

UNDP-GEF Management Response to the Terminal Evaluation of GOS-UNDP-GEF Project “Grid-Connected Rooftop Photovoltaic Systems”, Seychelles (*PV Project*)¹

Project Title: Grid-Connected Rooftop Photovoltaic Systems, Seychelles

UNDP Project ID (PIMS) #: 4331

GEF Project ID (PMIS) #: 4164

Terminal Evaluation Mission Completion Date: October 2016

Date of Issue of Management Response: December 2016

Prepared by: *UNDP Seychelles*

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Cleared by: UNDP Resident Representative Simon Springrett; UNDP GEF RTA Rob Kelly.

PROJECT SUMMARY TABLE

PROJECT TITLE	Grid-Connected Rooftop Photovoltaic Systems, Seychelles
Prodoc Signature Date:	April 2012
Planned Closing Date:	30 th April 2016
Revised Closing Date:	31 st December 2016

GEF Project ID:	4164	Finance	<i>at endorsement (Million US\$)</i>
UNDP Project ID:	00081971	GEF financing:	\$1.16
Country:	Seychelles	IA/EA own:	\$0.035
Region:	Africa	Government:	\$1.22
Focal Area:	CC Mitigation	NGOs/Other:	\$4.91
FA Objectives, (OP/SP):		Total co-financing:	\$6.13
Executing Agency:	MEECC	Total Project Cost:	\$7.29

¹ This template is in alignment with the [Management Response Template](#) for UNDP project-level evaluations in the Evaluation Resource Centre.

1. Context, background and findings

At the time of project preparation, Seychelles was approximately 90% dependent on imported oil to meet its energy needs, including electricity production. The objective of the project was to increase the use of grid-connected photovoltaic (PV) systems as a sustainable means of generating electricity in selected main islands and smaller islands of the Seychelles, with a focus on small-scale producers who are already connected to the national electricity grid. The project aimed to revise the legal, regulatory and policy framework to better support the adoption of renewable energy technologies, and grid-connected PV systems, in particular; to design and implement financial mechanisms to make the purchase and installation of solar PV systems more attractive to the private sector; to establish the first market supply chain for solar PV systems in the country; to provide training to establish local capacity for the installation and maintenance of PV systems; and to demonstrate for the first time in the Seychelles the viability and practicality of grid-connected PV systems through demonstration PV systems. Together, these actions were designed to play a critical role in “jump-starting” the adoption of solar PV technology in the Seychelles, and in setting the stage for broad-scale replication by reducing the costs of PV technology through a market-based approach that would establish financial incentive mechanisms for PV systems and reduce transaction costs (by creating a reliable supply chain and establishing local capacity for installation and maintenance). In this way, the project was designed to transform an energy sector that was almost 100% dependent on imported fossil fuels into one where solar PV and other RETs were beginning to provide a significant percentage of national energy production.

The Terminal Evaluation has found that the PV project has surpassed its objective and outcomes targets. As such, a Highly Satisfactory rating has been awarded to the project.

The overview of project objective and outcomes (Table 4 on the TE report) has given a Highly Satisfactory rating in regard to the achievement of all 13 indicators, which UNDP regards as a remarkable project achievement. To refer to the objective indicators specifically, 181 new PV systems have been installed with a combined installed capacity of 1.79 MW (137% of project target) resulting in 2,499 tonnes of CO₂eq emission reductions (162% of project target) and 3,485,130 kWh of electricity generated (205% of project target).

As per its intent, the project has served as a catalyst for PV development and transformation of the electricity market in Seychelles. However, UNDP acknowledges and agrees with the conclusion of the TE consultant that many external factors have also contributed to project success, and particularly that much credit in achieving and surpassing the targets is due to the efforts of other stakeholders (outside of the immediate project) that significantly facilitated PV development. To reiterate these (from the TE report):

1. Timing is critical and this PV project had perfect timing. Should the PV project have been implemented a few years earlier or later, the project impact would have been less marked. The renewable energy policy target had already been adopted before the project launch, work on legislation updates had started, there were few off-grid and three small on-grid PV installations, and the first PV suppliers were in place at the project start, and PV technology costs have already decreased significantly.
2. The 2010 national energy policy target to cover 15% of energy demand by 2030 with renewables [now changed to 100% by 2035] was a key driver for PV and renewable energy development in Seychelles. The Government of Seychelles, all state agencies and other parties work hard towards achieving this target. The renewable energy policy target, in a Seychelles context, is not just a political declaration, as it may be in some other countries, but it is a real life “hard fact” target that all stakeholders integrate seriously into their daily agenda and operation.
3. High fuel-oil based electricity tariffs, high also in international comparison, combined with the net-metering scheme created a real business opportunity with a short payback and a strong market incentive for PV installations – at least for high tariff customers.

4. SEC initiated, and is developing jointly with PUC, two PV farms with capacities of 4 MW and 5 MW. The 4 MW lagoon PV is to be based on an IPP model, the 5 MW PV farm of Ile Romainville is to be owned and operated by the PUC. A 6 MW wind power farm, financed with an ADFD grant to the GOS and implemented by MASDAR with the support of SEC and PUC, is owned and operated by PUC. This has contributed significantly to the evidence of sustainability and uptake of project results.

5. The GOS and a number of other international donors work in parallel with the UNDP-GEF project and support PV/RE development in Seychelles: new financial soft credit schemes have been implemented, legislation and regulatory bylaws are under development, additional PV dissemination programs targeting low-income households and schools are under development and/or have been partly developed and implemented, 100% renewable energy plans for selected islands are under consideration.

Despite the overall success of the project, the TE report does draw attention to some issues affecting project implementation, particularly the fact that, in reference to the project document, the project was implemented in a different way than originally planned. This is considered by UNDP as adaptive management to adjust to the fact that the envisaged PV market uptake in Seychelles occurred much faster than expected – in particular, there was no particular need for the project to invest in specific demonstrations (except for a single demo aimed at monitoring performance of different panel types). The market took off on its own, and every contribution of the project in supporting an individual installation (through the rebate scheme that was implemented from early on in the project lifetime) in effect acted as a demonstration for others. UNDP considered – as does the RE consultant - that this was acceptable adaptive management that in fact accelerated the progress of the project towards its targets.

The TE consultant has drawn attention to some areas where the project has not delivered as it should (although these activity-level outputs may not have impacted on overall achievements). These are agreed by UNDP and are addressed in the management response below. The two key issues raised by the TE consultant were a) lack of development of a solar irradiation map, and b) poor progress in some areas of national legislation that was envisaged as developing in parallel to the project, particularly in regard to net metering. In regard to the first point, UNDP notes that the project has now completed a solar irradiation map through a surrogate process – a national performance assessment of installed PV systems – and that solar irradiation data are being followed up more systematically by new initiatives that have been developed with project support. In regard to the second point, the process of enacting legislation is outside of the project control and UNDP feels that the project has done what it can to assist the responsible agencies (MEECC, SEC and PUC) in providing the required information and drafting legislation – but the bottom line, pointed out by the TE consultant, is that even if the existing net-metering scheme is not formalized in legislation, there are still sufficient incentives and guarantees for PV investors: the TE consultant did not find any complaints from potential investors that the lack of specific legislation creates additional risk.

Finally, UNDP agrees with the TE consultant that the project has had an important catalytic effect, and provided important support to MEECC, SEC and PUC in identifying and developing the next generation of PV projects as Seychelles moves into major climate financing initiatives and the adoption of an agenda for achievement of 100% renewable energy by 2035, well ahead of the UNFCCC target date.

2. Lessons Learned

<p>Terminal Evaluation Lessons Learnt 1. Proper project timing, and strong and effective country ownership and commitment are key prerequisites for successful project implementation. The PV project matched with this time-window opportunity when the project was launched after Seychelles had adopted RE policy and targets already, but practically no PV installations were in place yet. The timing of the project can serve as the best-case example, maximizing impact against investment.</p>

<p>Management response: The project indeed benefited from the onset from the huge appetite from the private sector to venture into the PV business, in effect the enabling environment for uptake of</p>

PV was already developing on its own and the project only had to support it, not create it. The demand for the technology was increasing, in particular in the commercial sector and high consuming residential sector, due to high electricity tariffs. It could be said that the project was to some extent redundant, in that the PV market was expanding on its own, but the project had an important role in steering the process, information dissemination, making sure that financing was available such that a range of consumers could benefit rather than just the richer ones, and helping to ensure sustainability and upscaling. The lesson learnt is that it is highly beneficial to time a project to kick in at a time of rising market interest – but also that flexibility is important for a project to adjust so as to maximize its impact as the market evolves.

Terminal Evaluation Lessons Learnt 2. High electricity tariffs combined with provisions allowing feed in of the generated power into the grid and affordable terms of financing create a strong market incentive for investors and do not require significant additional subsidies. However, PV requires 100% back-up, it does not offset utility infrastructure costs, and thus remaining electricity tariffs need to finance all utility infrastructure costs in case of a monopolistic market (or transmission/distribution costs only in case of a competitive market). PV technology makes the best economic sense in case of high marginal variable utility generation costs, i.e. high fuel costs, especially in the short/mid-term. The subsidy needed to cover the difference between avoided fuel marginal costs and PV generation costs in Seychelles can be financed either by tax payers from public budgets, or by electricity customers through utility electricity tariffs. The net-metering scheme in Seychelles with heavily cross-subsidized electricity tariffs provides a very strong incentive for high-tariff consumers to install PV at the cost of PUC/other customers, and at the same time there is no financial motivation to invest in PV for low-tariff customers.

Management response: While it is evident that those benefitting most from installing PV are the wealthy, high consuming households, the rebate scheme has allowed mid-consuming households also to invest. The current approval system does not allow for investment beyond household needs, with a view to becoming independent producers selling power to the grid, but this could change in the future as part of legislative reform. There is currently a plan to review the net-metering programme, since it does not provide a fair mechanism to all, and various Government schemes are in place or under development to promote uptake by poorer households.

Concerning the differential between avoided fuel marginal costs and PV generation costs, there is a Government intent to develop new financial mechanisms, such as a carbon tax, that would be used to offset the higher costs of power generated from PV and encourage IPP investment.

The lesson learnt is that there is a need to ensure PV investment is democratized, reaches all levels of society, and that mechanisms are developed to provide the financial subsidies needed to allow access by the poor to the benefits of renewable energy, and to offset perverse differentials that inhibit the uptake of PV as a commercial proposition. Seychelles is already aware of and implementing such an agenda.

Terminal Evaluation Lessons Learnt 3. Technical integration of PV into the PUC infrastructure is a more complex task than envisaged and budgeted for in the project document. Integration of PV technology impacts utilities' capacity to control frequency and voltage in their grids. Capacity to control frequency in the grid within required limits requires sufficient fast (spinning) capacity at the utility power plant. PV generation depends on actual solar irradiation that can change quickly with clouds, and thus increases demand for frequency control capacity. The higher the PV market penetration, the greater the need for frequency control capacity. Within the scope of the PV project,

with 1.79 MWp of PV installed so far, the frequency control is manageable with existing PUC technologies. However, problems with voltage controls in low-voltage networks may arise and should be addressed even with low PV penetration rate – especially in cases when a utility has difficulties with maintaining proper voltage in low-voltage networks. In such cases, projects designed to expand PV should be followed-up with an additional support on grid stability, as it is the case in Seychelles, which integrated grid strengthening into their first application for Green Climate Fund support.

Management response: This is correctly identified as a major constraint in upscaling PV in Seychelles, and this is recognized in the roadmap for 100% renewables currently being developed. There are a number of projects in the pipeline aiming specifically to address this constraint: PUC is already embarking on a grid upgrade and other initiatives to prepare for the development of two solar farms that will together inject a further 9 MW of renewable energy into the grid. A GCF proposal being prepared by UNDP in support of MEECC is specifically addressing issues of grid stability and needs for interim battery storage as these farms come online. A team from GreenWerks, Germany, has assisted MEECC and UNDP as co-applicants to the NAMA Facility for a grant which for most of 2017 will focus on feasibility studies for increasing grid resilience and improving energy storage capacity. The Institute of Environmental Analytics (IEA), in partnership with MEECC and UNDP, is implementing a proof-of-concept project focusing on Seychelles that will identify the requirements for variability modeling using historic and current EO and ground data to estimate the potential variation in RE output on a seasonal or time-specific period, taking account of environmental conditions (e.g. wind speeds, cloud cover, solar insolation). The lesson learnt is that indeed, as pointed out by the TE consultant, there are many technical issues associated with adoption of large-scale renewable energy within a grid and power utility that is not built for it – and these have to be considered as part of a renewables agenda. Seychelles is in the process of establishing itself as a demonstration country, perhaps an example of best practice, as to how a SIDS can switch to renewable energy.

3. Recommendations and management response

Terminal Evaluation recommendation 1. Recommendation to MEECC and SEC

The PV Rebate scheme is eligible also for PV installations already in operation, there is no time limit, until when investors shall apply for the rebate. The terms of the PV rebate scheme should be adjusted to support new PV installations only. The ex-post support during PV operation should not be eligible, because in such case the direct impact on new PV installation is minimal. The PV rebate scheme should also be adjusted in the future to the actual terms of updated net-metering scheme, or its replacement, and target primarily investors that might have difficult access to debt financing, such as low/mid-income investors. If the new support scheme to replace net-metering scheme would prove to be attractive enough, the demand would be low, and the PV rebate funds would remain unused, an exit strategy should be developed, that might include extension of the PV rebate scheme also to other RE/EE technologies, or incorporation of the remaining funds under the PV rebate scheme with the new PV support scheme.

Management response: The PV rebate scheme is reviewed on an annual basis by the SEC and the next review is scheduled for April 2017. Feedback from the terminal evaluation is noted and will be taken into account during this review, as will suggestions from PV suppliers and PV owners. On

close of project the rebate scheme remains under the management of SEC and DBS.				
Key action(s)	Time frame	Responsible unit(s)	Tracking ²	
			Comments	Status ³
1.1 Review of PV rebate scheme	April 2017	SEC		
1.2 Decision regarding remaining fund, whether to continue with rebate or use fund for other financial mechanism	Q1 2017	SEC		
1.3 Discuss eligibility of rebate mechanism (include other sectors apart from residential and commercial)	Q1 2017	SEC		

Terminal Evaluation recommendation 2. Recommendation to UNDP (replication project developers and sponsors)

When developing similar PV/RE projects in other countries, the timing and actual local development context, including effectiveness of country ownership, level of electricity tariffs, financial capacity of local utility/government to subsidize PV schemes, as well as financial capacity of local investors/households to invest, and other factors are decisive and should be properly taken into account, and the project design adjusted accordingly. Although this is a well-recognized fact, it cannot be overstated. A mere replication of a successful project in a different local context will not automatically generate the same results.

Management response: The recommendation is addressed to the wider UNDP community. The recommendation will be considered by the RTA and colleagues as part of the project development mechanism. UNDP is currently in process of developing a series of pipeline projects for climate financing in which this recommendation may be considered, notably the SIDS-STEP project for technical advice to a series of global GCF projects.

Key action(s)	Time frame	Responsible unit(s)	Tracking	
			Comments	Status
None				

Terminal Evaluation recommendation 3. Recommendation to UNDP (replication project

² If the TE is uploaded to the ERC, the status of implementation is tracked electronically in the Evaluation Resource Centre database (ERC).

³ Status of Implementation: Completed, Partially Completed, Pending.

developers and sponsors)

PV/RE development projects should not focus only on strengthening PV/RE supply chain, and on development of a RE legislation supporting financial integration of the PV/RE into the local electricity market, but they need to address also effective technical integration of RE into power utility infrastructure. The technical integration becomes more important especially with higher RE power generation targets, and in case when utility infrastructure has not been fully modernized to current standards yet. The technical integration of RE is a bigger challenge primarily for smaller utilities that do not have sufficient financial and technical capacity to upgrade their infrastructure. Further technical and financial assistance to PUC is needed to improve PV absorption capacity both on a central power generation site (sufficient fast/spinning frequency control capacity), and especially in low-voltage distribution networks (voltage control within a standard voltage interval).

Management response: The recommendation could equally be applied to MEECC which is the lead Ministry for the development of climate finance projects, and overall responsible for management of PUC and delivery of the 100% renewables agenda.

MEECC is aware of the issues pointed out by the TE consultant, and PUC is in fact already working towards grid upgrade and introduction of battery storage to cope with the influx of renewable energy into the grid. Addressing these issues also forms a key element of Seychelles' first GCF proposal which is expected to be submitted in early 2017. A NAMA Facility proposal developed in 2016 by MEECC, with UNDP as co-applicant, also aims to support the process of enabling the grid, and PUC, for the switch to renewables.

Key action(s)	Time frame	Responsible unit(s)	Tracking	
			Comments	Status
3.1 NAMA Facility proposal to include provision for further technical and financial assistance to PUC as indicated above.	Done. (Awaiting notice of approval; if non-approval the required elements will be transferred to a request for GCF Readiness funding.)	MEECC, UNDP		
3.2 GCF proposal to include elements as recommended	January 2017 (first draft); February 2017 (second draft for submission)	MEECC, UNDP		

Terminal Evaluation recommendation 4. Recommendation to GOS (MEECC)

There is a continuous need for PV/RE related training and capacity strengthening at all levels, including government, utility, and PV installers since PV/RE is a new and fast growing branch. GOS should integrate targeted RE trainings and capacity strengthening activities into their other RE related projects and facilitate training integration also with other donors/projects.

Management response: The recommendation could equally be applied to UNDP, which continues

to supporting MEECC in capacity building initiatives related to CCM and climate finance project.

The project, prior to termination, is paying for one staff member of SEC (Principal Officer for Engineering and Technical Affairs) to take an online course “Certificate in competence in photovoltaic power”. This course covers the two Engineering Recommendations EREC G83 and G59 which SEC, PUC and the Grid Code Committee are considering adopting for Seychelles.

The project, with leverage funding from the Environmental Trust Fund (ETF), has purchased equipment for the Seychelles Institute of Technology (SIT) to support a PV training courses they are developing. A formal handover ceremony is being planned in January 2017 and SIT have agreed to conduct a certification course for PV installers. Additionally, PUC have agreed to assist SIT in sourcing instructors and will pay for a Training of Trainers course in early 2017

SIT and SEC have finalized an MoU under the GOS-UNDP-GEF RE project for strengthening of existing relationship between SIT and SEC and for the establishment a framework for communication, cooperation and coordination, with the aim to put in place a training platform to support the deployment of Renewable Energy and Resource Efficient Technologies. A signing ceremony is being planned for January 2017.

Substantial capacity building measures are included within NAMA Facility proposal submitted in 2016, and complementary capacity building, particularly for PUC, is included within the GCF proposal to be submitted in early 2017.

Key action(s)	Time frame	Responsible unit(s)	Tracking	
			Comments	Status
4.1 SEC staff member completes “certificate in competence in photovoltaic power”.	March 2017	SEC		
4.2 Equipment handover to SIT and signing of MOU between SIT and PUC for training support	March 2017	SEC, SIT, PUC		
4.3 SIT to conduct certification course for PV installers	March 2017	SIT, SEC, PUC		
4.4 SIT to incorporate PV in all SIT modules	June 2018	SIT, SEC, PUC		
4.5 Initiation of capacity building under NAMA Facility and GCF proposals, if/when approved	2018	MEECC, UNDP, PUC, SEC		

Terminal Evaluation recommendation 5. Recommendation addressed to SEC, UNDP

(MEECC, PUC)

Information developed by the PV project and published on the project web site should remain online even after the PV project termination, either at the UNDP sponsored sites (PCU) or governmental and partners' web sites, such as MEECC, SEC and/or PUC web site. Potential PV investors might benefit also from simple but real-life examples of financial performance of PV installation and actual cash flow.

Management response: The domain name of the PV project website (www.pvproject.sc) was renewed in July 2016 and it will be valid for the next 2 years. The project, prior to termination, has also made an upfront payment to Maven for a website support contract of 12 months, with SEC agreeing to pay for any additional expenses that may arise during 2017. The website content will be updated by the data manager at SEC in conjunction with their own website (www.sec.sc). By the end of 2017, SEC and UNDP will decide if the website will be incorporated under one of the upcoming climate finance projects (i.e. NAMA Facility or GCF, or another) or continue to remain under SEC.

Key action(s)	Time frame	Responsible unit(s)	Tracking	
			Comments	Status
5.1 Continue with current administration of PV website (paid-up)	Until December 2017	SEC		
5.2 Migrate the website to SEC website or determine another means of continuing	By December 2017	SEC		

Terminal Evaluation recommendation 6. Recommendation to UNDP (replication project developers)

Log-frame indicators and targets should be defined for project objective, outcomes and outputs, not only formally, but de facto as well. Too detailed specification of project output indicators, which in fact refer rather to activity level indicators, is not suitable for monitoring of overall project results. More detailed project activity level indicators are defined in annual and quarterly work plans and monitored by project manager as a standard routine of a daily project management, as well as in quarterly and annual project reports.

Management response: This recommendation relates to the design of project log frames and is duly noted by UNDP. UNDP agrees that overly complex and detailed specification of output indicators need not be applied, and indeed this project has indicated the value of flexibility, or adaptive management, to respond to a rapidly evolving project environment. This recommendation is also coming out of other GEF Evaluations and will be taken into consideration for future project development.

Key action(s)	Time frame	Responsible unit(s)	Tracking	
			Comments	Status
No immediate key actions				

Terminal Evaluation recommendation 7. Recommendation to GOS (SEC, MEECC), UNDP (replication project developers)

When designing the legally formalized PV/RE support scheme with remuneration for PV power purchase based on a combination of avoided fuel costs and a premium, the total amount of funding needed to finance the premium should be estimated as well as the financing sources identified and funding secured.

Management response: Both the GCF and NAMA Facility proposals aim to work in close collaboration with SEC, PUC and MFTBE to conduct feasibility studies and develop policies and relevant legal frameworks for legally binding remuneration schemes that take into account avoided fuel costs and a premium, while ensuring the sustainability of PUC. As part of the GCF proposal, a full economic analysis is being undertaken to this end. Financial incentives, including means of ironing out fluctuations in fuel cost, will need to continue to form a part of PV projects (and of IPP agreements) as Government tries to achieve 100% renewables by 2035.

Key action(s)	Time frame	Responsible unit(s)	Tracking	
			Comments	Status
7.1 Economic analysis for PV investment and a future tariff structure completed as part of the GCF proposal	January 2017	UNDP, PUC, SEC		
7.2 Drafting of pilot power purchase agreement (in connection with lagoon solar farm tendering process)	June 2017	SEC, MEECC		

Approved by Mr Simon Springett, UNDP Resident Representative

Signature



Date

23/12/16

ANNEX: TERMINAL EVALUATION RATINGS

Elements evaluated	Rating
A. Attainment of project objectives and results	
Effectiveness	HS
Relevance	R
Efficiency	HS
Impacts	HS
B. Sustainability of project outcomes	
Financial	ML
Socio-political	L
Institutional framework and governance	L
Environmental	L
C. Achievement of outputs and activities	S
D. Monitoring and evaluation	HS
M&E design	HS
M&E plan implementation	S
Budgeting and funding for M&E activities	HS
E. Catalytic role	S
F. Preparation and readiness	HS
G. Country ownership	HS
H. Stakeholder involvement	HS
I. Financial planning	HS
J. Implementation approach	HS
K. UNDP/GEF Supervision and backstopping	HS

