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Ministry of Mines and Energy (MME) – Executing Agency

FINAL EVALUATION

CONCENTRATING SOLAR POWER TECHNOLOGY TRANSFER FOR ELECTRICITY GENERATION IN NAMIBIA (CSP-TT NAM)

(GEF Project ID: 4163 – UNDP PIMS ID 4334)

NAMIBIA
GEF Climate Change Mitigation; CC-4 (Climate change mitigation); SP3 (Promote low-GHG energy technologies, through the increased production of renewable energy in electricity grids)

Evaluation timeframe: August 2013-June 2017

Final version

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Mr. Johannes (Jan) Van den Akker
International consultant

Disclaimer

Please note that the analysis and recommendations of this report do not necessarily reflect the views of the United Nations Development Programme, its Executive Board or the United Nations Member States. This publication reflects the views of its authors.

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ABBREVIATIONS AND ACRONYMS

AfDB	African Development Plan
AWP	Annual Work Plan
CAPEX	capital expenditures
CEO	Chief Executive Officer
CO	Country Office
CO_2	carbon dioxide
CR	central receiver (tower)
CSH	concentrating solar heat
CSP	concentrating solar power
CSP-TT NAM	Concentrating Solar Power Technology Transfer for Electricity Generation in Namibia
CST	concentrating solar technology
CSTTB	Concentrating Solar Technology Transfer Body
DANIDA	Danish Development Assistance
DBN	Development Bank of Namibia
DBSA	Development Bank of Southern Africa
DNI	direct normal irradiance
EA	GEF Executing Agency (UNDP Implementing Partner)
ECB	Electricity Control Board
EIA	environmental impact assessment
EIF	Environmental Investment Fund
EPC	engineering, procurement and construction
FFS	full feasibility study
GDP	gross domestic product
GEF	Global Environment Facility
GHG	greenhouse gas
GIZ	Gesellschafft für International Zusammenarbeit
GCF	Green Climate Fund
GM(S)	Ground measurement (station)
GNI	global horizontal irradiance
IA	GEF Implementing Agency
IPP	independent power producer
IUM	International University of Management
IRENA	International Renewable Energy Agency
kWh	kilowatt-hour
GWh	gigawatt-hour
LCOE	levelised cost of energy
M&E	monitoring and evaluation
MCDM	multi-criteria decision making
MME	Ministry of Mines and Energy
MOU	Memorandum of Understanding
MRT	Mid-Term Review
MW	megawatt (= 1 million Watt)
NAD	Namibian dollar
NIRP	National Integrated Resource Plan
NEI	Namibia Energy Institute
NERF	New Energy Regulatory Framework
NREL	National Renewable Energy Laboratory
NUST	Namibia University of Science and Technology
OPEX	operational expenditures
PIR	Project Implementation Review
PMU	Project Management Unit
PSC	Project Steering Committee

PT	parabolic trough
R&D	research and development
RE	renewable energy
PPA	power purchase agreement
PV	photovoltaic
REEEI	Renewable Energy and Energy Efficiency Institute
REIAoN	Renewable Energy Industry Association of Namibia
RED	Regional energy distributor
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme (South Africa)
REFIT	Renewable Energy Feed-in Tariff
SAPP	Southern African Power Pool
SE4All	Sustainable Energy for All
SPE (or SPV)	special purpose entity (or vehicle)
tCO_2	ton of carbon dioxide
TE	Terminal Evaluation
TES	thermal energy storage
TOC	Theory of change
TTT	Technical Task Team
UNAM	University of Zambia
UNDP	United Nations Development Programme
UNPAF	United Nations Partnership Assistance Framework
USD	United States dollar
VTC	vocational training centre
WEC	World Energy Council

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EXECUTIVE SUMMARY

Concentrating solar power (CSP) is a power generation technology that uses mirrors to concentrate the sun's rays (i.e. solar heat). Given the relatively high cost of power production with CSP, applications are currently limited to areas that provide the best solar radiation and investment framework. Namibia has one of the best solar regimes in the world. With appropriate financial and regulatory frameworks and investment in research, development, and demonstration, CSP could play a future role in Namibia's power supply.

The project *Concentrating Solar Power Technology for Electricity Generation in Namibia*, hereafter referred to as "**CSP-TT NAM**", was formulated during 2010-12 by the United Nations Development Programme (UNDP) and the Namibian Ministry of Mines and Energy (MME) and submitted to the Global Environment Facility (GEF) for co-financing and that received a grant of USD 2.588 million from GEF in 2012.

Box 1 Project summary table

Project Title:	Concentrating Solar Power Technology Transfer for Electricity Generation in Namibia (CSP TT NAM) Project			
GEF Project ID:	PIMS 4334	Project financing	at endorsement (USD million)	at completion (USD million)
UNDP ATLAS Project ID:	00072612	*GEF financing:*	*1,718,000*	*1,718,000*
Country:	Namibia	IA/EA own:	80,000	80,000
Region:	Southern Africa	Government:	340,000	340,000
Focal Area:	Climate Change Mitigation	Other (Private sector, UNDP, Bilateral Aid Agencies):	450,000	450,000
GEF Focal Area Objectives, Strategic Program/OP:	Promote low-GHG energy technologies, through the increased production of renewable energy in electricity grids.	*Total co-financing:*	*870,000*	*870,000*
Executing Agency:	Ministry of Mines and Energy (MME)	Total Project Cost (in cash):	2,588,000	2,588,000
Other Partners involved:	Namibia Energy Institute (NEI) NamPower, Electricity Control Board (ECB)	ProDoc Signature (date project began):		August 2013
			Planned closing date: August 2016	Revised closing date: June 2017

Project implementation started, with some delays in 2014 and ended in June 2017. In accordance with the UNDP and GEF Monitoring and Evaluation (M&E) policies and procedures, a **Terminal Evaluation** (TE) needs to be undertaken of the project. The **objective of the evaluation** is "to assess the achievement of project results, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming". This report summarises the findings of the Terminal Evaluation by the independent consultant, J. Van den Akker, who conducted a mission conducted during 30 June – 10 July 2017.

Project description and implementation

The CSP-TT NAM project design was approved with the **objective** "to increase the share of renewable energies in the Namibian energy mix by developing the necessary technological framework and conditions for the successful transfer and deployment of CSP technology for on-grid power generation" and encompasses three **components**:

1) CSP investment partnerships in Namibia,

2) Policy frameworks for CSP initiatives in Namibia,
3) Facilitation of the first CSP plant.

Important overall targets in the CSP-TT NAM logical framework (results framework) were described in the project document (ProDoc) by the following **indicators**:

- Cumulative direct post-project CO2 emission reduction resulting from the investment in CSP by end-of-project (5.83 million tCO_2); which relates to the
- No. of CSP investments facilitated (one CSP plant) and installed power generation capacity from CSP (plant of 50 MW size);
- Number of planned, approved and financed CSP projects that replicate the first CSP investments (two); which relates to the
- Percentage share of CSP in the power generation mix of Namibia (10%);
- Number of sites where investment grade solar resource data is available (five);
- Number of government-endorsed CSP partnerships established (two);
- Number of local CSP engineering design firms with CSP design experience established and operational (seven); and Number of local CSP-related manufacturing, supply, and installation companies (10).

Unfortunately, the **log-frame design and formulation** have been flawed in many ways; a view confirmed in the Mid-Term Review (MRT) and annual Project Implementation Review (PIR)s:

- Many progress indicators are overly ambitious and optimistic,
- The type and definition of the indicators themselves are not sufficient to adequately describe project progress, do not reflect the different levels and stages in the typical CSP project development, and are sometimes defined in ambiguous ways,
- The log-frame mixes up outcomes with outputs and often puts these in the wrong Component.

More fundamentally, the whole concept of CSP promotion and development changed between 2010, when the idea was conceived, and 2015, when project implementation really started seriously. The original design started as a capacity building and technology transfer programme aimed at setting up small-sized demonstration-type of CSP facilities of around 5 MW to be replicated as IPP projects, led by local industry and investors (and that maybe in future could be scaled up to more commercially sized CSP plants). However, the market has been developing the other way around. The first CSP plant will be a large facility (135 MW) set up by the utility, NamPower, with global CSP players. Only when in operation, can the technical and commercial feasibility be demonstrated (post-project) and, as global cost of CSP energy production has a tendency to go down, this will then invite smaller local players to join the market as IPPs (provided an appropriate IPP framework is functioning). Thus, the concept has changed, in terms of targets of investments in CSP (from 5 to 50 to 135 MW, of the stakeholders involved (global vs local players) and of the role of local institutions. UNDP has only half-heartedly amended the results framework according to the facts on the ground, resulting in the flaws in the project log-frame as mentioned above. The quality of the results framework has been such that it has been of little use as a monitoring and evaluation tool making tracking progress difficult against the originally formulated baseline description. The Evaluator considers this as 'worst practice' and this is reflected in the M&E rating as 'unsatisfactory'.

Implementation started in only in 2014, that is with an almost 1-year delay, but with little progress in the first year. However, by 2015, the 'political climate' had changed and MME and NamPower had evolved from an ambivalent CSP stance to one that has been fully supportive. In energy policy utility-scale CSP has been selected as an option determined to reduce the country's dependency on electricity imports (which had been hampered by shortages in South Africa' power production and import price hikes). The project partners (UNDP, MME) did capture this change by changing the implementation arrangements in 2015, with the Namibia Energy Institute of the Namibia University of Science and technology) taking some management tasks and the lead in capacity building and capturing knowledge and in technology transfer activities and NamPower taking the lead in the feasibility activities of the first CSP, including measurements at the three sites pre-selected for their CSP potential. Since then, a 'fast-track' work plan has given some good results in the two-year period. The intervention of project partners to intervene positively in 2015 in the project and get results, despite of the design flaws and slow implementation start, can be considered a 'best practice'.

Project results

The results in terms of **outcomes and outputs** can be summarised as follows:

Knowledge transfer, skills enhancement, and information dissemination

- The project has supported the design of CSP modules in the renewable energy curriculum at the University of Namibia (UNAM) and the design of CSP modules in short specialized technical CSP training to be used by vocational and academic institutions. A CSP Professional Technical Training Manual was prepared;
- More than 60 potential local manufacturers, engineers, and consultants were trained on CSP development; and more than 50 potential entrepreneurs were trained on CSP market opportunities;
- Training was provided to NEI on ground measurement processes, maintenance, data analysis and reporting. Equipment was purchased in 2015 and installed at three sites (Auas, Kokerboom and Arandis) and measurements of solar (and other meteorological) data have been carried out (by CSP Services, with local contractor Hungileni) since 2015 for a 3-year period;
- The solar radiation data (GNI, DNI) were analysed by CSP Services and Solargis. Based on the solar data analysis, two reports were written (by Afromach); one report on the CSP power potential in Namibia and the other on socioeconomic impacts. The investment-grade data provide the basis for the construction of a good solar radiation map for the whole of Namibia;
- The status of NEI to function as CSP technology transfer and coordination body remains vague. An assessment report was made on NEI's capacity, but it is not clear how recommendations were implemented or how NEI would coordinate with possible clients, NamPower and local industry, on the need for services for CSP-related support and information dissemination services. For example, there is not a dedicated website on CSP, but information and important documents are spread over NEI's and NamPower's web pages, and it is not clear how, after the project's end, information and knowledge will be captured and disseminated to the public at large and by whom.

Governance capacity on RE and CSP

- Starting from a position of the Government of disinterest in CSP technology, and wait-and-see opposition from the state utility, NamPower, the Project has been instrumental in placing CSP at the forefront of the Government's power planning strategy and the utility's support for CSP-based power generation;
- Over 50 parliamentarians, policy-makers, and decision makers were made aware on CSP and capacitated on RE legislation and policy formulation;
- Key policy and planning documents have been updated, a process in which the Project has had an advisory role and has provided valuable inputs, namely the 1) National Energy Policy, 2) National Renewable Energy Policy, 3) the National Policy for IPP, and 4) National Integrated Resource Plan (NIRP). The first two documents were officially endorsed by the Cabinet in July 2017, the NIRP in May 2017, while the IPP Policy is approved by MME, but still awaiting Cabinet endorsement.

Facilitation of the first utility-scale CSP in Namibia

- A first phase of the full feasibility study for the Arandis CSP has been completed with the techno-economic study (by MottMcDonald, 2016), the NamPower-commissioned macroeconomic impact study (NamPower, Jan17) and the amended environmental and socioeconomic impact report (Aurecom, 2016);
- No final decision on technology has been made but based on the before-mentioned study, there is a tendency towards having a 135 MW CSP based on molten-salt tower technology with parabolic through as a second option. The solar resource is estimated to be between 2900 to 3000 kWh/m2/year. The exact storage size of this plant is envisaged to have a capacity between of 9-12 hours and will be capable of reliably generating base and peak load power. The capital expenditure (EPC cost) will be about USD 765-940 million.

With operating expenditures of about USD 8.1-8.8 million per year, the levelised cost of energy will be about USD 0.15-0.17/kWh, however, depending on the final cost of finance this could increase to USD 0.20/kWh.

- NamPower has to take a decision, and with Government approval, to go ahead with the second phase of the full feasibility (final concept, business, and financial planning) to reach the stage of engineering design, procurement, and construction (EPC), a process that could take 2-3 years or more.

Global environmental and other impacts

- The expected cumulative emission reduction of a 135 MW CSP plant at Arandis will be 10.97 million tCO_2, based on the plant's annual energy production of 746 GWh annually (a probability factor of 75% has been applied to account for the fact that with the full feasibility only half-way, no full assurance can be given that the plant will be built);
- In view of the priority given to CSP in the NIRP (which mentions the construction of up to 250 MW of CSP capacity), there is the possibility of replication at the next-best site at Kokerboom. Indirect emission reduction is estimated at 8.34-13.9 million tCO_2.
- The CSP plants will have positive social, economic and environmental impacts, including local job creation and opportunities for companies to provide local content.

Summary of conclusions, recommendations and lessons learnt

Namibia is a vast country blessed with a solar resource which is unparalleled to many other sunny places in the world. With thermal storage include, a CSP plant can operate outside of daylight hours supporting a peak, or base-load demand profile, and thus provide a clean and renewable solution for flexible and dispatchable power.

While the construction of such a large CSP plant will not occur until a couple of years after the CSP-TT NAM project's end, one can say that project has played an important role in laying the foundations for CSP in Namibia, by supporting assessments that demonstrate the technical and economic feasibility of 100-150 MW facilities in

Box 2 Summary of ratings

1. Monitoring and Evaluation	*rating*	2. IA& EA Execution	*rating*
M&E design at entry	U	Quality of UNDP Implementation	S
M&E Plan Implementation	MU	Quality of Execution - Executing Agency	S
Overall quality of M&E	*U*	*Overall quality of Implementation / Execution:*	*S*
3. Assessment of Outcomes	**rating**	**4. Sustainability**	**rating**
Relevance	R	Financial resources:	L
Effectiveness	MS	Socio-political:	L
Efficiency	S	Institutional framework and governance:	ML
Overall Project Outcome Rating	S	Environmental:	L
		Overall likelihood of sustainability:	*L*

Ratings for Outcomes, Effectiveness, Efficiency, M&E, IA&EA Execution

6: Highly Satisfactory (HS): no shortcomings
5: Satisfactory (S): minor shortcomings
4: Moderately Satisfactory (MS)
3. Moderately Unsatisfactory (MU): significant shortcomings
2. Unsatisfactory (U): major problems
1. Highly Unsatisfactory (HU): severe problems

Additional ratings where relevant:
Not Applicable (N/A)
Unable to Assess (U/A)

Sustainability ratings:

4. Likely (L): negligible risks to sustainability
3. Moderately Likely (ML): moderate risks
2. Moderately Unlikely (MU): significant risks
1. Unlikely (U): severe risks

Relevance ratings
2. Relevant (R)
1. Not Relevant (NR)

Impact Ratings:
3. Significant (S)
2. Minimal (M)
1. Negligible (N)

Namibia, and by ensuring that CSP has emerged in the electricity planning frameworks as one of the key options that are being prioritised by the Government.

The conclusion is that project has been relevant and implemented effectively (achievement of outcomes and the objectives that could be realistically attained according to a revised log-frame), despite the flaws in the original project design. The latter has affected M&E negatively and the efficiency in which the project has been implemented.

Some **lessons learned** are:

- The results frameworks (log-frames) need to be well-designed if to be used for sequencing and programming of project activities and to assess project performance. If circumstances and conditions change, UNDP should take the liberty to update the results framework according to the facts on the ground and report on this to the GEF, so that the progress in implementation and results can be presented in a more realistic and accurate way;
- In the case of grid-connected renewable (CSP) energy, it is important to distinguish between small systems (e.g. from 1 to 10 MW), medium-sized facilities (10 to 50 MW) and large plants (over 50 MW). It is important in the concept design to distinguish between the various market segments (each segment having different market players) that face different gaps and barriers, have different technical and financial support needs and in which investment decisions take place according to different timelines. The project design should state clearly what market segment is targeted and served with what type of policy and financial instruments. If the target groups change over time, project design or implementation should not stay the same, but activities should be changed in accordance with the needs of the (new) target group;
- The timeframe of large utility-scale renewable energy (RE) investments can be quite large from concept to actual construction and operation, depending on market segment and technology, sometimes longer than the timeframe of a typical GEF project. One should take this carefully into account when formulating the direct and post-project emission reduction expectations.

Recommendations that follow from the evaluation include:

UNDP and GEF: action for future project design and formulation

- When considering giving support to technology innovation and market dissemination, it might be fruitful to respond to the need of different beneficiaries in the various segments of the RE technology's market (small, medium, large) and to adopt a larger time frame for the project (in case of long preparation times of large infrastructure projects). Not all barriers are of equal importance, play a role in the same phase of technology development and diffusion or cannot necessarily be addressed simultaneously. Removal of one barrier may be a precondition for other barriers to be removed or lowered (e.g. investments by private entities in grid-connected RE may need a conducive policy-regulatory framework to be established first);
- Given the above, GEF and UNDP should allow more flexibility in re-formulating the log-frame if the changing environment or external factors dictate this, at concept stage (PIF), project formulation (ProDoc), inception (inception report and work plan) and at mid-term review stage (MTR report). It is important that the log-frame is built with progress indicators that can be realistically achieved in the timeframe of the GEF-supported project. Also, the log-frame should distinguish between outcome and output indicators to capture the difference between what is under the project's direct responsibility and what is merely influenced by it.
- In the standard rating table (see Box 1) the category "design" is not well presented; and only appears in the item "M&E design at entry". Design (togegether with "implementation/execution") is a major determinant in the achievement of results. For a better understanding, a category "1. Design" should be introduced (with new items, such as design logic, formulation of log-frame, management arrangements, lessons from other projects), in lieu of "1. Monitoring en evaluation', should be split and the items moved to "1. Design" (the item "M&E design) and "2. IA & EA execution" (the item "M&E Plan Implementation").

Support to further development of pipeline of CSP activities to reinforce benefits of CSP-TT NAM

- The business planning, detailed design and construction of the first CSP plant may take another three years. Organising the debt financing of about USD 700 million will be next on the agenda of CSP Arandis, once NamPower and the Government have given the green light to go ahead. One option is to approach the Green Climate Fund, which also has funds available for preparing the financing proposals;
- The process of replication and building a portfolio of several CSP projects (that will be in various stages of development) might be guided at the decision-making level by a 'CSP programme group'. One recommendation is that the Project Steering Committee and its Technical Task Team (TTT) are 'institutionalised' and will continue meeting on a regular basis to provide advice at the policy level and support the coordination of CSP activities;
- Concentrating solar has other applications apart from power generation, such as providing process heat in industry and desalination of sea water. Research and potential demonstration of concentrating solar heat (CSH) applications for Namibia is to be considered.

Future direction: Support for setting up a grid-connected RE program for IPPs

- Concentrating solar heat are systems, usually smaller than CSP, that can set up by local industry and here the role of NEI as a Concentrating Solar Technology Transfer Body (CSTTB) serving the needs of local players will be more obvious than in the case of large CSP. In fact, given the relatively small size of Namibia in terms of population and economy, the question arises of NEI-CSTTB's scope should not be expanded to function as Renewable Energy Technology Transfer Body (RETTB) to serve engineering, construction, and service companies that want to be involved in IPP projects for *all* RE technologies;
- The solar radiation measurements have now covered 3 sites in the southern and central part of the country. The original CSP-TT NAM ProDoc aimed at five sites. Adding investment-grade measurements in two more sites, covering the northern part, would add to make a complete solar map. The solar data and assessments at the sites will not only be beneficial for concentrating solar but will be necessary inputs to develop future solar PV, solar water heating, solar pumping and wind energy activities too;
- In addition to the small-scale IPP that currently benefit from the existing Renewable Energy Feed-in Tariff (REFIT) scheme, Namibia will need to attract medium-sized renewable IPP projects, defined as 5-100 MW in the National IPP Policy (2016). South Africa has set up the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). The programme is supported by an IPPPP Office that provides professional advisory services, procurement management services, as well as monitoring, evaluation, and contract management services. A similar setup could be considered for Namibia.

1. INTRODUCTION

1.1 Purpose of the terminal evaluation and objectives

1.1.1 Background

Namibia imports a majority of its electrical energy from its neighbours, approximately 65% in 2014[1]. With its current suppliers experiencing power shortages, and its own energy consumption expected to rise (as its population increases and the economy grows), Namibia is devoting increasing attention to the development of its own power generation capacity (discussed further in section 2.1).

Concentrating solar power (CSP) is a power generation technology that uses mirrors to concentrate the sun's rays (i.e. solar heat). Given the relatively high cost of power production with CSP[2], applications are currently limited to areas that provide the best solar radiation and have a conducive investment framework. Namibia has one of the best solar regimes in the world. With an appropriate financial and regulatory enabling environment and investment in research, development, and demonstration, CSP could play a future role in Namibia's power supply. To support the development of CSP technology and application in Namibia, the project "Concentrating Solar Power Technology Transfer for Electricity Generation in Namibia (CSP TT NAM)" was started in 2015 with support from the United Nations Development Programme (UNDP), co-funded by the Global Environment Fund (GEF) and implemented by the Ministry of Mines and Energy (MME).

1.1.2 Purpose of the terminal evaluation

Now, at the end of the implementation period, in accordance with the UNDP and GEF Monitoring and Evaluation (M&E) policies and procedures, a Terminal Evaluation (TE) needs to be undertaken of the project. The TE has to be carried out by an independent consultant, i.e. not previously involved in project design or implementation, for which task the international expert, Mr. Johannes (Jan) van den Akker, was selected, hereafter referred to as the 'Evaluator'.

The **objective** of the evaluation is "t*o assess the achievement of project results, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming*". This includes the contribution to capacity development and the attainment of global and country specific environmental goals. It is expected to review the project's results with an independent assessment of relevance and achievement of objectives and impact indicators, to determine progress being made towards the achievement of outcomes.

1.2 Scope and methodology

The Terminal Evaluation has been based on the following *sources of information*:

- Desk review of progress reports and project documents (listed in Annex C):
    - CEO Endorsement Request (CEO ER) and annexes; annual progress reports (PIRs, project implementation reviews); other progress reporting,
    - Overview of budget expenditures and realized co-financing; annual work plans,
    - Mid-term evaluation report,
    - Project technical reports and description of outputs; project or counterparts' websites,

[1] Source: IEA Energy balance, Namibia (2014). Domestic supply: 4300 GWh, imports: 2886 GWh. Local production from hydro: 1485 GWh and oil products: 13 GWh. Final consumption: 3747 GWh

[2] See Section 7.2 'Lessons learnt #4' and Annex E.1

- o National policy documents on energy, electricity, or climate change mitigation, as well as other relevant reports and documents from counterpart organizations (NamPower, NUST-NEI);
- The mission carried out by the Evaluator (from 30 June to 10 July 2017) to Namibia to meet project partners and stakeholders, in order to obtain in-depth information on impressions and experiences and to explore opinions about the initiative and their understanding and identify opportunities. Annex B gives the mission agenda, providing details of the stakeholders and people met and of the field visits undertaken.

Regarding *data analysis and methods for analysis*, a large number of relevant reports and documents was collected (where possible before the mission). The review of project and background documents (listed in Annex C) provided the basic facts and information for developing the terminal evaluation report, while the mission served to verify these basic facts, get missing data and to learn opinions of respondents to help interpret the facts. With respect to the latter, the interviews with individuals (representatives from project partners and stakeholders) were based on open discussion to allow respondents express what they feel as main issues, followed by more specific questions on the issues raised (guided by the list of interview questions, presented in Annex D). Triangulation has allowed validation of information through cross verification from two or more sources.

The evaluation is based on the criteria of relevance, effectiveness, efficiency, sustainability, and impact and uses on different rating scales, as indicated in the table in the Executive Summary (Box 2).

The rating has taken place according to the evaluation criteria and the rating scales identified in the UNDP *Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects* (2012)[3]. The ratings in this report have been determined based on the project progress reporting and the analysis the Evaluator carried out of the available information and comparing these with observations from the mission (interviews with stakeholders and site visits) and checking with information presented in project technical reports and policy and background documents (see Annex C).

A presentation of the initial findings was made at the end of the evaluation mission (on 10/07/2017) to a meeting of the Project Steering Committee (with representatives from project management, UNDP Country Office and the project partner organizations).

1.3 Structure of the evaluation report

This report contains the report body, executive summary, and annexes. The body of this report is structured around the following chapters; it starts with an introduction to the objectives, scope, and methodology of the terminal evaluation (Chapter One), description of the project context and a summary of project facts (such as start date, duration, the context in which the project started), its objectives and stakeholders (Chapter Two).

The assessment of the "evaluation findings" has been guided by the questions of the "evaluation matrix", of which a final draft was formulated at the inception stage of the assignment (see Annex D)[4]. The report follows the outline for terminal evaluations of UNDP/GEF projects[5] but has split the suggested chapter on findings in three parts for practical reasons due to the chapter size to permit a more reader-friendly presentation of the information. An overview of progress regarding the achievement of outcomes and outputs is given in Chapter Three. Findings on relevance, design, and formulation are in Chapter Four, while the findings on project implementation and monitoring are presented in Chapter Five. Finally, Chapter 6 discusses the achievement of the objective, efficiency, and effectiveness and presents findings on the replication effects and sustainability.

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[3] Other guidelines consulted are those presented in the UNDP *Handbook on Planning, Monitoring and Evaluating for Development Results*, *Updated Guidance on Evaluation* (2012), the UNDP Discussion Paper: *Innovations in Monitoring & Evaluating Results* (2013) and the GEF *Review of Outcomes to Impacts (ROTI) Handbook* (2009). Regarding gender aspects, the evaluation refers to the *Guide to Gender Mainstreaming in UNDP Supported GEF Financed Projects* (2016).

[4] See the *Inception Report* of the Terminal Evaluation (J. Van den Akker, June 2017)

[5] See Annex F, 'Evaluation Report Outline' in the UNDP *Guidance for Conducting Terminal Evaluations* (2012)

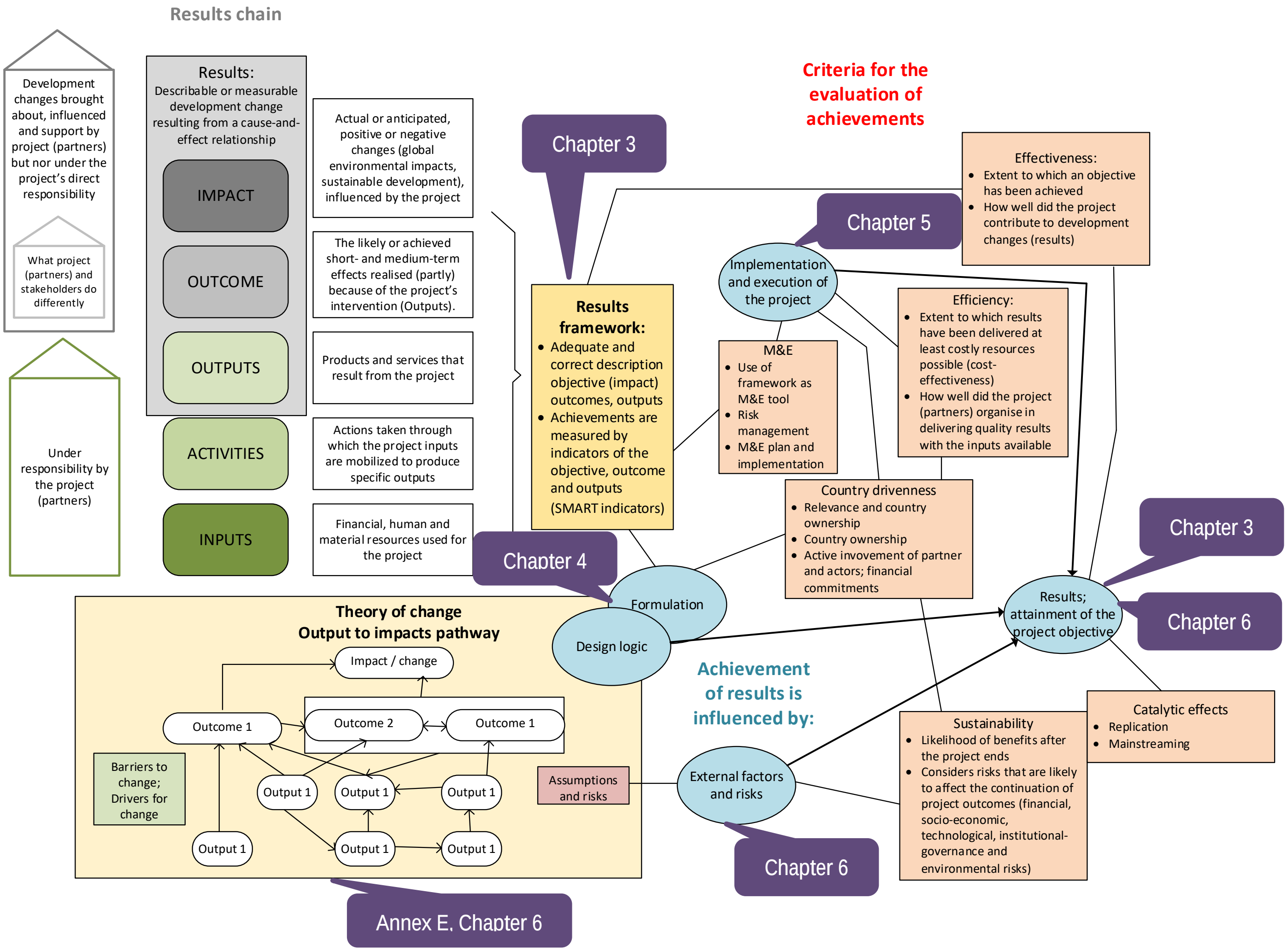
In development projects, ‘results’ are the describable or measurable development change resulting from a cause-and-effect relationship. These results include project outputs, short- to medium-term outcomes, longer-term impacts, including global environmental benefits and catalytic effects (replication, mainstreaming).

Box 3 explains the results chain of a typical UNDP/GEF projects with different level of results (outputs, outcome, impacts) and the contribution of the project to the achievement of the results (highlighting the diminishing contribution of the project as you go to the higher level).

The achievement of the results and the longer-term sustainability thereof is influenced by the:

- way project was formulated and designed (discussed in Chapter 4);
- way the project was implemented by the various project partners (discussed in Chapter 5);
- occurrence and impact of internal and external risks (discussed in Chapter 6).

Chapter Seven presents the conclusions, recommendations, and lessons learned from the project. These include actions that might be taken (by the Government) to help ensure the sustainability and continuity of project achievements, as well as steps that can be taken by UNDP (and GEF) to help improve the design and implementation of future projects.



Box 3 Relation of results chain elements with factors that determine their achievement and criteria for evaluation

Annexes at the end of the report include the Terms of Reference (Annex A), mission details and people interviewed (Annex B), documents collected and bibliography (Annex C), evaluation questions and methodology (Annex D), a description of the state of CSP development in Namibia and the Project's contribution (Annex D), a discussion on the project's results framework logic and (re-constructed) theory of change (Annex E).

How a project or programme leads to results is described in the 'logical framework' also called 'results framework'. Increasingly, donors and international organisations use a 'theory of change'. The differences between the two are described in Annex E. At project design stage, there was no requirement to incorporate a 'change of theory' and therefore it cannot be used as such to compare results at results at project design with results at project's end. Although strictly speaking not required in the Terms of Reference of the evaluation, this report presents of a 'reconstruction' of the project's theory of change and, based on this, a reformulated results framework (log-frame) with which the achievement of outcomes and the objective can be interpreted in a better way.

2. PROJECT DESCRIPTION AND BACKGROUND

2.1 Context and problems that the project sought to address

Namibia is dependent on imports for its power supply. Total energy consumption was 3,747 Gigawatt-hours (GWh) in 2014 and total supply (including transmission and distribution losses) was 4,300 GWh, of which 67% was imported (mainly coal-based) power from South Africa and other SADC countries through the Southern Africa Power Pool (SAPP). Of its own capacity of 393 MW in 2014, 36% was based on fossil fuels and the remainder mostly hydropower (240 MW). Energy security challenges have become detrimental for Namibia over the past decades with the Southern African Power Pool (SAPP) facing the prospect of power shortages, arising from South Africa's inability to meet its own domestic demand and its diminished capacity to export power to the rest of the region. In order to be energy-secure, Namibia needs to be energy-independent, given the risks in power supply in the SAPP. This has required Namibia to bolster its own energy generation capacity and diversify its energy mix generating capacity with the available domestic resources, including renewables and solar in particular. Against this background, the country has been making proactive efforts to develop this resource and developed the White Paper on Energy Policy of 1998, in which the Government stresses its support for the growth of renewable energy in Namibia. The White paper has since has been followed by a number of policy papers that aim at promoting the country's renewable energy industry (see Annex E.1 for the current status of renewable energy policy development in Namibia).

Concentrating solar power (CSP) is a power generation technology that uses mirrors to concentrate the sun's rays (i.e. solar heat) and, in most of today's CSP systems, to heat a fluid that is used to produce steam. Concentrating technologies exist in various types, such as parabolic trough, linear Fresnel reflector, solar tower and parabolic dish, of which the first three have been deployed commercially. Given the relatively high cost of power production with CSP[6], applications are currently limited to areas that provide the best solar radiation and investment framework. Namibia has one of the best solar regimes in the world with an average direct insulation of 2,200 kWh/m²/years (peaking to 3,000 kWh/m²/year in certain areas), minimal cloud cover. In the near future, sustainable energy production with CSP technology is expected to become commercially competitive, as energy production and capital costs get reduced. International investment in research, development, demonstration, and dissemination continues to yield important technical improvements and consequently, generation cost could drop to USD 0.10-0.16 by 2025-2030[7].

Apart from the general barrier of high initial investment cost, a number of barriers inhibit the establishment of CSP plants in Namibia (as mentioned in the Project Document):

- The participation of local industry in the supply of some components and services to a CSP project would potentially reduce costs, but in general there is insufficient capacity and CSP awareness of local manufacturing industry, and also local investors (including the development banks) lack the technical and financial resources and expertise to develop and adopt the CSP technology.
- Investors, in general, have tended not to invest in large-scale renewable energy technology in developing countries, including Namibia, due to the lack of support mechanisms such as appropriate financial and regulatory frameworks. A sustained and concerted effort to raise CSP awareness amongst policy-makers is required to provide Namibia with the appropriate policy support.

Companies from renewable energy market-leading countries such as Spain, US or Germany, are exploring the possibility of tapping into the Namibian and Southern African markets based on their global expertise. For

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6 See Section 7.2 'Lessons learnt #4' and Annex E.1

7 *Southern African Power Pool: Planning and Prospects for Renewable Energy* (IRENA, 2013); *Renewable Energy Power Generation Costs in 2014* (IRENA, 2015)

example, the presentation of a "CSP Pre-feasibility study" on 25 July 2012 in Windhoek attracted participants from South Africa, Germany Israel, Portugal and the United States of America[8].

2.2 Project description

2.2.1 Objectives of the project; expected results and established indicators

The project "*Concentrating Solar Power Technology for Electricity Generation in Namibia*", hereafter referred to as "*CSP-TT NAM*", was formulated in 2012 UNDP and the MME (Ministry of Mines and Energy) to address such barriers as mentioned above and as a follow-up to the before-mentioned CSP Pre-Feasibility Study. The UNDP-GEF project has the potential to catalyse a transformation of the Namibian power sector by including large utility-scale renewable in the power generation, capitalising on Namibia's sunny conditions (see Annex E.2 for details), which make CSP qualitatively very attractive in Namibia.

The project **outcomes and outputs** (as formulated in the Project Document, or ProDoc) are summarized in Box 1 together with the corresponding project progress indicators. Chapter 3 gives the baseline, target, and actual values of these indicators, together with a detailed description of the planned and achieved results per component.

Box 4 Summary of the project objective, outcomes, and outputs

Project Components/ Outcomes	Project outputs	Progress indicators	GEF budget (USD)
Objective: To increase the share of renewable energies in the Namibian energy mix by *developing the necessary technological framework and conditions for the successful transfer and deployment of CSP technology for on-grid power generation*		1. Cumulative direct post-project CO2 emission reduction resulting from the investment in CSP by end-of-project (EoP), Mtonnes CO2. 2. % share of CSP in the power generation mix of Namibia by EoP	
Component 1: CSP investment partnerships in Namibia Outcome 1: • Local entrepreneurs are engaged in the manufacturing, supply, and installation of CSP systems	1.1 Finalized technology partnership agreements; 1.2 Enhanced knowledge of applicable CSP applications in Namibia	3. Number of government-endorsed CSP partnerships established by yr3; 4. Number of local CSP engineering design firms with CSP design experience established and operational by yr3 5. Number of local CSP-related manufacturing, supply and installation companies by yr3	175,490
Component 2: Policy frameworks for CSP initiatives in Namibia Outcome 2: Increased investments in CSP technology applications in Namibia	2.1 Investment grade solar resource data; 2.2 CSP planning and implementation; mechanisms established within MME 2.3 Approved and enforced regulations for promoting development and operation of CSP plants in Namibia; 2.4 "High precision" stations or RSI stations in place for remote sites to obtain investment grade solar resource	6 Number of sites where investment-grade solar resource data is available by yr2; 7. No. of CSP investments facilitated by the CSP development guidelines by Year 3 that are streamlined with REPM outcomes 8. Number of planned and approved CSP technology application projects that are funded by local financing institutions by EOP and in line with REPM outcomes	460,187
Component 3: Facilitation of	3.1 Completed feasibility study	9. Number of planned, approved and	910,735

[8] *Pre-feasibility Study for the Establishment of a Pre-Commercial Concentrated Solar Power Plant* (Gesto, 2012)

the first CSP plant Outcome 3: Increased installed capacity of CSP plants in Namibia	of selected CSP site; 3.2 Completed environmental impact assessment 3.3 Approved institutional, financial and business arrangements for initial CSP plant development 3.4 Signed EPC contract and commencement of CSP construction 3.5 Workshops to disseminate lessons learned in the development of the 50 MW CSP plant	financed CSP projects that replicate the first CSP investment by EOP; 10. Cumulative installed power generation capacity from CSP plants by EOP; 11. Set of specific regulations promoting the development and operation of CSP plants that are, in turn, mainstreamed into the NERL and REPM guidelines	
Project Management / M&E			171,588
Total			1,718,000

Funding was sought from the Global Environment Facility (GEF) and obtained in February 2013[9]. The expected co-financing was USD 2,588,000, coming from the Government (MME, USD 340,000), Polytechnic of Namibia (USD 80,000), Development Bank of Southern Africa (USD 350,000) and the Clinton Climate Initiative (USD 100,000).

2.2.2 Project start and duration; main project partners and stakeholders

The Project has been executed under the NEX (national execution) modality, with UNDP as the Executing Partner (GEF Implementing Agency, IA) and with the Ministry of Mines and Energy (MME) as the Implementing Partnern (GEF Executing Agency, EA) on behalf of the Government. The execution and implementation modalities followed those of typical UNDP/GEF projects (in Namibia).

Effectively the project did not start until May 2014, after the hiring of the National Project Manager (Feb 2014) and the project's Inception Workshop (April 2014). There was further delay in putting in place project management arrangements. MME (as the implementing partner) delegated the hosting of the project to the Namibia Energy Institute (NEI) of the Namibia University of Science and Technology (NUST) in Feb 2015[10]. The project components lend themselves to division along relatively clear lines between project partners with NamPower has been responsible for the lead on issues relating to the feasibility assessment (agreement in 2015) and NEI responsible for the lead on issues related to technology transfer and local capacity building.

Box 5 List of project partners and main stakeholders

Project partners and other stakeholders	Role in the project (and CSP activities)	Short description
Ministry of Mines and Energy (MME)	Implementing Partner (Executing Agency), National Project Director, co-chairs PSC with UNDP; co-financier	Within MME, the Energy Directorate is responsible for the formulation of energy policy. One of the MME objectives is to make sure that increases in energy supply and utilization are sustainable, competitive and economically efficient. The Directorate consists of 3 divisions: Electricity Division, Renewable Energy Division, and National Energy Fund
Namibia Energy Institute (NEI)	PSC member; Delegated with responsibility for project implementation; co-financier	MME and the then Polytechnic of Namibia established as REEEI (Renewable Energy & Energy Efficiency Institute) funded by to promote renewable energy and energy efficiency through research & development. REEEI was incorporated as Centre for Renewable Energy and Energy Efficiency into the Namibia Energy Institute, itself part of the Polytechnic, now renamed as NUST
NamPower	PSC member; co-financier	NamPower a semi-autonomous government agency that is currently the

9 Under the GEF-5 funding cycle, GEF Trust Fund, as part of the climate change country allocation for Namibia

10 NUST formerly known as Polytechnic of Namibia (see Box 5)

		country's only supplier of electricity through its generation, transmission, trading and single-buyer activities. NamPower supplies electricity to mines, farms, REDs and local authorities (where REDs are not operational). Most of the distribution network is controlled by the City of Windhoek, Northern Regional Electricity Distribution (Nored) and the Erongo Regional Electricity Distribution (Erongored).
Electricity Control Board	PSC member	The core mandate of the ECB (as defined in the 2007 Electricity Act) is to exercise control over the electricity supply industry with the main responsibility of regulating electricity generation, transmission, distribution, supply, import and export in Namibia through setting tariffs and issuance of licenses
Ministry of Environment and Tourism (MET)	PSC member	MET is responsible for environmental management, wildlife, and biodiversity, tourism and gaming. Regarding climate change, MET is the GEF Operational Focal Point and UNFCCC National Focal Point.
National Planning Commission (NPC)	PSC member	Under the Office of the President, NPC's mandate is to plan and spearhead the course of national development. Namibia's Vision 2030 is a long-term perspective plan outlining the course of development
Environmental Investment Fund (EIF)	PSC member	EIF is currently funded by a Government allocation with the mandates to tap on local conservation fees and environmental levels. These funds will be used to invest in the protection and management of the environment, promoting sustainable use of natural resources for economic development, and conserving biological diversity.
Other stakeholders		
Government and semi-government: • NUST • UNAM		The University of Namibia (UNAM) is a national research university located in Windhoek, established in 1992. Namibia's other state-owned university is the Namibia University of Science and Technology (NUST), formerly known as Polytechnic of Namibia (PoN) until 2012
• Ministry of Trade and Industry (MTI)		Currently named the Ministry of Industrialization, Trade and SME Development, it is responsible for the development and management of Namibia's economic regulatory regime and for promoting growth and the formulation and implementation of appropriate policies to attract investment, increase trade and develop industry
• Development Bank of Namibia	Possible financiers of CSP projects.	The DBN is the premier provider of development financing in Namibia, providing finance for enterprises and can also fund private and public projects
Private sector • Namibia Manufacturers Association (NMA) • Renewable Energy Industry Association (REIAoN)	Consulting and engineering companies, e.g. Afromach, Amusha, Consulting Services Africa (CSA), CTS Services have been involved in s project assignments	REIAoN's objectives are to emphasize on industry representation, promoting and educating; adhering to quality standards; lobbying; and establishing professional relationships with bodies with similar objectives. NMA is an association of Namibian manufacturers engaged in lobbying and advocacy for manufacturing in Namibia.
Regional electricity distributors (REDs)		REDs a regional electricity distributing company tasked with supplying electricity to the residents in a specific region. Five REDs are envisaged: NORED, CENORED, Erongo RED, Central RED and Southern RED

3. FINDINGS: PROGRESS TOWARDS OUTCOMES

3.1 Introduction

- To what extent have the expected outcomes and objectives of the project been achieved?
- What outputs and outcomes has the project achieved (both qualitative and quantitative results, comparing the expected and realized end-project value of progress indicators of each outcome/output with the baseline value)?
- Is the project on track to deliver its expected outputs?

For each of the five project components, as mentioned in paragraph 1.2, this section assesses the progress in the implementation of the project's outcomes and outputs, following the 'project results framework' format and information provided as given in the UNDP Project Document and as reported by the |Project Management Unit (PMU) in the annual UNDP/GEF *Project Implementation Reports (PIRs)* of 2015 and 2016, the *Mid-Term Evaluation* report (March 2015) and the overview of *Progress made against all CSP-TT NAM Outputs* (Dec 2016)

In terms of wording, the exact formulation of outputs and corresponding indicators the Evaluator follows of the last PIR (2016). This section tries to provide a quantitative and descriptive overview on achievements of outputs and outcomes, as a preparing the ground for the discussion on design (Chapter 4) and implementation (Chapter 5)) with Chapter 6 will provide a re-assessment of results in terms of attainment of the objective and outcomes and the project's longer-term impacts.

The reader should note that the in the Boxes 7 to 10 in this Section, the numbering of outcomes, outputs and indicators corresponds to the numbering system of Box 4. The numbering of Outcomes (1, 2, etc.) and Outputs (1.1, 1.2, 2.1, etc,) is the same as the numbers given in the Project Document and CEO ER. For easy comparison, the numbering of Indicators (1, 2, etc.) follows the numbering given in the MTR report. The numbering of Activities under each output (i., iii, etc.) is according to the 2016 progress report. The baseline and target values of the Indicators are taken from the project's logical framework (as reported in the ProDoc and PIRs), while the achievements (i.e. indicator value at project's end, June 2017) is compiled from the 2016 PIR, 2016 progress report as well as own from observations during the mission (including interviews with respondents) and analysis of the outputs and reports produced during 2015-2017.

3.2 Progress in achieving outputs and outcomes

3.2.1 Component 1 CSP investment partnerships in Namibia

Box 6 Description of outcome, outputs and activities, Component 1

Output	Activities	Description of achievement
1.1 Finalized technology partnership agreement	Promotion and information	• 100xPromotional project posters, 3x pull-up banners, 50x USB, 50X Pen, 100x T-shirts, 100x Caps, 1000x brochures designed and produced and distributed; • A 30 minutes Video and 5min Video Trailer CSP TT NAM Promotional Video Produced and being screened at promotional events; • CSP Week in July 2016 o Two TV Business Programmes interviews on NBC TV promoting CSP investments in Namibia conducted on GMN and Business

		Today; o Two public lectures on CSP Technology and Opportunities in Namibia were conducted by renowned CSP international experts.at NUST and UNAM; • CSP TT NAM promotional article inked and being finalised for placement in international publication CSP Today
	i. Scoping and due diligence analysis of global CSP players using some of the networks created through the CSP Pre-feasibility Study and TREE project CSP Seminar; ii. Formulation and establishment of partnership MOU agreements with at least two partners: South- South and North-South to facilitate technology transfer;	• Technical specifications and design completed to set up and maintain database link of interested global and local stakeholders on the NEI website (interactive database where stakeholders can load information) • CSP promotion and networking: o With MITSD in North-South and South-South Partnership in Japan; o At CSP Today events in Dubai and Cape Town (exhibition stand) o Five local trade fairs • About six potential partnerships had been match-made and in process of reviewing the draft partnership agreements in the areas of manufacturing/assembling components, construction, academia, R&D, etc. in the supply/service chain for CSP market development.
	iii. Capacitating NEI to serve as a National Technology Transfer Coordinating Body (NTTCB).	• Needs assessment (report) for NEI[11] to serve as CSP National Technology Transfer Co-ordination Centre completed and findings presented to stakeholders during July, followed by an Implementation Plan
1.2 Enhanced knowledge of applicable CSP applications in Namibia	i. Conducting a capacity needs assessment for industry players	• Needs Assessment for Industry Conducted 2015 and consequent training programmes in July 2016
	ii. Designing and setting up a curriculum to address capacity needs with topics ranging from energy policy and planning to manufacturing requirements of CSP industries and financial and economic evaluation of CSP projects	• Designed Curriculum on CSP modules for the UNAM[12] M.Sc. (Renewable Energy programme), finalized during June 2016. Pending the academic programme approval process, starting in 2017 or 2018 • Designed CSP Professional Training Module to cater for specialized CSP training (e.g. short Courses) in the country by institutions such as VTCs, NEI and universities and also to cover aspects not covered in the UNAM curriculum
	iii. Delivery of CSP capacity building workshops by knowledgeable professionals;	• Namibia CSP Professional Technical Training Manual finalised and distributed to local academic institutions and key stakeholders • 5-Day Short Course (July 2016) was attended by 40 CSP designers, engineers and trainers in academia[13] • Networking/collaboration arrangements with IUM, UNAM and NUST on Student Internships and Capacity Development (since project start till Dec 2016), mentoring 12 students

[11] *NEI as CSP Technology Transfer Coordinating Body, Final Report* (Afromach, August 2016)

[12] *CSP Academic Curriculum, Final Report* (Afromach Investment, August 2016).

[13] *Professional Training Course on CSP Technology, Detailed Courses Outline* (July 2016)

	iv. Collecting feedback on the effectiveness of the workshops by the participants, and improving the subsequent workshops based on the feedback.	• Workshops Evaluation Template is developed and used at relevant workshops and trainings for evaluation

Outcome 1: Local entrepreneurs are engaged in the manufacturing, supply and installation of CSP systems

Indicator	Baseline	Target	Achievement Mid-2017	Description
3. Number of government-endorsed CSP partnerships established by year 3 (yr3)	0	5	2	The Government developed partnerships with companies (engineering, installation) to develop CSP market supply chain (i.e. enhance preparatory knowledge and technology transfer in preparation for when actual CSP plant construction commences)
4. Number of local CSP engineering design firms with CSP design experience established and operational by yr3	0	7	4	There are a number of engineering firms that can be involved in CSP development. Local firms have participated in feasibility and EIA studies study (e.g. Afromach and Aurecon Namibia) and measurements (Hungileni). Work thereafter will clearly specify local participation requirements in EPC and operation of the CSP facility to ensure this capacity is developed.
5. Number of local CSP-related manufacturing, supply and installation companies by yr3	0	10	5	There are local firms and they can develop capacity but it is difficult to do so in the absence of clear demand for what abilities and expertise are needed

The Project has involved local engineering and consulting companies in collaboration with foreign companies on DNI ground measurement stations installed in the country (see Outcome 2), the EIA study and the Techno-Economic study (see Outcome 3). A CSP Professional Technical Training Manual has been formulated, CSP modules incorporated in the UNAM science curriculum. Reportedly, over 200 stakeholders have received project-supported training, in which five Namibian manufacturing companies have benefited from technical assistance[14]. Collaborations have been put in place to assist with solar mapping and EIA studies.

However, the real proof of the pudding is in eating it. Going beyond the theoretical exposure in training and workshops (which can be documented, in terms of numbers of events and of participants), it is difficult to assess the outcome of in terms of capacity built. In the absence of any CSP facility yet, there is only on-the-ground experience with preparatory work, such as solar measurements and data assessment. The first CSP plant (at Arandis) has not yet reached the stage of detailed designs, so it is difficult to assess what the local participation of consulting and engineering companies can, will or should be in construction and engineering, and how the project's activities have strengthened local capacity in practice to have a visible role in design, construction, operation and future expansion of the CSP programme in Namibia. However, one can assume that the above-mentioned activities have put a certain basis of technical know-how and knowledge in CSP. The tender documents for the Arandis (and future) CSP plants should clearly specify local participation requirements to ensure that this capacity developed is not lost and is further strengthened in 'learning by doing'.

[14] *Socio- economic and environment Impact Project Analysis on a 125MW CSP plant* (Afromach, 2016)

3.2.2 Component 2 Policy frameworks for CSP initiatives in Namibia

Box 7 Description of outcome, outputs and activities, Component 2

Output	Activities	Description of achievement
2.1 Investment grade solar resource data	i. Select suitable ground measurement spots (that are less than 3 km from the 5 top CSP sites in Namibia as determined by the July 2012 CSP Pre-feasibility report ii. Finalize the site to be selected for CSP development through consultation with all stakeholders	• Sites (Auas, Arandis, Kokerboom, Gerus and Orumbu) selected in 2015 in consultation with stakeholders with Arandis as the most promising
	iii. Prepare plans for the continuance of ground solar measurements at other promising CSP sites; iv. Carry out ground measurements for the 5 top CSP sites in Namibia over one year *(merged with Output 2.4)*	• Training provided to NEI on ground measurement processes, maintenance, data analysis and reporting during Sep 2016 • Equipment of NEI with the relevant IT equipment for data monitoring purchased in 2015 and installed at the three sites. • Almost one year of installed measurements at Auas, Kokerboom and Arandis (installation reports available) started in 2015 and ongoing. Analysis of first year data analysis (DNI, direct normal irradiance; GHI: global horizontal irradiance) completed in Aug/Sep 2016[15]. NamPower is continuing with measurements for at least 3 years to obtain investment grade solar data.
2.4 RSI (Rotating Shadowband Irradiometer) stations in place for remote sites to obtain investment grade solar resource.	i. Purchase appropriate instruments that will provide the required on-site ground measurements *(merged with Output 21)*	
2.2 CSP planning and implementation mechanisms established within MME	i. Preparation of detailed information of the most promising CSP sites (including hybridization options with natural gas and biomass)	
	ii. Conducting a policy dialogue with national stakeholders according to a working agenda agreed upon with partner organizations.	• Report on the CSP potential for power and heat applications for Namibia[16] in Aug 2016 (highlighting the opportunities for CSP investment) • Inputs provided on CSP for key reports on energy produced in Namibia (Update of the National Energy Policy, Renewable Energy (RE) Policy, National Integrated Resource Plan (NIRP), IPP Policy Framework. The NIRP was finalised in Sept 16. Other drafts were finalised in Oct 2016 All have been approved by MME and endorsed by the Cabinet (except for the IPP Policy which is awaiting Cabinet endorsement).[17]
2.3 Approved and enforced regulations for promoting development and operation of CSP plants in Namibia.	iii. Defining the legal status of a private CSP operator in the modality of an IPP	
	iv. Resolutions regarding land tenure and water use rights for CSP projects. v. Research and determine the regulations concerning environmental constraints and management of CSP	• Has been assessed as part of the EIA Study that was conducted for the first CSP plant at Arandis *(see Output 3.2)*
	ii. Identification of financial incentives and options for local financing institutions with regards to risk mitigation for CSP investments.	• Part of the Macro-Economic Study[18] (draft report submitted Dec 2016) and also as part of the CSP Techno-Economic Study (draft report submitted 2017, *see Output 3.2)*

[15] See the reports on solar data (*Site Adaptation of Solargis Data)* at the three sites (Solargis, 2016) and the 2016 CSP GmbH reports *(Site Assessment of Solar Resource)*

[16] *CSP Heat and Power Potential in Namibia, Final Report* (Afromach Investment, 2016)

[17] See list of national policy documents in Annex C.

[18] *Study of the Macroeconomic Impact of a CSP Plant for Namibia* (NamPower, 2017)

	vi. Creating streamlined procedures for permits and concessions for CSP electricity generation and distribution.	• The new *Policy for IPP* • Consultations to assess possible replication viability in CSP procurement frameworks were conducted with the DBSA and RSA Department of Energy on their successful implementation of the RSA REIPPP framework and possible suitability for Namibia; • Follow up workshop on the implementation of the REIPPPP in RSA was organised in July 2016 (hosted by the RSA IPP Office and attended by MME, ECB and NamPower officials), followed by Presentation to Namibian stakeholders (Windhoek, Oct 2016)

Outcome 2: Increased investments in CSP technology applications in Namibia

Indicator	Baseline	Target	Achievement Mid-2017	Description
6. Number of sites where investment-grade solar resource data is available by Year 2	0	5	3	The figure confirms the actual ground measurement stations (3) installed by the project. The project extension (up to June 20170 has allowed the analysis of one full year of measurement (a minimum needed to obtain investment-grade data)
7. No. of CSP investments facilitated by the CSP development guidelines by Year 3 that are streamlined with REPM outcomes	0	1	0	Only the first part of the full feasibility study (FFS) for the CSP plant is finished (Phase 1) by the end of the GEF/UNDP project in June 2017(see Outcome 3), So, no real investments will be made before the end of the project, but might take place thereafter, provided that project can reach financial closure (after the post-project completing Phase 2 of the FFS)
8. Number of planned and approved CSP technology application projects that are funded by local financing institutions by EoP and in line with REPM outcomes	0	2	1	Currently, there are no planned projects, other than the Arandis CSP. The Namibia IRP however includes specifically CSP in its scenarios.

It is the Evaluator's view that the Indicators 7 and 8 are inappropriate for measuring outcomes of Component 2 and are in fact indicators of Outcome 3 (preparatory activities that lead to particular investments). Indicator 8 forms actually a subset of Indicator 9. Proper indicators should have been constructed measuring progress with respect to the outputs on progress in the policy-regulatory enabling environment (the reader is referred to the next Chapter 4 and section s).

At the same time, the Government has advanced in the formulation of the policy framework and regulations for renewable energy, such as the National Integrated Resource Plan (NIRP), National Energy Policy (NEP), National Renewable Energy Policy (NERP) and the policy regarding Independent Power Producers (IPPs). Although these documents have not been formulated as part of the project activities as such, the project staff and partners have provided essential inputs regarding the role of CSP and ensured that CSP has been anchored as an important RE option to be considered in Namibia's energy policy and energy investments. Regarding impacts of CSP, two studies have been completed on the *CSP Heat and Power Potential in Namibia* (Afromach, 2016) and the *Study of the Macroeconomic Impact of a CSP for Namibia* (NamPower, 2017). Thus, the project has contributed significantly to the outcome of Component and has been instrumental for a conducive environment for (future) CSP investments to be in place.

3.2.3 Component 3 Facilitation of the first CSP plant in Namibia

Box 8 Description of outcome, outputs and activities, Component 3

Output	Activities	Description of achievement
3.1 Completed feasibility study of selected CSP sites	i Ranking of the best CSP technologies and their reference costs (based on the 2012 CSP Pre-Feasibility Study) *(moved from with Output 2.3)* i. Validation of CSP technologies to be deployed on site including solar technology (tower or trough), dry cooling system specifications and storage systems based on solar technology selected	• MCDM Study conducted with key stakeholders participating in an evaluation workshop (Oct 2016). See *Phase 1 – MCDM Final report* (MottMcDonald, Dec 2016)
	ii. Setting up and utilization of a thermodynamic model for a selected plant configuration to optimize generation of electricity[19]; iv. Finalization of the plant configuration prior to a detailed engineering phase using model results[20]; v. Incorporation of field information into project design that may include specific geological information for foundations, and identification of areas with optimal DNI; vi. Formulation of a rough implementation plan that will include equipment procurement, site preparation, equipment installation, commissioning and O&M vii. Full financial model, including determination of plant revenue streams and rates of return, as well as recommended optimal capital structure.	• Activities have been carried out as part of the full feasibility study (FFS) of the first CSP plant. Techno-Economic Report (MottMcDonald, 2016) and Macro-economic report (NamPower, 2017), but detailed engineering design and business planning and financial engineering (Phase 2) is still pending
3.2 Completed environmental impact assessment.	i. Comprehensive review of existing legislation, policies and guidelines; ii. Identification and establishment of the baseline conditions (physical, biotic and social/cultural); iii. Definition of the main project components of CSP; iv. Assessment of potential impacts (social and physical) during construction and operation; v. Development of a suite of appropriate mitigation and enhancement measures; vi. Development of a plan for public consultations; vii. Development of an Environmental and Social Management Plan, including a Monitoring Plan	• Environmental impact assessments (EIA) has been completed as part of the feasibility study (FFS) for the most promising first CSP 125MW (with storage) at the Arandis site (report submitted in Aug 2016 and approved[21]).
3.3 Approved institutional, financial and business arrangements for initial CSP plant development	iii. Development of specific plans for improving MRV capacity and the feasibility of accessing specific carbon funds	• Workshop conducted to train MME and NEI on MRV and GHG Data Collection and Analysis processes during September.

19 The model will be built from a software package for CSP projects (such as the privately developed SunBD model or the NREL-developed SAM model) and can be used for future operations by plant owners and operators to determine plant electricity outputs with more precision and confidence.

20 This will involve optimization of the plant layout, and specific locations of the heliostat fields, heat exchanger, heat storage, and power plant.

21 *Socio- economic and environment Impact Project Analysis on a 125MW CSP plant in Namibia* (Afromach Investment, Aug 2016) and *Amended Environmental and Socio-Econ Impact for a CSP Facility near Arandis* (Aurecon, 2016)

	ii. Design specific financial mechanisms to finance the first CSP plant with concessional financing from development banks and private equity[22].	• Being done as part ongoing CSP full feasibility study (draft report submitted 2017): see Techno-Economic Report (MottMcDonald, 2016) and Macro-economic report (NamPower, 2017) • In seeking post-project financing options; PMU interacted with the Green Climate Fund (GCF) to assess potential Namibia CSP Plants financing options (Q1 2016), and with the Development Bank of South Africa (Q2 2016)
3.4 Signed EPC contract and commencement of CSP construction.	i. Setup a special purpose entity (SPE) dedicated towards engineering, constructing and operating the initial CSP plant; iv. Where possible, mainstreaming of the outputs and financial arrangements mentioned above into NERL regulations and REPM outcomes for future procurement of large-scale RE plants. i. Preparation of detailed engineering plans with sufficient detail for an EPC contractor to prepare tendered bids for CSP plant construction	• Will be done as part of the (post-project) Phase 2 of the CSP Full Feasibility Study (July-Dec 2017)
	ii. Preparation of an EPC tender and contract that will foster participation of local companies in the supply chain (of technology, engineering, financial, technical and managerial services); iii. Obtaining all legal permits; iv. Setup tendering process for the construction of the CSP; v. Opening of tenders, and negotiating and signing the EPC contract; vi. Preparing and managing implementation plans for constructing the CSP plant.	• These activities will be part of Phase 2 of the Arandis full feasibility study after July 2017 (post project)
3.5 Workshops to disseminate lessons learned in the development of CSP	i. Present at least 1 project implementation lessons learned workshops to key stakeholders. *(note: overlaps with Output 4.2)*	• CSP TT NAM researched and produced a Report on CSP Socio-Economic and Environment Impacts

Outcome 3: Increased installed capacity of CSP plants in Namibia

Indicator	Baseline	Target	Achievement Mid-2017	Description
9. Number of planned, approved and financed CSP projects that replicate the first CSP investment by EOP	0	2	1	Indicator 8 is actually a subset of this Indicator 9
10. Cumulative installed power generation capacity from CSP plants by EOP	0	50 MW	0	An EPC or IPP tender may be launched in the 2nd half of 2017 after positive decisions by NamPower/MME.
11. Set of specific regulations promoting the development and operation of CSP plants that are, in turn, mainstreamed into the NERL and REPM guidelines	0	1	n/a	General regulations in draft IPP policy. Specific regulations as part of the FFS activities for the Arandis CSP.

[22] The financial mechanism will likely contain a negotiated fixed tariff, debt incentives and tax exemptions

Since the Mid-Term review (2015), the project's pace of producing outputs has increased markedly. In 2015 the Government announced its intention to raise the capacity of the first planned CSP plant from 50 MW to 125 MW and go ahead with the preparatory activities. A full feasibility study (FFS) was planned to be completed for the first CSP facility at Arandis and this was one of the reasons for the CSP-TT NAM project being given a 1.5-year extension to June 2017 to be able to finalise the FFS.

The full feasibility study of Namibia's first CSP facility is now halfway:

- Solar radiation measurements of at least one year have been completed (2015-2016) at three sites (Arandis, Kokerboom and Auas) and the solar data have been analysed, as reported in the CSP GmbH (2016) and Solargis (2016) report (see Annex E for details)
- The potential of sites with alternative CSP technology was analysed and assessed in the multi-criteria report (MCDM) and the techno-economic feasibility study (both by MottMcDonald, 2016) that recommend a 135 MW CSP plant to be developed in the Arandis area with thermal storage (to provide baseload energy) with slight preference for molten salt tower over parabolic trough technology.

With the above activities, Phase 1 of the FFS has been completed, and the NamPower Board needs to take a decision to proceed into the next Phase 2 of the FSS will be completed, which would result in a business and finance plan, after which a tendering process for detailed engineering design, procurement, and construction (EPC) could be started.

3.2.4 Component 4 Project management: Learning, evaluation and adaptive management

Output	Activities	Description of achievement
4.3 Lessons learned documented and disseminated	i Networking and workshops ii. lessons learned and	A summary of monitoring and evaluation (Output 4.1) and management (Output 4.3) is presented in Section 5.3 on M&E and adaptive management, respectively.

4. FINDINGS: PROJECT DESIGN

This Chapter looks first at the project relevance and country drivenness (at project design), e.g. as evidenced by its links with national and development. Second, it looks at the design logic (in the framework of outcomes and objectives to reach the objective) and how the design framework was formulated, including definition of indicators and target values for outcomes and outputs.

The questions in the pink-coloured boxes in this and other Chapters, are the show which questions from the Evaluation matrix (Annex D) correspond to a particular section in this report.

4.1 Relevance and country drivenness

- Are project outcomes contributing to national development priorities and plans in accordance with the national local policy legal and regulatory frameworks?
  (see Annex D)

Relevance and country drivenness

Section 2.1 briefly introduced the energy context in which the UNDP/GEF Concentrated Solar Power Technology Transfer in Namibia (CSP-TT NAM) project was conceived. Energy security challenges have become urgent for Namibia over the past decade, arising from South Africa's inability to meet its own domestic demand, and its diminished capacity to export power to other countries in the southern African region. Against this background, the country has been making proactive efforts to develop this resource and develop its renewable energy industry.

At the time of writing the Project Document (ProDoc), Namibia had committed to the development of its renewable energy resources as articulated in the White Energy Paper of 1998, in which the Government further recognizes the important role renewable energy and particularly solar energy can play in the primary energy mix and energy security. The National Development Plan III (2007-12) set a target for 10% of the national energy demand to be sourced from renewable energy by 2012. Renewable energy power generation options are prioritised for the country's development agenda not only to address the lack of security of electricity supply but also as an important element in poverty eradication programmes, because energy is key to socio-economic development in the country and rural development in particular. Finally, during CSP-TT's implementation from 2014 to 2017) Namibia has further mainstreamed renewable energy as an important option in its energy policy and planning, as evidenced by the recent formulation and official endorsement by the Cabinet of the national (renewable) energy policies and electricity power plans (the reader is referred to Annex E.5 for a description of these recent policy and planning documents).

- Consistency with the GEF focal areas in Climate Change/operational program strategies of the GEF CC and with the UN and UNDP country programming in Namibia?
- Is the project aligned with the thematic focus of the UNDP Strategic Plan?
- How is the project relevant with respect to other donor-supported activities? Were lessons from other relevant projects properly incorporated in the project design?"
  (Annex D)

The UNDP Country Program Document (CPD) and United Nations Partnership Assistance Framework (UNPAF) 2014-2017 of the Government of Namibia and UNDP/UN identify 'energy and environment for sustainable development' as a key strategic point to support Namibia's long-term development aspirations. and that directly contributes to the attainment of the Sustainable Development Goals (SDGs) and sustainable energy for all (SE4ALL). Under the UNPAF, the UNDP-specific support for sustainable energy falls under "Environmental Sustainability and Climate Change" and it is mentioned that it will "focus on creating enabling conditions, and individual capabilities, synergistically and complementary, with existing national initiatives, for safeguarding Namibia's renewable and non-renewable resources to ensure that Namibia remain and sustain international and regional competitiveness by capitalizing on a nature-based economy".

The project, which aims at mitigating the impacts of climate change through the promotion of on-grid renewable energy in developing countries, is an element of the GEF-4 Resource Allocation Framework. The project idea responds directly to the aim of the Global Environment Fund (GEF) to promote low-GHG energy technologies, through the increased production of renewable energy in electricity grids.

UNDP comparative advantage

UNDP has been a trusted partner in Namibia in the design and implementation of sustainable energy projects in Namibia. From 2005-2010, the Government of Namibia initiated the UNDP/GEF Namibia Renewable Energy Programme (NAMREP), in order to accelerate the renewable energy market development, focussing on solar photovoltaics (on-grid, off-grid, solar pumping) and solar water heating. The project has contributed to the passage of new regulations supporting renewable energy (RE), to increased public awareness on RE, as well as to the establishment of financial products and platforms for consumer financing of RE technologies. NAMREP collaborated with the DANIDA-funded REEECAP (Renewable Energy and Energy Efficiency Capacity Building Program), implemented by the Polytechnic of Namibia. REEECAP worked on strengthening the capacity of its Renewable Energy and Energy Efficiency Institute (REEEI), efficient use of energy in low-cost housing, and capacity building on renewable energy, energy efficiency, and rural development. UNDP was also the GEF implementing agency of the Namibia Energy Efficiency Programme in Buildings (NEEP), which was jointly carried out by the MME and the of the Polytechnic of Namibia[23].

Linkages between project and other interventions

Before commencement of the project concentrated solar power (CSP) technology as a power generation option to mitigate Namibia's power supply shortages and security was relatively unknown. The emergence of CSP as part of Namibia's power supply options, and one that can be activated within a relatively short period is based on various interventions supported by Namibia's development partners, such as DANIDA, GIZ, and UNDP.

Lessons from other relevant activities or project

With support from the Energy and Environmental Program with Southern and East Africa (EEP S&EA), a *Pre-feasibility Study for the Establishment of a Pre-Commercial Concentrated Solar Power Plant* in Namibia was carried out by a consortium led by Gesto for the Polytechnic-REEEI on behalf of MME (Gesto, 2012). Based on the analysis of satellite irradiation and local data, the potential for CSP is assessed and suitable sites were identified. The study mentions that "CSP is a mature technology that can take advantage of Namibia's exceptional solar resource". Key elements in this pre-feasibility study were used in the formulation of the CSP-TT NAM project document.

The project design must also be seen in the framework of efforts to pursue CSP projects in the region, At the time for formulating CSP-TT NAM, a South African 100 MW CSP project was implemented by Eskom with funding from the World Bank, African Development Bank with further scaling up of CSP facilities being planned, while Botswana was undertaking a feasibility study on a 200 MW CSP plant (see also Annex E.1).

23 The Polytechnic has been renamed the Namibia University of Technology (NUST) and REEEI was absorbed in NUST's new Namibia Energy Institute (NEI)

4.2 Conceptualization and design

The design (and subsequent implementation) of CSP-TT NAM can be described as being a slow process. After the first concept was received by GEF in Nov 2009, it was included in its Work Program in May 2010 and got CEO endorsement in Dec 2012. It then took some time for the Project Document to be signed (July 2013), and a further year for the Project Manager to be hired and implementation to start in 2014.

4.2.1 Analysis of the project logic and strategy

- Were the project's objectives and components clear, practicable and feasible within its time frame?
- Does the project have a clear thematically focused development objective, the attainment of which can be determined by a set of verifiable indicators; Was the project was formulated based on the logical framework (project results framework) approach;
- Was the project's design (logframe) adequate to address the problems at hand? Was the project internally coherent in its design? Have any amendments to the assumptions or targets been made or planned during the Project's implementation? M&E design. Did the project have an M&E plan to monitor results and track progress towards achieving project objectives?
  (Annex D)

Analysis of the project logical framework

Target value of main indicators in the results framework and the project timeline

In the CEO Endorsement Request (CEO ER) and UNDP/GEF ProDoc, the emission reduction indicators' key target is not direct emission reduction (as a consequence of realised investments in the project period), but the target is achieving post-project emission reduction (that is, emission reduction as a consequence of construction and operation of a CSP in the post-project period). However, not all indicators in the log-frame reflect this. For example, realising investments in the project is still the target of Indicator 7. The PIR 2016 mentions that the progress indicators for this project (as listed in Box 4) were "in fact from an old version of the project logframe - one that should have been (but was not) updated to reflect subsequent discussions with the GEF Secretariat during the lengthy project preparation phase". This is a surprising statement as indeed there would have been sufficient time by UNDP during the protracted project preparation phase to sufficiently amend indicators to reflect a more realistic project design.

Also, the Mid-term Review (MTR, 2015) mentions that the indicators are *overly ambitious.* Given the typical size of the average commercial CSP project and the project preparation period (from concept, measurements, feasibility study, financial engineering to reach financial closure, detailed design, and construction, commissioning, to finally the production of the first kWh) is in the order of many years. The ProDoc itself thus already admits that to achieve construction of a large CSP plant in a three-year time frame as indicated in Box 16 is not possible and that no direct CO_2 reductions cannot be expected. In Chapter 5, arguments will be presented to show that even reaching the stage of financial closure in such a short period of 2014/15-2016/17 would be *very optimistic* for a project the size of 50-150 MW that employs a novel commercial technology, such as CSP, which would need site-specific solar data measurements of at least one year. The MTR rightly proposes to extend the project period with a year from 2016 to June 2017 to allow a full feasibility study to be finalised, but this seems to be based more on UNDP's expectations of the maximum extension period agreeable to the GEF Secretariat, rather than a realistic estimate of the timeframe needed to finalise a full feasibility study (including partnering, financial planning, contract and licence negotiations).

Outcomes and output indicators

If guided only by the Indicators of Box 4, the rating of results would be 'unsatisfactory' with the full feasibility study (including financial and business plan) of the first CSP only being halfway, with no construction of CSP starting immediately after CSP-TT's end, and with no other CSP projects even in the planning phase. However, this evaluation reports will argue that the target value where unrealistically defined and should have been corrected during project implementation to more realistic values and the report will demonstrate in Chapter 6 that the project has much more satisfactory achievements than what can be reported according to the initial log-frame's progress indicators.

A more fundamental flaw in the log-frame, apart from the target values, is that the type and definition of the indicators themselves is not sufficient to adequately describe project progress. The results of a project occur at various levels, i.e. impacts (higher-level changes aimed to be brought about with support by the project), outcomes (mid-level results, that are influenced by the project's efforts) and outputs (results what the project can and should deliver). The log-frame mainly gives indicators for the higher-level results, for example, GHG emission reduction (indicator 1) and financed or approved CSP plants (indicator 10), % share of CSP in the RE mix (indicator 2) and cumulative CSP power generation (indicator 11). Thus, the project design shoots itself in the foot by only reporting results whose realisation it does not or only indirectly influences. Also, the indicators are dependent on one another; if there is no CSP plant yet, that means that no investment has taken place, there will be no cumulative CSP power generation and obviously the % share of CSP in the energy mix will be zero. Many indicators can be derived from each other.

The log-frame would have been benefitted from indicators that reflect the different levels and stages in the project cycles process rather than just the end of the process. For example, a) number of sites with solar radiation data measurements (GNI, GDI), b) number of sites with pre-feasibility study (techno-economic, c) number of sites a full feasibility stage (detailed design, business plan), d) number of sites at financial closure and authorisation, e) number of sites at construction stage, f) number of sites with operational plants.

Mixing up components, outcomes, and outputs

Apart from the choice and quantification of indicators, equally troublesome in the design is that the placement of outputs under outcomes and that of outcomes under components seems hopelessly mixed up. For example, Component 2 deals with 'policy frameworks', while the associated outcome 2 of 'increased investment' does not refer to policy framework, and is closely linked with Outcome 3 'increased installed capacity', while Outcome 3 is put under Component 3 'financial capacity', which in terminology seems to be more linked with Component 2 (enabling environment). Component 1 is on 'CSP investment partnerships', while the progress reporting details activities that are more on capacity building (curriculum development) than on partnerships.

Of the important capacity building activities, the log-frame only gives one corresponding output (1.2: enhanced knowledge of applicable CSP) and which is actually more of an outcome than output and does not come with progress indicators. Not surprisingly, the real contribution of the project to CSP technical capacity building (curriculum development, technical manuals, workshops and number of participants) goes quite underreported in the PIRs.

Regarding the policy and regulatory framework, output 2.2 refers to 'planning and implementation in MME' and here, one would expect indicators regarding renewable energy policy formulation (and the role of CSP therein) and electric power planning. Instead, the ProDoc vaguely talks about selecting promising CSP sites, which is actually part of the site selection and solar data measurement outputs (2.1 and 2.4). To make the whole even more incomprehensible, the corresponding Indicator (#11: set of specific regulations promoting the development and operation of CSP plants) is put in Outcome 3.

Definition of indicators

Many indicators are not defined in an unambiguous way or are defined in such a way that do not make sense Some examples:

- Indicator 3 "Number of government-endorsed CSP partnerships established". Why should these be government-sponsored? What partnerships are we talking about? NamPower and a partner to jointly implement a CSP plant? Partnering of a Namibian with foreign academic institutions? Partnering of Namibian companies with foreign engineering or consulting companies?
- Indicator 8 reads' # of planned and approved projects approved by local finance institutions'. Why 'local' finance' and not any source of finance? Indicator 9 is worded slightly differently, but essentially means the same as indicator 8.
- Indicator 7 mentions '# of CSP investments facilitated and that are streamlined with REPM outcomes. What does 'facilitated' means and by whom? The ProDoc refers to REPM and NERF without clearly explaining what these concepts mean (and does not include these in the list of acronyms and abbreviations). Only when digging through the ProDoc, the Evaluator found that NERF stands for New Energy Regulatory Framework (NERF).
-

Box 9 Summary of the project objective, outcomes, and outputs in the first concept (PIF, 2010)

Project Components/ Outcomes	Project outputs	GEF budget (USD)
Objective: To increase the share of renewable energies in the Namibia energy mix by *developing the necessary technological framework and conditions for the successful transfer and deployment of CSP technology for on-grid power generation*		
Component 1: Establishment of CSP technology industry. Outcomes: • Technology partnership agreements are finalized foreign technology providers and Namibian partners including private sector, academia and government • Enhanced knowledge of applicable CSP applications in Namibia	1.1 National Technology Transfer Coordinating Body (CTTCB) is operationalised 1.2 Partnership agreements in place with at least two partners: (a)South- South and (b) North-South	50,000
Component 2: Market Policy Framework for CSP technology Outcome 2: • Approved policies supportive of CSP technology • A thriving CSP market in Namibia	2.1 Approved CSP investment guidelines 2.2 Approved CSP technical guidelines for grid quality	125,000
Component 3: Business Model and Financing Framework for CSP projects Outcomes: • Financing institutions/banks providing loans to CSP project • Increased number of CSP installations in the country	3.1 Approved package of financial incentives for CSP projects; 3.2 Tailored financing packages for CSP technology; 3.3 Established and enforced national CSP promotion strategies	125,000
Component 3: CSP Pre- Commercial demonstration plant Outcomes: • Improved confidence of the government and citizenry on the techno-economic viability of CSP • Several replications of the CSP plant	4.1 Detailed techno-economic feasibility reports 4.2 Demo CSP plant (5MW) built 4.3 O&M and performance reports 4.4 Technical performance manuals 4.5 Trained local technicians on the design and operation of CSP plants 4.6 Engineering curricula that incorporate CSP technology design and applications 4.7 Approved monitoring indicators for baseline mid and end-of-project analysis 4.8 Documented and disseminated project results	
Project Management / M&E		171,588
Total		1,718,000

To conclude, in the conundrum of the vaguely described design framework, it is difficult to report on the achievement of outputs and how these have contributed to achieving outcomes in a transparent and clear, well-defined way.

Capacity building vs. investment project

Maybe one reason for the confusing project results framework is that project designers have not had a clear focus. It is instructive to have a look at the original concept (PIF), of which the main elements are given in Box 9. The whole concept is centred on the idea of having a small 5 MW demonstration unit and the concept seems to assume that these type of small CSP units can then be replicated in a commercial way, provided that the regulatory framework has been strengthened, local finance mobilised and technical capacity built. Although not specifically mentioned, the idea is that local companies (with local financiers) could lead this effort as small-scale renewable energy IPP developers and that this process, once demonstrated, will attract global CSP player to establish large-scale, fully commercially viable, facilities.

It is realised during the project conceptualisation in 2010-2012 that the CSP technology diffusion process rather works the other way around. Unlike photovoltaic power, CSP is less scalable in terms of economics of scale, and globally there is a tendency to set up even facility of 15-100 M, either with investments by a national utility working with or by global CSP players and investors. Once these large often government-supported, have facility demonstrated the technical and commercial viability of CSP, and global investment costs have gone done, will this in future attract local (or regional) industry and companies to set up CSP plants as (smaller) IPP projects (and provided that the policy-regulatory framework is conducive for IPPs). For a more detailed discussion in the current status of CSP investments in the world, the reader is referred to Annex E.1.

<u>Assumptions and risks</u>

Compared to original PIF's, the ProDoc's project logical framework is adapted towards investment-type activities and activities are being moved around in the log-frame. For example, the demo experience is originally meant to help formulate an engineering curriculum (component 3). With the demo idea, out (replaced by a commercial CSP), the curriculum becomes a stand-alone activity but is then somehow 'hidden' in the outputs of Component 1 without the prominence it still deserves. Thus, we end up with a logical framework that is still pretty much of an academic type of R&D/demo-type of activities in concept but patched up with elements to make it look like more of an investment promotion type of programme. Thus, we end up with a non-convincing amalgam, in which the *assumptions and detailed risks*, in particular regarding the timeline and level of government support needed, are quite different for large CSP project than for a small CSP activity and especially the assumption of timelines becomes critical.

The designers of CSP-TT NAM did partly recognize that the concept should from the 5 MW R&D/demonstration-type CSP to a more commercially sized CSP facility of at least 50 MW. This should have gone together with re-thinking the timeline of CSP-TT NAM, realising that the lead time for setting up such a large CSP facility would be much longer. Thus, a demo facility may be built in 3 years, but constructing a commercial CSP plant, 10-30 times its size needs more time. Nonetheless, the designers try maintaining the original 3-year timeframe of CSP-TT NAM. The concept fails to mentions that feasibility and business plan formulation is a process that can take years of detailed design and difficult high-level negotiations between project partners and with government authorities and can go on well beyond the timeframe of CSP-TT NAM. Even setting up the necessary investment-grade measurements of solar data will take one year or more.

4.2.2 Management arrangements and stakeholder participation; replication approach

- Were the partnership arrangements properly identified and the roles and responsibilities negotiated prior to project approval? Were adequate project management arrangements in place at project entry?
- Are the project's targeted groups being systematically engaged, with a priority focus on the excluded and marginalized, to ensure the project remains relevant for them?
- *R*elevance of the project's objectives, outcomes and outputs to the different target groups of the interventions. Is the Project addressing the needs of the target beneficiaries?

The Project design envisages a **replication approach** where the lessons learned from building local capacity and fostering an enabling environment (regulatory, institutional) with financial will generate interest in investment in a small demo CSP and that the confidence obtained with demonstrating the first CSP will open the door for replication. As mentioned in the preceding section, this model is based on replication of a small 5 MW facility, as might be the case with other smaller-scale RE technologies, such as solar PV, and that will eventually attract investment on a large scale, However, CSP is a technology that, unlike solar PV, can only be implemented commercially with very large plants of over 50-100 MW.

The Project Document does define the main target **stakeholders** and their scope of involvement or level of engagement in project activities at all stages. The PIF mentions it works with German (or other) institutes, such as RENAC and SIJ (Germany) and possibly commercial CSP firms to have the 5 MW CSP demo facility. The description of the possible collaborative arrangement has not changed since the first concept (PIF). The Project Document mentions on its page 56: "the Renewables Academy AG as the provider of the technical training and overall capacity development; and Fraunhofer Institute ISE and/or Lahmeyer International as providers of technical expertise. The exact partnership structure and implementation arrangement of the plant installation will be decided based on the final choice of operator (whether SUNTEC Namibia (Pty) Ltd or another entity) and the investors involved. Further, if deemed appropriate and necessary the role of MME, NamPower and ECB on behalf of the Government of Namibia will be considered". The changing focus from capacity building and demonstration to commercial investment should have affected the choice of project partners according to the CSP business model needed. The size of investment is too large for local IPP developers or financiers and there was no approved IPP framework in Namibia at time of writing the ProDoc. Not surprisingly, no IPP has come forward and original co-financing partners (Suntec Namibia and the DBSA) quietly disappeared from the project's implementation.

Realising that in the large 50-150 MW segment the senior players are not Namibian industrial and financial entities, but global CSP industry, investment groups, and investment institutions with a prominent role to play for NamPower. However, as is the case with the logical framework, the project's institutional setup and stakeholder involvement stayed glued to the original demo facility concept. Given this context, it would have been appropriate for NamPower to take a prominent role in the investment related activities of the CSP-TT NAM project already at the design of the ProDoc. The Project Document leaves the discussion open on what partners need to be involved in investment undertakings and what business and finance model to use to the project implementation phase.

The Project Document should have discussed such **business and finance models** when discussing replication. One can imagine that after the first 100-150 MW CSP has shown technical and financial feasibility, this will open the field for broader adoption in which (maybe smaller-sized) CSP facilities are developed as IPP project. In such a context, commercial partners (foreign CSP developers partnering with Namibian and foreign investment partners) would set up an IPP company, with debt financing provided by foreign banks or development banks, which sells power, not only to NamPower but also to the REDs (regional electricity distributors) and other off-takers directly, in a market that would be transforming from single-buyer to a 'modified' single-buyer model.

4.3 Ratings for project design

Strangely enough, the UNDP/GEF rating requirements and criteria (see **Error! Reference source not found.**) do not include a '**rating on project design and formulation**', except for the item "M&E at design". This is surprising because the Evaluator argues (and has demonstrated in this Chapter) that 'design is one of the main factors, alongside 'implementation' and 'external factors' that determine the achievement of 'results.

In this report, ratings are given therefore for project design, and the overall rating is **unsatisfactory**, thus reflecting and giving a summary of the discussions in this chapter.

Box 10 Evaluation ratings of project design and formulation

Evaluation item	Corresponding section in the report	Rating
Design logic and approach; assumptions and risks	4.2.1 4.2.2	U
Formulation of the log-frame (choice and values of indicators)	4.2.1	HU
Lessons from other projects	4.1.1	MS
Stakeholder participation	4.2.2	S
Replication approach	4.2.2	U
Management arrangements	5.1.2	MU
Overall project design and formulation		**U**
M&E design at entry	5.4	U

5. FINDINGS: PROJECT IMPLEMENTATION

This part of the Evaluation Report describes the assessment and rating of the quality of the execution by the GEF Implementing Agency (IA), UNDP, and by the Executing Agency/Implementing Partner, MME. Building on the previous Chapter's critical look at project design and formulation, an assessment is made of the partnerships established and stakeholder interaction during implementation and the important role of adaptive management (changes in the project's design). The Evaluation Report presents an assessment and rating of the project monitoring and evaluation (M&E) plan design and implementation. A special section is dedicated to the budget, expenditures, and co-financing of the CSP-TT NAM project.

5.1 Adaptive management and arrangements

5.1.1 Changes in project design during implementation; feedback from M&E

- Describe adaptive management practices; How was UNDP and MME/NEI supervision and backstopping?
- Have there been regular reviews of the work plan to ensure that the project is on track to achieve the desired results, and to inform course corrections if needed?
- Has the project produced results (outputs and outcomes) within the expected time frame? Was project implementation delayed, and, if it was, did that affect cost effectiveness or results? If there were delays in project implementation and completion, what were the reasons? Did the delays affect project outcomes and/or sustainability, and, if so, in what ways and through what causal linkages?
  (Annex D)

Achievements of outputs by mid-2015

After signing of the Project Document (July 2013), it took a further year for the Project Manager to be hired and implementation started only in 2014, that is with an almost 1-year delay. One year thereafter by mid-2015, by the time of writing the first Project Implementation Review (PIR) and the Mid-term review (MTR), the project had made some progress:

- Providing inputs into the process of drafting the country's Renewable Energy Policy, by stressing the importance CSP as a priority into power planning, e.g. by incorporating a 125 MW CSP plant into the action plan of its National Development Plan IV (running until 2017);
- Establishing a CSP investment database (as a resource for Government and for interested private sector);
- Selecting three sites and installation of equipment for solar radiation measurements at these sites;
- Providing capacity building and networking workshops.

As discussed at length in the previous Chapter, the project design was over-ambitious with respect to the expected schedule. The concept design for the implementation of CSP in Namibia has gone through different stages, from an initial small pilot project of 5 MW to a wider project scope with deployment of large utility-scale (50-150 MW) CSP plants without looking critically at the (longer) time period needed to reach the EPC (engineering, procurement and construction) stage of such a large commercial venture.

One observation in the 2015 PIR is that many of the project's achievements by mid-2015 were essentially intermediate (i.e. workshops, solar data measurements), i.e. are means to an end, rather than an end goal themselves. The ultimate objective of the project, to develop a feasibility and investment plan for at least one CSP plant (let alone having a national rollout plan for more CSP facilities) seemed a distant prospect. The project was 6 months behind schedule, budget delivery standing at less than 30% and little progress seemed to have been made towards the central objective of the project, to prepare all of the groundwork - technical, administrative and financial - for the development of a CSP plant.

Changes in attitude towards CSP at policy and decision-making level in Namibia

The Mid-Term Review, therefore, gives the rating of 'marginally satisfactory' to the project's objective and its three components. It observes that "it is critical that a timeline be agreed with all project participants at the highest level and adhered to for all activities, in particular, those that are critical (ground measurement, techno-economic study, EIA, determination of local capacity and announcement of plans)".

It further mentions that "the assessment of project feasibility and the decision to proceed with CSP should be considered at the national level, involving the various Government stakeholders (MME, MoI, MoF, Nampower, etc.)". In this respect, the 'energy framework' in Namibia had been changing by 2015. Alerted by Namibia's looming power generation shortfall and the inability of neighbouring South Africa to ramp up power exports (as South Africa is facing load-shedding of its own), the Government position had been changing from a position of relative disinterest in renewable energy, to taking a more active interest in developing utility-scale renewable energy as a commercial option (in addition to conventional options, such as the Kudu natural gas project).

Here, the project did a good job of integrating itself into the apparatus of Government decision-making, as evidenced by the fact that development of the Renewable Energy Strategy was entrusted to the project. This has proven an excellent opportunity to highlight the fact that Namibia has the world's best solar energy resource and the potential of CSP in utilising this resource. Thus, the project has succeeded in placing CSP at the forefront of the Government's power planning strategy.

In tandem, the attitude of NamPower's management regarding CSP has changed. The 2015 PIR observes that a notable development is "the conversion of the state utility, Nampower, from an ambivalent (verging on anti-) CSP stance to one that is fully supportive of CSP and of the GEF-financed project. After a delay of one year, this culminated in the finalization of the agreement between NamPower and the Ministry of Mines and Energy". The responsibilities listed in the agreement makes NamPower the lead stakeholder responsible for carrying out the feasibility study for the CSP project[24].

5.1.2 Coordination and management arrangements

- How efficient are partnership arrangements for the project? Did each partner have assigned roles and responsibilities from the beginning? Did each partner fulfil its role and responsibilities? UNDP's supervision and backstopping. Was the project's governance mechanism (i.e., the PSC) functioning as intended?

The Mid-Term Review gave a rating of 'marginally unsatisfactory' for project implementation, giving project stakeholder satisfaction and lack of clear roles and responsibilities. On coordination and project oversight, it recommends that: 1) The presence of the PMU within NEI should be further exploited to make use of NEI's experience and resources, and 2) An operational-level meeting of the project participants should occur quarterly. Regarding work planning the MTR recommends that 3) An extraordinary meeting of the PSC should be called as soon as possible to lay out the work of the remaining months before EoP, and 4) the PMU and stakeholders should immediately develop a work plan with realistic but aggressive targets for the period until December 2016 (the then end-of-project date), prioritising the activities with the most important contributions

[24] The reader should note that the term 'feasibility study in the MoA (signed in February 2015) refers to a full feasibility (FFS) study, which includes solar resource measurement, the techno-economic Study (sometimes also referred to as" feasibility study" in a narrower sense), the environmental impact assessment (EIA). and other studies and activities needed to reach financial close of the project and start of construction.

to project outcomes. In this respect, the MTR observes that "it is critical that a timeline be agreed with all project participants at the highest level and adhered to for all activities, in particular, those that are critical (ground measurement, techno-economic study, EIA, determination of local capacity and announcement of plans)".

The project was being implemented by MME with the PMU hosted at NEI of the Polytechnic of Namibia with MME overseeing the use of funds and reporting to UNDP, the GEF Implementing Agency. In line with the above-mentioned recommendation of the MTR, it was agreed in March 2015 that the "project is to fall under the Polytechnic, and should be subjected to the rules and regulations of the Polytechnic of Namibia". Since then, project staff and financial accounts have by been managed by NEI, following the policies of the Polytechnic (now named NUST).

In the project management setup, the Project Steering Committee (PSC) is responsible for making management decisions for a project. According to the Project Document, the PSC will be responsible for:

- Achieving coordination among the various government agencies;
- Guiding the programme implementation process to ensure alignment with national and international policies, plans and strategies;
- Ensuring that activities are fully integrated with other developmental initiatives;
- Overseeing work of implementation units, monitoring progress and approving reports;
- Overseeing the financial management and production of financial reports;
- Monitoring the effectiveness of project implementation;

The PSC has been chaired by MME (Permanent Secretary) and has met about every 6 months (until the establishment of the TTT, as explained below). Members have been decision-making representatives from MME (Director, Deputy Director), NEI (Director), EIF (CEO), ECB, NPC and UNDP (Deputy Resident Representative) with PMU staff serving as secretary (Project manager) and rapporteur.

An Extraordinary PSC Meeting was organised in 2015 to offer strategic guidance towards fast-tracking project implementation. Following another recommendation of the MTR, a Technical Task Team (TTT) was established that would meet more frequently (at least every 2-3 months) with the PSC meeting less frequently and only when needed. Instead of having the standard semi-annual PSC meetings, the establishment of regular debriefings of the TTT with the PMU was aimed at fast-tracking project implementation and to achieve a more satisfactory progress.

The key objective of the TTT has been guiding the PMU on technical inputs, interfacing, monitoring and coordination of planning and execution of activities. Chaired by the MME, the participants have been more operational-level staff from the project partners, including the Deputy Director RE and the CSP MME Focal Point of MME, PMU members, Director of NEI, the Heads of projects and of RE of NamPower, the Regulations Technical Official of ECB and the UNDP contact person (Energy and Environment). The idea of the TTT was to support the fast-tracking of project implementation. The TTT met nearly monthly in 2015.

The project management succeeded in bringing NamPower on board, which was crucial from the viewpoint of commercial CSP development. However, some interviewees indicated that this, initially, also resulted in a lack of coordination among stakeholders, a lack of clarity in **communication** and confusion on the mandate and assignment of roles (PMU, TTT, NEI, NamPower) and expectations. This, in its turn, was reported to have led to time delays and a level of dissatisfaction among some of the project participants. The Evaluator notes that thereafter the project stakeholders and NamPower have been able to join their efforts on project implementation, but some communications issues have remained, such as the storage and exchange of information and documents between NEI and NamPower and the lack of one project website in which such information and knowledge is disseminated to the public at large.

5.1.3 Results of adaptive management interventions

In the before-mentioned Extraordinary PSC Meeting, the PMU was asked to draft a 'fast-track work plan'. The delivery of project outputs did increase remarkably during the reporting period of the second PIR (mid-2015 to mid-2016). By mid-2016:

- A full year of solar radiation measurements had been realised at the Auas, Kokerboom and Arandis sites.
- The formnulatioin of national policy frameworks (renewable energy policy, IPP framework; integrated resource planning; updated national energy policy) had been supported by the Project, and the process of government endorsement had started;
- The full feasibility study had started for the 100-150 MW CSP (an increase from the target size of 50 MW in the Project Document) with site selection (Arandis or Kokerboom), the solar mapping reporting, and the formulation of the techno-economic and environmental impact assessment in the process of being finalised.

Nonetheless, the ultimate objective of the project, to get the Government green light to go ahead, based on a sound business and investment plan, and reach financial closure for at least one CSP plant still seemed a somewhat distant prospect. Also, the business modality (whether it would be state-owned, privately-owned or a public-private partnership) was still under discussion. Given this state of progress of the full feasibility study, the CSP-TT NAM was granted a 1-year extension up to the end of June 2017. After securing this no-cost extension, the result one year after can be interpreted as being ambiguous. The above-mentioned studies (techno-economic, EIA study) were indeed finalised together with a macroeconomic study and a first CSP concept drafted for a 135 MW base-load facility with thermal energy storage at Arandis. But, the full feasibility study had only finalised Phase 1, that is was only **half-way** with the business plan (including finance and partnering), tender procedures and EPC contracting still pending.

5.2 Stakeholder involvement

- Did the project involve the relevant stakeholders through information sharing and consultation? Did the project implement appropriate outreach and public awareness campaigns? Which stakeholders were involved in the project (i.e. NGOs, private sector, other UN Agencies etc.) and what were their immediate tasks
- Did the project consult with and make use of the skills, experience, and knowledge of the appropriate government entities, NGOs, community groups, private sector entities, local governments, and academic institutions in the design, implementation, and evaluation of project activities?

Since its conception, the project's objective has changed from capacity building and technology transfer (only) with demonstration of a small pilot CSP facility (with local IPP participation) towards investment in the country's first large CSP plant whose implementation will be led by NamPower and international CSP players. Consequently, the stakeholders and targeted beneficiary groups have changed with local entities as junior partners providing local content rather than taking the lead.

Local content

The project has been engaging with the private sector to enhance its capacity for local content involvement in the CSP supply-chain, as well as closely involving the private sector in the CSP policy formulation process so as to ensure the policy environment is conducive to private-sector investment. For this reason, the CSP-TT NAM project has organised training workshops, participated in networking events and supported the integration of CSP in training manuals and curricula, as detailed in Chapter 3. It is mentioned in the 2016 PIR that "200 private potential entrepreneurs, ranging from developers, engineers, installers, manufacturers, financiers, etc., have undergone capacity development through project-organised initiatives as well as being exposed to networking with South-South and North-South partners for technology transfer".

Potential renewable energy supply entrepreneurs have identified an opportunity to broaden their businesses by providing local content and future solar energy projects developers (CSP, PV, and wind) will also find it easier to gather and select suitable potential sites thanks to project-supported solar and GIS data gathering and distribution. Researchers and students are now able to obtain training and research data on CSP (and solar energy) through the various training programmes and lectures offered by academic institutions with the support of project initiatives.

In the original design, the local private sector would play a pivotal role in providing investment financing, technical skills, materials and logistics to the small-scale CSP plants being planned by the Government, many of which will be implemented under a public-private partnership (PPP) modality. The MTR recommended that detailed study of the potential for local content should be undertaken and that development of local capability would play a role in the development of the tender documents of CSP plants. However, the decision on 'local content' (i.e. maximising the fraction of Namibian-manufactured CSP components manufactured or services provided by local consultancy and engineering services) is essentially beyond the scope of CSP-TT NAM and in the hands of the CSP plant owners and developers.

Thus, it is for NamPower to consider if and how preference for local content may be included in the tender for the Arandis CSP. While the issue of local content is an important one from a development perspective, the project will risk achieving little if it potential business and financial partners are shied away by adding local content requirements that would need allocation of additional time and financial resources. It will be a better strategy to have the experience of the first CSP in engineering, design, and construction and then, study the experiences in South Africa and Botswana, and then have a good local content study to see how this can be incorporated in future utility and IPP-led CSP development not only in Namibia but also at the sub-regional level.

<u>CSO/NGOs/indigenous people; local impacts</u>

CSP development has impacts on society. For example, there can be issues of displacement from selected plant sites and, in most cases, it is marginalised communities and women that are negatively affected. In this respect, it is worth mentioning that NamPower engaged the !Oe-‡Gân Traditional Authority in the land purchase[25] in 2012 for the establishment of power facilities, the Authority confirmed its support, provided that proper environmental management plans would be enforced and that the specific requirements of the Authority would be formalised in a MoU. Examples of such requirements are the incorporation of the !Oe-‡Gân Traditional Authority in the shareholding/ownership structure of the power facility (subject to bankability and Government approval), support to activities of the ‡Gainu Conservancy in the area (anti-poaching programmes, youth development, school programmes in the region, implementation of water points; employment of local people and setting aside small tenders for local entrepreneurs, e.g. local shops)[26].

One of the key issues for the region while considering a CSP program is the availability of water. Water consumption has an increased significance in a geography such as Namibia where the water availability is very low, and for that matter should be given priority for social uses, such as human consumption and farming (irrigation). The water requirements for a CSP plant are no different from the needs of conventional power plants, In light of the above, it was decided at the onset that any CSP plant proposed for Namibia must have a dry cooling technology, meaning that the water consumption for cooling can be considered negligible. Additional water will be needed for cleaning of the solar mirrors.

The Project developed a Stakeholder Engagement Plan and has initiated a number of processes to engage NGOs and civil society at all stages of CSP discussions. For example, a Stakeholder's Multilogue (on CSP market policy, financing, and entrepreneurial opportunities) was held with over 50 participants (Nov 2014).

[25] At other sites, the land use and ownership will be different. At Kokerboom, the facility will purchase form commercial farmers (the Evaluator was told when visiting the site that land prices have increased in the area).

[26] See Memorandum of Understanding, dated 11 September 2015

Gender

Gender aspects are not clearly identified in the Project Document, probably because gender mainstreaming did not figure that prominently in the UNDP ProDoc and GEF CEO ER templates at that time. In some initiatives being undertaken by the project (e.g. workshop participation), there is an explicit target of at least 40% or more female participation. However, the evaluation found little gender-relevant reporting, maybe also because the log-frame's progress indicators were not defined in a gender-sensitive way.

5.3 Project finance and co-financing

The financial resources that were requested and made available by GEF and the actual expenditures (until end of June 2017) are given in Box 11. The CDRs indicate that most of the GEF budget was spent (97%) by June 2017 and most was spent in budget categories (consultancy, contracted services, etc.) more or less in line with the budget as approved at CEO endorsement.

Box 11 UNDP/GEF budget and actual expenditures

	Approved budget	Expenditures				
		Total	2014	2015	2016	Jan-Jun2017
Consultants, travel, DSA	649,400	696,450	101,526	328,910	210,513	55,501
Contracted services	790,000	670,406	33,011	373,368	253,910	10,117
Materials and goods	203,000	212,424	23,096	108,853	79,378	1,097
Office supplies; communications	75,600	79,521	18,537	35,534	24,938	512
Miscellaneous; loss/gain		4,429	546	13,421	-7,002	-2,536
TOTAL	1,718,000	1,663,230	176,716	860,086	561,737	64,691

Note: The data are compiled from the *UNDP ProDoc* and the *Combined Delivery Reports* 2014, 2015, 2016 and the CDR Project Balance sheet July 2017.

Box 12 Committed co-financed and realised disbursements

	Cash		In-kind		Total	
	Committed	Disbursed	Committed	Disbursed	Committed	Disbursed
DBSA	350,000				350,000	0
Clinton Climate Initiative	100,000				100,000	0
MME	340,000	340,000			340,000	340,000
MME-National Energy Fund *)		836,000				836,000
NamPower **)		3,565,000			0	3,565,000
NamPower ***)		760,000				760,000
NEI			80,000	80,000	80,000	80,000
Total	790,000	5,501,000	80,000	80,000	870,000	5,581,000

Note: Data are compiled from the *GEF CEO Endorsement Request (ER)*, the PMU Co-financing Update (March 2015) and the NamPower *Concentrated Solar Power (CSP) Concept Note* (September 2016).

*) NAD 11,000,000 converted at USD 1 = NAD 13.16

**) Contribution from the European Investment Bank. EUR 1.3 million, converted at EUR 1 = USD 1.15

***) NamPower's contribution to project implementation

NamPower joined the project team and signed a MoA (Memorandum of Agreement) with MME in February 2015. The responsibilities listed in the MoA makes NamPower the lead stakeholder responsible for carrying out the feasibility study for the CSP project. The MoA included an updated budget, in which USD 1,000,000 of GEF funds (58.2% of the total GEF funds for this project) were allocated to the full feasibility study. The project partners recognised that even this allocation from the CSP TT project would be insufficient to conduct a full feasibility study and, hence, additional co-financing was procured for this purpose (as indicated in Box 13).

- Adequate resources have been mobilized to achieve intended results?
- Are project inputs procured and delivered on time to efficiently contribute to results?
- Did the project have appropriate financial controls, including reporting and planning, that allowed management to make informed decisions regarding the budget and allowed for timely flow of funds?
- Are the disbursements and project expenditures in line with budgets?
- Did promised co-financing materialize? If there was a difference in the level of expected co-financing and the co-financing actually realized, what were the reasons for the variance? Did the extent of materialization of co-financing affect project outcomes and/or sustainability?

Box 13 Summary table of co-financing

Co-financing (type/source)	UNDP own financing ('000 USD)		Government (MME, NAMPower and NEI) ('000 USD)		Private sector ('000 USD)		Total ('000 USD)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Grants			340,000	5,501,000	450,000		790,000	5,501,000
Loans/ Concessions								
In-kind support			80,000	80,000			80,000	80,000
Other								
Totals			420,000	5,581,000	450,000		870,000	5,581,000

5.4 Monitoring and evaluation

- Have there been regular reviews of the work plan to ensure that the project is on track to achieve the desired results, and to inform course corrections if needed?
- Is there regular monitoring of changes in capacities and performance of national institutions and systems relevant to the project? Is the project's M&E Plan being adequately implemented?
- Budgeting and Funding for M&E activities. Was M&E was sufficiently budgeted for at the project planning stage and whether M&E was adequately funded and in a timely manner during implementation.

Reporting

Regarding *quarterly reports*, the MTR report mentions that "reports are generally prepared and well stored. Reports need greater detail and greater focus on reporting actionable items. Conclusions do not seem to be drawn and used effectively for steering. The reports should include financial information and should have greater clarity on events being monitored and evaluated". The Evaluator has the opinion that the annual *Project Implementation Reviews (PIRs)* are informative and give a good overview of the results and progress in implementation and operational issues, although the presentation is a bit awkward as the information is presented according to outdated results framework (as discussed at length in Chapter 4).

M&E: design at entry and implementation

The Project Document provided an elaborate structure for Monitoring & Evaluation, which follows the 'standard' M&E Plan with a) inception activities (workshop, report), annual reporting (PIRs), project steering committee meetings, periodic status, financial and progress reporting, as well as audits, field visits and mid-term review and final evaluation reports. A total of USD 96,000 was allocated, about 5% of the total GEF budget, which is deemed sufficient for this type of projects.

The main shortcoming in M&E is not in the planning but relates to the faulty design of the set of outputs and progress indicators of the logical framework (see Chapter 4) and consequently it could not have been used as an effective monitoring tool, and in the inability or unwillingness by both UNDP and GEF to drastically change the log-frame according to the changing circumstance. Another issue mention by one respondent in the interviews was the changes in Country Office 'staff responsible for the Project, which may have affected M&E implementation and project oversight.

5.5 Ratings of project M&E and project implementation/execution

The project started with a delay of almost one year, but the project partners (UNDP, MME, NEI, NamPower) managed to progress under a fast track mechanism and has progressed the preparatory activities that would lead to the establishment of a 135 MW CSP plant, including investment-grade measurements and the first phase of the plant's full feasibility study. In the 2016 PIR it is mentioned by the UNDP Regional Technical Advisor "the study will still only be half-complete by June 2017, which is unacceptable". As co-financier, the CSP-TT NAM Project can influence, but in the end, the prospective CSP plant owner and investor, NamPower, will take the final decision on the full feasibility study, which is the. Given the size of the investments (about USD 1 billion, see Annex E) and the novel nature of CSP technology for grid-connected power supply, NamPower and the Government can be forgiven to take a cautious approach. As Box 17 explains, the tentative timeframe for the full feasibility study (including at least one year of investment-grade solar data measurements) is about 4-5 years. In other words, even if the project would have started on time in 2014, the full feasibility would still have not been finished by the CSP-TT NAM's project end (June 2017). On the other hand, one could have expected by this time for NamPower and MME at least to have taken a decision on to go ahead with Phase 2, which is currently still pending. Such a positive decision would have given some concrete assurance that the project will actually materialise.

There is a general surge in interest in utility-scale renewable power generation in Namibia, with a corresponding increasing interest in CSP, as evidenced by the recent drafting of the National Integrated Resource Plan and National Renewable Energy Policy. In these, CSP has emerged as one of the key options that are being prioritised, in such a way that the project-envisaged facilitation of a 50MW ha in the facilitation of the first commercial scale CSP of 135 MW (and the NIRP even mentions 250 MW in the near future up to 2030/35). Installation of such capacity will not occur during the project lifetime, *but the CSP-TT NAM project partners can be credited with have taken the necessary supporting steps for the future realisation of CSP.*

Regarding the **rating of project implementation and execution,** a rating of **satisfactory** accurately captures the 'fast-track' implementation progress that has been achieved in the past 2 years, acknowledging that **such a rating is a bit generous** in terms of capturing the cumulative situation over 2013-2017 in view of the slow, uncertain, implementation start in 2013-2014.

Box 14 Evaluation ratings of project implementation and execution

Evaluation item	Corresponding report section	Rating
Quality of UNDP implementation (adaptive management; finance; finance)	5.1-5.3	S
Quality of execution (MME, NEI, NamPower), coordination; adaptive management; stakeholder involvement	5.1-5.3	S
Overall UNDP implementation and implementing partner execution		**S**
M&E plan implementation	5.4	MU

Another concern is that with the focus on the full feasibility of the first CSP project, other aspects seem to have been put in the background. For example, little attention has been given to other post-project activities, such as the future role of NEI as the National Technology Transfer (TT) Coordinating Body and as a depository of the information and knowledge captured on CSP and the dissemination thereof through a CSP-dedicated website. The next Chapter 6 will discuss this in the see section on 'sustainability'.

6. FINDINGS: PROJECT RESULTS

6.1 Attainment of the objective and rating of results

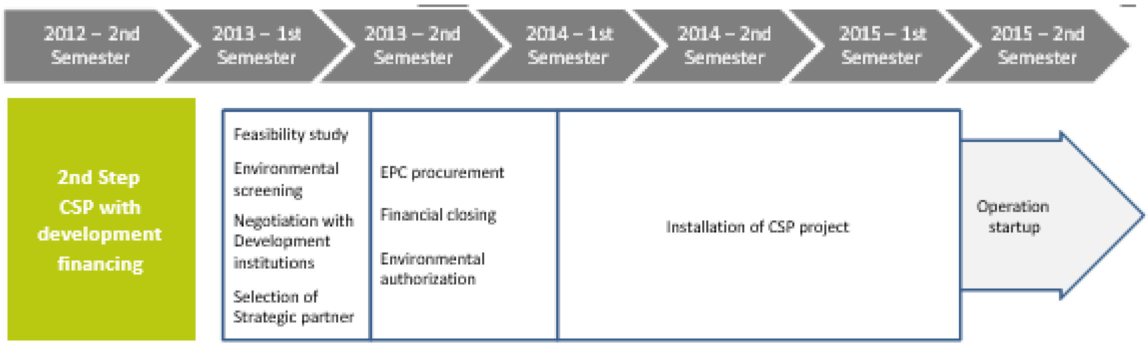
- Are the project outcomes commensurate with the original or modified project objectives? How do the stakeholders perceive the quality of outputs? Were the targeted beneficiary groups actually reached?
- Were there any unplanned effects? Which external factors have contributed or hinder the achievement of the expected results?
- Is the project proactively taking advantage of new opportunities, adapting its theory of change to respond to changes in the development context, including changing national priorities?

The project's objective has been to "increase the share of renewable energies in the Namibian energy mix by *developing the necessary technological framework and conditions for the successful transfer and deployment of CSP technology for on-grid power generation".* The indicator "percentage share of CSP in the power generation mix of Namibia" results from the "investment in CSP" (realised in the post-project period) from which another indicator, the "cumulative direct post-project CO_2 emission reduction" can be computed (see Box 15).

Box 15 Description of the objective's indicators

Indicator	Baseline	Target	Achievement Mid-2017
1. Cumulative direct post-project CO2 emission reduction resulting from the investment in CSP by end-of-project (EoP)	0	5.83 $MtCO_2$	N/A; See main text
2. % share of CSP in the power generation mix of Namibia by EoP	0	10%	N/A; See main text

As discussed in detail in Chapters 3 and 4, these indicators were over-ambitious and do not accurately reflect the objective of the project. In the Project Document, Figure 7 on its page 15 (reproduced here as Box 16) seems to indicate, in a very optimistic way, that a CSP plant could be operational by 2015. With more sense of realism, Annex 5 of the ProDoc states that "commissioning of the first CSP plan is not expected until after the completion of the 3-year CSP TT NAM project" (then scheduled to start in 2012 and to end in 2015). In other words, installation of such capacity would not occur during the project lifetime but the necessary preparatory steps for it could be expected to be realised during the project lifetime. Consequently, the logical framework of the ProDoc did not include *direct emissions.*



Box 16 Indicative timeframe for CSP investment as mentioned in the Project Document

The PIR 2016 mentions on its page 14 that "that should have been (but was not) updated to reflect subsequent discussions with the GEF Secretariat during the lengthy project preparation phase. The key development outcome of the project is, according to the CEO Endorsement Request that was finally endorsed, the production of a detailed feasibility study for a Concentrated Solar Power (CSP) plant in Namibia - rather than the construction and operation of a CSP plant". It remains somewhat ambiguous what this exactly means, e.g. there is signed EPC contract for construction, or does it mean there is an approved business and finance plan, by the end of the project? In any case, with the full feasibility study of the Arandis CSP (only) halfway, the 'soft' target of having financial closure or EPC contract signed before the end of the project has not been reached, in fact, not no formal decision to go ahead has been taken yet. Following this logic, *no direct post-project* CO_2 can be fully expected either, but in section 6.3.2 arguments will be presented in the section on emission reduction impacts to favourably consider post-project GHG emission reduction associated with the full feasibility stage (by making assumptions on the probability of reaching financial closure and the construction of the CSP in the next period 2017-2020).

By June 2017, only the first Phase of the full feasibility study was completed, including solar data assessment and measurements, multi-criteria and techno-economic assessment, and a concept of the CSP plant with technology (molten salts tower CSP) and site selection (Arandis) and with an environmental assessment. Phase 2 with project management and business planning, and financial engineering and the eventual engineering design, procurement and construction (EPC) is still pending.

One reason is the late start, implementation started only in earnest beginning 2015 with new project management arrangements and an agreement on the role of NamPower in the full feasibility study of a CSP plant).

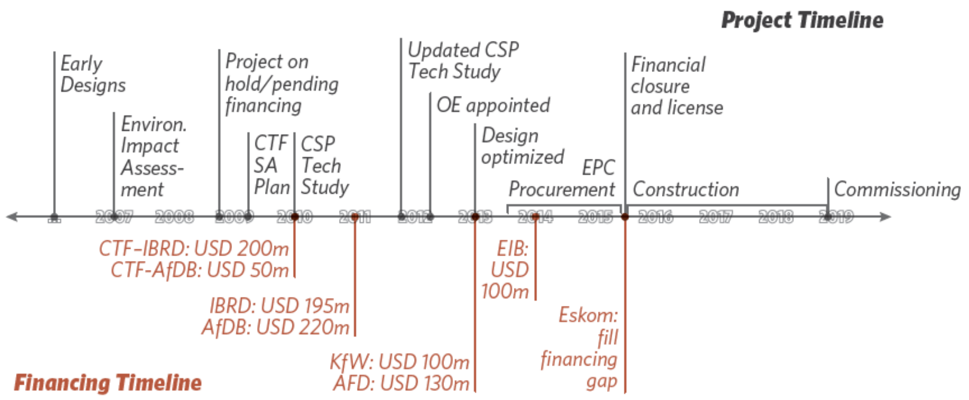
Box 17 Indicative timeframe of full feasibility study of the CSP plant at Arandis

Activities	2015	2016	2017	2018	2019	2021
Phase 1 (until end CSP-TT project, June 17)						
Solar radiation measurements in 3 sites	X	X				
MCDM, techno-economic report		X				
EIA study submitted to MET for clearance		X				
Final site selection (Arandis) and procurement of land		X				
Transmission connection water supply application cleared		X				
Phase 2 (after, June 17)						
Obtain NamPower Board and Government approval to proceed; obtain generation licence from ECB			X	X		
Procure partners and project agreements				X		
Conclude EPC tender documents; detailed design				X	X	
Procure funding and finance; financial closure					X	
Construction; commissioning (1.5-2 years)						X

Source: own estimate, based on the NamPower CSP Concept Note (2015)

The CSP-TT project was extended 2016 with one-year to June 2017 with the aim of finalising the full feasibility study (FFS). The possible timeline of the Arandis CSP Plant is given in Box 18, which shows the lengthy period from early studies in 2015 to financial closure in 2019 and commissioning in 2020-21, i.e. a timeline for the full feasibility study (from first measurements to financial closure) of about 5 years and. For comparison, the timeline of ESKOM's CSP plant in South Africa is given, which shows a 10-period of preparation and another 4 years to reach commissioning. In this context, it was not realistic to expect to FFS to be finalised and have reached financial closure or even EPC contracting in just one year after the CSP-TT project extension in 2016. However, one could have expected in in the one-year extension period, at the least to have obtained all the approvals by the Namibian authorities to go ahead with the second phase and business and finance planning activities to have started.

Box 18 Timeline of the ESKOM CSP facility near Upington



Source: Climate Policy Initiative (2014)

Given the size of the CSP (135 MW 1 billion), its prominent role in Namibia's power supply and the substantial investment (at a funding requirement of about USD 1 billion, see **Error! Reference source not found.**), it should be realised that decisions are not just simple techno-economic considerations, but require high-level decision-making at institutional level (MME, NamPower, ECB) with full Government support and, unfortunately, such high-level type of discussions tend to be time-consuming.

In Chapter 4, the internal logic of the project has been analysed. As support for the arguments of chapter 4, the Evaluator has reconstructed a theory of change diagram from the outcomes from the original ProDoc and the information gathered during the mission. The diagram, presented in Annex F, shows how outcomes and groups of outputs are logically connected and lead over time (from cause-to-effect) to intended outcomes and impacts. This theory of change logic has been used to re-draw the project's logical framework as to be better able to give ratings for the achieved results; this 'reformulated results framework' has been used by the Evaluator to be able to assess and rate the **results** of the Projects.

While the construction of such a large CSP plant will not occur during the project lifetime, one can say that project has been instrumental in laying the foundations for CSP in Namibia, by supporting several assessments

Box 19 Evaluation ratings of the project Outcome

Evaluation item	Rating	Comment / correspondence with sections in the report
Relevance	R	See section 4.1
Effectiveness	S	See section 6.1
Efficiency	MS	See section 6.1
Project results	S	Described in Chapter 3 and in Annex F
• Knowledge transfer, skills enhancement and information dissemination on CSP	S HS MS	See Annex F: • Knowledge transfer, skills enhancement, and information dissemination on CSP • Enhanced knowledge on solar data and on potential of CSP application in Namibia • Enhanced awareness and information dissemination on benefits and possibilities of CSP
• Governance capacity on RE and CSP strengthened	HS	See Annex F: • Policy-institutional-regulatory framework strengthened
• Facilitation of the first utility-scale CSP plant in Namibia	MS	See Annex F: • Full feasibility study of 50-150 MW CSP facility formulated and approvals obtained for construction of CSP
Overall project outcome	S MS	Overall project outcome and attainment of the objective: • Deployment of CSP technology • Necessary framework and conditions

that demonstrate the technical and economic feasibility of 100-150 MW facilities in Namibia and by ensuring that CSP has emerged in the electricity planning frameworks as one of the key options that are being prioritised by the Government. The conclusion is that project has become even more **relevant** than at concept stage, it has been implemented **effectively** (in terms of achievement of outcomes and the objectives that could be realistically attained according to a revised log-frame), but with serious doubt on project design. The latter has affected M&E negatively and the **efficiency** with which the project has been implemented.

6.2 Sustainability and risks

Sustainability is generally considered to be the likelihood of continued benefits after the project ends. Consequently, the assessment of sustainability considers the risks that are likely to affect the continuation of project outcomes (discussed in detail in Chapter 3 and the previous section 6.1). Five main areas are considered in this section and then rated as to the likelihood and extent that risks will impede sustainability.

- Are risks to the project adequately monitored and managed? Is the transition and phaseout arrangements are reviewed regularly and adjusted according to progress (including financial commitments and capacity)?
- Financial risks. Are there any financial risks that may jeopardize sustainability of project outcomes? What is the likelihood of financial and economic resources not being available once GEF assistance ends? Was the project successful in identifying and leveraging co-financing?
- Socioeconomic-political risks. Are there any social or political risks that may jeopardize sustainability of project outcomes? What is the risk that the level of stakeholder ownership (including ownership by governments and other key stakeholders) will be insufficient to allow for the project outcomes/benefits to be sustained? Do the various key stakeholders see that it is in their interest that project benefits continue to flow? Institutional framework and governance risks. Do the legal frameworks, policies, and governance structures and processes within which the project operates pose risks that may jeopardize sustainability of project benefits?
- Environmental risks. Are there any environmental risks that may jeopardize sustainability of project outcomes? Are there any environmental factors, positive or negative, that can influence the future flow of project benefits? Are there any project outputs or higher-level results that are likely to affect the environment, which, in turn, might affect sustainability of project benefits?
  (see Annex D)

Technological sustainability

The CSP project will use one of the two technologies proven as per bankability criteria from senior lenders in project financed environment, namely central receiver (tower) or parabolic trough technology. The project tender specification should be wide enough to include major players in CSP market, providing optimal solutions to meet performance requirements, through a competitive bidding process. Internationally, the cost of CSP tends to go down. IRENA mentions CSP as one of the technologies with the largest cost reduction to the year 2015, alongside solar PV and wind. The overall capital cost reductions for parabolic trough plants by 2025 could be between 20% and 45%, and for solar towers, the cost reduction potential could be as high as 28% (compared to 2010-11 levels). This means that by 2025, solar towers could be producing electricity for between USD 0.11 and USD 0.15/kWh on average[27].

Governance and policy risks

Starting from a position of Government disinterest in utility-scale RE technology, and wait-and-see opposition from the state utility, NamPower, the Project has been instrumental in placing CSP at the forefront of the Government's power planning strategy. A comprehensive RE and IPP investment policy and regulatory framework has been put in place (as explained in detail in Annex E) that is inclusive of CSP targets. The

[27] *Renewable Power Generation Costs in 2014* (International Renewable Energy Agency, 2015)

Government has prioritised CSP amongst the top 3 options in ensuring energy security of supply in the country and has committed itself together with the national power utility in facilitating the development of the first 135 MW CSP plant in the country.

Namibia is enforcing a regulatory policy of ensuring cost reflective electricity pricing and tariffs[28]; as well as recently the country introduced an environmental tax on carbon emitting fuels. All these interventions will contribute to making CSP development more competitive. On capital cost, the analysis of the Arandis plant (see Annexes E.3 and E.4) gives levelised cost of energy estimates of around USD 0.15-0.17/kWh, which would be slightly higher than the cost expected cost of energy imports at peak times in 2017-2018 of around USD 0.11-0.165/kWh[29], but offering the advantage of energy security and improved balance of payments. In 2016-17, some NAD 2.6-3 billion was leaving the country for energy imports[30]; a 135 CSP facility would save about NAD 0.9-1.2 billion by displacing imported electricity. Thus, even at relatively high investment cost, the project will proceed if the Government determines that, strategically, the project is of importance to create a sustainable power supply, to promote development of industry in Namibia and as a means of ensuring energy security of supply.

Environmental sustainability

An environmental impact assessment (EIA) was conducted in accordance with both local legislation and international standards and these studies included also climate change impacts and risks assessment. As the CSP plants are developed in the water-scarce regions of Namibia, any new CSP facility will make of dry cooling technology to reduce water consumption and its environmental impact. Future projects may benefit from global R&D the reduction of water usage in both steam/power generation and mirror cleaning.

Financial risks

Financial barriers are the most important in developing CSP market due to high investment costs. Risks include reduced private sector or foreign investor interest as a result of an economic slowdown at the national or regional level and higher-than-expected capital cost of the CSP facilities. Development banks are a natural option for the funding of RE projects since they have experience in long-term concessional lending and they have one of their overarching goals is the promotion of sustainable development. The highly capital-intensive nature of the project also implies high initial interest payments, particularly where the debt principal payments are sculpted to enable a minimum DSCR (debt service coverage ratio) to be met.

Local financiers (DNB and EIF) are now ready to finance RE on-grid developments (e.g. DNB is involved in smaller IPP PV projects), in which DNB absorbs the political risk. However, given the size of investments needed, local financiers can participate, but as junior financing partners, and most of the financing will be received from international financing institutions, whose loan structures would provide much-reduced interest cover requirements. For example, the ESKOM 100 MW CSP plant in South Africa has received concessional financing from several development banks (such as African Development Bank, World Bank and European Investment Bank, Kreditanstalt für Wiederafbau); the smaller Bokpoort 50 MW CSP is implemented as an IPP project by a private developer with South African investment groups and debt financing by local banks. International climate financing (such as the Green Climate Fund) could further help reducing the high upfront cost of financing CSP projects[31]. To cover the political risk and attract financing at a reasonable cost, it will be necessary that a clear risk package will be agreed with the Government of Namibia, with required support captured in an Implementation Agreement.

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[28] Tariffs have been increasing by about 11-15% annually over 2011-2015 and may double over the coming period 2016-2019 (Schütt, 2016) to compensate NamPower dfor the necessary investments in maintaining and upgrading the power infrastructure. In 2016, the average retail tariff was about NAD 1.86 (or USD 0.113) per kWh.

[29] NamPower, *Study of the Macro-Economic Impact of CSP Plant for Namibia* (2017)

[30] Windhoek Observer, 22/04/2016 and The Patriot, 24/02/2017

[31] AFD-EU RECP *Study on Conditions for Development of CSP Projects in Southern Africa* (Dec 2014).

Other risks are related to the macroeconomic environment such as currency, inflation and interest rate risks. In particular, foreign investors will be subjected to exchange risk, if the purchase power agreement is denominated in NAD (Namibian dollar). One of the main reasons for such concern is because the NAD is linked to South Africa currency (Rand), which is highly liquid and volatile.

All the power produced by the Arandis CSP will be sold to NamPower through a long-term PPA. This is expected to create a secure revenue stream sufficient to support all the plant's costs, including debt servicing, operational commitments, and investor returns. Substantially, all commercial risks (price and volume of power sales) are thus expected to be a pass-through for NamPower. Therefore, one financial risk is related to NamPower's credit rating and possible defaults on PPA payments. The rating agency Fitch rates NamPower as 'BBB-' with a stable outlook[32]. NamPower has strong legal, operational and strategic links with the state of Namibia, including direct government guarantees for part of NamPower's debt. However, the Fitch report expresses concern about the willingness and ability of government to cover PPA payments in the case of default by NamPower. To cover this risk, the Government should provide a direct financial undertaking for the project to secure its finance-ability or directly guarantee NamPower's obligation under the PPA.

Capacity and institutional sustainability

Researchers and students are now able to obtain knowledge on CSP through the various training programmes and lectures offered by academic institutions that have been formulated with CSP-TT NAM support. About 200 private potential entrepreneurs, ranging from developers, engineers, installers, manufacturers, financiers, etc., have undergone capacity development through project-organised initiatives and/or have participated in networking with South-South and North-South partners on technology transfer. However, with no detailed CSP design and construction taken place yet, there is a danger that the knowledge and skills accumulated will dissipate over time again, if not put to practical use.

One expected outcome of the project is that training, knowledge capturing and technology transfer (TT) continues after the project end. The Project Document aims to have the Namibia Energy Institute (NEI), function as a post-project Technology Transfer Coordinating Body (CSP TT CB). The Centre would be a networking hub for CSP development in Namibia and work with local and international CSP technology/services players to identify opportunities, monitor the trends, follow new developments and support the strategic positioning of local players in the CSP development.

However, these activities are at the risk of not being sustainable. A project report mentions that "NEI is understaffed and does not have the necessary skills base to effectively support CSP technology development in Namibia. The low staff complement illustrates a clear need for more skilled staff for NEI to undertake the current activities and future activities." The report recommends that NEI-TTCB can "provide services, such as intellectual property rights, networking[33] and partnership negotiations, weather data and power plant measured data analysis, feasibility and lifecycle assessment and analysis in exchange for soliciting the support of the industry for the long-term sustenance of NEI as a CSP TT Coordinating Body".

Box 20 Evaluation ratings of sustainability

Evaluation item	Rating
Governance and policy	L
Technological and costs	L
Financial	L
Capacity and institutional	ML
Overall sustainability	**L**

The original CSP-TT NAM project design envisaged a market of smaller CSP projects operated by a number of local IPP players that would benefit from outside and

32 Namibia was assigned by Fitch Ratings a long-term foreign currency rating of 'BBB-', and a long-term local currency rating of 'BBB' both with a stable outlook as a result of a stable policy environment and sound macro-economic fundamentals (2014, 2015)

33 NEI could work in strategic alliance with institutions such as South Africa's Stellenbosch University's Centre for Renewable and Sustainable Energy Studies, Solar-Institute Jülich (SIJ) in Germany, MASEN in Morocco".

technology transfer, e.g. from NEI-TTCB in setting up IPP projects and dealing with authorities and with NamPower as the power off-taker. In reality, the CSP market and technology development will be the other way around. Rather than starting with smaller, demonstration type projects, CSP in Namibia will be jumpstarted by one or more large-sized commercial, CSP projects set up by large national and international entities, i.e. the national utility NamPower partnering with global CSP industry. The question then is what the role of NEI is as TTCB, since NamPower can acquire knowledge and technology transferred directly from the international partners it works with and the engineering companies it will subcontract.

One way to use the services of NEI is as a depository of information, but this will require good coordination and communication between the two institutions at an organisational level and between staff at a personal level. As reported in Chapter 5, there have been communication issues between NEI and NamPower[34].

6.3 Impacts and mainstreaming

- Are there indications that the project has contributed to, or enabled progress toward, reduced environmental stress and/or improved ecological status?
- How did the project contribute to GHG emissions reduction within the project implementation cycle and beyond?
- To what extent the project was successfully mainstreamed with other UNDP priorities, including poverty alleviation, improved governance, the prevention and recovery from natural disasters, and gender. To what extent did the project actively incorporate gender mainstreaming into project development and implementation? Are social and environmental impacts and risks (including those related to human rights, gender and environment) being successfully managed and monitored in accordance with project document and relevant action plans? Are unanticipated social and environmental issues or grievances that arise during implementation assessed and adequately managed, with relevant management plans updated?
- Are the project's measures (through outputs, activities, indicators) to address gender inequalities and empower women relevant and producing the intended effect?

The findings related to outcomes (Chapters 3 and section 6.2) and sustainability (see section 6.3) provide insight as to whether the project has put in place the conditions (building blocks or process) that could eventually lead to impact (lasting improvements on socioeconomic and environmental status) and to identify key missing elements that may likely to obstruct further progress.

6.3.1 Policy and regulatory framework for renewable energy and IPPs

The CSP-TT NAM project contributed to drafting the Renewable Energy Policy, IPP Policy, Namibia Integrated Resource Plan and Updated Energy Policy that were either recently endorsed or are in the process of getting Government endorsement. Thus, the CSP-TT NAM has been instrumental in not only mainstreaming CSP but in providing inputs in conducive investment framework for renewable energy in general (see Annex E.5 for details).

6.3.2 Energy savings and greenhouse gas emission reduction

<u>Direct emission reduction</u>

Since commissioning of the first CSP plant is not expected until after the completion of CSP TT NAM project, no direct emission reductions neither expected on this project nor were these claimed in the ProDoc.

[34] One example of this is the project's website or, actually, the lack of a project website. Both NamPower and NEI have a webpage dedicated to CSP with information scattered over the two webpages without these even being linked to each other.

Direct post-project emission reduction

Since the project does include investment-support activities that would directly result in GHG emission reductions after the completion of the Project, direct post-project GHG reductions are expected and estimated in the Project Document. However, the ProDoc bases the calculates on three 50 MW facilities over a 10-year period. This report follows a somewhat different calculation method. It is assumed that the Arandis 135 MW will get constructed and become operational at around 2020-21.

Box 21 Direct and indirect greenhouse emission reduction

Post-project GHG emission reduction	
135 MW	Capacity CSP plant Arandis
20 yrs	Emission reduction period
0.980 tCO2/MWh	Cee UNFCCC-CDM (2013)
746,474 MWh/yr	See Box 13; average of energy production CT aand PT CSP plant
14,929,470 MWh	Cumulative over 20 years
14.63 MtCO2	Cumulative GHG reduction
10.97	75% Probability factor
Indirect GHG emission reduction (bottom-up)	
135 MW	Capacity CSP plant Kokerboom
709,150 MWh/yr	95% of Arandis production
14,182,997 MWh	Cumulative over 20 years
13.90 MtCO2	Cumulative GHG reduction
8.34 MtCO2	60% Influence factor
Indirect GHG emission reduction (top-down)	
250 MW	Considered in NIRP 2026-2035
27.80 MtCO2	based on Kokerboom GHG
13.90 MtCO2	50% Causality factor

It is assumed that the electric energy produced basically replaces energy imported through the Southern Africa Power Pool (SAPP). Largely based on thermal stations burning fossil fuels (coal), it has a high grid emission factor of 0.98 tCO_2/MWh[35].

At this point in time, it is not exactly known if the CSP plant will use tower (CR) or parabolic trough (PT) technology, so an average value is assumed for its energy production estimates (see Annex E for details of the calculation). Unfortunately, at this point in time, the full feasibility study is only half-way and there is no full assurance that the Arandis plant will be built and this expressed here by multiplying the GHG emission with a probability factor of 75%.

Consequential GHG emission reduction

Consequential (or indirect) emission reduction will result as a consequence of the broader adoption of CSP technology through replication and scaling-up (as explained in the theory of change diagram, see Annex F). These can be estimated in a **bottom-up** or **top-down approach**. In the bottom-up approach, it is assumed that first CSP facility is replicated, most logically by assuming the construction of a second plant at Kokerboom (replication factor of 100%). However, the preparation and decision-making are the results of the CSP-TT NAM's intervention and CSP mainstreaming, but cannot be fully attributed to it, hence an *influence factor* is applied (multiplying the expected GHG reduction with this factor, 60%). Top-down GHG emissions are calculated by looking at the various scenarios presented in the National Integrated Resource Plan (NIRP). Compared to the baseline, a capacity of 250 MW CSP might be operational by 2035 (in addition to the Arandis plant). Since these NIRP-indicated investments would be taken place during 2020-2035 even without a GEF intervention (baseline shifts), the GHG emission reduction is multiplied by an assumed GEF *causality factor*, which indicates to what degree the GEF intervention can claim causality for the reduction (50%)

[35] *Standardised baseline, Grid Emission Factor for the Southern African Power Pool* (UNFCCC-CDM, ASB001, 2013)

6.3.3 Other impacts; gender mainstreaming

Two studies have looked into the socio-economic and environmental impacts, namely the Afromach report (Aug 2016) and the macro-economic study commissioned by NamPower (2017). According to these studies the construction of a 125-135 MW CSP plant will have the following impacts:

- Increase in the gross domestic product (GDP) during construction (2 years) of 0.8-1.1% GDP (NAD 2.1-3.0 billion) and during operation with NAD 1.0-1.4 billion annually)'
- Increase in employment during construction of 0.7-1% (8,645-13,166 FTE person-years) and 0.03-0.04% annually during operation (211-260 FTE person-years), which in its turn will have a positive impact on the household income of between NAD 790-1020 million during construction and NAD 38-41 million annually during operation.

In terms of gender opportunities, it is foreseen that if no specific policies and training of women occur, the job opportunities will mostly be limited to the indirect jobs where women are already present. This Evaluation suggests that specific policies and measures are taken to provide incentives for women to be part of the work force involved in the direct jobs.

6.3.4 Catalytic effects; replication

- Describe any catalytic or replication effects: the evaluation will describe any catalytic or replication effect both within and outside the project. If no effects are identified, the evaluation will describe the catalytic or replication actions that the project carried out
- Is the project sufficiently at scale, or is there potential to scale up in the future, to meaningfully contribute to development change?

As shown in the theory of change diagram of Annex F, the broader adoption and behavioural change are based on the proven feasibility of CSP technologies/approaches. The broader adoption builds on the demonstration of the first, commercially sized, CSP facility (see Annexes E.3 and E.4) and the establishment of a favourable policy, legal and regulatory framework (see Annex E.5). Desired behavioural changes encompass the increase of political will to support RE development, mobilization of local and foreign private sector investments and the trust of financial entities in the feasibility of CSP.

This will result in a portfolio of potential CSP projects in Namibia, in which the experience of the first CSP at Arandis will be replicated to other sites, notably the other two sites at which investment-grade solar data measurements are taken place, Kokerboom and Auas. The solar data analysis reports by Solargis (2016) and CSP Services (2016) indicate also excellent solar energy potential (see Annex E.2).

It is interesting to note that the technology diffusion model has been different than expected at the time of formulating the CSP-TT NAM project around 2010. The expectation was to start CSP market development with small, pilot-type of CSP facilities, by local private sector and investors, that would sell power as IPP to NamPower as off-taker. The first 5 MW sized project would then be replicated to three or more, maybe, larger CSPs. Such local players would need the support of a neutral capacity building and technology transfer body and appropriate financial services. The first design (see PIF, Box 9) was based on this. No doubt influenced by the rapid market development of CSP at the global and sub-regional levels, the investment target shifted towards larger investments (50 MW target, see Box 4) and, as it turns out, the technology diffusion model seems to have worked the other way around. The CSP market in the region (South Africa, Namibia) is now jump-started by one or more large 100-150 MW CSP plants are set up by utilities (ESKOM, NamPower) and/or large investors. Facilitated by an appropriate IPP policy and regulatory framework, this might open up the market for smaller investments (50-100 MW) by IPP operators, if the global cost of CSP investment will go down.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 General conclusions

After the first concept was received by GEF in Nov 2009, it was included in its Work Program in May 2010 and got CEO endorsement in Dec 2012. It then took some time for the Project Document to be signed (July 2013), and a further year for the Project Manager to be hired. Only beginning 2015, the project's management was adjusted with MME leaving implementation to the NEI of NUST and with NamPower taking the lead in the activities associated with the full feasibility study of a 135 MW CSP facility. Thus, the project had a late start, because of the time required to bring all stakeholders on board in a working implementation arrangement.

Not surprisingly, the project was well behind schedule of delivery of outcomes and outputs, until it started 'fast-track' implementation of activities by mid-2015, which after two years have resulted in:

- Investment-grade solar data collection over at least a one-year period (measurement started mid-2015 and are planned to continue over a 3-year period) with techno-economic feasibility and socio-economic and environmental impact assessment, based on a 135 MW CSP plant;
- Support to formulation of policy frameworks that are conducive to investments in renewable energy in general and that highlight the potential of CSP;
- Actions in building local CSP technology capacity and technology transfer amongst local professionals (formulation of CSP modules in academic renewable energy curriculum and in short professional training courses; promotion of North-South and South-South partnership and networking with academic institutions, utilities, and industry)

Unfortunately, it is difficult to rate the above-mentioned progress towards achieving outcomes and outputs against indicators in the log-frame. One reason is that the original design is based on a description of CSP market development that is different from what has actually happened. The first design, as described in the PIF, is based on the idea of stimulating CSP technology application by means promoting demonstration of CSP facilities in the market segment of small sized (5-10 MW) demonstration facilities (setup with local industry and engineering service companies similar to solar PV projects) and in which NEI will function as an advisory centre for the local industry players for knowledge capturing and North-south and South-South CSP-relevant technology transfer. The government would have to strengthen the enabling environment for CSP and IPPs and this would entice larger investors and developers.

The institutional-political environment had moved by 2015 from starting from a position of Government disinterest in CSP and wait-and-see position from the state utility, NamPower, towards long-term government support for CSP (and for utility-scale RE power in general), as evidenced by the recent formulation of a RE and IPP policy framework with an Integrated Resource Plan. The Project has been instrumental in providing inputs into this process and placing CSP a forefront position in the Government's power planning strategy. Worldwide, the installed capacity of CSP has expanded rapidly with plants of above 50-100 MW to reach economics of scale in the cost of energy production. Thus, already the time of project formulation (ProDoc) the idea was already shifting towards promoting from a 5 MW demo-type facility towards a commercial CSP facility the size of 50 MW (or more).

Against this background, the Government has opted for constructing a 135 MW CSP facility and in the market segment of commercial 50-200 MW plants, the CSP industry players are different. Investors or developers are typically national utilities and/or large international investment groups working with international financial institutions and large commercial banks, in which the role of local industry at best is to provide local content in equipment and services and local banks as junior partners in the financing. Technology is not transferred through a local knowledge centre, but directly by from the global CSP industry partners involved.

The project concept as described in the ProDoc was not updated to reflect these fundamental changes and the internal logic was not in accordance anymore with the changing project environment. Thus, the progress indicators of the log-frame describe situations that are relevant anymore or provide target values that are not realistic. For example, the important indicator of realised investment in CSP (and linked indicators such as GHG emission reduction) is changed from 5 MW in the project concept (5 MW) to 50 MW in the project document to 135 MW in the progress reports (PIRs) without changing the much longer timeline associated with the preparation of the CSP plant investments (from concept to construction). Thus, it can be reported that progress is 'moderately satisfactory' (or even 'moderately unsatisfactory') because the full feasibility study of the 135 MW plant is only half-way, but we should consider that the preparation period of an investment a 135 MW commercial plant will be obviously much longer than the CSP-TT NAM's period. The Evaluator has the opinion it would have been a long shot to reach financial closure already in the 2 years after the full feasibility for the CSP started in earnest (2015) and thus it can be expected that the full feasibility is not finished or even half-way. However, one could have expected that in the one-year extension period to have at least obtained all the necessary approvals by the Namibian authorities to go ahead with the next second phase and that the business and finance planning activities would have started.

7.2 Lessons learnt

UNDP and GEF: Project design and implementation

1) One lesson learned is that results frameworks (log-frames) need to be well-designed if to be used for sequencing and programming of project activities and to assess project performance. Main feedback for adaptive management has come from the info provided in annual reports (PIRs), mid-term review and formal and informal discussion between project partners. The quality of the results framework (log-frame) of the ProDoc was such that it has been of little use as an M&E tool and thus tracking progress has been difficult. It is surprising, therefore, that UNDP has not intervened in M&E by updating at one point in time the results framework according to the facts on the ground so that the progress in implementation and results could have been reported in a more realistic and accurate way[36]. The flaws in project designs and, worse, inability to change the concept according to reality, can be considered as 'worst practice'.

2) In the case of grid-connected renewable energy, one could distinguish between small systems (e.g. from 1 to 10 MW), medium-sized facilities (10 to 50 MW) and large facilities (over 50 MW). Large projects often are commercially viable and set up through a negotiated process, in which IPPs typically can submit unsolicited project proposals. Medium-sized and small-medium projects are often organised through competitive tenders or licenses can be applied for in (unsolicited) individual IPP applications. These are often not fully competitive against conventional power generation options and therefore benefit from feed-in tariff schemes (and IPPs are given a license by the power regulator following a standard purchase power agreement that defines the feed-in tariff). A different category is formed by mini and micro-sized systems, often used in local grid or mini-grid systems (0.01-1 MW) and individual off-grid systems (such as solar PV systems). The definition of categories and size may differ per country and technology. When dealing with power generation by renewable energy, it is important to take into account the various market segments that each have different market players, face different gaps and barriers, have different technical and financial support needs, and in which investment decision and preparation take place according to differently sized timelines. Project design should state clearly what market segment is targeted and is served with what type of policy and financial instruments. If the target group changes over time, project design should not stay the same but change accordingly.

[36] For comparison, the Evaluator has drafted a 'results framework at evaluation' (see Annex F). If a similar log-frame had been 'reconstructed' by UNDP during project implementation (rather ex-post at evaluation), it could have been used as a tool to improve project implementation / execution, achievement of direct outcomes and get a better view on sustainability, replication and up-scaling issues. The 'reformulated framework' is used in this report as a basis for rating the project's results.

3) The timeline of RE investment can be quite long a period from concept to actual construction and operation, depending on market segment and technology, and in the case of large investments, can be longer than the timeline of a typical GEF project. In the example of CSP-TT Namibia, it turns out that the process of getting the first 135 MW CSP plant from conceptualisation, to getting investment-grade solar data, feasibility assessment to business and finance planning can easily take 4-5 years or so, longer than the period of GEF support (3 years in this case). This creates an issue when investment and related energy production and GHG emission reduction is an important progress indicator, i.e. when the investment preparation period is longer than the GEF support period, there is no assurance that the plant's construction will take place and that direct emission reduction can be claimed.

Namibia and CSP technology application

4) Namibia is a vast country blessed with a solar resource which is unparalleled to many other sunny places. With thermal storage include, a CSP plant can operate outside of daylight hours supporting a peak, mid-merit or base-load demand profile. Thus, CSP can provide a clean and renewable solution for flexible and dispatchable power. In addition, the large CSP plant in Arandis will generally have positive social, economic and environmental impacts, including local job creation and opportunities for companies to provide local content. CSP is still relatively expensive vis-a-vis other power generation options. The techno-economic feasibility analysis gives estimates for the levelised cost of energy of about USD 0.16-0.17 per kWh[37] for the Arandis 135 MW plant as compared the cost of other baseload options to hydro USD/kWh (0.06-0.13), new coal (USD/kWh 0.08-0.16) and open cycle gas turbines (0.14-0.24 USD/kWh)[38]. Globally, CSP remains more expensive than many other renewable power generation technologies. However, cost reduction and optimisation strategies (including a trend towards larger plants and greater economies of scale) could make costs drop to USD 0.11-0.14/kWh in the near future.

Worst and best practices

- The formulation of the project based on a wrong perception of the market of CSP (with large commercial plants instead of small pilot plant and, consequently, misinterpreting the role of various local and global actors play, the subsequent inability to change the concept and translate this into a realistic log-frame of outcomes, outputs, and indicators, can be considered as a '*worst practice*'.
- After the initial confusion on the project focus (small vs. large plants) and a slow start during 2013-15, the project partners got their focus right, adapted the management arrangements in 2015 and implemented a 'fast-track' work plan with the results that a) CSP has been firmly placed as a credible option in the national energy policy and integrated resource planning of the power sector, and that b) a concept for the CSP plant with techno-economic, environmental and macro-economic reports has been formulated, based on one year of investment-grade measurements. This turn-around can be considered a '*best practice*', although with the observation that the project would not have gotten this far without the enabling environment of long-term central support of the Government for utility-scale renewable energy.

7.3 Recommendations

UNDP and GEF: corrective actions for design and formulation

1) When considering providing support to technology innovation and market dissemination, it might be fruitful to adopt a larger time period (in view of the long preparation time of large infrastructure projects) and to respond to the need of different beneficiaries in various segments of the RE technology's market

37 Including financing cost will increase LCOE to about USD 0.20/kW (assuming interest rate of 10% with repayment over a 20-yr period, based on own calculations)

38 *South African Power Pool: Planning and Prospects for Renewable Energy* (IRENA, 2013)

(small, medium, large). The project's capacity building and other support activities have to be tailored to the needs of each phase. Not all barriers are of equal importance, play a role in the same phase of technology development and diffusion and cannot always be addressed simultaneously. Removal of one barrier may be a precondition for other barriers to be removed or lowered. Such an approach will start with lowering of the most important barriers in a particular phase. For example, the barriers of lack of data and of doubts regarding techno-economic feasibility are lowered as a pre-condition for committing more resources to financing investment and putting in place other barrier-removal activities (e.g. financial mechanism and risk-sharing facilities). Another example is that investments by private entities in grid-connected RE may need a conducive policy-regulatory framework to be established first. Spreading projects over a larger period of time would obviously generate higher administrative cost, so a balance would need to be found. In this sense, it may be wise to start with a small Phase 1 (in the CSP case, for example, start with general awareness, capacity building and measurements and a techno-econ study), and then to have the next Phase with a larger budget (expand to full feasibility study; expansion of technology), maybe depending on the results of the first phase.

2) Given the above, a lesson learned is that, at certain crucial points in time, the system should allow changes in the project setup of components and outcomes. For example, when formulating the Project Document, it should be possible to amend the original project concept (PIF), even if it means changing outcomes, budget and timeline if the changing project environment and occurrence of external factor require so. GEF and UNDP should allow more flexibility in re-formulating the log-frame, at concept stage (PIF), project formulation (ProDoc), inception (inception report and work plan) and at mid-term review stage, MTR report. It is important that the log-frame is built with progress indicators that can be realistically achieved in the timeframe of the GEF-supported project. Also, the log-frame should distinguish between outcome and output indicators. Outputs are results what the project can and should deliver and under the direct control of the project partners. Outcomes are higher-level results, to which the project has contributed, but whose realisation can only be partly attributed to the project's efforts. When reporting results and providing ratings for achievements, this distinction should be made to make clear what the project is directly responsible for and what not.

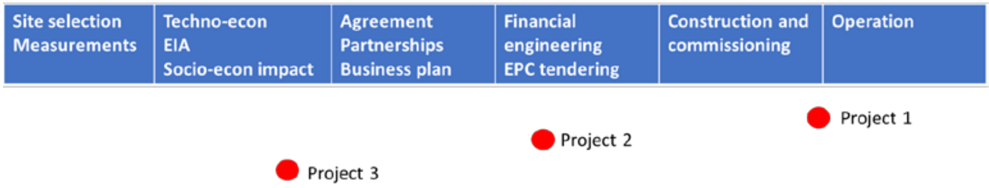
3) In the standard rating table (see Box 1) the category "design" is not well presented; and only appears in the item "M&E design at entry". Design (togegether with "implementation/execution") is a major determinant in the achievement of results. For a better understanding, a category "1. Design" should be introduced (with the items as given in Box 10, i.e. design logic, formulation of log-frame, management arrangements, etc.), in lieu of "1. Monitoring en evaluation', should be split and the items moved to "1. Design" (the item "M&E design) and "2. IA & EA execution" (the item "M&E Plan Implementation").

Government of Namibia

Support to further development of pipeline of CSP activities to enforce benefits of CSP-TT NAM

Organising the debt financing of about USD 700 million will be next on the agenda of the CSP Arandis once the Government has given NamPower the green light to go ahead. One option is to approach the Green Climate Fund[39], which also has funds available for preparing the proposals (including detailed design). It can be mentioned here that, for example, UNDP, EIF and AfDB are GCF-accredited entities, and be involved in future activities. In fact, such support could not be for one CSP, but to support a programme. In future, replication CSP technology demonstrated at Arandis could be replicated at the other two sites with investment-grade solar data measurements, Kokerboom and Auas (two sites that are also strategically located at Namibia's power transmission system) One can imagine a situation in which several CSP projects are being considered, as indicated below, and are in various stages of development:

[39] For example, in a similar infrastructure project in Solomon Islands (hydropower facility costing USD 220 million), GCF participates with a 36% contribution (loan of USD 70 million and a grant of USD 20 million). See www.gcfund.org.



The process of replication and building a portfolio of several CSP project might be guided at the decision-making level by a 'CSP programme group'. One recommendation is that the Project Steering Committee and its Technical Task team (TTT) are 'institutionalised' and will continue meeting on a regular basis and function as such a CSP group providing advice at the policy level and coordination of CSP activities.

Since CSP-TT NAM is about the use of CSP in power generation, this evaluation has discussed other applications, such as providing process heat in industry. Research and potential demonstrations of other CSP applications for Namibia would be beneficial. Renewable energy capacity that supports desalination of sea water has significant potential in a country like Namibia, and the use of CSP in desalination applications could help address water challenges faced by the country. One example of a country that has successfully promoted 'concentrating solar heat' (CSH) application is India. By 2013, there were about 144 CSH systems installed in the country in a range of industries (food and beverages, solar cooling and process heat in industrial processes) with 50 more expected to be installed in the year thereafter[40].

Future direction: support for setting up a grid-connected RE program for IPPs

Concentrating solar heat are systems, smaller than CSP, set up by local industry and here the role of NEI as a Concentrating Solar Technology Transfer Body (CSTTB) to serve local players would be more obvious than in the case of large CSP served by global CSP players. But, given the relatively small size of Namibia's economy, the question arises of NEI would not better expand this scope to Renewable Energy Technology Transfer Body (RETTB), serving engineering, construction and service companies that want to be involved in IPP projects for *all* RE technologies.

With respect the solar radiation measurements, these have now covered 3 sites in the southern and central part of the country. Adding measurements in two more sites, covering the northern part, would give a, more complete, solar map, based on the investment-grade measurements at five sites. Here, NEI can serve as a depository of the solar data and assessments of the three sites to help the formulation of concentrating solar, but solar PV, solar water heating, solar pumping and wind energy activities.

Another recommendation for future support is the institutionalisation of renewable energy. For example, South Africa set up the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) in 2011. It has created a platform for the private sector to develop projects and enter into PPAs with ESKOM (as the power off-taker). Through the use of a competitive bidding process in four tender rounds, the programme aimed to stimulate investments in SA's renewable energy industry, attracting about 79 projects with a combined capacity of 5230 MW[41]. The programme is supported by an IPPPP Office that provides professional advisory services, procurement management services, as well as monitoring, evaluation, and contract management services. A similar setup could be used in Namibia to attract medium-sized renewable IPP projects defined as 5-100 MW in the National IPP Policy (2016), in addition to the small-scale IPPs that currently benefit from the existing Renewable Energy Feed-in Tariff (REFIT) scheme.

Such capacity and institutional strengthening projects, as mentioned above, could be supported by a future GEF-supported project (to be financed in the upcoming GEF-7 budget cycle), alongside specific investment support to demonstration IPP projects by development banks with GCF support.

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[40] See *Mid-term Review Report of the UNDP/GEF Project "Market Development & Promotion of Solar Concentrators for Process Heat Applications in India"*, J. Van den Akker and D. Aggarwal

[41] *Case Study: Bokpoort CSP Project, South Africa*, by J. Harnmeyer and G. Ibikunle (University of Edinburgh, 2015)

ANNEX A. TERMS OF REFERENCE (TOR)

PROJECT BACKGROUND INFORMATION AND OBJECTIVE

Namibia has one of the best solar regimes in the world with an average direct insulation of 2,200 kWh/m²/years (peaking to 3,000 kWh/m²/year in certain areas), minimal cloud cover, and the potential for more than 250,000 MW of solar power generation capacity.

This CSP power generation potential utilization in Namibia could be achieved through in-depth feasibility assessment and appraisal of pre-selected sites to enable installation of CSP infrastructure. CSP technology partnership agreements between foreign providers and Namibian stakeholders in the private sector, government and academia will serve as the platform to raise investment and capacity to realise the CSP plant. In turn, this would lead to an outcome of an increased number of local entrepreneurs in the local CSP supply chain.

Secondly, the formulation of a renewable energy policy framework would lay the enabling environment for CSP technology development that could lead to a thriving CSP market in Namibia, and increased investments in CSP technology. Finally, the development of necessary documents, a business model, financing framework and contracting arrangements would lead to the provision of debt financing from banks for the construction of Namibia's first at least 50 MW CSP plant; an increase in the installed capacity of CSP plants in Namibia; and a subsequent increase in investor confidence in the development of CSP installations in the country. Overall, these goals are set against a background of rising electricity consumption and prices in Namibia and an expected capacity deficit in its generation capacity from 2015 due to current growth forecasts of its electricity demands.

The CSP TT NAM project objective has been therefore to increase the share of renewable energies in the Namibian energy mix by developing the necessary technological framework and conditions for the successful transfer and deployment of CSP technology for on-grid power generation, thereby reducing greenhouse gas (GHG) emissions.

Objective and Scope

The TE will be conducted according to the guidance, rules and procedures established by UNDP and GEF as reflected in the UNDP Evaluation Guidance for GEF Financed Projects.

The objectives of the evaluation are **to assess the achievement of project results, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming.**

Evaluation approach and method

An overall approach and method[42] for conducting project terminal evaluations of UNDP supported GEF financed projects have developed over time. The evaluator is expected to frame the evaluation effort using the criteria of **relevance, effectiveness, efficiency, sustainability, and impact**, as defined and explained in the UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects. A set of questions covering each of these criteria have been drafted and are included with this TOR (*in* Annex C). The evaluator is expected to amend, complete and submit this matrix as part of an evaluation inception report, and shall include it as an annex to the final report.

The evaluation must provide evidence-based information that is credible, reliable and useful. The evaluator is expected to follow a participatory and consultative approach ensuring close engagement with government counterparts, in particular the GEF operational focal point, UNDP Country Office, project team, UNDP GEF Technical Adviser based in the region and key stakeholders. The evaluator is expected to conduct field missions to all project sites where substantive investment has been made to date and relevant surrounding strategic areas. These field visits in Namibia will be undertaken to the specific sites for feasibility assessment to improve the consultant's context of the project and to access additional stakeholders.

[42] For additional information on methods, see the Handbook on Planning, Monitoring and Evaluating for Development Results, Chapter 7, pg. 163

Interviews will be held with the following organizations and individuals at a minimum:

1. UNDP staff who have project responsibilities;
2. Executing agencies (including but not limited to senior officials and component leaders): Ministry of Mines and Energy (MME); Namibia Energy Institute (NEI); Namibia Power utility (Nampower) and, the Electricity Control Board (ECB);
3. The Project Management Unit staff;
4. Project stakeholders to be determined at the inception meeting; including civil society organizations, academia, government, financiers, engineers, developers, entrepreneurs and CBOs.

The evaluator will review all relevant sources of information, such as the project document, project reports – including Annual APR/PIR, project budget revisions, progress reports, GEF focal area tracking tools, project files, national strategic and legal documents, and any other materials that the team considers useful for this evidence-based review. A list of documents that the project team will provide to the evaluator for review is included in Annex B of this Terms of Reference.

Evaluation Criteria & Ratings

An assessment of project performance will be carried out, based against expectations set out in the Project Results Framework (see Annex A), which provides performance and impact indicators for project implementation along with their corresponding means of verification. The evaluation will at a minimum cover the criteria of: relevance, effectiveness, efficiency, sustainability and impact. Ratings must be provided on the following performance criteria. The completed table must be included in the evaluation executive summary. The obligatory rating scales are included in Annex D. Annex E, F and G completes all annexes respectively for Evaluation Code of Conduct, Report Outline and Clearance Form.

Evaluation Ratings:			
1. Monitoring and Evaluation	*rating*	2. IA& EA Execution	***rating***
M&E design at entry		Quality of UNDP Implementation	
M&E Plan Implementation		Quality of Execution - Executing Agency	
Overall quality of M&E		Overall quality of Implementation / Execution	
3. Assessment of Outcomes	rating	4. Sustainability	**rating**
Relevance		Financial resources:	
Effectiveness		Socio-political:	
Efficiency		Institutional framework and governance:	
Overall Project Outcome Rating		Environmental :	
		Overall likelihood of sustainability:	

Project finance / co-finance

The Evaluation will assess the key financial aspects of the project, including the extent of co-financing planned and realized. Project cost and funding data will be required, including annual expenditures. Variances between planned and actual expenditures will need to be assessed and explained. Results from recent financial audits, as available, should be taken into consideration. The evaluator(s) will receive assistance from the Country Office (CO) and Project Team to obtain financial data in order to complete the co-financing table below, which will be included in the terminal evaluation report.

Co-financing (type/source)	UNDP own financing (mill. US$)		Government (mill. US$)		Partner Agency (Private Sector) (mill. US$)		Total (mill. US$)	
	Planned	Actual	Planned	Actual	Planned	Actual	Actual	Actual
Grants								
Loans/ Concessions								
• In-kind support								
• Other								
Totals								

Mainstreaming

UNDP-supported, GEF-financed projects are key components in UNDP country programming, as well as regional and global programmes. The evaluation will assess the extent to which the project was successfully mainstreamed with other UNDP priorities, including poverty alleviation, improved governance, the prevention and recovery from natural disasters, and gender.

Impact
The evaluators will assess the extent to which the project has achieved impacts or progressing towards the achievement of impacts. Key findings that should be brought out in the evaluations include whether the project has demonstrated: a) verifiable bankable solar DNI collection over at least a one year period and socio-techno-economic feasibility assessments, b) verifiable interventions in the formulation of policy frameworks that are conducive to investments in CSP generation projects c) verifiable actions in building local CSP technology capacity and technology transfer amongst local professionals, d) verifiable interventions to enhancing the local value chain supply entrepreneurship / local market development and investment promotion, and/or d) demonstrated progress towards these impact achievements.[43] A GEF Climate Change Mitigation Tracking Tool must be completed by the consultants as part of the Terminal Evaluation.

Conclusions, recommendations & lessons
The evaluation report must include a chapter providing a set of conclusions, recommendations and lessons.

Implementation arrangements
The principal responsibility for managing this evaluation resides with the UNDP CO in Namibia. The UNDP CO will contract the evaluators and ensure the timely provision of per diems and travel arrangements within the country for the evaluation team. The Project Team will be responsible for liaising with the Evaluators team to set up stakeholder interviews, arrange field visits, coordinate with the Government etc.

Evaluation timeframe
The total duration of the evaluation will not be more than *20* days according to the following plan:

Activity	Timing	Completion Date
Preparation	*3* days	15 June 2017
Evaluation Mission	*10 days*	10 July 2017
Draft Evaluation Report	*3* days	17 July 2017
Final Report	*2* days	31 July 2017

Evaluation deliverables
The evaluation team is expected to deliver the following:

Deliverable	Content	Timing	Responsibilities
Inception Report	Evaluator provides clarifications on timing and method	Not later than 1 week before the evaluation mission.	Evaluator submits to UNDP CO
Presentation	Initial Findings	End of evaluation mission	To project management, UNDP CO
Draft Final Report	Full report, (per annexed template) with annexes – including GEF Tracking Tool	Within 1 week of the evaluation mission	Sent to CO, reviewed by RTA, PCU, GEF OFPs
Final Report*	Revised report	Within 1 week of receiving UNDP comments on draft	Sent to CO for uploading to UNDP ERC and UNDP-GEF Unit for uploading to PIMS.

*When submitting the final evaluation report, the evaluator is required also to provide an 'audit trail', detailing how all received comments have (and have not) been addressed in the final evaluation report.

[43] A useful tool for gauging progress to impact is the Review of Outcomes to Impacts (ROTI) method developed by the GEF Evaluation Office: ROTI Handbook 2009

Team Composition
The evaluation will be carried out by 1 independent international consultant. The consultant shall have prior experience in evaluating similar projects. Experience with GEF-financed projects is an advantage. The evaluator selected should not have participated in the project preparation and/or implementation and should not have conflict of interest with project related activities.

The consultant must present the following qualifications/ credentials:

- At least a Master's degree in environment/ energy / climate, development studies, evaluation theory or a related field;
- Minimum of ten (10) years directly relevant work experience (e.g. conducting project/ programme evaluations) in the environment / energy sector;
- Knowledge of doing evaluations for UNDP and the GEF is an advantage;
- Competencies in result-based management, applying SMART indicators and reconstructing or validating baseline scenarios, including adaptive management are essential;
- Demonstrable analytical skills;
- Excellent English communication skills.
- Possessing excellent interpersonal skills and the ability to engage and motivate a wide range of stakeholders
- Experience working in the sub-Saharan African region.

Evaluator Ethics
Evaluation consultants will be held to the highest ethical standards and are required to sign a Code of Conduct (Annex E) upon acceptance of the assignment. UNDP evaluations are conducted in accordance with the principles outlined in the UNEG 'Ethical Guidelines for Evaluations'

Payment modalities and specifications

%	Milestone
20%	At contract signing
30%	Following submission and approval of the 1ST draft terminal evaluation report
50%	Following submission and approval (UNDP-CO and UNDP RTA) of the final terminal evaluation report and associated annexes (including GEF Tracking Tool)

Application process
Applicants are requested to apply online (http://jobs.undp.org) by 09 May 2017. Individual consultants are invited to submit applications together with their CV for these positions. The application should contain a current and complete C.V. in English with indication of the e-mail and phone contact. Shortlisted candidates will be requested to submit a price offer indicating the total cost of the assignment (including daily fee, per diem and travel costs).

UNDP applies a fair and transparent selection process that will take into account the competencies/skills of the applicants as well as their financial proposals. Qualified women and members of social minorities are encouraged to apply.

ANNEX B. ITINERARY OF THE EVALUATION MISSION AND RESULTS

Day	Agenda item	Comments / points discussed
Thu 29/06/2017	Morning: discussion in Jo'burg with Marcel Alers (UNDP Hqs)[44]	• History of project implementation • Expected and realized results • Reporting of GHG emissions
	14h10: Arrival at Windhoek Airport Receive additional documentation/reports/videos material	
Fri 30/06	Review materials and reporting	
Sat/Sun 01-02/07	Review materials and reporting Debriefings and receive additional documentation/reports material from Mr. Hamutwe (Project Manager)	
Mon 03/07	• Meeting at Ministry of Mines and Energy (Mr. John Titus, Director of Energy and National Project Director and Ms. Susan Tise, PMU Focal Point	• Status of energy policy development and contribution of CSP-TT NAM • History of project implementation and project management arrangements • Logical framework and results; opinion on results obtained and implementation • Status of full feasibility study • Cooperation with South Africa on CSP • Procurement by government entities
	• Meeting at ECB (Mr. Francois Robinson, Manager Regulatory Support Service)	• Role of ECB in approving power projects • PPA; IRR in tariff determination
	• Meeting at NamPower (Power System Development: Mr. Gordon Gadney and Mr. Fred Bailey)	• Status of full feasibility activities; • Way forwards (business model); financial closure of CSP plant expected by 2019 • Definition of roles of MME, ECB, NamPower
Tue 04/07	• Meeting with Mr. Harald Schütt (Renewable Energy Industry Association of Namibia, REIAoN, and Amusha CC, General manager)	• History of project design and role of UNDP-supported projects (NAMREP, NEEP) in awareness creating on sustainable energy • Issues and options in power sector Namibia • Government guarantees and attracting private sector investment
	• Meeting with Environment Investment Fund (EIF; Mr. Lazarus Nafidi, Head of Communications and Corporate Affairs)	• Role of EID in financing infrastructure and capacity strengthening activities • Role of EIF in Green Climate Fund
	• Meeting at National Development Bank of Namibia (DNB, Mr. E. DeWaal), Manager Investments, and Ms. H. Amupuloh, Manager, Lending)	• Role and possible interest of DNB in financing RE and CSP projects • Key challenges (political risks and government guarantees)
	• Meeting at Namibia Energy Institute (Mr. Abraham Nangula)	• History of project implementation and role of NEI; coordination and cooperation between project partners • Status of feasibility study (macro-econ and techno-economic reports)
	• Meeting at UNDP CO (Ms. Martha Naanda, Programme Specialist/Head, and Ms. Chikako Miwa, Programme Analyst M&E)	• Evaluation mission agenda • Content of the report (outline, theory of change, annexes)
Wed-Thu-Fri 05-08/07	Field visit (3 days): 1) Visit Ground Measurement (GM) Kokerboom Station and area around; 2) Visit (GM) Arandis Station (first CSP plant priority site)	• Status check of measurement equipment (in operation and apparently well-maintained at the

[44] Taking care of the project in lieu of the Regional Technical Advisor, Mr. Rob Kelly, who left UNDP recently

		moment of visiting the sites) • Discussion on advantages and disadvantages of the sites visited (Kokerboom, Arandis) and socio-economic and environmental subjects
Sat 08/07	Morning Debriefing with Mr. Hamutwe (Project Manager); arrive in Windhoek Reporting	• History of project implementation; coordination and communication issues between project partners; role and views of Government and NamPower at project inception and implementation; Issues and challenges in project management and implementation • Reasons for and impacts of 'fast-track' approach in 2015
Mon 10/07	Presentation of Preliminary Findings at MME (PSC meeting) 15h00: Departure from Windhoek Airport	• Presentation with PowerPoint (intro, design, implementation, results and and findings with recommendations and lessons learned) • Discussion on findings and recommendation • Next steps

ANNEX C. LIST OF DOCUMENTS COLLECTED AND REVIEWED

Project documents

Project design documentation:

- GEF Project Identification Form (2010)
- GEF CEO Endorsement Request (2012)
- UNDP Project Document (2014)
- Letters from MME to Polytechnic of Namibia (17/06/2015)) and Polytechnic to MME (07/08/15) on NEI-new management arrangements

Project monitoring and evaluation reports:

- Mid-Term Review Report (April 2015)
- Project Implementation Review (2015, 2016)
- Progress made against all the CSP-TT NAM Outputs (PMU, Dec 2016)
- Selected Minutes of Meeting, Project Steering Committee (PSC1, Oct14[45]; PSC2, Feb15)
- Selected Minutes of Meeting of Technical Task Team (TTT2[46]; Mar15)
- Selected Minutes of Meeting of PMU (PMU11, Dec16[47]; ad-hoc meeting[48], Oct15)
- GEF climate change Tracking Tool (in Excel)

Project budget and financial reports

- Combined Delivery Reports (CDR, 2014, 2015, 2016, 2017)
- Annual Work Plan – budget (2015, 2016, 2017)
- Co-financing update (PMU, March 2015)

Project technical and other related documents

Site and solar radiation reports

- *Site Assessment of Solar Resource,* Summary Reports Sept 2015-Aug 2016, Arandis, Auas, Kokerboom, by CSP Services GmbH (Germany, Nov 2016)
- *Site Adaptation of Solargis Data,* Technical reports Arandis, Auas, Kokerboom, by SolarGIS (Oct 2016)
- Factsheet *Investment Grade Solar Resource Data,* NamPower

Feasibility and socio-economic studies

- *Concentrated Solar Power (CSP) with Thermal Energy Storage (TES)*, Concept Note (NamPower, 2016)
- *CSP Heat and Power Potential in Namibia, Final Report* (Afromach Investments, Aug 2016)
- *Socio-economic and Environment Impact Project Analysis on a 125MW CSP plant in Namibia, Final Report* (Afromach Investments, Aug 2016)
- *CSP Namibia-TA2014032 NA ITF, Final Techno-Economic Report* (MottMcDonald, Dec 2016)
- *CSP Namibia-TA2014032 NA ITF*, *Phase I – MCM Final Report* (MottMcDonald, Dec 2016)

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45 Attended by: K. Kahuure (MME, Permanent Secretary), N. Hipangelwa (MME, DepDir of Energy), Z. Chuguyare (NEI, Director), A. Hangula (NEI-PMU), Sh. Hamutwe (PMU, Project Manager), N. Nakashole (PMU), B. Libanda (EIF, CEO), P. Kapolo (ECB), M. Sikanda (NPC), N. Zakaapi (UNDP Country Office)

46 Attended by S. Tise (MME, PMU focal point), Sh, Hamutwe (PMU), M. Sheya (PMU), H. Podewitz (PMU), P. Kapolo (ECB), A. Hangula (NEI) and H. Ikela (NEI)

47 Attended by: Sh. Hamutwe (PMU), Elia Dillu (PMU), Nawala Nakashola (PMU), N. Snyders (MME) and A. Hangula (NEI)

48 Attended by: Sh. Hamuwte (PMU-Project manager), M. Sheya (PMU), M. Mustchler (NamPower), A. Pfohl (NamPOwer), G. Araeb (NamPower), Z. Chiguyare (NEI-Director), N. Snyders (MME), S. Tise (MME), K. Kavetuna (ECB), A. Hangula (NEI), H. Ileka (NEI)

- *Environmental and Socio-Economic Impact Assessment for a Concentrated Solar Power Facility near Arandis in the Erongo Region, Final Amendment Report,* Aurecon, NamPower (Aug 2016)
- *Study of the Macroeconomic Impact of A Concentrated Solar Power Plant for Namibia,* Lithon, EcoCore, University of Stellenbosch, Urban-Econ for NamPower (January 2017)

Namibia policy and other country-relevant documents

- *National Policy for Independent Power Producers (IPPs) in Namibia* (MME, July 2016)
- *Namibia Energy Supply Industry, National Integrated Resource Plan Review and Update* (MME, Sept 2016)
- *National Renewable Energy Policy for the Republic of Namibia, Final Draft* (MME, Sept 2016)
- *National Energy Policy, Final Draft* (March 2017)
- *Higher Education for Renewable Energy, Country Mapping Namibia* (Africa-EU Renewable Energy Cooperation Programme (May 2015)
- *Electricity Supply Industry Statistical Bulletin 2014/15* (Electricity Control Board)
- *100% Decentralised Renewable Energy for Namibia* (article), by H. Schütt (2017)

CSP background information

- *Pre-Feasibility Study for the Establishment of a Pre-Commercial CSP Plant in Namibia* (Gesto, SCS, CSP Services, Solar Institüt Jülich; Sept 2012)
- *Study on Conditions for Development of CSP Projects in Sub-Saharan Africa* (Africa-EU RECP; Agence Française de Développement) by Fichtner (Dec 2014)
- *RET: Cost Analysis Series, Volume 1: Power Sector (Issue 2/5), Concentrating Solar Power* (IRENA, 2012)
- *South African Power Pool: Planning and Prospects for Renewable Energy* (IRENA, 2013)
- *The Role of Public Finance in CSP, Case Study: Eskom CSP, South Africa,* San Giorgio Group (2014) for the Climate Policy Initiative
- *The Potential Role of CSP in South Africa, Case Study: The Bokpoort CSP Project, South Africa*, by J. Harnmeyer and G. Ibikunle (2015), University of Edinburgh
- *World Energy Perspective, Cost of Energy Technologies* (World Energy Council, Bloomberg, 2013)
- *Overview of costs of sustainable energy technologies. Energy production: on-grid, mini-grid and off-grid,* J.H.A. van den Akker (ASCENDIS, 2017)

General project design, evaluation and other documents

- *Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects* (UNDP, 2012)
- *Handbook on Planning, Monitoring and Evaluating for Development Results, Updated Guidance on Evaluation* (UNDP, 2012*),*
- *Discussion Paper: Innovations in Monitoring & Evaluating Results* (UNDP, 2013)
- *Review of Outcomes to Impacts (ROTI) Handbook* (GEF, 2009)
- *Guide to Gender Mainstreaming in UNDP Supported GEF Financed Projects* (UNDP, 2016)
- *Use of Theory of Change in Project Evaluations* (UN Environment, Dec 2016)
- *Standardised baseline, Grid Emission Factor for the Southern African Power Pool* (UNFCCC-CDM, ASB001, 2013)
- *Manual for Calculating GHG Benefits of GEF Projects: Energy Efficiency and Renewable Energy Projects,* GEF/C.33/Inf.18 (GEF, Apr 2008)
- *Guidelines for Greenhouse Emissions Accounting and Reporting for GEF Projects*, GEF/C/48/Inf.09 (GEF, May 2015)

ANNEX D. QUESTIONNAIRE AND EVALUATION MATRIX

Contents	Model evaluation criteria and/or questions Indicators	Means and sources of information	Sources of verification and information triangulation
Findings: Relevance and design • Relevance and country drivenness • Stakeholder involvement • Assessment of logframe and M&E design	Relevance and stakeholders • Are project outcomes contributing to national development priorities and plans in accordance with the national local policy legal and regulatory frameworks? • Consistency with the GEF focal areas in Climate Change/operational program strategies of the GEF CC and with the UN and UNDP country programming in Namibia? • *Is the project aligned with the thematic focus of the UNDP Strategic Plan?* • How is the project relevant with respect to other donor-supported activities? • *Are the project's targeted groups being systematically engaged, with a priority focus on the excluded and marginalized, to ensure the project remains relevant for them?* • Relevance of the project's objectives, outcomes and outputs to the different target groups of the interventions. Is the Project addressing the needs of the target beneficiaries? <u>Indicators</u> • Relationship between the Project objectives and the GEF climate change focal area; • Relationship between identified national energy priorities, policies and strategies • Perceptions of in-country stakeholders, including energy sector practitioners, CSOs, NGOs, communities, local government, as to whether Project responds to national priorities and existing capacities Design: • Were lessons from other relevant projects properly incorporated in the project design? • Were the partnership arrangements properly identified and the roles and responsibilities negotiated prior to project approval? Were adequate project management arrangements in place at project entry? • Does the project have a clear thematically focused development objective, the attainment of which can be determined by a set of verifiable indicators; Was the project was formulated based on the logical framework (project results framework) approach; • Was the project's design (logframe) adequate to address the problems at hand? Was the project internally coherent in its design? Have any amendments to the assumptions or targets been made or planned during the Project's implementation?	• Desk review of project design and technical documents; Documents from GEF and other donors; national policies and strategies; • Interviews with project staff management, project partners (incl. former staff), stakeholders (industry, banks, associations) and UNDP staff	• Interviews with project partners (Annex B) o Project manager o MME (S. Tise, focal point) o PMU (Sh. Hamutwe, PM) o UNDP RTA (M. Alers) o UNDP CO (M. Naanda) o REAIoN (H. Schütt) o Presentation of findings and discussion (10/07) • Document and report analysis (Annex C) o Namibia policy and other country-relevant documents o UNDP Project Document o Macro-economic study (NamPower, 2017) o CSP background information

	• M&E design. Did the project have an M&E plan to monitor results and track progress towards achieving project objectives? Indicators: • Degree of involvement of government partners and other stakeholders in the Project design process • Coherency and complementarity with other national and donor programmes • Number and type of performance measurement indicators for monitoring of implementation of strategy and intended results in planning documents (SMART indicators) • Number and type of amendments made to project design		
Findings: Results and effectiveness • Assessment of outcomes and outputs (cf. with baseline indicators) • Effectiveness • Global environmental and other impacts	Results and effectiveness • Are the project outcomes commensurate with the original or modified project objectives? How do the stakeholders perceive the quality of outputs? Were the targeted beneficiary groups actually reached? • Were there any unplanned effects? Which external factors have contributed or hinder the achievement of the expected results? • To what extent have the expected outcomes and objectives of the project been achieved? • What outputs and outcomes has the project achieved (both qualitative and quantitative results, comparing the expected and realized end-project value of progress indicators of each outcome/output with the baseline value)? • *Is the project proactively taking advantage of new opportunities, adapting its theory of change to respond to changes in the development context, including changing national priorities?* • *Is the project on track to deliver its expected outputs?* Impacts • Are there indications that the project has contributed to, or enabled progress toward, reduced environmental stress and/or improved ecological status? • How did the project contribute to GHG emissions reduction within the project implementation cycle and beyond? • To what extent the project was successfully mainstreamed with other UNDP priorities, including poverty alleviation, improved governance, the prevention and recovery from natural disasters, and gender. To what extent did the project actively incorporate gender mainstreaming into project development and implementation? • *Are the project's measures (through outputs, activities, indicators) to address gender inequalities and empower women relevant and producing the intended effect?*	• Desk review of project design and technical documents (incl. PIRs; results framework); other relevant docs • Interviews with project partners, stakeholders (industry, banks, associations), and UNDP staff; interviews with project experts (national and international); • Visit to beneficiary companies and/or project sites	• Interviews with project partners and stakeholders: o MME (S. Tise, Focal Point) o PMU (Sh. Hamuwte, PM) o NamPower (F. Bailey, G. Gadney) o ECB (F. Robinson) o NEI (A., Nangula) o Amusha CC (H. Schütt) • Visit to project CSP sites o Visit GMs at Kokerboom and Arandis • Document and report analysis (Annex C) o Project monitoring and evaluation reports (incl. PIR and MTR reports) o Site and solar radiation reports o Feasibility and economic studies o Climate change tracking tool o UNDP Project document o CSP background information • Check with publicly available information o www.nampower.com.na o nei.nust.na o www.mme.gov.na o www.ecb.org.na o www.eskom.co.za o www.ip-pprojects.co.za o analysis.newenergyupdate.com/csp-today

	Indicators: • Program level of achievement (intended and unintended outputs, outcomes and impacts) • Number of planned vs. implemented Projects/activities (see progress indicators in document)		
Findings: implementation, processes and efficiency • Management and administration; role of UNIDO • Monitoring and evaluation systems • Stakeholder engagement and communications • Budget, expenditures and co-financing; procurement	Implementation and management • Was the project implemented efficiently, in-line with international and national norms and standards? Has the project produced results (outputs and outcomes) within the expected time frame? Was project implementation delayed, and, if it was, did that affect cost effectiveness or results? If there were delays in project implementation and completion, what were the reasons? Did the delays affect project outcomes and/or sustainability, and, if so, in what ways and through what causal linkages? • Describe adaptive management practices. Have there been regular reviews of the work plan to ensure that the project is on track to achieve the desired results, and to inform course corrections if needed? • Were counterpart resources (funding, staff, and facilities), and adequate project management arrangements in place at project entry? Was any steering or advisory mechanism put in place? • How efficient are partnership arrangements for the project? Did each partner have assigned roles and responsibilities from the beginning? Did each partner fulfil its role and responsibilities? • How was UNDP's and MME/NEI supervision and backstopping. Did UNDP staff identify problems in a timely fashion and accurately estimate their seriousness? Did UNDP staff provide quality support and advice to the project, approve modifications in time, and restructure the project when needed? • *Was project's governance mechanism (i.e., the project board or equivalent) functioning as intended?* Indicators: • Examples of changes made in approach or strategy by management; • Timeline for implementation and completion of activities • Evidence of clear roles and responsibilities for operational and management structure Assessment of M&E system • *Is the project's M&E Plan being adequately implemented?* • *Is there regular monitoring of changes in capacities and performance of national institutions and systems relevant to the project?* • *M&E plan implementation*. Was the information provided by the M&E system was used to improve performance and to adapt to changing needs; Are there any annual work plans?	• Desk review of project design and technical documents (incl, PIRs; data on budget; other relevant docs; media coverage, official notices and press releases • Interviews with project partners, stakeholders (industry, banks, associations) and UNDP staff; interviews with project experts (national and international)	• Interviews with project partners and stakeholders: o MME (S. Tise, Focal Point) o PMU (Sh. Hamuwte, PM) o NEI (A., Nangula) o Presentation preliminary findings and discussion (PSC meeting; 10/07) • Document and report analysis (Annex C) o Project monitoring and evaluation reports (incl. PIR and MTR reports. MoMs of selected PSC, TTT and PMU meetings) o Project budget and financial reports o UNDP Project document • Check with publicly available information o www.nampower.com.na o nei.nust.na o www.mme.gov.na

	• *Budgeting and Funding for M&E activities.* Was M&E was sufficiently budgeted for at the project planning stage and whether M&E was adequately funded and in a timely manner during implementation. <u>Indicators:</u> • Existence of a Project M&E system, including relevant processes and mechanisms for, monitoring, reporting, data collection & management, and learning; • Actual use of the M&E system to change or improve decision- making/adaptive management • Quality and quantity of progress report Stakeholder involvement • Did the project involve the relevant stakeholders through information sharing and consultation? Did the project implement appropriate outreach and public awareness campaigns? Which stakeholders were involved in the project (i.e. NGOs, private sector, other UN Agencies etc.) and what were their immediate tasks? • Did the project consult with and make use of the skills, experience, and knowledge of the appropriate government entities, NGOs, community groups, private sector entities, local governments, and academic institutions in the design, implementation, and evaluation of project activities? <u>Indicators:</u> • Extent to which the implementation of the Project has been inclusive of relevant stakeholders and collaboration between partners and/or local partnerships have been developed • Client/Stakeholder satisfaction with Project staff • Extent to which lessons learnt have been communicated to project stakeholders and other related programs and projects Financial planning and procurement • *Adequate resources have been mobilized to achieve intended results?* • Did the project have appropriate financial controls, including reporting and planning, that allowed management to make informed decisions regarding the budget and allowed for timely flow of funds? Are the disbursements and project expenditures in line with budgets? • Did promised co-financing materialize? If there was a difference in the level of expected co-financing and the co-financing actually realized, what were the reasons for the variance? Did the extent of materialization of co-financing affect project outcomes and/or sustainability?		

	• *Are project inputs procured and delivered on time to efficiently contribute to results?* <u>Indicators:</u> • Extent to which inputs have been of suitable quality and available when required to allow the Project to achieve the expected results; Planned vs. actual budget and co-finance realization • Percentage of budget for management and operations (vs. other activities); Percentage of budget spent on M&E systems		
Findings: sustainability • Risks and external factors • Replication	Sustainability • *Are risks to the project adequately monitored and managed?* • *Is the transition and phase-out arrangements are reviewed regularly and adjusted according to progress (including financial commitments and capacity)?* • *Are social and environmental impacts and risks (including those related to human rights, gender and environment) being successfully managed and monitored in accordance with project document and relevant action plans? Are unanticipated social and environmental issues or grievances that arise during implementation assessed and adequately managed, with relevant management plans updated?* • *Financial risks.* Are there any financial risks that may jeopardize sustainability of project outcomes? What is the likelihood of financial and economic resources not being available once GEF assistance ends? Was the project successful in identifying and leveraging co-financing? • *Socio-political risks*. Are there any social or political risks that may jeopardize sustainability of project outcomes? What is the risk that the level of stakeholder ownership (including ownership by governments and other key stakeholders) will be insufficient to allow for the project outcomes/benefits to be sustained? Do the various key stakeholders see that it is in their interest that project benefits continue to flow? *Institutional framework and governance risks.* Do the legal frameworks, policies, and governance structures and processes within which the project operates pose risks that may jeopardize sustainability of project benefits? • *Environmental risks.* Are there any environmental risks that may jeopardize sustainability of project outcomes? Are there any environmental factors, positive or negative, that can influence the future flow of project benefits? Are there any project outputs or higher-level results that are likely to affect the environment, which, in turn, might affect sustainability of project benefits? <u>Indicators:</u> • Extent to which risks and assumptions are adequate and are reflected in the project documentation	• Desk review of project design and technical documents (incl, PIRs; other relevant docs) • Interviews with project staff, project partners, stakeholders (industry, banks, associations) and UNDP staff; interviews with project experts (national and international)	• Interviews with project partners and stakeholders: o PMU (Sh. Hamuwte, PM) o EIF (L. Nafidi) o DNB (De Waal) o ECB (F. Robinson) o Presentation preliminary findings and discussion (PSC meeting; 10/07) • Document and report analysis (Annex C) o Feasibility and socio-economic studies o UNDP Project document o Policy and country-relevant documents o CSP background information

	• Extent to which project is likely to be sustainable beyond the project; • Extent to which main stakeholders plan to provide sustainability to the project's results in the future, including commitment of financial resources Replication • Describe any catalytic or replication effects: the evaluation will describe any catalytic or replication effect both within and outside the project. If no effects are identified, the evaluation will describe the catalytic or replication actions that the project carried out • *Is the project sufficiently at scale, or is there potential to scale up in the future, to meaningfully contribute t development change?*		
Conclusions and recommendations • Conclusions on attainment of objectives and results • Lessons learned • Recommendations	• Evaluation conclusions related to the project's achievements and shortfalls (comprehensive and balanced statements which highlight the strengths, weaknesses, and results of the project) • Summary of ratings (quality of outcomes, effectiveness, efficiency, M&E, IA and EA execution; likelihood of sustainability) • *Is the project generating knowledge – particularly lessons learned (i.e., what has worked and what has not) – and has this knowledge informed management decisions and changes/course corrections to ensure the continued relevance of the project towards its stated objectives, the quality of its outputs and the management of risk?* • What recommendations, if any, can be made to o follow up or reinforce initial benefits from the project; Proposals for future directions related to the main objectives	• Interviews with project staff and partners • Desk review of project docs and reports as well as external policy and other docs	• Interviews with project partners and stakeholders and analysis thereof (as above, including discussion at presentation of preliminary findings at PSC meeting, 10/07) • Document and report analysis (as above)

Note:
Questions that appear in the Project Quality Assurance report (PQA) are integrated in this table (see text in *italics*).

ANNEX E. DETAILS ON CSP DEVELOPMENT IN NAMIBIA

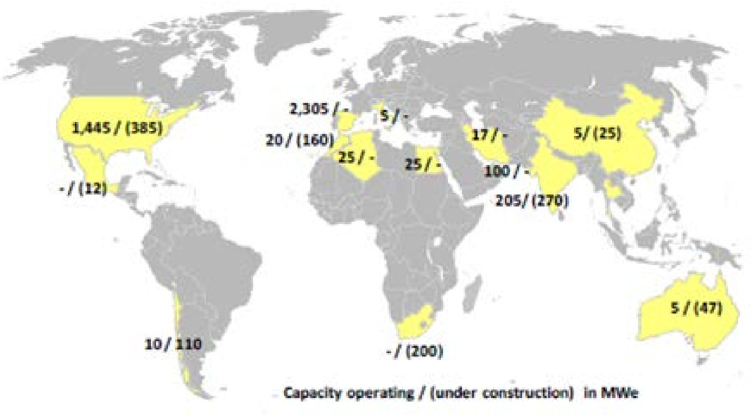
E.1 Global concentrating solar power (CSP) development

Concentrating solar power (CSP) is a power generation technology that uses mirrors to concentrate the sun's rays (i.e. solar heat) and, in most of today's CSP systems, to heat a fluid that is used to produce steam. Concentrating technologies exist in four optical types, namely parabolic trough, linear Fresnel reflector, and solar tower and parabolic dish, of which only the first three have been deployed commercially. Worldwide, installed capacity is about 4.8 GW (with linear Fresnel only about 0.8 GW)[49].


Parabolic trough collectors (PT) have dominated up to now the total installed capacity of CSP plants at about 4.1 GW installed capacity in 2014. A standard parabolic trough power plant consists of many parallel single-axis-tracking parabolic trough collectors, a heat transfer fluid system, a steam generation system, a steam turbine/generator cycle, and optional thermal storage.

In solar tower power plants, a field of heliostats (large individually two-axis tracked mirrors) is used to concentrate sunlight onto a central receiver (CR) mounted at the top of a tower. 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 (steam or gas turbine).


Water/steam, molten salts, air at atmospheric pressure and pressurized air have been used as thermal energy storage (TES). Out of the different solar tower concepts, mainly the direct steam and molten salt solar tower concept have been pursued in recent years and the first large-scale projects have commenced operation. Global installed capacity of tower technology was about 0.5 GW.



Whereas early commercial CSP development focused entirely on parabolic trough technology, new capacity addition is now fairly evenly between PT and tower (CR) technologies. Spain and the USA play host to the most important CSP markets (4.5 GW in 2016, up from 1.8 GW in 2000). In Spain alone there are 45 parabolic trough power plants, each with a capacity of 50 MW; the largest parabolic trough plant is the 280 MW Solana plant in USA., but a number of other countries have recently installed CSP (see figure on CSP deployment worldwide, 2014 data; source; Fichtner, 2014).

[49] Source of data in this section: IRENA (2012) ; www.wikipedia.org; Fichtner (2014); WEC (2013); NamPower (2017) ; REN21 (2016)

In the region, South Africa is advancing with CSP. Driven by its Renewable Energy Independent Power Procurement Producer Programme (REIPPPP), the first three CSP facilities have been constructed in Northern Cape, totalling 200 MW in 2016 (producing 590 GWh, source: www.nersa.org), including one solar tower facility (KhiSolar, 50 MW) and the other parabolic through plants. An additional 400 MW has been allocated for CSP during 2016-2018 in other REIPPPP procurement windows. Botswana is looking in total at 200 MW CSP, for which a bankable feasibility study has been conducted, recommending in a first stage a 100 MW CSP plant with storage, to be procured as IPP, for which bidding started in 2017. This is also indicative of a global trend in which developers continued to focus on larger plants, with many facilities exceeding 100 MW in size.

Costs quoted in 2010-13 vary between USD 3,420-7,670 per megawatt (MW) for systems without storage and (at capacity factors 24-28%) with levelised cost of energy (LCOE) mentioned at USD 0.20-0.50 per kilowatt-hour (USD 0.123-0.248/kWh in China/India)[1]. The CSP industry has focused increasingly on maximising value through thermal energy storage (TES) systems that provide dispatchable power. Almost all new CSP plants are being developed with TES systems. Investment costs with storage in 2010/13 were about USD 6000-11,000/MW and (at capacity factor 28-42%) LCOE of USD 0.16-0.47/kWh. The weighted average LCOE of CSP by region varied from a low of USD 0.20 in Asia to a high of USD 0.25/kWh in Europe in recent years, with the LCOE of individual projects varying significantly depending on location and level of storage. However, as costs are falling, recent projects are being built with LCOEs of around USD 0.17/kWh, and power purchase agreements are being signed at even lower values where low-cost financing is available. Future cost reductions can be expected if deployment accelerates, but policy uncertainty is hurting growth prospects.

E.2 Solar resource data and measurements

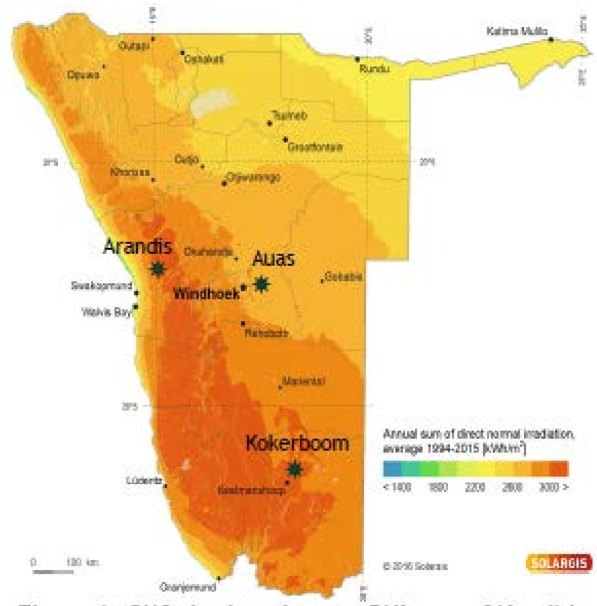


Figure 1: GMS site locations on DNI map of Namibia

Namibia has installed three solar resource Ground Measurement (GM) stations in Namibia. Following a site selection study carried out by NamPower, suitable sites were identified and selected for the development of a CSP plant. Consequently, 3 sites were selected for solar resource GMS installations and measurements, for which supply the German CSP Services GmbH, with Hungileni (local contractor), was the successful tenderer. The Figure illustrates the locations of the three GMSs, namely: Arandis, Auas and Kokerboom which have been in operation since August 2015. The meteorological station data and the meta information is provided by company CSP Services (Germany), which conducts the measurement campaign. Daily cleaning of sensors and quarterly maintenance visits have been carried out to ensure that quality and integrity of the data is captured.

An analysis if the solar data was carried out by SolarGIS and CSP Services after 13 months of ground measurements giving the following results:

- Estimation of the long-term average solar resource at the site and its inter-annual variability, expressed by P50/75/90/95 values in kWh/m²a, denominating the annual sum of DNI or GHI that will be reached or exceeded with 50/75/90/95% probability[50];

[50] Note: P50 is essentially a statistical level of confidence suggesting that we expect to exceed the predicted solar resource/energy yield 50% of the time. Lenders and investors typically use P90 estimates (probability of 90%) to be confident that sufficient energy will be generated, allowing to safely repay their project debt.

Source: "Investment Grade Solar Resource data", NamPower information sheet; SolarGis and CSP Services reports of the three sites (Auas, Kokerboom, Arandis)

- Compilation of a 12 months on-site ground measurement time series of solar irradiance (global, direct and diffuse radiation) and other meteorological parameters (temperature, relative humidity, barometric pressure, precipitation as well as wind speed and direction);
- Provision of a 22-year time series of solar irradiance and meteorological parameters (derived from satellite imagery and numeric weather models through site-adaptation based on the on-site ground measurements);
- Formation of Typical Meteorological Year (TMY) files for irradiation sum exceedance probabilities of P50, P90, P95 in hourly resolution, representing the representing the average solar irradiance conditions on an annual basis.

The three stations have yielded promising results. The results of the annual Direct Normal Irradiance (DNI) and Global Horizontal Irradiance (GHI) values of the long-term exceedance P50 are illustrated in Figure 2. A similar summary in Figure 3 illustrates the GMSs recorded data for the 3 sites.

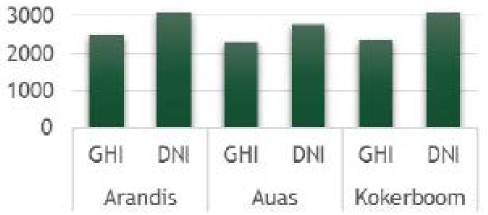


Figure 2: Long term exceedance P50 data (kWh/m²a)

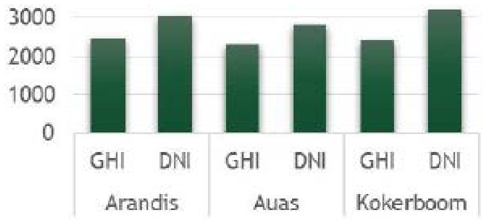


Figure 3: 2015/2016 GMS recorded data (kWh/m²a)

The assessment is based on the combination of a) satellite-derived irradiance time series by SolarGIS (www.solargis.info), covering the 22-yr period from January 1994 to August 2016 (the time series database is computed by in-house developed models) with b) on-site ground measurement data from 01 July 2015 to 31 August 2016 from the MDI station, with rotating a shadowband irradiometer at Arandis and/or with MHP weather stations at all 3 sites (using pyrheliometer and sun trackers with temperature, pressure and humidity sensors; anemometers and wind vanes).

E.3 Site and technology selection of CSP projects

As part of an agreement between EIB and the NamPower, the company MottMcDonald won a tender to undertake a techno-economic analysis of a Concentrated Solar Power (CSP) project in Namibia, as part of the 'Phase 1' full feasibility study (FFS). A multicriteria decision making (MCDM) study was carried out to help identify the most suitable sites and technologies for a CSP facility. For the MCDM process, the five sites identified (Auas, Arandis, Kokerboom, Gerus and Orumbu), three size options (from smallest size up to largest size usually offered in commercial projects, 50, 135 and 200 MW) and two technology options (considered bankable from international perspective, i.e. Central Receiver (CR; molten salt tower) or Parabolic Trough (PT) with or without PV hybridization) were considered. In a stakeholder MCDM workshop, the various options were discussed and four options were identified for the MCDM analysis: a 135 MW facility using molten salt tower or parabolic trough technology (with thermal storage) and either constructed at Kokerboom or Arandis. In the MCDM analysis, the four options were compared by applying a score to various weighted criteria in a number of areas (technical, infrastructure, environmental, socio-economic, terrain and funding). The end result is that the option of a CR (tower) CSP at Arandis received the highest MCDM scoring. In the final analysis, the MCDM scoring was combined with the analysis of LCOE (levelised cost of energy) as calculated in the detailed Techno-Economic analysis (MottMcDonald, 2016) for the four options. The LCOE results are driven predominantly by differences in cost between technology options (CAPEX) and the efficiency (load factors) and energy production at Arandis and Kokerboom. The result mirrors the MCDM ranking with normalised LCOE ranking of molten salts tower (central receiver, CR) at Arandis and Kokerboom at 100% and 97% respectively (LCOE of NAD 1,793 and 1,920/MWh respectively) and parabolic trough (PT) at Arandis and Kokerboom at 93 and 87% (LCOE of NAD 1,843 and 2,031/MWh)[51].

[51] Data in this section are based on the following sources: 'CSP Namibia-TA2014032 NA ITF' Final Techno-Economic Report and MCDM Final Report (Dec 2016), Mott McDonald. Study of the Macroeconomic Impact of a CSP Plant for Namibia, NamPower (2017). LCOE is the discounted average unit-cost (NAD/kWh) of electricity generated over the lifetime of a plant, including the cost of building

Installed capacity	150 MW		
Net capacity	135 MW		
Discount factor (WACC)	12.7%		
Lifetime	40 years		
Techno-economic study	**Tower (CR)**	**PT**	
CAPEX techno-econ study (adjusted)	897	770	USD million
LCOE - Arandis (adjusted) *)	0.128	0.133	USD/kWh
Macro-economic study			
Investment cost (CAPEX)			
- solar field	248	233	
- power block	171	131	
- receiver	182	96	
- thermal storage and steam generator	151	152	
- balance of system	188	153	
EPC (engineering, procument, construction)	940	765	USD million
Operating and maintenance (OPEX)			
Operational expenditures	8.8	8.1	USD million/yr
Cost of power production			
Capacity factor	73%	53%	
Power production	864,901	628,046	MWh/yr
LCOE - Arandis *)	0.149	0.169	USD/kWh
Macro-economic parameters			
Local content content			
- construction phase (% of CAPEX)	13.7%	22.8%	
- operational phase (% of OPEX)	36.0%	42.0%	
Balance of payments (positive/negaive)			
- increased imports during construction *)	-811	-590	USD million
- imports for operation minus avoided power imports *)	73.8	53.0	USD million
Impact on GDP during 40-yr lifetime			
- construction (2 years)	130	185	USD million
- operation	3601	2588	USD million
Employment creation during 40-yr lifetime			
- construction (2 years)	8645	13166	FTE-person-years
- operation	10520	8439	FTE-person-years

A consortium (Lithon, EcoCore, Stellenbosch University, Urban-Econ) carried out a Macro-economic study (NamPower, 2017) for the Arandis CSP. It compares the two technology options (parabolic through versus solar tower) and looks not only at the cost-related aspects, but discusses macro-economic impacts too (impact on balance of payments, foreign reserves, electricity prices, inflation and climate change). Considering the optimal system configuration for Namibia, the 135 MW PT CSP plant with a 9-hour storage capacity and the 135 MW CR CSP plant with a 12-hour storage capacity are feasible. In aligning the technical assumptions between the two studies, the techno-economic consultant (Mott-McDonald) updated the EPC price calculations (using the macroeconomic study's plant parameters and including contingencies and owner's and development costs) to make the studies comparable.

The result is an alignment within in 5% (the techno-econ study gives CAPEX (EPC) costs of NAD 14,357 and 12,318 million for CR and PT technology respectively and the macro-economic consultant gives figures if NAD 15,008 and 12,227 million.

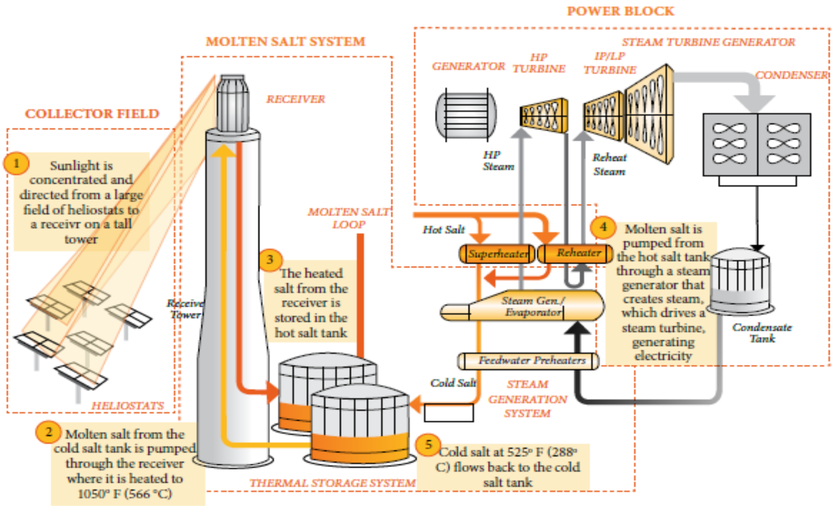
The conclusion of the analysis is that although the CR CSP plant is envisaged to cost NAD 2.8 billion more to construct than the PT option, the CR plant will generate more electric energy annually and will render greater net benefits over its lifespan than the PT CSP plant (with a lower LCOE). The local content opportunity and employment creation of the CR will be lower, but other macro-economic benefits (GDP increase, balance of payments) will be more positive.

E.4 Description of the Arandis CSP project concept

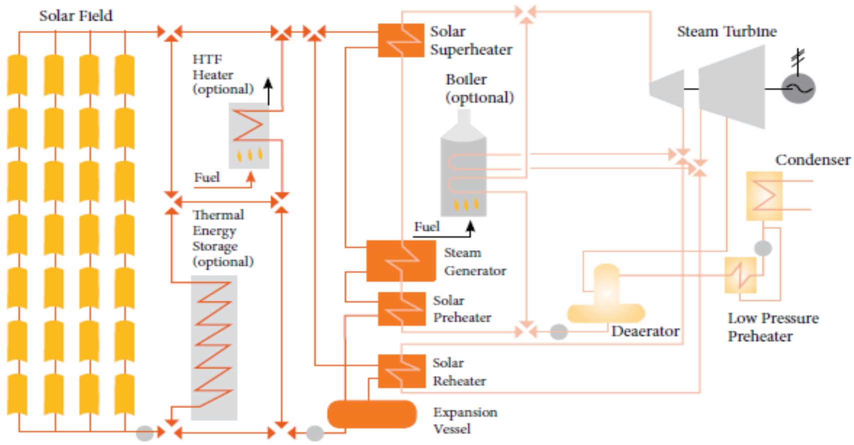
The first CSP plant will be located at a site east of Arandis in the Erongo region, Namibia. No final decision on technology has been made, but (based on the mult-criteria and techno-economic analyses, described in E.3) there is tendency towards having a 135 MW using central receiver with storage technology (molten salt tower, see figure above) with parabolic through as a second option (see figure, below). The solar resource is an estimated 2900 to 3000 kWh/m^2/year. The exact storage size of this plant is yet to be defined but it is envisaged having a capacity between of around 9-12 hours. The solar field will have an area of about 2 km^2 and thermal storage rating of about 4200-5000 MWh. CSP utilizes a conventional steam turbine and synchronous generator, which in addition to electricity, provides voltage support and improves system stability of the national grid. The

(capital expenditures, CAPEX) and operating and maintenance expenditures (OPEX) the power plant. USD 1 = NAD 16. Note that *) are own estimates, based on data given in the table.

power plant will use dry cooling in order to reduce water consumption. Considering the above characteristics, the plant will be capable of reliably generating base and peak load power in utility scale and, hence, is well-suited to provide the "flexible capacity" requirements of the Namibian power system.



After getting the green light, NamPower will decide on the optimal procurement strategy for this project (planned for by the end of 2017), where after the procurement of either an IPP partner and/or an EPC Contractor will continue. The project will require credible technical partners with global EPC, O&M and Original Equipment Manufacturer (OEM) experience in CSP for financiers to consider equity investment of debt funding. To develop the project, a special project vehicle (SPV) company will be set up with NamPower participating with an equity envisage to be 30-50% and the IPP equity partner(s) between 30-40% and 10-20% provided by others, such a local community trust and a development finance institution. The equity share is likely to be about 30% and debt 70%. The financing might be a mix of concessional financing (e.g. from African Development Bank, AfDB, or Green Climate Fund, GCF) with commercial financing. In the South African CSP plants, development banks such as WB, AfDB, EIB and DBSA as well as South African banks such as ABSA, Standard Bank and NedBank have provided financing. In Namibia, the Development Bank of Namibia and Environment Investment Fund (the latter also being a GCF Accredited Entity) could be possible financiers as junior partners. NamPower has bonds listed on the Namibian Stock Exchange (NSX) to fund infrastructure projects (NamPower's current bond programme is approved for the value of NAD 3 billion).



Indicative financing needs (USD million)	CR (tower)	PT
EPC (capital outlay)	940	765
Working capital	25	20
Debt reserve	12	10
Interest during construction (2-yr period)	166	135
Funding requirement	1143	930
Debt share 70%	800	651
Equity share 30%	343	279

Own estimates, based on EPC estimates of Box 13

Guarantees, backed by both NamPower (also being the off taker) and the Namibian government (by means of National Treasury) will be required. Regarding the first, a power purchase agreement (PPA) of 20 years should be in place. Regarding the latter, the Government can partly finance or provide guarantees. The Namibian Sovereign Debt Management Strategy (SDMS) has a strategic target aiming to keep national debt within 35% of GDP and that the government can give guarantees up to a maximum value of 10% of GDP.

E.5 National (renewable) energy policy in Namibia

The Namibian government is determined to reduce the country's dependency on electricity imports. Greater domestic generation capacity would not only allow Namibia to achieve security of electricity supply and stimulate higher growth and development in the country, but assist in constraining the rise in electricity prices linked to high-cost of short-term imports. Renewable energy is given a centre stage in addressing the country's electricity security as this is supported through numerous national developmental and energy-related policies:

- Namibia Vision 2030, and National Development Plan IV (2012/13 to 2016/17);
- White Paper on Energy Policy (1998), and Electricity Act (2000, 2007);
- National Policy on Climate Change (2010), and Intended Nationally Determined Contributions (INDC) (2015)

Furthermore, through policy and other legislative instruments, Namibia is shifting away from public sector dominance of the power sector, and is putting measures in place to lure private sector participation in the electricity sector (alongside government ownership through NamPower) in a two-pronged approach, in which new generation capacity is owned by an IPP or by means of an equity partnership between NamPower and an IPP. Currently, Namibia differentiates renewable energy procurement based on system size as follows a) net metering rules for installations <500 kW for all renewable energy technologies (not to exceed the main electricity supply circuit breaker current rating); b) a renewable energy feed-in tariff (REFiT) for projects >500kW and < 5 MW including biomass, concentrating solar power, solar PV, and wind and c) competitive auction approach for projects >5MW.

A number of policies (*National Energy Policy, National Renewable Energy Policy, National IPP Policy*) and the National Integrated Resource Plan and regulations have recently been drafted in parallel and have been approved or are in the final stages of reaching promulgation; a process the CSP-TT NAM project has been asked by MME to support and has provide crucial inputs concerning the role and potential of CSP. At the same time, both the Namibia *Energy Regulatory Authority Bill* and the *Electricity Bill* are being developed:

A) The goals of the **National Energy Policy** (currently in draft) are to ensure the security of all relevant energy supplies to the country; create cost-effective, affordable, reliable and equitable access to energy for all Namibians; promote the efficient use of all forms of energy; and incentivise the discovery, development and productive use of the country's diverse energy resources.

B) The **National Renewable Energy Policy** aims to make RE a powerful tool for the Government of Namibia to meet its short-term and long-term national development goals. Specific goals include for Namibia to become energy-secure, and also aim to become a net electricity exporter by 2030, by leveraging its RE resources, which should contribute 70% of electricity generation by 2030. RE shall be a driver of income-generating opportunities, and poverty alleviation through increased access to affordable energy services. The RE Policy provides policy statements regarding the main framework elements, which includes a) establishing a long-term vision for a sustainable power system (e.g. RE targets, climate change goals, power sector planning), b) enhancing the flexibility of the power system (e.g. RE grid integration and stability study, RE and energy storage, fair access for distributed generation, regional integration, rural electrification), and c) maintaining the bankability of renewable energy projects (e.g. subvention, enabling regulations for net-metering, PPAs with IPPs, streamlined licensing process, and other risk mitigation measures).

C) The RE Policy as such does not prescribe any specific capacity or generation targets for any individual RE technology. The RE Policy supports the growth of all RE technologies to their potential, in keeping with evolving market, technology, and financing opportunities. It presents some scenarios that are based on the N**ational Integrated Resources Plan.** In its reference scenario (1629 MW installed capacity and 600 MW imports), the Van Eck coal plant (120 MW) will be retired, but new coal capacity added (168 MW) while the Kudu natural gas facility (442 MW) will be operational in 2021, with RE contributing 987 MW (of which 653 MW hydro, 100 MW CSP, 137 MW PV, plus wind and biomass). The target of 70% RE electricity generation can be reached if conventional power is minimised and RE maximised. The NIRP discusses a number of scenarios with installed capacity ranging from 1420 to 2012 MW by 2030 and the share of RE ranging from 58% (with 50 MW of installed CSP capacity) to 79% (with 250 MW CSP installed capacity by 2030).

D) The **National IPP Policy** lays out the provisions of classifying the IPP market into three categories and establishes the approach to be followed to promote private sector investments in power generation through IPP projects consistent with the NIRP. Small-scale IPPs (up to 5-10 MW) are licensed under the REFIT scheme and the investment is governed by standardized PPAs signed by the IPP and the off-taker and approved by the ECB. Medium-sized IPPs (5-100 MW) shall be procured through competitive tenders under the supervision of a Tender Board. Large IPPs (> 100 MW), consistent with the NIRP shall be implemented through a "negotiated approach" depending upon the needs of Namibia. Through this National IPP Policy shall adapt the current de facto 'single buyer' market model to a broader array of transactions and electricity sources, which are termed the Modified Single Buyer Model (MSBM).

The official status of the policies is as follows:

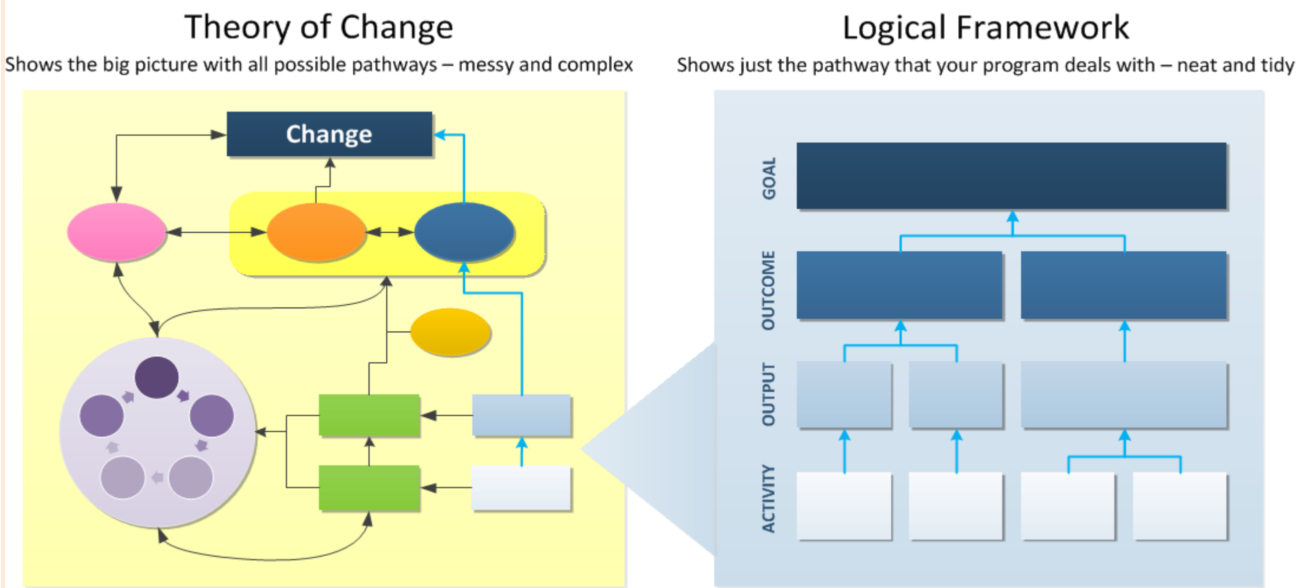
- National Energy Policy: endorsed by the Cabinet, July 2017
- IPP policy: final version approved by MME, awaiting cabinet endorsement
- NIRP: endorsed by the Cabinet, May 2017
- National Renewable Energy Policy: endorsed by the Cabinet, July 2017

ANNEX F. THEORY OF CHANGE

F.1 Description of logical frameworks and theory of change

Over the last few decades, there has been an ongoing debate in the international development community about the best way to describe how programs lead to results. One approach has been to use a Logical Framework (also called a Log-Frame), which most donors now require. Another increasingly popular approach is to create a Theory of Change.

Box 22 Differences between log-frame and theory of change



Theory of Change

- Gives the big picture, including issues related to the environment or context that you can't control.
- Shows all the different pathways that might lead to change, even if those pathways are not related to your program.
- Describes how and why you think change happens.
- Could be used to complete the sentence "if we do X then Y will change because…".
- Is presented as a diagram with narrative text.
- The diagram is flexible and doesn't have a particular format – it could include cyclical processes, feedback loops, one box could lead to multiple other boxes, different shapes could be used, etc.
- Describes why you think one box will lead to another box (e.g. if you think increased knowledge will lead to behaviour change, is that an assumption or do you have evidence to show it is the case?).
- Is mainly used as a tool for program design and evaluation.

Logical Framework

- Gives a detailed description of the program showing how the program activities will lead to the immediate outputs, and how these will lead to the outcomes and goal (the terminology used varies by organisation).
- Could be used to complete the sentence "we plan to do X which will give Y result".
- Is normally shown as a matrix, called a log-frame. It can also be shown as a flow chart, which is sometimes called a logic model.
- Is linear, which means that all activities lead to outputs which lead to outcomes and the goal – there are no cyclical processes or feedback loops.
- Includes space for risks and assumptions, although these are usually only basic. Doesn't include evidence for why you think one thing will lead to another.
- Is mainly used as a tool for monitoring.
- Most Logical Frameworks are shown using a log-frame matrix, such as the project Results Framework in the UNDP Project Documents

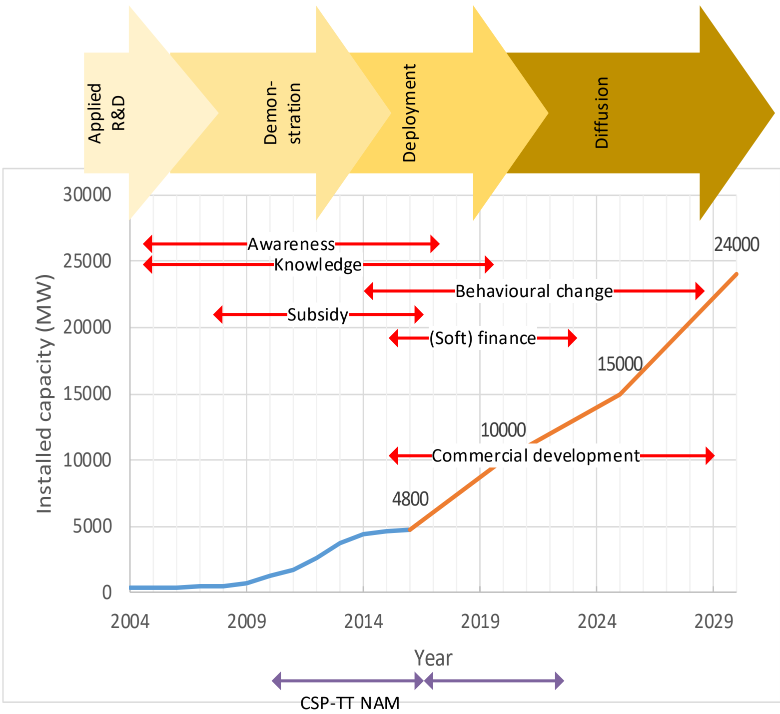
In reality, there is no official definition of a Theory of Change (TOC) or how it differs from a Logical Framework. A TOC explains the process of change by outlining causal linkages in an intervention, i.e., its outputs, direct outcomes, 'intermediate states', and longer-term outcomes. The identified changes are mapped as a set of interrelated pathways with each pathway showing the required outcomes in a logical relationship with respect to the others, as well as chronological flow. Each 'step' in the pathway is a prerequisite for the next. A TOC is best presented as a narrative description that is accompanied by a diagram. A TOC diagram is useful to show an overview of the causal pathways, the cause-to-effect relationship between different results/changes, and the drivers and assumptions that apply along the causal pathways.

Until recently, the UNDP (ProDoc) did include neither a TOC narrative nor a TOC diagram. For evaluation purposes, the TOC thus needs to be prepared or 'reconstructed' from the Logical Framework table and the narrative description of the intervention in the ProDoc. This 'reconstructed TOC' is made to reflect any formal documented (or informal) changes in the project's intended results or intervention logic and/or to take into account any changes in the external context of the intervention that may influence the causal pathways and the changing needs and priorities of stakeholders. For example, in the course of project implementation, some project outputs or even whole components might have been cancelled or added to respond to external changes (or misjudgments at design) regarding, among other things, stakeholder needs and priorities, resource availability, partner capacity and risk factors.

F.2 Theory of change and the CSP-TT NAM project

The intervention of CSP-TT NAM must be seen as part of the whole development and diffusion of CSP in the global market. The CSP market starts with applied R&D, followed by the demonstration of first CSP plants in a few countries (Spain, USA), followed in recent years by the deployment of commercial-scale CSP facilities. The technology is now at a turning point in market expansion beyond Spain and the United States and a wave of new projects has been under construction leading to the technology from deployment to commercial diffusion phase. CSP facilities will operate at significantly lower tariffs than other operational facilities in the deployment phase a result of cheaper debt and learnings from previous phases and R&D in the further reduction of CSP components.

Box 23 Global CSP technology innovation and the role of technical assistance



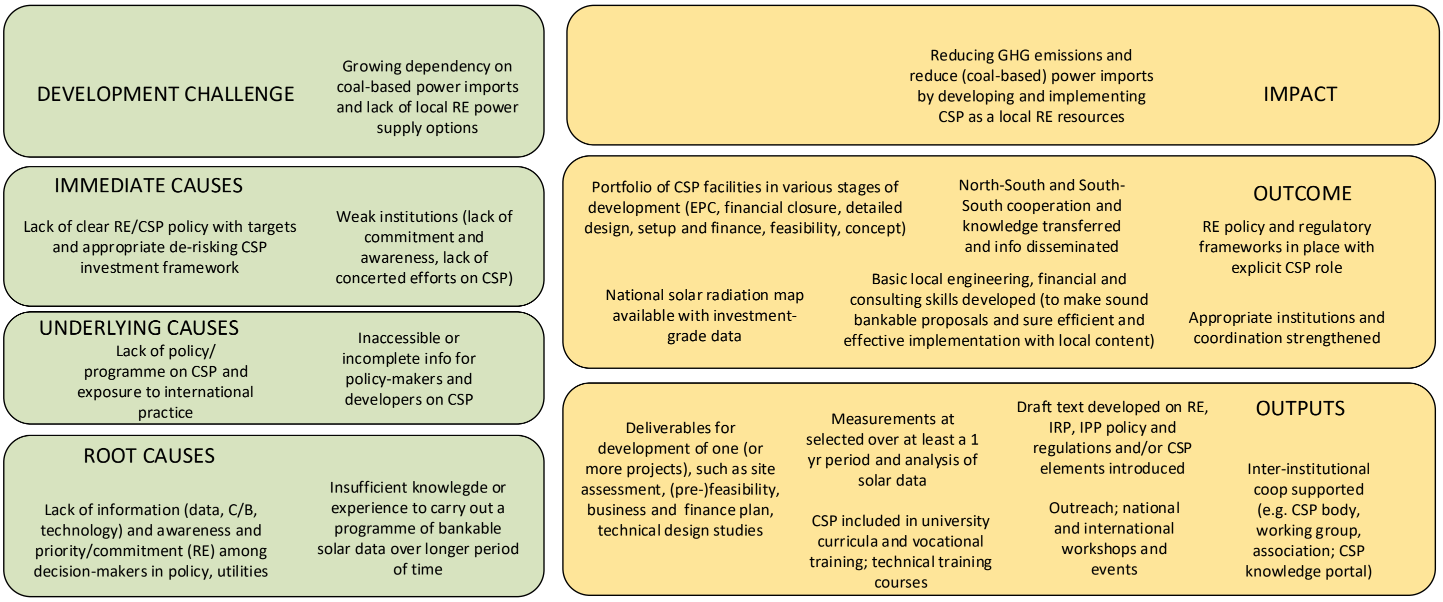
Source: J.H.A. van den Akker, based on realised installed global capacity data from *Renewable Energy Statistics* (IRENA, 2016) and forecasts from *Energy Technology Perspectives 2015* (data, 6ºC Scenario)

The CSP-TT NAM project was conceived when globally the CSP technology was pretty much in a demonstration phase with a few utility-scale plants operating in Spain and USA (see Annex E.1). In this context, the project was designed as a capacity building and technology transfer project with a small-sized demo facility (5 MW). Since then, worldwide more CSP plants have been deployed in a commercial approach. Given this global trend, and given the advances in CSP employment in the region in South Africa, the project partners rightly opted for changing the project's outcome towards establishing a commercially sized CSP (i.e. between 50 and 150 MW).

However, as we see in the discussions on CSP-TT NAM project design in Chapter 4, this new focus led to the 1) introduction of over-ambitious targets regarding the realization of the first commercial CSP in a timeframe that is still based on a small non-commercial demo CSP, and 2) a project log-frame that was not adapted and pretty much based on knowledge generation and transfer, and less so on the technical assistance and policy framework activities required for setting up the country's first utility-scale CSP and establishing the enabling environment needed for future replication of CSP.

A draft Theory of Change was presented to stakeholders at the discussion of the preliminary findings during the mission at the PSC meeting (10 July), which is reproduced in Box 24 below.

Box 24 Theory of change for the CSP-TT NAM project

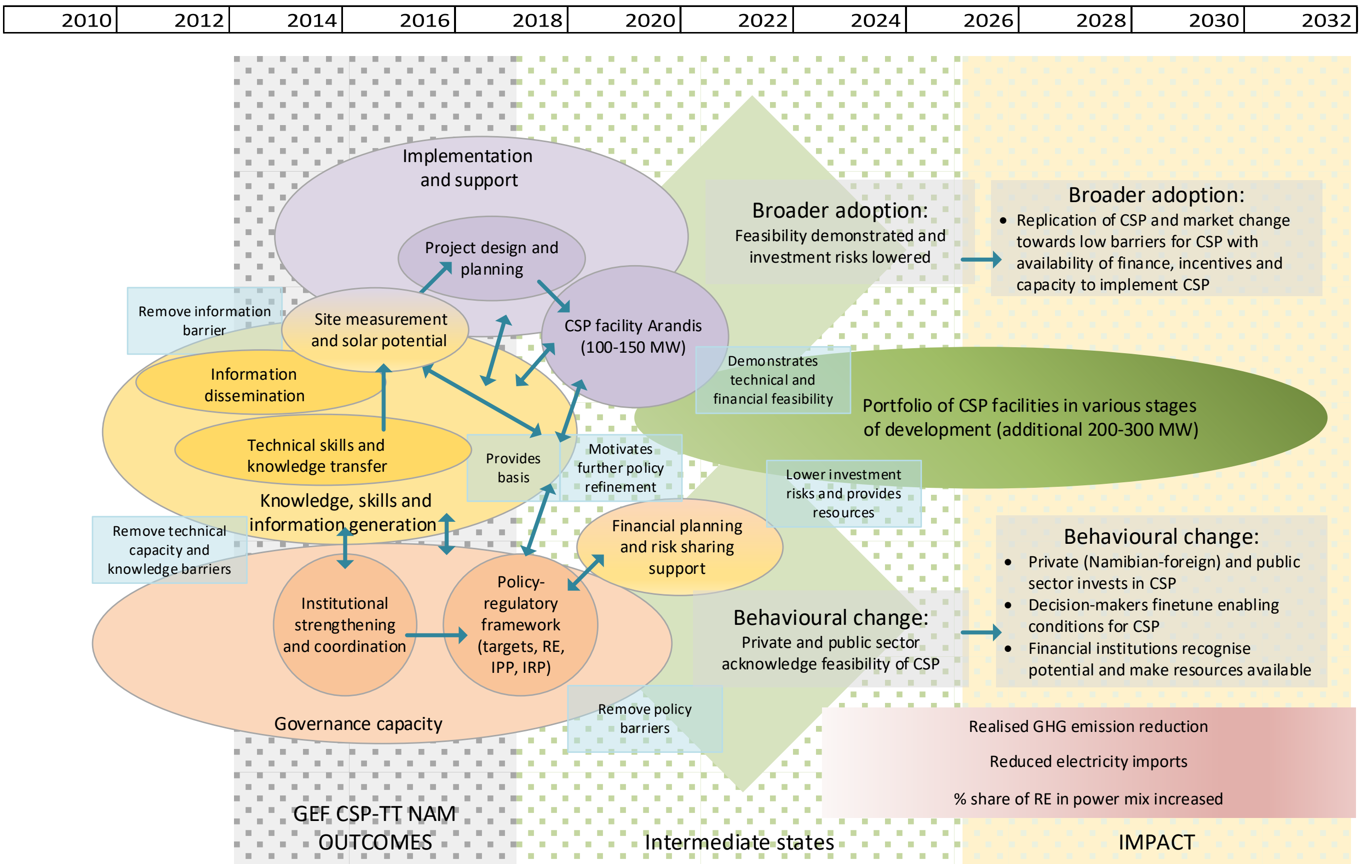


The Box summarizes the theory of change of the project, showing the development challenge and its immediate, underlying and root causes, as well as a hierarchy of expected results of the project, from outputs to outcomes to overall impacts.

In the original concept, the CSP TT-NAM project's focus was on supporting small the pilot CSP plants, but the focus later shifted towards deployment of a commercially sized facility (50-150 MW). It is instructive to see the difference in design approach. For example, with respect to governance, the design has the Indicator of "specific regulations promoting the development and operation of CSP plants" (Indicator 11, Component 3), while during implementation the project has rightly expanded to systematic improvements in the policy and legal framework (and this should have been reflected in the project's log-frame). That is, the project has tackled barriers in policy, planning and regulations regarding renewable energy (RE) in general by supporting the formulation and providing crucial inputs in the National Energy Policy, Renewable Energy Policy, National Integrated Resource Planning and Independent Power Policy that working together will provide a strong policy-regulatory enabling environment for utility-scale RE projects in general, ensuring that CSP is given adequate attention. Thus, the project has managed to influence the outcome of a conducive policy-regulatory enabling environment to facilitate the implementation of CSP projects. At the same time, the techno-economic and macro-economic assessment have not only highlighted the potential of CSP but have provided inputs into the process of updating RE policy and legal framework.

One problem has been the initial lack of awareness and skepticism amongst decision-makers regarding the potential of CSP as a viable renewable energy option in utility-scale power supply. The problem has been addressed by the Project by means of outreach activities (workshops, participation in events) and South-South networking with entities in the region that are also working on CSP (e.g. South Africa, REIPPPP[52]) and by bringing on board the special expertise of consulting and engineering companies from countries with CSP experience (North-South technology transfer, e.g. CSP Services from Germany, SolarGIS, working with local Namibian companies) that have helped to have a basis of necessary information (investment-grade solar radiation data and the assessment thereof to determine the techno-economic feasibility of CSP).

The project envisions strengthening of technical skills in Namibia as necessary to ensure local content in CSP development support and services. Removal of the information barriers and creating awareness on the potential of CSP will enable market participants to make informed business decisions and policy makers to make informed policy decisions.



Box 25 Dynamic theory of change (TOC) model of the CSP-TT NAM project

On 'broader adoption', the demonstrating the feasibility and deployment of the first CSP in Namibia will lay the basis for further replication and for a portfolio of CSP projects that will materialise in various stages of

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development over time. The general acceptance of CSP by the private and public sector as well as the broader public represents a necessary building-block for changes in stakeholder decision-making with regard to investments in RE and CSP.

Taking into account the above-mentioned above TOC consideration and the findings (presented in Chapter 3-6), an attempt has been made by the Evaluator to 'reformulate' the original results framework with a more appropriate set of outcomes, outputs, and indicators. This has been used as a better benchmark against which the project's results can be rated.

Box 26 Summary and rating of project results following TOC's revised log-frame indicators

Project Components/	Project Outcome and Outputs	Progress indicators (impact, outcome, output)	Progress reported and rating of result
Impacts		I. Installed CSP facilities o Number of facilities o Capacity (MW) o Electricity generation (GWh/yr) o Annual and cumulative emission reduction (kiloton of CO_2) o LCOE (cost per kWh) II. Impact share of CSP in the power generation mix of Namibia in post-project period (2017-2035) II. Reduced energy imports (in GWh and USD) over 2018-2035	
Objective: *Developing the necessary technological framework and conditions for the successful transfer and deployment of CSP technology for on-grid power generation*		A. Status of portfolio with number of CSP projects in various stage of development a. Operation b. Installation and construction c. Advanced feasibility (business and finance plan, design, approvals) d. Feasibility (techno-economic, socio-economic and environmental impacts e. Concept and site B. Technical and financial feasibility of first CSP facility demonstrated and investment risks lowered	The first CSP at Arandis finalized the feasibility stage (phase 1) and still has to enter the advanced stage (phase 2). Two other sites have been identified with investment-grade measurements Overall rating: *Marginally satisfactory:* (deployment of CSP technology) *Satisfactory* (necessary framework and conditions)
Component 1: Knowledge transfer, skills enhancement and information dissemination on CSP	Outcome 1a: • Basic local engineering, financial and consulting skills developed (providing local content in support services in CSP design, feasibility, implementation, and operation)	C. Status of local content: companies or institutes providing support services to the CSP (and other RE) facility development a. Number of companies b. Number and type of contracts/services c. Number of people involved in i. % are women D. Local experts can provide support services (engineering, financial, services) a. Number of experts that can	See section 3.2.1 (Box 7) for a detailed description. The project has supported the design of CSP modules in the RE curriculum at UNAM and the design of CSP modules in short specialized technical CSP training (vocational, academic institutions) CSP Professional Technical Training Manual. The curriculum for postgraduate CSP subjects and short courses will be open for intake in 2017

Project Components/	Project Outcome and Outputs	Progress indicators (impact, outcome, output)	Progress reported and rating of result
		provide support services b. Number of people following CSP-related topics in academic curricula (% of which women) E. Number of type of short and longer-term training on CSP offered	According to Afromach 92016), more than 60 potential local manufactures, engineers and consultants trained on CSP development; and more than 50 potential entrepreneurs trained on CSP market opportunities *Rating:* Satisfactory
	Outputs: 1.1 Capacity strengthened of academic institutions • Designed CSP modules in RE curriculum • Designed CSP professional training modules 1.2 Capacity needs of CSP industry players assessed and strengthened	1. Number of academic institutions that offer solar energy and CSP in their curriculum 2. Number and type of specialized and short courses offered on CSP 3. NTTCB and operational with post-project business plan 4. Functioning website on CSP as part of NTTCB's operations 5. Number of trainings for CSP industry players	
	Outcome 1b: • Enhanced knowledge on solar data and on potential of CSP application in Namibia	F. National solar radiation map available with investment-grade data a. Number and characteristics of sites covered G. Availability of information (quantitative, qualitative) available on CSP techno-econ potential and impacts for policy and investment decision-making	See section 3.2.2, Box 8 for details. Training provided to NEI on ground measurement processes, maintenance, data analysis and reporting. Equipment (with IT for data monitoring at NEI) purchased in 2015 and installed at the three sites (Auas, Kokerboom and Arandis) with measurements carried out by CSP Services since 2015. Solar data have been analysed and assessed (CSP, Solar GIS). Based on the solar data analysis, two reports have been written by Afromach, one on the CSP power potential in Namibia.and the other on socio-economic impacts. It should be noted that measurements do not only serve CSP, but also assessments for solar PV, thermal and wind energy assessments. *Rating:* Highly satisfactory
	1.3 Capacity strengthening of Namibian entities to carry out solar data measurements and GM stations installed • Training provided • Measurement equipment procured • N-S technology transfer 1.4 Measurements at selected sites carried out • Selection of suitable sites; and carry out measurements at the selected sites (DNI, GNI, wind and other data) 1.5 Analysis of measured data 1.6 Estimation of CSP techno-economic potential and macro-economic impacts	6. Number of Namibian entities that can carry out solar data measurements 7. Number of sites with investment-grade solar data (P50-P90, based on measurements) and time period of measurements (1 year, 3 years) 8. Number of studies on CSP potential and impacts (macro-econ and environmental) in Namibia	
	Outcome 1c: Enhanced awareness and information dissemination on benefits and possibilities of CSP	H. Level of awareness on decision-makers in private and public sector a. Number of decision-making staff that acknowledge role and/or feasibility of CSP	See section 3.2.1 (Box 7) for a detailed description. Afromach (2016) mentions that over 50 parliamentarians, policy-makers and decision makers were capacitated on CSP. The year 2015

Project Components/	Project Outcome and Outputs	Progress indicators (impact, outcome, output)	Progress reported and rating of result
	1.7 Promotional materials prepared and disseminated 1.8 North-South and South-South networking and partnerships 1.9 Capacity strengthened of NEI to serve as a National Technology Transfer Coordinating Body (NTTCB) • Needs assessment and business plan • CSP website set up	9. Type and amount of materials disseminated (audiovisual, poster, brochures, articles in magazines, TV time) 10. Participation on CSP in public and networking events in a. Namibia, b. Abroad 11. Database setup and maintained on (interested) global and local stakeholders (linked with CSP website 12. Partnerships agreements between Namibian and foreign partners (academia, consulting)	saw a tilt towards CSP decision-making in NamPower and CSP by starting the implementing of the full feasibility in 'fast track' and incorporating CSP in drafting energy policy docs. On outputs, the project participated in events (Dubai. Japan, South Africa) with stands. The design was completed of a database link of interested global and local stakeholders on the NEI website. However, the status of NEI to function as NTTCB remains vague. An assessment report was made, but it is not clear how recommendations will be implemented. Both NamPower and NEI operate webpages on CSP without links to each other. Coordination between NamPower and NEI was an issue during project implementation that does not seem to have subsided. *Rating:* Moderately satisfactory
Component 2: Governance capacity on RE and CSP strengthened	Outcome 2: • Policy-institutional-regulatory framework strengthened	I. Approval and endorsement status of RE and IPP framework (with CSP mainstreamed in) of energy policy, planning and regulations	Endorsed by the Cabinet in July 2017: • National Energy Policy (final report, March 2017) • Renewable Energy Policy (final report, Sept 2016) Approved by MME and awaiting Cabinet endorsement: • National Integrated Resource Plan (final report, Sept 2016) • National Policy for IPPs (revised report, July 2016) *Rating:* Highly satisfactory
	Outputs: 2.1 Inputs provided on CSP for key reports on energy produced in Namibia (Update of the National Energy Policy, Renewable Energy (RE) Policy, National Integrated Resource Plan (NIRP), IPP Policy Framework;	13. Key reports updated and/or inputs provided (on CSP) by the Project: • National Energy Policy • National Renewable Energy Policy • IPP policy framework • National Integrated Resource Policy	
Component 3: Facilitation of the first utility-scale CSP plant in Namibia	Outcome 3: • Full feasibility study of 50-150 MW CSP facility formulated and approvals obtained for construction of CSP	J. Status of full feasibility and arrangements for CSP facility	The first phase of feasibility studies has been completed with techno-economic study (MottMcDonald), macro-economic study (NamPower, Jan17) and amended environmental and socio-impact study. However, the second phase needs to be started after NamPower has recommended the final concept and
	Outputs: 3.1 Phase 1 full feasibility study • Selection of site and validation of CSP	14. Status of phase 1 full feasibility study 15. Status of Phase 2 full feasibility study	

Project Components/	Project Outcome and Outputs	Progress indicators (impact, outcome, output)	Progress reported and rating of result
	technologies • Techno-economic assessment • Environmental and socio-economic impact assessment • Finalization of plant concept and configuration and getting approvals 3.2 Phase 2 full feasibility study • Business and finance plan (SPV-institutional setup, financial and business arrangements; implementation plant for EPC; public consultation and environmental and social plan) • Procurement of partners and funders/financiers; 3.3 Tendering process EPC contractor • Preparation of detailed engineering plans with sufficient detail for an EPC contractor to prepare tendered bids • Preparation of an EPC tender, tender bids and contract (incl. local content stipulations); 3.4 Agreement on tariffs, government endorsement, legal permits and signed EPC contract (to commence CSP construction)	16. Status of CSP project agreements and approvals and obtaining generation license 17. Status of procuring partners and funders 18. Status of EPC tendering process	MME approved the proposed investment. This achievement is only half-way to reaching EPC contract signing status as envisaged in the original ProDoc. CSP-TT NAM has provided valuable inputs and the decision on a USD billion dollar investment is not in the project's hands and obviously not taken lightly. However, one could have expected MME and NamPower to at least have taken the decision to have started second phase by now. *Rating:* Moderately satisfactory
Project Management / M&E	*Output:* 4.1 Adaptive management, monitoring and evaluation 4.2 End-of-project activities (project final report and workshop)	19. Project plans, M&E reports and financial reporting (see sections 5.1, 5.3 and 5.4) 20. Project final report with post-project action plan and lessons learned	There is no real final report and post-project action. This is one reason to rate M&E implementation as moderately unsatisfactory (see section 5.5)

ANNEX G. EVALUATION REPORT OUTLINE

Contents (Evaluation report outline guidelines)	Corresponding section in this report
Opening page (title and basic report information) Acknowledgements	Opening page Acknowledgements List of abbreviations and acronyms Table of Contents List of boxes
Executive summary (3-5 pages) • Project Information Table • Project Description • Evaluation Ratings & Achievement Summary Table • Concise summary of conclusions and recommendations	Executive summary ▪ Project information table ▪ Project description ▪ Project results ▪ Evaluation ratings table ▪ Concise summary of conclusions, lessons learnt and recommendations
1. Introduction • Purpose of the final evaluation (FE) and objectives • Scope & Methodology: principles of design and execution of the FE, approach and data collection methods, limitations to the FE; rating scales • Structure of the FE report	1. Introduction 1.1 Purpose of terminal evaluation and objective 1.2 Scope and methodology 1.3 Structure of the evaluation report
2. Project description and development context (3-5 pages) • Project start and duration • Problems that the project sought to address • Immediate and development objectives of the project • Baseline Indicators established • Expected Results • Main stakeholders	2. Project description and background 2.2.2 Project start and duration 2..1 Context and problems the project sought to address 2.2.1 Project objective; Expected results and established indicators (idem) 2.2.2 Main project partners and stakeholders
	3. Findings: progress towards outcomes 3.1 Introduction 3.2 Progress in achieving outcomes and outputs 3.3 Attainment of the objective
3. Findings (12-14 pages) 3.1 Project design / formulation • Analysis of LFA/Results Framework (Project logic /strategy; Indicators); • Assumptions and Risks • Lessons from other relevant projects incorporated into project design • Replication approach • UNDP comparative advantage • Linkages between project and other interventions within the sector • Management arrangements	4. Findings: project design 4.2.1 Analysis of the project logic and strategy 4.2.1 Analysis of the project logic and strategy 4.2.2 Management arrangements and stakeholder participation; replication approach (idem) 4.2.1 Analysis of the project logic and strategy (idem) 4.2.2 Management arrangements and stakeholders
	4.3 Theory of change 4.4 Ratings form project design
3.2 Project Implementation • Adaptive management (changes to the project design and project outputs during implementation) • Partnership arrangements • Relevant stakeholder involvement • Project Finance • M&E at design and implementation (*) • UNDP and Implementing Partner implementation / execution (*) coordination, and operational issues	5. Findings: project implementation 5.1 Adaptive management and arrangements 5.5.1 Changes in project during implementation 5.1.3 Results of adaptive management intervention 5.1.2 Coordination and management arrangements 5.2 Stakeholder involvement 5.3 Project finance and co-financing 5.4 M&E 5.5 Ratings of project M&E and project implementation/execution

Contents (Evaluation report outline guidelines)	Corresponding section in this report
3.3 Progress Towards Results • Overall results (attainment of objectives) (*) • Relevance (*); • Country ownership (*) • Effectiveness & Efficiency (*) • Mainstreaming • Sustainability (*) • Impact (*)	6. Findings: project results (see Chapter 3 for description of outcomes and outputs) 6.1 Attainment of the objective 4.1 Relevance and country drivenness (idem) 7. Conclusions 6.3 Impacts and mainstreaming 6.2 Sustainability and risks 6.3 Impacts and mainstreaming
4. Conclusions, Recommendations and Lessons Learnt (4-6 pages)	7. Conclusions, recommendations and lessons learnt 7.1 Conclusions
• Corrective actions for design, M&E of the project • Actions to follow up to reinforce benefits • Proposals for future direction	7.2 Recommendations • UNDP and GEF: actions for project design • Support to further development of pipeline of CSP activities to reinforce benefits • Future direction: support for setting up a grid-connected RE program for IPPs
• Best and worst practices	7.2 Lessons learnt
5. Annexes • TE ToR (excluding ToR annexes) • Mission itinerary; List of persons interviewed and field visits • List of documents reviewed • TE evaluative matrix (evaluation question matrix) • Questionnaire or Interview Guide --- • Evaluation Consultant Agreement form • Annexed in separate files: a) audit trail from received comments on draft report; b) GEF tracking tool	Annexes A ToR B Itinerary of the evaluation mission C List of documents collected and reviewed D Questionnaire and evaluation matrix (idem) E Theory of change F Evaluation Consultant Agreement form (separate files)

ANNEX H. CONSULTANT CODE OF CONDUCT FORM

Evaluators/reviewers:

1. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded
2. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation with expressed legal rights to receive results.
3. Should protect the anonymity and confidentiality of individual informants. They should provide maximum notice, minimize demands on time, and respect people's right not to engage. Evaluators must respect people's right to provide information in confidence, and must ensure that sensitive information cannot be traced to its source. Evaluators are not expected to evaluate individuals and must balance an evaluation of management functions with this general principle.
4. Sometimes uncover evidence of wrongdoing while conducting evaluations. Such cases must be reported discreetly to the appropriate investigative body. Evaluators should consult with other relevant oversight entities when there is any doubt about if and how issues should be reported.
5. Should be sensitive to beliefs, manners, and customs and act with integrity and honesty in their relations with all stakeholders. In line with the UN Universal Declaration of Human Rights, evaluators must be sensitive to and address issues of discrimination and gender equality. They should avoid offending the dignity and self-respect of those persons with whom they come in contact in the course of the evaluation. Knowing that evaluation might negatively affect the interests of some stakeholders, evaluators should conduct the evaluation and communicate its purpose and results in a way that clearly respects the stakeholders' dignity and self-worth.
6. Are responsible for their performance and their product(s). They are responsible for the clear, accurate and fair written and/or oral presentation of study limitations, findings, and recommendations.
7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

Evaluation/reviewer Consultant Agreement Form

Agreement to abide by the Code of Conduct for Evaluation in the UN System

Name of Consultant: J.H.A. VAN DEN AKKER (Team Leader)
Name of Consultancy Organization (where relevant): ________________
I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at Westerhoven, Netherlands
Signature: ________________

ANNEX I. ABOUT THE EVALUATOR

Mr. Jan van den Akker is a technology management scientist with a Master's degree from Eindhoven University of Technology (Netherlands), specializing in international development cooperation. He is an expert on sustainable energy policy and technologies. Mr. Van den Akker specializes in studies and analytical work, project design and development, project coordination and implementation, project monitoring and evaluation, knowledge management, capacity strengthening and public-private partnerships in the field of sustainable energy strategies, energy efficiency, energy technologies and supply, climate change and the Clean Development Mechanism. He has lived and worked abroad for over 7 years in Zambia, Mexico, and Thailand. In addition, has undertaken numerous short missions to about 45 countries in Africa, Latin America, and Asia & the Pacific.

In 2003/2004, he founded ASCENDIS, as an independent office, and has been providing consultancy on sustainable energy and climate change, specializing in development issues. ASCENDIS is based in Westerhoven, Netherlands, but offers services in Africa, Asia and the Pacific, Europe and Latin America & the Caribbean, often by associating itself with local freelance experts, professionals, and organizations. As a long-term expert with the United Nations system, Mr. Van den Akker has provided advice to governments and organizations on the design of investment and capacity building programs for UNEP, UNDP and UNIDO (mostly in GEF-funded activities), UNFCCC, European Commission and for NGOs/consultancy companies (e.g., Practical Action Consulting, Winrock) in the area of renewable energy, energy efficiency and sustainable transportation.

As an independent consultant, he has reviewed and evaluated about 30 GEF-funded sustainable energy projects and assisted in the design of about 35 sustainable energy projects. He worked as UNDP Regional Technical Advisor on climate change mitigation (in Eastern and Southern Africa) during 2007-2009 and as Key Expert in the European Union Technical Assistance Facility for Sustainable Energy for All (2015-16). he also worked as Technical Advisor in the implementation of individual projects in Guatemala, Peru, and currently, in Malawi.

ANNEX J. AUDIT TRAIL

To the comments received on the draft report (dated July 2017) of the Terminal Evaluation of CONCENTRATING SOLAR POWER TECHNOLOGY TRANSFER FOR ELECTRICITY GENERATION IN NAMIBIA (CSP-TT NAM) - GEF Project ID: 4163 – UNDP PIMS ID 4334)

The following comments were provided to draft Terminal Evaluation report (version "Namiba CSP- Eval Report v1a.docx", July 2017); they are referenced by institution ("Author") and location (if linked to a specific page):

Author	#	Comment location	Comment/Feedback on the draft TE report	Evaluator's response and actions taken
Results and knowledge specialist, UNDP NY	1		• Opening page: o The following items are missing: ▪ Evaluation time frame ▪ GEF operational program/strategic program (CC4, SP3 according to the results framework in the TOR) ▪ Implementing & executing agencies	The missing items have been added
	2		• Executive summary: o Evaluation rating table ▪ Please provide an overall rating for the project outcomes, rather than (or in addition to) splitting the rating between two categories. ▪ Please note that this table only needs to appear once in the document. The blank version can be removed from the Scope and Methodology section.	Overall rating has been provided, although the justification is detailed according to categories is maintained in the results rating table in Chapter 6.
	3		• Theory of change: o A great deal of time is spent on the TOC, but it is not clear why the terminal evaluator decided to create a new theory of change for the project at the end of implementation. There seems to be little value in this exercise, even if the pre-existing logical framework was significantly flawed. Please clarify the decision-making process for this. o The logframe, however flawed, has been agreed to and signed off on by the responsible parties. It is of some concern that "based on theory-of-change considerations, the original log-frame has been 're-formulated' in this evaluation for the purpose of being able to describe project results and provide a rating" (p10). The logframe used for evaluation purposes should be the one actually used by the project.	The Country Office asked to look into the Theory of Change. Its e-mail, dated 29/06/17 reads: "one of the newest requirements that could inform the evaluation is a reconstruction of the TOC by the evaluator so that the evaluation is based on testing that TOC. It may or may not yet has been reflected in the TOR" It is surprising that one entity in UNDP insists on doing the exercise, while another says it has little value. Apart from the request, the log-frame had to be looked into anyhow in detail and a 're-formulation' was necessary because the old log-frame simply cannot be used as an instrument for credibly rating the project results. However, since this was strictly speaking not required by the ToR, I have taken most text related to Theory of Change and log-frame reconstruction out of the body text and put together in one Annex (F).
	4		• Findings: o Project finance: Please include the co-financing table.	See my response below: o OK

			▪ A blank template has been attached for convenience. o Effectiveness and efficiency section is missing. This section requires a rating. o Overall results: The overall rating is missing o Relevance: the rating is missing ▪ The formatting in the TOC indicator table needs to be adjusted so that the rating boxes to not cover up the text.	o Added o Added o Added
			• Conclusions, recommendations & lessons o Please discuss best and worst practices, per the TOR	Reference to what is worst and best practice has been added in 'lesson learned'.
	5		• General comments: o The explicit discussion of gender is very good. o The discussion of the project is thoughtful and comprehensive o There are grammatical and punctuation errors, missing words, extra words, and poorly constructed sentences throughout the document. Please proofread. o The MS rating stands for "*moderately* satisfactory", not "*marginally* satisfactory." Please correct throughout the document. o Length: per the TOR, the report (without annexes) should be no more than 40 pages. This more of a guideline than a strict requirement, but at 69 pages this report is almost twice as long as it is supposed to be. I suggest making some sections more concise.	See my comments below: o Detailed proofreading was postponed until the final version of the report. o OK o The body text has been reduced by putting the text boxes on CSP applications and development in Namibia a separate Annexes. Also, the sections on 'theory of change' have been taken out of the body and put in a separate Annex
MME	6		The NIRP is part of the cabinet approved documents (May 2017)	Corrected at places in the text (Exec Summary, page 10; and in Box 8, Output 2.2, page 25; Annex E.6, page 80
NEI	7	Page 14 Page 18	Three editorial comments (page 14) and 2 on page 18, related to cost comparison of CSP	See Section 7.2 'Lessons learnt #4' and Annex E.1 for cost comparisons of CSP
	8	Box 5	GW instead of MW	Has been corrected, now in Annex E
	9	Page 21	Page 21, editorial comments	Have been corrected
	10	Page 23	At the debrief meeting on 10 July. The first thing spoken about was the design of the project and how that the design made evaluation difficult. i.e. • the relationship between outputs and indicators are not related. • Also, it was mentioned that the framework expects the project to produce outputs for which the project has no direct influence on. • The design was overly ambitious on things such as policy development etc.	This is discussed in detail in Chapter 4
	11	Page 25	This discusses what the project has done, but is not necessarily evaluating against the project design. i.e. are these achievements in line with the expectations of the project. Where the outputs met and by how much? Or did the project not reach the set targets?	These comments fail to take into subsequent Sections, i.e. Section 3 is an introduction to the Findings, presenting the facts, while the analysis of the facts as to whether achievements were according to design expectations or not is given
		Page 27	This gives the impression that it is only considering the achievement from mid to end of project. And not the	

			achievement from the start to the end of project. The final evaluation in my mind should give the project outcomes from start to finish.	in the Sections 4 to 6
		Page 30	It should be mentioned that the design is flawed in thinking that any size plant other than a small demo plant could be built in the timeframe allocated to the project.	The reason for this comment is not clear as this is exactly the Evaluator's point made in detail in Section 6.1
		Pages	Editorial comments	Addressed
		42	Based on the above I don't understand why it's not highly Unsatisfactory	The Evaluator feels that giving the rating 'unsatisfactory' is already bad enough. Although very flawed, the design did provide some basis to get CSP started, hence the rating "U" and not 'HU". In the design section, log-frame formulation is rated with "highly unsatisfactory", but the item is not part of the formal rating table that needs to be presented accoding to the UNDP/GEF format.