Global Environment Facility (GEF)

United Nations Development Programme (UNDP)

Department of Mineral Resources and Energy (DMRE)

Mid-term Review

SOUTH AFRICA WIND ENERGY PROJECT (SAWEP) - PHASE II

(GEF Project ID: 5341 – UNDP PIMS ID 5256)

SOUTH AFRICA
GEF-5; GEF Climate Change Mitigation; CCM-3: Renewable Energy – Promote investment in renewable energy technologies

Evaluation timeframe: May 2015 – October 2019

Final version

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Jan Van den Akker **Karen Eatwell**

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

ABP	Annual Budget Plan
AWP	Annual Work Plan
BBBEE	Broad Based Black Economic Empowerment
BST	Basic Safety Training
BTT	Basic Technical Training
BW	Bidding Window
CPD	Country Programme Document
CPUT	Cape Peninsula University of Technology
CSIR	Council for Scientific and Industrial Research
CSP	Concentrated Solar Power
DANIDA	Danish International Development Agency
DBSA	Development Bank of South Africa
DEA	Department of Environmental Affairs
DEDEAT	Department of Economic Development Environmental Affairs and Tourism
DEFF	Department of Environment Forestry and Fisheries
DHET	Department of Higher Education and Training
DoE	Department of Energy
DMRE	Department of Mineral Resources and Energy
DST	Department of Science and Technology
DTI	Department of Trade and Industry
DTU	Technical University of Denmark
EME	Exempted Micro Enterprise
EA	Executing Agency
ED	Economic Development
EnD	Enterprise Development
ERA	Electricity Regulation Act
FIT	Feed-in Tariff
GEF	Global Environment Facility
GWh	Gigawatt hour
HCD	Human Capacity Development
IA	Implementing Agency
IRP	Integrated Resource Plan
IPP	Independent Power Producer
LCOE	Levelised Cost of Energy
M&E	Monitoring and Evaluation
M&V	Monitoring and Verification
MW	Megawatt
MWh	Megawatt hour
MTR	Mid-Term Review
NERSA	National Energy Regulator of South Africa
NQF	The South African National Qualifications Framework
NT	National Treasury
NSF	National Skills Fund
NWA	Numerical Wind Atlas
OWA	Observational Wind Atlas
PCU	Project Coordination Unit
PIMS	UNDP-GEF Project Information Management System
PIR	Project Implementation Report
PPA	Power Purchase Agreement
PSC	Project Steering Committee

PV	Photovoltaic
QCTO	Quality Council for Trades and Occupations
QPR	Quarterly Progress Report
QSE	Qualifying Small Enterprise
R&D	Research and Development
RCU	Regional Coordinating Unit
RE	Renewable Energy
REDZ	Renewable Energy Development Zone
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RLA	Reimbursable Loan Agreement
SA	South Africa
SABS	South African Bureau of Standards
SAGEN	South Africa-German Energy Programme
SANEDI	South African National Energy Development Institute
SANS	South African National Standard
SAQA	South Africa Qualifications Authority
SARETEC	South African Renewable Energy Technology Centre
SAWEA	South African Wind Energy Association
SAWEP	South African Wind Energy Project
SAWS	South African Weather Service
SDG	Sustainable Development Goals
SEA	Strategic Environmental Assessment
SED	Socio-economic Development
SETA	Sectoral Education Training Authority
SMME	Small Medium and Micro Enterprise
SSWT	Small Scale Wind Turbine
TOR	Terms of Reference
TREC	Tradable Renewable Energy Certificate
TVET	Technical and Vocational Education and Training
UCT	University of Cape Town
UNDP	United Nations Development Programme
USD	United States of America Dollar
WASA	Wind Atlas of South Africa
WESSA	Wildlife and Environment Society of South Africa
WTST	Wind Turbine Service Technician Training
ZAR	South African Rand

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EXECUTIVE SUMMARY

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Project Title:	**South Africa Wind Energy Project (SAWEP) - Phase II**			
GEF Project ID:	5341		*Committed at endorsement (USD Million)*	*Realized co-financing / spent GEF budget at midterm review (USD Milion)*
UNDP Project ID:	5256	GEF financing:	3.554	1.342
Country:	South Africa	IA/EA own:	0.200	0.100
Region:	Southern Africa	Government:	12.388	11.235
Focal Area:	Climate Change	Others (incl. private):	23.080	22.074
FA Objectives, (OP/SP):	Climate Change programme #3 to Renewable Energy - Promote investment in renewable energy technologies	Total co-financing:	35.668	33.408
Executing Agency:	UNDP	Total Project Cost:	39.042	34.750
Other Partners involved:	Department of Mineral Resources and Energy (Implementing Partner)	GEF endorsement: May 2015		ProDoc Signature (date project began): 18 Dec 2015
		(Operational) Closing Date:	18 Dec 2019	Extension proposed: Dec 2020

Description of the Project

The project has been formulated by UNDP and the Department of Energy (DoE; now: Department of Mineral Resource and Energy, DMRE) with financial support provided by the Global Environment Facility (GEF). The South African National Energy Development Institute (SANEDI) was brought in to provide project management services. SAWEP II is the successor project to SAWEP I (implemented during 2008-2010). SAWEP II was formulated during 2013-14 and the Project Document (ProDoc) was signed in Dec 2015. Implementation started de facto in the second half of 2016 with an agreement with the South African National Energy Development Institute (SANEDI) to provide project management services and with the Inception Workshop (Oct 2016).

The **objective** of SAWEP II The objective of the project "to assist Government and industry stakeholders overcome strategic barriers to the successful attainment of South Africa's IRP (2010) target of 3,320 MW of wind power online by 2018/2019".

The objective will be achieved through **four components**: 1) Monitoring and Evaluation of the implementation of local content requirements; 2) Resource-mapping and wind corridor development support for policymakers; 3) Support for the development of small-scale wind sector; 4) Training and human capital development for the wind energy sector.

The period between project preparation and *de facto* start of activities (2013-2016), also saw the successful implementation of four bidding windows under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) during 2011-2015, which boosted large-scale grid-connected wind power development, although new bidding windows have been on hold since then. This new situation has led to changes in the originally planned activities, as explained below. The main **achievements of SAWEP II** so far have been:

Component 1

- With the M&V system already functioning at the IPP Office of REIPPPP, the importance of Component 1 has diminished. The main activity has then been the study *Assessment and Analysis of the Impact of the Renewable Energy*

Independent Power Producer Procurement (RE IPPP) Programme on the South African Economic Development which was carried out during 2017-18. The study comes with an analysis of the socio-economic impacts of REIPPPP and provides recommendations for alignment with other national socio-economic programmes, for updated community income and ownership measures, and update monitoring.

Component 2

- Finalisation of the Wind Atlas (WASA) activities, which is a collaboration between DTU Wind and South African partners (SAWS, CSIR, UCT) coordinated by SANEDI. WASA has been carried out in three phases (WASA 1, 2009-2014; WASA 2, 2014-2018; and WASA 3, 2017-2020). Thus, WASA 2 partly overlapped with SAWEP II, while WASA 3 is under implementation. Under WASA, nineteen wind measurement masts have been installed (5 of these masts were installed under WASA 3 in the Northern Cape), which allow the construction of a database with time series of wind measurements and visualization in high-resolution wind maps that cover the whole country (www.wasaproject.info)
- The Wind Atlas forms the basis for the identification of areas for the Strategic Environmental Assessment for wind and solar energy (SEA, Phase 2) of the Department of Environmental affairs (DEA), now the Department of Environment Forestry and Fisheries (DEFF).

Component 3

- SAWEP II works together with German development partners and the Eastern Cape Provincial Department. of Economic Development Environmental Affairs and Tourism (DEDEAT) to add a wind energy component by early 2020 to a PV-diesel hybrid mini-grid in Upper Blinkwater which has recently been set up.
- Also, SAWEP works with DEDEAT and Department of Public Works in defining a project on water pumping with the ongoing schools' environmental education programme that is being implemented by Chris Hani District Municipality (CHDM) and the Wildlife and Environment Society of South Africa (WESSA) in selected schools in the Eastern Cape. This is an initiative interesting also from the viewpoint of climate change adaptation (recurrent droughts).
- A number of other activities are in progress, such as a) a "Green" tariff study with small-scale wind energy for Buffalo City Metro, b) small-scale wind capacity building (with University of Fort Hare), and c) feasibility study to determine market potential and viability to establish a medium-size wind turbine refurbishment industry in South Africa.

Component 4

- By the time SAWEP II started, technical wind training had been set up in a number of institutions to meet the demand for a skilled workforce to service wind farms set up as part of the REIPPPPP. The South African Renewable Energy Technology Centre (SARETEC) was set up to build country's skills capacity to support the renewable energy industry. SARETEC offers a five-month full-time Wind Turbine Service Technician (WTST) course as well as short technical courses. Given this background, a study was carried out on capacity strengthening needs (*Status and Development of Wind Energy Training, Education, Skills and Human Capacity Development).*
- The project will sponsor a number of students during 2020 to participate in WTST
- As part of outreach and communication, SAWEP II has sponsored a number of annual wind energy events, such as WindAc and Windaba.

The main **findings** and **ratings** of the mid-term review are presented below:

Main criteria	Rating	Explanation
Progress towards results	- S	The Progress towards Results is in principle 'unable to assess' in the sense that the Project Results Framework with its set of progress indicators, was largely outdated by the time project operation started in Quarter 4 2016 due to the new developments, such as REIPPPP implementation and advances with WASA, described above. Hence, one recommendation is the revision/update of the Results Framework. Nonetheless, progress in activities is visible, as described above, and based on the findings of the MTR mission an analysis of project documents, the MTR Team has provided ratings for the four components (based on the achievements summarised above) with an overall rating as "satisfactory".'.
- Component 1 - Component 2 - Component 3 - Component 4	- MS - HS - S - MS	

Relevance	- R	The SAWEP programme is quite "relevant" in view of the importance of wind power in the REIPPPP and in view of the importance of small-scale wind power to address issues in energy access (wind-powered mini-grids in off-grid areas) and clean water access (water pumping in dry areas), focussing on Eastern Cape Province.
Implementation and adaptive management	- S	By the time the SAWEP II started, significant progress had already been made especially with the implementation, in particular setting up the RE IPPPP office (Component 1) and wind training, education, skills development at SARETEC (Component 3). Thus, the proposed outputs, activities for Outcome 1 and 4 were outdated. Project management (RCU) correctly decided to do a review, status, and update of Outcomes 1, 3 and 4, and has revised the work programme accordingly with budget shifting from Components 1 and 4 to Component 3 on small-scale wind development. This is indeed an area where the project can make a difference
Sustainability	- L	The completion of high-resolution Wind Atlas overing the whole of South Africa and capacity strengthening at CSIR (that might take over the 19 wind masts installed for continuing measurements) and recent capacity building activities at University of Fort Hare (by CSIR) on wind resource assessment give confidence on the likely sustainability in capacity, while the new IRP (recently gazetted in Oct 2019) makes a continuation of the government to boost large-scale renewable energy to achieve its renewable energy goal by 2030 likely. With a new REIPPPP bidding round 5 being mooted, this will release new financial resources. Thus, the MTR Team rates 'sustainability' as 'likely'.

Note:

- "Progress towards results" and "Implementation and adaptive management" are rated on a 6-point scale ranging from Highly satisfactory (HS), Satisfactory (S), Moderately satisfactory (MS), Moderately unsatisfactory (MU), Unsatisfactory (U) and Highly unsatisfactory (HU).
- Relevance is rated on a 2-point scale: Relevant (R) or Not relevant (NR)
- Sustainability is rated on a 4-point scale, ranging from Likely (L), Moderately Likely (ML), Moderately Unlikely (MU) and Unlikely (U)
- U/A: unable to assess

Recommendations

Number	Recommendation	Entity Responsible
1	The MTR Team proposes that the SAWEP II implementation period is extended with a period until Q4 2020 (one-year extension) for the following reasons: • Component 2: WASA 3 started with eight months implementation delay and is scheduled to end by 2020. If the sister project SAWEP II closes before the end of 2020 this may negatively affect the results and financial management of WASA 3; • Component 3: After launching the Upper Blinkwater hybrid mini-grid, operation and maintenance will be overseen by DEDEAT at least until May 2021. However, to allow a smooth transition, technical assistance by SAWEP until end of 2020 may still be needed; • Component 3: The school-based small-scale wind water pumping projects will not be commissioned and handed over until Q4 2020/Q1 2021. To allow proper monitoring and troubleshooting support, the assessment, design, and construction, and activities should fall within the SAWEP II implementation period (to be extended until Dec 2020)	UNDP CO DME
2	The MTR team proposes that the Project Results Framework be updated to reflect the many changes that occurred before and after SAWEP II project inception and to (re-)define realistic end-of-project target values. This will allow a good monitoring (and terminal evaluation) of the progress of outcomes and the objectives. The MTR team has added a proposal for such a reformulated logical framework (see below).	UNDP CO DME
3	By mid-2020, the RCU should make a 'post-SAWEP' action plan that reflects: • Post-WASA continuation on wind measurements, ownership of wind masts, and continued use for climate forecasting;	Project team (PCU)

	• Capacity building needs (e.g. continued support to SARETEC or expansion of wind courses to other educational institutions), depending on future demand for skilled workforce • Analysis of the market development of large grid-connected wind power in view of the new IRP 2019 and the possible resumption of REIPPPP. • Market assessments Incl. institutional arrangements needed) and financial-economic analysis of small-scale wind energy, including power generation in the 100 kW- 2 MW range, and wind-powered water pumping	

The changes, suggested by the MTR Team, in the Project Results Framework are summarized below:

Output	**Original indicator**	**New output**	**New indicator**
1.1-1.2 Enhanced, capability among Government and industry stakeholders to monitor and verify implementation and verify factors related to the success or failure of project sponsors to meet local content requirements and socio-economic development commitments	- M&V system and supporting business processes defined, developed and implemented at the DoE (IPP Unit) by end-2015. - Four masts and related equipment installed in the Northern Cape for SAWEP II-sponsored phase two of WASA (or WASA II) by 2016 (bringing the cumulative total of WASA-installed masts to 9)	1.1 Enhanced capacity of DoE IPPP Office to strengthen M&V system	- Detailed assessment on economic, socio-economic and enterprise development impacts of REIPPP
2.1 Geographical extension of verified Wind Atlas (WASA developed for Northern Cape	- 4 masts and related equipment installed in the Northern Cape for SAWEP II-sponsored phase two of WASA (or WASA 2) – by 2016	2.1 Geographical extension of verified Wind Atlas (WASA developed for Northern Cape	- Four masts and related equipment installed in the Northern Cape in WASA 3 bringing total WASA masts to 19
2.2-2.3 Preliminary and final WASA II data processed for use in definition of RE Development Zones (REDZs);	- REDZs in WASA II sites defined, on the basis of WASA II data; - Final REDZs around all SAWEP II-sponsored sites in the Northern Cape province defined – by end-2018	2.2 WASA data processed to produce high-resolution wind resource map covering the whole nation	- Completed and validated high-resolution wind resource map and database
		2.3 Enhanced capacity within Government to use wind atlas data for energy planning at policy and strategic level	- Wind energy development focus areas defined in SEA Phase 2
3.1-3.2 Establishment of small-scale wind demonstration project;	- 8 MW small-scale wind farm demonstration project developed - Publicly available Monitoring and Evaluation (M&E) Report on demonstration small-scale wind farm project.	3.1 Establishment of small-scale wind demonstration projects	- At least two small-scale wind demonstration projects developed in Eastern Cape and monitored

The MTR Team wants to stress that there is no change at the project objective level, which is maintained (see the table in Recommendation section 7.2 (Box 17). The relative importance of Components has changed and the progress indicators are updated, but there is no real change in the overall scope of the project as such.

1. INTRODUCTION

1.1 Purpose of the mid-term review (MTR) and objectives

1.1.1 Background

The 1998 White Paper on Energy Policy of South Africa calls for diversification of the energy mix, which was followed by White Paper on Renewable Energy of 2003. These official documents laid the policy foundation for the promotion of renewable energy technologies such as solar, hydro, biomass and wind. In line with these policies, the Integrated Resource Plan (IRP 2010) sets a target of 17,800 MW of renewable energy to be achieved by 2030 in respect of the electricity generation mix, of which 8,400 MW to be achieved by wind energy.

In 2000, the Government manifested support for wind power by requesting the Global Environment Facility (GEF) and DANIDA for the development of a wind power development programme, including supporting the establishment of a national demonstration project, the Darling wind farm. A preparation phase (PDF-B) was approved by GEF in 2001, which resulted in a number of studies (on financial and other barriers to wind power development, funding sources and mechanisms, and commercial requirements) and in a full-size project document for a South Africa Wind Energy Programme (SAWEP). Originally, SAWEP was planned as a 5-year project, with investment in the new Darling wind farm as co-financing, but GEF decided that the project should be implemented in two Phases.

SAWEP Phase I was approved by GEF in 2007 as a two-year project and implemented during February 2008-March 2010 with a GEF budget of USD 2 million. SAWEP Phase 1 started with a "zero" basis wind industry in South Africa and its main activities, e.g. its support of the 2.5 MW Darling Wind farm and initiation of the Wind Atlas for South Africa (WASA) focussed on creating an environment for sustainable wind energy development in South Africa. Since 2008, South Africa's wind energy industry has grown rapidly, also taking advantage of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which commenced in 2011 and consists of multiple procurement rounds known as Bidding Windows (BWs), targeting 3,320 MW of wind power generating capacity by 2018/19, of which 1,983 MW had been awarded in the first three bidding rounds.

Despite reaching the aforementioned milestones, the further development of the South African wind energy sector faced a number of challenges, such as the development of local content level in wind power, delays in environmental impact assessments, slow or non-existent development of the small-scale wind energy sector, and shortage of skilled technicians and wind farm operation and maintenance.

To address such challenges, the SAWEP Phase II was formulated during 2013-14 and endorsed by the Global Environment Facility (GEF) for financing support in 2015. Lead agency of SAWEP Phase II is the Department of Mineral Resources and Energy and signed Project Document was signed with UNDP (the GEF Implementing Agency) in December 2015. Envisaged to be implemented during 2015-2019, Phase II started in August 2016 when the South African National Energy Development Institute (SANEDI) agreed with DoE and UNDP to provide project management services.

1.1.2 Purpose of the MTR

With implementation well underway, a Mid-Term Review (MTR) needs to be undertaken of the project in accordance with the UNDP and GEF Monitoring and Evaluation (M&E) policies and procedures. The MTR has to be carried out by an independent consultant, i.e. not previously involved in project design or implementation. In a competitive process, two experts were chosen to undertake the MTR, Mr. Johannes (Jan) van den Akker (Netherlands) and Dr. Karen Eatwell (South Africa), hereafter referred to as the "MTR Team".

The **objective** of the MTR is to "*assess progress towards the achievement of the project objectives and outcomes as specified in the Project Document and assess early signs of project success or failure with the goal of identifying the necessary changes to be made in order to set the project on track to achieve its intended results. The MTR will also review the project's strategy and its risks to sustainability*."

1.2 Scope and methodology

The MTR 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;
  - Project technical reports and description of outputs; project or counterparts' websites;
  - National policy documents on (energy, renewables, climate change, etc.) as well as other relevant reports, PowerPoint presentations, and documents from counterpart organizations.
- A review mission of nine working days to meet UNDP, DoE, SANEDI and to hold interviews with project partners and stakeholders. A list of project partners and stakeholders met is provided in Box 7. The meetings and interviewed persons helped the reviewers to obtain in-depth information on impressions and experiences and to explore opinions about the Project and their understanding and identify opportunities.
- A presentation of the initial findings was made at the end of the evaluation mission (on 14/10/2019).

Regarding *data analysis and methods for analysis*, a large number of relevant reports and documents were 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 mid-term review (MTR) 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 to express what they feel are main issues, followed by more specific questions on the issues raised. Triangulation has allowed validation of information through cross verification from two or more sources.

The rating has taken place according to the evaluation criteria and the rating scales identified in the UNDP *Guidance for Conducting Midterm Reviews of UNDP-supported, GEF-financed Projects* (2014)[1]. The ratings in this report have been determined based on the project progress reporting and the analysis the Reviewers carried out of the available information and comparing these with observations from the mission (interviews with stakeholders and site visits) and checking with the information presented in project technical reports and policy and background documents.

1.3 Structure of the MTR 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 mid-term review (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 "review findings" has been guided by the questions of the "review evaluative matrix", of which a final draft was formulated at the inception stage of the assignment (see Annex D)[2]. The report follows the outline for

[1] 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).

[2] See the *Inception Report* of the Mid-Term Review (J. Van den Akker/K. Eatwell, Sept 2019)

midterm reviews of UNDP/GEF projects[3] but has split the suggested chapter on "Findings" in three parts for practical reasons due to the chapter size and to permit a more reader-friendly presentation of the information. Findings on relevance, design, and formulation are in Chapter Three. An overview of progress regarding the achievement of outcomes and outputs is given in Chapter Four, while the findings on project implementation and monitoring are presented in Chapter Five. Finally, Chapter six discusses the findings on the replication effects and sustainability. 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.

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 and development benefits.

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

- way project was formulated and designed (discussed in Chapter 3);
- 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).

Annexes at the end of the report include the Terms of Reference (Annex A), mission details and list of organisations and people interviewed (Annex B), documents collected and bibliography (Annex C), evaluation questions and methodology (Annex D).

[3] See Annexes 3 and 12 in the 'Report Content Checklist" in the UNDP *Guidance for Conducting Mid-Term Reviews of UNDP-Supported, GEF-Financed Projects (*2014)

2. PROJECT DESCRIPTION AND BACKGROUND

2.1 Context and problems that the project sought to address

2.1.1 Electricity sector

Current electricity production in South Africa relies heavily on coal inputs with about 94% of South Africa's electricity generation coming from coal and, therefore, has a very high greenhouse gas (GHG) emission factor. Around 77% of South Africa's energy needs are directly derived from coal and 92% of coal consumed on the African continent is mined in South Africa. South Africa has 18 coal-fired power stations with an installed capacity of 40,836 MW, conventional hydroelectric power stations and hydro pumped storage schemes at 3,571 MW and gas turbine power stations with an installed capacity of 3,326 MW. Renewable energy contribution to the energy mix is about 3,309 MW mainly from wind energy, small hydro, solar photovoltaics and concentrated solar power, while nuclear energy contributes 1,850 MW. Total installed capacity was 53,025 MW in 2017, to which 1,500 MW of imported hydro can be added[4].

Peak demand in 2011-12 was 37,065 MW (power produced was 49,889 MW). The energy generated in 2012 was 298,752 GWh[5]. Most of this electricity was consumed domestically, but around 13,038 GWh was exported to Swaziland, Botswana, Mozambique, Lesotho, Namibia, Zambia, Zimbabwe and other Southern African Development Community countries participating in the Southern African Power Pool. South Africa supplements its electricity supply by importing around 9,000 GWh per year from the Cahora Bassa hydroelectric generation station in Mozambique via the 1,920 MW Cahora Bassa high-voltage direct current transmission system of which 1500 MW is sold to South Africa. Electricity distributed in South Africa amounted to 229,342 gigawatt-hours (GWh) electricity in 2016[6].

Box 1 South Africa, power generation capacity

	Generation capacity (MW, 2017)			
	ESKOM	IPP	Municipal	Total
Coal	40,142	214	480	40,836
Gas	2,426	1,023		3,449
Hydro (large)	3,391		180	3,571
Hydro (small)	2	17		19
Nuclear	1,860			1,860
Wind	113	1,499		1,612
Concentrated solar (CSP)		300		300
Solar PV		1,367		1,367
Biomass/landfill gas		11		11
Total	**47,934**	**4,431**	**660**	**53,025**

Compiled from: ESKOM, *Factsheet Generation Plant Mix* (2017); Wikipedia, *List of power stations in South Africa* (2017/18); Energy Information Agency, US Department of Energy (2018)

The utility Eskom was converted in 2002 into a public company, although it is de facto a parastatal under the Department of Public Enterprises. Eskom currently owns most of the electricity production. Eskom still has the majority of generation rights and produces approximately 90% of the electricity. Of the capacity of 53,025 MW in 2017, about 660 MW was generated by municipalities and 4,431 MW by independent power producers (IPPs). Eskom maintains the national grid (operating the integrated national high-voltage transmission system) and a large part of the distribution infrastructure.

In January 2008, SA experienced widespread rolling electricity blackouts due issues with generation capacity at Eskom. To remedy the inadequacy of supply, load shedding was carried out and lasted until early May 2009. In 2013 South Africa again approached a period of limited capacity during a winter period of higher demands. Power problems escalated in late 2014 when the coal storage silo collapsed at one of the largest coal power plants. After experiencing chronic power shortages for several years, no major blackouts occurred. Since 2016, South Africa has had a power capacity surplus as a result of weaker electricity demand and of new capacity commissioned by both public and private sectors, mainly from

[4] See Box 1. The imported hydro comes from the Mozambique Cahora Bassa dam;

[5] NERSA, *Energy Supply Statistics for South Africa 2012*

[6] STATS SA, *Electricity generated and available for distribution (Preliminary)*, June 2018

independent power producers (or IPPs) which added about 4.5 GW[7]. However, in 2019 the issue of power shortage returned with load shedding of about 4 GW[8].

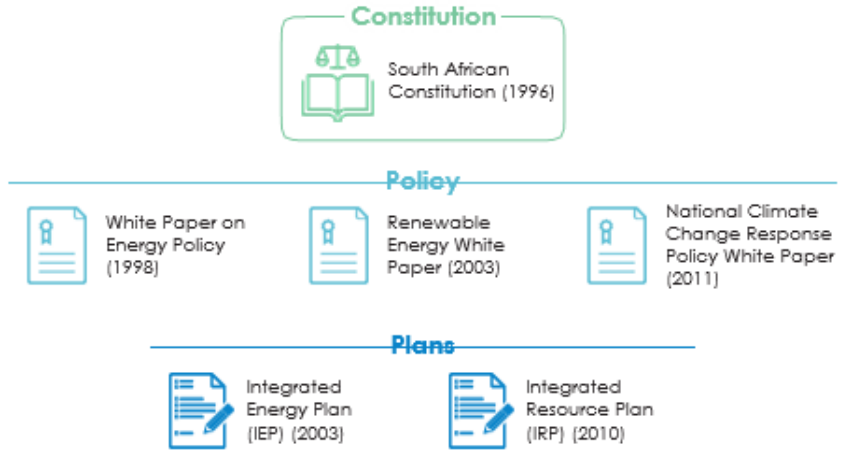
2.1.2 .Renewable energy policy and plans

Policy and plans

Since 1996, with the introduction of the Constitution, South Africa has been creating the building blocks for economically and ecologically sustainable development and a sustainable energy future.

A number of official documents have laid the policy foundation for the promotion of renewable energy technologies such as solar, hydro, biomass and wind.

Box 2 South Africa renewable energy policy context



Source: *State of Renewable Energy in South Africa* (DoE, 2017)

- The 1998 White Paper on Energy Policy of South Africa[9] calls for diversification of the energy mix and addresses the importance of energy access
- The White Paper on Renewable Energy of 2003 mentions a non-mandatory renewable energy target for the first time, indicating that 10 GW should come from renewable energy by 2013.
- The Integrated Resource Plan 2010-2030 (2011). IRP aims to double electricity generation capacity through a diversified energy mix by 2030, mainly coal, gas, nuclear and renewables. IRP includes a strong reliance on renewables: 42% of all added capacity by 2030 should be by renewable generation, the equivalent of 17,800 MW (of which 8,400 MW to be achieved by wind energy. The IRP is to be updated every two years. The first Update (2013) revised down the target for renewable energy from 17 800 MW to 10 000 MW in line with the bleaker economic outlook. After another Update in 2016, the latest Update was drafted in 2018 and gazetted in October 2019, and extends the analysis period to 2050 and would bring installed RE capacity by 2030 to about 25,000 MW[10], of which 11,442 MW is of wind power.
- Compared to the IRP that focuses on electricity generation, the Integrated Energy Plan (IEP, 2016) outlines the energy sector as a whole and aims to guide the development of energy policies, to provide the future landscape of energy infrastructure investments and policy development. The IEP addresses energy demand balanced with energy supply, transformation, economic and environmental considerations regarding available resources.
- The National Climate Change Response Policy White Paper (2011) includes Renewable Energy as one of its 'flagship programmes', based on the plans specified in the IRP 2010-2030. The Nationally Determined Contribution (NDC) states

[7] Eskom plans to bring online over 12,000 MW of new electricity installed capacity (US Energy Information Administration, 2015), of which 8770 MW coal-fired, 2097 wind power, 400 concentrated solar, 1094 solar PV plants, 33 MW landfill gas/biomass (Wikipedia, List of power stations in South Africa (2017/18).

[8] Source: UNDP/GEF Project Document "Leapfrogging South Africa's markets to high-efficiency LED lighting and high efficiency distribution transformers"

[9] The White Paper defines as specific objectives: a) Increase access to affordable energy services; b) Improve energy governance; c) Secure supply through diversity; d) Stimulate economic development, and e) Manage energy-related environmental and health Impacts.

[10] Estimated based on Table 7, *IRP 2018, draft-for-comments:* 7,608 MW hydro and pumped storage, 7,958 PV, 600 MW CSP, 11,442 MW wind and 499 MW other RE and cogeneration

an ambition for a de-carbonised energy sector and "a complete transformation of the future energy mix", incorporating clean and high-efficiency generation technology.

- The National Development Plan Vision 2030 (2012) calls for an increase in electricity generation reserve margin from 1% (2014) to 19%, requiring the development of 10 GW of additional electricity capacity by 2019 against the 2010 baseline of 44 GW, with 5 GW of the 10 GW to be sourced from renewable energy.

In May 2011, the Department of Energy (DoE) gazetted the Electricity Regulations on New Generation Capacity (New Generation Regulations) under the Electricity Regulation Act (ERA). The ERA and Regulations enable the Minister of Energy (in consultation with NERSA) to determine what new capacity is required. Ministerial determinations give effect to components of the planning framework of the IRP. New determinations amount to 29,110 MW, of which 14,725 MW of renewable energy (including 6,360 MW of wind).[11]

A significant share of the new electricity capacity will be developed and produced by Independent Power Producers (IPPs). The New Generation Regulations establish rules and guidelines that are applicable to the undertaking of an IPP Bid Programme and the procurement of an IPP for new generation capacity. In November 2010 the Department of Energy (DoE)[12] together with the National Treasury entered into an agreement with the Development Bank of Southern Africa (DBSA) to provide the necessary support to implement the IPPPP and establish the IPPPP Office (see www.ipp-renewables.co.za/)

Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)

Historically, feed-in tariffs (FITs) have been the most widely used international government policy instrument for procuring renewable energy (RE) capacity. After investigating the RE-FIT option, the South African government favoured a competitive tender approach to reach the RE goals set in the IRP 2010. For this purpose, the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) was established by DBSA, DoE and the National Treasury. The REIPPPP's main objective is to secure private sector investment for the development of new electricity generation, which is expected to be from renewable energy sources with about 7,000 MW operational by 2020. The REIPPPP has provided a clearer framework upon which Eskom could enter into power purchase agreements with producers.

From August 2011 to 2015 four procurement rounds known as Bidding Windows (BWs, in which 6,422 MW of electricity was procured from 112 RE Independent Power Producers (IPPs). By March 2019, 3,976 MW of electricity generation capacity from 64 IPP projects has been connected to the national grid[13] (of which 1,980 MW of onshore wind), contributing to South Africa's climate change objective with reduction of 36.2 million tons of carbon dioxide and generating 35,669 GWh of energy and generated about 40,134 jobs (of which 33,019 were in construction and 7,115 in operations).

The REIPPPP has attracted significant investment in the development of the RE IPPs into the country. The total investment (total project costs, including interest during construction), of projects under construction and projects under (financial) negotiation, is ZAR 209.7 billion (this includes total debt and equity of ZAR 209.2 billion, as well as early revenue and VAT facility of ZAR 0.5 billion). The REIPPPP has attracted ZAR 41.8 billion in foreign investment and financing in the four BWs and small-scale windows. Investment costs have been ZAR 22/MW on average for wind (ZAR 31/MW for solar, and ZAR 89/MW for CSP).

In the determination, the Minister allocated an initial 100 MW of the 3725 MW to the procurement of small projects which has since been expanded to 400 MW. The projects with a generation capacity of not less than 1 MW and not more than 5 MW using a number of RE technologies (wind, solar PV, biogas, landfill gas) are considered as qualifying technologies for selection under this Small Projects IPP Procurement Programme. Currently, about 99 MW is generated by 20 small IPPs under the small-scale RE window.

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11 *IPPPP, An Overview*, DoE-DBSA-NT (2019).

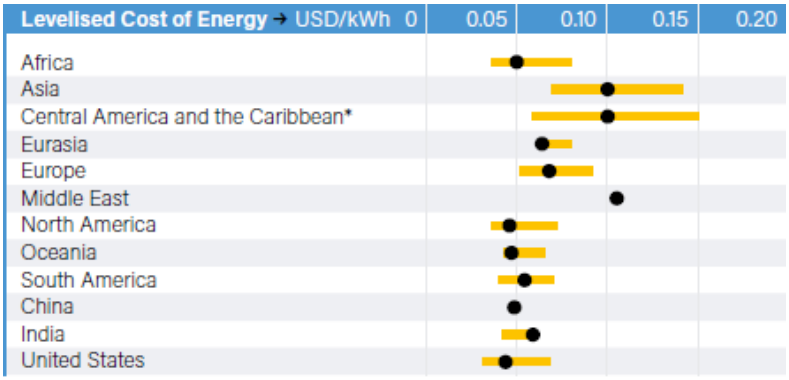
12 Now part of Department of Mineral Resources and Energy (DMRE)

13 *South Africa's Utility-Scale Wind & RE Industry Key Data* (SAWEA, March 2019) and https://www.ipp-renewables.co.za/ *IPPPP, An Overview*, DoE-DBSA-NT (2019).

Box 3 Global onshore wind power trends

The global weighted-average levelized cost of energy (LCOE) of onshore wind projects commissioned in 2018, at USD 0.056/kWh, was 13% lower than in 2017 and 35% lower than in 2010, when it was USD 0.085/kWh. This trend is driven by the continued reductions in total installed costs (from an average of USD 1,913/kW in 2010 to USD 1,497/kW in 2018), as well as by improvements in the average capacity factor (from 27% in 2010 to 34% in 2018). This mirrors the trend in utility-scale photovoltaic energy (PV), which saw an even more dramatic trend in lowering the LCOE from USD 0.37/kWh in 2010 to USD 0.09/kWh in 2018 (with investment cost dropping from USD 4,621/kW on average in 2010 to USD 1,210 per kW in 2018). The LCOE may further drop (to USD 0.048/kWh for solar PV and USD 0.045/kWh for onshore wind). Similarly, the cost of concentrated solar power (CSP) has dropped from USD 0.341 in 2010 to USD 0.185/kWh in 2018 and maybe to USD 0.073/kWh in 2021 (IRENA, 2018). Costs of electricity from onshore wind are now at the lower end of the fossil fuel cost range. Globally, new solar PV and onshore wind will increasingly be cheaper than the marginal operating cost of existing coal-fired power plants.

Global installed capacity of onshore wind power was about 568 GW in 2018 (from 120 GW in 2008). Over the past 6 years, an average of about 49 GW has been added each year (47 GW was added, for example, in 2017). Offshore wind had 23 GW installed capacity in 2018



At least 103 countries have commercial wind power capacity and 33 countries have more than 1 GW in operation. China leads the pack with 206.8 GW, followed by USA (96.6 GW), Germany (53.2 GW), India (35.1 GW), France (15.3 GW), Brazil (14.7 GW), UK (13.0 GW) and Canada (12.8 GW). In 2018, installed onshore wind in Africa and Middle East was 5.72 GW, of which 2,1 GW in South Africa. (REN21, 2019) and GWEC (2019)

The renewable energy market as a whole expanded from 800 GW (85 GW, excluding hydro; out of total generation capacity of 3,800 GW in 2004) to about 2,738 GW (1,246 excluding hydro) or 33% of total installed power generation capacity (REN21, 2019; REN21, 2014).

Internationally, the strong RE market growth is stimulated not only by the increasingly lower costs, but also by the emergence of regulatory regime that intends to promote clean energy. Regulatory policies, including feed-in policies and renewable portfolio standards, have been instrumental in guaranteeing market access for renewable power suppliers, in setting power prices for grid-connected renewable systems and in establishing mechanisms for achieving new lower prices for technology delivery.

Renewable energy deployment

Given the trends of global lower prices (see **Box 3**) national regulations and programmes and long-term domestic visibility of a multi-decade transition towards diversification, the country has already seen significant market growth in RE since 2010. The biggest contribution has been from utility-scale RE, driven by programmes such as REIPPPP. In conjunction with REIPPPP, Eskom has an active research programme focusing on the development of wind energy, pumped storage, and CSP projects.

Operational capacity of renewable power increased from about 100 MW in 2000 (excl. the 2,048 MW large hydro and pumped storage) out of a total installed capacity of 50,657 MW)[14] to 4,036 MW in 2017 (of which 2,096 MW wind,

[14] NERSA *Energy Supply Statistics for South Africa* (2000)

excluding the 3,553 large hydro and pumped storage; out of total installed capacity of 52,811 MW in 2017[15]). According to the CSIR (2015) study, the introduction of renewable energy into the national grid resulted in a reduction of an equivalent of 4.4 million tonnes of CO_2.

As of March 2019, there are 22 operational wind power IPP's that have up to date an installed capacity of 2078 MW connected to the national grid (contributing 52% of the power supply by renewables) with more than 900 wind turbines spread out over three provinces (most in Eastern Cape, and in Western and Northern Cape). Wind energy produced net savings of ZAR 1.8 billion in the first half of 2015 and was also cash-positive for Eskom by ZAR 300 million[16]

Impacts of REIPPPP

The multi-phase bidding process has been characterized by progressive reductions in the prices offered by RE independent power producers (IPPs), as well as increases in local content and levels of employment in the RE sector. This has been encouraged by evaluation criteria for the REIPPPP that demand that 70% should be related to price and the remaining 30% to economic, job creation, local content, ownership management, and preferential procurement consideration.

Box 5 highlights benefits of the development of onshore wind projects under REIPPPP. First, what is clearly visible from the wind energy bidding rounds is that kWh prices fell with each bidding window, averaging ZAR 0.71 per kWh in the last and fourth bidding round, a decline of 100% compared with the first bidding round with ZAR 1.42 per kWh. Likewise, solar PV bid prices decreased from ZAR 3.29 /kWh to ZAR 0.82/kWh in Round 4. For onshore wind, average tariffs went down with 50% from ZAR 1.67/kWh to ZAR 0.84 per kWh[17]. For small wind projects, the average tariff has been ZAR 1.27/kWh.

Box 4 Generation capacity awarded under REIPPPP

	BW1		BW2		BW3		BW3.5		BW 4		ALL	
	Capacity MW	Number of Projects	Capacity MW	Number of Projects	Capacity MW	Number of Projects	Capacity MW	Number of Projects	Capacity MW	Number of Projects	Capacity MW	Number of Projects
Onshore Wind	649	8	559	7	787	7			1 362	12	3 357	34
Solar PV	627	18	417	9	435	6			813	12	2 292	45
Solar CSP	150	2	50	1	200	2	200	2			600	7
Landfill Gas					18	1					18	1
Biomass					17	1			25	1	42	2
Small Hydro			14	2					5	1	19	3
	1425	**28**	**1040**	**19**	**1457**	**17**	**200**	**2**	**2 205**	**26**	**6 327**	**92**

Since November 2011 more than 6 327 MW from 102 renewable energy projects have been awarded, of which wind projects contribute more than half of total capacity (3,557 MW). The figures do not include the Small RE programme (about 95 MW).

Source: PowerPoint, *Enabling Renewable Energy in South Africa: Assessing the REIPPPP*, WWF, August 2014

The employment for South African citizens in the construction and operation of RE IPPs has continued to grow from about 2,500 in 2013/14 (DoE, 2017) with more than 33,000 job years by 2019 (*IPPPP, An Overview,* March 2019), just above the target of 32,000 jobs. However, there have been some complaints, especially by organised labour, regarding jobs associated with conventional sources of energy like coal, and associated value chains, being threatened by the expanding renewable energy sources[18].

[15] en.wikipedia.org/wiki/List_of_power_stations_in_South_Africa

[16] *Financial costs and benefits of renewable energy in South Africa in 2014*, CSIR (2015)

[17] *IPPPP, An Overview*, DoE-DBSA-NT (2019).

[18] Mukonza & Nhamo (2018), *Wind energy in South Africa: A review of policies, institutions and programmes*

Significantly more people from local communities were employed during construction than was initially planned. The expectation for local community participation was 13,000 job-years. To date, 18,250 job-years have been realised (i.e. 140% more than initially planned). Regarding the employment share in construction, *IPPPP, An Overview* (March 2019) mentions black citizens (79%), local communities (49%), women (8%) and youths (41%). These shares all have exceeded the original targets set.

Minimum ownership by local communities in an IPP of 5% is required as a procurement condition, with the actual achievement being about 9%. For projects that have reached financial closure, South Africans on average own 52% equity in all IPPs. Black South Africans own, on average, 33% of project equity, while local communities hold 9% equity in the IPPs[19]. An average of 21% shareholding by black people in engineering, procurement and construction (EPC) contractors has been attained in projects that have reached financial close under the REIPPPP (this is 1% higher than the 20% target).

A possible local content level of 68% has been aimed at in the latest BW rounds. Local content commitments by IPPs amount to R67.6 billion, i.e. 45% of total project value (R151.1 billion for all bid windows). Thus, achievements have been lower, around 45-48% for wind, but higher for solar (about 55-65%). In the case of solar PV, imports even started to be offset by significant exports as South Africa is becoming a significant player in the assembly of PV panels.

The share of procurement that is sourced from Broad-Based Black Economic Empowered (BBBEE) suppliers, Qualifying Small Enterprises (QSE), Exempted Micro Enterprises (EME) and women-owned vendors are tracked against commitments and targeted percentages. The actual share of procurement spent by IPPs from BBBEE suppliers for construction and operations combined is currently reported as 86% (more than 60% target; ZAR 48.5 billion).

IPPs are required to contribute a percentage of projected revenues accrued over the 20-year project operational life toward SED initiatives, i.e. education and skills development, social welfare, health, enterprise development. For the current portfolio, the average commitment level is 2.2% (which is well above the target level of 1%). Enterprise development contributions committed for BW1 to BW4 and the small RE programme amount to ZAR 7.2 billion.

After a protracted period of supply constraints and occasional load shedding, the national utility's operations stabilised during 2015 and reached a state of surplus capacity during 2016/17. This is ascribed to slowing electricity demand, the addition of new build capacity and a significant improvement in the utility's operational performance. Consequently, Eskom indicated that the addition of further large-scale RE capacity might lead to significant overcapacity on the system and declined to sign PPAs. Delays with REIPPPP after BW3 have had severe adverse effects on newly established local industries. The DoE (2017) report on the status of RE, mentions that of the original 12 new manufacturing businesses reported at the end of 2015, six had closed or suspended operations.

However, due to the troubled financial situation of utility Eskom, the buyer of the allocated power, developers of the projects in question had to renegotiate the PPAs and accept lower prices. After a hiatus of three years, all of the 27 outstanding PPAs awarded in rounds 3.5 and 4 of the REIPPP programme were signed (representing a generation capacity of 2.3 GW) in April 2018. A new round (BW5) is now under preparation, aiming at securing 1,800 MW[20], but awaiting the official approval of the updated IRP.

Box 5 Benefits of wind power development under REIPPPP Bid Windows (BW)

	BW1	BW2	BW3	BW4
MW allocation	649	559	787	1,362
Local content (million ZAR)	2727	4,817	6,283	5,146
Local content (%)	27%	48%	47%	45%
Job creation (construction)	1,810	1,787	2,612	2,831
Job creation (operation)	2,461	2,238	8,506	8,161

Source: DoE, *State of Renewable Energy in South Africa* (2016).
IPPPP, Overview, March 2019

[19] Mukonza & Mhamo (2018); Future Growth (2019): article *REIPPP comes of age* (May 2019). IPPPP, An Overview, DoE-DBSA-NT (2019

[20] PV Magazine, *South Africa to launch new 1.8 GW REIPPP round this year* (June 2018)

2.1.3 SAWEP Phase 1

In 2000-01, the Ministry of Minerals and Energy manifested support for wind power by requesting the Global Environment Facility (GEF) and DANIDA for the development of a wind power development programme, including supporting the establishment of a first national demonstration project, the Darling wind farm. A preparation phase (PDF-B) was approved by GEF in 2001, which resulted in a number of studies (on financial and other barriers to wind power development, funding sources and mechanisms, and commercial requirements) and in a full-size project document for a South Africa Wind Energy Programme (SAWEP). Originally, SAWEP was planned as a 5-year project, with investment in the Darling wind farm as co-financing, but GEF decided that the project should be implemented in two Phases.

SAWEP Phase I was approved by GEF in 2007 as a two-year project and implemented during Feb 2008-March 2010 with a GEF budget of USD 2 million. The objective was to install and operate the Darling wind farm (5.2 MW) and help prepare the enabling environment for the development of 45 MW and more combined wind farms.

SAWEP Phase I had the following components:

1. Increased public-sector incremental cost funding
   - Detailing appropriate financing instruments (NERSA REFIT; report on the business case for renewable energy);
2. Green power funding initialised
   - Draft Domain Protocol for voluntary Tradable Renewable Energy Certificates (TRECs); provision of Green Power Guarantee Scheme with DBSA and City of Cape Town;
3. Long-term policy and implementation framework for wind energy developed
   - Support policy development (review of White paper on RE; Wind Energy Industrial Strategy, Wind Farming Guidelines, Environmental Framework for wind farms);
4. Wind resource assessment
   - Development of first (meso-scale) wind map, covering Western Cape and areas of Northern and Eastern Cape (co-funded by DANIDA, in cooperation with DTU Wind Energy (Risoe)[21], CSIR, UCT, SAWS); Training and knowledge sharing with wind private sector developers
5. Commercial wind energy development promoted;
   - Support GIZ-funded grid study and to wind energy capacity studies; studies implemented on the impact of wind power on capacity planning and system operation; support provided to update the grid code for wind turbine connection; support SABS with technical standard development;
6. Capacity built and institutions strengthened
   - Capacity strengthening (workshops, participation in events; meetings); Coordinate with key government departments (policy, regulations), public agencies and companies (e.g. financing; Eskom), wind farm industry and associations, and development partners; dissemination of lessons learned.

SAWEP Phase 1 had two key outputs that have been important for wind energy development:

- For the Darling Wind Farm, a Green Power Guarantee Scheme was established at the DBSA to facilitate the signing of the Power Purchase Agreement with the City of Cape Town[22]
- Wind Atlas for South Africa (WASA), of which the first version (Phase 1) was carried out in March 2012-April 2014 (see http://www.wasaproject.info/)[23]. The WASA team consists of DTU Wind Energy (then Risoe DTU) of Denmark, Council for Scientific and Industrial Research (CSIR), the University of Cape Town, (UCT) the South African Weather Service (SAWS) and the South African National Energy Development Institute (SANEDI).
- Revival of the South African Wind Energy Association (SAWEA) through assistance with the development of the Business Plan and initial wind energy seminars;

[21] Risoe National Laboratory for Sustainable Energy became part of the Technical University of Denmark (DTU) as Risoe DTU

[22] The Darling Wind farm, South Africa's first commercial wind farm that was financed through a 20-year power purchase agreement (PPA) with the City of Cape Town. It should be noted that this type of municipal PPAs is no longer legally possible.

[23] With about USD 600,000 of UNDP/GEF allocated to WASA I; The Danish Government committed DKK 9.9 million (eq.USD1,5 million) for the WASA 1 Component.

- Wind Energy Industrial Strategy, which was investigated by CSIR and DTU Wind, resulting in a Final Report (with 3 parts, 1. Global Wind Energy Market and Industry, 2. South African Wind-energy Market and Industry, and 3. Strategic Analysis).

Part of the progress in the development of the South African wind industry and allocation of wind power under the REIPPPP can be attributed to the first phase of the SAWEP. The Terminal Evaluation Report of SAWEP Phase I concluded that SAWEP had played a highly visible, influential and critical role in catalysing public interest in wind energy in South Africa and in assisting the national governmental departments such as DoE, the DTI, DST, National Treasury, NERSA and Eskom with the provision of relevant and required regulatory and implementation frameworks needed for investment in the sector[24].

However, despite the achievements of SAWEP I and the removal of many key institutional and regulatory barriers, there remain a couple of **obstacles** to the medium-term achievement of the wind energy allocations. These are summarized below:

1. *Challenges in the definition of, and progress towards, local content targets*.

   The REIPPPP set local content requirements starting with a minimum threshold of 25% and target of 45% in BW1 to a minimum threshold of 40% and target of 65% in BW3 and BW4. While the minimum thresholds were exceeded, the targets were not met.

2. *Incomplete wind resource mapping and identification of all potential sites for harnessing wind energy.*

   Linked to SAWEP I, wind resource maps for all of the Western Cape, as well as parts of Northern Cape and Eastern Cape provinces (collectively known as WASA 1 sites), were developed by the WASA 1 project. Extension of the wind atlas to cover all of the Northern Cape, Eastern Cape, KwaZulu-Natal and parts of Free State Provinces (collectively known as WASA II sites) would result in the capture of at least 80% of South Africa's wind resource-base.

3. *Lack of capacity in small-scale wind sector.*

   Given that the project developers that have an interest in this sub-sector often do not have the same resources as those focusing on utility-scale developments, participation in the small-scale renewable energy has been considerably more difficult. Application has remained by RE enthusiasts and in off-grid applications mainly, such as electricity for a house, mini-grid, telecommunications, or to charge batteries.

4. *Lack of adequate vocational training schemes targeted at the wind energy sector.*
   While the training of the technicians required to support wind farm operations, for instance through the South African RE Technology Centre (SARETEC), has received attention, there has not been the same level of focus regarding vocational training relating to the manufacturing of wind turbine components, resulting in constraints to the development of local value-chains for wind turbine components.

These obstacles were analysed in detail in the SAWEP I Terminal Evaluation (TE), which – based on the many challenges still facing the nascent wind industry – recommended the development of the second phase of SAWEP (SAWEP II). The recommendation was that SAWEP II should focus on supporting the expansion/refinement of the wind atlas; wind turbine and components testing and certification capacity; on-going awareness and engagement between Government and industry participants; implementation of a Wind Industrial Strategy; and wind energy education and training.

2.2 Project description and strategy

2.2.1 Objectives of the project; expected results and established indicators

The **objective** of the project "to assist Government and industry stakeholders overcome strategic barriers to the successful attainment of South Africa's IRP (2010) target of 3,320 MW of wind power online by 2018/2019".

[24] As described in DoE (2015); UNDP/GEF SAWEP Phase 2 Project Document

The objective will be achieved through 4 **components**: 1) Monitoring and Evaluation of the implementation of local content requirements; 2) Resource-mapping and wind corridor development support for policymakers; 3) Support for the development of small-scale wind sector; 4) Training and human capital development for the wind energy sector.

A summary of the project framework with **objective, outcomes, outputs, and indicators** is provided in **Box 6** below.

Box 6 Summary of the project objective, outcomes, and outputs

Objective	Indicator and target
To assist the Government and industry stakeholders overcome strategic barriers to the successful attainment of South Africa's Integrated Resource Plan target of 3,320 MW of wind power generation online by 2018/19	• Generation from wind farms (GWh) – 1,367 GWh cumulatively produced or contracted by Year 4 of project implementation • Number of individuals benefiting from wind-generated electricity: 74,230 by Year 4 of project implementation. • Incremental tonnes of CO_2 emissions reduction due to wind energy capacity: direct cumulative emission reduction of 70,378 tCO_2 (due to wind contracted by Year 4)

Component 1 *Monitoring and verification of the implementation of local content requirements for wind energy procurement mechanisms.* GEF budget: USD 310,859 (TA)

Output		Indicator and target
Outcome	*Mechanisms in place for objective, evidence-based assessment and verification of progress in implementing localisation initiatives, taking into account any correlations between local content requirements, investment metrics (e.g. generation capacity, financial returns, costs, prices, etc.) and socio-economic development (e.g. employment creation).*	
1.1	Enhanced, technology-enabled capability among Government and industry stakeholders to monitor and verify implementation of local content requirements	M&V system and supporting business processes defined, developed and implemented at the DoE (IPP Unit) by end-2015.
1.2	Enhanced capacity among Government wind industry stakeholders to objectively monitor and verify factors related to the success or failure of project sponsors to meet local content requirements and socio-economic development commitments	*Twelve* quarterly reports on localisation and socio-economic development (SED) published and 6 workshops convened by 2018

Component 2 *Resource-mapping and wind corridor development support for policy-makers*
GEF budget: USD 44,386 (INV support) and USD 1,489,481 (TA); total: USD 1,933,867

Output		Indicator and *target*
Outcome	*Expanded verified Wind Atlas (of South Africa, WASA), Phase II, completed for additional provinces in support of future wind power project development and procurement mechanisms*	
2.1	Geographical extension of verified Wind Atlas developed for Northern Cape.	*Four* masts and related equipment installed in the Northern Cape for SAWEP II-sponsored phase two of WASA (or WASA II) by 2016 (bringing the cumulative total of WASA-installed masts to 9)
Outcome	*Strategic wind corridors/areas identified and formally approved for all WASA Phase II sites*	
2.2	Preliminary and final WASA II data processed for use in the definition of RE Development Zones (REDZs) in WASA II sites	Preliminary REDZs around DANIDA-sponsored WASA II sites in the Eastern Cape, Free State and KwaZulu Natal provinces defined – by end-2016
Outcome	*Fully capable policy-makers, regulators and local authorities efficiently dealing with grid connections at all WASA sites.*	
2.3	Enhanced capacity within Government to use wind atlas data for energy planning at policy and strategic levels	Final REDZs around all SAWEP II-sponsored sites in the Northern Cape province defined – by end-2018

Component 3 *Support for the development of the small-scale wind sector.* GEF budget: USD 299,587

Output		Indicator and target
Outcome	*Capacity developed among relevant stakeholders on technical, financial, regulatory and socio-economic aspects of small-scale wind projects.*	
3.1	Establishment of small-scale wind demonstration project	*1.8 MW* small-scale wind farm demonstration project developed
3.2	Enhanced capacity of project sponsors to develop small-scale wind energy projects.	Publicly available Monitoring and Evaluation (M&E) Report on demonstration small-scale wind farm project.

Component 4 *Training and human capital development for the wind energy sector*
GEF budget: USD 705,817 (TA) and USD 134,870 (INV); total: USD 840,867

Output		Indicator and target
Outcome	*Enhanced local stakeholders' capacity to manage, operate and maintain wind farms in a given area based on best practice models developed in other countries.*	
4.1	Increased number of Technical and Vocational Education and Training (TVET) colleges participating in wind energy vocational apprenticeship programme	Number of TVETs = *maximum 5*
Outcome	*Enhanced skills of local stakeholders to manufacture and/or assemble wind energy components based on the Government of South Africa's localization strategy, taking into account international best practices*	
4.2	National Artisan Development (NAD) programme extended to include wind energy training.	Number of apprentice artisans trained by end-2018 = *20*; percentage of women participating in training programme, by end-2018 = *30%.*

Note: Project Document and CEO ER document. GEF-funded project management, USD 169,250. Total GEF budget: USD 3,554,250

2.2.2 Project start and duration; main project partners and stakeholders

The Project was approved by GEF in May 2015 with UNDP as GEF Implementing Agency (IA) and DMRE (DoE)[25] as the Executing Agency (EA) and Implementing Partner. With the Project Document signed in December 2015, the Project was envisaged to be implemented during 2015-2019. However, Phase II started de facto in August 2016 when SANEDI finalised an agreement with UNDP to provide project management services. SANEDI also implements and coordinates the WASA 3 Project[26]. The GEF contribution to SAWEP Phase II is USD 3,554,250. The committed co-financing was USD 35,667,936 (including a USD 12,388,176 contribution from national government entities).

The project Inception Workshop was held in October 2016 and the Inception Report finalised in December 2016.[27].

Box 7 List of project partners and main stakeholders

Entity	Function/task/mandate	Involvement in SAWEP-II
Department of Energy, DoE (since 2019: Dept. of Mineral Resources and Energy)	DoE is responsible for energy planning, policy formulation and implementation (including drafting of the IRP), relevant sub-sectors include electricity generation, transmission/distribution, energy efficiency, and electrification. Its IPP	DoE is the UNDP Implementing Partner and GEF Executing Agency of SAWEP II

[25] The Department of Minerals and Energy (DMRE) was established in June 2019 by the merger of the Department of Energy (DoE) with the Department of Mineral Resources (DMR)

[26] Agreement SANEDI with DTU Wind Energy, CSIR (Council of Scientific and Industrial Research), SAWS (South African Weather Service) and UCT (University of Cape Town)

[27] RLA: reimbursable loan agreement. There is also an agreement (letter) between DoE and UNDP Country Office with the UNDP providing support such as procurement and financial services to DMRE (DoE).

	office manages the public procurement programme for IPP projects based on coal, gas and renewable energy generation.	
National Energy Regulator of South Africa (NERSA)	The electricity, gas and petroleum pipeline industries are regulated by NERSA, an independent regulator established under the 2004 National Energy Regulatory Act. NERSA issues, among others, generation licenses and enforces their compliance, regulates all tariff increases proposed by Eskom, provides national grid codes, develops regulatory rules for relevant industries and determines the applicable standards.	
South African National Energy Development Institute (SANEDI)	SANEDI is a state-owned institute, acting as DoE's implementation agency to reach energy goals. SANEDI's main function is to direct, monitor and conduct applied energy R&D development, demonstration, and deployment as well to undertake specific measures to promote the uptake of green, low-carbon energy, and energy efficiency in South Africa. SANEDI's focus is on public interest energy R&D and seeks to assist national government in meeting the national goals of 1) economic development (and by implication national competitiveness) and 2) improvement of quality of life of all citizens	Managing the extensions of the WASA project (WASA 2 and 3) as well as the South Africa-German Energy Programme (SAGEN), SANEDI is the point of coordination (through the WASA 2 PIU and SAGEN with the SAWEP II Project Coordination Unit (PCU) on the relevant SAWEP II components. Coordination with SAGEN will focus on SAWEP II's support for training and human-capital development at Technical and Vocational Education and Training (TVET) colleges and the South African RE Technology Centre (SARETEC). Per Agreement, SANEDI also provides the SAWEP Project Manager
Eskom	The national utility Eskom is responsible for generation, transmission, and distribution of electricity to industrial, mining, commercial, agricultural and residential customers and redistributors. Eskom is a single buyer of electricity produced by numerous IPPs and it oversees all grid operations, including the connection of new customers and provision of continuous service.	The wind resource modelling related to WASA II sites will be refined as more data becomes available. The conceptualisation of new transmission grid corridors that will result from the wind resource modelling of WASA 2 sites will be undertaken as part of this process, jointly with Eskom.
Department of Trade and Industry (DTI)	DTI develops industrial policies, strategies and action plans, legislation and regulations. The Industrial Policy Action Plan (IPAP) has prioritised Green Industries (including wind industry) as one of the emerging sectors with a high potential for employment creation.	The National Skills Fund (NSF) is providing finance for the training of artisans in the wind-energy related manufacturing sector, in support of localisation. This will complement the training interventions, sponsored by GIZ. The NSF will also provide support to wind-energy related training offered at (TVET) colleges on wind farm operations (focusing on Eastern Cape)
South African Bureau of Standards (SABS)	SABS is a statutory body established in terms of the Standards Act, 1945 and operates in terms of the latest edition of the Standards Act, 2008 as the national standards institution in South Africa.	SABS has adopted and published the SANS 61400-1 series standards that apply to large-scale wind turbines. SABS will also finalise the development of IEC 61400-2 series standards, which apply to small-scale wind turbines. This will be helpful in considering options for the testing of locally-manufactured small-scale wind energy components

		as part of the proposed SAWEP II-sponsored small-scale wind energy demonstration project
Department of Higher Education and Training (DHET)	DHET's University Branch focuses on the development of skills in wind energy through SARETEC, which is housed at the Cape Peninsula University of Technology (CPUT). The role primarily focuses on policy issues affecting the development of skills at university and university of technology level.	SARETEC plays a critical part in the development of wind energy service technicians in preparation for their participation in wind farm operations and maintenance activities. SARETEC will also provide training for TVET college lecturers as part of developing wind energy-related skills.
National Treasury (NT)	Oversight on IPP-related transactions concluded on private-public partnership basis, as well as financial backing to Eskom	
Department of Environmental Affairs (DEA). Since 2019 Department of Environment Forestry and Fisheries (DEFF)	The Department of Environmental Affairs (DEA) spearheads the development of the Strategic Environmental Assessment (SEA) programme and Renewable Energy Development Zones (REDZs) scheme. The SEA and REDZs are intended to expedite environmental impact assessments (EIAs) and related permitting processes, as well as transmission capacity planning (both of which benefits wind project development.	SAWEP II supports the processing of the preliminary data from WASA II sites located in the Eastern Cape, KwaZulu-Natal and Free State provinces, which is expected to be available from end-2015 or early-2016. This enables a seamless transition from the SEA process for WASA I sites (i.e. 'SEA I') to a similar process for WASA II
SAWEA	As an industry association, SAWEA's role is to create a platform for interaction between its members and other societal actors, including the Government.	SAWEA also provides an entry point for SAWEP II into the recently-formed association of industry associations, the South African Renewable Energy Council (SAREC). With support from SAWEP II, SAWEA will benefit from technical assistance for the development of capacity to undertake self-monitoring of progress towards meeting the local economic development (LED) requirements of the REIPPPP
CSIR	Set up in 1945 as a science council, the CSIR undertakes directed and multidisciplinary research, technological innovation as well as industrial and scientific development to improve the quality of life of the country's people.	The CSIR Energy Centre is involved in Component 2 of SAWEP II in Resource-mapping and wind corridor development support for policy-makers. The CSIR plays a significant role in WASA I, WASA 2 and WASA 3 projects, including installation & maintenance of wind masts, measurements and modelling in collaboration with DTU (Denmark). CSIR is also involved in Component 3 of SAWEP II in supporting the development of the small-scale wind sector. CSIR, together with local/provincial entities (e.g. DEDEAT), is responsible for activities for integrating wind power into the Upper Blinkwater Mini-grid project in the Eastern Cape.
SAWS	The South African Weather Service (SAWS) is the national weather service of South Africa.	Presently SAWS is busy with a reassessment of extreme winds for South Africa and therefore can play an active role in the application part of this project. The outputs of the mesoscale modelling of this project can serve as a critical input in the determination of the extreme wind climate of South Africa, through the application of the WAsP Engineering software, developed by DTU Wind Energy.
DTU Wind Energy	DTU Wind Energy has been active for decades in wind energy assessment area and has developed	DTU is involved in Component 2 Resource-mapping and wind corridor development support for policy-

	the WAsP software, a microscale modelling tool for wind farm energy calculations, and the KAMM/WAsP method, for the calculation of wind resources over large areas.	makers. DTU plays a significant role in the mesoscale modelling for WASA III
SARETEC	SARETEC is the first national renewable energy technology centre establish at the Cape Peninsula University of Technology (CPUT) Bellville campus in Cape Town	SARETEC has a specialised wind training facility that is an initiative of the Department of Higher Education & Training (DHET) and financed with support from the National Skills Fund (NSF).
Eastern Cape Province Department of Economic Development, Environmental Affairs and Tourism, DEDEAT	DEDEAT promotes innovation for sustainable development, with the strategic objectives being to improve organisational performance, local economic participation, emission reduction, carbon reduction, and green economy initiatives, and to secure the provincial conservation status.	Eastern Cape DEDEAT is playing a role in Component 3 particularly with assisting in the activation of the UB Mini-grid wind component and the other small-scale wind turbine and pilot projects.

2.2.3 Project implementation arrangements

The project is nationally implemented (NIM) by the Department of Energy (DoE), in line with applicable agreements between UNDP and the Government of South Africa, providing direct day-to-day oversight of the project.

The project is overseen by the Project Steering Committee (PSC), which is accountable for the realisation of the project's outcomes. The PSC, chaired by DoE, consists of representatives from the UNDP Country Office (CO), DTI, DHET, DST, DEA and SANEDI. The PSC membership reflects the involvement of the various government entities in the Components of the SAWEP II. For example, under Component 1, DTI, DST and DoE play a leadership role, noting the Component's focus on the DoE-administered REIPPPP as a driver for localisation, which is, in turn, championed by DTI and DST from industrial policy and technology development perspectives, respectively. SANEDI provides leadership in respect of Component 2 – wind resource-mapping, while DoE and DTI lead Component 3, which focuses on the small-scale wind energy sector. DHET plays a leadership role in respect of Component 4, which focuses on training and human-capital development.

DoE has set up a Project Coordination Unit (PCU), which is responsible for ensuring that agreed outputs are delivered. SANEDI per 'Reimbursable Loan Agreement (RLA)' has made available the Project Manager, who together with a DoE energy specialist[28], forms the Project Coordination Unit (PCU)[29]. The Project Manager's prime responsibility is to ensure that the project produces the outputs specified in the project document, to the required standard of quality and within specified time and cost constraints. The PCU produces Annual Work and Budget Plans (AWPs & ABPs) to be approved by a Project Steering Committee (PSC) at the beginning of each year. The PCU also produces quarterly (QPRs) and annual progress reports (PIRs to the PSC, or any other reports at the request of the PSC).

SANEDI, due to its coordination of the DANIDA-sponsored extension of the Wind Atlas to parts of the Eastern Cape, KwaZulu-Natal and Free State provinces, also provides coordination services for the SAWEP II-sponsored extension of the Wind Atlas to parts of the Northern Cape province. Under the Danish-sponsored WASA project, SANEDI works with Council for Scientific and Industrial Research (CSIR), Technical University of Denmark (DTU), University of Cape Town (UCT) and South African Weather Services (SAWS) to conduct wind resource data modelling and weather simulation.

The UNDP Country Office oversees the management of the overall project budget and is responsible for monitoring project implementation, timely reporting of the progress to the UNDP Regional Support Centre in Addis Ababa and the GEF, as well as organising mandatory and possible complementary reviews, financial audits and evaluations on an as-needed basis.

[28] Siyabonga Zondi

[29] Mr Andre Otto, who was the Project Manager for Phase 1, continued his job in SAWEP II.

3. FINDINGS: PROJECT DESIGN AND STRATEGY

This part of the report presents an overview of the evaluation findings. Due to the size of the main text it has been divided over four chapters that cover a) project design and formulation, b) project results, c) project implementation and d) sustainability. The findings are based around a number of evaluative criteria and questions, so that the reader can make a link with what was asked and what was found. The questions in the orange-coloured boxes in this and other Chapters, are taken from the Evaluative matrix (Annex D), corresponding to a particular section in this report.

Chapter 3 looks first at the project relevance and country drivenness (at project design), and links with national 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 the definition of indicators and target values for outcomes and outputs. Project implementation has deviated substantially from the original design with implications for project resources utilization, which is discussed in Chapter 5. For implementation efficiency, the reader is referred to Chapter 5.

3.1 Relevance and design

Country priorities and project strategy

- Does the project adequately take into account the national realities, both in terms of institutional and policy frameworks in its design? Are project outcomes contributing to national development priorities and plans in accordance with the national local policy legal and regulatory frameworks (country priorities)?
- 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 South Africa?

The project is well-embedded in the country's (renewable) energy framework, including the Integrated Resource Plan (IRP) and the REIPPPP programme. In fact, the objective of SAWEP II has been formulated as "assisting the Government and industry stakeholders overcome strategic barriers to the successful attainment of South Africa's Integrated Resource Plan target of 3,320 MW of wind power online by 2018/2019". Thus, the project directly contributes to achieving the IRP goals.

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-5 Resource Allocation Framework. The project idea fits squarely in its Climate Change programme #3 to "Promote investment in renewable energy technologies (CC-3). The Project responds to three Outcome areas under CC-3, namely 4.1 Favourable policy and regulatory environment created for renewable energy investments, 4.2 Investment in renewable energy technologies increased, and 4.3 greenhouse gas emissions avoided.

The UNDP Country Program Document (CPD) 2013-2017 served as a guideline for programming of activities of UNDP with the Government of South Africa at the time of formulation of the Project. The CPD mentions a number of programme outcomes of which the following are relevant to SAWEP II: a) Increase in the number of sustainable 'green jobs' created in the economy; and b) Stabilisation and reduction of carbon emissions and climate change mitigation and adaptation strategies fully operational (by 2016, the governance systems, use of technologies and practices and financing mechanisms that promote environment, energy and climate adaptation have been mainstreamed into national development plans). The CPD was formulated within the UNDAF (UN Development Assistance Framework) which mentions the outcome "the transition to a 'green economy is accelerated through policies that promote the creation of green jobs, increased energy production from renewable sources, greater energy efficiency and increased reliance on low carbon development".

Stakeholder needs and design process; gender

- Is the Project addressing the needs of the target beneficiaries? Relevance of the project's objectives, outcomes and outputs to the different target groups of the interventions.
- Are relevant gender issues raised in the project design? Are broader development and gender aspects of the project being monitored effectively (do SMART 'development' indicators, include sex-disaggregated indicators and address future catalyse beneficial development effects (i.e. income generation, gender equality and women's empowerment, improved governance etc...) that should be included in the project results framework and monitored on an annual basis.

The SAWEP Phase II addresses the needs of two different target groups, namely the needs of large-scale, commercial, wind developers (i.e. grid-connected independent power producers), and small-scale, 'social' applications (e.g. in rural mini-grids, or water pumping applications).

It is the latter group, that gender issues become more relevant. For example, mini-grid establishment can be linked with productive uses of energy, in particular promoting women-led small local enterprise. Gender as such is not reflected much in the results framework, probably at time of project conceptualisation (2013/14) there was less stricter guidelines on including gender-relevant indicators in the results framework.

3.2 Conceptualization and results framework

- Are lessons from other relevant projects properly incorporated in the project design?
- Is the project internally coherent in its design? Are there any incorrect assumptions or changes to the context to achieving the project results or are any amendments to the assumptions or targets been made or planned during the Project's implementation?
- Is the project's design (logframe) adequate to address the problems at hand? how "SMART" are the end-of-project targets are (Specific, Measurable, Attainable, Relevant, Time- bound), and suggest specific amendments/revisions to the targets and indicators as necessary.
- Are perspectives of those who would be affected by project decisions, those who could affect the outcomes, and those who could contribute information or other resources to the process, taken into account during project design processes?
- M&E design. Does the project have an effective M&E plan to monitor results and track progress towards achieving project objectives?

Results framework and changes in wind power development since conceptualisation

SAWEP Phase 2 builds on SAWEP 1, so in that sense lessons learnt from Phase were incorporated in the project design, and, as such, the project design follows the SAWEP 1 logic and is coherently designed. However, the SAWEP II Prodoc was developed over the period 2013-2014, and reflects the needs and expectations at the time of project formulation, i.e. roughly in the same period that the Department of Energy IPP Office had been established and the Renewable Energy Independent Producers Programme (REIPPPP) was under implementation.

By the time the project started with the Inception Workshop and Report (October-December 2016), wind energy development boosted by the REIPPPP had advanced quite substantially, while the WASA 'sister' project was progressing, as will be summarised below.

In Component 1, the DoE IPP Office was well-established and operational at the time of Inception with a M&V system already present. This has implied that the activities of Output 1.1, i.e. support the establishment and initial

implementation of a new M&V system at the IPP Office for localisation move towards activities that deliver input into the current system. Regarding Output 1.2, it is noted that the DoE IPP Office produces progress reports on a quarterly basis that provide an overview of the REIPPPP, the procured RE capacity, cost-effectiveness and actual bid prices, actual operational capacity, investment attracted as well as information on ownership and shareholding, social and economic impacts (employment, local content, enterprise development) and climate change impact both on a national level as well as provincial level.

After consultation with the DoE, DoE IPP Office and Department of Trade and Industry, it was decided to focus on review of RE IPPPP Economic Development. It was suggested to draft a ToR for the "Assessment and Analysis of the Impact of the REIPPPP on the South African Economic Development" (approved 2017) and the study carried out in 2018. The study is not only relevant for wind but for the RE sector involved in REIPPPP as a whole.

In Component 2, the WASA (Wind Atlas) programme was evolving in a Phase 3 focussing on areas in Northern Cape that that could not be included in WASA I and WASA II. At the same time, Department of Environmental Affairs (DEA) was finalising the Phase 2 of SEA. Rather than focussing in REDZs linked to WASA sites, the Strategic Environmental Assessment (SEA) Phase 2 covers all of South Africa and will make use of the WASA-2's modelling and high-resolution wind resource map. SEA-2 is implemented by CSIR for DEA.

In view of the above, SAWEP Phase 2 was re-focussed on providing input to the finalisation of the DEA SEA Phase 2 and on continuing with the WASA team and based on the institutionalisation of WASA through the implementation of WASA 3. The WASA 3 Agreement (with a total budget of ZAR 22.2 million) was signed by all the parties in December 2017 (SANEDI, CSIR, UCT, SAWS, DTU Wind Energy). The duration of WASA 3 to allow for at least two full years of wind measurements with commencement date 1 September 2017, will extend (no additional cost) into 2020 with completion by July/August 2020.

In Component 4, by the time of the Inception Workshop many activities of this component were already under implementation through GIZ and Danish support. For example, SARETEC has already set up vocational training and a wind energy course, as detailed in Section 4.2.4. It was therefore decided to do stocktaking, starting with a "Review and Analysis of Wind Energy Training Education Skills and Capacity development in SA" to define and describe SAWEP II support with the highest potential impact in the remaining SAWEP II period, including updating of the SAWEP II Project document. Based on the findings and recommendations, the outputs, activities and Project Results Framework of Component 4 in the ProDoc will be updated where necessary and form the basis for the development of terms of references (the final report was submitted in April 2018, as described in more detail in Section 4.2.

Regarding Component 3, the MTR team observes that the role of mini-grid systems as a means of achieving 100% electrification by 2030 (one of the SDG 7 goals) has been given more attention by the international community and more prominence in energy-related funding for energy access by development partners. Small-scale wind can be one of the power sources in such systems (in combination with PV and/or diesel backup systems) in areas with sufficient wind resources. The proposed mini-grid, being one of the first in South Africa, is therefore not only important from the angle of development of the small-scale subsector with the wind power sector. Given the fact that 3 million households are without grid-based electricity, it is important from the viewpoint of achieving full electrification in South Africa[30].

Given the above, the Project Results Framework is in need of being updated with new progress indicators that reflect the new situation when the project started (by end of 2016) rather than based on the situation in 2013-14. In discussion with the PCU and UNDP, the MTR team makes a recommendation on an updated Results Framework.

[30] Integrated Resource Plan (IRP; Oct 2019)

3.3 Ratings for project design

The UNDP/GEF rating requirements and criteria for MTRs do not include a '**rating on project design and formulation**', except for the item "M&E at design". This is surprising because we think that the 'design' is one of the main factors, alongside 'implementation' and 'external factors' that determine the achievement of 'results'. The MTR Team proposes to give a rating for 'design' of the SAWEP II Project using a six-point rating scheme:

- Highly satisfactory (HS), no shortcomings
- Satisfactory (S), minor shortcomings
- Moderately satisfactory (MS), moderate shortcomings
- Moderately unsatisfactory (MU), significant shortcomings
- Unsatisfactory (U), major shortcomings
- Highly unsatisfactory (HU), severe shortcomings
- U/A = unable to assess.

As explained in the previous section, the logical framework was 'outdated' at project incpetion. It is not that the logframe was badly formulated, but REIPPP progressed much more rapidly than could be anticipated in 2013/14. We do not give a rating therefore (not required as such) but give it the label 'unable to assess (U/A)

Despite this, the Project still has been quite relevant in supporting wind measurements and construction of a detailed wind resource map based on measurements that are strategically placed all over the country, providing valuable information for utility-scale wind power developers as well as small-scale users alike.

Box 8 Evaluation ratings of project design and formulation

Evaluation item	Corresponding section	Rating
Design logic and approach; addressing barriers	Section 3.2	U/A
Formulation of the log-frame with progress indicators and M&E design	Section 3.2	U/A
Project integration: stakeholder participation and lessons learnt from other projects	Section 3.2	S
Overall project design and formulation		
Relevance	Section 3.1	R

4. FINDINGS: PROGRESS TOWARDS OUTCOMES

4.1 Introduction

- To what extent have the expected outcomes and of the project been achieved (review the logframe indicators against progress made towards the end-of-project targets)
- What outputs 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)?
- Were there any unplanned effects? Which external factors have contributed or hinder the achievement of the expected results? Can the project take advantage of new opportunities, adapting its theory of change to respond to changes in the development context? Are there any unaddressed barriers?

This Chapter presents progress towards results. For each of the four 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 as reported by the Project Team in the annual UNDP/GEF Project Implementation Reports (PIRs, 2017, 2018, 2019), Quarterly Progress Reports (QPR) and a number of PowerPoint presentations presented by the PCU (Project Coordination Unit) to the MTR reviewers. Section 4.2 describes the progress achieved in outputs and activities for each Component/Outcome, following the outline of outcomes and outputs of Box 6. This section tries to provide a quantitative and descriptive overview of the achievements of outputs and outcomes, provides a re-assessment of results in terms of attainment of the objective and outcomes. Under each 'main activity', it reports the actual sub-activities been carried out or planned.

Section 4.3 presents a summary of the achievements up to now of indicators. 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 are based on progress reported in the PIRs, supplemented by additional information obtained during the mission (including interviews with respondents) and analysis of the project technical outputs produced during 2017-2019. The greenhouse gas emissions reported in the GEF Tracking Tool have also been reviewed; these are discussed in Section 4.3.1. The Chapter ends with Section 4.4, which gives a summary of the MTR Team's ratings towards results.

4.2 Progress in achieving outputs and outcomes

The following provides an overview of progress against the indicators reported in the project's results framework and subsequent PIRs. The achievement is colour-coded, according to:

- Green: a completed or indicator shows successful achievements,
- Yellow: indicator shows expected completion by EoP (End of Project)
- Red: unlikely to be achieved by EoP
- Orange: unable to assess (U/A)

4.2.1 Component 1 Monitoring and verification of the implementation of local content requirements for wind energy procurement mechanisms.

Outcome:
Mechanisms in place for objective, evidence-based assessment and verification of progress in implementing localisation initiatives, taking into account any correlations between local content requirements, investment metrics (e.g. generation capacity, financial returns, costs, prices, etc.) and socio-economic development (e.g. employment creation).

Baseline

In 2010 the Council for Scientific and Industrial Research (CSIR) and Risø-DTU (now DTU Wind) of Denmark undertook an "investigation into the development of a Wind Energy Industrial Strategy for South Africa" as part of the SAWEP Phase 1. The study involved an analysis of the global and domestic wind energy industry, as well as the review of the support mechanisms that could be employed to develop the sector further. In 2015, DTI commissioned a study aiming at investigating the optimum level of localisation that can be achieved in the wind energy industry and contribute to the alignment of industry and government interventions[31], such as the Renewable Energy IPP Programme, which provides a regulatory framework and market that created opportunities for the development of the industry and business activities (described in detail in Section 2). The roll-out of the REIPPPP came with an M&V system (at the implementing DoE IPP Unit), in which the DoE IPP Office has been producing quarterly reports since 2015, including quarterly provincial reports see https://www.ipp-projects.co.za/Publications. These reports highlight the REIPPPP contribution to the energy supply capacity, national-level impacts (investment, socio-economic, environmental) and local impacts (provincial and community). Regarding impacts, the reports provide information on the creation of local wind energy-related capabilities and capacity, and describes the progress towards local content and ownership, the local socio-economic development (SED) and enterprise development (EnD) goals of wind energy projects.

Output	**Indicator and target**	**Mid-2019 level and status** (based on MTR observation and project progress reports)
1.1 Enhanced, technology-enabled capability among Government and industry stakeholders to monitor and verify implementation of local content requirements	• M&V system and supporting business processes defined, developed and implemented at the DoE (IPP Unit) by end-2015	• Indicators were already met at project Inception as a M&V system was already functioning at the DoE-IPP project. There has been little need for SAWEP II support *Status:* indicator should be reformulated
1.2 Enhanced capacity among Government wind industry stakeholders to objectively monitor and verify factors related to the success or failure of project sponsors to meet local content requirements and socio-economic development commitments	• *Twelve* quarterly reports on localisation and socio-economic development (SED) published and 6 workshops convened by 2018	

Implementation

Given the above, the study *Assessment and Analysis of the Impact of the Renewable Energy Independent Power Producer Procurement (RE IPPP) Programme on the South African Economic Development* was carried out[32]. This report analyses the "economic development" (ED) element impact of the RE IPPP Programme, that consists of the following sub-elements: creation, local content, ownership, management control, preferential procurement, and makes recommendations towards the achievement of optimal socio-economic benefits, enterprise development (EnD) and socio-economic activities (SED, education and skills, health, social welfare). The focus of the study was to review specifically the socio-economic development (SED), enterprise development (EnD) and a sub-component of the ownership criteria (relating to community ownership). The assignment comes with an economic (Excel-based) model to forecast the respective flows of

[31] *The Wind Energy Industry Localisation Roadmap in Support of Large-Scale Roll-Out in South Africa* (DTI, 2015) The study consists of the following components: a) wind energy market profiling and sustainability assessment, looking at the wind power market in South Africa and Sub-Saharan Africa; b) wind energy industry value chain profiling, including South African wind turbine manufacturers; c) investigation into the localisation potential of key components (blades, nacelle assembly, nacelle castings and forgings, generators, transformers), d) wind project finance and certification aspects analysis, and e) wind energy localisation roadmap.

[32] Carried out by Prime Africa Consultants (July 2018) during Nov 2017 – June 2018.

SED, EnD and community ownership dividends from BW1-4, and to estimate macro-economic impacts of the fund flows This basically has been the major output of Component 1 (with the funds originally allocated shifted to other Components. Some conclusions coming out of the study are:

- Review and update of the current IPP Programme ED criteria and align these with the Broad-Based Black Economic Empowerment (BBBEE) of DTI;
- Have a more strategic and institutionalised focus on EnD e.g. promote pooled supplier contracts to support enterprises supported through EnD initiatives;
- Adoption of mechanisms for implementing equalised annuity income dividend repayment approaches for community-based owners;
- An updated generation ED monitoring system that includes additional measures of effectiveness of spend of SED and EnD; relevant Community ownership measures; and linkage with relevant Sustainable Development Goals (SDG).

4.2.2 Component 2 Resource-mapping and wind corridor development support for policy-makers

Baseline

The Wind Atlas of South Africa (WASA) project is a collaboration between DTU Wind and South African partners (SAWS, CSIR, UCT) coordinated by SANEDI. The WASA is financially supported by Denmark and GEF through SAWEP, WASA 1 (2009-2014) covered the Western Cape and areas of the Northern Cape and Eastern Cape provinces, WASA 2 (2014-2018) covered KwaZulu-Natal, Free State and remaining areas of the Eastern Cape province and WASA 3 (2017 to 2020) covers the remaining areas of the Northern Cape province and the rest of South Africa.

The main aim of the WASA programme is to develop and employ numerical wind atlas methods and develop capacity to enable planning of large-scale exploitation of wind power in South Africa, including dedicated wind resource assessment and siting tools for planning purposes, i.e. a numerical wind atlas and database for South Africa. The wind atlas assists in the development of large grid-connected wind farms and the identification of potential off-grid electrification opportunities, as well as seasonal and climate change impact studies, by providing a long-term wind data bank for South Africa and wind power forecasting.

Outcome:
Expanded verified Wind Atlas (of South Africa, WASA), Phase II, completed for additional provinces in support of future wind power project development and procurement mechanisms

Output	**Indicator and target**	**Mid-2019 level** (based on MTR observation and project progress reports)
2.1 Geographical extension of verified Wind Atlas developed for Northern Cape	• Four masts and related equipment installed in the Northern Cape for SAWEP II-sponsored phase two of WASA (or WASA II) by 2016 (bringing the cumulative total of WASA-installed masts to 9)	• At project inception WASA-2 was already being implemented and WASA has evolved into WASA 3 with a total of 18 measuring masts and development of wind resource map for the whole of South Africa *Status:* indicator needs to be updated accordingly

Implementation

Working closely with SANEDI, SAWEP II's contribution will primarily be in support of the acquisition and installation of wind masts and related equipment, as well as the required modelling, analysis and application of the wind resource data generated. WASA 3 (Northern Cape) is an expansion of WASA to the remaining areas of the Northern Cape province that could not be included in WASA I and WASA II due to budgetary constraints. Time-wise, part of WASA 2 and the WASA 3 overlap with the SAWEP II implementation. With WASA going up to the end of 2020, and SAWEP II ending by the end of 2019 (counting four years from ProDoc signature in Dec 2015), this might pose an issue for WASA 3 completion.

Nine WASA 1 (funded with SAWEP 1 support) and the five WASA 2 masts (funded by the Danish Government) are all still in operational condition (except one mast being vandalized). The masts will operate alongside the new four WASA-3 masts, which all were operational by November 2018[33].

Box 9 Location of WASA wind masts

Source: www.wasaproject.info

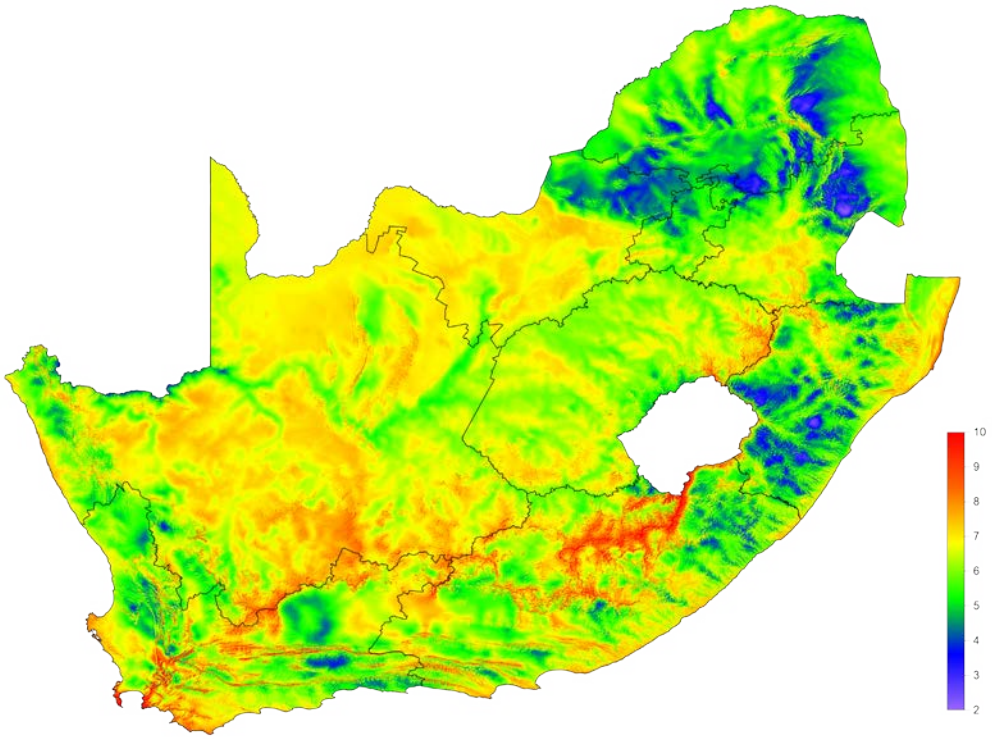
Wind mast	Location	Wind mast	Location	Wind mast	Location
WM 1	Alexander Bay	WM 7	Prince Albert/Beaufort	WM 13	Jozini
WM 2	Calvinia	WM 8	Humansdorp	WM 14	Memel
WM 3	Vredendal	WM 9	Noupoort	WM 15	Winburg
WM 4	Vredenburg	WM 10	Butterworth	WM 16	Pofadder
WM 5	Napier	WM 11	Rhodes	WM 17	Strydenburg
WM 6	Sutherland	WM 12	Eston	WM 18	Kuruman
				WM 19	Upington

Important in this WASA-3/SAWEP II phase is institutionalisation at local institutions of wind assessment and meteorology at local institutions, such as CSIR, UCT and SAWS. In this respect CSIR has expressed interested in taking over the WASA masts and undertook a Life Extension Business Case study that identified potential sources of long-term support of the WASA masts with SANEDI.

The significance for WASA 3 project having the WASA 1 and WASA 2 masts operating concurrently with WASA 3 masts, total of 18 masts (19 installed, but one vandalised) in operation across five provinces spanning 75% of South Africa land area is that the statistics are also good for those areas that are not directly covered by WASA masts.

[33] The upgrading of the WASA 1 and WASA 2 masts from the balance of the Danish RE EE Program R2,684,394.49 and WASA 2 demobilisation funds R798,261 were completed by the CSIR alongside the installation and commission of the 4 WASA 3 masts Nov 2018 (total tender completed and paid: masts R3,577,525.16 and instruments R1,183,786.35, online graphs http://wasa.csir.co.za/web/welcome.aspx). Source: PIR (2019)

Box 10 WASA high resolution wind resource map



Source: www.wasaproject.info

The map gives mean wind speed (in metres per second) measured at 100 m a.g.l. (Dec 2018). The Map is based on a) information from the Interim WASA Numerical Wind Atlas validated against information from the WASA measurement masts, b) the WAsP microscale modelling and c) input topographical data (e.g. terrain elevation and roughness). The WAsP software suite, developed by DTU Wind Energy, is used for sites located in all kinds of terrain for wind resource assessment, siting and energy yield calculation for wind turbines and wind farms.

In this respect, the term 'atlas' is wider than just a map but is comprised of a volume of tables, charts, and databases,
The WASA work contains a number of Work Packages:
1. *Meso-scale wind modelling*, using the mesoscale WRF model and WAsP software, and creation of a Numerical Wind Atlas (NWA), including training. Activities planned for 2019-20 include the creation of a Validated NWA covering all South Africa and updating of databases.
2. *Wind measurements*, including wind measurement system and mast design, operation, data analysis and training. Here, the WASA 3 masts in 2018, while measurements and data collection of other WASA masts will continue 2018-2020
3. Micro-scale wind modelling, including modelling with WAsP, creation of an Observational Wind Atlas (OWA) and training. The OWA for WASA 3 measurements will continue, while OWA for WASA 1 and 2 will be carried out in 2020
4. *Application for wind resource assessment*, including tool development (guidelines and trainings), workshops for stakeholders (authorities, planners, private sector), micro-scale resource mapping. A High-Resolution Wind Resource Map for the whole country - based on Interim WASA 3km NWA was finalised by the end of 2018, and WASA time series wind data were updated in 2018-19. A mid-term workshop was held in April 2019. Planned for 2020 are Microscale High-Resolution wind resource maps for WASA 3 domain covering the whole country with an update of wind atlas and microscale modelling guides, training course
5. *Extreme winds* (better understanding of seasonal variations and estimation of extreme winds. Status: mesoscale modelling of extreme wind speeds is progressing and an Update Extreme Wind Atlas Guide expected towards the end of 2020.
6. *Documentation and dissemination,* incl. website, publications and research papers.

The importance of the Wind Atlas is recognised in the new IRP (2019): "The Wind Atlas developed for South Africa provides a basis for the quantification of the potential that wind holds for power generation elsewhere in the country, over and above the prevalence of the wind resource around the coastal areas. Most wind projects have been developed in the Western Cape and Eastern Cape, so far" (page 13).

The wind atlas, database and the wind resource map now span all nine provinces (with WASA 3 completing the Northern Cape province) with the launch of the first High-Resolution Wind Resource map and database for South Africa (see Box 10). Information on wind masts, data and maps can be downloaded from the WASA website (www.wasaproject.info).

Outcome:
Strategic wind corridors/areas identified and formally approved for all WASA Phase II sites

Output	Indicator and target	Mid-2019 level (based on MTR observation and project progress reports)
2.2 Preliminary and final WASA II data processed for use in definition of RE Development Zones (REDZs) in WASA II sites.	• Preliminary REDZs around WASA II sites in the Eastern Cape, Free State and KwaZulu Natal provinces defined – by end-2016 and Northern Cape – by 2018	• This indicator is linked with the SEA Phase 1 for solar and wind. However, the SEA has now entered Phase 2, in which the high-resolution WASA wind resource map will serve as the basis for the SEA Phase 2 identification of wind technical areas. *Status:* the indicator still relevant, but needs to be updated to reflect SEA-2 work

The wind resource map and data now form the basis for the identification of areas for the Strategic Environmental Assessment for wind and solar energy (SEA, Phase 2). The SEA Phase 2 of the Wind and Solar PV SEA aims to identify geographical areas best suited for the roll-out of wind and solar PV energy projects. In a first report, a number of solar and wind technical areas are identified (see Box 11). In addition, WASA data are used in various planning documents, such as the IRP Update 2019 and in the DoE REIPPPP Quarterly update reports.

Outcome:
Fully capable policy-makers, regulators and local authorities efficiently dealing with grid connections at all WASA sites.

Output	Indicator and target	Mid-2019 level (based on MTR observation and project progress reports)
2.3 Enhanced capacity within Government to use wind atlas data for energy planning at policy and strategic levels	• REDZs in WASA II sites defined, on the basis of WASA II data.	• REDZ area were defined in SEA-1 and new focus areas are proposed in SEA-2 *Status:* the indicator still relevant, but needs to be updated to reflect SEA-2 work

Planned activities

The WASA 3 work should be finalised as by December 2020 (according to the schedule given in Box 12) with a Final Wind Seminar and financial closure in the first quarter of 2021.

Box 11 Renewable energy development zones (REDZ)

The Department of Environmental Affairs (DEA) introduced a Wind and Solar PV Strategic Environmental Assessment (SEA). The primary objective of the SEA is to streamline regulatory processes for new RE power plants in line with the REIPPPP and without compromising the environment.

Based on the SEA, eight Renewable Energy Development Zones (REDZ) were identified. These areas were selected through integrated spatial analyses and wide stakeholder consultation, and as geographical areas in which development is considered most appropriate from a national strategic perspective. Factors taken into consideration include energy resource potentials, infrastructure availability, stakeholder and local authority support, environmental suitability and socio-economic need. Although the REDZ identified priority areas for development, they do not preclude development of renewable energy projects in the numerous suitable areas with exceptional wind and/or solar resource that exist outside the REDZs.

SEA Phase 2 follows on from the recently completed Phase 1 and is implemented by CSIR. The SEA Phase 2 aims to identify geographical areas best suited for the roll-out of wind and solar PV energy projects. It is envisaged that wind and solar PV development will be incentivised and streamlined in the REDZs. The SEA process also provides a platform for coordination between the various authorities responsible for issuing authorisations, permits or consents and thereby allows for an integrated environmental authorisation process. Based on environmental constraints and technical opportunities, a mapping for solar and wind technical areas of focus for SEA Phase 2 was made (see figure below) These focus areas will be refined to form potential REDZs for submission to DEA based on specialist assessments. Refinement of the areas includes the possible reduction or elimination of the identified focus areas.

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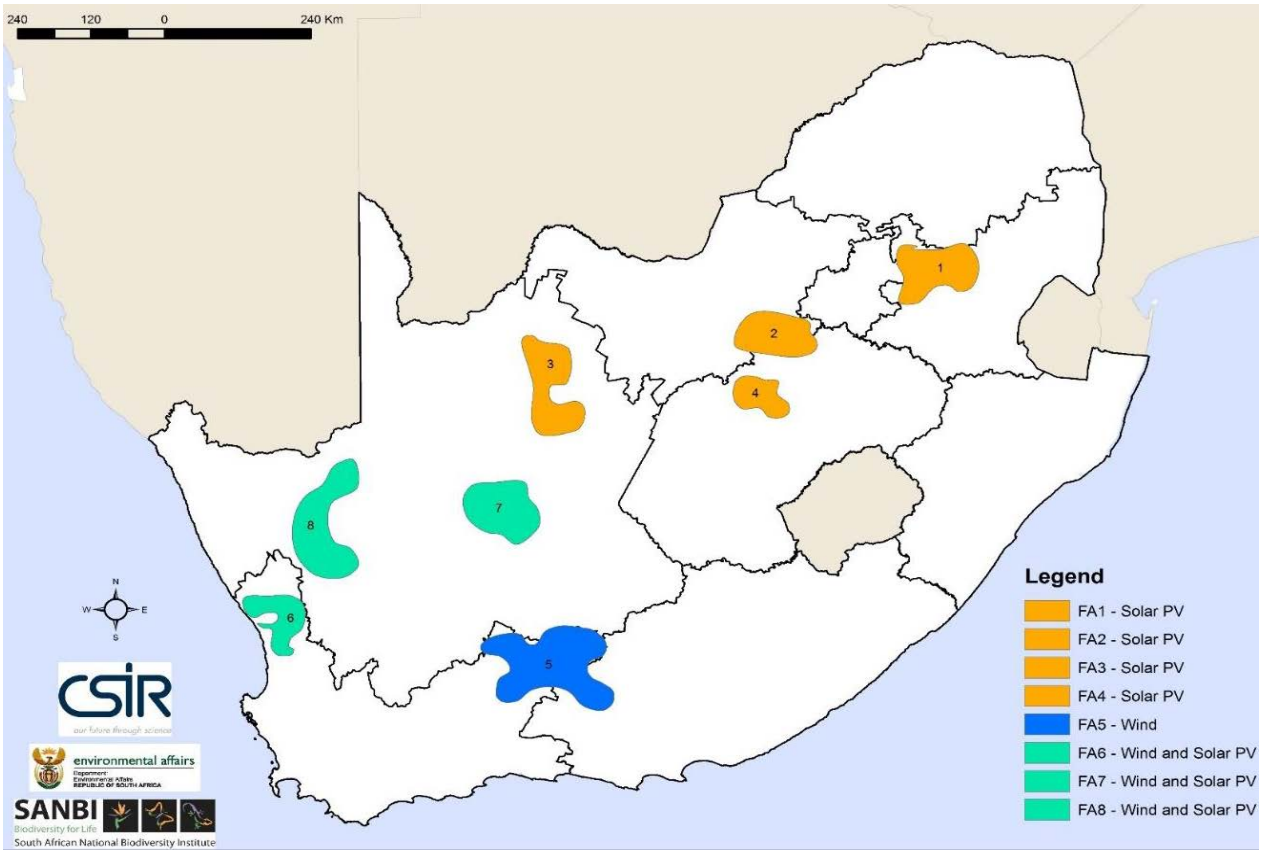
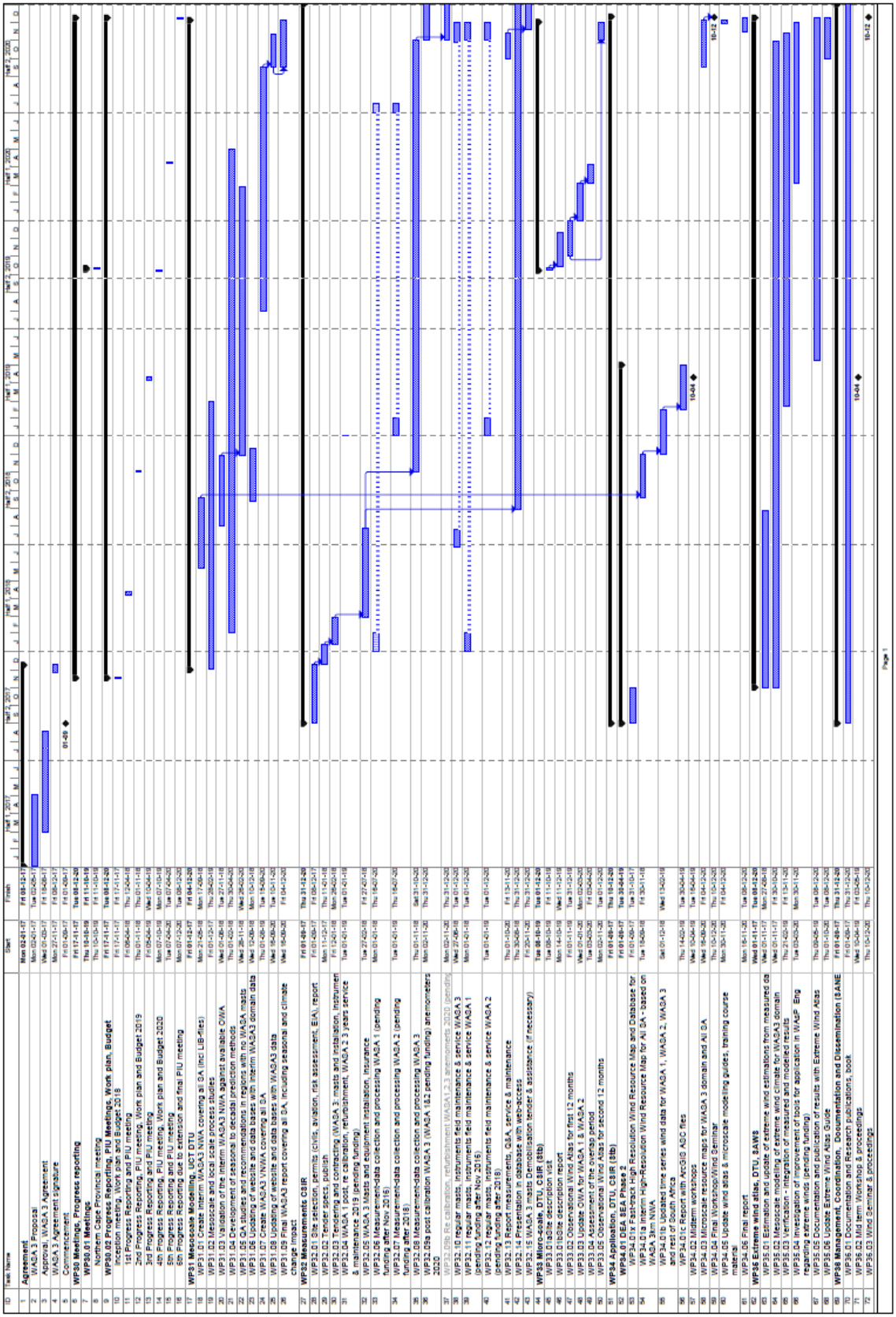


Source: https://redzs.csir.co.za/ and DEA-CSIR (2019)

Box 12 WASA 3 work plan



Source: WASA 3

4.2.3 Component 3 *Capacity developed among relevant stakeholders on technical, financial, regulatory and socio-economic aspects of small-scale wind projects*

Baseline
Small-scale wind projects did not feature prominently in the early stages of the IPP programme, Project developers that have an interest in small-scale wind energy generally have less access to fewer (financial) resources and, in general, find participation in programmes, such as REIPPPP, more difficult. The small-scale wind energy sector faces additional challenges due to competition from other RE technologies (e.g. roof-top solar PV). While South Africa already has a small to medium scale wind turbine manufacturing industry, the country does not have a dynamic market for these products yet. As such, SAWEP II focusses on facilitating a better understanding of the reasons for the non-competitiveness of the small-scale wind energy sector in South Africa from the perspective of technological performance, economics and finance, configuration in relation to the grid (i.e. grid-connected, off-grid and hybrid options), as well as regulatory requirements in South Africa.

Outcome **Capacity developed among relevant stakeholders on technical, financial, regulatory and socio-economic aspects of small-scale wind projects.**

Output	**Indicator and target**	**Mid-2019 level** (based on MTR observation and project progress reports)
3.1 Establishment of small-scale wind demonstration projects 3.2 Enhanced capacity of project sponsors to develop small-scale wind energy projects	• 1.8 MW small-scale wind farm demonstration project developed • Publicly available Monitoring and Evaluation (M&E) Report on demonstration small-scale wind farm project.	• Small Wind Power Integration in the Upper Blinkwater Minigrid project is a priority as the main, basis project; • SAWEP II support to Buffalo City Metro (BCM) that are interested in investigating a "green" tariff that includes small-scale wind turbines • Technical assistance support utilising wind energy for electricity/water pumping at schools (Eastern Cape)

A key outcome will be the definition of a demonstration project that will be used to assess the practical considerations on which the viability of the small-scale wind sector is likely to depend. Used to assess the key aspects associated with the small-scale wind sector, such as access to municipal electricity distribution networks, pricing, and financing, as well as socio-economic development.

For this purpose, the study *Status & Specification on Small Scale Wind Energy Pilot Project* was carried out[34]. Some key findings include:

- A small local and export market exists for small-scale wind turbines (SSWT)
- The absence of more exposure, guidance (application/configuration and sustainability, procurement) to potential consumers as well as Government and other stakeholders on what is possible with SSWT (stand-alone or in hybrid configuration with other RE, and/or in mini-grids systems is the challenge for SSWT growth in South Africa;
- One SSWT pilot will not be enough in creating this exposure and that several, strategic selected SSWT configurations/applications (pilot projects) targeting different market segments/partners will be necessary for SAWEP II support to have the best chance of measurable success.
- Make Eastern Cape Province anchor for small-scale wind pilot projects.
- Water supply in rural off-grid areas remains the largest market in South Africa for SSWT (and future proposals can focus on this thematic area).

[34] Submitted by Innovate Energy (July 2018)

Following the report, the PSC supported the idea of making the Eastern Cape Province the anchor for the implementation of small-scale wind pilot projects (where a number of national, provincial and municipal key stakeholders expressed an interest during the development of the draft final report and have been identified as potential partners in the implementation of the pilot project). A workshop was organised in March 2018 in which a number of partners contemplated a number of possible projects.

Planned activities from Q4 2019 onwards

UB mini-grid

One such project is the CSIR-based Small Wind Power Integration in the Upper Blinkwater (UB) Mini-grid project. SAWEP has cooperated with CSIR being a non-commercial, independent research institution. The UB project will be the major small wind activity supported by SAWEP, in which wind power will be integrated with the 75 kW PV with 20 kW genset hybrid system (that is already being advanced by the Eastern Cape Provincial Department of Economic Development Environmental Affairs and Tourism (DEDEAT) in collaboration with GIZ and DLR TA[35]). Costs are an estimated ZAR 2.6 million with SAWEP contributing ZAR 2.235 million and CSIR ZAR 0.580 million)[36]. CSIR will provide assessment of the analysis and sizing of the local wind energy resources[37]. The activities started with an inception workshop (Feb 2019) and wind measurements[38] to be followed by the sourcing, installation, and integration of small wind turbines with the system (scheduled for March 2020). In addition, one element (for success) is local (CSIR)-to-local (EC communities) wind resource assessment knowledge transfer and participation.

The monitoring and evaluation (M&E) of the PV component of the mini-grid (solar array, battery storage, and community reticulation system) will be carried out, contracted by GIZ, by the Nelson Mandela University. The M&E of the Wind Component will start, once commissioned, for which purpose SAWEP will contract Fort Hare University with CSIR support. After the formal launch of the wind-solar hybrid mini-grid (about June 2020), this would imply a period of 10 months of M&E, assuming SAWEP 2 ends by Q1 2021.

Small-scale water pumping

SAWEP 2 will work with Eastern Cape DEDEAT in other small wind activities, such as for electricity/water pumping at schools (with Eastern Cape Department of Public Works). The concept is linked with the WESSA[39] activities, on promoting environmental education in schools. One WESSA activity is the "Sustainable Schools in Rural Communities (formerly known as Rural Sustainable Villages)" implemented in partnership with the Chris Hani District Municipality in the Eastern Cape supporting 11 schools in the district, and work on sustainable energy solutions, such as biogas, wind turbines and solar lighting (see Box 13). Working in relatively dry zones, an adequate water supply (e.g. powered by wind pumps) will be important as water is needed for their biogas plans and food crop gardens.

The work plan for the "school small-scale water pumping" is provided in Box 13 , which shows that assessment and design studies will take place during Q4 2019 to Q3 2020, followed by construction and commissioning during Q4 2010 – Q1 2021.

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35 DLR Institute of Networked Energy Systems (Germany), who is responsible for the mini-grid modelling and design. The project is supported by the German GIZ and government of Lower Saxony

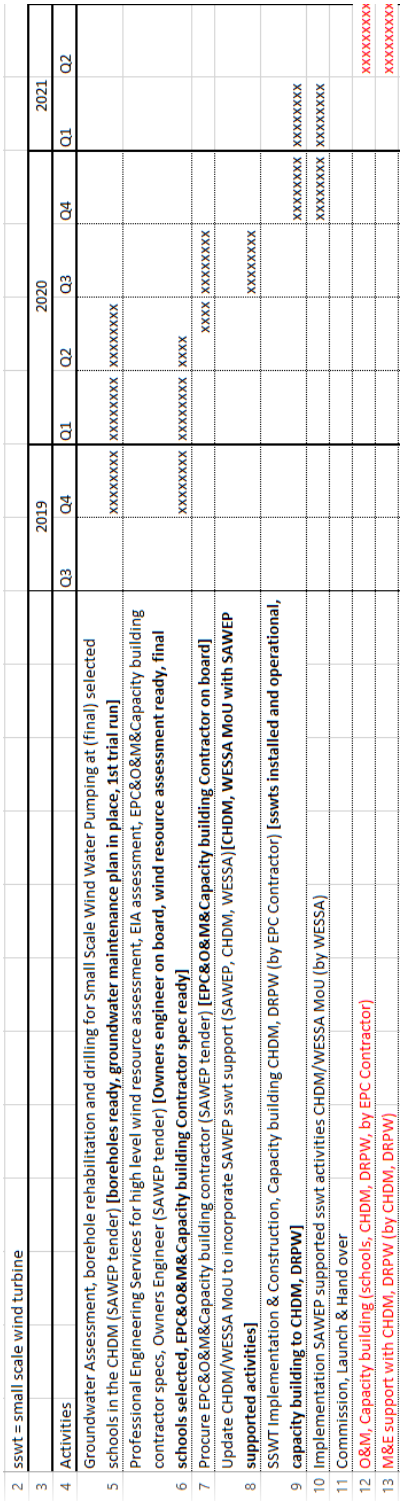
36 ZAR 1.8 million for EPC contracting of the six SSWT (procurement, delivery, installation, integration and commissioning) and ZAR 0.5 million for M&E equipment

37 LIDAR-based wind measurements are ongoing (total 6 months) and together with the WASA data and small-scale wind turbines specs, a possible location for the SSWRs have been identified with a preliminary SSWT spec to be confirmed with integration of the wind component with the DLR DigSilent and HOMER mini-grid models and wind measurements

38 The LIDAR wind measurements are ongoing (total 6 months) and together with the WASA data, a possible location for the SSWT has been identified with a preliminary SSWT specs to be confirmed with integration of the wind component with the DLR DigSilent and HOMER mini-grid software models and wind measurements. It might be noted that, while an EIA assessment is not strictly necessary, a draft EIA report was submitted to DEDEAT (also the EC EIA Authority) for any potential land use issues and other environmental issues.

39 WESSA (Wildlife and Environment Society of South Africa) is a national, environmental, membership-based non-government organisation that works to ensure environmental sustainability. More info on the school project on http://wessa.org.za/what-we-do/schools-youth-program/sustainable-schools-in-rural-communities.

Box 13 Schools small-scale wind pumping work plan



sswt = small scale wind turbine													
		2019		2020				2021					
Activities		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2				
Groundwater Assessment, borehole rehabilitation and drilling for Small Scale Wind Water Pumping at (final) selected schools in the CHDM (SAWEP tender) **[boreholes ready, groundwater maintenance plan in place, 1st trial run]**			xxxxxxxx	xxxxxxxx	xxxxxxxx								
Professional Engineering Services for high level wind resource assessment, EIA assessment, EPC&O&M&Capacity building contractor specs, Owners Engineer (SAWEP tender) **[Owners engineer on board, wind resource assessment ready, final schools selected, EPC&O&M&Capacity building Contractor spec ready]**			xxxxxxxx	xxxxxxxx	xxxx								
Procure EPC&O&M&Capacity building contractor (SAWEP tender) **[EPC&O&M&Capacity building Contractor on board]**					xxxx	xxxxxxxx							
Update CHDM/WESSA MoU to incorporate SAWEP sswt support (SAWEP, CHDM, WESSA)**[CHDM, WESSA MoU with SAWEP supported activities]**						xxxxxxxx							
SSWT Implementation & Construction, Capacity building CHDM, DRPW (by EPC Contractor) **[sswts installed and operational, capacity building to CHDM, DRPW]**							xxxxxxxx	xxxxxxxx					
Implementation SAWEP supported sswt activities CHDM/WESSA MoU (by WESSA)							xxxxxxxx	xxxxxxxx					
Commission, Launch & Hand over									xxxxxxxx				
O&M, Capacity building (schools, CHDM, DRPW, by EPC Contractor)									xxxxxxxx				
M&E support with CHDM, DRPW (by CHDM, DRPW)									xxxxxxxx				

School name	Municipality	Average wind speed (m/s) *	Location GIS Latitude GIS Longitude
Nompumelelo High School	Enoch Mgijima	5	-32.19978 (S) 26.81612 (E)
Maria Louw High School	Enoch Mgijima	5-6	-31°55'24.72" 26°52'19.73
Kleinbooi Primary School	Enoch Mgijima	6	-31.92255 27.03629
Nzimankulu High School	Emalahleni	7	-31.735201 26.950967
Daliwonga High School	Intsika Yethu	7-8	-31°57'51.59 27°33'3.89
Cofimvaba High School	Intsika Yethu	6	-32° 0'36.72 27°34'59.24
Three Crowns Primary School	Emalahleni	7	-31°45'1.23" 27° 6'42.43
Mbewula Primary School	Sakhisizwe	7	-31.67774 27.70938
Nyanga High School	Engcobo	6	-31°40'47.17 28° 2'28.07
Mount Arthur High School	Emalahleni	7	-31°41'15.04 27° 9'11.74
Arthur Mfebe Agri Schools	Intsika Yethu	5	-32° 1'21.54 27°23'15.65
Zwelivumile Sec. School	Intsika Yethu	7-8	-32° 7'10.20 27°38'4.95

Notes:

* At 100 agl (WASA 3), http://stel-apps.csir.co.za/wasa-data/grids/Wind%20Speed%20Map%20for%20South%20Africa%20(2018).kmz

Other activities

A number of other activities have been initiated, such as a) a "Green" tariff study with small-scale wind energy for Buffalo City Metro, and b) small-scale wind capacity building (with University of Fort Hare). Furthermore, it was noted that there may be a market gap between small wind turbines (typical up to 100kW) and the REIPPPP-type of commercial turbine (2 MW and above). While the 'upper-end' commercial (and grid-connected) market moves to even higher wind machines and larger mast heights there is market for refurbishing smaller-scale turbines, that may be appropriate in certain applications and of more interest for local manufacturing. In cooperation with ELIDZ[40], a Terms of Reference has been drafted for a feasibility study to determine market potential and viability to establish a medium-size wind turbine refurbishment industry in South Africa.

[40] East London Industrial Development Zone Ltd.

4.2.4 Component 4 Training and human capital development for the wind energy sector

Baseline
The South African Renewable Energy Technology Centre (SARETEC) offers a five-month full-time Wind Turbine Service Technician (WTST) course[41], which is the only formally registered wind turbine technician qualification registered with the South African Qualifications Authority (SAQA). In addition, SARETEC offers the smaller (3-day) Basic Safety Training (BST)[42] and the (5-day) Basic Technical Training (BTT)[43].

While the training of the technicians required to support wind farm operations, e.g. by SARETEC, has received attention, there has not been the same level of focus regarding vocational training relating to the manufacturing of wind turbine components. The ProDoc mentions, that, unless this is addressed, it will "result in constraints to the development of local value-chains for wind turbine components". It further mentions that "support for the development and implementation of a vocational training programme targeted at building skills in manufacturing value-chains that are relevant to the wind energy industry, taking into account the outcomes of DTI's Wind Localisation Roadmap project". This would be in collaboration with DHET's National Artisan Development (NAD) programme.

In reality, demand for skills, so far, has not been with manufacturing, but more with operation and maintenance of wind farms. Given, the relatively small size of the regional market for wind power (in South Africa and its neighbouring countries), the level of sophistication of large-scale wind, and a dull in RE development REIPPP after the last bid round #4 (and relatively small market for small-medium scale wind machines, there is currently less scope for wind manufacturing and this has affected the needs in the market for manufacturing-related skills development.

Outcome:
Enhanced local stakeholders' capacity to manage, operate and maintain wind farms in a given area based on best practice models developed in other countries.

Output	Indicator and target	Mid-2019 level (based on MTR observation and project progress reports)
4.1 Increased number of Technical and Vocational Education and Training (TVET) colleges participating in wind energy vocational apprenticeship programme	• Up to five TVETs	• Wind capacity development needs study • Support provided to SARETEC's courses (financing scheme for students and work placement support) • Financial support to WindAc and Windaba annual events
4.2 National Artisan Development (NAD) programme extended to include wind energy training.	Number of apprentice artisans trained by end-2018 = 20; percentage of women participating in training programme, by end-2018 = 30%.	

In view of the noted baseline developments since 2013-14 (when the ProDoc was formulated), it was recommended to carry out a study first on real wind power-related capacity building needs. Thus, a study was carried out on the *Status and Development of Wind Energy Training, Education, Skills and Human Capacity Development*[44]. Its main recommendations are:

[41] The course consists of 5-months theory and practical work (encompassing subjects such as wind power technology, safety, wind turbine technology, rotor blade repair, control systems) and 2 months of in-service training at a wind farm
[42] First aid, manual handling, fire awareness, work at height
[43] Mechanical, electrical, hydraulics, installation
[44] Altgen, Sean Gibson (April 2018)

- The report confirms that there is an overemphasis on formal NQF5 WTST training (at SARETEC) related to the over-estimation of jobs/MW in the (large) wind sector as high as 1.3, while in reality only 0.11 technicians/MW work currently in the operational wind farms
- There is reportedly a delink with industry needs. Wind Industry (IPPs) cannot wait for (existing or prospective) staff to undergo the 5-7 months WTST, while there are less formal trained, by technical well--inclined human resources available (''informal" artisans) that they can quickly train up for their needs.
- The study recommends that the BST and BTT course should also receive SAQA accreditation and SETA (Sectoral Education Training Authority) and are given by SAQA/SETA-certified trainers[45].
- SARETEC to be enhanced/restructured to provide and/or through networking with other service providers these trainings as well to serve the needs of the industry and thereby stay relevant and useful.
- SARETEC expands training outside the current REIPPPP scope to market opportunities for future job seekers (e.g. electrification, PPAs, funding) and to organise short courses for the benefit of local government officials, community representatives and (wind energy) industry professionals (on economic and socio-economic development and monitoring, community ownerships, public-private partnerships, enterprise and entrepreneurial skills development, etc.).
- There is not only a need to focus on technical subjects, but also on human capacity development (HCD), SMME and Enterprise development (EnD) and supporting a clear training, education and capacity building path from the lowest skilled individuals to NQF 5.
- More training should take gender issues into account (the wind energy industry is one of the worst-performing industries in South Africa when it comes to empowering women, according to the report).

Instead of the activities, mentioned in the ProDoc (and based on the recommendations in the capacity development needs report), SAWEP II has re-oriented its support for the following (based on a SARETEC proposal):

- Financing Scheme (course fee and stipend) for 24 students (based on demand for trained students (in relation with the installed wind capacity in the country) for a WTST course (12 per year) at SARETEC (students would need to have NQF4 level[46]), as well as BTT and BST training targeting 40 qualifying (minimum grade 10 level);
- Workplace Placement and Support for up to 15 SARETEC Students.

However, at one point in time it was observed that SARETEC was not accredited by the Quality Council for Trades & Occupations (QCTO) as a training organization. The SARETEC WTST accreditation with QCTO is now in progress. This has been a condition for SAWEP II (and agencies such as DANIDA and GIZ) to financially support candidates for the WTST training[47].

Another output of SAWEP-2 is providing some financial support (n 2017, 2018 and 2019) to the organisation of the annual WindAc (SARETEC-organised) and Windaba (SAWEA-organised) events. The programme of the events includes presentation sessions in plenary, exhibits and many opportunities to network with academics, students and industry players.

Future outlook:

RE capacity projections and planning beyond REIPPPP BW 4 are not clear at this stage, that sets the energy source and supply targets from wind etc. So, it is difficult for wind turbine manufacturers to get the signal for demand increase in local manufacturing and thus for skilled artisans in wind manufacturing. The small-scale wind industry is expected to grow and demand may increase from two small wind turbines per week, as seen today, to 25 small-scale wind turbines per week in 2025, especially with the advent of factors such as increased grid electricity prices, reduced wind turbine cost and net-metering (PIR, 2019). The opportunities exist but they are too far down the line to substantiate an increase in SAWEP artisan training support now.

[45] A proposal, in support of SARETEC focusing on ongoing NQF5 WTST training based on real demand 0.1 WTST/MW numbers from operating wind farms - targeting 24 qualifying (minimum NQF4) and GWO BTT, BST training targeting 40 qualifying (minimum grade 10) needy individuals from REIPPPP bid 4 and surrounding communities, was submitted at the 4th PSC meeting.

[46] The number is based on assessment of the latest BW4 round in REIPPPP with a capacity of 1.3 GW and a ratio of 0.1 WTST/MW

[47] A first group of 12 people started WTST training in July 2019. Attendance of a WTST course is about ZAR 78,000

4.3 Climate change and other impacts

4.3.1 Emission reductions

The *Guidelines for Greenhouse Gas Emissions Accounting and Reporting for GEF Projects* (GEF/C.48/Inf/09, May 2015) replace 'indirect emissions' with a new terminology, 'consequential emission reduction', defined as those projected emissions that could result from a broader adoption of the outcomes of a GEF project, plus longer-term emission reductions from behavioral change'. In GEF-7, the GEF Tracking Tools (Excel-based) are replaced by GEF Core Indicator Tables.

The SAWEP II project objective[48] is linked with the installation of 1,320 MW newly added wind power capacity under REIPPPP Bidding Window 4 to be contracted during the SAWEP II implementation period. Interruptions in the implementation of the RE IPPPP (e.g. Eskom reluctance to sign PPA's for RE IPPPP Bid Window 4) were feared to have a detrimental impact on achieving of SAWEP II objective. Fortunately, BW4 managed in the end to realise a contracted wind power capacity of 1,362 MW. When fully operational[49], the 1,362 MW will generate 3,104 GWh per year[50], or 62,087 GWh cumulatively over the assumed 20-year lifetime of a wind power facility. Taking a grid emission factor[51] of 0.94 ton of CO_2 (tCO_2) per MWh, this implies a cumulative emission reduction of 58,362 tCO_2.

The ProDoc mentions that 74,230 individuals will benefit from 1,320 newly added power. Thus, following the same reason we can say that adding 1,362 MW will benefit about 75,000 individuals with wind-generated electricity. In addition, the reader is referred to Box 5 for information on other benefits of wind power development, such as local content in investment and job creation in construction and operation.

The possibility of a recurring drought problem in the country cannot be disregarded. Climatic conditions are changing and over the past three years South Africa experienced the worst drought in 30 years due to the El Nino effect covering five provinces. This has devastating impacts on agricultural output and the local economies of the affected areas[52]. It stresses the importance of a small activity as part of Component 3, in which SAWEP II supports the application of water pumping.

4.3.2 Gender and youth

The gender aspect is particularly prominent in component 4 (wind energy training), as is illustrated by the following figures:

1) Component 4: Women students benefited from attendance and participation at the WASA 2 Mid-term workshop 20 June 2018, SAWEP II support of WindAc 2018 (25 students, of which 46% female), WASA 2 Final Seminar/WASA 3 midterm workshop 10 April 2019 (71 attendees); of the 12 successful candidates that qualified for SARETEC WTST program 5 training, four out of six who applied are women;
2) Component 3: The UB Mini-grid project has a good women representation in the Project Steering Committee and a capable women social facilitator that is key for the successful implementation of the UB mini-grid. More, importantly, gender is an important factor when it comes to lack of access to energy services. The burden of lack of access to energy naturally falls on women who often have toil for hours collecting wood as the main energy source for cooking and

[48] Source: GEF Tracking Tool and UNDP Project Document Note that the post-project (indirect) emission reduction (as a result of the project's capacity building, resource mapping and institutional strengthening are an estimated 1,610-11,917 kilotonnes of CO_2. The BW4 added wind power capacity was additional to the BW 1 to 3 capacity considered as baseline

[49] By March 2019, about 1,980 MW of the total planned capacity of 3,557 MW under REIPPPP was operational. Source: REIPPPP Quarterly

[50] Capacity factor of 26%, mentioned in the ProDoc, which is based on REIPPPP period 2013-14 (Eskom data)

[51] National Business Initiative (2013). This is a slightly lower emission factor than used in the ProDoc at which time coal content in the national grid power generation was higher.

[52] Source: IRP (2019), page 16

heating. The addition of wind into the mini-grid project would improve energy output which could allow excess energy to be used for other activities such as water pumping and other productive activities such as agriculture.

In the context of South Africa, a substantial number of youths are unemployed or only partially employed. However, SAWEP reports do not specifically give details on youths. In addition to gender-relevant reporting, the MTR Team suggests that progress reporting should also consider disaggregating data by age group.

Regarding the REIPPP programme, it should be noted that its quarterly reports do provide disaggregated data, such as women-owned share of spending in construction, and on the employment equity share of special groups, such as youths, women, local communities, and others. The reader is referred to the quarterly *IPPPP, An Overview* reports[53].

4.4 Ratings of progress towards the objective and outcomes

The table below gives a summary of the ratings of the 'progress towards results', based on the findings presented in Chapter 4. In assessing the progress towards results of the SAWEP II Project at its mid-point, a six-point rating scheme is used:

- Highly satisfactory (HS), no shortcomings
- Satisfactory (S), minor shortcomings
- Moderately satisfactory (MS), moderate shortcomings
- Moderately unsatisfactory (MU), significant shortcomings
- Unsatisfactory (U), major shortcomings
- Highly unsatisfactory (HU), severe shortcomings
- U/A = unable to assess.

Many indicators in Components 1 and 2 had already been achieved by the time SAWEP II started operations. It is difficult to assess progress in such a manner. We suggest that the progress indicators are re-designed (see Recommendations) and then rated accordingly. A proposal for such a 'new' Results Framework is suggested by the MTR Team in Box 15.

Box 14 Evaluation ratings of progress towards results

Evaluation item	Corresponding section	Rating	
		Old	New
Objective achievement		S	S
Component 1	Section 4.2.1	U/A	MS
Component 2	Section 4.2.2	HS	HS
Component 3	Section 4.2.3	S	S
Component 4	Section 4.2.4	U/A	MS
Overall progress towards results			**S**

[53] These are available for downloading at www.ipp-projects.co.za/Publications

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 local Implementing Agency DMRE. Building on the previous Chapter's critical look at project results, an assessment is made of the partnerships established and stakeholder interaction during implementation and the important role of adaptive management. 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 SAWEP II Project.

5.1 Implementation and management

5.1.1 Management arrangements and adaptive management

- Are adequate project management arrangements in place at project entry? How efficient are partnership arrangements for the project? Are responsibilities clear (does each partner have assigned roles and responsibilities from the beginning)? Did each partner fulfil its role and responsibilities? Adaptive management practices
- What is the quality of execution of the Executing Agency/Implementing Partner(s) and the GEF Partner Agency (UNDP) and are there recommend areas for improvement?

Management arrangements and execution

The SAWEP II Prodoc was developed during 2013-2014 although not signed until December 2015. Thereafter, there was an eight months delay with initiation of the SAWEP II activities until the appointment of the Project Manager in August 2016. This long startup phase of SAWEP II also saw frequent changes at Minister level (at the helm of DoE) and internal restructuring which did not help prompt decision-making. Eventually, the individual designated as Project Manager was retained from the programme's first phase, SAWEP I. Also, the decision on retaining project service providers from Phase 1 took quite some time and the no objection from DoE was obtained only in August 2017 with agreements signed between SANEDI and service providers (including CSIR) shortly thereafter.

Adaptive management

By the time the SAWEP II started in 2016, already significant progress had already been made, especially with setting up the RE IPPPP office (Component 1) and with wind training, education, skills development at SARETEC (Component 3). Thus, the proposed outputs, activities for Outcome 1 and 4 were outdated by the start of SAWEP II's activities. Project management (RCU) correctly decided to do a review, status, and update of Outcomes 1, 3 and 4 outputs:

- Assessment and Analysis of the Impact of REIPPPP on the South African Economic Development (Component 1),
- Status & Specification on Small Scale Wind Energy Pilot Project (Component 3),
- Status and Development of Wind Energy Training, Education, Skills and Human Capacity Development (Comp 4).

A second change concerned the delay in the REIPPPP bidding programme, in particular, the initial reluctance of Eskom to sign power purchase agreements (PPAs) of REIPPPPs of Bidding Window (BW) 4 and the subsequent postponement of future BWs. This has shed doubt on activities of Component 4 as the future uptake of the trained workforce would depend on the expected wind industry growth.

This above has led project management to reallocate budget from Components 1 and 4 to Component 3, also because small-scale wind development is less dependent on REIPPPP, and, last but not least, because of the growing need for wind energy for water pumping and to address energy access and poverty issues in the Eastern Cape.

5.1.2 Monitoring and evaluation

- Does the M&E system provide the necessary information? Has the information provided by the M&E system been used to improve performance and to adapt to changing needs?
- Is M&E was sufficiently budgeted for at the project planning stage and has M&E was adequately funded and in a timely manner during implementation.
- Were progress reports produced accurately and timely, and did they respond to reporting requirements including adaptive management changes?

M&E: design at entry and implementation

The Project Document has provided the structure for Monitoring & Evaluation, which follows the 'standard' M&E Plan with an inception activity (workshop, report), annual reporting (PIRs), project steering committee meetings, periodic status, financial and progress reporting, as well as audits, field visits. A total of USD 130,172 was allocated, about 3.5% of the total GEF budget, which is deemed sufficient for this type of project.

Reporting

The SAWEP II progress is being reported and in a satisfactory way. Progress is reported regularly, in three PIRs (2017, 2018, 2019), quarterly progress reports (from Q4 2016 to Q2 2019), and five PSC meetings (2016, 2017, 2017, 2018, 2019).

Internal communications

With the PCU consisting of the SANEDI-provided Project Manager and the DoE-provided Wind Energy expert, this allows frequent contact between SANEDI and DoE, while having good communications lines with the UNDP Country Office.

5.2 Stakeholder involvement

- Project management: Has the project developed and leveraged the necessary and appropriate partnerships with direct and tangential stakeholders?
- Participation and country-driven processes: Do local and national government stakeholders support the objectives of the project? Do they continue to have an active role in project decision-making that supports efficient and effective project implementation?
- Participation and public awareness: To what extent has stakeholder involvement and public awareness contributed to the progress towards achievement of project objectives?

External communications and knowledge development

Communications between the Project and the various stakeholders appear quite satisfactory, notably with the entities involved in the 'sister' project WASA (i.e. CSIR, UCT, SAWS, DTU Wind Energy) of Component 2 and with various local stakeholders of Eastern Cape (Component 3) as well with various government entities (e.g. DEDEAT) and development partners (Germany). Through Component 4, the Project realizes communications with a wider audience by supporting

wind power events (WindAc, Windaba) and supporting the participation of students to participate in training and capacity building activities in cooperation with SARETEC and SAWEA.

Having the same team in place in the various phases of WASA and SAWEP has further contributed to skills and knowledge transfer from the Technical University of Denmark Wind Energy Group (DTU Wind Energy) and the institutionalization of WASA at South African public entities, such as the Council Scientific Industrial Research (CSIR), South African Weather Service (SAWS) and the University of Cape Town (UCT). In addition, CSIR is now transferring knowledge and skills on wind energy and resource assessments to local institutions by (funding) capacity building of Fort Hare University (Eastern Cape) students through the UB Minigrid Wind Component project.

The public at large is informed through the websites www.wasaproject.info and http://sawep.co.za. Litha Communications (see http://lithacommunications.co.za) was appointed in Feb 2019 as the SAWEP II 'Communications Management and Event Organiser".

5.3 Project finance and co-financing

- Are there changes to fund allocations as a result of budget revisions and, if so, what is the appropriateness and relevance of such revisions. Does the project have the appropriate financial controls, including reporting and planning, that allow management to make informed decisions regarding the budget?
- Specifically, the evaluation will also include a breakdown of final actual project costs by activities compared to budget (variances), financial management (including disbursement issues)
- Is there a difference in the level of expected co-financing and the co-financing actually realized, what were the reasons for the variance? Is the co-financing being used strategically to help the objectives of the project? Is the Project Team meeting with all co-financing partners regularly in order to align financing priorities and annual work plans?

There have been substantial delays in disbursements of the project which has led UNDP officials involved (UNDP Country Office Programme Officer and Regional Technical Advisor, RTA) to give ratings that between 2017-2019 have ranged between moderately unsatisfactory and moderately satisfactory. However, these delayed disbursements are a reflection of a number of internal and external factors:

- The project has faced delays in starting up. It took about a year after CEO endorsement (2015) for the project to be signed (Dec 2015), followed by another 10 months to get the inception workshop done and to put the project management team in place.
- Interruptions in the implementation of the RE IPPPP (e.g. Eskom's reluctance to sign PPA's for RE IPPPP Bid Window 4; see Section 2.1.2) have had an impact on SAWEP II, in particular, its Component 4: the training and education activities as these activities are dependent on the wind industry growth and thus, the ability to uptake trained workforce. Part of the Eskom, IPP impasse was resolved in April 2018 with the signature by DoE of the long outstanding REIPPPP BW 3.5 and 4, but a new BW 5 is still under discussion.
- Many activities as originally designed in 2013-14 for the SAWEP II project document were not valid anymore by the time project activities started in 2016. The first year was filled with a good deal of preparation and replacing and/or updating activities.

In spite of these initial delays and poor disbursement, the project remains on course and will have a substantial development impact, especially with a larger focus on small-scale wind development. Project expenditure will be accelerated in 2020 with a large part of the budget allocated to Component 3, notably about USD 380,000 for the UB Mini-grid project, and about USD 635,000 for the WASA 3 activities, and the SARETEC WTST training (USD 188,000)

The above is reflected in planned and actual expenditures, that are summarised in Box 15.

Box 15 Overview of planned and realised GEF budget and co-financing

GEF budget	Approved Budget (USD) (ProDoc)	Expenditures					
		Disbursements (Rand)			Planned (Rand)	Total (Rand)	Total (USD)
		2017	2018	2019	2019-2020		
Component 1	208,386	398,020				398,020	29,483
Component 2	1,748,769	2,480,185	7,742,894	1,276,485	10,712,967	22,212,531	1,645,373
Component 3	197,114	891,829	8,154	393,637	8,151,373	9,444,993	699,629
Component 4	738,214	730,338	481,102	514,800	3,988,700	5,714,940	423,329
Project Management	169,250	109,134	73,534	93,000	961,750	1,237,418	91,661
Project Coordination Unit*	492,517	808,205	823,822	1,287,294	2,316,859	5,236,180	387,865
Total	**3,554,250**	**5,417,711**	**9,129,506**	**3,565,216**	**26,131,649**	**44,244,081**	**3,277,339**

Note: Based on information provided by PCU
Exchange rate used: USD 1 = ZAR (Rand) 13.50

Co-financing (in USD)	Planned			Realized (by mid-2019)		
	In-kind	Cash/grant	Tot	In-kind	Cash/grant	Tot
DoE	2,229,814		2,229,814	1,114,907		1,114,907
DTI	55,974	44,358	100,332	116,821	44,538	161,359
DST		621,118	621,118		621,118	621,118
DHET SARETEC		9,136,770	9,136,770		9,316,770	9,316,770
DEA	98,403	21,739	120,142	20,537		20,537
GIZ		13,910,000	13,910,000		13,910,000	13,910,000
DANIDA		2,160,000	2,160,000		2,160,000	2,160,000
SAWEA		1,508,429	1,508,429		502,810	502,810
Adventure Power		5,501,331	5,501,331		5,501,331	5,501,331
UNDP		200,000	200,000		100,000	100,000
Total	**2,384,191**	**33,103,745**	**35,487,936**	**1,252,265**	**32,156,567**	**33,408,832**

Note: Based on information provided by PCU
DoE: includes operational cost as well as RCU (Wind Energy expert)
DTI: staff cost as ZAR 630,880 per year (Director level); and cost of DTI Wind Localisation Study
DST: expenditures related to Wind Spoke
SARETEC: building, equipment and training cost related to WTST
GIZ: cost related to implementation of the GIZ SAGEN programme (South African-German Energy Programme)
DANIDA (Denmark): WASA grant funding
SAWEA: pro rata estimate of SAWEA activities in Component 4
Adventure Power (manufacturer of 300 kW wind turbine). Company will be sold but assets should be worth over USD 5.5 million
UNDP: estimated expenditures

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

A summary of ratings is given in Box 16. In assessing 'implementation and adaptive management' of the SAWEP II Project at its mid-point, a six-point rating scheme is used:

- Highly satisfactory (HS), Implementation of all components, 1) management arrangements, work planning, reporting, project-level monitoring and evaluation, 2) stakeholder engagement and communications, 3) finance and co-finance, is leading to efficient and effective project implementation and adaptive management. The project can be presented as "good practice".
- Satisfactory (S), implementation of most of the components is leading to efficient and effective project implementation and adaptive management except for only few that are subject to remedial action
- Moderately satisfactory (MS), implementation of some of the components is leading to efficient and effective project implementation and adaptive management, with some components requiring remedial action.

- Moderately unsatisfactory (MU), implementation is not leading to efficient and effective project implementation and adaptive, with most components requiring remedial action.
- Unsatisfactory (U), implementation of most of the components is not leading to efficient and effective project implementation and adaptive management.
- Highly unsatisfactory (HU), implementation of none of the components is leading to efficient and effective project implementation and adaptive management.
- U/A = unable to assess.

Box 16 Evaluation ratings of project implementation and execution

Evaluation item	Corresponding report section	Rating
Adaptive management, management arrangements, M&E, work planning, reporting (UNDP, Project Team,DMRE)	Section 5.1.1	HS
Stakeholder involvement; communications	Section 5.1.2	S
Budget, utilisation of GEF and co-financing	Section 5.1.3	MS
Overall UNDP implementation and implementing partner execution		**S**

6. FINDINGS: SUSTAINABILITY

6.1 Sustainability and risks

- *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? Are requisite systems for accountability and transparency, and required technical know-how, in place?
- *Environmental and social risks.* Are there any environmental risks that may jeopardize sustainability of project outcomes? 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? Is there sufficient public/stakeholder awareness in support of the project's long-term objectives?
- *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?
- *Capacity risks.* Have partners and stakeholders successfully enhanced their capacities and do they have the required resources to make use of these capacities?

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. In fact, many risks are in one way or another related to the "barriers" mentioned in Section 2.1. One can argue that some of the "risks' the Project might face mean basically being unable to lower corresponding "barriers" substantially, thus negatively affecting the likeliness of "sustainability" of the project's interventions. The critical "assumptions" then is that the "internal risks" (i.e. risks that can be mitigated or managed by Project management), and 'external risks' have a low incidence and/or impacts, in such a way that sustainability remains (moderately) likely. The quality of adaptive management (mentioned in Section 5.1) is determined by the mitigation response of Project management to these external and internal risk factors as these manifests themselves more intensely and/or more frequently than expected.

In assessing the 'sustainability' of the SAWEP II project at its mid-point, a simple rating scheme is used:
• Likely (L): negligible risks to sustainability;
• Moderately Likely (ML): moderate risks to sustainability;
• Moderately Unlikely (MU): significant risks to sustainability; and
• Unlikely (U): severe risks to sustainability; and

Three main areas are considered in this section and then rated as to the likelihood and extent that risks will impede sustainability.

Governance and institutional sustainability: likely

Project level
The SAWEP II project had a relatively long lag period between conceptualisation of the project document (2013 to 2014), the project approval by GEF CEO (May 2015) and the final initiation and start of the project only in August 2016. This has posed a risk from the onset for activities planned in the project to be completed. The Project Team did, however, work well to progress on the tasks laid out in the Project Document. The project has requested a time extension to move the project end date to December 2020 to allow for full completion of wind measurement that serve as important inputs into accurate wind energy modelling and achievement of project outcomes in Component 2 and 3. The successful installation of four additional wind masts and additionally the continued functioning of the 14 masts setup in SAWEP I ensure the continued availability of wind data beyond the life of the current GEF Funded SAWEP II. There is a risk in terms of funding for maintenance of the masts and data collection, however, there is a plan in place for the CSIR Energy Centre to be the custodians of the wind masts into the future and they are investigating various options (including government support

and possibly interested industries that may benefit from having access to this type of data) for future sustainability of the masts. During SAWEP II the CSIR Energy Centre team has also been capacitated through collaboration with DTU in order to continue with the work and modelling. The updated Wind Atlas of South Africa and high-resolution maps generated through WASA2 and WASA3 contribute significantly to the decision making for areas with the best wind generation potential in the country. A Life Extension Business Case study is taking place with the CSIR, DoE and SANEDI to secure the long-term sustainability and use of the WASA masts e.g. CSIR, to start building a national capability around "Energy Meteorology" (PIR, 2019).

At the time of this report there have not yet been any new small-scale wind demonstration projects established, however the Project Team together with the collaboration of the CSIR and the Eastern Cape DEDEAT in collaboration with GIZ and DLR TA will complete a small Wind Power Integration in the Upper Blinkwater (UB) Mini-grid project by mid-2020. The small wind power will be integrated with 75 kW PV with 20 kW genset hybrid system. As mentioned in section 4.2.3 the UB Mini-Grid will be the main small wind project supported by SAWEP.

National level

The SAWEPII project contributes positively towards South Africa's move towards a green economy with higher energy efficiency and lower carbon emissions. There are various government policies and plans (as discussed in Section 2.1) that lay the foundation for the promotion of renewable energy technologies including wind energy. The launch of the REIPPPP programme by the DBSA, DoE and National Treasury, has also positively contributed towards the establishment of IPPs, attracting foreign investment and increased renewable energy generation from solar and wind. The Project document identified certain risks in terms of the reduction of the allocation of wind power (from 9,200 MW to 4,360 MW) by 2030 in the then updated IRP. At the time of the MTR the Gazette-updated draft of the IRP (October 2019) has increased the analysis period to 2050 and wind power installed capacity to 11,442 MW. This should have a positive impact on the outcomes of SAWEP II and future development including small scale wind development in the country. There is a concern regarding the gap in procurement proposed in the IRP for 2022 to 2024 for wind and solar projects. There is also a plan for a Bid Window 5 for the REIPPPP programme.

The SAWEP II Project Steering Committee has representatives from a number of government departments including DoE, DTI, DST, DHET and DEA. Governments buy-in and support of the project and the future of wind energy development in South Africa contributes positively to the sustainability of project and future work.

Environmental and social sustainability: likely

The main contribution of the project towards future environmental sustainability lies in the use of the WASA 2 and potential future updates with WASA 2 data to the SEA process of identifying and defining REDZs. These REDZs enable the future development of wind energy by removing barriers to environmental permitting and requirements associated with transmission grid expansion. The only risk may be in the delay of the finalisation and sign-off of these REDZs.

The training of individuals through SARETEC (WTST training) will supplement the availability of trained individuals to be taken up into the wind energy industry in South Africa. It, however, came to light that SARETEC is not QCTO accredited as a training organization for the SAQA Accredited WTST training. This poses a risk for the timeframe for support of the individuals to be trained by the SAWEP II project as the project nears its end. The SAWEP II Project Manager took up the matter with SARETEC and they have subsequently put in their application for accreditation and QCTO has committed to processing the application within a reasonable timeframe (PIR, 2019).

Financial Sustainability: likely

The main sources of funding for renewable energy projects in South Africa come from donor or grant funding, government funding schemes, and other formal competitive funding streams. These sources also tend to favour the larger and more commercial-sized projects. South Africa would benefit from development within the small-scale wind energy sector and the continued sustainability of this sector may need to source funding from more than one source. The South African REIPPPP is likely to release the Bid Window 5 now that the updated IRP has been gazetted. This programme will ensure continued local and foreign investment in the wind energy sector.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

SAWEP II has been the successor of the SAWEP I project, which was implemented during 2008-2011. SAWEP II has been formulated during 2013-14 and is under implementation since 2015-16 with four components, a) Monitoring and verification of the implementation of local content requirements for wind energy procurement mechanisms; b) Resource-mapping and wind corridor development support for policy-makers; c) Support for the development of the small-scale wind sector; and d) Training and human capital development for the wind energy sector.

The SAWEP II ProDoc was approved by GEF in May 2015, with the ProDoc signed in December 2015 with project activities starting with the appointment of the Project manager in August 2016. Meanwhile, South Africa implemented four bidding rounds during 2011-2015 of the country's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). This has implied a boost to grid-connected, large-scale, wind power, with some 1,980 MW procured.

By the time the project started, in 2016, a number of activities in particular Components 1 and 3 were outdated. The Project Team has responded to this positively, turning the challenge posed by the new implementation environment into opportunities:

- *Component 1*. By the time SAWEP II started, the DoE IPP Office (managing REIPPPP) was well-established and operational at the time of Inception with a M&V system already present. Rather than establishing a M&V system, it was decided to provide it with some strategic support in the form of an assessment of REIPPPP on economic development, based on the M&V (quarterly) reports.
- *Component 2* involves the development of a Wind Atlas (WASA), implemented by SANEDI, CSIR, UCT, SAWS, DTU Wind Energy. Designed to support WASA 2 as well as DEA with the establishment of renewable energy development zones (under the Strategic Environmental Assessment), by the time SAWEP II started, WASA was being implemented (2014-18) and developing into its Phase 3 (2017-2020), while SEA was initiating its successor phase SEA II). This means that the targets of this Component are well beyond what was originally formulated with WASA 3 installing the last series of wind masts which allow measurements covering the whole of South Africa and derive high-resolution wind maps, data series and databases accordingly.
- *Component 4* saw that by the time SAWEP II started, SARETEC was already offering a five-month wind turbine service technician (WTST) training as well as short basic training (BTT) and basic safety refresher training (BRT). Thus, a stocktaking of wind power capacity building needs was carried out and the activities in the Component adapted accordingly, basically supporting student participation in these courses. As REIPPPP has been on hold since 2015, it was difficult to expand technical capacity building activities, due to uncertainty on the (future) demand and uptake by the wind industry of the trained workforce
- *Component 3* has seen the cooperation with Germany and Eastern Cape authorities in adding a wind component to planned solar hybrid mini-grid system in Upper Blinkwater. Project management decided to shift attention more to small-scale wind development, such as assessment of the market of (local manufacturing) of small wind turbine (in view of possible demand by small wind developers, such as municipalities, in the 1 kW-2 MW range).
- The MTR welcomes also the new small-scale wind energy, i.e. wind-powered water pumping. In South Africa thousands of wind pumps are still operating. These are mostly used to provide water for human use as well as drinking water for large livestock. The climate-change-induced increasing incidence of drought in the country puts the option of small wind pumping in a new perspective. SAWEP has included a water pumping initiative at schools, which is also very relevant in the framework of education on environmental issues.

Most of the activities, as described above, are on track, and therefore we give a **'Satisfactory' rating regarding the "Progress towards results".** Given the readiness of the PMU for adaptive management, the MTR Team gives an overall rating of **'Satisfactory' for "Implementation and adaptive management"**. The last PIR (2019) gives a lower rating, partly

based on the lack of disbursements in the budget. While this is certainly an indicator of lack of progress, the MTR Team does not advocate 'spending for the sake of spending', and the funds that currently (Oct 2019) still remain can be used during 2019-2020 to fund the planned expansion of SAWEP II of the small-scale wind activities of Component 3, and to allow a possible extension of SAWEP until 2020-21 to enable the SAWEP project to bring all these activities to a successful completion.

The completion of the high-resolution map covering the whole of South Africa and capacity strengthening at CSIR (that might take over the 19 wind masts installed for continuing measurements) and recent capacity building activities at University of Fort Hare (by CSIR) on wind resource assessment give confidence on the likely sustainability in capacity, while the new IRP (recently gazetted in October 2019) makes a continuation of the government to boost large-scale renewable energy to achieve its 17,742 MW goal by 2030 likely. With a new REIPPPP bidding Round Five being mooted, this will release new financial resources. Thus, the MTR Team rates **'sustainability' as 'likely'.**

The final conclusion, that the SAWEP programme has been an important instrument to carry out a detailed wind energy resource assessment and to build the needed local capacity, as well as in promoting small-scale wind power applications.

7.2 Recommendations

Number	Recommendation	Entity Responsible
1	The MTR Team proposes that the SAWEP II implementation period is extended with a period until Q4 2020 (one-year extension) for the following reasons: • Component 2: WASA 3 started with eight months implementation delay and is scheduled to end by 2020. If the sister project SAWEP II closes before the end of 2020 this may negatively affect the results and financial management of WASA 3; • Component 3: After launching the Upper Blinkwater hybrid mini-grid, operation and maintenance will be overseen by DEDEAT at least until May 2021. However, to allow a smooth transition, technical assistance by SAWEP until end of 2020 may still be needed; • Component 3: The school-based small-scale wind water pumping projects will not be commissioned and handed over until Q4 2020/Q1 2021. To allow proper monitoring and troubleshooting support, the assessment, design, and construction, and activities should fall within the SAWEP II implementation period (to be extended until Dec 2020)	UNDP CO DME
2	The MTR team proposes that the Project Results Framework be updated to reflect the many changes that occurred before and after SAWEP II project inception and to (re-define realistic end-of-project target values. This will allow a good monitoring (and terminal evaluation) of the progress of outcomes and the objectives.. The MTR team has taken the liberty to make a proposal for such a reformulated logical framework (see Box 17)	UNDP CO DME
3	By mid-2020, the RCU should make a 'post-SAWEP' action plan that reflects: • Post-WASA continuation on wind measurements, ownership of wind masts, and continued use for climate forecasting; • Capacity building needs (e.g. continued support to SARETEC or expansion of wind courses to other educational institutions), depending on future demand for skilled workforce • Analysis of the market development of large grid-connected wind power in view of the new IRP 2019 and the possible resumption of REIPPPP. • Market assessments Incl. institutional arrangements needed) and financial-economic analysis of small-scale wind energy, including power generation in the 100 kW- 2 MW range, and wind-powered water pumping	Project team (PCU)

Box 17 Proposed changes in the Project Results framework with updated indicators

Output	Indicator and baseline situation (2016)	Indicator and end-of-project value	Mid-2019 level and status (based on MTR observation and project progress reports)
1.1 Enhanced capacity of DoE IPPP Office to strengthen M&V system	• Detailed assessment on economic, socio-economic and enterprise development impacts of REIPPP		
	• The DoE IPP Office started producing produces high-quality reports that reports on the REIPPPP progress in RE projects (incl., wind) since 2015, including details on local content, socio-economic development (SED) and enterprise development (EnD)	• At least one report containing assessment, analysis, and recommendations	• Report has been submitted

Output	Indicator and baseline situation (2016)	Indicator and end-of-project value	Mid-2019 level and status (based on MTR observation and project progress reports)
2.1 Geographical extension of verified Wind Atlas (WASA developed for Northern Cape	• Four masts and related equipment installed in the Northern Cape in WASA 3 bringing total WASA masts to 19		
	• Nine wind measurements installed as part of WASA 1 and five under WASA 2	• Four wind masts installed under WASA 3 (bring the total to 18)	• WASA 3 masts have been installed and are operational

Output	Indicator and baseline situation (2016)	Indicator and end-of-project value	Mid-2019 level and status (based on MTR observation and project progress reports)
2.2 WASA data processed to produce high-resolution wind resource map covering the whole nation	• Completed and validated high-resolution wind resource map		
	• Nine wind masts installed as part of WASA 1 and five will be as part of WASA 2	• One high-resolution wind energy map and database	• High-resolution wind map and database available and in the process of being updated

Output	Indicator and baseline situation (2016)	Indicator and end-of-project value	Mid-2019 level and status (based on MTR observation and project progress reports)
2.3 Enhanced capacity within Government to use wind atlas data for energy planning at policy and strategic level	• Wind energy development focus areas defined in SEA Phase 2		
	• DEA's SEA entered Phase 2, in which the high-resolution WASA wind resource map will serve as the basis for the SEA Phase 2 identification of wind technical areas.	• Status of SEA 2 report and definition of wind focus areas	• CSIR report mapping for solar and wind technical areas of focus for SEA Phase 2. Based on areas will be refined to form potential REDZs for submission to DEA based on specialist assessments

Output	Indicator and baseline situation (2016)	Indicator and end-of-project value	Mid-2019 level and status (based on MTR observation and project progress reports)
3.1 Establishment of small-scale wind demonstration projects	• Small-scale wind farm demonstration projects developed in Eastern Cape and monitored		
	Wind power has focussed on large-scale grid-connected applications mainly (as part of REIPPPP)	• One small-scale wind farm mini-grid demonstration project designed and operational • One programme on small-scale wind pumping for schools	• The (GIZ-supported) solar component (75 kW) will be added by Oct 2019, while the wind component (SAWEP-supported) should be ready by Jan 2019) • One other small-scale wind pumping programme being designed with 11 schools participating (with WESSA, schools) • "Green" tariff study with small-scale wind energy for Buffalo City Metro

Output	Indicator and baseline situation (2016)	Indicator and end-of-project value	Mid-2019 level and status (based on MTR observation and project progress reports)
4.1 Increased number of people receiving training in management, operation and maintenance of wind technology	• Number of institutes that provides training • receiving training in management, operation and maintenance of wind technology		
	• The South African Renewable Energy Technology Centre (SARETEC) offers a five-month full-time Wind Turbine Service Technician (WTST) course. In addition, SARETEC offers the smaller (5-day) Basic Safety Training (BST) and Basic Technical Training (BTT).	• At least two institutes provide recognised wind energy training at higher and vocational level • 60 people trained	• SARETEC WTST course in the process of receiving support (24 students); BTT/BST: 40 • Small-scale wind capacity building (with University of Fort Hare) • Support to the organisation of the annual WindAc (SARETEC-organised) and Windaba (SAWEA-organised) events.

It should be noted that the "project objective" has not been changed.

Objective	Indicator and target	Mid-level status
To assist the Government and industry stakeholders overcome strategic barriers to the successful attainment of South Africa's Integrated Resource Plan target of 3,320 MW of wind power generation online by 2018/19	• Generation from wind farms (GWh) – 1,367 GWh cumulatively produced or contracted by Year 4 of project implementation • Number of individuals benefiting from wind-generated electricity: 74,230 by Year 4 of project implementation. • Incremental tonnes of CO_2 emissions reduction due to wind energy capacity: direct cumulative emission reduction of 70,378 tCO_2 (due to wind contracted by Year 4)	• Under BW4 1,362 MW of wind capacity was added, bringing the total to 3,557 MW. By April 2019, 1,980 MW was operational • If the BW4 capacity of 1,362 MW will be fully operational this generate 3,104 GWh per year or 62,087 GWh cumulatively over the assumed 20-year lifetime of a wind power facility. Taking a grid emission factor of 0.94 ton of CO_2 (tCO_2) per MWh, this implies a cumulative emission reduction of 58,362 tCO_2. • 75,000 individuals will benefit if the 1,362 MW will be fully operational

ANNEX A. TERMS OF REFERENCE (TOR)

UNDP-GEF Midterm Review: South Africa Wind Energy project (SAWEP) Phase 2

Location: South Africa
Category: Wind Energy
Type of Contract: One individual Contract (International & Local Consultant)
Languages Required: English
Starting Date: 01 September 2019
Expected Duration of Assignment: 4 months

1. INTRODUCTION

This is the Terms of Reference (ToR) for the UNDP-GEF Midterm Review (MTR) of the full-sized project titled South African Wind Energy Project (SAWEP Phase 2) (PIMS 5256) implemented through the Department of Energy and the South African Energy Development Institute (SANEDI), which is to be undertaken in Q1 2019. The project started on 18 December 2015 and is in its third year of implementation. In line with the UNDP-GEF Guidance on MTRs, this MTR process was initiated before the submission of the second Project Implementation Report (PIR). This ToR sets out the expectations for this MTR. The MTR process must follow the guidance outlined in the document Guidance For Conducting Midterm Reviews of UNDP-Supported, GEF-Financed Projects (http://web.undp.org/evaluation/guidance.shtml#gef).

2. PROJECT BACKGROUND INFORMATION

With a GEF-5 allocation of USD 3,554, 250, SAWEP Phase 2 was designed to overcome barriers to the successful attainment of South Africa's 2010 Integrated Resource Plan target of 3,320 MW of wind power generation online by 2018/19. In order to achieve this, the project has been divided into four main components: Component 1: Monitoring and Evaluation of the implementation of local content requirements, Component 2: Resource-mapping and wind corridor development support for policymakers, Component 3: Support for the development of small-scale wind sector and Component 4: Training and human capital development for the wind energy sector.

3. OBJECTIVES OF THE MTR

The MTR will assess progress towards the achievement of the project objectives and outcomes as specified in the Project Document, and assess early signs of project success or failure with the goal of identifying the necessary changes to be made in order to set the project on-track to achieve its intended results. The MTR will also review the project's strategy, its risks to sustainability.

4. MTR APPROACH & METHODOLOGY

The MTR must provide evidence-based information that is credible, reliable and useful. The MTR team will review all relevant sources of information including documents prepared during the preparation phase (i.e. PIF, UNDP Initiation Plan, UNDP Environmental & Social Safeguard Policy, the Project Document, project reports including Annual Project Review/PIRs, project budget revisions, lesson learned reports, national strategic and legal documents, and any other materials that the team considers useful for this evidence-based review). The MTR team will review the baseline GEF focal area Tracking Tool submitted to the GEF at CEO endorsement, and the midterm GEF focal area Tracking Tool that must be completed before the MTR field mission begins.
The MTR team is expected to follow a collaborative and participatory approach1 ensuring close engagement with the Project Team, government counterparts (the GEF Operational Focal Point), the UNDP Country Office(s), UNDP-GEF Regional Technical Advisers, and other key stakeholders.

Engagement of stakeholders is vital to a successful MTR.2 Stakeholder involvement should include interviews with stakeholders who have project responsibilities, including but not limited to the Project Steering Committee members, and the Department of Energy (Renewable Energy Directorate and IPP Office), SANEDI, Department of Trade and Industry, Department of Environmental Affairs, SARETEC, WASA Consortium (CSIR, UCT, SAWS, DTU), SAWEA, Royal Danish Embassy in South Africa, GIZ, public officials from the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT), Department of Science and Technology (DST), Department of Higher Education (DHET), industry representatives; executing agencies, senior officials and task team/ component leaders, key experts and consultants in the subject area, Project Board, project stakeholders, academia, local government and CSOs, etc. Additionally, the MTR team is expected to conduct field missions to the Eastern Cape including the following project sites (Blink Water) and the Northern Cape (WASA 3 wind measurement mast sites).
The final MTR report should describe the full MTR approach taken and the rationale for the approach making explicit the underlying assumptions, challenges, strengths and weaknesses about the methods and approach of the review.

5. DETAILED SCOPE OF THE MTR

The MTR team will assess the following four categories of project progress. See the Guidance For Conducting Midterm Reviews of UNDP-Supported, GEF-Financed Projects for extended descriptions.

i. Project Strategy

Project design:

- Review the problem addressed by the project and the underlying assumptions. Review the effect of any incorrect assumptions or changes to the context to achieving the project results as outlined in the Project Document.
- Review the relevance of the project strategy and assess whether it provides the most effective route towards expected/intended results. Were lessons from other relevant projects properly incorporated into the project design?
- Review how the project addresses country priorities. Review country ownership. Was the project concept in line with the national sector development priorities and plans of the country (or of participating countries in the case of multi-country projects)?
- Review decision-making processes: were perspectives of those who would be affected by project decisions, those who could affect the outcomes, and those who could contribute information or other resources to the process, taken into account during project design processes?
- Review the extent to which relevant gender issues were raised in the project design. See Annex 9 of Guidance for Conducting Midterm Reviews of UNDP-Supported, GEF-Financed Projects for further guidelines.
- If there are major areas of concern, recommend areas for improvement.

Results Framework/Logframe:

- Undertake a critical analysis of the project's logframe indicators and targets, assess how "SMART" the midterm and end-of-project targets are (Specific, Measurable, Attainable, Relevant, Time- bound), and suggest specific amendments/revisions to the targets and indicators as necessary.
- Are the project's objectives and outcomes or components clear, practical, and feasible within its time frame?
- Examine if progress so far has led to, or could in the future catalyse beneficial development effects (i.e. income generation, gender equality and women's empowerment, improved governance etc...) that should be included in the project results framework and monitored on an annual basis.
- Ensure broader development and gender aspects of the project are being monitored effectively. Develop and recommend SMART 'development' indicators, including sex-disaggregated indicators and indicators that capture development benefits.

ii. Progress Towards Results

Progress Towards Outcomes Analysis:

- Review the logframe indicators against progress made towards the end-of-project targets using the Progress Towards Results Matrix and following the Guidance For Conducting Midterm Reviews of UNDP-Supported, GEF-Financed Projects; colour code progress in a "traffic light system" based on the level of progress achieved; assign a rating on progress for each outcome; make recommendations from the areas marked as "Not on target to be achieved" (red).

Project Strategy	Indicator	Baseline Level	Level in 1st PIR (self-reported)	Midter m Target	End- of-project Target	Midterm Level & Assessment	Achievement Rating	Justification for Rating
Objective:	Indicator (if applicable):							
Outcome 1:	Indicator 1:							
	Indicator 2:							

Indicator Assessment Key

Green= Achieved	Yellow= On target to be achieved	Red= Not on target to be achieved

In addition to the progress towards outcomes analysis:

- Compare and analyse the GEF Tracking Tool at the Baseline with the one completed right before the Midterm Review.
- Identify remaining barriers to achieving the project objective in the remainder of the project.
- By reviewing the aspects of the project that have already been successful, identify ways in which the project can further expand these benefits.

iii. Project Implementation and Adaptive Management

Management Arrangements:

- Review overall effectiveness of project management as outlined in the Project Document. Have changes been made and are they effective? Are responsibilities and reporting lines clear? Is decision-making transparent and undertaken in a timely manner? Recommend areas for improvement.
- Review the quality of execution of the Executing Agency/Implementing Partner(s) and recommend areas for improvement.
- Review the quality of support provided by the GEF Partner Agency (UNDP) and recommend areas for improvement.

Work Planning:

- Review any delays in project start-up and implementation, identify the causes and examine if they have been resolved.
- Are work-planning processes results-based? If not, suggest ways to re-orientate work planning to focus on results?
- Examine the use of the project's results framework/ logframe as a management tool and review any changes made to it since project start.

Finance and co-finance:

- Consider the financial management of the project, with specific reference to the cost-effectiveness of interventions.
- Review the changes to fund allocations as a result of budget revisions and assess the appropriateness and relevance of such revisions.
- Does the project have the appropriate financial controls, including reporting and planning, that allow management to make informed decisions regarding the budget and allow for timely flow of funds?

- Informed by the co-financing monitoring table to be filled out, provide commentary on co- financing: is co-financing being used strategically to help the objectives of the project? Is the Project Team meeting with all co-financing partners regularly in order to align financing priorities and annual work plans?

Project-level Monitoring and Evaluation Systems:

- Review the monitoring tools currently being used: Do they provide the necessary information? Do they involve key partners? Are they aligned or mainstreamed with national systems? Do they use existing information? Are they efficient? Are they cost-effective? Are additional tools required? How could they be made more participatory and inclusive?
- Examine the financial management of the project monitoring and evaluation budget. Are sufficient resources being allocated to monitoring and evaluation? Are these resources being allocated effectively?

Stakeholder Engagement:

- Project management: Has the project developed and leveraged the necessary and appropriate partnerships with direct and tangential stakeholders?
- Participation and country-driven processes: Do local and national government stakeholders support the objectives of the project? Do they continue to have an active role in project decision-making that supports efficient and effective project implementation?
- Participation and public awareness: To what extent has stakeholder involvement and public awareness contributed to the progress towards achievement of project objectives?

Reporting:

- Assess how adaptive management changes have been reported by the project management and shared with the Project Board.
- Assess how well the Project Team and partners undertake and fulfil GEF reporting requirements (i.e. how have they addressed poorly-rated PIRs, if applicable?)
- Assess how lessons derived from the adaptive management process have been documented, shared with key partners and internalized by partners.

Communications:

- Review internal project communication with stakeholders: Is communication regular and effective? Are there key stakeholders left out of communication? Are there feedback mechanisms when communication is received? Does this communication with stakeholders contribute to their awareness of project outcomes and activities and investment in the sustainability of project results?
- Review external project communication: Are proper means of communication established or being established to express the project progress and intended impact to the public (is there a web presence, for example? Or did the project implement appropriate outreach and public awareness campaigns?)
- For reporting purposes, write one half-page paragraph that summarizes the project's progress towards results in terms of contribution to sustainable development benefits, as well as global environmental benefits.

iv. Sustainability

- Validate whether the risks identified in the Project Document, Annual Project Review/PIRs and the ATLAS Risk Management Module are the most important and whether the risk ratings applied are appropriate and up to date. If not, explain why.
- In addition, assess the following risks to sustainability:

Financial risks to sustainability:

- What is the likelihood of financial and economic resources not being available once the GEF assistance ends (consider potential resources can be from multiple sources, such as the public and private sectors, income generating activities, and other funding that will be adequate financial resources for sustaining project's outcomes)?

Socio-economic risks to sustainability:

- 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 the project benefits continue to flow? Is there sufficient public / stakeholder awareness in support of

the long term objectives of the project? Are lessons learned being documented by the Project Team on a continual basis and shared/ transferred to appropriate parties who could learn from the project and potentially replicate and/or scale it in the future?

Institutional Framework and Governance risks to sustainability:

- Do the legal frameworks, policies, governance structures and processes pose risks that may jeopardize sustenance of project benefits? While assessing this parameter, also consider if the required systems/ mechanisms for accountability, transparency, and technical knowledge transfer are in place.

Environmental risks to sustainability:

- Are there any environmental risks that may jeopardize sustenance of project outcomes?

Conclusions & Recommendations

The MTR team will include a section of the report setting out the MTR's evidence-based conclusions, in light of the findings. Recommendations should be succinct suggestions for critical intervention that are specific, measurable, achievable, and relevant. A recommendation table should be put in the report's executive summary. See the Guidance For Conducting Midterm Reviews of UNDP-Supported, GEF-Financed Projects for guidance on a recommendation table.

The MTR team should make no more than 15 recommendations total.

Ratings

The MTR team will include its ratings of the project's results and brief descriptions of the associated achievements in a MTR Ratings & Achievement Summary Table in the Executive Summary of the MTR report.

Measure	MTR Rating	Achievement Description
Project Strategy	N/A	
Progress Towards Results	Objective Achievement Rating: (rate 6 pt. scale)	
	Outcome 1 Achievement; Rating: (rate 6 pt. scale)	
	Outcome 2 Achievement; Rating: (rate 6 pt. scale)	
	Outcome 3 Achievement; Rating (rate 6 pt. scale)	
Project Implementation &Adaptive Management	(rate 6 pt. scale)	
Sustainability	(rate 4 pt. scale)	

6. TIMEFRAME

The total duration of the MTR will be approximately twenty-one (21) days over a time period of six(6) weeks starting (01 February 2019), and shall not exceed five months from when the consultant(s) are hired. The tentative MTR timeframe is as follows:

TIMEFRAME	ACTIVITY
22 November 2018	Application closes
Before 10 January 2019	Select MTR Team
15 January 2019	Prep the MTR Team (handover of Project Documents)
2 days (before 25 January 2019)	Document review and preparing MTR Inception Report
2 days	Finalization and Validation of MTR Inception Report- latest start of MTR mission
7 days (between 28 January 2019 and 15 February 2019)	MTR mission: stakeholder meetings, interviews, field visits
Between 10-15 February 2019)	Mission wrap-up meeting & presentation of initial findings- earliest end of MTR mission
7days (27 February 2019)	Preparing draft report
2 days (10 March 2019)	Incorporating audit trail from feedback on draft report/Finalization of MTR report
TBD	Preparation & Issue of Management Response
TBD	Expected date of full MTR completion

Options for site visits should be provided in the Inception Report.

7. MIDTERM REVIEW DELIVERABLES

#	Deliverable	Description	Timing	Responsibilities
1	MTR Inception Report	MTR team clarifies objectives and methods of Midterm Review	No later than 2 weeks before the MTR mission: 15 January 2019	MTR team submits to the Commissioning Unit and project management
2	Presentation	Initial Findings	End of MTR mission: 15 February 2019	MTR Team presents to project management and the Commissioning Unit
3	Draft Final Report	Full report (using guidelines on content outlined in Annex B) with annexes	Within 3 weeks of the MTR mission: 27 February 2019	Sent to the Commissioning Unit, reviewed by RTA, Project Coordinating Unit, GEF OFP
4	Final Report*	Revised report with audit trail detailing how all received comments have (and have not) been addressed in the final MTR report	Within 1 week of receiving UNDP comments on draft: 10 March 2019	Sent to the Commissioning Unit

*The final MTR report must be in English. If applicable, the Commissioning Unit may choose to arrange for a translation of the report into a language more widely shared by national stakeholders.

8. MTR ARRANGEMENTS

The principal responsibility for managing this MTR resides with the Commissioning Unit. The Commissioning Unit for this project's MTR is UNDP South Africa Country Office. The commissioning unit will contract the consultants and ensure the timely provision of per diems and travel arrangements within the country for the MTR team. The Project Team will be responsible for liaising with the MTR team to provide all relevant documents, set up stakeholder interviews, and arrange field visits.

9. TEAM COMPOSITION

A team of two independent consultants will conduct the MTR - one team leader (with experience and exposure to projects and evaluations in other regions globally) and one team expert, usually from the country of the project (South Africa). The consultants cannot have participated in the project preparation, formulation, and/or implementation (including the writing of the Project Document) and should not have a conflict of interest with project's related activities.

The selection of consultants will be aimed at maximizing the overall "team" qualities in the following areas:

- Recent experience with result-based management evaluation methodologies;
- Experience applying SMART indicators and reconstructing or validating baseline scenarios;
- Competence in adaptive management, as applied to UNDP/GEF Projects;
- Experience working with the GEF or GEF-evaluations;
- Experience working in South Africa, and knowledge of the policy landscape;
- Work experience in relevant technical areas for at least 10 years (experience in small-scale wind energy and mini-grids, as well as wind skills capacity building will be an added advantage);
- Demonstrated understanding of issues related to gender and experience in gender sensitive evaluation and analysis;
- Excellent communication skills;
- Demonstrable analytical skills;
- Project evaluation/review experiences within United Nations system will be considered an asset;
- A Master's degree in (Engineering, Energy, Finance, Economics, Physics, Environment or Development Studies), or other closely related field.

ANNEX B. ITINERARY OF THE EVALUATION MISSION

Mission agenda

Wednesday 02 Oct 2019	• Internal discussion MTR Team
Thursday 03 Oct 2019	• Travel Johannesburg – East London (Eastern Cape) • 3rd CSIR meeting at University of Fort Hare (students, social facilitator and local and other stakeholders) involved in UB Mini Grid)
Friday 04 Oct 2019	• Visit Upper Blinkwater (UB) Minigrid, Eastern Cape • Travel East London – Johannesburg
Sat-Sun 05-06 Oct	• Reporting
Mon 07 Oct	• WASA 3, third PIU Meeting at SANEDI (Johannesburg) • Travel Johannesburg – Cape Town
Tue – Wed 08-09 Oct	• Windaba Conference and Exhibition (Cape Town) • Visit SARETEC
Thu 10 Oct	• Travel to Upington (Northern Cape) • Visit Wind Mast 19 (WM 19), near Upington • Travel to Olifantshoek
Fri 11 Oct	• Visit WM 18 (near Kuruman) • Travel back to Johannesburg
Sat 12 Oct	• Reporting
Mon 14 Oct	• SAWEP II, sixth PSC meeting (at DMRE, Pretoria) • Meeting with PSC members (including DMRE); presentation and discussion of preliminary MTR findings

List of stakeholders

Project Steering Committee	
DoE (Energy *now* Mineral Resources and Energy, DMRE) (Chair PSC)	Mokgadi Modise, Mokgadi.Modise@energy.gov.za Noma Qase, Noma.Qase@energy.gov.za (Director, Renewable Energy Initiatives) Siyabonga Zondi, Siyabonga.Zondi@energy.gov.za (PM, Renewable Energy Initiatives, Member of SAWEP PCU)
DST (Department of Science and Technology)	Rebecca Maserumule, Rebecca.Maserumule@dst.gov.za Tumi Mailula, Tumi.Mailula@dst.gov.za Somila Xosa, Somila.Xosa@dst.gov.za
DHET (Department of Higher Education and Training)	Brenda Swart, Swart.B@dhet.gov.za
DEA (Environmental Affairs, *now* Department of Environment, Forestry and Fisheries)	Dea Fischer, DFischer@environment.gov.za Olga Chauke, OChauke@environment.gov.za
SANEDI	David Mahuma; davidm@sanedi.org.za Andre Otto, PM, andreo@sanedi.org.za (member of PCU)
UNDP	Janice Golding; janice.golding@undp.org
Stakeholders; service providers	
Output 1.1	Lolette Kritzinger-van Niekerk, lolette.vanniekerk@ipp-projects.co.za. (DoE-IPP Office; Jackie Crafford, j.crafford@primeafrica.net
Output 2.1	CSIR (Council for Scientific and Industrial Research), Greg Landwehr, glandwehr@csir.co.za DTU Wind Energy (Technical University of Denmark), Jens Carsten Hansen, jcha@dtu.dk Embassy of Denmark, Jørgen Erik Larsen (Counsellor) joelar@um.dk , Maleepile Felicity Moseki, malmos@um.dk SAWS (South African Weather Service) Andries Kruger, Andries.Kruger@weathersa.co.za UCT (University of Cape Town), Chris Lennard, lennard@csag.uct.ac.za
Output 3.1	Carsten Laugesen, carsten@hlaugesen.com
Output 3.2.1	Alistair McMaster, Alistair.McMaster@dedea.gov.za Sander Maebe, sander.maebe@giz.de
Output 3.2.2	Qaphela Mpotulo, qmpotulo@chrishanidm.gov.za Luvuyo Nkwentsha, luvuyo.nkwentsha@ecdpw.gov.za Donavan Fullard, Donavan.Fullard@wessa.co.za Buffalo City Metro, RobF@buffalocity.gov.za East London IDZ, Chris Ettmayr, Chris@elidz.co.za
Output 3.3	Thomas Garner, tommy@thomasgarner.africa
Output 4.1	Sean Gibson, sean@altgen.co.za
Output 4.2.1	Naim Rassool, RASSOOLN@cput.ac.za
Output 4.3.1	Yolanda Adams, yolanda@windaba.co.za Ntombifuthi Ntuli (CEO SAWEA), ntombifuthi@sawea.co.za
Comm, Event Service Provider	Teresa Jenkins, teresa@lithacommunications.co.za Lynette Alexander, lynette@lithacommunications.co.za

ANNEX C. LIST OF DOCUMENTS COLLECTED AND REVIEWED

The following project reports/documents have been acquired before the mission:

- SAWEP II Inception Report (2016)
- SAWEP II UNDP Project Document; GEF CEO ER document
- GEF Tracking Tool (in Excel)

- Technical reports and products
  - Assessment and Analysis of the Impact of the Renewable Energy Independent Power Producer Procurement (RE IPPP) Programme on the South African Economic Development (Final report, Prime Africa; 2018)
  - Status & Specification on Small-Scale Wind Energy Pilot Project (Innovate Energy, 2018)

The following project reports should be made available during the mission:

- Overview of GEF budget expenditures (ATLAS) and realized co-financing;
- PIR (Project Implementation Review), 2017, 2018, 2019 (if available)
- Project National Steering Committee (NSC), Minutes of meeting
- Other materials produced by the projects, such as training manuals, information brochures, promotional videos and selected technical reports, not mentioned above

Although not a product of project activities, the following documents have been consulted in support of the review:

- Capacity Credit of Wind Generation in South Africa (GIZ/DoE/Eskom; DlgSilent GmbH, 2011)
- Co-Benefits in South Africa (CSIR-Energy Centre)
  - Consumer savings through solar PV self-consumption in South Africa
  - Improving health and reducing costs through renewable energy in South Africa
  - Future skills and job creation through renewable energy in South Africa
  - Economic prosperity for marginalised communities through renewable energy in South Africa
- Commercial Feasibility Study of a Small-Scale Wind Turbine Manufacturing in South Africa (thesis, V. Yazdani, 2015)
- Decentralised Generation Study (SAWEA; Africa Power Ventures, 2019)
- Domain Protocol for the South African Voluntary Tradable Renewable Energy Certificates Market (SAWEP, 2010)
- Electricity generated and available for distribution (Preliminary) (STATS SA, 2017)
- Factsheets wind energy (on www.energy.gov.za)
- Final Energy Report South Africa (RVO-Netherlands Enterprise Agency, 2018)
- Integrated Energy Plan (DoE; 2016)
- Integrated Resource Plan for Electricity 2010-2030 (DoE, 2011) and IRP Update (Oct 2019)
- How well are South African wind farms performing? (Lloyd's Register, 2018)
- SADC Renewable Energy and Energy Efficiency Status Report 2018 (SACREEE/REN21/UNIDO)
- South Africa's Low Emission Development Strategy 2050 (DEA, 2018)
- South Africa's Utility-scale Wind and RE Industry (factsheet March 2019; SAWEA)
- State of Renewable Energy in South Africa (DoE, 2017)
- The South African Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) – Lessons Learned (PowerPoint, IRENA, 2016)
- The South African Renewable Energy IPP Procurement Programme (Eberhard, A. and Naude, R.; 2017)
- Wind Energy (factsheet; SAWEA, 2017)

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
3. Findings: Relevance and design	Relevance: • Are project outcomes contributing to national development priorities and plans in accordance with the national local policy legal and regulatory frameworks (country priorities)? Does the project adequately take into account the national realities, both in terms of institutional and policy frameworks in its design and implementation? 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 Malaysia • Is the Project addressing the needs of the target beneficiaries? Relevance of the project's objectives, outcomes and outputs to the different target groups of the interventions. • Are lessons from other relevant projects properly incorporated in the project design? Are the partnership arrangements properly identified and the roles and responsibilities negotiated prior to project approval? • Are relevant gender issues raised in the project design? If there are major areas of concern, recommend areas for improvement. <u>Indicators</u>: • Extent to which Project supports national energy priorities, policies, and strategies; Adequacy of project design and implementation to national realities and existing capacities • Extent to GEF climate change focal area is incorporated • Degree to which the project supports aspirations and/or expectations of stakeholders (see Annex D) and beneficiaries (incl. females) Design and results framework • Is 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? Have lessons from other projects been taken into account? • Was the project was formulated based on the logical framework (project	• Desk review of project design and technical documents; Documents from GEF; national policies and strategies; • Interviews with project staff management, project partners (incl. former staff), stakeholders (local and national government entities, private sector, universities/NGOs) and UNDP staff	• Interviews with project partners (Annex B) o Project manager o DoE o SANEDI o SARETEC • Document and report analysis (Annex C) o National policy documents o Project Document (ProDoc) o Project progress reports o MTR briefing (PowerPoints) o Newspaper articles

	results framework) approach with verifiable indicators? 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 (SMART indicators)		
4. Findings: Results and effectiveness	Results and effectiveness • To what extent have the expected outcomes and of the project been achieved? • What outputs 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)? • Were there any unplanned effects? Which external factors have contributed to 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? Are there any unaddressed barriers? Indicators: • Level of achievement (as laid out in the logframe) • Achievement of outputs (qualitative, quantitative) and description of activities • Evidence of adaptive management and/or early application of lessons learned	• Desk review of project design and technical documents and other relevant documents • Interviews with project staff management, project partners (incl. former staff), stakeholders (local and national government entities, private sector, universities/NGOs) and UNDP staff • Interviews with project experts (national and international)	• Interviews with project partners and stakeholders: o UNDP, DoE o Project team o All the stakeholders met and interviewed (see the list in Annex B) • Document and report analysis (Annex C) o Project Document o Progress reports and MTR briefings by Project team o Technical reports and PowerPoints (see Annex C) • Check with publicly available information o Newspapers articles (referred to in footnotes in the main text)
5. Findings: Implementation, processes	Management arrangements and adaptive management • 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? Describe adaptive management practices • 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?	• 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 staff management, project partners (incl. former staff), stakeholders (local and national government entities, private sector, universities/NGOs) and	• Interviews with project partners and stakeholders: o Project team o UNDP, DoE • Report analysis (Annex C) o Project progress reports, o Excel sheet with overview of budget, expenditures and co-financing

	Indicators • Extent to which project partners committed time and resources to the project • Extent of commitment of partners to take over project activities • Evidence of clear roles and responsibilities for operational and management structure Assessment of M&E system • M&E design. Does the project have an effective M&E plan to monitor results and track progress towards achieving project objectives? • 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? • 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. • Were progress reports produced accurately and timely, and did they respond to reporting requirements including adaptive management changes? • Did UNDP and Project staff identify problems in a timely fashion and advice to the project, approve modifications in time, and restructure the project when needed? Did UNDP provide the right staffing levels, continuity, skill mix, and frequency of field visits for the project? Indicators • Mid-tern targets in logframe; M&E work plan • Actual use of the M&E system to change or improve decision-making/adaptive management • Share of M&E in the budget • Quality and quantity of progress reports Stakeholder involvement • To what extent were partnerships/linkages between institutions/ organizations/private sector encouraged and supported? • Which partnerships/linkages were facilitated? Which ones can be considered sustainable? What was the level of efficiency of cooperation and collaboration arrangements? Indicators • Extent to which project partners committed time and resources to the project • Extent of commitment of partners to take over project activities	UNDP staff • Interviews with project experts (national and international)	

	Financial planning and procurement • 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? Specifically, the evaluation will also include a breakdown of final actual project costs by activities compared to budget (variances), financial management (including disbursement issues) • 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, and, if so, in what ways and through what causal linkages? • Have funds been available and transferred efficiently (from donor to project to contractors) to address the project purpose, outputs, and planned activities? <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; • Timely delivery of funds, mitigation of bottlenecks. • Level of satisfaction of partners and beneficiaries in the use of funds Efficiency and cost-effectiveness • Has the project produced results (outputs and outcomes) within the expected time frame? Was start and 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? • Have the inputs from the donor, UNDP and Government/counterpart been provided as planned, and were they adequate to meet requirements? Was the quality of inputs and services as planned and timely? <u>Indicators:</u> • Extent to which results have been achieved (compared with logframe and workplans) • Planned vs. actual budget and co-finance realization • Percentage of budget for management and operations (vs. other activities);		
6. Findings: sustainability	Sustainability • How likely will the Project outcomes be sustained and beyond Project termination? What are risks to sustainability? • Financial risks. Are there any financial risks that may jeopardize the sustainability of project outcomes? What is the likelihood of financial and	• Desk review of project design and technical documents (incl, PIRs; other relevant docs) • Interviews with project	• Interviews with project partners and stakeholders: o Project team o UNDP, SEDA, DoE

	economic resources not being available once GEF assistance ends? • Social and environmental risks. 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? Is there sufficient public/stakeholder awareness in support of the project's long-term objectives? Are there any environmental risks that may jeopardize sustainability of project outcomes? • 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? Are requisite systems for accountability and transparency, and required technical know-how, in place? Have partners and stakeholders successfully enhanced their capacities and do they have the required resources to make use of these capacities? <u>Indicators:</u> • Extent to which risks and assumptions are adequate and are reflected in the project documentation • 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 • Extent to which partners and stakeholders are applying new ideas outside of the immediate project context	staff management, project partners (incl. former staff), stakeholders (local and national government entities, private sector, universities/NGOs) and UNDP staff	• Report analysis (Annex C) o Project progress reports, Project Document, MTR briefings
7. Conclusions and 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), including a summary of ratings • What lessons can be learnt from the project regarding efficiency • 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 <u>Indicators:</u> • Perceptions of or actual levels of relative effectiveness and/or efficiency of the project cf. with other projects; Perceptions of partners, and other stakeholders as to tangible development results from activities • Lessons that have been learned regarding the achievement of outcomes and efficiency (implementation) • Changes could have been made (if any) to the design to improve the achievement of the results	• 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 (see the list in Annex C) and analysis thereof • Document and report analysis (as above)

ANNEX E. CONSULTANT CODE OF CONDUCT FORM

Evaluators/reviewers:

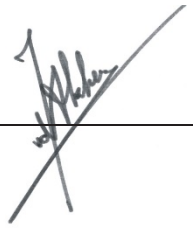
1. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded
2. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation 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 F. ABOUT THE REVIEWERS

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, GFA) 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 36 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.

Dr. Karen Eatwell

Dr. Karen Eatwell, is an environmental scientist – resource economics at Prime Africa Consultants, a consulting firm based in Pretoria South Africa. Karen joined Prime Africa in late September 2018. She holds a PhD in Quantitative Genetics from the University of Pretoria and Computer Science Diploma–from the Computer Training Institute Pty (Ltd) in Pretoria. Karen started her career in 2001 at the CSIR, the largest research organisation in Africa. She worked in the Natural Resources and the Environment unit as a research scientist. Karen was involved mainly in projects in the forestry, energy and water sectors and the impacts of climate change within these sectors. Her experience and skills include data collection, management and analysis, strategy development and project management of large complex and multi-year projects. She has experience in working in assignments for UN organisations (e.g. climate-relevant assignments for UNEP and UNFCCC. She has more than 16 years of local and international experience working with governments, corporations, educational institutions, and NGOs.)

ANNEX G. AUDIT TRAIL

The comments received on the draft report (dated Nov 2019) of the Mid-term Review are attached in a separate file