop a local solar industrial complex and a research/development base, develop interior regions of the country, and create urgently needed jobs. As part of the project design, MASEN is expected to use each bidding process for the plants under the Morocco Solar Plan to encourage development of local manufacturing capacity.

[25] *See Revised Clean Technology Fund MENA CSP Investment Plan, Third Update Note*, p. 13 (2014).

Based on the experience with Noor I, MASEN anticipates that procurements equivalent to at least 35 percent of the Noor-Ouarzazate II and III's costs would be sourced locally, which should help stimulate development of Morocco's industrial base and create jobs. In the area around Ouarzazate, local authorities and the population will continue benefiting from the economic and social development opportunities that the project can bring, as successfully demonstrated in Noor I, particularly with regard to playing a catalyst role in the development of this semi-desert region.

34. **At the regional and even global level, the project is expected to have transformational effects not only on Morocco and its energy system but also on the MENA region.** Morocco is expected to significantly contribute to the scale-up of CSP technology with strong learning effect, and to subsequent reductions in the technology's costs, thus achieving wider global benefits. Morocco is well suited to shift the global technology cost curve, facilitating its long-term economic viability and making it more attractive regionally and globally. Finally, other global positive impacts include avoided greenhouse gases emissions of 506,000 tons of CO_2 equivalent per year.

C. PDO Level Results Indicators

35. The PDO level results indicators are:
    (a) Generation capacity of renewable energy constructed under the Project (MW);
    (b) Noor-Ouarzazate Complex electricity sales (GWh);
    (c) Noor-Ouarzazate Complex electricity sales during peak hours (GWh);
    (d) Direct project beneficiaries (number), of which female (%);[26] and
    (e) Avoided global GHG pollution (Tons of CO_2 eq./year).

III. PROJECT DESCRIPTION

36. The Project will support:

a. **MASEN's implementation of the second phase of the Noor-Ouarzazate Complex (up to 350 MW)**. This second phase consists of 2 distinct plants, including their Associated Facilities:[27] (a) a 150-200 MW parabolic trough CSP plant (Noor-Ouarzazate II) and (b) a 100-150 MW tower CSP plant (Noor-Ouarzazate III). Both plants will be constructed on lots adjacent to Noor-Ouarzazate I that have already been acquired by MASEN.

b. **MASEN's purchase of energy from the entire Noor Complex (i.e., Noor-Ouarzazate I, II, and III)** by partially covering the incremental revenue gap between the costs MASEN is expected to incur in the first few years of the plants' operations to purchase

[26] The number of beneficiaries will be calculated by dividing the energy output of Noor-Ouarzazate II and III by the average annual consumption of electricity per customer on ONEE's system. For the number of female beneficiaries as a percent of the direct beneficiaries, the share of females in the Moroccan population will be used.

[27] "Associated Facilities" means those facilities and infrastructures referred to in Section 4.3.5 of the 2014 FESIA (described in para. 40 herein) , including those to be built and operated for the purposes of (i) providing water for the operation of Noor-Ouarzazate II and III, and (ii) transporting power to and from these plants through transmission line.

energy from the facilities and the revenue it receives from the sale of this energy to ONEE.

37. **The Project is presented to the Bank Board of Executive Directors for approval in advance of the conclusion of the procurement process to select private-sector sponsors to implement Noor-Ouarzazate II and III**. As was the case with the Noor-Ouarzazate I Bank Project, this is important to provide bidders with sufficient comfort that the full financing for the project had been committed and, in particular, that the critically-important financing from CTF was secured. As discussed further below, the heavily concessional nature of CTF funds is key to reducing the project's financing costs, thus critical to the financial viability of the venture.

A. Project Components

38. The Project consists of two components (see Annex 2 for more details):

39. **Component 1 – Financing the Initial Investment** (US$119 million from CTF and US$100 million from IBRD): Component 1 consists of (A) development of Noor-Ouarzazate II through the formation of a partnership between MASEN and a competitively-selected partner; (B) construction of the associated facilities needed for Noor-Ouarzazate II's operation; (C) development of Noor-Ouarzazate III through the formation of a partnership between MASEN and a competitively-selected partner; and (D) construction of the associated facilities needed for Noor-Ouarzazate III's operation. Financing for construction of the associated facilities under sub-components (B) and (D) is covered by separate financing from donors to ONEE that has already been committed. CTF and IBRD financing is focused on construction of Noor-Ouarzazate II and III under sub-components (A) and (C).

40. **In addition to Associated Facilities already under construction for Noor-Ouarzazate I, one additional Associated Facilities, namely the Ouarzazate – Tazarte 225 kV transmission line, is needed for operation of Noor-Ouarzazate II and III**. Construction of this transmission line, which is financed mainly by AFD, will not commence before early 2015. Other Associated Facilities for the overall site of the Noor-Ouarzazate Solar Complex are listed in the updated Framework Environmental and Social Impact Assessment (FESIA), which was re-disclosed in Infoshop on 26 June 2014. Construction of these associated facilities is either underway or complete.

41. **Until the costs of CSP technology become more in line with levels comparable to traditional technologies, there is a need for support to either reduce the project's overall cost or increase its revenues**. Analysis of Noor-Ouarzazate I's financial structure indicates that the plant's levelized cost of energy is highly sensitive to changes in capital costs, the biggest component of the plant's total costs. It is envisaged that the capital costs bid for at least Noor-Ouarzazate II (which is based on the same type of technology used for Noor-Ouarzazate I) would be less than those bid for Noor-Ouarzazate I.

42. **MASEN has already prequalified four highly experienced international consortia for the projects, and a highly competitive bidding process is anticipated**. Three of these consortia are bidding for both Noor-Ouarzazate II and III, and one consortium is bidding for only Noor III. MASEN issued the request for technical proposals in December 2013 in a 2-stage

bidding process that is designed to award both projects as a package, as the case may be. This approach is expected to incentivize bidders, particularly those bidding for both projects, to optimize their technical design to ensure that MASEN receives the best possible price from both projects together. Furthermore, unlike Noor-Ouarzazate I, Noor-Ouarzazate II and III's minimum functional specifications have been optimized to maximize the number of peak-hour generation from the plants. Peak-hour generation yields higher value to MASEN and ONEE because it is expected to displace more expensive generation on the grid from combined-cycle gas turbines using imported liquefied natural gas.

43. **Nonetheless, it is unlikely that the magnitude of any such savings would be sufficient to mitigate the incrementally higher plant costs when compared to the system cost of power**. It is expected that competitive pressures will help reduce capital and project development/owner costs, as well as contingencies and other project costs, to their lowest reasonable levels. In the absence of additional capital and non-financing related cost savings, support mechanisms designed to reduce or buy-down the capital costs (e.g., grants) would likely be the best tools to bring about the necessary reductions. Noor-Ouarzazate I's financing package included grants from the EU's Neighborhood Investment Facility (NIF) and the BMU that indeed helped to partially reduce the incremental costs to the extent of the mobilized grant amounts. MASEN requested grants from the NIF for Noor-Ouarzazate II and III as well that are, on a per project basis, more than what NIF provided for Noor-Ouarzazate I. If made available, these grants are expected to partially reduce the incremental costs.

44. **In the absence of additional sources of grant funding to bring down the capital costs, the next step is to attempt to reduce the plants' financing costs as much as possible.** As such, financing from CTF and IBRD under sub-components (A) and (C) of Component 1 will support construction of Noor-Ouarzazate II and III under one or more partnerships between MASEN and each of the bidders competitively-selected to develop the two plants. Funding of (a) US$119 million from CTF (which, when combined with an equal amount to be provided by CTF through the AfDB, represents approximately US$680 of CTF support per kW of installed capacity in comparison to US$1231/kW for Noor I);[28] and (b) US$100 million from IBRD to MASEN as Borrower under this Component would partially cover construction of the plants. Both CTF and IBRD funds under this Component are expected to be on-lent by MASEN to each of the privately-owned SPVs formed by the selected bidders to design, construct, own, operate, and maintain the two plants. The balance of the funding required to complete construction is expected to be provided through co-financing arrangements with AFD, AfDB, EIB and KfW, as well by the selected bidders and MASEN Capital through equity investments.

45. **Component 2 – Cost Mitigation Mechanism (US$ 299 million from IBRD):** While the construction funding under Component 1 is key to reducing the financing costs, it is not expected by itself to reduce the levelized cost of energy from the plants to parity levels with the wholesale cost of power on ONEE's system. Like Noor-Ouarzazate I, it is expected that the GoM will enter into Specific Conventions with the SPVs for each of Noor-Ouarzazate II and III that provides its specific commitment to financially support MASEN in covering the remaining

[28] The CTF lending is based on the trust fund's soft terms, which were approved by the CTF Trust Fund Committee on June 27, 2014.

incremental costs of power purchases from the projects. Several options to mitigate these incremental costs were explored.[29] These options included the possibility of issuing green bonds to fund these costs, but the expected higher cost of commercial debt financing, when compared to concessional financing, actually increases the anticipated incremental costs. This increase would likely be less if the bonds were supported by a partial risk guarantee that could enhance the GoM's credit to reduce the costs of capital, but the reductions were not expected to bring down the costs of capital to the level of concessional financing.

46. **As such, Component 2 is designed to support the acquisition of kilowatt hours (kWh) produced by the SPVs to partially cover the difference in the price at which MASEN would buy electricity generated by Noor-Ouarzazate II and III (as well as Noor-Ouarzazate I as further discussed below) and the price at which MASEN would sell such electricity to ONEE**. Put differently, it supports the acquisition of kilowatt-hours produced by the three CSP plants – Noor-Ouarzazate I, II, and III - to partially cover the difference in the price at which the Borrower would buy the electricity generated by all three plants and the price at which the Borrower would sell such electricity to ONEE. MASEN will be able to withdraw funds under Component 2 on the basis of a formula that will determine the maximum amount that can be withdrawn. This maximum amount would equal (A) the amount MASEN paid to purchase power from the SPVs net of (B) revenue received from the sale of this power to ONEE and (C) any contributions made by the GoM towards covering the difference between (A) and (B).

47. **In order to more appropriately target IBRD's intervention in this respect, an IBRD loan where repayments are linked to the date of disbursement with more flexible terms is envisaged to relieve the demands on GoM's support in the plants' early years of operations.** MASEN has requested cancellation of the existing IBRD loan under the Noor-Ouarzazate I Bank Project, which was designed to provide similar support to Noor-Ouarzazate I as Component 2 of the proposed Project, contemporaneously with effectiveness of the new IBRD loan proposed herein. This will allow MASEN to consolidate similar support the Bank is providing to the Noor-Ouarzazate Complex and better leverage the funds across Noor-Ouarzazate I, II, and III. It will also allow MASEN to make use of the more flexible terms of the new loan to better align its disbursements with MASEN's cash needs.[30]

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[29] The possibility of an IBRD loan made directly to the GoM was also explored. Under this scenario, the GoM would provide the proceeds of this loan to MASEN as a grant, which would then on-grant it to the SPVs to buy down the plants' capital costs upfront and reduce the levelized cost of energy (LCOE) for the life of the PPAs. However, such an approach would change a 20-year, Bank-recommended operating policy in Morocco where state-owned enterprises are required to borrow directly to fund their operations, with only payment guarantees provided by the government. A partial risk guarantee to MASEN was also explored, but, because bidders have not raised issues with MASEN's credit, the guarantee's impact would likely be limited.

[30] The new loan is expected to start disbursement, under Component 1, with commencement of Noor-Ouarzazate II and III's construction and, under Component 2, within 6 months following commissioning of Noor-Ouarzazate I, now anticipated in the latter end of 2015. Disbursements under Component 2 would continue until 2018 after Noor-Ouarzazate II and III commence their operations (currently anticipated in 2017 and 2018), linked to payments MASEN has to make to the SPVs to purchase energy and revenues it receives from ONEE for the sale of this energy.

48. **Component 2's initial disbursements to cover the incremental costs of each of Noor-Ouarzazate I, II, and III are conditioned on commissioning of the relevant plant.** The disbursement amounts will be based on (A) MASEN's costs to purchase energy from the relevant SPV in accordance with the terms of the relevant PPA net of (B) MASEN's revenue from the sale of this energy to ONEE in accordance with the terms of the power sale agreement and (C) any GoM cash contributions to cover the incremental difference between (A) and (B) in the relevant disbursement period. This is represented in the IBRD loan agreement as a formula: [(A-B) – C]. To the extent that the awarded plant costs are lower than the costs estimated during appraisal of the proposed Project, it is envisaged that the IBRD loan proceeds allocated to Component 2 would then cover MASEN's incremental revenue gap for a longer period than currently anticipated.

49. **Structure of the Project's financing agreements and terms.** Noor-Ouarzazate I was awarded to APO in 2012 and is currently under construction. Thus, funding for the acquisition of energy from Noor-Ouarzazate I under Component 2 should conceptually be only subject to completion of construction and commissioning of the plant in order for MASEN to purchase the plant's energy and sell it to ONEE. Noor-Ouarzazate II and III could potentially be awarded to two separate consortia/SPVs under distinct legal frameworks that would contemplate separate financial close for each plant. As such, financial close for each of Noor-Ouarzazate II and III could potentially occur at different times, depending on the process and progress with each awarded consortia/SPV.

50. Recognizing this structure, the loan agreements between CTF and IBRD, on the one side, and MASEN, as Borrower on the other side, are structured to be effective shortly after signature.[31] However, availability of CTF and IBRD funds under Components 1 and 2 of the proposed Project is subject to conditions of disbursement that recognize the independent development path of each of Noor-Ouarzazate I, II, and III. Funds from CTF and IBRD for construction of Noor-Ouarzazate II and III under Component 1, for example, are subject to each plant's financial close (i.e., execution and effectiveness of key project documents that allow construction of the plants to commence, and co-financing agreements that ensure availability of funds from other International Financial Institutions (IFIs) required to complete construction). Even if the two projects are awarded to the same consortium, the process of completing and signing the underlying contractual framework (which would may involve different construction contractors, equipment suppliers, operation and maintenance contractors, and, in some respect, different shareholders) could mean a different schedule for each project's financial close. Funds from IBRD under Component 2's Cost Mitigation Mechanism to support the acquisition of energy from each of these plants are subject to the relevant plant's commissioning. In this respect, disbursements of CTF and IBRD funds have been optimized to match progress on each plant.

[31] Effectiveness would be subject to (a) receipt of the legal opinions required under Section 9.02 of both the IBRD General Conditions for Loans and the CTF Standard Conditions and (b) cross-effectiveness of the IBRD and CTF loan agreements.

B. Project Cost and Financing

51. The below table summarizes the overall project cost and how these are to be financed. Annex 2 provides for a more detailed break-down of the construction costs and co-financing arrangements. The proposed Project is financed by six international development agencies, including two loans managed by the Bank, one from CTF and another from IBRD. The terms of the CTF loan are consistent with the most concessional terms offered by the fund, as was the case with Noor-Ouarzazate I. The IBRD Flexible Loan is denominated in Euro (80 percent) and in US Dollars (20 percent) with disbursement-linked repayments and a final maturity of 18 years, including a grace period of 9.5 years.

52. Retroactive financing under the IBRD and CTF loans is envisaged for up to €46,900,000 and US$16,000,000 from the IBRD loan and US$ 24,000,000 from the CTF loan. This retroactive financing would cover payments for eligible expenditures made prior to the date of the IBRD and CTF legal agreements but on or after January 15, 2015.

Table 1: Project Costs and Financing in US$ Million

Project Components	Project cost	Donor Co-Financing	IBRD Financing	CTF Financing (WB implemented)	% Financing
1. Component 1: Financing for Initial Investment	2,377	2,158	60	119	9%
2. Component 2: Cost Mitigation Mechanism	299	0	299	0	100%
3. Unallocated	0	0	40	0	100%
Total Costs	2,676	2,158	399	119	19%
Total Project Costs	2,676	2,158	399	119	
Front-End Fees	1		1		
Total Financing Required	2,677	2,158	400	119	

C. Lessons Learned and Reflected in the Project Design

53. There were several lessons learned from Noor-Ouarzazate I's process that MASEN incorporated into the technical design of Noor-Ouarzazate II and III as well as the structure and approach of the procurement process followed for selection of the private sector sponsors. These lessons include:

- Optimizing the plants' technical design: Noor-Ouarzazate I was procured on the basis of minimum technical specifications that required 3 hours of thermal storage, which was, at the time, the maximum amount of storage that can reasonably be expected for large capacity plants. Storage is critical in the plant's design as it is the means by which the plant could meet the country's critical evening peak electricity demand when the cost of generation on ONEE's system is highest. As such, more storage would increase the value of the plant's output. To maximize this value, MASEN made the minimum technical specifications of Noor-Ouarzazate II and III more flexible, specifying instead the minimum amount of peak hour generation needed from the plants. MASEN left it to bidders to propose an optimized plant design to meet this peak hour requirement and offer the optimum size of thermal storage needed subject to utilizing a minimum of 3 hours of storage. In this way, MASEN anticipates that peak hour generation from Noor-

Ouarzazate II and III would far exceed the amount now expected from Noor-Ouarzazate I, and, as a result, generate more revenue to MASEN from the sale of power on ONEE's system. This approach leaves bidders flexibility to explore innovative approaches to meeting this requirement while minimizing the amount of thermal storage needed, which could also significantly impact the plants' capital costs.

- Accelerating the Schedule to Reach Financial Close and Start of Construction: Because Noor-Ouarzazate I was the first plant in MASEN's program, the Company did not yet have model procurement documents and legal agreements to use. MASEN developed these documents during the procurement process and the subsequent negotiations that took place with the selected private sector sponsor for Noor-Ouarzazate I. As a result, Noor-Ouarzazate I's procurement took some time to complete, and the process to develop and negotiate the related legal agreements that followed award of the project took almost a year. For Noor-Ouarzazate II and III, MASEN included in the related procurement process almost fully developed legal agreements, which were largely based on those developed for Noor-Ouarzazate I, for bidders to review and comment on prior to submitting their bids. MASEN expects that bidders submit initialed versions of these agreements as part of their final bids. Although some negotiations to finalize the documents may still be needed after award, it is envisaged that the timeframe to reach financial close and start of construction (and disbursements) would be far quicker than experienced on Noor-Ouarzazate I.

- Accelerating the process of completing the plant-specific environmental and social impact assessment: In Noor-Ouarzazate I, the plant-specific environmental and social impact assessment was started after award of the project and determination of the exact technology to be used for the plant. This work, which included public consultations and disclosure period, took some time to complete. To accelerate this process, MASEN included in the bidding documents terms of reference for consultants to be hired by bidders to undertake most of the assessment during the procurement process. Bidders are required to submit a draft of the assessment as part of their final bids. Once the selected bidder(s) are identified and awards are announced, the bidders can begin their public consultation process and subsequently disclose the assessment(s), after Bank review, for the requisite disclosure period. This approach is expected to accelerate the timeframe for start of Noor-Ouarzazate II and III's construction when compared with Noor-Ouarzazate I's schedule.

- Optimizing the structure of Bank support for MASEN's revenue gap: In Noor-Ouarzazate I, the Bank provided MASEN with a US$200 million loan from IBRD that is structured as a standby facility. The loan was designed to disburse after Noor-Ouarzazate I's commercial operations based on a formula that took into consideration MASEN's costs to purchase power from Noor-Ouarzazate I, the amount of revenue MASEN receives from ONEE, and the amount of GoM support provided. The loan was structured to help relieve some of the pressure on the public budget in the early years of Noor-Ouarzazate I's operations, and to provide added comfort to the private sector sponsors that MASEN will have the necessary cash to make good on its payment obligations in Noor-Ouarzazate I's power purchase agreement. Nonetheless, the relatively short loan

grace period meant that, 2-3 years after Noor-Ouarzazate I's commercial operations and start of the loan's disbursement period, the loan's repayment period would overlap the drawdown period. In this respect, MASEN would have to start repaying the loan while it continues to draw down its remaining balance, thus reducing its net impact. As such, Component 2 of the proposed Project sought to address MASEN's Cost Mitigation Mechanism by increasing the grace period and applying more flexible IBRD terms.

- Optimizing the Disbursement Profile from IBRD Support: Noor-Ouarzazate I's IBRD support was designed to start disbursements after the plant's 2-2.5 year construction period has been completed and the plant is commissioned. As a result, disbursements from the loan are expected to commence over 4 years after Board approval of the loan. To address this issue, the proposed Project is designed to include a construction component to begin disbursements much earlier than would be expected under the Noor-Ouarzazate I structure. Further, including support for Noor-Ouarzazate I in Component 2 also implies that disbursements to support the Noor-Ouarzazate Complex's revenue gap would commence at least a year earlier than Noor-Ouarzazate II and III's anticipated commissioning date.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

54. **MASEN was formed by Law 57-09 to implement the MSP and thus responsible for defining all the technical, safeguards, and fiduciary aspects of Noor-Ouarzazate II and III**. Sub-components (A) and (C) of the proposed Project's Component 1 is expected to be implemented through partnerships between MASEN and the private sponsors that will form SPVs, which will be the proposed Project Implementing Entities, to design, construct, own, operate, and maintain Noor-Ouarzazate II and III. The sponsors are expected to be selected through a 2-stage competitive procurement process that is now in an advanced stage. The first stage involves technical bids to meet MASEN's minimum functional specifications. This allows MASEN the opportunity to evaluate the technical proposals and any innovative approaches offered by bidders to meet the requirements. It also allows more clarity on risk allocations and provides the draft legal agreements before formulation of the financial bids.

55. **The second stage involves financial offers, focusing on the amount of feed-in tariff per kilowatt hour (kWh) to be paid by MASEN for energy from Noor-Ouarzazate II and III.** In order for bidders to provide financial offers, MASEN needs to provide to them, during this second stage, the terms of the debt financing MASEN will provide the awarded SPVs. As MASEN aims to reach commercial closing (i.e., reaching agreement on all of the commercial issues) shortly after award, MASEN needs to know the final terms of debt financing that will be made available to it from IFIs prior to concluding this second stage bid process.

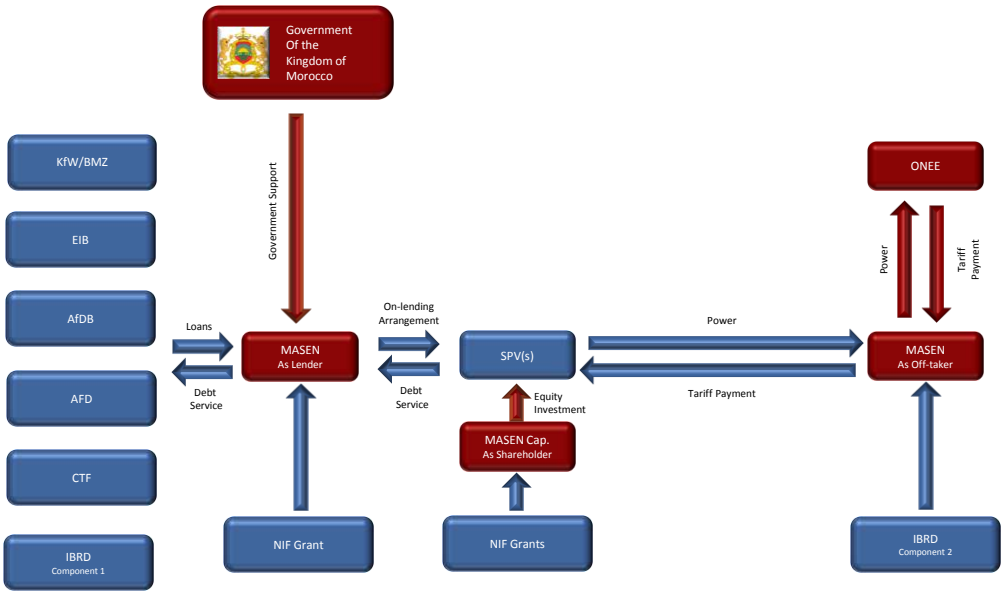
56. **Once selected, the winning bidder(s) is/are expected to enter, through the SPVs, into a suite of agreements with MASEN to provide the contractual basis for the partnership**. The structure of the envisaged partnership is largely based on typical commercially-financed, limited recourse transactions for infrastructure projects. MASEN will enter into power purchase agreements with the selected bidder(s) to purchase the entirety of Noor-Ouarzazate II

and III's output at the competitively determined feed-in tariff. MASEN will, in turn, enter into power sales agreements with ONEE to sell this power to ONEE at the regulated high-voltage system tariff.

57. **MASEN is expected to enter into supply agreements with the SPVs to provide water, and the common infrastructure facilities to be used by the plants**; **MASEN is also expected to take a minority equity interest (up to 25 percent) in the SPVs and special purpose vehicles formed to operate and maintain the plants**. The Company's participation in the day-to-day activities of these vehicles is expected to be limited to the typical role of a minority shareholder. Nonetheless, MASEN hopes that its participation will give it more insight into operating these types of business enterprises and to increase its capacity to design subsequent projects to implement the remaining projects in its 2,000 MW mandate.

58. **Consistent with the approach followed in Noor-Ouarzazate I and as illustrated in Figure 6 below, MASEN is expected to enter into a lending arrangement with the SPVs to pass to them the proceeds of the IFI financing made available to MASEN for Noor-Ouarzazate II and III.** These proceeds are expected to comprise the bulk of the debt financing of the projects and cover up to 80 percent of Noor-Ouarzazate II and III's costs. The amount of debt financing will depend on the final bid award prices that will determine the overall project costs. The remaining 20 percent of Noor-Ouarzazate II and III's costs will be covered by commercial equity provided by the SPVs' shareholders.

Figure 6 – Overview of Institutional and Implementation Arrangements



B. Results Monitoring and Evaluation

59. **MASEN will regularly monitor the SPVs' implementation of Noor-Ouarzazate II and III pursuant to the agreed contractual obligations that will be put in place prior to making any disbursements from the CTF and IBRD loans**. PDO level results indicators and intermediate indicators will be monitored by MASEN and reported to the World Bank and other

IFIs in Project reports covering a period of one calendar semester. MASEN will submit the reports to the Bank 45 days after the end of each calendar semester. The reports will cover, among other things, financial statements, physical progress, and procurement.

60. The CTF and IBRD loan agreements provide for periodic submission of interim unaudited financial reports, supported by a technical audit report prepared by an independent verification expert. The audit report will particularly focus on (i) achievement of milestones set out in the relevant engineering, procurement, and construction (EPC) contract and (ii) compliance with the contract's pricing provisions.

C. Sustainability

61. **The GoM considers this Project as critical for the development of its economy, and, as described above, an integral part of MSP and its strategy of combatting climate change**. The initial costs the program and the risk that it fails to generate the expected wider benefits are well-known.

62. **The sustainability of the Project itself is ensured with the help of a dedicated organization, namely MASEN, staffed with top professionals to develop the MSP and its association with financially strong and technically capable private developers to develop the Noor-Ouarzazate Solar Complex.** This partnership will ensure that the plants will be constructed, operated and maintained according to industry standards. The experience of Noor-Ouarzazate I indicates that this institutional framework works.

V. KEY RISKS AND MITIGATION MEASURES

A. Risk Ratings Summary Table

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

B. Overall Risk Rating Explanation

63. Given its inherent technological and financial risks, **the Project is considered high risk for Project implementation**. While the sum of individual risk ratings may indicate a lower overall rating, the importance of the risks pertaining to sector viability, project financials (affordability), and technology suggests an overall high risk rating.

VI. APPRAISAL SUMMARY

A. Economic Analysis

64. **Traditional project level economic analysis does not capture the full economic rationale for the Project.** As further discussed below, the Bank's traditional, project-level economic analysis does not, in and of itself, provide a clear rationale for the Project. However, this traditional analysis does not recognize the inherent global dimension of using climate-friendly technologies. Such technologies, by definition, produce benefits that transcend national boundaries and that need to be analyzed within the context of the global public goods they create. Indeed, the World Bank Energy Directions Paper recognized the need to balance competing priorities in energy sector development by highlighting support to, among others, very high-cost, low-emissions projects that offer strategic future benefits. These benefits include "upstream efforts to pilot and scale up technologies that are relatively new in their market and where there may be global externalities in demonstration and replication effects." Nevertheless, as noted below, the Project has a sound economic rationale: (i) it will contribute to the global public good of lower costs for a low carbon technology and (ii) Morocco stands to benefit from lower costs in its future CSP investments.

65. **It is well established that the traditional framework for project-level cost-benefit analysis (CBA) provides only a partial assessment of the economic benefits of a transformational project at an early stage of the technology learning curve**. Without investment at the early stages of technology development, capital and operating cost reductions cannot be attained, an experience clearly demonstrated in the case of PV technology. There is strong evidence that similar learning curve cost reductions are achievable for CSP technology.

66. **Moreover, beyond the normal economic benefit of electricity generation that is the yardstick for conventional CBA, renewable energy has a range of benefits that are difficult to quantify**. These include improved energy security and system diversity, and the macroeconomic (and employment generation) benefits that stem from establishing a domestic manufacturing industry for significant parts of CSP plants. Both are important GoM objectives, given the macroeconomic and fiscal disruptions of the last oil price escalation in 2008/2009. However, both are difficult to capture in conventional CBA. This is even more true for benefits of contributions to the global learning curve.

67. The economic analysis, therefore, proceeds in stages:

(i) A conventional, project-level CBA that examines the energy generation benefits, assessed against the next best thermal generation alternative (detailed modeling shows

that CSP would displace combined-cycle, gas-fired turbines (CCGT) using imported liquefied natural gas (LNG).

(ii) Consideration of local environmental externalities (associated with the avoidance of damage costs associated with local air pollutants of thermal generation).

(iii) Consideration of the global environmental externalities (avoided GHG emissions).

(iv) Consideration of the energy security and diversity benefits.

(v) Consideration of the direct macroeconomic benefits that derive from the establishment of a domestic manufacturing industry to produce key components of CSP capital expenditure, as well as the indirect (multiplier) benefits.

(vi) Consideration of the global learning curve benefits.

68. ***Conventional CBA.*** CSP is not economic on the basis of conventional cost-benefit analysis (the economic rate of return (ERR) is negative over the anticipated 25-year horizon of the PPA) (see Table 2); the economic benefits are taken as the avoided costs of the next best thermal alternative, which is CCGT using imported LNG. To be economic at the (real) opportunity cost of capital to the GoM (at five percent discount rate), the valuation of CO_2 would need to be US$92/ton of CO_2 (calculated as switching value), or US$57/ton of CO_2 when calculated as the Marginal Abatement Cost (MAC), as discussed further in the CTF Annex. A sensitivity analysis shows the main risk is that of capital cost escalation (particularly for the tower technology of Noor-Ouarzazate III, for which there is less international experience). Nonetheless, the quality of MASEN's tender process has been demonstrated, and a well-managed international competitive bidding (ICB) has an excellent chance of bringing further CAPEX reductions. Although the Bank's estimate of capital costs are already somewhat lower than MASEN's planning estimate, a further 15 percent cost reduction over the Bank's baseline estimate would not be unexpected. This would result in a reduction of the MAC to US$35/ton of CO_2 (at 5 percent discount rate), US$58/ton of CO_2 (at 10 percent discount rate), well in the range of other renewable energy generation avoided costs. The Noor-Ouarzazate I experience showed significant CAPEX reductions over pre-bid expectations.

Table 2 – Summary of Economic Returns without Environmental Externalities

Basis	Govt. Opportunity Cost	ONEE
Discount Rate (Real)	5%	10%
Baseline Economic Rate of Return (ERR)	-0.07%	-0.07%
Baseline Net Present Value (NPV) (US$ Million)	-733	-1,005

69. ***Local environmental externalities***. The impact of local environmental externalities on the proposed Project's economic returns is beneficial but small. This is in part a consequence of Noor-Ouarzazate II and III displacing natural gas (except for the first few years when some oil and coal is displaced) from ONEE's generation stack. Electricity generation from natural gas produces no particulates or SOx emissions, so damage costs are smaller (related only to NOx) in comparison to other generation stations using other types of solid or liquid fuels.

70. ***Global environmental externalities (avoided GHG emissions)***. In the absence of macroeconomic benefits, achieving the hurdle rate requires relatively high carbon valuations (switching value US$229/ton of CO_2 at 10 percent discount rate), and significantly higher than those for other renewable energy technologies. Export sales to the EU are primarily a financial

benefit (i.e., it would be EU electricity consumers, not Moroccan consumers, that assume the incremental costs).

Table 3 – Summary of Economic Returns with Environmental Externalities

Basis	Govt. Opportunity Cost	ONEE
Discount Rate (Real)	5%	10%
Baseline ERR	-0.07%	-0.07%
ERR (inc. Local Environmental Externalities)	0.18%	0.18%
ERR (inc. Local and Global Environmental Externalities @US$30/ton)	1.72%	-1.72%
Switching Value (GHG)	92	225
Baseline NPV	-733	-1,005
NPV (inc. Local and Global Environmental Externalities)	-517	-883
Marginal Abatement Cost (MAC)	57	79

71. ***Energy security and diversity benefits***. Energy security and diversity benefits cannot easily be valued in a CBA framework, but the concern of the GoM about the macroeconomic impacts of fossil fuel price shocks are justified in the light of Morocco's recent experience. The GoM's strong commitment to, and ownership of, the MSP, in general, and the Noor-Ouarzazate Complex, in particular, reflects the importance of this objective.

72. Notwithstanding the difficulty of quantitative consideration of energy security benefit, it is well established in the economics literature that the macroeconomic impact of oil price shocks is significant, and is also not symmetric (i.e., after some sharp price rise that causes a decline in economic growth, as occurred in 2008/2009, the macro-economy does not immediately spring back to its former level if the oil price returns to its former level). The diversification of the electricity supply system remains a useful hedge against exposure to fossil fuel price volatility, though the value of that hedge in the usual CBA framework is likely to be small, and therefore not quantified in this case.

73. ***Macroeconomic Benefits***. The above valuations do not take into account the potential local manufacturing benefits that could accrue from MASEN's program and CSP developments in the country. Based on a detailed survey of the local manufacturing potential in Morocco, the Fraunhofer Institute (2014) estimated that the cumulative economic impact of a 450 MW CSP program by 2020 brings direct macro-economic benefits of US$603 million, and additional indirect macro-economic benefits of US$474 million, equivalent to a total of US$1.076 billion. By 2025, the combined direct and indirect macro-economic benefits would be about US$1.8 billion, considering 700 MW of CSP installed. If Morocco were to install 2.3 GW of CSP by 2025, the economic benefits would increase significantly due to the local manufacturing impact rising to US$2.2 billion by 2020 (with an installed capacity of 1 GW), and US$5.3 billion by 2025.

74. These valuations are subject to considerable uncertainty because it is unclear at this stage whether the projected levels of local procurement can be achieved. However, if in fact such levels can be achieved, it would have a considerable impact on the economic analysis. The direct benefits noted above are scaled to apply only to Noor-Ouarzazate II and III. The baseline ERR

improves from -0.07 percent to 2.2 percent, and the MAC decreases from US$57/ton of CO_2 to US$ 29/ton CO_2 (for 5 percent discount rate), and from US$79/ton to US$56/ ton of CO_2 (for 10 percent discount rate).

75. In sum, the inclusion of macroeconomic benefits significantly increases the economic returns. The main uncertainty is less in the methodology of the Fraunhofer study that provides the basis for these estimates, but in the recognition that the necessary investments in manufacturing facility will depend on the pace of the MSP's implementation to install another 1,500-2,000 MW of CSP beyond Noor-Ouarzazate II and III. In other words, the faster Morocco implements its MSP, the more likely these macroeconomic benefits would materialize.

76. ***Global learning curve benefits***. The standard project economic analysis above does not take into account the positive global impact from advancement of the CSP learning curve resulting from increased installed capacity. As demonstrated during the development of wind and PV technologies, the future economic returns from subsidizing new technologies in its early developmental stages can be dramatic. PV, for example, experienced a 21 percent price reduction for every doubling of installed capacity, which significantly contributed to its increased commercialization and near-parity with traditional fossil-based technologies. Most assessments of past learning curves for CSP suggest historical learning rate was approximately 10 percent for each doubling of capacity. Based on the Bank's analysis, average capital costs could fall to around US$3,350/kW once 32 GW of additional global CSP capacity is added. Considering the ambitious CSP targets announced by some countries (e.g., Saudi Arabia's 25 GW CSP target by 2032) and the IEA forecast of 70 GW of global CSP capacity by 2035, this estimate of global capacity additions is reasonable. CSP cost reductions benefit the global community by making a technology that is widely expected to play a major role in meeting future electricity demand with clean energy more affordable.

77. In order to better understand the future benefits of global subsidy investments in CSP during the early years of the technology's development, a preliminary indicative analysis was undertaken of a hypothetical scenario of selling CSP electricity from the MNA region to Europe from 2020, including consideration of the incremental transmission costs. Although typical transmission lines for CSP projects are likely to be high-voltage direct current (HVDC), the scenario necessarily requires some undersea section, which can be up to 5 times the cost of comparable land-based lines. The capital costs of the CSP plants were assumed to reach their 2030 levels (US$3,350/kW) as noted above and largely displace gas-fired CCGT plants in the European markets in which CSP energy would be sold.

78. Using a conservative range of carbon prices estimated by the US Interagency Working Group on the Social Cost of Carbon (IWGSCC), and European gas price forecasts of the World Energy Outlook, the baseline estimate of the future economic rate of return from CSP projects was 6.9 percent using a 2030 carbon price of US$57/ton of CO_2. In 2015, the net subsidy required for CSP is US¢ 2.1/kWh - being the difference between CSP at US¢ 13.8/kWh and CCGT at US¢ 11.8/kWh. But by 2030, the cost of CSP will have fallen (from US¢ 12.9/kWh to US¢ 7.3/kWh). The cost of gas for the CCGT (as per the WEO 450 ppm scenario) also declines from current level, but the cost of carbon is assumed to increase (see Annex Figure 6.3 for details). The net result is that by 2030, CSP would be US¢ 3.4/kWh less expensive than gas - hence achieving a net economic benefit.

79. A range of sensitivities were run based on variations of carbon prices, CCGT plant efficiency and capacity factors, transmission losses, and gas prices. As summarized in Table 4 below, the resulting economic returns ranged from 3 to 11.6 percent on the basis of these variations. The analysis shows that the global investment into CSP in the short term - to cover the incremental costs and subsidies required for the projects built today, such as Noor-Ouarzazate II and III - bring a long-run (real) rate of economic return of 6.9 percent. This is because, in the future, CSP becomes less costly than the fossil fuel alternative - but this is a result achieved only if the incremental costs are subsidized by the global community in the short-run. In other words, provided the global community supports not just Noor-Ouarzazate II and III, but a further 10,000 MW or so in the next decade, then the global community's economic return on that support may be substantial.

Table 4: Summary of Sensitivity Analysis of Global Learning Curve Benefits

		Pessimistic	Baseline	Optimistic
2030 CSP CAPEX	US$/kW	3,800	3,350	3,000
2030 Carbon Price	US$/ton	40	57	80
Gas Price	US$/mmBTU	10.2	10.2	12.2
CCGT Efficiency	[ ]	50.0%	48.0%	48.0%
CSP Capacity Factor	[ ]	37.5%	40.4%	41.0%
HVDC Transmission Loss	[ ]	12.0%	11.0%	10.0%
ERR	[ ]	3%	6.9%	11.6%

80. **Conclusion.** In summary, the economic analysis shows that investment in the Project is justified given: (i) The contributions of Noor-Ouarzazate II and III to the global learning curve, and macroeconomic benefits, which will be realized provided that CSP investments are made at scale; (ii) a well-managed tender process that maximizes the chance of further CAPEX reduction if good international companies can be attracted, which is the case for the Project; and (iii) firm government commitment to CSP (and beyond just that of Noor-Ouarzazate II and III) that will encourage manufacturers to invest in the necessary local manufacturing capacity and worker training, so that the chances of realizing the macroeconomic benefits are good.

B. Technical

81. **Technical specifications and location.** The Bank undertook a review of the technical specifications of Noor-Ouarzazate II and III on the basis of review of studies and reports prepared by MASEN's technical consultants, the minimum functional specifications developed by MASEN and its technical advisor, MASEN's technical advisor, for Noor-Ouarzazate II and III's procurement process, and site visits. Noor-Ouarzazate II and III are expected to be implemented on an existing 2,500 hectare (ha) site 10 kilometers (km) northeast of the city of Ouarzazate in central Morocco. This location was selected by MASEN on the basis of its DNI characteristics, which was found to be excellent based on preliminary modeling using 1 year of solar insolation data and measurements from an on-site station that was installed in September 2010. The site is easily accessible from the port city of Agadir, which facilitates transportation of major equipment, and is adjacent to the Mansour Eddahbi dam.

82. **Water Consumption.** Noor-Ouarzazate II and III are expected to be dry-cooled, which significantly reduces their water consumption in comparison to wet-cooled technology.[32] Noor-Ouarzazate II and III are expected to need up to 230,000 cubic meter (m^3) and 125,000 m^3 of water, respectively, from the reservoir behind the Mansour Eddahbi dam, which is in the aggregate less than a quarter of Noor-Ouarzazate I's water consumption and, when combined with Noor-Ouarzazate I's consumption, represents less than one (1) percent of the dam's Regular Annual Volume and 0.5 percent of the overall water resources available in the region once the new Tiouini dam's construction is completed. Water is expected to be supplied from the reservoir to the site through a 10 km pipeline that is currently under construction as part of the Noor-Ouarzazate I process.

83. **Associated Facilities.** The plants' electrical output will be evacuated to the grid on a new Associated Facility, a 225 kV line connecting the existing substations at Ouarzazate and Tazarte. ONEE has already defined the routing of the new line to be generally parallel to an existing one and is in the process of procuring a contractor for the work using financing under a separate project with funding from AFD. Once completed, the line will increase the transmission capacity of the existing 225 kV line between the same substations, thus allowing the evacuation of power from Noor-Ouarzazate II and III, and creating a stronger loop in the area among the Ouarzazate, Errachidia, Tarzzate, and Khenifra substations.

84. **Front-End Engineering and Design (FEED) to meet MASEN's minimum technical specifications will be carried out by the awarded bidders who will construct, own, and operate Noor-Ouarzazate II and III**. Both Noor-Ouarzazate II and III plants will be of solar stand-alone configuration and will be designed, manufactured, installed, erected, operated and maintained in such a way that they will achieve high availability and reliability with minimum generation costs. Noor-Ouarzazate II and III's specifications request the power plants to be optimized to maximize peak-hour generation in order to displace combined-cycle gas turbines fueled by expensive imported LNG. The plants will follow environmentally sound practices and comply with the recommendations of the Framework Environmental and Social Impact Assessment study ("FESIA"). Fuel and water consumption will be minimized for both plants. Fuel-burning equipment will be used only for auxiliary support functions (i.e. Plant start-up and safe operation).

85. **Parabolic trough technology selected for Noor-Ouarzazate II is commercially proven.** As previously noted, the proposed Project includes the construction of two large-scale CSP plants: a parabolic trough plant (Noor-Ouarzazate II) and a solar tower power plant (Noor-Ouarzazate III). With regard to Noor-Ouarzazate II, the parabolic trough choice is considered a proven and fully commercial technology for energy production, and the technology presents no unusual construction or operational challenges for a power plant of that size. Parabolic trough is the CSP technology with the most commercial operating experience. At the end of 2013, around 3400 MW of installed CSP capacity used the parabolic trough technology and accounted for most of the current installed CSP capacity. Noor-Ouarzazate II's Minimum Functional

[32] During development of Noor-Ouarzazate I, MASEN undertook an analysis of the costs and benefits of wet and dry cooling technologies, and offered bidders the option of either technology at the time of bidding. MASEN's analysis indicated a preference for wet cooling based on the Noor-Ouarzazate I bidders' feedback and analysis. However, for Noor-Ouarzazate II and III, the technology has sufficiently improved to change this conclusion.

Specifications (MFS) have been prepared by MASEN with the assistance of highly qualified consultants, incorporating international best practices and the lessons learned from Noor-Ouarzazate I procurement process. The technical specifications have also been reviewed by the donors' technical experts in order to ensure that all relevant construction and operational risks are adequately addressed.

86. **The solar tower technology selected for Noor-Ouarzazate III is still an evolving technology in its early commercial stages**. Solar tower also has higher capital costs than parabolic trough, and the operational experience is much more limited due to the relatively low number of projects currently under construction and operation. The total capacity in operation has recently increased to almost 500 MW with the commissioning of Ivanpah by Brightsource in California. Ivanpah, together with the Crescent Dunes in Nevada (currently under commissioning) show that it is possible to build and operate large-scale solar towers using different technologies (molten salt or direct steam as working fluid). However, the construction and commissioning of both projects have taken longer than initially planned. There is a higher risk of delay in the commissioning of a solar tower when compared to parabolic trough, due to the scaling-up challenges and the continuous technical improvements and cost optimizations that are being incorporated in the newer plants. The team acknowledges this risk and will closely follow the performance of the mentioned solar towers and monitor the procurement and construction of Noor-Ouarzazate III in order to minimize potential delays.

87. **However, solar tower also has important benefits that make it very attractive and potentially better than other CSP technologies**:

(i) Higher conversion efficiency from solar thermal energy to electricity because the technology can achieve very high temperatures with manageable losses by using molten salt as a heat transfer fluid. This allows higher operating temperatures and steam cycle efficiency, and reduce the cost of thermal energy storage by allowing a higher temperature differential;

(ii) Molten salt towers have lower water consumption requirements; and

(iii) Greater potential for cost reduction and local manufacturing. These advantages are driving the increasing share of solar tower projects planned worldwide and according to several expert sources, solar towers might become the technology of choice in the future.

C. Financial Management

88. **As part of the Noor-Ouarzazate I process, MASEN established an accounting and financial management system satisfactory to the Bank**. This system is based on rules applicable to commercial law of the Kingdom of Morocco. MASEN's financial statements are submitted annually to an independent external auditor, and will be submitted to the Bank no later than 6 months after the end of the related fiscal year. Similar to the approach adopted for Noor-Ouarzazate I, interim unaudited financial reports, which will cover all the activities and sources of funds of the Project, will be prepared for the Project twice a year by MASEN and transmitted to the Bank 45 days after the end of each semester.

89. **Audits.** The external annual audit report of the Project's accounts and the management letter covering recommendations to improve the internal controls and the accounting system will be transmitted by MASEN to the Bank no later than six (6) months after the end of each fiscal year. Moreover, the annual audit report of the Project's accounts (for both CTF and IBRD funds) will be carried out in accordance with the Bank guidelines by an acceptable auditor and according to terms of references acceptable to the Bank. As part of the Project's preparation process, the Bank appraised the system and related procedures to ensure its continued compliance with the Bank's requirements in OP/BP 10.00.

90. In addition, MASEN was informed of the Bank's Access to Information Policy, which mandates that the Bank and MASEN make the Project audit report publicly available in a timely fashion and in a manner acceptable to the Bank. MASEN requested, and the Bank has agreed to, only partial publication of its audit report as well as the SPVs' audit reports as certain information can be considered confidential.

91. **Financial Management Assessment.** The SPVs, which will be the Project Implementing Entities, will not be identified until after conclusion of the procurement process and award of Noor-Ouarzazate II and III. As such, appraisal of their accounting and management system is not possible until then. However, the CTF and IBRD loan agreements require, as a condition to disbursement under the agreements, that the SPVs establish an accounting and financial management system acceptable to the Bank. It is envisaged that this system would provide for preparation of annual financial statements and periodic expenditure reports by component, category, and source of funding. Once established, the SPVs will be audited annually by an independent external auditor acceptable to the Bank, and the audit report will be shared with the Bank no later than 6 months after the end of the related year. MASEN is expected to reflect these requirements in the conditions to effectiveness or disbursement of the PPA(s), the financing agreement(s) governing the on-lending arrangements of IFI funds, or other similar contracts entered into with the SPVs. As part of verifying compliance with these conditions, the Bank will confirm ongoing adherence to OP/BP 10.00's requirements for financial management.

D. Procurement

92. **Procurement Risk.** The initial capacity assessment of MASEN (newly created entity) permitted to note that it did not have experience with World Bank procurement. The present capacity assessment, which is an update of the previous one undertaken for the Noor-Ouarzazate I Bank Project, recognizes that the situation has changed since the initial assessment. There has been significant improvement in terms of organization, human resources and technical tools available to carry out procurement function. However, due to the complexity of the Project, the risk remains high.

93. **MASEN's procurement rules.** Because of its status of "Société Anonyme" (limited liability company with Management and Supervisory boards), ruled under private law, with public capital and a Supervisory Board, MASEN is not governed by the public procurement decree. It follows its own procurement rules dated on April 6, 2011, complemented by a well-structured manual of procedures, with a dedicated "Procurement" module. To take into account MASEN's specificities, those rules differ from the public procurement decree, on some key

points among which the thresholds for procurement methods, the composition and functioning of the procurement committees, etc. An update of MASEN's procurement rules is underway to further improve its quality and to include detailed procedures for e-tendering which is widely used in practice. After review by the Directorate, the new version will be submitted to the Supervisory Board for approval (expected in the latter end of 2014).

94. **General Affairs Unit.** MASEN has set up a General Affairs Unit (GAU), in charge of Procurement and Logistics. This unit is composed of three staff, and MASEN intends to strengthen the team in 2014 with two new hires. The GAU participates in the procurement of works, equipment and installations related to the facilities for the CSP sites (water supply, access roads, perimeter roads, boundary wall, water supply from the dam ME, buildings, etc.). The unit's scope is mainly focused on the procurement process itself, with technical and other inputs provided by MASEN's operational departments. Specific training in procurement for concerned staff (GAU and other departments involved in procurement) is necessary to build internal capacity and improve staff skills, but not required for the Project.

95. **MASEN's structuring team.** Procurement of private sponsors for CSP projects, such as Noor-Ouarzazate I, II, and III, are the responsibility of MASEN's Structuring Team, supported by staff from other departments, such as "Engineering Design" and "Strategic Management" as needed. Because procurement of sponsors for CSP projects is complex, the Structuring team is assisted by several consultants for the management of the whole procurement process (i.e., preparation of the RFP and bid evaluation report, management of selection process).

96. **E-Procurement.** MASEN is using e-procurement with the electronic platform for e-tendering as part of the "Enterprise Resource Planning" (ERP) tool. The platform helps to manage the whole procurement process: planning, bidding including advertisement, monitoring of contract execution and management of payments. The use of ERP optimizes the procurement cycle while helping for a more effective management of the process from tendering through the payment phase. Currently, the ERP is being improved to enhance its reliability. As a general rule, the use by MASEN of its e-tendering platform in Bank funded projects (partially or fully) is subject to a satisfactory assessment by the Bank. Such assessment has not taken place yet.

97. **Procurement Assessment.** MASEN benefitted from IFI support during the 1st phase (Noor-Ouarzazate I) and therefore has become more familiar with Bank procurement procedures and requirements, especially with regard to operations involving partnerships with the private sector (para. 3.14(a) of the Bank's procurement guidelines). However, as mentioned above, the risk remains high, as in Noor-Ouarzazate I, considering the complexity of the operation. Therefore, the Bank's close follow up and support is key for a timely and successful completion of the procurement process. With regard to capacity building, the Bank is expected to offer MASEN's staff involved in procurement specific training on Bank procurement procedures, to the extent MASEN requests such training.

98. **Public supervisory authority over MASEN.** As a state owned entity, MASEN is under the oversight of the "*Direction des Etablissements Publics et de la Privatisation*" (DEPP). By the law, MASEN is subject to the supervision of the General Inspectorate of Finance (IGF) and the Court of Account (CoA). But to date, no IGF or CoA mission has taken place.

99. The Project's procurement consists of the competitive selection of private sector sponsor(s) for a partnership with MASEN to design, build, own, operate, and transfer the Noor-Ouarzazate II and III facilities. The procurement process follows the requirements of para. 3.14(a) of the Bank's procurement guidelines, which provides for selection of the sponsors under open competitive bidding procedures acceptable by the Bank. Once selected in this manner, the sponsors would then be free to procure goods, works, and consulting/non-consulting services required to implement the contemplated arrangement from eligible sources using the sponsors' own procedures. As a result, the Project's procurement plan is limited to two power purchase agreements (PPAs) for the purchase of power from special purpose vehicle(s) (SPVs) formed by the selected sponsor(s) to construct, own, and operate Noor-Ouarzazate II and III for the term of the agreements.

100. Because of the MSP's implementation timeline, the procurement process commenced during the Bank's project preparation and is currently at an advanced stage. MASEN adopted a procurement approach that includes a prequalification phase and a 2-stage bidding process. On January 23, 2013, MASEN issued an invitation for prequalification that provided a short description of Noor-Ouarzazate II and III, and enumerated the requirements for prequalification. Seven highly qualified consortia were invited to participate in the next bidding stage, three of which qualified to bid for Noor-Ouarzazate II, and 4 qualified to bid for Noor-Ouarzazate III. On December 12, 2014, MASEN issued the request for proposal (RfP) in the first stage of the bidding process to invite technical bids. The RfP provided minimum functional specifications to set the parameters for the technical design, but otherwise left the bidders flexibility to propose the most optimum design to meet MASEN's requirements. For those bidders prequalified for both Noor-Ouarzazate II and III, the RfP provided flexibility to propose a design that provided for two separate plants or one that is optimized to combine them in the most cost-effective manner.

101. The RfP also invited bidders to submit proposals for Industrial Integration, consistent with MASEN's mandate to promote local industrial development. The bidding documents invited bidders to proposed either direct or indirect investments that are equivalent to at least 35 percent of Noor-Ouarzazate II and/or III's costs, as applicable. Direct measures comprise expenditures on construction of the plants (e.g., civil works, earth movement, construction materials, and other services from companies incorporated in Morocco). Indirect measures comprise investments in, for example, maintenance facilities and research and development centers. However, the RfP made clear that "Bidder's proposal of any such investment in the first stage of the Tender Procedure is discretionary and voluntary." The RfP further provided that "the nature and level of the investment, as reflected in the Industrial Integration Proposal, is left to the complete discretion of the Bidder." Once a bidder voluntarily proposes some investments in the first stage of bidding, it is expected to commit to such proposal in the second stage of the process.

102. Final bids are due in the latter end of September 2014. MASEN expects to reach commercial closing (e.g., signature of the PPAs, on-lending agreements that will govern pass-through of the Bank's and other IFI's funds from MASEN to the SPVs, and other plant-related documentation) for both Noor-Ouarzazate II and III within a short period after award of the plants to selected sponsors. As such, it is critical to ensure that the requisite debt financing from

the Bank and other IFIs is approved prior to conclusion of the second stage of the bidding process. Aside from the credibility this provides in such a key element of the plants' financing structure, such approvals would ensure that the necessary terms and conditions of financing are known and can be reflected in the documents to be signed by bidders at the time of award.

E. Social (including Safeguards)

103. **The risk of adverse social impacts caused by the plants is low**. The plants are not expected to involve any involuntary or physical resettlement; the potential for adverse socio-economic impacts, including through land acquisition is also limited. However, due to its size, scope and complexity, including in terms of associated facilities, the Project triggers OP 4.12 and is categorized as A.

104. **Site of Noor-Ouarzazate Solar Complex**. The Noor-Ouarzazate Solar Complex is located in the Ghessat council and at the «Tamzaghten Izerki» village, about 10 km north east of Ouarzazate city, a town of approximately 50,000 inhabitants situated in south-central Morocco, at about 160 km south-east of Marrakesh. The region has relatively higher levels of unemployment and lower levels of per capita income than the remainder of Morocco. The Noor-Ouarzazate Solar Complex is therefore seen as a welcome addition to the local economy and expected to enhance employment opportunities.

105. **Land acquisition.** For the purpose of the Noor-Ouarzazate Solar Complex MASEN acquired 2,500 hectares (ha) of collective land in 2010 for the solar plants (including for Noor-Ouarzazate I, II, and III). A second additional acquisition of 543 ha of collective land took place in 2013, which is mainly dedicated to a proposed photovoltaic plant, which is not part of this Project. 15 hectares of the additional 543 hectares will be used for the Noor-Ouarzazate I Solar Complex, which due to soil erosion on the originally demarcated 2,500 hectares had to be slightly re-aligned. The land for the Noor-Ouarzazate Solar Complex was unoccupied and of arid nature and of little or no economic value.

106. The acquisition of the land was carried out following Moroccan standard procedures for similar types of voluntary transactions between a local community and a public agency. The purchase of land followed therefore a willing-buyer, willing-seller arrangement.

107. **Associated infrastructure.** A number of infrastructures are associated with the Noor-Ouarzazate Solar Complex, including small infrastructures (for example) that are ancillary to the site and larger infrastructures that are necessary to ensure production and off-take electricity from the site (transmission lines). The updated 2014 FESIA includes all these facilities. The Noor-Ouarzazate II and III plants entail only one new additional associated facility that was not included under Noor-Ouarzazate I Bank Project – namely, the Ouarzazate – Tazarte 225 kV transmission line necessary to ensure the evacuation of power from the Noor-Ouarzazate II and III plants into the wider Moroccan grid. The existing 2011 FESIA, which was developed and disclosed as part of the Noor-Ouarzazate I Bank Project as discussed further below, has been revised and re-disclosed in-country and at the Infoshop on June 25 and 26, 2014, respectively.

108. The new transmission line will be built by ONEE with financing mainly from IFIs. Its specific routing will not be determined until February 2015 following completion of the site

survey and geotechnical analysis. At that time, the parcels of land necessary for the line's construction will be identified. The line route will pass through nonagricultural land of arid nature, of which approximately 90 percent is publicly owned or owned by collective communities. ONEE anticipates securing the real property rights it needs on a voluntary, willing-buyer, willing-seller basis. OP 4.12 aspects related to the line are covered in a Resettlement Policy Framework developed by ONEE and submitted to the Bank. ONEE will also provide the related safeguards documentation (RAP) for Bank clearance and disclosure ahead of the start of construction (see below). However, disclosure of this document is required only in the case of involuntary land acquisition as reflected in the loan agreements between the Bank and MASEN

109. **Safeguards documentation**: As part of the process for Noor-Ouarzazate I's development, MASEN prepared and disclosed on January 12, 2011, a FESIA in line with the Bank's safeguards policies. The reason for the preparation of a framework was the level of uncertainty as to design and technology choices for the entire Noor-Ouarzazate Complex, including the Noor-Ouarzazate I plant, during project preparation, which depended on the ongoing procurement process for the Noor-Ouarzazate I plant. Following award of the plants, a detailed Specific Environmental and Social Impact Assessment (SESIA) was carried out before construction started.

110. A similar approach was adopted for the proposed Project. As the design and technology choices for the Noor-Ouarzazate II and III will be determined after the conclusion of the ongoing procurement process, the 2011 FESIA was updated to reflect the latest available information, and re-disclosed in-country and at the Infoshop after public consultations in June 2014. Additionally, the procedures used for all land acquisition were communicated to the Bank through land acquisition plans, with a view to ensuring full compliance with safeguard policies.

111. As discussed further below, the plant-specific SESIA will be carried out by the selected private sector sponsors of Noor-Ouarzazate II and III. The SESIAs will follow the requirements of the updated FESIA, and include a public consultation process in compliance with World Bank guidelines. It is expected that, once the SESIAs are reviewed by the Bank and found in compliance with Bank policies, the documents would be publicly disclosed prior to start of the plants' construction.[33]

112. Disclosure for associated facilities has taken place as described in the updated FESIA. In addition, the ESIA and the Resettlement Policy Framework (RPF) for the Ouarzazate – Tazarte transmission line were disclosed on June 26, 2014 both in-country and to Infoshop. The RPF establishes the process for compliance with OP 4.12. Once the specific land parcels are identified and the related owners are determined, ONEE will provide the Bank with the safeguard documentation (RAP or LAP) for clearance and disclosure ahead of start of construction of the line. However, as noted above, disclosure of this document is required only in the case of involuntary land acquisition as reflected in the loan agreements between the Bank and MASEN

[33] MASEN will undertake, to the extent reasonably possible, such disclosure at least one hundred and twenty (120) days prior to start of construction.

113. **Community projects and grievance mechanism**. Compensation for MASEN's acquisition of collective land for the Noor-Ouarzazate Complex, which includes Noor-Ouarzazate I, II, and III, is required by law to be administered by the Rural Affairs Directorates of the Ministry of Interior (DAR) for the benefit of the communities involved. The communities identify development projects, and, working with DAR and local authorities, implement them using the compensation proceeds.

114. As of April 2014, approximately 85 percent of the MAD 30.5 million purchase price paid by MASEN for the Noor-Ouarzazate I, II, and III sites and deposited with DAR has been allocated to a pipeline of local development projects for the benefit of local communities. These include irrigation channels, new water wells and extension of existing wells, irrigation pumping stations, drinking water tank and extension/reinforcement of a drinking water network, a student hostel, an equipped ambulance, and a variety of infrastructure projects.

115. The balance of the price purchase has been reserved to projects that still need additional funding to proceed. This process involves (i) the communities to internally agree on the list of projects to pursue, (ii) agreement with local authorities and DAR on the project list approved by the communities, (iii) any requisite project procurements take place, and (iv) construction to be completed. As part of the Noor-Ouarzazate I process, MASEN agreed to prepare a Social Development Plan (SDP) within 6 months from the effective date of the Bank's legal agreements to inform the Bank of the status of this process. The Bank will continue to follow the implementation of the SDP during Noor-Ouarzazate II and III's supervision.

116. In addition to those community projects carried out by DAR/MOI, MASEN is also conducting a wide range of additional community projects, which range from provision of traveling health clinics, to training.

F. Environment (including Safeguards)

117. The Project triggers OP 4.01 due to its limited environmental impacts.

118. **Environmental impacts and mitigation measures:** The Project has limited environmental impacts, especially considering the size of the power plants to be constructed. It should be noted that, as a renewable energy facility, the environmental impacts of the underlying solar facilities are significantly lower than an alternative conventional fuel power plant. Most importantly, the Project will reduce air pollution as it is not emitting greenhouse gases or other local pollutants.

119. The potential environmental risks in the Project's area of influence are:

- ***Impacts to Soil, Water, and Air Resources:*** Construction of Noor-Ouarzazate II and III facilities on such large areas of land will require grading, and results in soil compaction, potential alteration of drainage channels, and increased runoff and erosion. Engineering methods can be used to mitigate these impacts.

- ***Water use:*** Parabolic trough and central tower systems typically use conventional steam plants to generate electricity, which commonly consume water for cooling. In arid

settings such as the Ouarzazate desert environment, any increase in water demand can strain available water resources. However, for the Noor-Ouarzazate II and III plants dry cooling is being used, thus minimizing water use. Water is also being used for the cleaning of mirrors. Water from Mansour Eddahbi Dam (MED) reservoir will serve three purposes: (i) irrigation for agriculture (180Mm3/yr), (ii) drinking water for the city of Ouarzazate (5 Mm3/yr), and (iii) industrial water for the Noor-Ouarzazate Complex (2.11 Mm3/yr).

- ***Ecological impacts:*** The use of large areas of land for the Noor-Ouarzazate solar power facilities will adversely affect native vegetation and wildlife in many ways, including loss of habitat; interference with rainfall and drainage; or direct contact causing injury or death (flying birds). These potential impacts on the avifauna will be evaluated and documented in the EIAs for each technology, and mitigation measures proposed. However, according to Smit Hanneline[34], the following are not limited actions that should be taken to mitigate negative impacts on birds: (i) preconstruction monitoring to determine the presence of "threatened, rare, endemic" bird species; (ii) monitoring should take into account seasonal variation, fly paths and birds' behavior; (iii) during construction the position and height of the receiver tower should be taken into account at CSP plant developed with a central receiver tower; (iv) ensure that birds do not get in contact with evaporation ponds, i.e., ponds should be covered with wire mesh or netting to reduce the possibilities of (a) attracting, (b) drowning, and (c) poisoning; (v) motivate the need for new power lines to be marked with anti-collision devises and constructed with bird-friendly designs to prevent electrocution.

- ***Particulate matter:*** The construction and operation of Noor-Ouarzazate II and III facilities could generate particulate matters, which can be a significant pollutant particularly for the nearby classified/sensitive areas such as the Biosphere reserve of the South Moroccan Oasis during windy conditions. Regular watering of the vehicles and trucks itinerary paths at the construction sites will be undertaken at regular basis as mitigation measures to avoid rising of clouds of dust that would affect the surrounding environment by heavy layers of particles deposited on the biosphere reserve vegetation.

- ***Risk of toxic fluid leaks:*** The CSP in Noor-Ouarzazate II and III will employ oils or molten salts, hydraulic fluids, coolants, and lubricants that may be hazardous and present spill risks. Proper planning and good maintenance practices will be used to minimize impacts from these hazardous materials. To prevent hazardous and presence of spill and leak risks, tubing and specialized equipment and materials will be used to prevent cracking and corrosion. This mitigation measures will also involve the use of flanges, gaskets, pumps and pump seals (for HTF service) as well as security valves to reduce emissions and leaks, and containment pits to minimize accidental spread of molten salts.

[34] BirdLife in South Africa: Guidelines to minimize the impact on birds of Solar Facilities and Associated Infrastructure in South Africa (http://www.birdlife.org.za/images/stories/conservation/birds_and_wind_energy/solar_power.pdf)

120. Among the key mitigation measures are the Project's safety and security protocols. The Project incorporates worker safety and security measures to mitigate the use and manage the impacts of hazardous materials (molten salts, heat-transmission fluid, fossil fuel, etc.), fire hazards and other soil pollution on the environment and human health. To ensure that plant facilities comply with the minimum standards to provide worker security and protect the environment, HSSE personnel will permanently monitor the complex's facilities and report all incidents that may occur during construction and operation of Noor-Ouarzazate II and III power plants.

121. The Project's associated facilities' potential environmental considerations include land disturbance/land use impacts; impacts to soil, water and air resources; impacts to wildlife and sensitive species; visual, cultural, paleontological, socioeconomic, and environmental justice impacts, and potential impacts from hazardous materials.

122. **Safeguards documentation.** The updated FESIA covers all of the Noor-Ouarzazate Complex's site and the different technologies (CSP parabolic trough and solar tower) under consideration by MASEN. The updated FESIA was prepared in a participatory manner including all requisite stakeholders' consultation and disclosures. It includes a description of: (i) the legal and regulatory framework applicable to the plants, (ii) alternative options considered, (iii) a state of the environment in the plants' location and surrounding region, (iv) potential impacts and associated compensation measures to be considered, and (v) a Framework Environmental and Social Management Plan (FESMP). The FESMP includes institutional settings, general mitigations measures and monitoring plan for the potential impacts expected from plant activities during construction and operation stages.

123. The updated FESIA will guide the preparation, adoption and monitoring of the SESIAs, which, as noted above, are to be carried out by the bidders and their respective SPVs for each of Noor-Ouarzazate II and III once their initial designs are determined. The SESIAs will include a detailed Environmental and Social Management Plan (ESMP) in accordance with the provision of the updated FESIA, including the processes, rules and standards defined in the FESIA, and will be subject to the Bank's review and concurrence before its final approval and implementation by MASEN and the relevant SPVs.

124. After the SESIAs' review and disclosure, the SPVs are expected to contract environmental and social safeguards coordinators that will have direct responsibility for implementing the agreed environmental, health and safety measures at the plants' site during construction and operation. These coordinators will, inter alia, prepare a monthly Health, Safety and Environment report during the construction and operation phases of Noor-Ouarzazate II and Noor-Ouarzazate III, and MASEN will provide a summary of this information for the Bank's review during the supervision phase of the proposed Project.

125. Supervision of the implementation of the ESIAs and their ESMPs for the Associated Facilities will be carried out by MASEN and ONEE, which are responsible for completing these facilities.

126. **Implementation Capacity**. MASEN has a department within its organization to monitor development and implementation of the safeguards aspects of the Noor-Ouarzazate Complex, including Noor-Ouarzazate I, II, and III. MASEN is expected to ensure that staff in this department receive adequate training and possess the relevant expertise to supervise implementation by the SPVs of all relevant environmental and social impact mitigation measures, including occupational, health and safety guidelines, that are mainstreamed into the plants' design in accordance with the provisions of the updated FESIA.

127. Though MASEN's Sustainable Development Department is staffed with qualified personnel with regard to the safeguards aspects of the Noor-Ouarzazate Complex (corresponding to the size of Noor-Ouarzazate I) being implemented, for the expansion of the Complex with two additional plants (Noor-Ouarzazate II and Noor-Ouarzazate III) an appropriate budget will be made available to ensure adequate monitoring equipment and staffing to accommodate the new settings.

G. Other Safeguards Policies Triggered (Safety of Dams (OP 4.37))

128. **Like Noor-Ouarzazate I, Noor-Ouarzazate II and III's water requirements will be satisfied from the existing MED reservoir**. To this end, a 19 km long water intake channel from the dam to the site of the Noor-Ouarzazate Complex is being constructed by MASEN. The plants' performance will depend on availability of water and performance of the dam. Failure or misuse of this dam may have adverse results on the plants' operation. Therefore, the Bank's policy OP 4.37 on Dam Safety is triggered. As detailed below, the monitoring and maintenance procedures as well as past assessments of the MED satisfy the requirements of OP 4.37.

129. The MED is located on the "oued"[35] Drâa and is an arch dam with a height of 70 meters at its highest point. During periods of normal hydrology, the dam holds 560 million m3 of water serving irrigation, energy use and flood management. The dam was impounded in April 1972.

130. The raw water requirement from the dam's water reservoir for the Noor-Ouarzazate Complex will be pumped, conveyed and stored in two water tanks (capacity 15,000 m3 each) to a site adjacent to the Complex. The quantities of water needed to feed the cooling system (dry) of the Noor-Ouarzazate II and III solar plants are estimated to be 230,000 m3/yr and 125,000 m3/yr, respectively. There will not be any conflict on water allocation, according to MASEN's document on water needs analysis, on the base of the following: (i) there is a new dam (Tiouine dam) that is currently under construction, with a capacity of 270 Mm3 that will start servicing the region (Ouarzazate and Zagora) in 2014, with a forecasted regular annual volume of 150 Mm3; (ii) this new dam will provide 20 Mm3 of drinking water and 10 Mm3 of water for irrigation to supplement supplies from the MED; (iii) though the irrigation needs are supposed to subtract about 180Mm3/yr and 5Mm3/yr of drinking water, there will not be any conflict because the water ceded from MED reservoir to perform these functions will be reduced but complemented by the supply from the Tiouine dam; hence the additional 350,000 m3/yr to satisfy the needs of Noor-Ouarzazate II and III from MED will not be an impediment to the

[35] An "oued" is a river that only carries water during the winter months when it rains. It is commonly dry during the summer months.

provision of water to either the entire Noor-Ouarzazate Complex or the irrigation water and drinking water in the Ouarzazate Region.

131. **The MED is managed by the Moroccan Hydraulics Administration in accordance with the requirements of Moroccan law**. As it is the practice in Morocco, the dam is equipped with a testing and monitoring network. To ensure consistent maintenance of the dam's parts and with the aim of prolonging the life of dams the Hydraulic Administration has, since the 1980s, been using preventive maintenance. The latest detailed auscultation analysis for the dam is dated May 2012. The report finds a mechanically and hydrologically satisfactory behavior of the dam in line with the findings of a site visit conducted as part of the report. A World Bank team visited the site in May 2014 and confirmed the visual assessment.

132. **Morocco has a comprehensive framework in place to safeguard the safety of its dams. Dam safety is governed by the Water Act 10-95**. Section 16 of this Act requires the preparation of an Integrated Water Resources Development Executive Plan (*Plan Directeur d'Aménagement Intégré des Ressources en Eau* - PDAIRE) which is prepared by the administration for each watershed or set of water basins. Its main objective is the management of water resources of the water basins, including estuary waters, to ensure both quantitatively and qualitatively, present and future water needs, of different water users of the water basin. The PDAIRE defines, among other actions, the necessary operations for the mobilization, the distribution, the protection, the restoration of water resources and the public water domains, including hydraulic structures.

133. Morocco has implemented a system for the dams' monitoring and maintenance under the guardianship of the hydraulic basin agencies. The latter are organized to mobilize the necessary resources (human, technical and material) to ensure comprehensive inspections and assessments of the dams' safety. Monitoring is documented monthly for each dam in an inspection report which reflects the evolution of each hydraulic or mechanical phenomenon and also tracks the state and behavior of the dam. Moroccan regulation therefore seems to have developed procedures and means acceptable for dams' review and monitoring.

Annex 1: Results Framework and Monitoring

MOROCCO: Noor-Ouarzazate Concentrated Solar Power Plant Project

Results Framework

Project Development Objective (PDO): The Project's PDO is to increase (a) installed capacity (MW) and (b) electricity output (MWh), especially during peak hours, of the Noor-Ouarzazate Solar Complex.

PDO Level Results Indicators	Core	Unit of Measure	Baseline (2014)	Cumulative Target Values					Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
				2015	2016	2017[36]	2018	2019				
Indicator One: Generation Capacity of Renewable Energy (other than hydropower) constructed	☒	MW	0	0	0	0	250	250	Once, after end of Project	MASEN report	MASEN	Tested plant capacity
Indicator Two: Noor-Ouarzazate Complex Electricity Sales	☐	GWh	0	0	460	460	1300	1300	semi-annually	MASEN report	MASEN	Amount of energy purchased from Noor-Ouarzazate Complex
Indicator Three: Noor-Ouarzazate Complex Electricity Sales during Peak Hours	☐	GWh	0	0	120	120	540	540	semi-annually	MASEN report	MASEN	Amount of energy purchased from Noor-Ouarzazate Complex

[36] Avoided local air pollution and avoided global GHG pollution indicators based on commissioning of the plant on July 1st 2017.

Indicator Four: Direct Project beneficiaries (number), of which female (%)[37]	☒	No./%	0/0	0	0.4 million of which **50.3%** female	0.4 million, of which **50.3%** female	1.1 million, of which **50.3%** female	1.1 million, of which **50.3%** female	Annual after plant commissioning	MEMEE and planning department	MASEN	Estimate of number of electricity customers served by plants annually, and percent of which that are female
Indicator Five: Avoided global GHG pollution[38]	☐	Tons of CO_2 eq./year	0	0	290,00	290,00	700,000	700,000	Annual after plant commissioning	MASEN report	MASEN report	Est. of avoided CO2, based on various fuel used (oil, coal, gas)
INTERMEDIATE RESULTS												
Intermediate Results (IR):												
IR indicator One: Transaction financial close	☐	Yes/No	No	**Yes**	Yes	Yes	Yes	Yes	Single event	MASEN report	MASEN	Transaction financial close occurs when all loan agreements are effective
*IR Indicator Two***:** Private capital mobilized	☒	US$ Million	0	200	200	200	200	200	Once at plants' financial close[39]	MASEN report	MASEN report	Amount of commercial equity committed for construction
IR indicator Three: Beginning construction of	☐	Yes/No	No	**Yes**	Yes	Yes	Yes	Yes	Single event	MASEN report	MASEN	Official Notification of Construction Start as provided for in

[37] The number of beneficiaries will be calculated by dividing the energy output of Noor II and III by the average annual consumption of electricity per customer on ONEE's system. For the number of female beneficiaries as a percent of the direct beneficiaries, the share of females in the Moroccan population will be used.

[38] Based on emissions rates of 0.64 tons of CO2 eq./year for Noor-Ouarzazate I and 0.45 tons of CO2 eq./year for Noor-Ouarzazate II and III.

[39] The term "Financial close" is defined for purposes of this document as signature of all debt and equity legal agreements that provides for the requisite funding for the Noor II and III, and satisfaction or waiver of all conditions to the effectiveness and/or disbursement of these agreements.

the plant												the EPC Contract for relevant plant
IR indicator Four: Commissioning of the plant	☐	Yes/No	No	**No**	No	**No**	Yes	Yes	Single event	MASEN report	MASEN	Certification of commissioning as required in the power purchase agreement(s)

Annex 2: Detailed Project Description

MOROCCO: Noor-Ouarzazate Concentrated Solar Power Plant Project

I. Overview

1. The Project will support MASEN's implementation of the second phase of the Noor-Ouarzazate Complex. This second phase consists of 2 distinct plants: (a) a 150-200 MW parabolic trough CSP plant (Noor-Ouarzazate II) and (b) a 100-150 tower CSP plant (Noor-Ouarzazate III). Both plants will be constructed on lots adjacent to Noor-Ouarzazate I that have already been acquired by MASEN. The proposed Project consists of 2 components as follows:

Component 1 – Financing the Initial Investment (US$119 million from CTF and US$100 million from IBRD)

2. Component 1 consists of (A) development of Noor-Ouarzazate II through the formation of a partnership between MASEN and a competitively-selected partner; (B) construction of the associated facilities needed for Noor-Ouarzazate II's operation; (C) development of Noor-Ouarzazate III through the formation of a partnership between MASEN and a competitively-selected partner; and (D) construction of the associated facilities needed for Noor-Ouarzazate III's operation. Financing for construction of the associated facilities under sub-components (B) and (D) is not included in the proposed Project, and is covered by separate financing from donors that has already been committed. CTF and IBRD financing is focused on construction of Noor-Ouarzazate II and III under sub-components (A) and (C).

3. Under this component one additional Associated Facility, namely the Ouarzazate – Tazarte 225 kV transmission line, will be financed mainly by funding from IFIs. This transmission line is necessary for the evacuation of power from the Noor-Ouarzazate II and III plants. Construction of the line will not commence before early 2015. Other associated facilities for the overall site of the Noor-Ouarzazate Solar Complex are listed in the updated Framework Environmental and Social Impact Assessment (FESIA), which was re-disclosed in Infoshop on 26 June 2014. Construction of these associated facilities is either underway or complete.

Component 2 – Cost Mitigation Mechanism (US$299 million from IBRD)

4. Component 2 is designed to provide a US$299 million loan from IBRD to MASEN to: (A) support the acquisition of kilowatt-hours (kWh) produced by Noor-Ouarzazate I to partially cover the difference in the price at which MASEN would buy the electricity generated by the plant and the price at which MASEN would sell such electricity to ONEE; (B) support the acquisition of kilowatt-hours (kWh) produced by Noor-Ouarzazate II to partially cover the difference in the price at which MASEN would buy the electricity generated by the plant and the price at which MASEN would sell such electricity to ONEE; and (C) supporting the acquisition of kilowatt-hours (kWh) produced by Noor-Ouarzazate I to partially cover the difference in the price at which MASEN would buy the electricity generated by the plant and the price at which MASEN would sell such electricity to ONEE. Component 2 was divided in this manner to allow

flexibility to begin disbursements under a specific sub-component when the related plant is commissioned without needing to wait for the other plants to be commissioned as well.

II. Project Components

2.1 Component 1 – Financing the Initial Investment (US$ 119 million from CTF and US$ 100 million from IBRD)

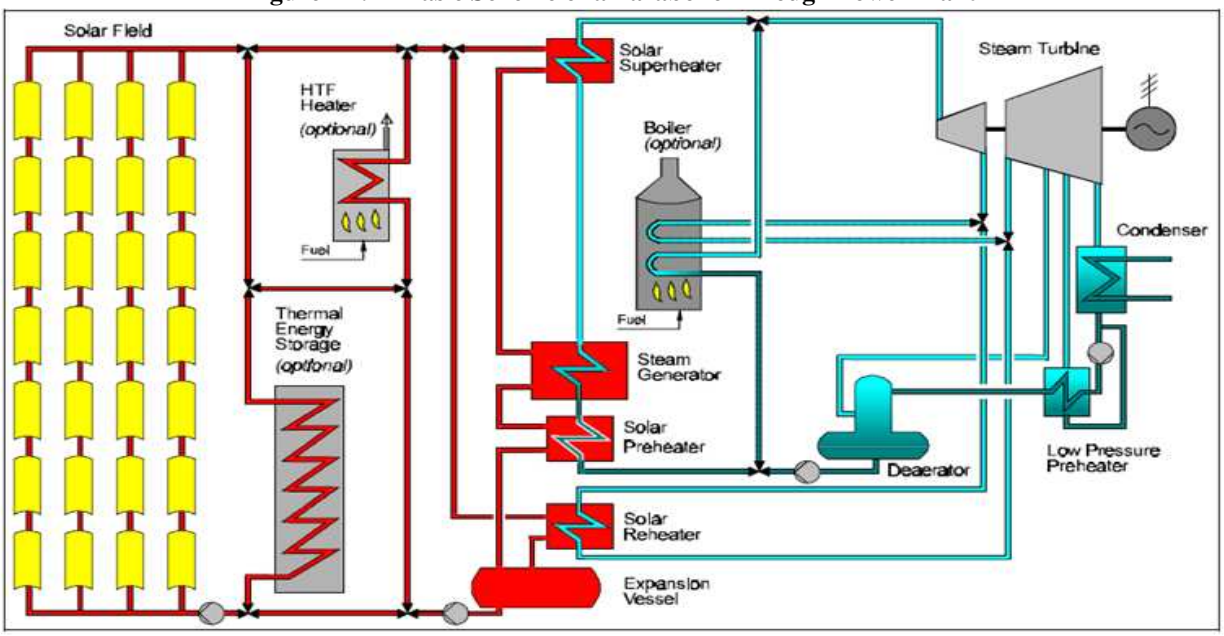
2.1.1 Basic design of Noor-Ouarzazate II (Parabolic trough)

5. Parabolic trough power plants consist of large fields of parabolic trough collectors, a Heat Transfer Fluid (HTF) system, a steam generation system, a Rankine steam turbine/generator cycle (power block) and optional thermal storage and/or fossil-fired backup systems. The basic scheme of a parabolic trough power plant, the technology selected also for Noor-Ouarzazate I, can be observed in Figure A2.1. The collector or solar field is modular and comprises many parallel rows made up of a large number of single-axis-tracking parabolic trough solar collectors, normally aligned on a north-south horizontal axis. Each solar collector has linear parabolic-shaped mirrors (reflectors) that focus the sun's direct beam radiation by about 70-100 times on the receiver (SolarPACES/Estela/Greenpeace, 2009), a linear absorber pipe located at the focus of the parabola. The collectors track the sun from east to west during the day. The HTF, synthetic oil in all commercial operating plants, is heated up as it circulates through the absorber, then transferring the heat from collection pipes to heat exchangers, where water is preheated, evaporated and then superheated. In a conventional steam turbine power cycle (Rankine cycle), this superheated steam runs a turbine, which in turn drives a generator to produce electricity. The water returns to the heat exchangers after being cooled and condensed.

6. Experience has shown that by increasing the solar field outlet temperature, power block performance increases significantly. Current commercially proven technology is limited to temperatures around 400°C, after which, the HTF and coatings degrade and thermal losses increase. Therefore, there are several lines of R&D today directed at studying advanced HTFs, as well as the rest of the components.

7. In Figure A2.1 two optional elements of a CSP plant are also represented: the Thermal Energy Storage (TES) and the Back-Up Boiler (BUB), usually working with natural gas. Both increase the capacity factor of the system, allowing the plant to operate even when there is not enough direct solar radiation or to fit to a demand curve (see section on storage).

Figure A2.1 - Basic Scheme of a Parabolic Through Power Plant



Source: ESMAP

2.1.2 Basic design of Noor-Ouarzazate III (Tower)

8. In power tower plants, also known as central receiver systems, a field of hundreds or thousands heliostats (large two-axis tracking individual mirrors) is used to concentrate sunlight 600 to 1000 times (SolarPACES/Estela/Greenpeace, 2009) onto a central receiver mounted at the top of a tower (see Figure A2.2). The field of heliostats, which all move independently of one another, can either surround the tower (Surround Field) for larger systems or be spread out on the shadow side of the tower (North Field) in the case of smaller systems.

9. Due to the high concentration ratios, high temperatures can be reached, resulting in increased efficiency of heat to electricity conversion and reduced cost of thermal storage (IEA, 2010). Within the receiver, a heat transfer fluid absorbs the highly concentrated radiation reflected by the heliostats and converts it into thermal energy to be used in a conventional power cycle. The power tower concept can be incorporated with either a Rankine steam turbine cycle or a Brayton gas turbine cycle, depending on the applied heat transfer fluid and the receiver concept. Some plants have modular designs, with several towers that feed one power block (IEA, 2010).

10. In a molten salt power tower plant, the cold salt (290°C) is pumped from the cold tank to the receiver, where the salt is heated up to 565°C by the concentrated sunlight. The hot salt is then pumped through a steam generator to generate superheated steam that powers a conventional Rankine cycle steam turbine (see Figure A2.2). The solar field is generally sized to collect more power than demanded and by the steam generation system and the excess energy can be accumulated in the hot storage tank. Table A2.1 below shows a technology comparison of both technologies.

Figure A2.2 - Schematic of molten salt power tower with steam turbine cycle (Source: ESMAP)

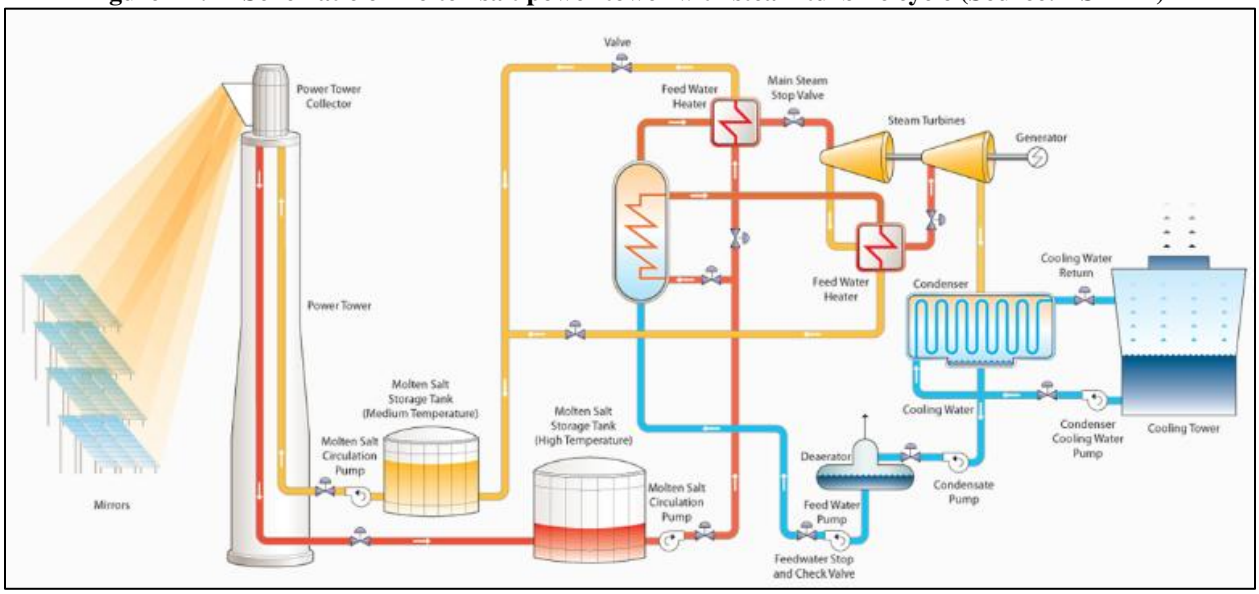


Table A2.1 - Solar Technology Comparison: Parabolic Trough vs Central Tower Receiver

TECHNOLOGY	Concentrating Solar Power (CSP)	
	Parabolic Trough (with storage)	Central Tower Receiver (with storage)
Technology Status	Commercial	Commercial (early stages)
Fuel Sources	Solar (DNI only)	Solar (DNI only)
Operational Experience 1 = low to 5 = high	5	2
Individual Plant Size	150-200 MW	100-150 MW
Overview	•Line-focus receiver in evacuation tube •Heat transfer oil flows through receiver tube •390ºC max. temp commercially proven	• Receiver on tower • Working fluid: molten salt or steam (in direct steam generation plants) • 565ºC max. temp commercially proven
Concentration Ratio	• Typically ~ 30 to 100 suns	300 to 1,500 suns
Storage Option & Type	Indirect Molten Salt Thermal Energy Storage (TES) with auxiliary heat source considering electricity, propane and low sulphur diesel.	Direct Molten Salt TES with auxiliary heat source
Co-Firing Option	Yes	Yes
Land Requirements (Ha) (based on 125 MW plant)	~ 250 to 400 ha Dependant on TES vol.	~ 400 to 500 ha Dependant on TES vol.
Annual Solar to Electric Efficiency %	13% to 15%	14% to 18% (direct steam generation) 15%-20% (molten salts)
Estimated Annual Capacity Factor without Storage (TES)	20% to 25%	20% to 25%

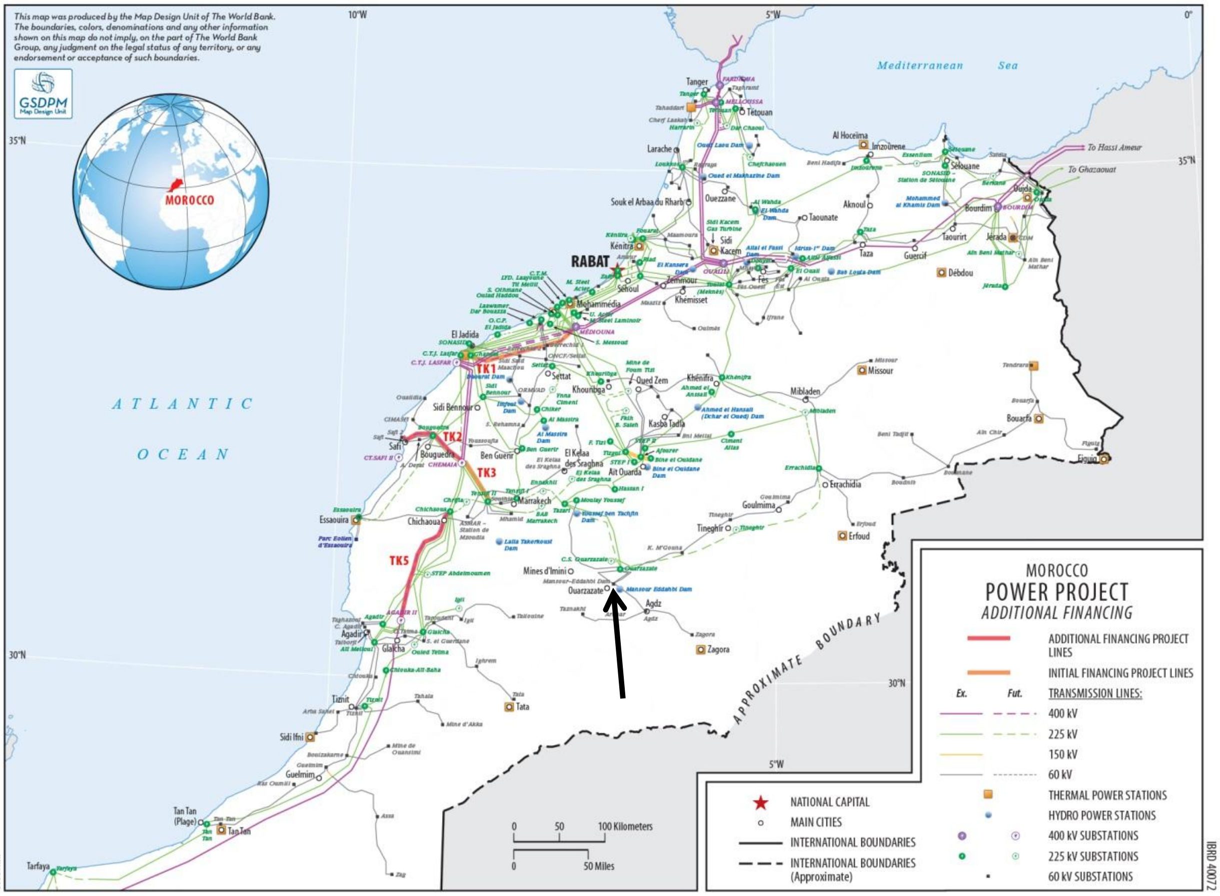
2.1.3 Site Description

11. The site, a 2,500 ha green field area situated 10 km E-NE of Ouarzazate (see Figure A2.3), is well suited for solar projects, especially for the development of CSP, because of:

- Excellent solar resources. On-site measurement stations have allowed data collection since Feb 2010 to October 2012, including solar insolation. Based on the analysis of the measured time series data, the long-term annual average of Direct Normal Irradiance is 2636 kWh/m^2. Similar annual DNI can be expected in any single year, which is significantly higher than typical site qualification limits and satellite data used in the preliminary modelling. This conclusion is based on: comparisons of the Ouarzazate site data with insolation data from the Andasol site in Granada, Spain and the Solar Energy Generating Systems (SEGs) site in the Mojave Desert, California, US.
- Availability of water. A reservoir with a capacity of 480 million m3 is located approximately 10 km south of the city, although dry cooling is required for Noor-Ouarzazate II & III, leading to expected consumption of 230,000 m^3/year for Noor-Ouarzazate II and 125,000 m3/year for Noor-Ouarzazate III (based on Fichtner, MASEN's technical advisor information[40]). Therefore, the Noor-Ouarzazate Complex's impact on the overall water resources in the region is minimal, representing a consumption of approximately 0.8 percent of the Regular Annual Volume of Mansour Eddahbi dam and 0.5 percent of the overall water resources available in the region once the Tiouine dam's construction is completed
- Accessibility. The site is accessible via paved tracks originating from the paved N10 road that runs from the port city of Agadir, approximately 350 km from the Site, through Ouarzazate. The Agadir port is located at a relatively short distance and could be used to import and transport heavy equipment from abroad to avoid the Atlas Mountains. Use of the Casablanca port would require crossing the Atlas Mountains.
- Proximity to the power grid. The existing grid and planned reinforcements by ONEE will allow evacuation of the full capacity of the power plant at peak output conditions. Furthermore, CSP can be fitted with thermal energy storage capabilities allowing the optimization of peak output to meet the network carrying capacity within reasonable limits.

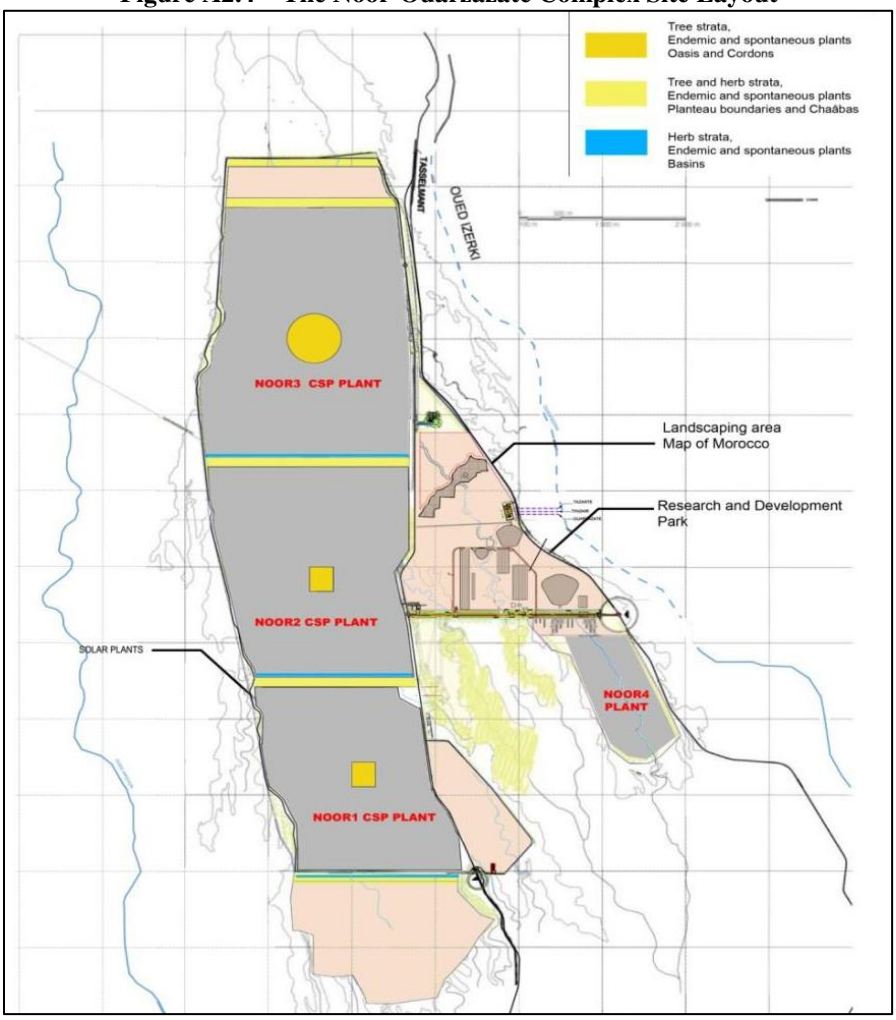
[40] Retained by MASEN

Figure A2.3 - Location of the Proposed Ouarzazate Solar Power Plant



2.1.4 Plant Layout and Design

Figure A2.4 – The Noor-Ouarzazate Complex Site Layout



12. Noor-Ouarzazate II is expected to be a concentrating solar power plant of a gross capacity between 150 and 200 MW (including a single power block with one steam turbine generator set) using solar parabolic trough technology with a Thermal Energy Storage Capacity of at least 3 hours (with Molten Salt Fluid or MSF) over a minimum of 25 years during the lifetime of the Plant from the Initial Commercial Operation Date.

13. Noor-Ouarzazate III is expected to be a concentrating solar power plant of a gross capacity between 100 and 150 MW of (including a single power block with one steam turbine generator set) using solar tower technology with a Thermal Energy Storage Capacity of at least 3 hours (with Molten Salt Fluid or MSF) over a minimum of 25 years during the lifetime of the Plant from the Initial Commercial Operation Date.

14. Both plants would be constructed on lots adjacent to Noor-Ouarzazate I that have already been acquired by MASEN.

15. In terms of land usage, the bidder will use a maximum of 680 ha for Noor-Ouarzazate II and 750 ha for Noor-Ouarzazate III. The bidders will reduce, to the extent possible, the site footprint but taking into account all requirements for operation and maintenance. The Bidders will justify the area required for each plant.

2.1.5 Plant Operations

16. Both Noor-Ouarzazate II and III will be of solar stand-alone configuration and will be designed, manufactured and configured, installed, erected, operated and maintained in such a way that it will achieve highest availability and reliability with minimum generation costs. Capital and operational costs will be optimized to achieve a competitive price of delivered electricity.

17. Noor-Ouarzazate II and III's MFS request to maximize the number of peak-hour generation from the plants. Generation during the peak-hours' time slot yields higher value to MASEN and ONEE because it is expected to largely displace more expensive generation from combined-cycle gas turbines (CCGT) using imported LNG. More specifically, (i) the bidder will use thermal energy storage in order to ensure a maximum storage of thermal energy immediately before the start of the peak hours' time slot, and (ii) at least 35 percent of the net electricity generated by the plant during any contract year will be delivered during peak hours' time slots. In addition, the bidder is required to foresee adequate design configuration and parameters for the plant in order to lessen power intermittence (e.g., control valves in solar field, HTF buffer tank).

18. The plants will follow environmentally sound practices and comply with the recommendations of the FESIA.

19. For both plants, fuel consumption will be minimized and fuel-burning equipment will be (i) used only for auxiliary support functions (i.e. plant start-up and safe operation), and (ii) operated on the most available and reliable fuel source. Acceptable auxiliary fuels for the Plant include propane, low sulphur diesel (< 50 ppm) and/or light fuel. Limitations of auxiliary fuels are specified below:

i. Operation of emergency generator;
ii. Keep Heat Transfer Fluid (HTF) [just for Noor-Ouarzazate II , as oil as HTF is just used in Noor-Ouarzazate II, (see table 1)] and Molten Salt Fluid (MSF) temperature above design minimum temperature during hours without sufficient solar radiation;
iii. Required seal steam to maintain pressure in steam turbine from one stop for the next start-up of the Plant; and
iv. Start-up from null load to the Minimum Load in steam turbine (indicated in the technical specification of the supplied steam turbine).

20. Consumption of fuel is prohibited when the following conditions apply:

i. When power is exported to the 225 kV line;

ii. For Noor-Ouarzazate II, when the HTF loop (measured behind the recirculation pump) is above the Solar Field Freeze Protection Temperature. Such temperature will be below 100°C; and
iii. When the MSF measure is above the MSF Freeze Protection Temperature. Such temperature will be below 250°C.

21. In all above cases, all fuel burners must be shut off.

22. Very importantly, the plants are requested to be designed to minimize water consumption. The maximum annual quantity of available water for all needs on Site is 280000 m3 for Noor-Ouarzazate II and 155000 m3 for Noor-Ouarzazate III. Among other measures:

a. Auxiliary cooling water systems will be designed as a closed loop and sized to minimize water loss. The bidder will provide a dry cooling solution for the purpose of primary condensation of steam, selecting as main cooling system an Air Cooled Condenser (ACC);
b. The raw water treatment system will be designed to minimize the global raw water consumption; and
c. Sanitary waste water from the plant area will be treated in biological treatment plant where all sanitary effluents will be reduced from organic matter to stable sediment. The treated water discharged from this plant will be conveyed to the evaporation ponds.

2.1.6 Technology Assessment

23. As previously described, the proposed Project includes the construction of two large-scale CSP plants: a parabolic trough plant (Noor-Ouarzazate II) and a solar tower power plant (Noor-Ouarzazate III). With regard to Noor-Ouarzazate II, the parabolic trough choice is considered a proven and fully commercial technology for energy production, and the plant presents no unusual construction or operational challenges for a power plant of that size. Parabolic trough is the CSP technology with the most commercial operating experience. At the end of 2013, around 3400 MW of installed CSP capacity used the parabolic trough technology and accounted for most of today's installed CSP capacity. Noor-Ouarzazate II's MFS have been prepared by MASEN with the assistance of highly qualified consultants, incorporating international best practices and the lessons learned from Noor-Ouarzazate I procurement process. The technical specifications have also been reviewed and commented by the donors' technical experts in order to ensure that all relevant construction and operational risks are adequately addressed.

24. On the other hand, the solar tower technology selected for Noor-Ouarzazate III is still an evolving technology in its early commercial stages. Solar tower also has higher capital costs than parabolic trough, and the operational experience is more limited due to the reduced number of projects under construction and operation. The total capacity in operation has recently increased to almost 500 MW with the commissioning of Ivanpah by Brightsource in California. Ivanpah, together with the Crescent Dunes in Nevada (currently under commissioning) show that it is possible to build and operate large scale solar towers using different technologies (molten salt or direct steam as working fluid). However, the construction and commissioning of both projects

have taken longer than initially planned. There is a higher risk of delay in the commissioning of a solar tower when compared to parabolic trough, due to the scaling-up challenges and the continuous technical improvements and cost optimizations that are being incorporated in the newer plants. The team acknowledges this risk and will closely follow the performance of the mentioned solar towers and monitor the procurement and construction of Noor-Ouarzazate III in order to minimize potential delays.

25. However, solar tower also has important benefits that make it very attractive and potentially better than other CSP technologies: (i) higher conversion efficiency from solar thermal energy to electricity since they can achieve very high temperatures with manageable losses by using molten salt as a heat transfer fluid. This allows higher operating temperatures and steam cycle efficiency, and reduce the cost of thermal energy storage by allowing a higher temperature differential (ii) molten salt towers have lower water consumption requirements; (iii) greater potential for cost reduction and local manufacturing. These advantages are driving the increasing share of solar tower projects planned worldwide and according to several expert sources, solar towers might become the technology of choice in the future.

26. In order to better understand the analytical basis of MASEN's technology choice for the Noor-Ouarzazate Complex, the Bank commissioned a study by Mercados in 2013 to determine the optimal least-cost expansion choice of renewable energy technologies in ONEE's transmission system.[41] The study focused particularly on the impact of PV solar plants as compared to CSP with storage. The study took into account the anticipated load growth in Morocco, fuel costs, capital costs for generation and transmission facilities, capacity factors and availability of plants using different technologies, discount rates, reliability standards, among others. These aspects were modeled by Mercados by analyzing the levelized cost of energy from the different technology alternatives from a system perspective. The study found that, on a *capacity* basis, PV plants would be a better choice, yielding the least cost to the system. This result seemed logical because *capacity* targets lead the least-cost planning model to minimize costs by introducing the cheapest technology on the basis of capital costs.

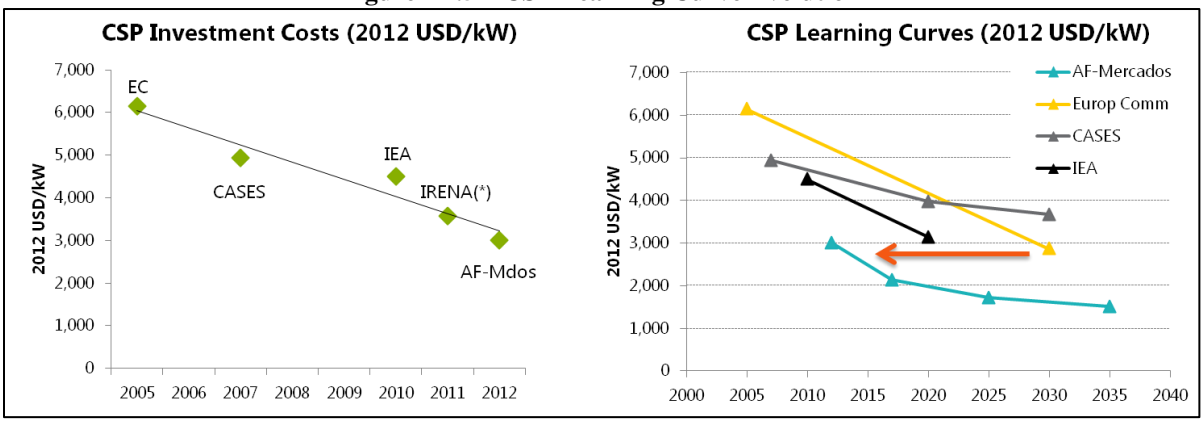
27. Nonetheless, a capacity-based analysis does not take into consideration the substantial additional costs, particularly where large renewable energy penetration is expected, that the grid will have to incur to support variable generation, such as PV generation. The grid needs more operational reserves, such as fasting-starting plants (e.g., gas turbines or reciprocating engines), to provide the necessary flexibility to maintain high levels of reliability and stability. In Morocco's case, this would mean continuing to rely on imported gas or liquid fuels to provide the additional capacity and energy to maintain system stability and security of supply when the PV plants are not generating. It also means that, aside from the extra cost of adding and maintaining such spinning reserves, and the need to continue to rely on imported fuels to meet the country's energy needs, these reserves increase the GHG emissions from the system.

28. If, however, the analysis is made on an *energy* basis (i.e., where large renewable energy penetration targets are defined on the basis of *energy* generated), the least-cost planning model minimizes system cost by prioritizing technologies with high capacity factors that are able to

[41] Mercados, *Morocco: Analysis of Low Carbon Development Options in the Power Sector* (2013).

produce energy when required. CSP plants can optimize their output by increasing their solar multiple (i.e., increasing the size of the solar field) and using thermal storage to extend their operating hours into the evening when Morocco's electricity demand peaks, thus yielding a much higher capacity factor than PV plants. CSP plants could also provide reserve capacity and other ancillary services to mitigate system regulation issues and imbalances caused by intermittent plants (e.g., PV and wind). Accordingly, the study concluded that, on an energy basis, CSP generation with the highest amount of thermal storage is the optimal choice.

Figure A2.5 – CSP Learning Curve Evolution



29. Nonetheless, while CSP generation presents clear benefits to grid operations and system costs, its relatively higher capital costs, when compared to PV and traditional fossil fuel technologies, have practical financing implications. These costs are expected to decline by 40-50 percent over the next 10 years (see Figure A2.5).[42] Until then, however, governments need to address sustainability of the investment from a financial and fiscal perspective much in the same way as was needed for wind power and PV technologies in early stages of their development. Governments had typically adopted targeted programs that helped reduce project costs or increase project revenue to support the higher debt levels needed to finance these costs. For example, programs adopted in the past to target reduction of projects costs included maximizing the use of grant or concessionary financing to reduce financing costs; loan guarantees; investment tax credits; tax credit bonds; mezzanine financing; etc. Other programs adopted to increase project cashflows included feed-in tariffs, green tariff premia, income tax holidays, production tax credits, etc. In many cases, governments sought to use a combination of these programs in order to minimize their overall fiscal costs on public budgets and offer some flexibility to project developers to customize the support needed.

2.1.7 Associated Facilities

30. As discussed in more details in the 2014 Framework Environmental and Social Impact Assessment and as discussed further in Annex 3, the following main facilities are currently considered critical to operation of Noor-Ouarzazate II and III: (a) conveyance system that provides water for the plants' operations from the near-by Mansour Eddahbi dam; and (b) a 225

[42] In fact, the capital costs bid for Noor I were almost 30 percent lower than estimates at the start of the project's procurement process, thus confirming the downward trajectory of future CSP costs.

kV transmission line between the substations at Ouarzazate and Tazarte. The water conveyance system is already under construction as part of implementing Noor-Ouarzazate I as it is expected to support operation of the entire Noor-Ouarzazate Complex. Only the transmission line is yet to be built and is considered the only new Associated Facility needed for Noor-Ouarzazate II and III's operations that is not already covered by Noor-Ouarzazate I's implementation.

2.2 *Component 2 – Cost Mitigation Mechanism (US$299 Million IBRD Loan)*

31. While the plants' construction funding under Component 1 is key to reducing the financing costs, it is not expected by itself to reduce the levelized cost of energy from the plants to parity levels with the wholesale cost of power on ONEE's system. Like Noor-Ouarzazate I, it is expected that the GoM will enter into Specific Conventions with the SPVs for each of Noor-Ouarzazate II and III that provides its specific commitment to financially support MASEN in covering the remaining incremental costs of power purchases from the plants. Several options to mitigate these incremental costs were explored. These options included the possibility of issuing green bonds to fund these costs, but the higher cost of commercial debt financing, when compared to concessional financing, actually increases the anticipated incremental costs.

32. This increase would likely be less if the bonds were supported by a partial risk guarantee that could enhance the GoM's credit to reduce the costs of capital, but the reductions were not expected to bring down the costs of capital to the level of concessional financing. The possibility of an IBRD loan made directly to the GoM was also explored. Under this scenario, the GoM would provide the proceeds of this loan to MASEN as a grant, which would then on-grant it to the SPVs to buy down the plants' capital costs upfront and reduce the levelized cost of energy (LCOE) for the life of the PPAs. However, such an approach would change a 20-year, Bank-recommended operating policy in Morocco where state-owned enterprises are required to borrow directly to fund their operations, with only payment guarantees provided by the government. A partial risk guarantee to MASEN was also explored, but, because bidders have not raised issues with MASEN's credit, the guarantee's impact would likely be limited.

33. As such, Component 2 is designed to support the acquisition of kilowatt hours (kWh) produced by the SPVs to partially cover the difference in the price at which MASEN would buy electricity generated by Noor-Ouarzazate II and III (as well as Noor-Ouarzazate I) and the price at which MASEN would sell such electricity to ONEE. Put differently, it supports the acquisition of kilowatt-hours produced by the three CSP plants – Noor-Ouarzazate I, II, and III - to partially cover the difference in the price at which the Borrower would buy the electricity generated by all three plants and the price at which the Borrower would sell such electricity to ONEE.

III. PARTNERSHIP ARRANGEMENTS

34. MASEN will implement Component 1 of the proposed Project through a partnership with private developers. This is motivated by a desire to introduce private sector participation in a gradual manner in the CSP market, important preconditions to ensure that the long term plan for capacity addition relies as much as possible on privately mobilized capital. The partnership will also facilitate the implementation of contractual mechanisms ensuring that the private sector is

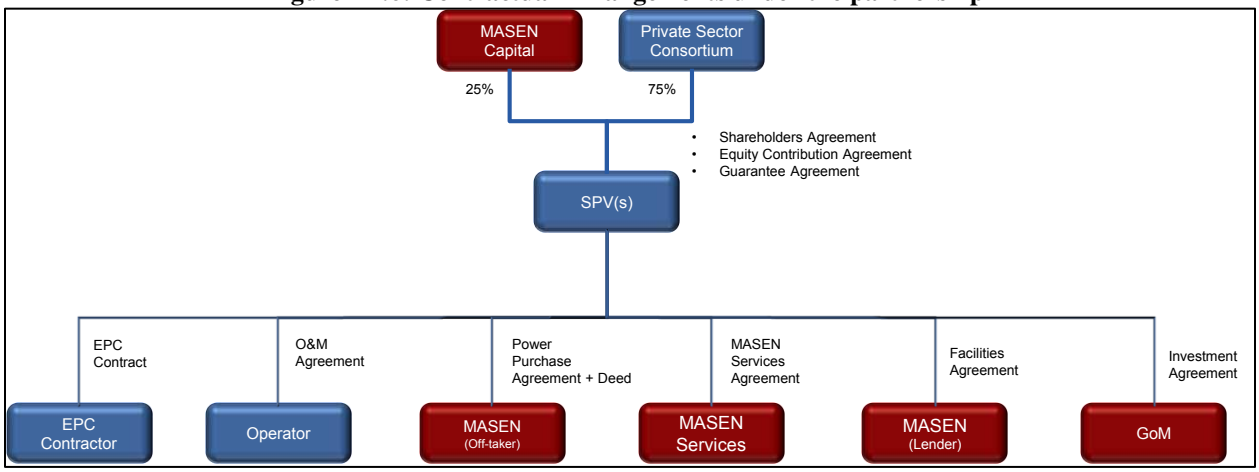
incentivized, to the extent possible, to construct the power station with no cost overruns, no time delay and to operate and maintain the power station adequately.

35. Under the partnership structure, a consortium (made up of several private sector developers) is being competitively selected to enter into a set of long-term contractual commitments to ensure the construction, financing and operation of the plant, as well as the sale of electricity at a competitively tendered price. The consortium, once such agreements have been finalized, will create two (2) SPVs (as the Project Implementing Entities) to design, construct, own, and operate Noor-Ouarzazate II and III, and sell their generated electricity to MASEN. MASEN will be obliged to purchase the electricity only if the plant has been constructed and is operating in accordance with MASEN's requirements. Each SPV will enter into a number of contracts (construction contracts, operation and maintenance contract, power purchase agreements, financing contracts etc.) to fulfill the obligations it undertakes under the partnership. This contractual structure is similar to the other partnerships and IPPs that the Bank and other MDBs have supported in the past (including in the MENA region).

36. Construction of Noor-Ouarzazate II and III will be financed with 20 percent equity and 80 percent debt. The equity will be contributed largely by the competitively-selected private sector consortium and by MASEN (up to 25 percent, through MASEN Capital). The IFIs will provide all the funds required to finance 100 percent of the plants' debt and part of its equity (through MASEN and MASEN Capital), in tenors ranging from 15 to 50 years. MASEN intends to on-lend IFI funds to the SPVs that will own and operate Noor-Ouarzazate II and III with a tenor that amortizes the SPVs' repayment of the loans to MASEN within the 25-year term of anticipated power purchase arrangements between the SPVs and MASEN. The on-lending arrangement will be based on typical project finance structures where MASEN, as lender, will have recourse to the SPVs' assets as security for the loans. The loan terms will be largely based on terms provided by IFI, except that the interest rate charged by MASEN to the SPVs will be a fixed rate for the life of the loan. Because the IFIs' loans to MASEN are mostly based on variable interest rates, MASEN has included a small margin in the interest rate it charges the SPVs to help it mitigate its exposure to interest rate fluctuations between the fixed interest payments it receives from the SPVs and the variable payments MASEN makes to the IFIs. MASEN has agreed with the GoM that any support MASEN seeks to cover its incremental revenue gap from the government would be net of any excess cash MASEN derives from the plants, including excess cash generated as a result of this interest rate margin.

37. The SPVs will enter into a number of contracts with MASEN and private sector entities to fulfill the SPVs' obligations in their agreements with MASEN (i.e., designing, constructing, operating, and maintaining the plants). This is presented in Figure A2.6 below.

Figure A2.6: Contractual Arrangements under the partnership



Tendering process and conclusion of the partnership

38. The selection of the partner will be made in a two-stage bidding process to allow discussion of the technical bids and ensure the soundness of the proposals and their compliance with the technical specifications indicated in the RFP. As is typical in relation to this type of structuring, the partnership is being developed in steps as follows:

(a) Prequalification of consortia (August 2013);

(b) Preparation of Request for Proposals (RFP), including draft contracts to be included in the RFP. It is normally best practice to include all draft contracts required to be signed as part of the partnership. In this partnership, the RFP for the first stage of the bidding process was issued in December 2013 including only draft shareholder agreement and draft PPA between the relevant SPV and MASEN which was already reviewed by the Bank. It did not include the draft loan agreement from MASEN to the SPV;

(c) Publication of RFP and Q&A from potential bidders on the terms of the RFP, with eventually publication of amendments / clarification to the RFP (completed in January 2014);

(d) Submission of technical proposals by bidders (March, 2014);

(e) Publication of a final RFP, including sufficiently developed documents to be initialed by the bidders, incl. the draft MASEN-SPV loan agreement (July 2014);

(f) Submission of final proposals by bidders (planned for September 2014);

(g) Selection of a preferred bidder (planned for November-December 2014);

(h) Negotiation with the preferred bidder on the contractual documentation; in parallel the preferred bidder will complete negotiations with its suppliers in relation to construction and operation and maintenance (as well as if relevant any additional requirement for financing);

(i) Once the contractual documentation has been finalized between the preferred bidder and MASEN, signature of all partnership related contracts (commercial and financial close) (planned for April 2015);

(j) Commissioning of the power plants (planned for second half of 2017 (Noor-Ouarzazate II) and 2018 (Noor-Ouarzazate III));

(k) Once the plant is constructed, sale of electricity and operation and maintenance of the plant.

39. Three consortia were prequalified[43] for Noor-Ouarzazate II:

1) **"Abengoa Consortium"[44]** consists of:

- Abengoa SA - Campus Palmas Altas, C/ Energía Solar 1, 41014, Sevilla, Spain registered in the Companies House of Seville page 2921, folio 107, volume 47, acting as Tower Lead Member; and

- Abengoa Solar - Avenida de la Buhaira Nº 2, Sevilla, Spain registered in the Companies House of Seville sheet 1 of volume 4.568 page SE-71, 375, entry n°1, acting as Tower Technical Member.

2) **"ACWA Consortium"[45]** consists of:

- INTERNATIONAL COMPANY FOR WATER AND POWER PROJECTS - Business Gate Building, Exit 8, Eastern Highway, PO Box 22616 Riyadh, Postal Code 11416, Kingdom of Saudi Arabia registered under n°1010253392 in the City of Ryadh Register, acting as Tower Lead Member and

- Sener Ingeneria y Systemas - Av Zugazarte, 56 Guecho Vizcaya, Spain registered in the Mercantile Register of Bizkaïa on page B1-2264, volume 291, folio 176, acting as Tower Technical Member.

3) **"IP GDF SUEZ Consortium"[46]** consists of:

- International Power SA (Dubaï branch of GDF Suez) - PO Box 66235, Business Central Towers - B, 50th Floor, Sheikh Zayed Road, Media City, Dubai, United Arab Emirates with a commercial license n°102397 from the department of economic development of Dubaï, acting as PT Lead Member,

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[43] The name of the Lead Member of each consortium is the name given to the consortium.

[44] Further information can be obtained on the websites of the consortium members: www.abengoasolar.com,.

[45] Further information can be obtained on the websites of the consortium members: www.acwapower.com and www.sener.es/home/en.

[46] Further information can be obtained on the websites of the consortium members: www.gdfsuez-samea.com and www.masdar.ae/en.

- Solar Reserve LLC - 2425 Olympic Blvd., Suite 500 East, Santa Monica, CA, USA registered at the division of corporation of the state of Delaware on, acting as Tower Technical Member and

- Abu Dhabi Future Energy Company PJSC/MASDAR - P.O. Box 54115, Abu Dhabi, United Arab Emirates with a licence n°CN-1137318 from the Abu Dhabi Chamber.

40. Four consortia were prequalified[47] for Noor-Ouarzazate III:

(1) **"Abengoa Consortium"**[48] consists of:

- Abengoa SA - Campus Palmas Altas, C/ Energía Solar 1, 41014, Sevilla, Spain registered in the Companies House of Seville page 2921, folio 107, volume 47, acting as Tower Lead Member and

- Abengoa Solar - Avenida de la Buhaira Nº 2, Sevilla, Spain registered in the Companies House of Seville sheet 1 of volume 4.568 page SE-71, 375, entry n°1, acting as Tower Technical Member.

(2) **"Acwa Consortium"**[49] consists of:

- INTERNATIONAL COMPANY FOR WATER AND POWER PROJECTS - Business Gate Building, Exit 8, Eastern Highway, PO Box 22616 Riyadh, Postal Code 11416, Kingdom of Saudi Arabia registered under n°1010253392 in the City of Ryadh Register, acting as Tower Lead Member and

- Sener Ingeneria y Systemas - Av Zugazarte, 56 Guecho Vizcaya, Spain registered in the Mercantile Register of Bizkaïa on page B1-2264, volume 291, folio 176, acting as Tower Technical Member.

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47 The name of the Lead Member of each consortium is the name given to the consortium.

48 Further information can be obtained on the websites of the consortium members: www.abengoasolar.com.

49 Further information can be obtained on the websites of the consortium members: www.acwapower.com and www.sener.es/home/en.

(3) "**EDF Consortium**"[50] consists of:

- EDF SA - Electricité de France, 22-30 Avenue de Wagram, 75008, Paris, France registered on the Paris Commercial and Companies Register under n°552 081 317, acting as Tower Lead Member,

- Brightsource Energy Inc - 1999 Harrison Street, Suite 1250, Oakland, California, USA 94612 registered at the division of corporation of the state of Delaware on 12 March 2007 (9:53 a.m.), acting as Tower Technical Member,

- EDF Energies Nouvelles SA - Cœur Défense - Tour B - 100 Esplanade du Général de Gaulle - 92932 Paris La Défense Cédex - France registered on the Nanterre Commercial and Companies Register under n°379 677 636, and

- Alstom Power System SA - 2 quai Michelet - 3 avenue André Malraux - 92309 Levallois Perret Cedex - France registered on the Nanterre Commercial and Companies Register under n°389 192 030.

(4) **"IP GDF SUEZ Consortium"**[51] consists of:

- International Power SA (Dubaï branch of GDF Suez) - PO Box 66235, Business Central Towers - B, 50th Floor, Sheikh Zayed Road, Media City, Dubai, United Arab Emirates with a commercial license n°102397 from the department of economic development of Dubaï, acting as PT Lead Member,

- Solar Reserve LLC - 2425 Olympic Blvd., Suite 500 East, Santa Monica, CA, USA registered at the division of corporation of the state of Delaware on, acting as Tower Technical Member and

- Abu Dhabi Future Energy Company PJSC/MASDAR - P.O. Box 54115, Abu Dhabi, United Arab Emirates with a licence n°CN-1137318 from the Abu Dhabi Chamber.

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[50] Further information can be obtained on the websites of the consortium members: www.edf.com, www.brightsourceenergy.com, www.edf-energies-nouvelles.com/en, brookstonepartners.com/africa/, www.alstom.com/power/ and www.mitsui.com.

[51] Further information can be obtained on the websites of the consortium members: www.gdfsuez-samea.com, www.solarreserve.com and www.masdar.ae/en.

Annex 3: Implementation Arrangements

MOROCCO: Noor-Ouarzazate Concentrated Solar Power Plant Project

Project Institutional and Implementation Arrangements

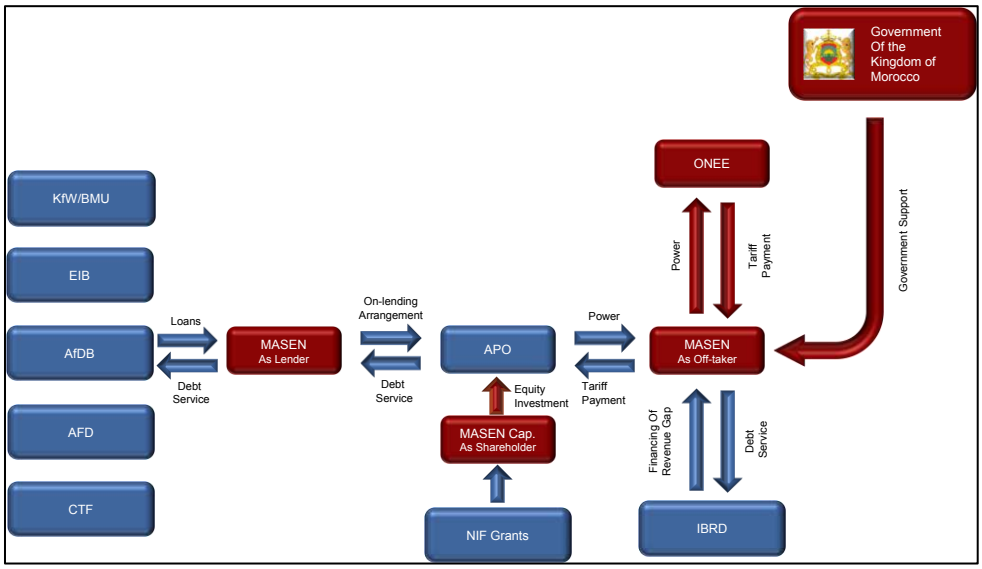
1. MASEN was formed by Law 57-09 to implement the MSP and thus responsible for defining all the technical, safeguards, and fiduciary aspects of Noor-Ouarzazate II and III. The proposed Project is expected to be implemented through partnership between MASEN and the private sponsors that will form SPVs, which will be the proposed Project's Implementing Entities, to design, construct, own, operate, and maintain Noor-Ouarzazate II and III. The sponsors are expected to be selected through a 2-stage competitive procurement process that is now in an advanced stage. The first stage involves technical bids to meet MASEN's minimum functional specifications. This allows MASEN the opportunity to evaluate the technical proposals and any innovative approaches offered by bidders to meet the requirements. It also allows more clarity on risk allocations and provides the draft legal agreements before formulation of the financial bids.

2. The second stage involves financial offers, focusing on the amount of feed-in tariff per kilowatt hour (kWh) to be paid by MASEN for energy from Noor-Ouarzazate II and III. In order for bidders to provide financial offers, MASEN needs to provide them, during this second stage, the terms of the debt financing MASEN will provide the awarded SPV. Because MASEN aims to reach commercial closing (i.e., reaching agreement on all of the commercial issues) shortly after award, MASEN needs to know the final terms of debt financing that will be made available to it from IFIs prior to concluding this second stage bid process.

3. Once selected, the winning bidder(s) are expected to enter, through the SPVs, into a suite of agreements with MASEN to provide the contractual basis for the partnership. The structure of the envisaged partnership is largely based on typical commercially-financed, limited recourse transactions for infrastructure projects. MASEN will enter into a PPA with each SPV to purchase the entirety of Noor-Ouarzazate II and III's output at the competitively determined feed-in tariff. MASEN will, in turn, enter into a power sales agreement to sell this power to ONEE at the regulated high-voltage system tariff.

4. MASEN is expected to enter into supply agreements with the SPVs to provide water, and provide the common infrastructure facilities to be used by the plants. MASEN, through its subsidiary MASEN Capital, is also expected to take a minority equity interest in the SPVs (up to 25 percent) and special purpose vehicles formed to operate and maintain the plants. The Company's participation in the day-to-day activities of these vehicles is expected to be limited to the typical role of a minority shareholder. Nonetheless, MASEN hopes that its participation will give it more insight into operating these types of business enterprises and to increase its capacity to design subsequent projects to implement the remaining projects in its 2,000 MW mandate.

Figure A3.1: Overview of Institutional and Implementation Arrangements



5. Consistent with the approach followed in Noor-Ouarzazate I and as illustrated in Figure A3.1 above, MASEN is expected to enter into a lending arrangement with the SPVs to pass to them the proceeds of the IFI financing made available to MASEN for Noor-Ouarzazate II and III. These proceeds are expected to comprise the bulk of the plants' debt financing and cover up to eighty (80) percent of Noor-Ouarzazate II and III's costs. The amount of debt financing will depend on the final bid award prices that will determine the overall plant costs. The remaining twenty (20) percent of Noor-Ouarzazate II and III's costs will be covered by commercial equity provided by the SPVs' shareholders.

Project Administration Mechanisms

6. MASEN is a limited liability company (LLC) with the Moroccan State, ONEE, Fonds Hassan II and the *Société d'Investissements Energétique* (SIE) as equal shareholders, created in March 2010 to develop at least 2,000 MW of solar power capacity by 2020. While MASEN is responsible for the implementation of the MSP, the SPVs will be created by the competitively-selected private-sector partners to construct, own, and operate Noor-Ouarzazate II and III. ACWA Power Ouarzazate (APO) is already constructing Noor-Ouarzazate I and will own and operate the plant after its commissioning. MASEN is governed by a Board of Directors ("*Directoire*") and a Supervisory Council ("*Conseil de Surveillance*"). Their functions and responsibilities are defined in MASEN's Statutes as required by the LLC Law.

7. MASEN's Supervisory Board consists of 10 members, including the Ministers of Economy and Finance; Energy, Mines, Water, and Environment; Industry, Commerce, and New Technologies; and Interior. The Board also includes representatives from the company's shareholders.

8. MASEN retained the service of several well reputed international technical, legal, and financial advisors to assist in the structuring and implementation of the procurement process to

select the private sector sponsors for Noor-Ouarzazate II and III. MASEN also expects to retain the services of a technical firm (Technical Advisor to MASEN in its capacity as lender to the SPVs) to assistance in monitoring the plants' construction, and an independent expert to certify completion of the plants' major milestones.

Financial Management, Disbursements and Procurement

Financial Management

9. MASEN's financial management systems and fiduciary arrangements were assessed and found compliant with the Bank's requirements in OP/BP 10.00. However, because the SPVs that construct, own, and operate Noor-Ouarzazate II and III have not yet been identified, their financial management systems and fiduciary arrangements could not be assessed. Such assessment is a condition to disbursement for both CTF and IBRD loan agreements, therefore, the assessment will be completed before Bank or CTF funds are made available to MASEN. The Project's risks were assessed to be high before mitigation measures discussed below are applied.

10. The Bank's experience in Morocco under Noor-Ouarzazate I demonstrated that MASEN was able to maintain satisfactory financial management arrangements in compliance with OP/BP 10.00.

11. **Financial Systems Assessment:** For Noor-Ouarzazate II and III, similar to Noor-Ouarzazate I, MASEN will be responsible for managing the Project's funds and all related financial transactions. MASEN is a company created by the GoM as state-owned commercial and industrial enterprise with financial and administrative autonomy. Accordingly, it operates as a private sector entity with systems in place that are based on principles and procedures that comply with Morocco's commercial law.

12. An assessment of the FM system and fiduciary arrangements in place at MASEN was carried out during Noor-Ouarzazate I's preparation to determine its compliance with Bank project management requirements under OP/BP 10.00. The system was found to be adequate for these purposes. The assessment was redone during preparation of the proposed Project to confirm the system's continued adequacy and appropriate implementation.

13. **Staffing Assessment:** MASEN hired qualified and experienced experts whose capacity and experience were found to be sufficient for effective management of the proposed Project. MASEN undertakes its accounting functions in-house, which represents a change from Noor-Ouarzazate I where accounting activities were out-sourced as MASEN continued to build its internal system and staffing capacity. Over the past several years, MASEN experienced a remarkable increase in its staff and internal capacity, adding a cadre of qualified professionals to cover different areas of its business needs. MASEN also developed a detailed and elaborate procedures manual to help provide a corporate baseline for its staff's day-to-day activities.

14. **Accounting:** MASEN has an accounting system that allows risk management and financial reporting. The accrual accounting applied by MASEN is governed by rules applicable to autonomous public entities (Decree of November 10, 1989). During Noor-Ouarzazate I's last

supervision mission (December 2013), the Bank reviewed the performance of MASEN's accounting system and found it acceptable and in compliance with Bank requirements. It is expected that the proposed Project's accounting approach will cover all sources and uses of funds for all donors. The Project transactions and activities will be distinguished from other activities carried out by MASEN. FM and disbursement manual accepted by the Bank for Noor-Ouarzazate I describes all applicable accounting principles.

15. **Reporting:** Financial reports will be designed to provide quality and timely information to MASEN's management, donors and various stakeholders monitoring the Project's performance. It is expected that the unaudited Interim Financial Statements (IFRs) for MASEN will include data on the Company's financial situation. These reports are also expected to include (i) a statement of sources (by donor) and uses of funds for each applicable period in aggregate values, (ii) a statement of the use of funds by component and expenditure category, and (iii) a budget statement indicating forecasts and deviations from implementation. MASEN will submit to the Bank these semi-annual unaudited IFRs 45 days after the end of each semester. The reports were established in accordance with Bank guidelines, and their format was agreed. The agreed IFR template will be added as an annex to the Disbursement Letter.

16. The Financial Statements of the Project (FSP) are expected to be prepared in accordance with the Code of General Accounting Standards (CGNC), which is deemed acceptable. The FSP are produced annually by MASEN. They are expected to include: (a) a cash flow statement, (b) a financial closing, (c) a statement of on-going commitments, and (d) an analysis of payment.

17. **Internal Control System:** MASEN has an internal audit department that ensures implementation of its internal controls. MASEN has also developed an internal control manual (Financial Management and Disbursement Manual) for Noor-Ouarzazate I that was approved by all donors and is expected to be used for Noor-Ouarzazate II and III. Moreover, MASEN is subject to financial control and review by the state financial controller in accordance with the law 69-00 on financial controls of public entities. As such, these control mechanisms were found to be in compliance with Bank requirements.

18. **External Control System:** The Court of Accounts, Morocco's supreme audit institution, performs external audits for management and use of public funds. As a state-owned enterprise, MASEN is subject to these audits and the court's jurisdiction. In addition, MASEN is subject to statutory annual audits performed by an independent auditor. The statutory audit report for MASEN must be approved by its Board of Directors and include a management letter to explain any issues noted during the audit. The choice of the independent auditor must be acceptable to the Bank, and its audit report, as approved by MASEN's Board, is expected to be submitted to the Bank for review no later than 6 months after the end of each financial year.

19. MASEN is aware of the Bank's information policy, which mandates the Bank and MASEN to make the Project audit report publicly available in a timely fashion and in a manner acceptable to the Bank. MASEN requested, and the Bank has agreed to, partial publication of its audit report as well as the SPVs' audit reports to protect confidential information, consistent with the Bank's policies.

20. Risks identified for MASEN:

- Risk 1: External audit report submitted late.
  Mitigation measures: The MASEN fiduciary team as well as the Bank team will ensure timely follow up on the submission of the financial statements as well as respect of the auditor's ToR and respect of the deadlines.

- Risk 2: UIFR submitted late and incomplete.
  Mitigation measures: MASEN will ensure that the SPVs submit the financial information requested on a timely basis. Training will be provided to the SPVs to ensure their compliance with the Bank's applicable fiduciary policies. In addition, the Bank team will provide close support to MASEN and SPVs.

- Risk 3: Degradation of the fiduciary arrangements.
  Mitigation measures: The Bank team ensures close monitoring and ensures during implementation support that the financial arrangements are well maintained. In addition, MASEN has put in place a competent team that ensures respect of the legal requirements with the donors and maintain a constant communication to ensure that any potential issue is resolved on a timely manner. Also, all concerned donors monitor closely the acceptance of the fiduciary arrangements and will promptly share if any significant issues arise.

21. **FM Obligations for SPVs:** As the SPVs have not yet been identified, an assessment of their FM capacity and systems will be undertaken after conclusion of the procurement process. FM requirements are expected to be included in the request for proposals, as part of the procurement process, to give bidders notice of the expected requirements that they will have to adhere to if selected. The SPVs' adoption of FM procedures and controls acceptable to the Bank is required as a condition of disbursement of the CTF and IBRD loans.

22. Risks identified for the SPV:

- Risk 1: Selected auditor not acceptable to the Bank
  Mitigation measures: The auditor's ToR will require that they be acceptable to MASEN and to the Bank. Hence, no recruitment of the auditor will occur until the Bank accepts the selected auditor.

- Risk 2: Information System not compliant with the Bank's requirements.
  Mitigation measure: The Bank required, as a condition to initial disbursement, that SPVs establish an accounting and financial management system acceptable to the Bank.

- Risk 3: The SPV recruited unqualified staff
  Mitigation measure: The Bank required, as a condition to initial disbursement, that the SPVs adopt a financial and disbursement manual acceptable to the Bank.

Disbursements

23. Disbursements under each of the Categories 1-5, as defined in the IBRD and CTF loan agreements, will separately be subject to conditions that ensure that, for construction, financial close and, for cost mitigation, commissioning for the relevant plant have occurred. These conditions are listed in the Data Sheet in the beginning of this PAD and are more fully described in Section IV(B), Schedule 2, of the IBRD and CTF loan agreements with respect to disbursements under Categories 1-5 from the IBRD loan and Categories 1-2 from the CTF loan.

24. **Allocation of Loan Proceeds to Disbursement Categories.** The loan proceeds will be allocated to the disbursement categories, as shown in the tables of eligible expenditures set out below (see Tables A3.1 and A3.2). Because withdrawals from the IBRD and AfDB-administered CTF loans are expected to be front-loaded to cover initial construction expenditures, the percentage of expenditures to be financed from IBRD under Component 1 and other IFIs for Noor-Ouarzazate II and III's construction has been determined using indicative estimates of annual construction expenditures as a proxy (see Tables A3.3 and A3.4). Withdrawals from the IBRD and AfDB-administered CTF loans will be done on a *pari-passu* basis, as will withdrawals from the IBRD and other IFIs loans under Component 1 following full disbursement of the CTF loans.

Table A3.1 - CTF Loan Allocation to Eligible Expenditures

Category	Amount of the Loan Allocated (expressed in USD)	Percentage of Expenditures to be Financed (inclusive of Taxes)
(1) Goods, works and non-consulting services under Part 1.A of the Project	68,000,000	28.4%
(2) Goods, works and non-consulting services under Part 1.C of the Project	51,000,000	28.3%
TOTAL AMOUNT	119,000,000	

Table A3.2 - IBRD Loan Allocation to Eligible Expenditures

Category	Amount of the Loan Allocated (expressed in EUR)	Amount of the Loan Allocated (expressed in USD)	Percentage of Expenditures to be financed (inclusive of Taxes)
(1) Goods, works and non-consulting services for Part 1.A of the Project	40,339,000	13,766,000	3.2% up to June 30, 2015, and 7.5% afterwards
(2) Goods, works and non-consulting services for Part 1.C of the Project	18,267,000	6,234,000	1.9% up to June 30, 2015, and 4.5% afterwards
(3) Purchase of electricity for Part 2.A of the Project	54,993,000	18,767,000	100% of the Solar Incremental Cost
(4) Purchase of electricity for Part 2.B of the Project	71,276,000	24,324,000	100% of the Solar Incremental Cost

Category	Amount of the Loan Allocated (expressed in EUR)	Amount of the Loan Allocated (expressed in USD)	Percentage of Expenditures to be financed (inclusive of Taxes)
(5) Purchase of electricity for Part 2.C of the Project	25,597,000	8,709,000	100% of the Solar Incremental Cost
(6) Front-end Fee	586,000	200,000	Amount payable pursuant to Section 2.03 of this Agreement in accordance with Section 2.07 (b) of the General Conditions
(7) Unallocated	23,442,000	8,000,000	
TOTAL AMOUNT	**234,500,000**	**80,000,000**	

Table A3.3 –
Noor-Ouarzazate II Indicative Expenditure Allocation per IFI Loan Facility (US$ Million)

	S1 2015	%	S2 2015		S1 2016		S2 2016		S1 2017	
CTF (IBRD)	68,213	28.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
CTF (AfDB)	68,213	28.4%								
AFD	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
AfDB	10,568	4.4%	29,503	10.2%	30,173	10.2%	16,489	10.2%	11,311	10.2%
EIB	37,282	15.5%	104,079	35.8%	106,445	35.8%	58,169	35.8%	39,903	35.8%
IBRD	7,779	3.2%	21,717	7.5%	22,211	7.5%	12,138	7.5%	8,326	7.5%
KfW	48,437	20.1%	135,221	46.5%	138,294	46.5%	75,574	46.5%	51,843	46.5%
NIF	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total Drawdowns	240,492	100%	290,520	100%	297,123	100%	162,370	100%	111,384	100%

Table A3.4 –
Noor-Ouarzazate III Indicative Expenditure Allocation per IFI Loan Facility (US$ Million)

	S1 2015		S2 2015		S1 2016		S2 2016		S1 2017	
CTF (IBRD)	51,160	28.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
CTF (AfDB)	51,160	28.3%								
AFD	7,339	4.1%	20,488	9.4%	20,954	9.4%	11,451	9.4%	7,855	9.4%
AfDB	4,110	2.3%	11,473	5.2%	11,734	5.2%	6,412	5.2%	4,399	5.2%
EIB	14,091	7.8%	39,337	18.0%	40,231	18.0%	21,985	18.0%	15,082	18.0%
IBRD	3,523	1.9%	9,834	4.5%	10,058	4.5%	5,496	4.5%	3,770	4.5%
KfW	47,557	26.3%	132,762	60.7%	135,780	60.7%	74,200	60.7%	50,900	60.7%
NIF	1,761	1.0%	4,917	2.2%	5,029	2.2%	2,748	2.2%	1,885	2.2%
Total Drawdowns	180,699	100%	218,812	100%	223,785	100%	122,293	100%	83,891	100%

25. Proceeds from the CTF and IBRD loans under Component 1 will be deposited in two Designated Accounts (DA) denominated in Moroccan Dirham at the *Bank Al Maghreb*, a financial institution acceptable to IBRD. The DAs will be segregated such that CTF and IBRD funds disbursed to these accounts will not be comingled with other donors' funds. MASEN will open a bank account for each donor to cover donor's share of Noor-Ouarzazate II and III's construction costs. Report-based disbursements will be followed, and CTF and IBRD loans proceeds will be advanced into the appropriate DA with a ceiling equivalent to a cash forecast of 3 quarters of expenditures provided by MASEN in semester unaudited Interim Financial Reports (IFRs). The IFRs will be provided, in form and substance satisfactory to the Bank, using the template attached to the Disbursement Letter.

26. Once the proceeds of the CTF loans have been fully withdrawn, MASEN will draw funds from the remaining IFI facilities, including IBRD, for construction of Noor-Ouarzazate II and III and for purchases of kWh following commissioning of the plants. These withdrawals will be made on the basis of expenditure projections in accordance with the following process:

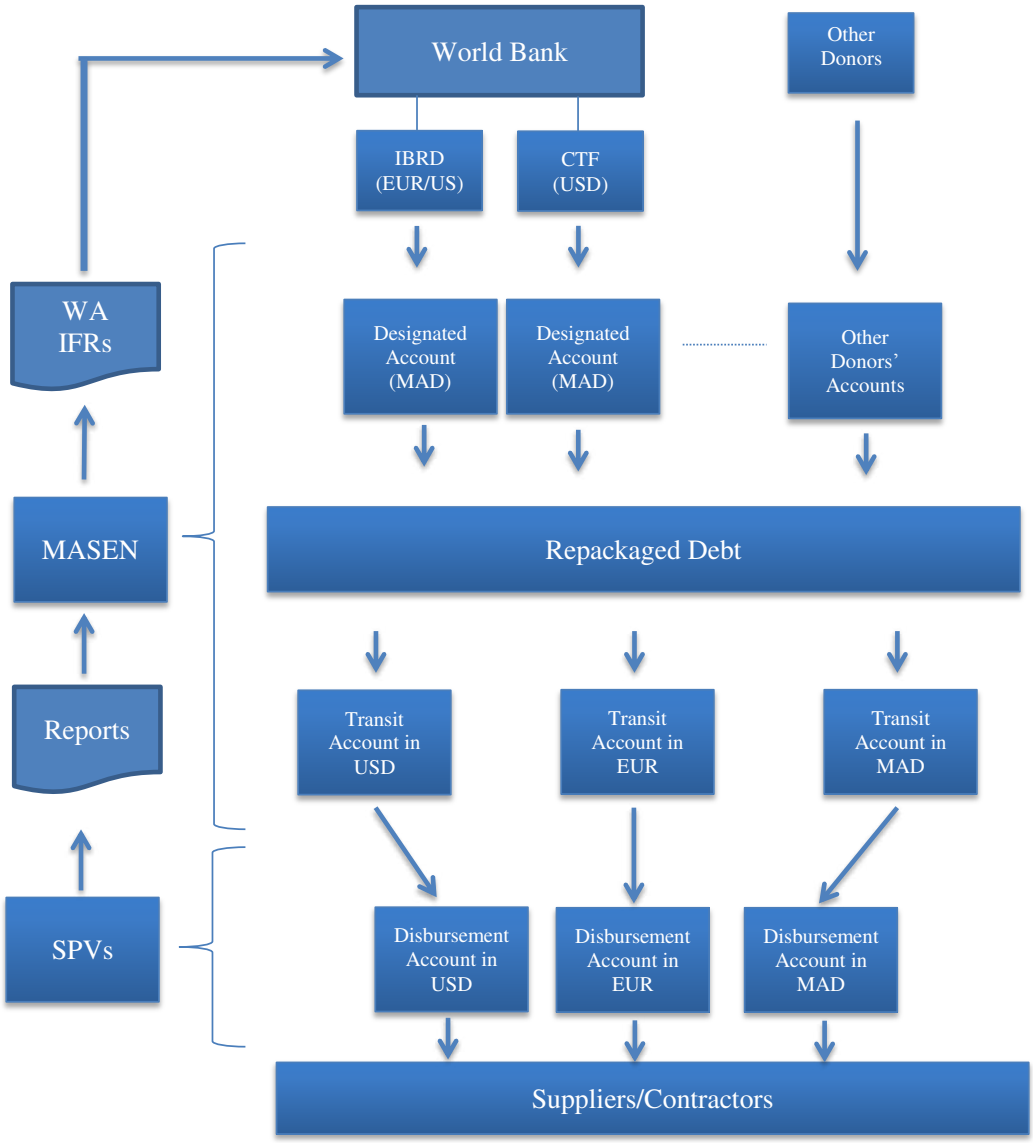
- **Disbursement under Component 1** of the proposed Project will cover the costs of eligible expenditures on goods, works, and services used in constructing Noor-Ouarzazate II and III. The initial advance into the DAs will be based on initial projections of eligible expenditures in the first 3 quarters following effectiveness of the legal agreements. Thereafter, advances will be made on the basis of unaudited semi-annual IFRs with expenditure projections for the succeeding 3 quarters along with a technical audit report prepared by an independent verification expert. The technical audit report would attest to (a) achievement of the relevant milestones set forth in the EPC contract and (b) compliance with the pricing provisions set forth in that contract. As report-based disbursements are proposed, the IFR template will include additional schedules such as the DA reconciliation statement, sources and uses of funds by expenditure category.

- **Disbursements under Component 2** from IBRD used to support MASEN's energy purchases from the SPVs are expected to be drawn after each of Noor-Ouarzazate I, II, and III are commissioned and MASEN starts to incur energy costs in excess of its revenue from ONEE. The initial disbursement from Component 2 is expected once Noor-Ouarzazate I's construction is completed and the plant is commissioned, which is currently expected in the second half of 2015. Disbursements would then ramp up as Noor-Ouarzazate II and III are commissioned in 2017 and 2018, respectively.

- Disbursement under Component 2 of the proposed Project is expected to be made on a 'Reimbursement' basis. The disbursement amounts will be based on (A) MASEN's costs to purchase energy from the relevant SPV in accordance with the terms of the relevant PPA net of (B) MASEN's revenue from the sale of this energy to ONEE in accordance with the terms of the power sale agreement and (C) any GoM cash contributions to cover the incremental difference between (A) and (B) in the relevant disbursement period. This is represented in the IBRD loan agreement as a formula: [(A-B) – C]. Withdrawal requests will be accompanied with appropriate documentary support acceptable to the Bank supporting eligible expenditures covered by the IBRD loan under this Component. Specifically, with respect to each withdrawal application under Categories (3), (4) and (5), the MASEN will prepare and provide to the Bank an interim unaudited financial report for the Project covering the time period agreed with the Bank, in a form and substance agreed by the Borrower and the Bank. Each IFR will include a technical audit report acceptable to the Bank, prepared by an independent verification expert under terms of reference satisfactory to the Bank, certifying that the amount of the relevant Solar Incremental Cost (as defined in the legal agreements) is correct as per the provisions of PPAs and PSAs for Noor-Ouarzazate I, II and III (as the case may be), the Conventions and any other relevant document.

27. Figure A3.2 below shows the flow of funds under the construction phase and under the operational phase.

Figure A3.2 - Flow of Funds in the Project's Construction/Operational Phases



Procurement

28. The initial capacity assessment of MASEN (newly created entity) permitted to note that it did not have experience with World Bank procurement. The present capacity assessment, which is an update of the previous one undertaken for the Noor-Ouarzazate Project, recognizes that the situation has changed since the initial assessment. In terms of organization, human resources and technical tools available to carry out procurement function, a lot of improvements have been made. However, due to the complexity of the Project, the risk remains high.

29. Because of its status of "Société Anonyme" (limited liability company with Management and Supervisory boards), ruled under private law, with public capital and a Supervisory Board, MASEN is not governed by the public procurement decree. It follows its own procurement rules dated on April 6, 2011, complemented by a well-structured manual of procedures, with a dedicated "Procurement" module. To take into account MASEN's specificities, those rules differ from the public procurement decree, on some key points among which the thresholds for procurement methods, the composition and functioning of the procurement committees, etc. An update of MASEN's procurement rules is underway to further improve its quality and to include detailed procedures for e-tendering which is widely used in practice. After review by the Directorate, the new version will be submitted to the Supervisory Board for approval (expected in the latter end of 2014).

30. MASEN has set up a General Affairs Unit (GAU), in charge of Procurement and Logistics. This unit is composed of three staff, and MASEN intends to strengthen the team in 2014 with two new hires. The GAU participates in the procurement of works, equipment and installations related to the facilities for the CSP sites (water supply, access roads, perimeter roads, boundary wall, water supply from the dam ME, buildings, etc.). The unit's scope is mainly focused on the procurement process itself, with technical and other inputs provided by MASEN's operational departments. Specific training in procurement for concerned staff (GAU and other departments involved in procurement) is necessary to build internal capacity and improve staff skills, but not required for the Project.

31. Procurement of private sponsors for CSP projects, such as Noor-Ouarzazate I, II, and III, are the responsibility of MASEN's Structuring team, supported by staff from other departments, such as "Engineering Design" and "Strategic Management" as needed. The Structuring team also relies on consultants to prepare bidding documents and bid evaluation reports. Because procurement of sponsors for CSP projects is complex, MASEN is assisted by several consultants for the management of the whole procurement process (preparation of the RFP, management of selection process).

32. MASEN is using e-procurement with the electronic platform for e-tendering as part of the "Enterprise Resource Planning" (ERP) tool. The platform helps to manage the whole procurement process: planning, bidding including advertisement, monitoring of contract execution and management of payments. The use of ERP optimizes the procurement cycle while helping for a more effective management of the process from tendering through the payment phase. Currently, the ERP is being improved to enhance its reliability. As a general rule, the use

by MASEN of its e-tendering platform in Bank funded projects (partially or fully) is subject to a satisfactory assessment by the Bank. Such assessment has not taken place yet.

33. MASEN benefitted from the support of the IFI during the 1st phase (Noor-Ouarzazate I) and therefore has become more familiar with Bank procurement procedures and requirements especially with regard to partnership type operations (para. 3.14(a) of the Bank's procurement guidelines). However, as mentioned above, the risk remains high, as in Noor-Ouarzazate I, considering the complexity of the operation. Therefore, the Bank's close follow up and support is key for a timely and successful completion of the procurement process. With regard to capacity building, the Bank is expected to offer MASEN's staff involved in procurement specific training on Bank procurement procedures (except few presentation and frequent interactions with Bank missions), to the extent MASEN requests such training.

34. As a state owned entity, MASEN is under the oversight of the "*Direction des Etablissements Publics et de la Privatisation*" (DEPP). By the law, MASEN is subject to the audit of the General Inspectorate of Finance (IGF) and the Court of Account (CoA). But until now, no IGF or CoA mission has occurred.

35. The Project's procurement consists of the competitive selection of private sector sponsor(s) for a partnership with MASEN to design, build, own, operate, and transfer the Noor-Ouarzazate II and III facilities. The procurement process follows the requirements of para. 3.14(a) of the Bank's procurement guidelines, which provides for selection of the sponsors under open competitive bidding procedures acceptable by the Bank. Once selected in this manner, the sponsors would then be free to procure goods, works, and consulting/non-consulting services required to implement the contemplated arrangement from eligible sources using the sponsors' own procedures. As a result, the Project's procurement plan is limited to 2 power purchase agreements (PPAs) for the purchase of power from special purpose vehicle(s) (SPVs) formed by the selected sponsor(s) to construct, own, and operate Noor-Ouarzazate II and III for the term of the agreements.

36. Because of the MSP's implementation timeline, the procurement process commenced during the Bank's project preparation and is currently in an advanced stage. MASEN adopted a procurement approach that includes a prequalification phase and a 2-stage bidding process. On January 23, 2013, MASEN issued an invitation for prequalification that provided a short description of Noor-Ouarzazate II and III, and enumerated the requirements for prequalification. Seven highly qualified consortia were invited to participate in the next bidding stage, 3 of which qualified to bid for Noor-Ouarzazate II, and 4 qualified to bid for Noor-Ouarzazate III. On December 12, 2014, MASEN issued the request for proposal (RfP) in the first stage of the bidding process to invite technical bids. The RfP provided minimum functional specifications to set the parameters for the technical design, but otherwise left the bidders flexibility to propose the most optimum design to meet MASEN's requirements. For those bidders prequalified for both Noor-Ouarzazate II and III, the RfP provided flexibility to propose a design that provided for two separate plants or one that is optimized to combine them in the most cost-effective manner.

37. The RfP also invited bidders to submit proposals for Industrial Integration, consistent with MASEN's mandate to promote local industrial development. The bidding documents invited bidders to proposed either direct or indirect investments that are equivalent to at least 35 percent of Noor-Ouarzazate II and/or III's costs, as applicable. Direct measures comprise expenditures on construction of the plants (e.g., civil works, earth movement, construction materials, and other services from companies incorporated in Morocco). Indirect measures comprise investments in, for example, maintenance facilities and research and development centers. However, the RfP made clear that "Bidder's proposal of any such investment in the first stage of the Tender Procedure is discretionary and voluntary." The RfP further provided that "the nature and level of the investment, as reflected in the Industrial Integration Proposal, is left to the complete discretion of the Bidder." Once a bidder voluntarily proposes some investments in the first stage of bidding, it is expected to commit to such proposal in the second stage of the process.

38. Final bids are due in the latter end of September 2014. MASEN expects to reach commercial closing (e.g., signature of the PPAs, on-lending agreements that will govern pass-through of the Bank's and other IFI's funds from MASEN to the SPVs, and other Project-related documentation) for both Noor-Ouarzazate II and III within a short period after the plants' award to selected sponsors. As such, it is critical to ensure that the requisite debt financing from the Bank and other IFIs is approved prior to conclusion of the second stage of the bidding process. Aside from the credibility this provides in such a key element of the plants' financing structure, such approvals would ensure that the necessary terms and conditions of financing are known and can be reflected in the documents to be signed by bidders at the time of award.

Environmental and Social (including safeguards)

39. The risk of adverse social impacts caused by the Project is low. The Project is not expected to involve any resettlement; the potential for adverse socio-economic impacts, including through land acquisition is also limited. However, due to its size, scope and complexity, including in terms of associated facilities, the Project triggers OP 4.12 and is categorized as A.

40. **Site of Noor-Ouarzazate Solar Complex:** the Noor-Ouarzazate Solar Complex is located in the Ghessat council and at the Tamzaghten Izerki village, about 10 km north east of Ouarzazate city, a town of approximately 50,000 inhabitants situated in south-central Morocco, at about 160 km south-east of Marrakesh. The region has relatively higher levels of unemployment and lower levels of per capita income than the remainder of Morocco. The Noor-Ouarzazate Solar Complex is therefore seen as a welcome addition to the local economy and expected to enhance employment opportunities.

41. For the purpose of the Noor-Ouarzazate Solar Complex, MASEN acquired 2,500 hectares (ha) of collective land in 2010 for the CSP Noor-Ouarzazate Complex (including for Noor-Ouarzazate I, II, and III). A second additional acquisition of 543 ha of collective land took place in 2013 and is mainly dedicated to a proposed photovoltaic plant that is not part of the proposed Project. Fifteen (15) ha of the additional 543 ha will be used for Noor-Ouarzazate I to slightly

realign the originally demarcated 2,500 ha to address some soil erosion. The land for the Noor-Ouarzazate Solar Complex was arid and unoccupied, and of little or no economic value.

42. The acquisition of the land was carried out following Moroccan standard procedures for similar types of voluntary transactions between a local community and a public agency. The purchase of land, therefore, followed a willing-buyer, willing-seller arrangement.

43. **Associated infrastructures:** a number of infrastructures are associated with the Noor-Ouarzazate Solar Complex, including small infrastructures (for example) that are ancillary to the site and larger infrastructures that are necessary to ensure production and off-take electricity from the site (transmission lines). The updated 2014 Framework Environmental and Social Impact Assessment (FESIA) includes all these facilities. The Noor-Ouarzazate II and III plants entail only one new additional associated facility that was not treated under Noor-Ouarzazate I - the Ouarzazate – Tazarte 225 kV transmission line, necessary to ensure the evacuation of power from the Noor-Ouarzazate II and III plants into the wider Moroccan grid. The existing FESIA, which was developed and disclosed as part of the Noor I Bank Project, has been revised and re-disclosed in-country and at the Infoshop on 26 June, 2014 and 26 June, 2014 respectively.

44. The transmission line will be built by ONEE with financing mainly from IFIs. Its specific routing will not be determined until February 2015 following completion of the site survey and geotechnical analysis. At that time, the parcels of land necessary for the construction will be identified. The line route will pass through nonagricultural land of arid nature, of which approximately 90 percent is publicly owned or owned by collective communities. ONEE anticipates securing the real property rights it needs on a voluntary, willing-buyer, willing-seller basis. OP 4.12 aspects related to the line are covered in a Resettlement Policy Framework developed by ONEE and submitted to the Bank. ONEE will also provide the related safeguards documentation (RAP) for Bank clearance and disclosure ahead of the start of construction (see below). However, disclosure of this document is required only in the case of involuntary land acquisition as reflected in the loan agreements between the Bank and MASEN

45. Another larger infrastructure is the 10 km water conveyance system that provides water to the Complex (including, Noor-Ouarzazate I, II, and III) from the Mansour Eddahbi dam for the entire site. MASEN completed acquisition of the requisite land for this pipeline in early 2014 and the funds associated with collective lands were transferred to the Rural Affairs Directorates of the Ministry of Interior (DAR) for the benefit of the community owners of these lands. The balance of the land used for the system outside the Noor-Ouarzazate Complex is public land.

46. **Safeguards documentation:** As part of the process for Noor-Ouarzazate I's development, MASEN prepared and disclosed on 12 January 2011 a FESIA in line with the Bank's safeguards policies. The reason for the preparation of a Framework was the level of uncertainty as to design and technology choices for the Noor-Ouarzazate I plant during project preparation, which depended on the ongoing procurement process for the Noor-Ouarzazate I plant. Following the plant's award, a detailed Specific Environmental and Social Impact Assessment (SESIA) was carried out.

47. A similar approach was adopted for the proposed Project. As the design and technology choices for the Noor-Ouarzazate II and III will be determined after the conclusion of the ongoing procurement process, the 2011 FESIA was updated to reflect the latest available information, and re-disclosed in-country and at the Infoshop on June 25, 2014 and June 26, 2014, respectively, after public consultations in June 2014. Additionally, the procedures used for all land acquisition were communicated to the Bank through land acquisition plans, with a view to ensuring full compliance with safeguard policies.

48. As discussed further below and similar to the process adopted for Noor-Ouarzazate I, the plant-specific SESIA for Noor-Ouarzazate II and III will be carried out by the selected private sector sponsors of each of the plants. The SESIAs will follow the requirements of the updated FESIA, and include a public consultation process in compliance with World Bank guidelines. It is expected that, once the SESIAs are reviewed by the Bank and found in compliance with Bank policies, the documents would be publicly disclosed prior to start of the plants' construction.[52]

49. Disclosure of safeguard documents related to the associated facilities has taken place as described in the updated FESIA. In addition, the ESIA and the Resettlement Policy Framework (RPF) for the Ouarzazate – Tazarte transmission line have been disclosed on June 26, 2014, both in-country and at the Bank's InfoShop. The RPF establishes the process for compliance with OP 4.12. Once the specific land parcels are identified and related owners are identified, ONEE will provide the Bank with the safeguard documentation (RAP or LAP) for clearance and disclosure ahead of start of construction of the line. However, disclosure of this document is required only in the case of involuntary land acquisition as reflected in the loan agreements between the Bank and MASEN

50. **Community projects/grievance mechanism:** Compensation for MASEN's acquisition of collective land for the Complex, which includes Noor-Ouarzazate I, II, and III, is required by law to be administered by the Rural Affairs Directorate (DAR) in the Ministry of Interior for the benefit of the communities involved. The communities identify development projects, and, working with DAR and local authorities, implement them using the acquisition proceeds

51. As of April 2014, approximately 85 percent of the MAD 30.5 million purchase price paid by MASEN for the Noor-Ouarzazate I, II, and III sites and deposited with DAR has been allocated to a pipeline of local development projects for the benefit of local communities. These include irrigation channels, new water wells and extension of existing wells, irrigation pumping stations, drinking water tank and extension/reinforcement of a drinking water network, a student hostel, an equipped ambulance, and a variety of infrastructure projects.

52. The balance of the purchase price has been reserved to projects that still need additional funding to proceed. This process takes time as (i) communities internally agree on the list of projects to pursue, (ii) the list is agreed with local authorities and DAR, (iii) any requisite project procurements take place, and (iv) construction is completed. As such, MASEN agreed, as part of the Noor-Ouarzazate I process, to prepare a Social Development Plan (SDP) within 6 months

[52] MASEN will undertake, to the extent reasonably possible, such disclosure at least one hundred and twenty (120) days prior to start of construction.

from the effective date of the Bank's loan agreements to inform the Bank of the status of this process. The Bank will continue to follow implementation of the SDP during Noor-Ouarzazate II and III supervision.

53. In addition to those community projects that MASEN is legally obligated to undertake, MASEN is also conducting a wide range of additional community projects, which range from provision of traveling health clinics, to training.

54. A grievance mechanism has been put in place.

Environment (including Safeguards)

55. The Project triggers OP 4.01 due to its limited environmental impacts.

56. **Environmental impacts and mitigation measures:** the Project has limited environmental impacts, especially considering the size of the power plants to be constructed. It should be noted that as a renewable energy facility, the environmental impacts of Noor-Ouarzazate II and III are significantly lower than an alternative conventional fuel power plant. Most importantly, the plants will contribute to air pollution as it is not emitting greenhouse gases or other local pollutants.

57. The potential environmental risks in the Project's area of influence are:

- ***Impacts to Soil, Water, and Air Resources:*** Construction of Noor-Ouarzazate II and III facilities on such large areas of land will require grading, and results in soil compaction, potential alteration of drainage channels, and increased runoff and erosion. Engineering methods can be used to mitigate these impacts.
- ***Water use:*** Parabolic trough and central tower systems typically use conventional steam plants to generate electricity, which commonly consume water for cooling. In arid settings such as the Ouarzazate desert environment, any increase in water demand can strain available water resources. However, for the Noor-Ouarzazate II and III plants dry cooling is being used, thus minimizing water use. Water is also being used for the cleaning of mirrors. Water from Mansour Eddahbi Dam (MED) reservoir will serve three purposes: (i) irrigation for agriculture (180Mm3/yr), (ii) drinking water for the city of Ouarzazate (5 Mm3/yr), and (iii) industrial water for the Noor-Ouarzazate Complex (2.11 Mm3/yr).

- ***Ecological impacts:*** the use of large areas of land for the Noor-Ouarzazate solar power facilities will adversely affect native vegetation and wildlife in many ways, including loss of habitat; interference with rain runoff and drainage; or direct contact causing injury or death (flying birds). These potential impacts on the avifauna will be evaluated and documented in the EIAs for each technology, and mitigation measures proposed.

However, according to Smit Hanneline[53], the following are not limited actions that should be taken to mitigate negative impacts on birds: (i) preconstruction monitoring to determine the presence of "threatened, rare, endemic" bird species; (ii) monitoring should take into account seasonal variation, fly paths and birds' behavior; (iii) during construction the position and height of the receiver tower should be taken into account at CSP plant developed with a central receiver tower; (iv) ensure that birds do not get in contact with evaporation ponds, i.e., ponds should be covered with wire mesh or netting to reduce the possibilities of (a) attracting, (b) drowning, and (c) poisoning; (v) motivate the need for new power lines to be marked with anti-collision devises and constructed with bird-friendly designs to prevent electrocution.

- ***Particulate matter:*** the construction and operation of Noor-Ouarzazate II and III facilities could generate particulate matters, which can be a significant pollutant particularly for the nearby classified/sensitive areas such as the Biosphere reserve of the South Moroccan Oasis during windy conditions. Regular watering of the vehicles and trucks itinerary paths at the construction sites will be undertaken at regular basis as mitigation measures to avoid rising of clouds of dust that would affect the surrounding environment by heavy layers of particles deposited on the biosphere reserve vegetation.

- ***Risk of toxic fluid leaks:*** The CSP in Noor-Ouarzazate II and III will employ oils or molten salts, hydraulic fluids, coolants, and lubricants that may be hazardous and present spill risks. Proper planning and good maintenance practices will be used to minimize impacts from these hazardous materials. To prevent hazardous and presence of spill and leak risks, tubing and specialized equipment and materials will be used to prevent cracking and corrosion. This mitigation measures will also involve the use of flanges, gaskets, pumps and pump seals (for HTF service) as well as security valves to reduce emissions and leaks, and containment pits to minimize accidental spread of molten salts.
- **Aircraft operations:** CSP solar tower systems have elsewhere been associated with interference with aircraft operations (if reflected light beams of the solar tower are misdirected into aircraft pathways). However, in the case of the Noor-Ouarzazate Solar Complex, the plant site is located outside of any flight path and thus aircraft operations are not expected to be impacted.

58. Among the key mitigation measures are the Project's safety and security protocols. The Project incorporates worker safety and security measures to mitigate the use and manage the impacts of hazardous materials (molten salts, heat-transmission fluid, fossil fuel, etc.), fire hazards and other soil pollution on the environment and human health. To ensure that plant facilities comply with the minimum standards to provide worker security and protect the environment, HSSE personnel will permanently monitor the complex's facilities and report all incidents that may occur during construction and operation of Noor-Ouarzazate II and III power plants.

[53] BirdLife in South Africa: Guidelines to minimize the impact on birds of Solar Facilities and Associated Infrastructure in South Africa (http://www.birdlife.org.za/images/stories/conservation/birds_and_wind_energy/solar_power.pdf)

59. The Project's associated facilities' potential environmental considerations include land disturbance/land use impacts; impacts to soil, water and air resources; impacts to wildlife and sensitive species; visual, cultural, paleontological, socioeconomic, and environmental justice impacts, and potential impacts from hazardous materials.

60. **Safeguards documentation:** The updated FESIA covers all of the Noor-Ouarzazate Complex's site and the different technologies (CSP parabolic trough and solar tower) under consideration by MASEN. The updated FESIA was prepared in a participatory manner including all requisite stakeholders' consultation and disclosures. It includes a description of: (i) the legal and regulatory framework applicable to the plants, (ii) alternative options considered, (iii) a state of the environment in the plants' location and surrounding region, (iv) potential impacts and associated compensation measures to be considered, and (v) a Framework Environmental and Social Management Plan (FESMP). The FESMP includes institutional settings, general mitigations measures and monitoring plan for the potential impacts expected from plant activities during construction and operation stages.

61. The updated FESIA will guide the preparation, adoption and monitoring of the SESIA to be carried out by the bidders and their respective SPVs for each of Noor-Ouarzazate II and III once their initial designs are determined. The SESIAs will include a detailed Environmental and Social Management Plan in accordance with the provision of the updated FESIA, including the processes, rules and standards defined in the FESIA, and will be subject to the Bank's review and concurrence before its final approval and implementation by MASEN and the relevant SPVs.

62. The SESIAs will include a detailed Environmental and Social Management Plan (ESMP) for the plants. After the SESIAs' review and disclosure, the SPVs are expected to contract environmental and social safeguards coordinators that will have direct responsibility for implementing the agreed environmental, health and safety measures at the plants' site during construction and operation. These coordinators will, inter alia, prepare a monthly Health, Safety and Environment report during the construction and operation phases of Noor-Ouarzazate II and Noor-Ouarzazate III, and MASEN will provide a summary of this information for the Bank's review during the supervision phase of the proposed Project.

63. ESIAs and their ESMPs for the Associated Facilities will be carried out by MASEN and ONEE, who are responsible for completing these facilities.

64. **Implementation Capacity:** MASEN has a department within its organization to monitor development and implementation of the safeguards aspects of the Noor-Ouarzazate Complex, including Noor-Ouarzazate I, II, and III. MASEN is expected to ensure that staff in this department receives adequate training and possess the relevant expertise to supervise implementation by the SPVs of all relevant environmental and social impact mitigation measures, including occupational, health and safety guidelines, that are mainstreamed into the plants' design in accordance with the provisions of the updated FESIA.

65. Though Masen's Sustainable Development Department is staffed with qualified personnel with regard to the safeguards aspects of Noor-Ouarzazate I currently under construction, an appropriate budget will be made available to ensure adequate monitoring equipment and staffing

to cover expansion of the Complex with two additional plants (Noor-Ouarzazate II and Noor-Ouarzazate III).

Other Safeguards Policies Triggered (Safety of Dams (OP 4.37))

66. Like Noor-Ouarzazate I, Noor-Ouarzazate II and III's water requirements will be satisfied from the existing Mansour Eddahbi dam reservoir. To this end, a 19 km long water intake channel from the dam to the site of the Noor-Ouarzazate Solar Complex is being constructed by MASEN. The plants' performance will depend on availability of water and performance of the dam. Failure or misuse of this dam may have adverse results on the plants' operation. Therefore, the Bank's policy OP 4.37 on Dam Safety is triggered. As detailed below, the monitoring and maintenance procedures as well as past assessments of the Mansour Eddahbi dams satisfy the requirements of OP 4.37.

67. The Mansour Eddahbi dam is located on the "oued"[54] Drâa and is an arch dam with a height of 70 meters at its highest point. During periods of normal hydrology, the dam holds 560 million m3 of water serving irrigation, energy use and flood management. The dam was impounded in April 1972.

68. The raw water requirement from the dam's water reservoir for the Noor-Ouarzazate Solar plant will be pumped, conveyed and stored in two water tanks (capacity 15,000 m3 each) to a site adjacent to the Noor-Ouarzazate Complex. The quantities of water needed to feed the cooling system (dry) of the Noor-Ouarzazate II and III solar plants are estimated at 230,000 m^3/yr and 125,000 m3/yr respectively. There will not be any conflict on water allocation, according to Masen's document on water needs analysis, on the base of the following: (i) there is new dam (Tiouine dam) that is being built, with a capacity of 270 Mm3 that will start servicing the region (Ouarzazate and Zagora) in 2014, with a forecast regular annual volume of 150 Mm3; (ii) this new dam will provide 20 Mm3 of drinking water and 10 Mm3 of water for irrigation to supplement the provision of the MED; (iii) though the irrigation needs are supposed to subtract about 180Mm3/yr and 5Mm3/yr of drinking water, there will not be any conflict because the water ceded from MED reservoir to perform these functions will reduced but complemented by the supply from the Tiouine dam; hence the additional 350,000 m^3/yr to satisfy the needs of Noor-Ouarzazate II and III from MED will not be an impediment to the provision of water to neither the entire Noor-Ouarzazate complex nor the irrigation water and drinking water to the Ouarzazate Region.

69. The Mansour Eddahbi dam is managed by the Moroccan Hydraulics Administration in accordance with the requirements under Moroccan law. As it is the practice in Morocco, the dam is equipped with a testing and monitoring network. To ensure consistent maintenance of the dam's parts and with the aim of prolonging the life of dams the Hydraulic Administration has since the 1980s been using preventive maintenance (MECEP). The latest detailed auscultation analysis for the dam is dated May 2012. The report finds a mechanically and hydrologically

[54] An "oued" is a river that only carries water during the winter months when it rains. It is commonly dry during the summer months.

satisfactory behavior of the dam in line with the findings of a site visit conducted as part of the report. A World Bank team visited the site in May 2014 and confirms the visual assessment.

70. Morocco has a comprehensive framework in place to safeguard the safety of its dams. Dam safety is governed by the Water Act 10-95. Section 16 of this Act requires the preparation of an Integrated Water Resources Development Executive Plan (Plan Directeur d'Aménagement Intégré des Ressources en Eau- PDAIRE) which is prepared by the administration for each watershed or set of water basins. Its main objective is the management of water resources of the water basins, including estuary waters, to ensure both quantitatively and qualitatively, present and future water needs, of different water users of the water basin. The PDAIRE defines, among other actions, the necessary operations for the mobilization, the distribution, the protection, the restoration of water resources and the public water domains, including hydraulic structures.

71. Morocco has implemented a system for the dams' monitoring and maintenance under the guardianship of the hydraulic basin agencies. The latter are organized to mobilize the necessary resources (human, technical and material) to ensure comprehensive inspections and assessments of the dams' safety. Monitoring is documented monthly for each dam in an inspection report which reflects the evolution of each hydraulic or mechanical phenomenon and also tracks the state and behavior of the dam. Moroccan regulation therefore seems to have developed procedures and means acceptable for dams' review and monitoring.

Monitoring & Evaluation

72. The monitoring and evaluation of the Project will be ensured by the following: (a) MASEN will submit to the Bank an annual report covering, inter alia, progress on the physical implementation, procurement, financial commitments and other elements of Project's progress; (b) MASEN will submit to the Bank semi-annually a report covering implementation of the framework environmental management plan. Each fund withdrawal application will include the report from the independent verification expert, certifying that the amount of the relevant SICS is correct as per the provisions of the PPA, the PSA, the Conventions and any other relevant document.

73. The Bank, in co-ordination with the other lenders (see "Role of Partners" below), will hold regular meetings (bi-annually during construction and annually thereafter) to address implementation issues, and, in particular, to review the implementation progress of the environmental management plan.

Role of Partners (if applicable)

74. The Project has raised strong interest and support from IFI, industry players and other stakeholders. The prequalification process that was launched in a variety of interest from strong and diverse consortia.

75. Donors have been coordinating review of the various Project elements during preparation, which included inter-donor issues arising from incompatibility of the donors' rules and procedures. It is expected that cooperation between the donors would continue during

Project implementation, continuing the course of dealings established on Noor-Ouarzazate I where supervision missions are undertaken jointly.

Annex 4: Operational Risk Assessment Framework (ORAF)

MOROCCO: NOOR Ouarzazate Concentrated Solar Power Plant Project

1. Project Stakeholder Risks	**Rating: Moderate**			
Description : The potential risk that stakeholder motivation could decline during the implementation of the project.	**Risk Management:** Government commitment and very strong support for CSP and renewable energy (RE) scale-up by GoM and NGOs. MASEN is a Company fully committed to its mandate to develop and implement the country's solar program, as demonstrated in the Noor-Ouarzazate 1 Bank Project. The single buyer and off-taker of the generated electricity is fully on board and a minority shareholder of MASEN. The local authorities and population are supportive of the Project because it creates opportunities of employment and could play a catalyst role in developing this semi desert region. The private partner will be selected competitively through a clear and transparent process, in a similar fashion than in Noor-Ouarzazate 1. Consultation and discussion with all stakeholders during project preparation confirmed this strong support of all stakeholders to the proposed Project. Consultations will continue as needed during project implementation.			
	Resp: Client	**Stage: Prep/Impl.**	**Due Date: continuous**	**Status: ongoing**
2. Implementing Agency Risks (including fiduciary)				
2.1 Capacity	**Rating: High**			
Description : The potential risk in working with a newly created Company is its inexperience, which can sometimes take long time to become operational. However, MASEN rapidly built up competence, knowledge and the ability of managing complex transactions during Noor-Ouarzazate I. MASEN will undertake multiple roles in the partnership transaction, which are likely to be partially conflicting with each other. Such multitude of roles is unusual. MASEN will need to analyze and commercially structure these roles in a way that is both fair and attractive to the private sector and that represent an adequate degree of protection for IFIs (IFIs financing will be on-lent from MASEN via a loan agreement yet to be conceptualized). MASEN chose, as in Noor-Ouarzazate 1, to rely on highly competent staff with good understanding of its mission and objectives and reliance on highly reputable consultants and advisors to carry out activities related to the selection of a private	**Risk Management :** On-going support to MASEN by Bank staff, TA through CTF and other trust funds. Training of MASEN staff to acquaint them with Bank procedures, especially safeguards. Hiring by MASEN of a consultant well acquainted with Bank procurement procedures, as in Noor-Ouarzazate 1. Significant degree of supervision between loan signature, loan effectiveness, and meeting of loan disbursement conditions. Thorough list of condition precedents to loan disbursement especially for the payment of construction of the Noor-Ouarzazate II and Noor-Ouarzazate III plants. Should the partnership not be conclusive, the IBRD and CTF loans would not become effective.			
	Resp: Client	**Stage: Prep/Impl**	**Due Date : continuous**	**Status: ongoing**

partner to develop the plants. Nevertheless, MASEN will require additional and adequate capacity to manage two plants in parallel.				
2.2 Governance	**Rating: Low**			
Description : No significant risk identified	**Risk Management :** MASEN possesses a robust governance mechanism that includes all relevant local laws and regulations. This mechanism has been a condition of effectiveness to the Noor-Ouarzazate 1 loans.			
	Resp: Client	**Stage: N/A**	**Due Date: N/A**	**Status: N/A**
3 Project Risks				
3.1 Design	**Rating: High**			
Description: As in Noor-Ouarzazate 1, Board is taking place before the partnership structure has been fully developed, before feedback on the preliminary structure has been received from bidders and before either the identity of the winner or the cost of the plants are known. The contractual structure that will be used to channel IFIs loans into the SPVs is expected to be similar to the structure used in the previous project. There are risks of (i) bid failure and delay leading to the risks that the loans committed are not drawn down, or are drawn down at a much later stage than currently anticipated; (ii) uncertainty of plant costs, leading to smaller or larger than committed financing needs from IFIs and (iii) risk allocation in the loan agreement between SPVs and MASEN not adequately reflect the needs of the IFIs, including for the IBRD and CTF loans. Because of the timing of presentation to the Board, key Project risks cannot fully assessed, both in nature and consequences, at time of Board presentation and this will remain so until full development of the plants, conclusion of the competitive bidding process, commercial then financial closing.	**Risk Management :** High caliber advisor to MASEN during selection process. Finalization of key documents subject to the Bank's No Objection. Execution and effectiveness of the documents, as cleared by the Bank, will be conditions to disbursement for CTF/IBRD funding for construction of Noor-Ouarzazate II and III in the legal agreements between the Bank and MASEN.			
	Resp: Client	**Stage: Prep**	**Due Date: continuous**	**Status: ongoing**
3.2 Social & Environmental	**Rating: Moderate**			
Description : Non-compliance with Bank rules and procedures could hinder project implementation. Specific risks could be:	**Risk Management :** Compliance with Bank social and environmental rules will be included in the RFP and contractually mandated. With respect to the mentioned specific risks, the following mitigating measures will be followed: a. Construction phase: smoking ban, electrical habilitation, adequate maintenance of vehicles, and			

<table>
<tr><td rowspan="2">Natural environmental risks: cricket invasion, fire (due to the presence of thermal transmission oil at high temperature and fossil fuel).

Technologically-induced environmental risks: parabolic trough, turbines (fire hazard and explosion)

Delay in implementing social development projects.

To mitigate this risk, MASEN built up a strong experience in the social and environmental field.</td><td colspan="4">installation of fire extinguishers.
b. Operational phase: regular maintenance of equipment, regular monitoring/ surveillance of vegetation and electrical equipment.
c. Social development projects: close coordination between MASEN and DAR.</td></tr>
<tr><td>Resp: Client</td><td>Stage: Prep/Impl</td><td>Due Date :continuous</td><td>Status: ongoing</td></tr>
<tr><td>3.3 Program & Donor</td><td>Rating: Moderate</td><td colspan="3"></td></tr>
<tr><td rowspan="2">Description :
Concessional funding (CTF) exhausted and RE financing/support mechanisms not operational.

CSP cost reduction likely to be insufficient after Noor-Ouarzazate Complex to make CSP competitive for the rest of the Moroccan Solar Program (including Tata and Midelt).

Financiers/donors have different procedures and rules. Risk of burdening or confusing MASEN during the preparation of the Project, Differences in opinion and rules may create delays during preparation and require close donor coordination. During preparation of the Noor-Ouarzazate I Bank Project MASEN demonstrated great leadership in the coordination of donors.

Inappropriate use of funds and/or double dipping</td><td colspan="4">Risk Management :
Bank continued support to Morocco to secure additional concessional funding.

Ensure success of Ouarzazate and disseminate results to replicate the Moroccan approach in MENA and extend the size of the market to lower CSP cost.

Co-financiers will align on WB procedures.

Clarification of working procedures and joint appraisal.

A financial management and Disbursement Manual will be prepared agreed by co-financiers.</td></tr>
<tr><td>Resp: Client</td><td>Stage: Prep/Impl</td><td>Due Date: continuous</td><td>Status: ongoing</td></tr>
<tr><td>3.4 Delivery Monitoring & Sustainability</td><td>Rating: Moderate</td><td colspan="3"></td></tr>
<tr><td rowspan="2">Description :
No delivery of plants by partnership partners</td><td colspan="4">Risk Management :
Capacity of the private partner evaluated and quality of delivery contractually mandated. Penalties applied in case of delays or performance shortfall.</td></tr>
<tr><td>Resp: Client</td><td>Stage: Prep</td><td>Due Date :completed</td><td>Status: completed</td></tr>
<tr><td>3.5 Affordability</td><td>Rating: High</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td rowspan="2">Description :
CSP generation cost substantially higher than for fossil fuel technologies. GoM committed to cover gap after mobilization of concessional financing and grant.
However, the impact on the budget could be too high given the difficulties facing the subsidy mechanisms for energy and other commodities, or priorities for use of state budget could change in order for instance to finance social or poverty reduction programs.</td><td colspan="4">Risk Management :
MASEN mobilizing with Bank assistance concessional funding and grants to address affordability issue.

Some of the incremental financial cost will be compensated by dividend gains at MASEN’s level.</td></tr>
<tr><td>Resp: Client</td><td>Stage: Prep</td><td>Due Date: completed</td><td>Status: completed</td></tr>
<tr><td>3.6 Technical</td><td>Rating: High</td><td colspan="3"></td></tr>
<tr><td rowspan="2">Description :
Development of large CSP plants remains a high technological endeavor. This risk is amplified by the fact that the solar tower project is not only a new technology for Morocco, but the size of plant is also larger than previously constructed.</td><td colspan="4">Risk Management :
The same mitigation measures formulated by MASEN under Noor-Ouarzazate I will apply to the second phase: (a 2-stage bidding process, where the partner will be selected after thorough discussion of technical issues and risks, (b) requirement, as part of the technical bid, to have project implementation experience demonstrated with evidence from actual completed projects, (c) existence of bonding requirements and liquidated damages, should the plant not be able to produce, (d) an engineering, procurement and construction (EPC) contract that will pass a significant amount of technological risk to the construction company and equipment supplier.</td></tr>
<tr><td>Resp: Client</td><td>Stage: Prep</td><td>Due Date : completed</td><td>Status: completed</td></tr>
<tr><td>Overall Implementation Risk</td><td colspan="4">High</td></tr>
<tr><td colspan="5">Given its inherent technological and financial risks, the Project is considered High risk for implementation. While the sum of individual risk ratings may indicate a lower overall rating, the importance of the risks pertaining to sector viability, project financials (affordability), and technology suggests an overall high risk rating.</td></tr>
</table>

Annex 5: Implementation Support Plan

MOROCCO: NOOR Ouarzazate Concentrated Solar Power Plant Project

Strategy and Approach for Implementation Support

1. The implementation support plan has been conceived based on the design and the risk profile of the Project. It aims at providing sufficient technical support to the MASEN and the relevant SPV, to ensure fiduciary compliance with World Bank guidelines and to adequately carry out the mitigation measures defined in the ORAF. The large private partner contract under Ouarzazate Phase I is also expected to bring expertise into MASEN More precisely, the strategic approach for implementation support includes the following:

A. Technical Audits: an independent verification agent will conduct technical audit of the Noor-Ouarzazate II and III plants.

B. Financial Management: Supervision of Project financial management will be performed applying a risk-based approach. The supervision will review the Project's financial management system, including but not limited to accounting, reporting and internal controls. Masen will continue to use its financial management and disbursement manuals that were prepared for the Noor-Ouarzazate I Bank Project. New manuals will be developed for the new SPVs for Noor-Ouarzazate II and III in line with acceptable Bank standards.

C. Procurement: The Project Sponsor contracts anticipated in this Project are subject to prior review. Implementation support will include: (a) reviewing procurement documents and providing timely feedback to MASEN; and (b) providing detailed guidance on Bank Procurement Guidelines to MASEN; and (c) monitoring procurement progress against the detailed Procurement Plan.

D. Environmental and Social Safeguards: The Bank team will supervise the implementation of the agreed Environmental Management Plans and Land Acquisition Plans (LAPs)/ Resettlement Action Plans (RAPs) for the Project; and ensure compliance with World Bank safeguards policies.

E. Partnership Management: Supervision of the partnership will be conducted during the partnership preparation, execution (e.g. construction of the plant) and operation. The nature of the supervision will vary depending on the phase of the Project: during the partnership preparation (e.g. up until financial close) the supervision will focus on assessing all the elements of the Project that could have an impact on the success of the partnership structure, including evaluation of the contractual documentation being prepared for the partnership, evaluation of the economic and financial viability, assessment of the strength of the contractual structure, and evaluation of the risk allocation all with view to ensuring the sustainability and replicability of the Project. This will be done in close coordination with MASEN. During the execution and operation phase of the partnership, supervision will focus on ensuring that the contracts are being

properly implemented, and to determine whether any additional risks are arising from the project implementation either at the SPVs' or at MASEN's level.

F. Donor coordination: The Bank team will ensure coordination of procurement procedures with other co financiers: AfDB, AFD, KfW, and EIB to facilitate implementation and avoid overburdening MASEN.

G. Governance mechanism: MASEN will continue to use the governance risk management framework which it had developed as part of the effectiveness conditions for the Noor-Ouarzazate I Bank Project. The SPV (or SPVs) for the new plants (Noor-Ouarzazate II and III) will develop new separate governance frameworks. The purpose is to support good governance and business ethics, enhance disclosure and transparency and reduce the risk of collusion, fraud and corruption. The risk management framework would cover the relationship between directors, officers, shareholders, employees, suppliers and the SPVs and will be developed on the basis of four essential elements, namely: (1) risk assessment, (2) control activities, (3) information and communication; and (4) monitoring. This framework will include a code of conduct which would be aimed at ensuring the independence of MASEN's employees and reducing potential for conflicts of interest. The principal elements to be covered and essential risk mitigating measures would be as follows:
   - Human Resource on-boarding procedures that will guide employee behaviors and which would introduce new employees to the organizational culture and ethical workplace values;
   - Processes which allow for continuous dissemination and education of employees, on good ethical business practices and for obtaining internal feedback;
   - Internal disclosure and authorization: due diligence mechanisms to require employees to disclose assets, outside and proprietary interests (at the time of hiring, and periodically during the term of an employee's tenure);
   - Mechanisms to prevent conflicts of interest (segregation of duties, strong internal controls, polices on family members and relatives, gift policy);
   - Complaint handling mechanisms for third parties to report allegations, e.g. ethics helpline;
   - Accessibility of declaration and reports for internal and external review;
   - Mechanisms to prevent, investigate, refer or sanction employee wrongdoing;
   - Feedback mechanisms that would provide for periodic updates to the risk assessment and mitigating measures;
   - Introducing fraud and corruption mitigation measures in standard bidding documents.

Implementation Support Plan

2. To successfully supervise implementation of the Project, the Bank team consists of experts in power engineering, procurement, environment, as well as in other relevant areas such as partnership structuring. The task team is based in Rabat, Washington DC and other locations worldwide. Formal supervision and field visits will be carried out at least once each year, and more frequently during the construction period (first 3 years of Project implementation). Detailed inputs from the World Bank team are outlined below:

A. **Financial Management:** During Noor-Ouarzazate I's preparation for presentation to the Bank Board, MASEN relied mostly on external support for its accounting function. Now, the Company has a dedicated department for internal controls and thus relies on its internal resources for work. The Company uses an ERP system to ensure its internal controls are well implemented and monitored. MASEN is also testing a parallel system, called Fund Manager v1.0, that was developed in-house by MASEN's staff to become MASEN's main internal accounting and controls platform. Once testing is complete, this parallel system will become MASEN's main accounting and controls platform, which should make it more useful than commercially-available options and specifically tailored to their needs Nevertheless, given the complexity of the Project, Bank supervision missions will be perform jointly with the Task Team and other donors, and include site visits of MASEN, SPVs and the power plant in Ouarzazate to review (i) continuing adequacy of MASEN and SPVs control framework, and (ii) individual transactions.

B. **Procurement:** The Bank's procurement team (procurement specialists in Washington, DC and Rabat and the partnership focal point in the office of the Regional Procurement Manager (RPM)) will supervise closely the bidding process and contract for the selection of the developer to ensure its acceptability by the Bank. During both the selection process and implementation, MASEN will be supported by a first-rate transaction advisor. The selection process of the private partner is subject to the Bank's prior review.

3. The schedule risk is mitigated by the fact that the bidding process is well advanced and lessons from Noor-Ouarzazate I are being applied.

C. **Environmental and Social Safeguards:** The experienced environmental and social specialists on the task team will monitor and evaluate the implementation effectiveness of the agreed LAP and the Environmental Management Plans. Formal supervision will be carried out at least annually, and continuous support is available as required by the client. As for Noor-Ouarzazate II and Noor-Ouarzazate III, the Bank will supervise that the selected bidder(s) and the EPC contractor(s) put in place mechanisms to monitor and comply with HSE requirements of Moroccan law and Bank guidelines during construction: Construction Environmental and Social Management Plans, Emergency Response Plans, Access Plans, Waste Management Plans, Medical Assistance and Accident Investigation Plans, and Risk Assessment Procedures to govern activities of its/their workers on-site. HSE activities will be monitored through a multi-layered structure that includes specific HSE staff located on site from MASEN Services, the selected bidder(s), the EPC contractor(s), and the individual subcontractors. The Bank will supervise periodic audits carried out to establish the level of HSE compliance with requirements of the SESIAs. Furthermore, preparation and supervision of Noor-Ouarzazate II/III will seek the provision of a dedicated social safeguard consultant to MASEN's team to support compliance and coordination with external stakeholders.

4. Furthermore, preparation and supervision of Noor-Ouarzazate II/III will seek the provision of a dedicated social safeguard consultant to MASEN's team to support compliance and coordination with external stakeholders.

D. **partnership management:** The partnership team will supervise closely the contractual development process and the bidding process and the contract implementation through annual or more frequent supervision missions.

E. **Donor coordination:** A steering group representing all co-financiers of these institutions met on a monthly basis to review the status of project preparation and will continue to meet regularly during implementation. To strengthen their coordination, all co-financiers agreed to: (i) develop a common list of effectiveness and disbursement conditions (ii) recruit a common consortium of legal and technical consultants to review the plants' contractual documents and (iii) harmonize their procedures and their interaction with MASEN. All co-financiers agreed to adopt joint effectiveness and or disbursement conditions, in particular with regard to co-financing. Donors have agreed to disburse CTF funds first and adopt joint disbursement principles for Component 1. The preparation of a FM and Disbursement Manual, approved by the IFIs, is a condition to disbursement. The Bank will provide continued support to Morocco to secure additional concessional funding, which in principle is available.

F. **Good governance mechanism:** The governance risk management framework would be implemented by MASEN's Supervisory Council. Prior to disbursement, the Bank will ensure that the design of the mechanisms is robust and includes all relevant local laws and regulations. During the Project's implementation, the Bank will monitor the effective implementation of the good governance mechanism as well as the operation of the Supervisory Council.

G. **Operations:** The TTL will provide day-to-day supervision support, and will be assisted by an Energy/Operations specialist. They will liaise closely with the client and coordinate efforts within the task team.

Table A5.1 -– Skills Mix and Resources Required

Skills Needed	Number of Staff Weeks (SWs)	Number of Trips	Comments
Task Team Leader	8 SWs annually	Field visits as required	
Energy Specialist/ Operations Officer	6 SWs annually	2 trips annually, field visits as required	
Power Engineer/Solar energy specialist	6 SWs annually	2 trips annually, field visits as required	
Institutional and partnership Specialists	10 SWs annually	Between 2 to 6[55] trips annually	
Social Safeguards Specialist	3 SWs annually	Field visits as required	Country office based
Environmental Specialist	6 SWs annually during the first two years then 3 SWs annually	2 trips annually, field visits as required	
Procurement Specialist	6 SWs first year, then 2 SWs annually in following years	2 supervision missions annually Field visits as required	Country office support available
Financial Management Specialist	3 SWs annually		Country office based
Governance Specialist	2 SW annually first year, then 1 SW	1 trip annually as required	Function may be covered by FM specialist
Operational Support	4 SWs annually	Field visits as required	

[55] Until financial close a high level of supervision will be required (6 trips per year). This will be reduced to 3-4 trips annually during construction and 2 annual trips during operation.

Annex 6. Summary of Economic and Financial Analysis

1. It is well established that the traditional framework for cost-benefit analysis provides only a partial assessment of the economic benefits of a transformational project at an early stage of the technology learning curve. Without investment at the early stages of technology development, capital and operating cost reductions cannot be attained, an experience clearly demonstrated in the case of photovoltaic (PV) technology. There is strong evidence that similar learning curve cost reductions are achievable for CSP technology.

2. Moreover, beyond the normal economic benefit of electricity generation that is the yardstick for conventional Cost-Benefit Analysis (CBA), renewable energy has a range of benefits that are difficult to quantify. These include improved energy security and system diversity, and the macroeconomic (and employment generation) benefits that stem from establishing a domestic manufacturing industry for significant parts of the capital expenditure. These are important Government objectives, given the macroeconomic and fiscal disruptions of the last oil price escalation in 2008/2009. However, these benefits are difficult to capture in conventional Cost-Benefit Analysis (CBA), even less so the benefits of contributions to the global learning curve.

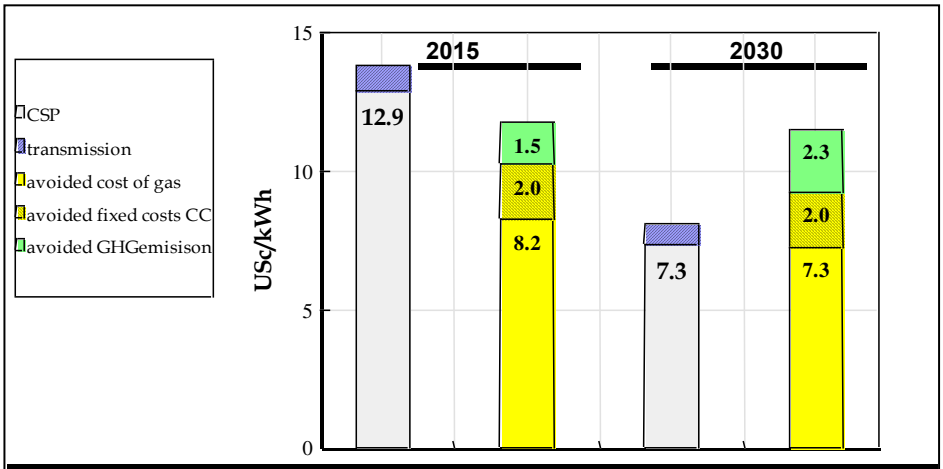
3. Noor-Ouarzazate II and III are not economic on the basis of conventional, project-level CBA. The impact on economic returns when factoring in the benefits of local economic externalities is positive. However, the magnitude of this positive impact is small largely because the plants are expected to displace mostly LNG-fired generation, which has low or no particulates or sulfur oxides. While the plants will also positively contribute to reductions of global Greenhouse Gas Emissions, the hurdle rate would require relatively high carbon valuations, certainly higher than those required for wind generation. Furthermore, while there is value to energy security and diversity of supply to Morocco from using CSP, it is difficult to quantify this value. The potential macroeconomic benefits from developing a local manufacturing base for CSP is significant and contributes to a major increase in the economic returns, but these benefits will depend on the pace of installing the remaining 1,500 MW in the MSP over the next 5-10 years. Based on its commitment thus far, there is every reason to believe that the Government of the Kingdom of Morocco (GoM) will continue to aggressively pursue its solar energy program for installing 2000 MW by 2020, so there are reasonable expectations that the anticipated macroeconomic benefits would be realized.

5. Although the economic returns for Noor-Ouarzazate II and III are below hurdle rates (or economic only under very high valuations of avoided carbon), the project-specific economic assessment does not recognize the plants' contribution to the global public good. If the global community makes a commitment to cover the subsidies necessary to build CSP projects in the short-run, the learning curve effects will lower the costs of future CSP projects to the point where it will provide lower cost electricity in the future (an experience clearly documented by PV and wind, and generally expected for CSP as well).

6. The expected learning curve for CSP suggests that once the total installed global capacity of CSP reaches approximately 32,000 MW, the capital cost should decline from the present

US$5,500/kW to $3,350/kW.[56] As shown in Figure 6.1, while CSP today is more expensive than CCGT, requiring a levelised subsidy of US¢ 2.1/kWh (when evaluated at the assumed five percent opportunity cost of capital), by 2030, the cost of CSP is expected to be US¢ 3.4/kWh cheaper than gas (under the assumption of 32 GW global CSP capacity by then). This conclusion is based on the trajectory of the social cost of carbon, as estimated by the US Interagency Working Group on the Social Cost of Carbon (IWGSCC), at the 3 percent discount rate (from the 2015 estimate of US$38/ton to US$57/ton by 2030).

Figure 6.1 - CSP v CCGT



As USc/kWh	CSP	CCGT	CSP	CCGT
CSP	12.9		7.3	
transmission	0.9		0.8	
avoided cost of gas		8.2		7.3
avoided fixed costs CCGT		2.0		2.0
avoided GHGemisisons		1.5		2.3
total	13.8	11.8	8.1	11.5
net subsidy required	2.1			
net benefit			3.4	

7. Nevertheless, these 2030 costs, and the benefits that go with it, can only be achieved if the world builds 32GW of CSP which would be necessary to bring down the costs as shown. Considering the ambitious CSP targets announced by some countries (e.g., Saudi Arabia's 25 GW CSP target by 2032 and the IEA forecast of 70 GW of global CSP capacity by 2035), this estimate of global capacity additions is not unreasonable. Indeed, by 2030, the IEA 450ppm scenario anticipates 15 GW of CSP just in Europe.

8. It can be demonstrated that the global investment in CSP in the short-term – to cover the incremental costs and subsidies required for projects built today, such as Noor-Ouarzazate II and III – bring a long-run (real) rate of economic return of around seven percent. This is just like a standard economic analysis, in which the costs are the subsidy requirements in the early years, and the benefit stream is the cost advantage in future years (as shown). Table 6.1 summarizes

[56] Other estimates of CSP CAPEX decline are more aggressive: the 2012 IEA World Energy Outlook and the 2013 *Mercados* Study of low carbon energy futures for Morocco assume a long-term CSP CAPEX of US$2,550/kW.

the detailed calculations for three scenarios, based on the assumption that by 2030, 32 GW of CSP would supply either the European market (and therefore includes the cost of HVDC transmission – for example, from Libya to Milan, and Jordan to Ankara) or markets in India, Australia or the USA that would also involve significant HVDC transmission. European gas prices are taken from the 2013 IEA World Energy Outlook. In the pessimistic scenario for instance, CSP capital costs only reach US$3,800/kW by 2030, and carbon prices decline rather than increase.[57]

Table 6.1 - CSP Learning Curve Scenarios

		pessimistic	baseline	optimistic
2030 CSP CAPEX	$/kW	3,800	3,350	3,000
2030 carbon price	$/ton CO_2	40	57	80
gas price	$/mmBTU	10.2	10.2	12.2
CCGT efficiency	[ ]	50.0%	48.0%	48.0%
CSP capacity factor	[ ]	37.5%	40.4%	41.0%
HVDC transmission loss	[ ]	12.0%	11.0%	10.0%
ERR	[ ]	3%	6.9%	11.6%

Source: P.Meier&R.Weisenberg, *Global learning curve benefits of concentrated solar power*, April 2014

9. It is to be noted that the *Noor-Ouarzazate* Solar Complex reaps only a very small share of these benefits for itself, for the Complex pushes CSP only a very small distance toward the global learning curve target of 32 GW. Thus, none of these benefits are applied to the Noor-Ouarzazate II and III economic flows. This analysis simply illustrates what may be the benefits of the global learning curve, and what are the likely returns if the *global international community* should invest in CSP.

10. The evidence that significant CAPEX reductions can be achieved as the cumulative global capacity brings down cost is plausible. Precisely how much of a reduction is possible, and the speed with which it can be achieved, remains uncertain. However, the analysis shows that a global investment in CSP to cover the incremental costs of the early projects (by concessional finance, subsidy support) will bring significant long-term economic benefits (even considering only the direct electricity generation benefits). Even if Noor-Ouarzazate II and III *themselves* do not benefit from the global learning curve, there can be no question that the plants' experience will contribute to the global public good.

11. In summary, the economic analysis shows that investment in the Project is justified, given:

- The contributions of Noor-Ouarzazate II and III to the global learning curve, and macroeconomic benefits, which will be realized provided that CSP investments are made at scale;
- A well-managed tender process that maximizes the chance of further CAPEX reduction if good international companies can be attracted; and

[57] It may be noted that the assumption that CSP displaces gas CCGT in Europe is conservative. If it is coal that is displaced, then the economic returns are slightly *higher*, because even though the cost of coal (as US$/mmBTU) is much lower, the efficiency is also lower, and GHG emissions per mmBTU are more than double that of gas CCGT. Moreover, the avoided local externalities of coal are also greater than gas because in addition to NOx, coal projects have significant particulate and SO_2 emissions.

- Firm government commitment to CSP (and beyond Noor-Ouarzazate II and III) that will encourage manufacturers to invest in the necessary local manufacturing capacity and worker training, so that the chances of realizing the macroeconomic benefits are good.

12. Under these circumstances, the necessary carbon valuations are relatively low, well within the cost thresholds to justify CTF support, and consistent with the valuations of the global social cost of carbon proposed by the international community. This is one of the few opportunities for Morocco to gain a first mover advantage in a technology whose costs can only fall if there is an adequate global investment in providing concessional finance to realize the global learning curve benefits.

13. Moreover, a financial analysis of the impact of Noor-Ouarzazate II and III on the GoM and MASEN indicates that the negative impact of the plants on a "net cash" basis is significantly less than the economic impact. This primarily results from the positive cash flow generated by (i) dividends from Morocco's stake in the SPVs through MASEN,[58] (ii) corporate taxes (30 percent tax rate), and (iii) the debt service margin included in the interest rate that MASEN charges the SPVs for IFI loans (including CTF and IBRD loans) for construction of plants, which is designed to mitigate MASEN's exposure to foreign exchange fluctuations and the variable interest payments to be paid to some IFIs.[59] This positive cash flow is expected to partially mitigate MASEN's anticipated revenue gap created by the difference in the price it pays the SPVs for power from the plants and the price it receives from selling this power on the national grid. As a result, this positive cash flow is expected to significantly reduce the financial impact on the GoM from the support it is expected to provide MASEN during the 25-year term of the power purchasing arrangements with the SPVs.

[58] 25 percent equity stake contemplated via MASEN Capital, a subsidiary of MASEN

[59] For modeling purposes, debt service margins are limited to 10 years after operation start (variable loans are expected to offset the margin afterwards), and any interests on net cash available at MASEN's level are not taken into account

Annex 7. Clean Technology Fund (CTF)

Morocco: Noor-Ouarzazate Concentrated Solar Power Plant Project

Key Indicators	CTF/World Bank Project Noor-Ouarzazate II and III	Scaled-up phase Morocco's Solar Plan by 2020
Installed solar capacity for power generation (MW)	350 MW	2,000 MW
Power generation (GWh per year)	1,156 GWh	6,606 GWh
Avoided CO_{2eq} - tons per year - lifetime (tons/25 years)	521,670 13 million	3.7 million tons per year
Financing leveraged through CTF financing (US$ million)	US$ 2,785 million Breakdown of financing: - US$ 300 million to be provided by IBRD for cost mitigation mechanism; - Debt: US$ 1,988 million (80%), to be provided by AfDB , KfW, EIB, IBRD, and AFD; - Private equity: US$ 497 million (20%), including from NIF.	US$ 9 billion
CTF leverage ratio	1:11.7	1:37.8
Cost effectiveness - CTF cost effectiveness [$\$_{CTF}/tCO_{2eq}$ avoided over lifetime of the project] - Total project cost effectiveness [$\$_{Total\ Project}/tCO_{2eq}$ avoided over lifetime of the project]	US$ 18.3 US$ 155 [60]	US$ 2.57 US$ 97.3 (See footnote [61])
Environmental co-benefits in terms of avoided local pollution (US$ million)	25	n/a
Other co-benefits	- Improved energy security from increased penetration of solar renewable energy in the energy mix: 4.3-5% of current installed capacity. Solar target is 14% in 2020. - Reduced imports of electricity. - Increased employment from development of local industry. - Cost reduction in concentrated solar power technologies. - The regional Technical Assistance program that is being developed in parallel will be used to help support gender equity.	

[60] The calculation of Total Project cost effectiveness considers total EPC cost of US$2,015 million, therefore excludes viability gap financing and contingency.

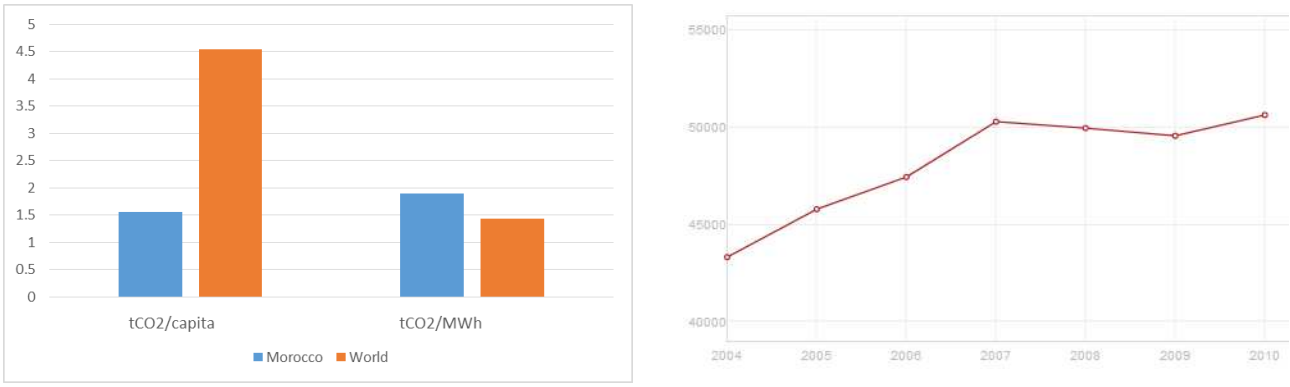
[61] The calculation of CTF and Total Project cost effectiveness assumes 3.7 million tons CO2eq over 25 years.

I. Introduction

Background: country and sector context

1. Morocco is experiencing strong real GDP growth. This raises challenges of long-run energy security and management of the country's increasing GHG emissions (see Figure 1 (b)), given both that Morocco imports nearly all its energy needs (97 percent, excluding non-commercial forms of energy). Power generation in Morocco is dominated by thermal generation (installed capacity in 2012: coal 37 percent; fuel and gasoil 18 percent; and natural gas 19 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 (see Figure A7.1 (a)). Improving energy security and climate change mitigation are therefore two key objectives of the country's energy policy. This should be done without jeopardizing energy access for all citizens and businesses, and at the lowest cost possible.

Figure A7.1 - Morocco: CO_2 Emission Intensity (2011) and Emission Trend (2004-2010)



a) **Morocco CO2 emissions intensity (kt, source WDI)**

b) **Morocco CO2 emissions**

Source: based on IEA statistics (2011)

2. Morocco has physical attributes that make it particularly promising for scale-up of solar technologies with particular focus on concentrated solar power (CSP): abundant sunshine, low humidity and plenty of unused flat land close to road networks and transmission grids. These attributes, together with access to EU electricity markets (at least in the medium-long term) through the existing interconnection with Spain, makes Morocco one of the most suitable places globally to get cost reduction for CSP and accelerate global CSP deployment

Morocco and the CTF MENA CSP Investment Plan

3. The World Bank Group and the AfDB, together with other donors, such as the EIB, AFD, KfW/BMU, and the EC have worked together to accelerate CSP deployment in the region. A significant part of this initiative is the CTF's MENA CSP Investment Plan (MENA CSP IP), which was endorsed in December 2009, updated in November 2010, and revised in May 2013. The MENA CSP IP aims to mobilize nearly US$ 5 billion (including US$660 million from the CTF) to accelerate the deployment of CSP projects in Morocco, Egypt, Tunisia, and Jordan.

4. In addition to US$197 million CTF funding destined to the development of Noor-Ouarzazate I (formerly known as "Ouarzazate"), the MENA CSP IP has earmarked US$ 218 million CTF funding to support the development of Noor-Ouarzazate II and III, to be channeled by the World Bank and the African Development Bank (AfDB). Additional US$ 20 million are requested for Noor-Ouarzazate II and III, as bidders' technical proposals lead to the conclusion that most likely these two new plants will end up installing a capacity 50 MW larger than originally targeted (see table below with 300 MW planned as per the 2013 Investment Plan Update). While Noor-Ouarzazate I received a capital subsidy of US$1230/kW installed, under the last Investment Plan (IP) Update a markedly lower subsidy per kW installed was proposed, namely US$727/kW corresponding to a reduction of the subsidy of 41 percent. With the addition of 50 MW to the plant the subsidy would fall further to US$623/kW installed or by a total of 49 percent.

5. While some decrease in the amount of CTF financing can be justified as the costs of Noor-Ouarzazate I were by about 30 percent lower than expected, it should be noted that even with the currently proposed subsidy, Morocco will bear US$890 million of the incremental costs of the project that remains once all concessional financing has been taken into account. The addition of US$20 million to the overall CTF funding envelope for this project would allow for the subsidy to be slightly increased to US$680/kW corresponding to a reduction in subsidy of 44 percent compared with Noor-Ouarzazate I. These additional CTF funds would come from the endorsed MENA CSP IP.

Table A7.1- MENA CSP CTF Indicative Financing Plan—May 2013 Update (in US$ million)[62]

Country	**Projects / Capacity (MW)**	**CTF Financing (US$ million)**
Morocco	Noor-Ouarzazate I (formerly "Ouarzazate") 160	197
	Noor-Ouarzazate II and III 300	218
Egypt	Kom Ombo 100	123
Tunisia	Akarit 50 (possibility to increase to 100)	62 (US$123 million for 100 MW)
Jordan	IFC Up to 100 MW (including Concentrated PV)	50
Total Projects	550	453
Technical Assistance	NA	10
Total		**660**

[62] An update of the MENA CSP IP will be submitted for consideration of the CTF Trust Fund Committee in June 2014. The update note will reflect the revised amount of US$238 million CTF co-financing required for 350MW solar CSP capacity under the proposed Noor II and III project. This represents an increase in both CTF funding and MW installed as compared with the MENA CSP IP revision of May 2013, which provided a tentative allocation of US$218 million for 300MW total installed capacity.

Project Description

6. Similarly to the Noor-Ouarzazate I first phase process, the World Bank, the AfDB and other IFIs are involved with MASEN in the competitive selection of qualified and financially robust private partners to establish a partnership, which would be responsible for the preparation and implementation of the second phase of the Noor-Ouarzazate CSP complex. This second phase consists of 2 distinct plants: (a) a 150-200 MW parabolic trough CSP plant (Noor-Ouarzazate II) and (b) a 100-150 tower CSP plant (Noor-Ouarzazate III).

7. Under this component, one additional Associated Facility, namely the Ouarzazate – Tazarte 225 kV transmission line, will be financed mainly by the Agence Française du Développement (AFD). This transmission line is necessary for the evacuation of power from the Noor-Ouarzazate II and III plants. Construction of the line will not commence before early 2015. Other associated facilities for the overall site of the Noor-Ouarzazate Solar Complex are listed in the updated Framework Environmental and Social Impact Assessment (FESIA), which was re-disclosed to Infoshop on June 26, 2014. Construction of these associated facilities is either underway or complete.

8. MASEN has already prequalified 4 highly experienced international consortia for the projects. Three of these consortia are bidding for both projects, and one consortium is bidding for only one. MASEN has issued the request for technical proposals in December 2013 in a 2-stage bidding process that is designed to award both projects as a package. This approach is expected to incentivize bidders, particularly those bidding for both projects, to optimize their technical design to ensure that MASEN receives the best possible price from both projects together.

II. Assessment of the Proposed Project with CTF Investment Criteria

Potential for GHG Emission Savings

9. **Emission reduction potential of investment.** Absent any further development of renewable resources, GHG emissions from power generation have been forecasted by the GoM to increase from an estimated 16 million tons per year in 2007 to an estimated 36 million tons by 2020 – an increase of 20 million tons. Using the underlying fuel savings estimated by ONEE and the typical CO_2 emission rates of the different types of power plants[63], the CO_2 saving for the Project are estimated at 522,000 tons per year. This estimate is based on 350MW of solar CSP installed capacity with 37.7 percent capacity factor (including storage) producing 1,156 GWh solar power on an annual basis. As stated in the Economic Analysis, Noor-Ouarzazate II and III are indeed not part of ONEE's least cost plan, and must be forced into the solution. Figure A6.1 and table A6.3 of shows the generation that is displaced when Noor-Ouarzazate II and III are forced in. In the first few years significant amounts of fuel oil are displaced, but subsequently LNG-CCGT accounts for most of the displaced energy – consistent with the announced MASEN strategy of contributing to the evening peak load where CCGTs would normally operate. In other words, Noor-Ouarzazate II&III replaces mainly natural gas, leading to a weighted average

[63] 987 kg/MWh for coal, 592 kg/MWh for oil and 406 kg/MWh for gas (combined cycle)

emission factor of 452 kg CO2/MWh. Over the 25 year-lifetime of a CSP plant, the cumulative emissions reduction of CO_2 is estimated at 13.04 million for Noor-Ouarzazate II and III.

10. **CSP Technology Development Status.** The proposed project includes the construction of two large-scale CSP plants: a parabolic trough plant (Noor-Ouarzazate II) and a solar tower power plant (Noor-Ouarzazate III). With regard to Noor-Ouarzazate II, the parabolic trough choice is considered a proven and fully commercial technology for energy production, and the project presents no unusual construction or operational challenges for a power plant of that size. Parabolic trough is the CSP technology with the most commercial operating experience. At the end of 2013, around 3400 MW of installed CSP capacity used the parabolic trough technology and accounted for most of todays installed CSP capacity. Noor-Ouarzazate II's Minimum Functional Specifications (MFS) have been prepared by MASEN with the assistance of highly qualified consultants, incorporating international best practices and the lessons learned from Noor-Ouarzazate I procurement process. The technical specifications have also been reviewed and commented by the donors' technical experts in order to ensure that all relevant construction and operational risks are adequately addressed.

11. The solar tower technology selected for Noor-Ouarzazate III is in its first commercial stages. Solar tower has also higher capital costs than parabolic trough, and the operational experience is much more limited due to the reduced number of projects under construction and operation. The total capacity in operation has recently increased to almost 500 MW with the commissioning of Ivanpah by Brightsource in California. Ivanpah, together with the Crescent Dunes in Nevada (currently under commissioning) show that it is possible to build and operate large-large scale solar towers using different technologies (molten salt or direct steam as working fluid). However, the construction and commissioning of both projects have taken longer than initially planned. There is a higher risk of delay in the commissioning of a solar tower when compared to parabolic trough, due to the scaling-up challenges and the continuous technical improvements and cost optimizations that are being incorporated in the newer plants. The team acknowledges this risk and will closely follow the performance of the mentioned solar towers and monitor the procurement and construction of Noor-Ouarzazate III in order to minimize potential delays.

Cost-effectiveness

12. The cost effectiveness is 18.4 US$/$tCO_2$ for CTF funding and 155 US$/tCO2 considering total funding for the project.

Marginal abatement cost

13. **Marginal abatement cost.** In October 2013, the CTF Trust Fund Committee suggested providing information on the estimated marginal abatement cost (MAC) for projects for which the marginal abatement cost is likely to exceed US$100 per ton of CO2eq. This decision draws from the CTF criteria which specifies that CTF co-financing will not be available for investments in which the marginal cost of reducing a ton of CO2eq exceeds US$200, which reflects the lower-end estimate of the incentive needed to achieve the objectives of the BLUE Map Scenario as indicated in the *International Energy Agency's Energy Technology Perspectives 2008 Report*.

14. Preliminary calculations confirm that the MAC for the project will not exceed the aforementioned US$200 threshold value per ton of CO2eq. These computations overestimate the MAC as the Net Present Value (NPV) is computed without accounting for local co-benefits (jobs creation, reduced local pollution etc.) and knowledge spillovers. Moreover, the project is part of a wider strategy of Morocco to build large scale CSP, which is expected to reduce emissions at a lower MAC than each of its projects evaluated separately.

15. The marginal abatement cost is computed as the project's NPV divided by lifetime CO2eq (LCO2) avoided emissions:

$$MAC = \frac{NPV}{LCO2},$$

where NPV stands for Net Present Value and LCO2 stands for Lifetime CO_2eq emissions.

16. The MAC is between US$23 and US$78 per ton of CO2eq, depending on the discount rate used. For the 5 percent discount rate that reflects Morocco's opportunity cost of capital, which is the base case for the economic analysis, the MAC is US$57 per ton CO2eq. Even at the ONEE discount rate of 10 percent, the MAC is US$78 per ton CO2eq.

Table A7.2: Marginal Abatement Costs (MAC) using different discount rates

			Stern Report	Govt. Opportunity Cost	ONEE
	Discount rate		1.4%	5%	10%
1	Lifetime avoided GHG emissions	mtCO2eq	12.8	12.8	12.8
2	NPV	US$ m	-293	-733	-1005
3	Marginal Abatement Cost	US$/ton CO2eq	23	57	78

Source from Economic and Financial Analysis

17. **Expected Cost Reduction of Solar Technologies.** CSP is considered to be a proven technology that is at the point of exiting the early stage of its cost reduction curve. Cost reductions are expected due to: (i) technical improvements, as lessons are learned from installed plants and parallel R&D efforts identify performance improvements; (ii) increasingly larger-scale installed plant size, that allows for more efficient and more cost effective components to be used; and (iii) volume production that allows fixed costs of investments in production efficiency to be spread over larger production runs.

18. Learning cost curve effects are commonly measured using the "Progress Ratio," which is defined as the rate at which costs decline for every doubling of cumulative installation. As shown in the following table there is a median Progress Ratio (PR) value of approximately 0.82 for Wind and PV. The projections for CSP have been more conservative compared to the historical evidence from other industries (see table A7.3).

19. It is apparent that the CSP industry behavior since the restart of 2006 has not stabilized well enough to show a clear conclusion for only 8 years of experience. Furthermore, the existence of different technologies (Parabolic trough, Central receiver and Fresnel) with or without storage makes it still more difficult to have a consistent data base for creating one learning curve for all CSP technologies.

Table A7.3: Median Progress Ratio (PR) value for Wind, PV and CSP and Cost Reduction per Doubling of Capacity

Source	Progress ratio	Cost Reduction per doubling
Related industry precedents		
Sargent and Lundy (2003) quoting PV	0.82	18.0%
Sargent and Lundy (2003) quoting wind 1980 - 1995	0.82	18.0%
GEF (2005) quoting PV to 2000	0.8	20.0%
Hinkley et al (2011) quoting Hayward etal on PV	0.8	20.0%
Hinkley et al (2011) quoting Hayward etal on wind	0.85	15.0%
GEF (2005) quoting IEA, median over range of industries	0.82	18.0%
CSP near term projections		
Sargent and Lundy (2003) Low	0.85	15.0%
Sargent and Lundy (2003) High	0.96	4.0%
Richter et al (2009) current estimate for CSP	0.9	10.0%
GEF (2005) quoting 1999Enermodal study for CSP low	0.85	15.0%
GEF (2005) quoting 1999Enermodal study for CSP high	0.92	8.0%
GEF (2005) quoting DLR 2004 Athene study for CSP - solar field 0.9, storage 0.88, power cycle 0.94 gives overall	0.9	10.0%
IEA (2010A) roadmap for CSP	0.9	10.0%
Hinkley et al (2011) analysing CSP to date	0.85	15.0%

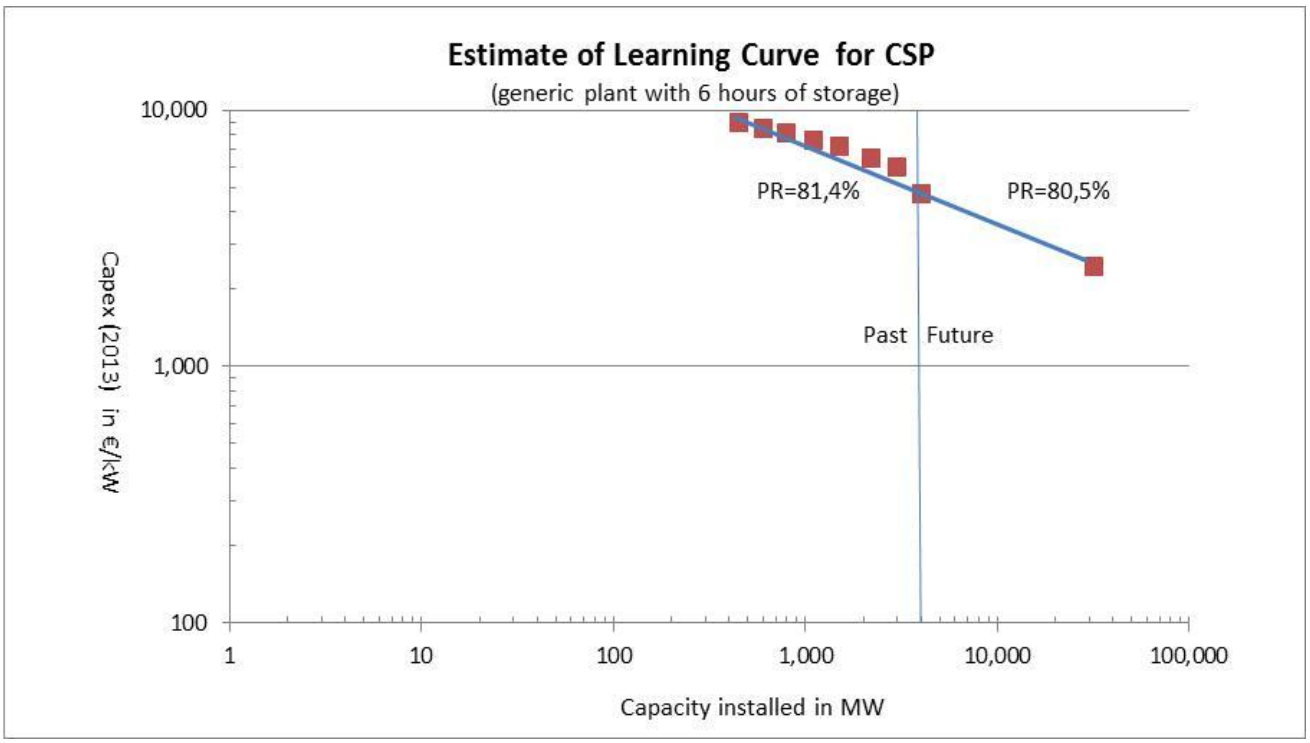
Source: IT Power, Realizing the Potential for Concentrating Solar Power in Australia, Australia, May 2012.

20. On the other hand, the changes in the Spanish regulation over the last two years have had a direct impact in the cost learning curves for CSP. Before the year 2012, the old feed-in tariff structure in Spain dis incentivized any cost reduction and held the cost of CSP plants at a very high level over several years. Today, the prevailing tender process for CSP projects, more competition and the existences of a global market for CSP offer more incentives for cost reductions and innovation. For this reason, a two-phase learning curve approach for CSP has

been used: phase from 2006-2013 with PR = 81.4 percent; and phase from 2014 on with PR = 80.5 percent. The progress ratio (PR) is a parameter that expresses the rate at which costs decline for every doubling of cumulative installation. For example, a progress ratio of 80 percent equals a learning rate (LR) of 20 percent and thus a 20 percent cost decrease for each doubling of the cumulative capacity. Both terms are used in the literature.

21. The learning cost curve estimate above would indicate that the Noor-Ouarzazate Complex can be expected to reduce the global cost curve for CSP by 3 percent, while the 2000 MW Morocco Solar Plan, if it relied solely on CSP, would be capable of reducing global CSP costs by 13 percent.

Figure A7.2 - Learning Cost Curve for a generic plant with 6 hours of storage



Source: Wiesenberg (2014).

Demonstration Potential at Scale

22. *Scope of avoided GHG emissions through replication.* The country program calls for the installation of 2,000 MW of solar installed capacity by 2020. This would lead to an important increase of emission reductions. If the numbers were extrapolated for the capacity additions, the potential of GHG emission savings for the government's target would reach over 3 million tons of CO_2 emission reductions per year in 2020. The proposed Project is expected to help bring down the global costs of CSP technology by increasing demand for related equipment and creating manufacturing economies of scale and learning effects from replication

23. *Transformation potential.* The proposed project has high transformational potential at the country, regional and even global level:

- *At the country level,* the project will help in building, after Noor-Ouarzazate I, a sound foundation for a successful implementation of the solar plan and installation of 2,000 MW of solar generation capacity by 2020: (a) a successful completion of the transactions under Noor-Ouarzazate I has established MASEN as a solid partner to private developers interested in CSP/solar development - this transformation is essential as the program requires funds well beyond the public sector financing capability and the country's capacity to raise debt; (b) the experience of Noor-Ouarzazate I has built MASEN's capability (learning by doing) to prepare, manage and implement complex projects and competitively select strong private partners to achieve its ambitious solar development target; (c) the contractual arrangements developed during the selection of the partner for Noor-Ouarzazate I has set the standards for future transactions as they have adequately addressed possible conflicts of interest by adequately ring fencing the different functions entrusted by the government to MASEN; (d) successful construction of Noor-Ouarzazate I, II and III will build the foundation for achieving the government target, provide confidence to manufacturers and developers in the country's solar market leading to more investments locally and cost reduction.

- *At the regional level,* the Noor-Ouarzazate complex project is the most ambitious solar project and more importantly the only one involving private sector to date. Its success will provide other countries in the region with confidence to consider partnership as a reliable mean to raise the sizeable funds required for the development of CSP at the regional level. The financial close of the partnership has reinforced interest of international developers in the development of local capacity in manufacturing and support services triggered by the MENA CSP IP. Furthermore, Morocco's ambitious solar program has been followed by the disclosure of ambitious development targets in many countries of the region.

- *At the global level,* Noor-Ouarzazate is one of the largest CSP projects announced to date. It is particularly important because it attracted the developers' attention to the solar potential in the MENA region. The successful completion of the transactions under Noor-Ouarzazate I project have shown that mitigation of institutional and market risks are possible through adequate contractual arrangements, even in developing countries. Noor-Ouarzazate II and III will contribute to achieving the target envisaged under the MENA CSP IP, and to localizing manufacturing capacity in the region to reduce cost and contribute to local value creation.

24. In order to enhance and complement the transformational impact that the project helps to bring about in its own right, a technical assistance program is being made available in parallel, which is targeting the improvement of local manufacturing capabilities in MENA, including Morocco, and the improvement of the administrative and legal framework in MENA to help put in place CSP projects.

Development Impact

25. **Improved reliability.** 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. CSP is a technology that is of particular interest to utilities as it is more predictable than most renewable energy options and is closest to economically viable energy storage, and therefore easy to integrate into conventional electricity systems.

26. **Improved 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. While Noor-Ouarzazate production will initially be for local consumption, a growing share of the electricity produced under Morocco's Solar Plan will be exported to Europe over the medium term. In the longer-term, this share is expected to peak, and to decline when the CSP costs go down, therefore making the technology more affordable to serve local markets.

27. **Development of local industry.** Scale-up of solar development will support industrial infrastructure and strengthen the foundation for sustainable development. The Government also intends to promote local manufacturing to increase local content of the solar program. The development of the solar sub-sector in Morocco would further strengthen the country's role as a leader in renewable energy development in the region. In this context, the Ministry of Energy and the Ministry of Industry are jointly developing an integrated "Offre Industrielle" for green energy development, which essentially consists of incentives and specialized training aimed at attracting local and foreign investments in the renewable sector.

28. The development of this project through a partnership is also a clear commitment of the government to involving the private sector in the solar program. This will provide confidence not only to foreign investors but also to Moroccan private companies to increase their involvement and invest in goods and services to contribute to increased local industrial integration and job creation.

29. To support the MENA CSP IP and assess derived economic benefits, a study commissioned by the World Bank (Fraunhofer Institute, 2014) analyzed the potential or local manufacturing of CSP components across the five countries of the MENA CSP IP, namely Algeria, Egypt, Jordan, Morocco and Tunisia, and evaluated the potential economic benefits in particular with respect to the labor and the foreign trade impact. Below are the results for Morocco:

- ***Average share of local manufacturing in the CSP value chain:*** Assuming 1,000 MW CSP capacity installed by 2020 and 2,300 MW in 2025, the total potential of local content of CSP plants will increase constantly and could reach 45 percent in 2020 and up to 52 percent in 2025.
- ***The economic impact on GDP:*** Beyond electricity production, the economic impact of CSP development in Morocco is a function of local content and size of installed CSP capacity. If 2.3 GW of CSP is installed until 2025, then the economic benefit would be 5,2 bn US$. Almost 3 bn US$ comes from the construction and operation of power plants

whereas more than 2 bn US$ comes from the component manufacturing in the supply chain.

- ***Labor impact:*** Over the period 2010-20***,*** the cumulated total jobs of full-time equivalent for construction, manufacturing and O&M of CSP plants for 1 GW will reach over 24,000. In the long-term, between 26,000 and 73,000 FTE jobs can be created cumulatively in Morocco. In 2020, between 2000 and 5000 people would be working in the CSP industry and in 2025, between 2000 and 10000 people could potentially be employed.
- ***Foreign trade impact:*** Additional impacts on job creation and growth of GDP could come from export of CSP components.

30. **Environmental Benefits.** With respect to environmental benefits, the generated power in Noor-Ouarzazate II and III is expected to replace mainly natural gas generation in CCGTs, except for the first few years when there is also some displacement of coal and fuel oil The local environmental benefits are estimated in US$ 25 Million (when discounted at the Government opportunity cost of capital, 5 percent).

31. These estimates of avoided local externalities associated with fossil fuel combustion are subject to some uncertainty because there are no Morocco-specific health damage studies available, and therefore they are based on the average values from two studies (i) using the benefit transfer method, extrapolating values from the EU studies to Morocco by adjusting for per capita partnership GDP, and (ii) based on the (lower) damage cost estimates in the Six Cities study. The average damage cost is taken as 539$/ton NOx (which is escalated at the assumed rate of per capita GDP growth), resulting in a levelized damage cost of 0.19 USc/kWh.

32. **Gender.** Among the PDO level results indicators, the direct project beneficiaries (number) will be measured, and particularly the percentage which are female. This a core sector indicator. To that effect, it will be assumed that electricity customers are actually households whose gender makeup is similar to the national average of males to females in the population. So, the national average of males to females should be indicative of the gender breakdown of project beneficiaries. The MENA CSP Technical Assistance program that is being presented to the CTF in parallel will include gender-specific interventions.

Implementation Potential

33. **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 company for energy efficiency and renewable energy development, and set up an institution specifically dedicated to implementing the Solar Plan. The implementation of the solar program was entrusted to the Moroccan Agency for Solar Energy (MASEN or the "Company"), a fully state-owned limited liability company created on 26 March, 2010 to develop at least 2,000 MW of solar power capacity by 2020. MASEN is governed by a Board of Directors (the Directoire) and an oversight council (the Conseil de Surveillance).

34. The commitment of Morocco to a low carbon growth is evidenced by its high level participation in the recent Conferences of Parties (COPs) to the United Nations Framework Convention on Climate Change (UNFCCC) and in line with the Cancun and Durban COPs, with an explicit commitment to climate change mitigation. In preparation for the COP meetings, the Government of Morocco (GoM) released a National Action Plan against Global Warming, which lists adaptation and mitigation measures either already implemented or under consideration across a range of sectors.

35. To achieve these objectives, the key elements of Morocco's energy strategy are: (a) diversification and optimization of the energy mix using reliable and competitive energy technologies, in order to reduce the share of oil to 40 percent in primary energy consumption by 2030; (b) development of the national renewable energy potential by increasing the RE power generation capacity to 42 percent of installed capacity by 2020; (c) improvements in energy efficiency to induce energy savings of 15 percent from the "business as usual' scenario by 2020 and 25 percent by 2030; (d) development of indigenous energy resources by intensifying hydrocarbon exploration activities and developing conventional and non-conventional oil sources; and (e) integration into the regional energy market, through enhanced cooperation and trade with Maghreb and EU countries.

36. Morocco's Solar Plan, launched in November 2009, is the cornerstone of the country's renewable energy and climate change mitigation strategy. This US$ 9 billion plan calls for the commissioning of five solar power generation plants by 2020 for a total capacity of 2,000 MW, starting with the ambitious Noor-Ouarzazate complex project structured as a public-private partnership (partnership). In addition to fostering low-carbon development of the energy sector and enhancing energy security, the implementation of this plan will stimulate large investments and enhance Morocco's competitiveness. This is an integrated plan in the sense that it calls for local manufacturing, as well as related training, education and research activities, therefore boosting economic growth and contributing to job creation.

37. 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 ONEE

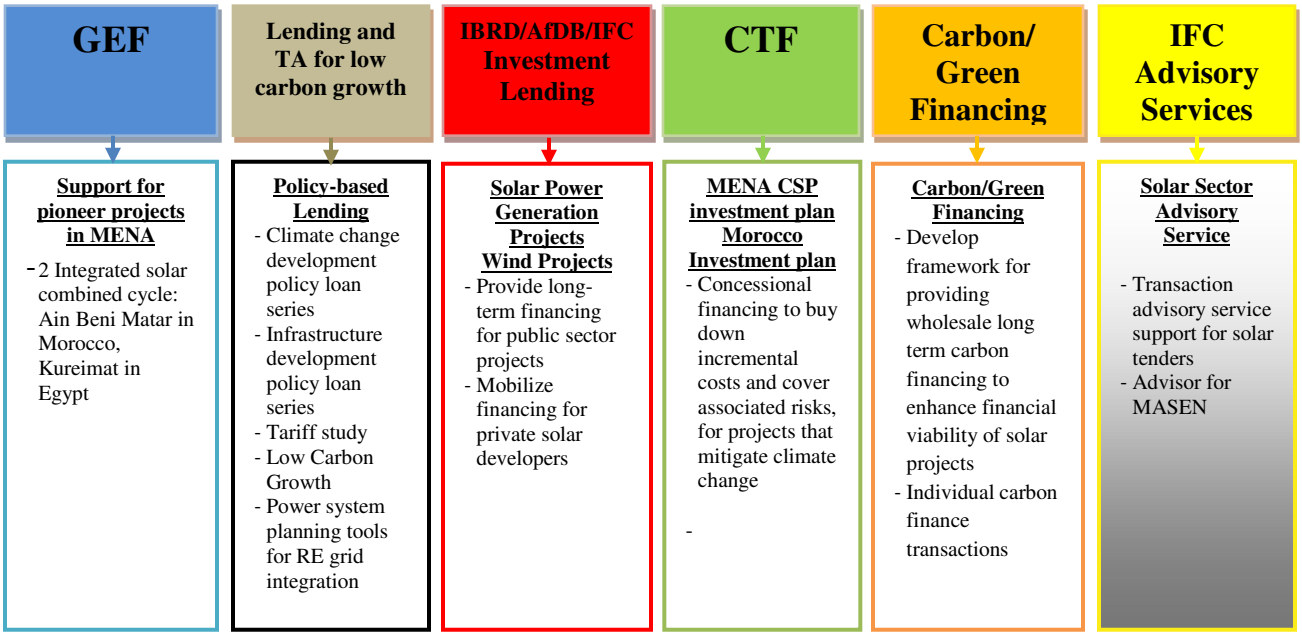
38. The Government is also undertaking extensive efforts to implement cost-reflective energy pricing and is launching energy conservation programs that will ease the transition to cost-reflective pricing by keeping consumer electricity expenditures steady.

39. **Sustainability of Transformation.** In addition, the World Bank and the African Development Bank are engaged with the Government to enhance the overall sector policy framework and advance reforms aimed at improving the sector's commercial environment and financial sustainability.

40. **Leverage of domestic public and private sector resources, carbon finance, GEF, bilateral and multilateral co-financing**. As illustrated below, the World Bank and the AfDB

are leveraging a set of actions aimed at building capacity within Morocco and providing the adequate incentives for policy reforms enabling a higher penetration for renewable energy.

Figure A7.3: Utilizing different instruments to make a transformational impact



41. IFI and Donor Coordination: Given the importance of solar energy in Morocco's development agenda and its significance to mitigating climate change, a number of IFIs and donors are assisting the GoM implement its national solar plan. There is already considerable coordination as well as collaboration of these efforts. This is exemplified by the various sources of financing announced for Noor-Ouarzazate II & III.

42. **Leverage:** The CTF is leveraging an additional US$1374 million from KfW, IBRD, EIB, AfDB, NIF and AFD. The financial leverage ratio is 1 to 11.7

CTF Additionality

43. The CTF and AfDB/World Bank loans are critical to enhancing the financial viability of the project. In the absence of the CTF funds, the resulting cost increase due to the higher generation cost of CSP compared to coal (with the future of electricity exports still uncertain for Noor-Ouarzazate II and III) would place pressure on fiscal subsidies or burden electricity consumers in the unlikely case where additional costs could be passed on to consumers. Furthermore, the CTF funds will also enable MASEN to take greater calculated risks and look to achieving breakthroughs, where boundaries are being pushed in terms of development that go beyond what many private companies would be willing to undertake.

44. The direct impact of CTF is expected to be important and it is expected to weight around 10-15 percent of the total concessional debt. If the CTF debt were to be on commercial terms (7 percent), the repackaged IFI rate would have increased twofold from 1 percent to 2.6 percent.

Implementation Readiness

45. MASEN has already prequalified 4 highly experienced international consortia for the projects. Three of these consortia are bidding for both projects, and one consortium is bidding for only 1.

46. MASEN has issued the request for technical proposals in December 2013 in a 2-stage bidding process that is designed to award both projects as a package financial closure is expected to occur in April 2015. Plant construction would then begin in and the plant would be commissioned in the second half of 2017.