

Independent Terminal Evaluation

UNIDO - Global Sustainable Energy Islands Initiative (GSEII)

**UE/GLO/04/162, FI/RLA/03/298,
UE/GLO/07/009**

Caribbean Region



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO EVALUATION GROUP

Terminal Evaluation

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Initiative (GSEII) UE/GLO/04/162

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Abbreviations and Acronyms

AOSIS	Alliance of Small Island States
CFL	Compact Fluorescent Lamp
COP	Conference of the Parties (of the UNFCCC - UN Framework Convention on Climate Change)
CSEP	Caribbean Sustainable Energy Program
CSFP	Caribbean Solar Finance Program
DFID	UK Department for International Cooperation
DOMLEC	Dominica Electricity Services Limited
EC	European Commission
EE	Energy Efficiency
ESG	Energy and Security Group
EUEI	European Union Energy Initiative
CI	Climate Institute
GEF	Global Environmental Facility
GSEII	Global Sustainable Energy Islands Initiative
ITE	Independent Terminal Evaluation (e.g. this evaluation)
NEVLEC	Nevis Electricity Company Ltd
OECS	Organisation of Eastern Caribbean States
PICs	Pacific Island Countries
OSL/EVA	Bureau for Organizational Strategy and Learning/Evaluation Group
PIGGAREP	Pacific Island Greenhouse Gas Abatement through Renewable Energy (a GEF project covering 11 Pacific Island Countries)
PPA	Power Purchase Agreement
RE	Renewable Energy
RMI	Republic of Marshal Islands
SKN	St Kitts and Nevis
SEPs	Sustainable Energy Plans
SIDS	Small Island Developing States
SMART	Specific, Measurable, Achievable, Realistic, and Time bound
SWH	Solar Water Heaters
TOR	Terms of Reference
UNF	UN Foundation
UNFIP	UN Fund for International Partnerships
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
WIP	West Indies Power Holdings B.V
WSSD	World Summit on Sustainable Development (1992, Johannesburg)

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This independent evaluation was prepared with the invaluable assistance from relevant UNIDO headquarters staff and from the UNIDO-GSEII project partners. However the review analysis, conclusions and recommendations are solely the responsibility of the author.

Glossary of evaluation terms

Term	Definition
Conclusions	Conclusions point out the factors of success and failure of the evaluated intervention, with special attention paid to the intended and unintended results and impacts, and more generally to any other strength or weakness. A conclusion draws on data collection and analyses undertaken, through a transparent chain of arguments.
Effectiveness	The extent to which the development intervention's objectives were achieved, or are expected to be achieved, taking into account their relative importance.
Efficiency	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.
Impacts	Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended.
Indicator	Quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a development actor.
Institutional development impact	The extent to which an intervention improves or weakens the ability of a country or region to make more efficient, equitable, and sustainable use of its human, financial, and natural resources, for example through: (a) better definition, stability, transparency, enforceability and predictability of institutional arrangements and/or (b) better alignment of the mission and capacity of an organization with its mandate, which derives from these institutional arrangements. Such impacts can include intended and unintended effects of an action.
Lessons learned	Generalizations based on evaluation experiences with projects, programs, or policies that abstract from the specific circumstances to broader situations. Frequently, lessons highlight strengths or weaknesses in preparation, design, and implementation that affect performance, outcome, and impact.

Logframe	Management tool used to improve the design of interventions, most often at the project level. It involves identifying strategic elements (inputs, outputs, outcomes, impact) and their causal relationships, indicators, and the assumptions or risks that may influence success and failure. It thus facilitates planning, execution and evaluation of a development intervention. Related term: results based management.
Outcome	The likely or achieved short-term and medium-term effects of an intervention's outputs. Related terms: result, outputs, impacts, effect.
Outputs	The products, capital goods and services which result from a development intervention; may also include changes resulting from the intervention which are relevant to the achievement of outcomes.
Recommendations	Proposals aimed at enhancing the effectiveness, quality, or efficiency of a development intervention; at redesigning the objectives; and/or at the reallocation of resources. Recommendations should be linked to conclusions.
Relevance	The extent to which the objectives of a development intervention are consistent with beneficiaries' requirements, country needs, global priorities and partners' and donors' policies. Note: Retrospectively, the question of relevance often becomes a question as to whether the objectives of an intervention or its design are still appropriate given changed circumstances.
Results	The output, outcome or impact (intended or unintended, positive and/or negative) of a development intervention. Related terms: outcome, effect, impacts.
Sustainability	The continuation of benefits from a development intervention after major development assistance has been completed. The probability of continued long-term benefits. The resilience to risk of the net benefit flows over time.

1. Executive Summary

1.1 Background

The UNIDO Global Sustainable Energy Islands Initiative (UNIDO-GSEII) project was the result of a four year development process that led to its start on 01 November 2004. The GSEII had been formally launched in November 2000 at COP6 (the Hague, Netherlands) by a group of five international NGOs and multilateral agencies comprising the Climate Institute (CI), Winrock International, Counterpart International, Forum for Energy and Development, and the Organisation of American States (OAS). At the beginning of the GSEII initiative, the specific focus was on the OECS (Organisation of Eastern Caribbean States) countries of Dominica, Grenada and St Lucia, with an envisaged replication effect to around 20 other Caribbean and Pacific small island states.

Following a series of initial consultation meetings, in late 2002 UNIDO and its GSEII consortium partners (OAS, CI and ESG – Energy and Security Group) obtained a \$75,000 grant from UNF (United Nations Foundation) for the preparation of the full project proposal. Core funding was envisaged to come from UNF. St. Kitts and Nevis was envisaged as a likely further country to participate in the project, and joined the UNIDO-GSEII project in 2003. UNF approved the project proposal and allocated funds to the project on 12 November 2003. The final project document was then signed by UNFIP¹ (UN Fund for International Partnerships) on August 18, 2004, which signaled the formal project start date.

UNIDO's Energy and Cleaner Production Branch (UNIDO) developed the project document for execution by UNIDO with the assistance of its partners (OAS, CI and ESG). The planned project duration was three years with an envisaged overall budget of \$1,050,000 budget. The UNF/UNFIP core funding was for \$500,000. Co-funding of \$550,000 from then unidentified sources was a condition of UNF/UNFIP funding beyond the initial disbursement of \$250,000..Obtaining this full budget was subject to UNIDO and its partners' fundraising success, although this was not explicitly stated in all parts of the ProDoc.

This Independent Terminal Evaluation (ITE)'s overall purpose was to independently assess the UNIDO-GSEII project's design, its achievements and performance, the UNIDO value added and to formulate recommendations as to any follow-up activities, and lessons learned for future projects.

Following the receipt and review of a range of project documents, a two week evaluation mission was undertaken by the evaluator, Mr. Frank Pool², in Dominica,

¹ Through UNFIP, funds mobilised by the UN Foundation are channelled to the UN system, for implementation of projects.

² Mr. Frank Pool is an independent, New Zealand-based consultant, specialized in the field of clean energy

Grenada, St Kitts and Nevis, and St Lucia in May 2010. Initial findings were presented to UNIDO in June 2010, further review work was undertaken, and this review report was finalised including feedback from UNIDO .

1.2 Design

The UNIDO-GSEII background documentation shows a strong emphasis on updating existing national sustainable energy plans (SEPs) in the applicable Caribbean countries. It was envisaged that these updated SEPs would contain aggressive renewable energy (RE) and energy efficiency (EE) targets, that these ambitious targets would be supported by the UNIDO-GSEII project and by other partners and driving forces, and that this would then lead to tangible RE and EE actions in the applicable countries.

After SEPs, the largest single UNIDO-GSEII project funded element was for solar water heaters (SWH), for which a key assumption in the original UNIDO-GSEII Project Document (ProDoc) was that: the key target market should be medium income households; the primary barrier was a lack of access to consumer SWH financing; the primary source of such financing would be local credit unions; the provision of finance to the local credit unions would attract interest; funds lent to loan recipients would be at a capped interest rate; the finance would be disbursed through the central league of credit unions in the applicable country; and each individual loan would need individual approval from the applicable central league of credit unions. It does not appear that the design of the SWH financing plan (the Caribbean Solar Finance Program (CSFP)) was explicitly aiming to drive down SWH prices or that it was aiming to review or remove any other SWH barriers other than those assumed to be arising from financing availability and interest rates.

In its design, the UNIDO-GSEII project was clearly aimed at increasing the uptake of renewable energy and energy efficiency to reduce the high dependence on imported oil (particularly diesel used for grid electricity generation). The project strongly focussed on assisting the relevant governments in developing National Sustainable Energy Plans (SEPs). The project design phase had also developed six screened specific projects, as follows:

1. Grenada Nutmeg Shell to Energy Project
2. Caribbean Solar Financing Program (CSFP – all three original countries)
3. St. Lucia Ciceron Landfill Gas to Energy Project
4. St. Lucia Point de Caille Wind Farm Project
5. St. Lucia Poultry Litter to Energy Project
6. Energy and Power Losses Reduction in DOMLEC Distribution System (Dominica)

The description of the proposed pipeline of individual projects in the ProDoc is at a

good pre-feasibility study level of detail and analysis, to have considered most relevant issues, to have identified the need for more comprehensive feasibility studies, and appears to have been suitably realistic given the resources devoted to working up these project concepts.

However, other than the technical feasibility of the individual projects, the planned project approach to achieve impact (i.e. widespread RE application), as reflected in the project document, was built on a couple of unrealistic, implicit (not spelled out in the document) assumptions. It should be noted that very similar implicit overarching rationales and assumptions are common in donor-led sustainable energy support projects for SIDS such as UNIDO-GSEII. They usually apply the following logic: for enhanced RE and EE uptake one first needs a SEP; that the SEP can be externally driven provided the local government and stakeholders are consulted and that this gives sufficient local buy-in; then once the SEP is ratified by the local government that somehow the status quo will spontaneously change to a greater use of RE and enhanced EE. Experience shows that a SEP needs to be more country- than donor driven to actually lead to its implementation.

Other barriers that weakened the GSEII project concept were, most importantly: that the commercially oriented power monopolies normally do not have an interest in adopting RE for grid electricity because of higher cost and absence of strong independent electricity regulators; the time horizon was too short to bring about real change; priority awarded to RE by the Government is subject to change, often in relation to oil price fluctuations and/or political changes.

1.3 Implementation

1.3.1 Implementation of planned activities

(1) In September 2004 Hurricane Ivan hit Grenada and caused extensive damage³ (estimated to be equivalent to 200% of GDP) and downed 80% of nutmeg trees on the island. The proposed Grenada nutmeg shell to energy project was therefore no longer viable as it would take 6 – 10 years to restore nutmeg production to pre-hurricane levels and make the project relevant again.

(2) The St Lucia SWH support project (CSFP- Caribbean Solar Finance Program) was the largest single UNIDO-GSEII project in terms of its budget, and was implemented largely as designed, however the formal target group had shifted from the middle income group in the ProDoc to a low-middle income target group in the consultancy TOR. In addition, the interest rate that the credit unions could charge on the loans was capped at 10% p.a. However, the proposed SWH loans to supposed low-middle income earners through local credit unions were not taken up, in spite of

³ http://en.wikipedia.org/wiki/Effects_of_Hurricane_Ivan_in_the_Lesser_Antilles_and_South_America

strong and ongoing efforts. It appears that the CSFP design was not adequately researched as to the real barriers to SWH uptake, as it was not designed to remove in an integrated fashion the myriad barriers holding back increased SWH uptake. The CSFP appears to have focused on the wrong market segment as only relatively wealthy people have water heating in St Lucia. It is also not clear why the CSFP only targeted credit unions as credit providers and why it persisted in trying to push the complex new financing mechanism⁴ even when it was clear that it was not working. It appears that the GSEII partners are still trying to implement this CSFP model (largely in its clearly unsuccessful original St Lucia form) to Grenada and other countries.

SWH sales in St Lucia did double in the project implementation period and CSFP contributed through SWH marketing efforts to this sales increase. However, other factors also contributed (e.g. new suppliers) and the level of contribution of CSFP is unclear.

(3) The landfill gas project in St Lucia did not proceed as there was found to be an insufficient landfill gas resource.

(4) The St Lucia wind farm project did not proceed as there were found to be hard to resolve issues around land ownership; and it is also not clear how promising the wind resource at the proposed site really was.

(5) The St Lucia poultry litter project was found to have an inadequate resource to be viable and was not taken any further.

(6) The Dominica Electricity Services Limited (DOMLEC) utility on Dominica had high losses of around 18 - 20%. The UNIDO-GSEII project engaged a firm of international consultants for a sum of \$36,000. This work provided the impetus for the DOMLEC Board to initiate work that has led to a reduction in losses to around 10%. Around 30% of the loss reduction came from a reduction in technical losses and the remainder came from the ongoing replacement of old electro-mechanical revenue meters with modern accurate electronic meters. DOMLEC envisage that losses will ultimately be reduced to 4.5% when 100% electronic revenue meters are used.

The UNIDO-GSEII project supported the update of existing (2001-2002 vintage) SEPs in Dominica, Grenada and St Lucia. The reviewer had difficulty in obtaining copies of the finalised updated SEPs - both from UNIDO and from relevant officials in the respective countries. It seems that there had been changes in political circumstances and the implicit national or donor SEP implementation funding had not materialized. Little evidence could be found of the updated SEPs leading to tangible RE or EE investments.

⁷ GEF now strongly discourages its funded projects from developing new financing mechanisms due to their common excessive effort required, generally low uptake rate, and common ongoing project timescale slippage.

1.3.2 Implementation of additional activities

Successful funds mobilization (\$292,000) enabled new project activities to be added to replace the originally planned projects that were no longer viable, although this took additional time and led to two one-year project extensions.

The replacement UNIDO-GSEII activities comprised:

1. Follow-up support to the St. Kitts and Nevis Bio-energy Study
2. Geothermal and wind energy policy and legal technical assistance to St. Kitts and Nevis
3. Energy efficiency promotion and capacity building in Caribbean SIDS Water Utilities
4. Development of a sustainable and energy efficient housing program in Grenada
5. Policy and legal technical assistance to St. Lucia on geothermal and wind energy
6. Demonstrating and promoting grid-tied photovoltaic systems in St. Lucia
7. Supporting sustainable energy awareness during the 2009 St. Lucia Energy Week

Most of the additional activities were successfully implemented by the UNIDO-GSEII project. In addition, a 10,000 CFL (Compact Fluorescent Lamp) free distribution program was planned for Grenada, but this was cancelled when a larger Cuban-funded scheme eventuated (however, the Cuban-funded scheme seems to have distributed poor quality CFLs and according to anecdotal evidence it has not led to the sustainable CFL replacement of incandescent lamps).

The project was finally completed in 2010 with some residual funds remaining to be allocated, which are primarily the \$46,000 of the St Lucia SWH financing scheme (CSFP) that were not able to be utilised. Parallel funding of \$100,000 was obtained from the government of Italy and spent on UNIDO-GSEII project activities. Thus the UNIDO-GSEII project successfully obtained its full \$500,000 UNF/UNFIP funding; its full 3rd party matching funding of \$250,000; and \$100,000 of parallel funding (compared with envisaged parallel funding of \$300,000). Thus the project was very successful in ultimately raising a budget of \$850,000 (compared to its envisaged \$1,050,000 budget), for an overall funds mobilisation rate of 81%.

1.3 Assessment

The UNIDO-GSEII project activities were all clearly relevant to the four Caribbean middle income developing countries involved in the project. However, the project's overarching vision that its activities would (logically) lead to sustainable energy project implementation uptake both from its sustainable energy plans (SEPs) and from wider replication of its results in other island developing countries has not been

achieved. In practice in developing island countries the existence of sustainable energy policies is generally only weakly linked if at all with actual on-the-ground real activities⁵. There is also an issue that UNIDO's core competence is in the industrial sector, and yet many of the UNIDO-GSEII interventions were in other sectors where UNIDO had to rely on its GSEII partners to determine the relevance of the proposed activities. Overall, the UNIDO-GSEII project is clearly relevant to its four applicable countries, and as such it is assessed as satisfactory in terms of its relevance.

In terms of efficiency, the UNIDO-GSEII project seemed to be generally efficiently implemented. The initial programmed activities were initiated in a very short time period, those activities that were no longer relevant were quickly put aside, and substitute activities were initiated in a timely fashion. The feedback from stakeholders in the four Caribbean countries was that UNIDO was suitably responsive, and that UNIDO was very capable in its core areas of technical expertise. In terms of efficiency the UNIDO-GSEII project is thus assessed as very satisfactory.

In terms of effectiveness and impact, the UNIDO-GSEII project has achieved mixed results. Some individual activities were highly effective. For example, the DOMLEC electricity loss reduction study led to actual reductions far beyond the targeted 10% mark. Similarly, the technical assistance for water utilities energy efficiency, the support of the development of geothermal and wind resource laws and the subsequent development of wind and geothermal power purchase agreements (PPA) in Nevis were highly effective, contributing to some 12 MW of renewable energy being available and grid-connected at Nevis from wind and geothermal sources. Some activities such as the St Lucia SWH financing support activity (CSFP) carried on too long with its initial design approach when in retrospect this approach was clearly not working, but CSFP in St Lucia still contributed (although the exact level of contribution is unclear) to a doubling of annual SWH sales. Other activities such as the support of updated or new SEPs (sustainable energy plans) did not seem to utilise UNIDO's comparative advantage and did not seem to lead to any discernable concrete results. Overall, this area is assessed as satisfactory.

In terms of sustainability some activities such as the DOMLEC loss reduction study seem almost certain to lead to sustainable results. Other individual UNIDO-GSEII project supported elements such as the Nevis wind farm are very likely to be sustainable. It is still too early to say if the Nevis geothermal power project will be sustainable as the production wells are not yet drilled, and hence it is not producing any grid power yet. Overall, this area is assessed as satisfactory.

⁵ e.g. see the Pacific PIGGAREP mid term evaluation at http://www.sprep.org/att/irc/ecopies/pacific_region/646.pdf

1.4 Recommendations

The UNDO-GSEII project comprised a range of individual project elements in the four applicable eastern Caribbean nations. From this review, five recommendations have been identified as follows:

1. *There is a need for Greater Focus on Underlying Intervention Logic and assumptions, in particular with a view to ensure impact of demonstration projects.*
It is recommended that UNIDO should not just rely on its project partners' (implicit) assessment of the relevance and applicability of proposed interventions.
2. *UNIDO Energy activities should concentrate on areas of UNIDO comparative advantage, in particular within the industrial sector.*
It is recommended that UNIDO focus on activities where UNIDO has a comparative sustainable energy advantage in terms of industrial sector applications, links to productive uses, fundraising, or project implementation management.
3. *Reinforce Success and Abandon Failure.*
It is recommended that project resources are shifted from initiatives that fail to produce the expected results to those that proved to work.
4. *Actively Project-Manage UNIDO Funded Partner Activities* - UNIDO should take firmer control of partner activities that are funded through UNIDO, even if other project partners initiated the activity and are supposed to have expertise in the relevant area.
5. *Avoid Design Drift Lacking Explicit Analysis* – in a number of UNIDO-GSEII project activities there appears to have been an important and significant shift in the target market or output or intervention logic where a clear justification is not apparent.

2. Introduction

The UNIDO Global Sustainable Energy Island Initiative (UNIDO-GSEII) project proposal was approved by UNF/UNFIP on 12 November 2003. The specific range of activities to be undertaken was based on the project document (ProDoc) that was signed on 18 August 2004 by the UN Foundation for International Partnerships (UNFIP) and the United Nations Industrial Development Organisation (UNIDO). The UNIDO-GSEII ProDoc was for a three years duration project with a budget of \$1,050,000. The project has three different UNIDO Project Numbers (UE/GLO/04/162, FI/RLA/03/298, UE/GLO/07/009) and a UNF/UNFIP Programme Number of IDO/RLA/03/298.

The UNIDO-GSEII project started initial operations on 01 November 2004. After the start of significant operations in 2005 and following some delays in project fund raising, the project ultimately successfully raised \$850,000, with most funds expended by February 2010 (see table below).

Summary of project funding

Project No.	Title	Donor	Total allotment (in US\$)	Disbursements (in US\$)
UE/GLO/07/009	GLOBAL SUSTAINABLE ENERGY ISLAND INITIATIVE (GSEII)	Austria Euro a/c	144,287	143,579
FI/RLA/03/298		Un Fund For International Partnerships	575,239	538,013
UE/GLO/04/162; US/GLO/04/162		Italy, Euro Account	100,939	98,130
Total			820,4656	779,722

Source: UNIDO Infobase, 24 February 2010

The UNIDO-GSEII ProDoc contained the requirement of an independent mid-term review to be undertaken within 18 months of project start and for a final evaluation to be undertaken after the operational completion of the project (this evaluation). In consultation with UNF/UNFIP, the specified mid-term review was not undertaken as after 18 months of project implementation the project had already largely spent its then existing funds, and it was seen as being too soon for project outputs to have led to outcomes and to have achieved any measurable impacts. Following UNIDO successfully raising the last \$146,000 of matching funds, and the release of the associated remaining \$146,000 of UNF/UNFIP funding, it was decided to undertake

⁶ This amount does not include project support costs (psc).

one comprehensive final evaluation (this evaluation).

Accordingly, in consultation with the UNIDO-GSEII project partners and the primary funding provider (UNF/UNFIP), this independent terminal evaluation (ITE) was commissioned and undertaken.

The overall purpose of this ITE is to provide an independent assessment of the relevance of UNIDO-GSEII's original design; the rationale and logic of the changes made to its original design as the project was implemented; the project's achievements and performance since its tangible operations started on 01 November 2004; its prospects for post-project relevance and for the sustainability of its achievements; to identify any lessons learned; and to make recommendations for any similar initiatives to be undertaken by UNIDO in the future.

The evaluator selected for this review, Mr. Frank Pool, was completely independent from the design, implementation or management of UNIDO-GSEII and its activities and its projects. The reviewer was chosen to possess relevant international experience in both UNIDO activities and in wider sustainable energy development interventions, as well as sustainable energy project design, operation, management, and review/evaluation.

This ITE was conducted in compliance with UNIDO's Evaluation Policies and its Guidelines on Technical Cooperation. The scope of the evaluation covers three levels: i) a review of UNIDO-GSEII as a whole; ii) a review of the individual UNIDO-GSEII projects; and iii) a review of how the success and impacts of individual UNIDO-GSEII projects provides lessons for future UNIDO activities in sustainable energy support in SIDS (Small Island Developing States).

This evaluation was designed and undertaken to meet UNIDO requirements for independent evaluations to provide transparent reviews of UNIDO's operations and to maximize the learning and refinement opportunities from UNIDO's ongoing activities. This evaluation is also designed to meet the needs of the UNIDO-GSEII project donors in obtaining a review of the design context (in retrospect); a review of the changes made to the UNIDO-GSEII project during its implementation; and to review the relevance, effectiveness, efficiency and sustainability of the UNIDO-GSEII interventions that the donors funded.

The evaluation was carried out in accordance with the relevant Terms of Reference, which established the evaluation methodology and which can be found in Annex C. The following approach was adopted: (a) examination of the overall aspects of UNIDO-GSEII and its design and implementation through a desk-review of the available documentation; (b) validation of data and verification of facts through semi-structured interviews with key project stakeholders and by undertaking selected site

visits; (c) in-depth analysis of information from a range of sources to underpin independent and evidence-based findings; (d) circulation of the draft evaluation findings to key UNIDO-GSEII stakeholders; and (e) adjustment of the report to reflect stakeholder feedback and suggestions received.

The evaluation involved the review of the available documents relevant to UNIDO-GSEII and its constituent activities and projects (design, progress and related activity reports). The main documents consulted are listed in Annex A. Discussions with relevant project staff at UNIDO Headquarters in Vienna was conducted after the field discussions in the applicable four Caribbean countries.

A two-week evaluation fieldwork mission was undertaken in St Lucia, Dominica, Grenada and St Kitts and Nevis (in that order) in May 2010. Invaluable support during the evaluation mission in St Lucia was provided by Ms Christine Wilkinson of E3-Consulting. A list of people consulted is provided in Annex B. A presentation of initial evaluation findings was provided to relevant staff at UNIDO HQ in Vienna in May 2010. The feedback of UNIDO-GSEII and UNIDO staff has been incorporated in this report.

3. UNIDO-GSEII context

3.1. History and overview of the project

The UNIDO Global Sustainable Energy Islands Initiative (UNIDO-GSEII) project was the result of a four year development process that led back to a formal start at the GSEII launch in November 2000 at COP6 (UNFCCC, the Hague, Netherlands) by a group of five international NGOs and multilateral agencies (some prior work had been undertaken during the previous two years by the Climate Institute – CI). The initial GSEII partners comprised the Climate Institute (CI), Winrock International, Counterpart International, Forum for Energy and Development, and the Organisation of American States (OAS). From the beginning of the GSEII initiative, the specific focus was on the OECS (Organisation of Eastern Caribbean States) countries of Dominica, Grenada and St Lucia, with an envisaged replication effect to around 20 other Caribbean and Pacific small island states. St. Kitts and Nevis was envisaged as a likely further country to participate in the project, and formally joined the GSEII project in its late planning phases in 2003.

There were a number of initial consultation meetings and some initial funding was obtained from the Rockefeller Brothers Fund to support early GSEII activities such as the development of initial sustainable energy plans (SEPs) in the original three countries. Around \$50,000 was raised and spent on pre UNIDO-GSEII activities. In late 2002 UNIDO and its then GSEII consortium partners (OAS, CI and ESG –

Energy and Security Group) obtained a \$75,000 grant from UNF (UN Foundation) for the preparation of the full formal project proposal (the ProDoc for this UNIDO-GSEII project) with core funding to come from UNF.

UNIDO's Energy and Cleaner Production Branch (UNIDO) developed a comprehensive and specific activity focussed ProDoc (Project Document) for UNF/UNFIP (UN Foundation / UN Fund for International Partnerships) funding that was to be executed by UNIDO with the assistance of its then partners (OAS, CI and ESG). The UNIDO-GSEII project design was for a three year duration project with an envisaged total overall \$1,050,000 budget (this budget was subject to UNIDO and its partners' fundraising success). That this full \$1,050,000 project budget was dependent on fundraising success was explicitly stated in the body of the ProDoc, but not in its Executive Summary. The requested UNF/UNFIP core funding was for \$500,000, third party matching funding (from then unidentified sources and a condition of UNF/UNFIP funding being released beyond the initial UNF/UNFIP funding of \$250,000) was \$250,000, and anticipated parallel funding (from then still unidentified sources) was \$300,000.

The wider GSEII program was an overarching framework under which it was envisaged that the various partners would undertake tangible activities as and when funding was successfully mobilised from various sources. This evaluation covers only the UNIDO executed GSEII activities (i.e. the UNIDO-GSEII project). However, in practice, the UNIDO-GSEII project covers nearly all the active GSEII initiatives undertaken from late 2004 to 2008.

Some Sustainable Energy Plan (SEP) activities were undertaken by the non-UNIDO-GSEII partners before the UNIDO-GSEII project formally started at the end of 2004. However only limited funding was available for this pre UNIDO-GSEII SEP work. Although it is not under the terms of reference of this evaluation, this pre UNIDO-GSEII SEP development work seems to have been reasonably comprehensive. This pre UNIDO-GSEII SEP development work seems to have enjoyed reasonable local political support at the time, although this support did not continue with ongoing political and bureaucratic changes in the countries involved. However, there is little available evidence that this prior (and also during UNIDO-GSEII or indeed subsequent post UNIDO-GSEII too) SEP work led directly to significant sustainable energy projects being implemented. Critically, the SEP process does not seem to have been really country led or to have fully involved bilateral and multilateral donors from its inception⁷.

From its inception, there was a clear vision for GSEII to be a permissive framework

⁷ The externally driven and unconnected to any implementation project donors GSEII SEP efforts are in contrast to the very promising TERM (Tonga Energy Road Map) process that has been both nationally driven and fully supported by appropriate bilateral and multilateral donors to fund tangible and specific implementation project actions, see <http://www.tonga-energy.to/>

under which work on sustainable energy in Alliance Of Small Island States (AOSIS) countries could be undertaken. From 2001 to July 2009, approximately \$1 million has been spent for the preparation of national and sustainable energy plans, bio-fuel feasibility studies, energy-efficient lighting and training courses and renewable energy projects under GSEII⁸. The original impetus for GSEII came from the Climate Institute (CI), which still also manages the overall GSEII website. However, the great majority of GSEII funds raised and expended to date (around \$850,000 of the approximately \$1 million total) has been administered through UNIDO under the UNIDO-GSEII project that is the focus of this evaluation.

Following a first framework planning meeting of the UNIDO-GSEII project made during the WSSD (World Summit on Sustainable Development, August-September 2002) in Johannesburg, South Africa, UNIDO started in late 2002 to develop a specific project concept to support the efforts of the then three Caribbean countries (St Kitts and Nevis joined the project in 2003) towards a more sustainable energy situation. Thus the UNIDO involvement in starting specific development of the project concept to obtaining signed UNFIP funding support of \$500,000 in August 2004 was less than two years, a very short time duration for such project development and shorter than the average comparable GEF sustainable energy project design and approval process.

According to the original project document, the goals and objectives of the UNIDO-GSEII project (and in particular for its UNF/UNFIP core funding) were “to promote and support the transition of AOSIS nations toward cleaner, more sustainable energy use. A principal focus of the project will be to support the consolidation of Dominica, Grenada and St. Lucia efforts in orienting their national energy policy and development towards renewable energy and energy efficient technologies. In line with the national priorities, the project will help these islands to lay the foundations of improved energy security, reduced electricity tariffs and improved allocation of resources. In addition, the project plans to expand its sustainable energy planning/implementation efforts to an additional 4 AOSIS member nations and to provide outreach and training to up to 20 additional member nations.

The main objectives of the UNIDO-GSEII project were the following:

1. Work with partner countries on the development and implementation of Sustainable Energy Plans that identify policy, financing, technical and institutional barriers hindering project development and outline solutions to mitigate these barriers
2. Build and strengthen local capacity at national and regional levels to continue to develop and implement sustainable energy options and approaches

⁸ <http://www.gseii.org/about.html>

3. Catalyze private investment in renewable energy (biomass, geothermal, hydropower, photovoltaic, solar thermal and wind technologies) and energy efficiency projects
4. Demonstrate that energy can be used as a tool for sustainable development and poverty reduction, thereby contributing to attainment of the Millennium Development Goals (MDGs).

In each of the countries involved, the project was to promote the development of sustainable, market based approaches to the delivery of energy services through public-private partnerships.”

A mission by UNIDO representatives and international experts in renewable and energy efficiency technologies and clean energy project financing was undertaken in Dominica, Grenada and St. Lucia. These initial design and mission findings resulted in the identification of six screened specific projects, as follows:

1. Grenada Nutmeg Shell to Energy Project
2. Caribbean Solar Financing Program (CSFP – proposed for all three original countries)
3. St. Lucia Ciceron Landfill Gas to Energy Project
4. St. Lucia Point de Caille Wind Farm Project
5. St. Lucia Poultry Litter to Energy Project
6. Energy and Power Losses Reduction in DOMLEC Distribution System (Dominica)

The ProDoc detailed a comprehensive list of outputs that was to be undertaken in the full proposed UNIDO-GSEII project. However, the implementation of all the proposed activities was clearly linked to the UNIDO-GSEII team’s success in mobilizing the third party funds required by UNF/UNFIP to provide its maximum support (\$500,000) to the project as well as mobilization of a substantial portion of the full envisaged parallel funds of \$300,000. The specifics of the full proposed list are not seen as particularly relevant in evaluation terms, as they were clearly a wider initial list of possible activities amongst which some projects would be implemented depending on funds availability and more detailed investigations. In the event that full matching funds and parallel funds were not achieved the project was explicitly to be restructured as follows:

1. The existing focus on advancing activities in the existing island nations of St. Lucia, Grenada and Dominica would continue as priority initiatives. There would be no reduction of activities in these three nations.
2. The primary reduction in activity to reflect a decreased funding base would occur in the (non) expansion of activity to other countries.
3. There would be (i) reduction in support for the regional offices, in particular, no regional office would be established in the Pacific, and (ii) reduced funding would be available for participation in the Barbados+10 Conference.

3.2. Sustainable energy context in UNIDO-GSEII countries

Small Island Developing States (SIDS) are generally dependent on imported petroleum products for (most or all of their power generation as well as for all their international and internal transport requirements. A major economic and social impact of the dependence of most SIDS on imported petroleum products is for power generation, where most SIDS have the majority of their power generation (and often 100% of their power generation) based on imported diesel fuel for diesel generators. This ongoing use of diesel for power generation is a significant financial drain on local economies and a major cost over which the SIDS have no control - as diesel prices are driven by international oil markets.

When the GSEII project was first being considered in 2000, the international price of oil was around US\$25/barrel, and even this was then of concern as a perceived high oil price level. By late 2004 when the UNIDO-GSEII project was approved, the price of oil was over \$40/bbl and the impact of rising oil prices was even more of concern. The price of oil then continued to rise and it peaked at \$147/bbl in July 2008, at which point the world economy stalled largely from the indirect impacts of high oil (and other related commodity) prices. The oil price then collapsed back to a low of \$32/bbl in December 2008, and has then gradually risen to around \$90/bbl by the end of 2010. The price of oil comprises around half the delivered consumer cost of diesel powered electricity generation systems in SIDS. So increases in crude oil prices inevitably lead to either large increases in electricity tariffs, attempts to put off electricity tariff price rises (which soon show up in unreliable electricity supply from deferred generator and distribution system maintenance or a lack of diesel fuel) or unsustainable subsidies (which eventually show up as insolvent electricity utilities, rising government debt, or rising foreign debt if oil is partly supplied on credit as with the Petrocaribe scheme).

This dependence on high, gradually rising and highly variable oil prices led to the UNIDO-GSEII project's focus on a reduction in fossil fuel energy imports and facilitating a shift to renewable energy (RE) generation and an increase in energy efficiency (EE). An increase in RE and an enhanced uptake of EE would clearly

greatly improve the economic and social situation of the four SIDS covered by the UNIDO-GSEII project.

A critical key positive factor for the UNIDO-GSEII project, and one not explicitly mentioned in its ProDoc, is that in three and a half of the four countries the power utilities operate on a mostly commercial basis with an essentially automatic oil price pass-through mechanism to the retail electricity tariff. This avoids the very common problem in other SIDS where retail electricity prices are held below the true cost of supply for political or social reasons, with resulting poor quality electricity service, unsustainable subsidies and a reliance on donors for any power system rehabilitation and new equipment⁹. Only the St Kitts part of the St Kitts and Nevis Federation (the half a country that is an exception to electricity utilities operating on a mostly commercial basis in the four relevant UNIDO-GSEII countries) makes use of the Petrocaribe “use now but partly pay later” oil supply scheme from Venezuela which pushes around half of the oil price impact into the future (in political terms this a seductively attractive NIMTO (Not In My Term of Office) solution).

A \$7.5 million UNEP-GEF grant funded Caribbean Regional Project in Dominica, St. Kitts and Nevis, and St. Lucia covering Eastern Caribbean Geothermal Development (Geo-Caraibes) would have enabled some of the GSEII geothermal SEP outputs (both from UNIDO and from other GSEII partners) to be progressed. The Geo-Caraibes project was developed separately but in parallel with the UNIDO-GSEII project. Unfortunately the proposed Geo-Caraibes project was not successful in obtaining GEF funding.

4. Project Planning and Design

Previous sections have already highlighted that the UNIDO-GSEII project had a total formal planning and design period of four years - although it appears that the Climate Institute (CI) was involved in an additional two years of prior project development discussions prior to the GSEII formal launch at COP6 in late 2000. UNIDO led the last two years of the project’s formal development and design process prior to the tangible operational start of the UNIDO-GSEII project at the end of 2004. As already stated, a two year formal design duration period to tangible project start is quite efficient and effective compared to many comparable projects, for instance for many similar GEF (Global Environmental Facility) funded sustainable energy projects.

The rationale and scope of the wider UNIDO-GSEII project rested on a number of core assumptions which do not seem to have been subjected to very close or explicit

⁹ See from the author a discussion of the widespread negative impacts of unrealistically low electricity tariffs in Pacific SIDS in the PIGGAREP project mid term evaluation at http://www.sprep.org/att/irc/ecopies/pacific_region/646.pdf

scrutiny in the four years of development of the UNIDO-GSEII project, nor in the six years since the UNIDO-GSEII project gestation started. These core assumptions were also at best only partially explicitly stated in the UNIDO-GSEII ProDoc.

The UNIDO-GSEII ProDoc and the evaluation interviews revealed a number of important but mostly implicit assumptions behind the establishment of UNIDO-GSEII, as follows: -

1. That the applicable three target countries have promising, readily accessible and cost competitive RE resources available for electricity generation. While this assumption is valid to some extent, there are several issues that would have required deeper analysis. For example, there was no discussion of any storage needed with run of river-hydro or the need for dams and hydro storage if such new hydro is to provide firm electricity generation capacity. There was a useful discussion of expected wind energy penetration percentages, grid interface issues, and the need to firm up inferred wind speeds or capacity factors, but this was only found in the Appendix to the ProDoc for the St Lucia wind farm and not in the body of the ProDoc. There was also no discussion that, although geothermal energy was clearly a promising option in all the countries, no test wells, let alone production wells had yet been drilled or independently evaluated for ongoing heat flow rates, in the applicable countries. There was no discussion of the high capital cost and the appreciable risk of not finding a commercially viable geothermal resource with any production well unless very careful (and expensive) geophysical work is undertaken and numerous and test wells are drilled. Finally there was no discussion that photovoltaic generated electricity was not yet cost competitive with large diesel generators unless the PV capital cost is provided through donor soft loans or grants.
2. That there would be sufficiently strong local leadership and donor funding to unlock existing EE potentials.
3. That donor funded and externally generated national sustainable energy plans (SEPs) with aggressive targets for renewable energy and energy efficiency - even if collaboratively generated with local governments, relevant Cabinet Ministers and key stakeholders – would only need national ratification to somehow set the stage for the necessary significant changes in the energy sector and the large capital investments to inevitably follow. It was also assumed that public political commitments supporting sustainable energy by the government and/or minister of the day would be valid for the periods of time needed to implement tangible RE and EE initiatives - ignoring that governments and ministers (and hence political priorities) regularly change in any democratic country.

4. That the primary barrier to the application of solar water heating (SWH) was a lack of access to suitable financing and that middle income families were the most promising SWH target market (rather than for example high income households, institutions and the hospitality industry). It was also assumed that credit unions were the most promising financial institutions to provide SWH loans, and that the loans to the credit unions should be provided at a low rather than zero interest rate thereby greatly complicating the administrative running of the financing scheme for very little real interest generated (3% was the rate for funds lent to the credit unions mentioned in the ProDoc).
5. That the successful demonstration of SEPs leading to RE and EE gains in the original three UNIDO-GSEII countries would inevitably lead to wider replication in the Caribbean and wider Pacific et al SIDS.
6. That the power utilities on all the three original target countries would be very interested in putting in their own equity and raising extra debt or buying power from IPPs (Independent Power Producers) to have renewable energy (RE) generation to replace diesel fuel use, although most of the RE would not provide firm capacity and hence the same amount of diesel generation capital equipment would still be required. There was no apparent recognition that the power utilities were commercially focussed statutory monopolies (except in the later addition of St Kitts from the St Kitts and Nevis Federation where it is a government department, with Nevis being a commercially focused arms-length semi-independent utility from the Nevis government), and that the utilities were not under the control of strong independent regulators that could require the utilities to implement RE. The utilities already had pass-through oil price mechanisms in place, so the volatile price of oil was not of direct concern to the utilities' own profitability. So it was not clear why the utilities would be interested in investing in RE by raising their own capital or buying RE power from IPPs compared to continuing to utilise their lower capital cost diesel generators and just passing any diesel price fluctuations directly on to their customers. If there was to be donor led support for grid RE, then the donors would want to deal with governments and not the utilities thereby undermining the monopoly role of the utilities. It is thus not clear how the stated private sector investment in RE was to be achieved with commercially focussed electricity utilities with a statutory monopoly on power generation, distribution and sale and no strong independent electricity regulators.

However, very similar implicit overarching rationales and assumptions are common in donor-led sustainable energy support projects for SIDS such as UNIDO-GSEII. They

usually apply the following logic: for enhanced RE and EE uptake one first needs a SEP; that the SEP can be externally driven provided the local government and stakeholders are consulted and that this gives sufficient local buy-in; then once the aggressive SEP is ratified by the local government that somehow the status quo will spontaneously change to a greater use of RE and enhanced EE.

Time and again one sees the assumption implicitly made in projects such as UNIDO-GSEII that RE and EE implementation will somehow inevitably follow a magical new SEP. There is a wide lack of recognition of how few grand and ambitious SEPs (even in many well resourced developed countries) actually lead to much tangible change. For developing countries there is generally little explicit acknowledgement that in practice donors are required to fund the necessary tangible RE and EE changes and that donors have their own agendas and timescales, including developing their own SEPs for their own projects and not just automatically buying-into an SEP developed by some other prior donor. Only in rare cases is a SEP or sustainable energy road map exercise really driven by local interests, and only rarely does it fully involve appropriate donors from the outset so that the necessary commitment and funding will be in place to implement the ambitious objectives of such a SEP or sustainable energy road map exercise. The Tonga Energy Road Map (TERM) is a rare example of such a nationally driven and fully donor integrated sustainable energy implementation funding exercise.

The later addition in UNIDO-GSEII once it was underway of the St Kitts and Nevis (SKN) sugar cane fuel study assumed that a defunct sugar industry could be revived in SKN to produce bio-fuels without regard for land ownership issues, limited land that could be mechanically worked or the high labour cost that had largely led to the demise of the sugar industry in the first place. However, to be fair, such assumptions were common in the situation of the greater focus on alternatives to imported fuel in the 2004-2008 era of seemingly inexorably rising international oil prices.

UNIDO's core expertise that it brought to the UNIDO-GSEII project was in bundling specific aspects together and developing an overarching project design, as well as in fundraising, project management, and in bringing particular skills to technical studies such as water utilities optimisation and power loss reduction studies. In the design of the UNIDO-GSEII project, it appears that UNIDO undertook one review /design mission to the countries involved and that UNIDO strongly relied on its project partners for many aspects of the design. This reliance is in retrospect not unreasonable as its project partners had several years of prior engagement with the countries involved and could have reasonably been assumed to have a good understanding of the underlying sustainable energy situation, the barriers to be overcome, and proven expertise in developing SEPs. Where the reliance on project partners seems to have most let UNIDO down is the implicit assumption that SEPs logically and spontaneously lead to the implementation of tangible projects following

the SEP ratification by relevant governments, as well as in the design and implementation of the SWH financing project in St Lucia (the initial CSFP work) and probably in the successor SWH CSFP activity in Grenada.

The description of the proposed pipeline of individual projects in the ProDoc appears to be at a good pre-feasibility study level of detail and analysis, to have considered most relevant issues, to have identified the need for more comprehensive feasibility studies, and appears to have been suitably realistic given the resources devoted to working up these project concepts.

The conditionality of individual project support with fundraising success was explicitly stated and options were explicitly considered in case fundraising was less than fully successful.

5. Project Implementation

The UNIDO-GSEII ProDoc was signed by the Executive Director of UNFIP on 18 August 2004, following its UNIDO signature on 03 August 2004 by the Managing Director of the UNIDO Programme Development and Technical Cooperation Division. There was then a two month delay while the \$104,000 of third-party matching funds mobilized by OAS (\$54,000 from DFID - the UK Department for International Cooperation - and \$50,000 from USAID) was being transferred to UNF/UNFIP and was then in turn transferred to UNIDO. The official project start date was thus 01 November 2004 - when UNIDO had received the necessary funds and was then able to start implementation of project activities - as per standard UNIDO project administrative procedures to wait until funds are actually received before committing to any expenditure based on such funds. The initial UNIDO-GSEII budget was \$321,825, including 5% UNIDO support cost. No specific forward looking budget seems to have been prepared to reflect the reduced funding availability for calendar 2004 and 2005.

5.1 Calendar 2004

In the 2 months to the end of calendar 2004, no funds seem to have been spent on project implementation activities as the focus seems to have rather been on contracts and activities being put into place for 2005. For example, the DOMLEC (Dominica Electricity Services Ltd) loss reduction study proposals had been received from consultants by 15 December 2004 in a competitive bidding process, which represents very fast TOR finalisation and soliciting bids work on the part of UNIDO. Activities for the Mauritius meeting in January 2005 were also presumably arranged in this period, although the expenditure did not show up until the 2005 calendar year.

5.2 Calendar 2005

In 2005 the project made substantial expenditure progress, with \$223,433 committed (i.e. expended in UNIDO financial terms) during the first half of the year, and \$48,894 committed during the second half of the year. In UNIDO 5% administrative costs included terms, the project had thus committed \$292,243 of its available \$315,525 budget by 31 December 2005 for an expenditure (funds commitment) rate of 91% of the funds available and allocated for 2004 and 2005.

In terms of activities underway in 2005, three activities specified in the ProDoc as initial activities accounted for the bulk of calendar 2005 UNIDO-GSEII financial commitments/expenditure, as follows: -

1. In January 2005, UNIDO-GSEII organised a side event entitled “Clean Energy Islands – SIDS as Examples of Sustainable Development” at the International Meeting held in Mauritius for the Ten Years Review of the Implementation of the Barbados Programme of Action for the Sustainable Development of SIDS (Small Island Developing States). \$21,000 was committed to CI (the Climate Institute and a UNIDO-GSEII project partner) for organizing the event and \$4,494 was used to support the participation of the Hon. Theophilus Ferguson John, Minister for Planning, Environment and Housing of the Government of St. Lucia.
2. The updated DOMLEC loss reduction proposal from consultants was received on 24 February 2005 and the study was completed by October 2005 within its budget of \$35,605. The study provided the Dominica Electricity Services Limited (DOMLEC) national power utility (an Eastern Caribbean Stock Exchange publicly listed monopoly power utility with 20% government ownership), with the necessary impetus to management to underpin DOMLEC’s subsequent and ongoing transmission and distribution (T&D) losses reduction program. The study was used to trigger action to reduce technical losses by around 3% of the total electricity supply, and even more importantly to implement a program of progressive roll out of electronic meters to reduce the larger non-technical losses component from inaccurate and non-functional old electro-mechanical revenue meters. DOMLEC’s losses have been reduced from around 18% to around 10%, and DOMLEC expects that its losses will be reduced to around 4.5% with full implementation of its electronic 2-way communications AMI (Automated Metering Infrastructure) system.
3. The major expenditure (commitment) of funds in 2005 was for the Caribbean

Solar Financing Programme (CSFP) - which was initially focused on St Lucia. A \$121,000 contract was awarded (with a waiver obtained to UNIDO's normal requirements for competitive bidding for any awarding of contracts) to the UNIDO-GSEII project partners of OAS (Organisation of American States) working with ESG (the Energy and Security Group), as well as with the OAS' Trust for the Americas. Due to limited initial funding available to the UNIDO-GSEII project, CSFP activities were not initially launched in Dominica and Grenada as planned in the ProDoc. However, in September 2005 parallel funding from the Government of Italy was approved and the funds were transferred to UNIDO in October 2005, this enabled work to start on the CSFP in Grenada in June 2006.

The CSFP was implemented substantially as planned in the UNIDO-GSEII ProDoc. However the formal target group had shifted from middle-income households in the ProDoc to low-middle income households in the consultancy TOR and in practice. Another, key design feature was that the interest rate that the credit unions could charge on the loans was to be capped, in practice this was set at 10% p.a.

However, the proposed SWH loans to what was supposed to be low-middle income earners (there was some feedback that the actual income limits were set too low even for these categories) through local credit unions were not taken up, in spite of strong and ongoing implementation efforts. It appears that the CSFP design was not adequately researched as to the real barriers to SWH uptake, as it was not designed to remove in an integrated fashion the myriad barriers holding back higher levels of SWH sales. The CSFP also appears to have focused on the wrong market segment as only relatively wealthy people, institutional facilities and the hospitality industry generally have any water heating in St Lucia. Low income households in St Lucia mostly live in wooden houses and do not have any hot water supply, as St Lucia is in the tropics and is only slightly cool for two months of the year. The CSFP only targeted credit unions as credit providers on the basis that they were thought to provide the majority of consumer credit to medium income households (as stated in the ProDoc), but in fact this assumption seems to not be fully accurate as it seems that many medium income households (and even many low income households too) obtain their consumer credit from banks. The CSFP in St Lucia persisted in trying to implement the complex new financing mechanism¹⁰ even when it was clear it was not working. It appears that the GSEII partners are still trying to implement this CSFP model (largely in its already demonstrated unsuccessful form) to Grenada and to other countries. Finally, feedback from credit unions and others in St Lucia

¹⁰ GEF now strongly discourages its funded projects from developing new financing mechanisms due to their common excessive effort required, generally low uptake rate, and common ongoing project timescale slippage.

suggests that low interest rates (assumed as the key financial driver) were not that important with around half of credit union loan users being unaware of current interest rates and with the repayment per month being the main criteria people look at when taking out credit union loans.

SWH sales in St Lucia did double in the project implementation period from around 400 systems sold per year to around 800 per year. The level of CSFP contribution through SWH marketing efforts to this sales increase is probably significant. However, the CSFP marketing contribution to this increase is unclear vis-à-vis increasing awareness of SWH from other sources, the emergence of a strong second SWH supplier in St Lucia, and the impact of strongly rising electricity prices (the majority of SWH are storage electric systems) during the CSFP implementation period in St Lucia. So although the ProDoc design target of increasing SWH sales by 100 SWH systems in each of the three applicable countries (including Dominica and Grenada) was exceeded in St Lucia alone, it is not clear to what extent the CSFP in St Lucia really led to this increase and how much of the increase was actually due to other causes. OAS as the implementing agency was asked to review this SWH sales increase attribution issue but no information was received in this regard for this evaluation. A total of around \$120,000 was spent by the UNIDO-GSEII project on CSFP activities on St Lucia (from 2005 to 2009).

5.3 Calendar 2006

The UNIDO GSEII project received its second funding installment of \$136,175 in February 2006 from UNF/UNFIP. This second installment represented the final funds available from UNF/UNFIP until further cofinancing from other sources could be obtained, as per the UNF/UNFIP matching funds requirement of \$250,000 required to be raised for the last \$250,000 of the \$500,000 approved UNF/UNFIP funds to be fully released.

Funds amounting to \$119,291 (including UNIDO 5% project support costs) were committed (expended) during 2006. Cumulative project expenditures through to 31 December 2006 amounted to US\$ 412,191 compared to a cumulative total project budget of \$458,000 (including project support costs). This gives a utilization rate of total available funds of 90.0% from 01 November 2004 to 31 December 2006.

In terms of UNIDO-GSEII activities planned for and undertaken in 2006: work continued with the CSFP (SWH financing) project in St Lucia with a review and some fine tuning of SWH loan conditions from April 2007 (but with still only very modest success in SWH loans uptake) however no new CSFP funds were committed from UNIDO-GSEII over those funds already committed in 2004; the SEP (Sustainable Energy Plan) updating activities specified as initial project activities in the ProDoc were initiated and largely completed; and a new activity to support a bioenergy study

in St Kitts and Nevis (SKN) was initiated. Some project outreach activities were also undertaken; as well as further fundraising efforts for the UNIDO-GSEII project and for two proposed successor projects (one policy-focused project led by OAS and one technically focused SWH project led by UNIDO).

1. Sustainable Energy Plans (SEPs) were a key design feature of the UNIDO-GSEII project. Accordingly, in 2006 work started on updating the existing SEPs (dating back to earlier work from 2001/02 undertaken by OAS) for Dominica and Grenada with their original SEPs completed in 2003, and for St. Lucia with its previous SEP being adopted by Cabinet in 2005.

Work started in May 2006 under the UNIDO-GSEII project on developing the first ever formal SEP for the St Kitts and Nevis Federation (SKN). Three reports were produced comprising “Toward a Sustainable Energy Plan”, a Draft Sustainable Energy Plan and a Draft of a National Energy Policy Template. However, the evaluation found no evidence that the SKN government endorsed any final SEP. The budget for this SKN SEP was \$50,000, OAS undertook the work, and \$15,000 of the budget from the Government of Italy and \$35,000 was provided by the UNIDO-GSEII project. More work was subsequently undertaken under the OAS led CSEP successor project (funded by the EU) to update this SEP for SKN. However, during the evaluation mission in May 2010, the primary focus of the government of St Kitts was clearly on using the Petrocaribe¹¹ scheme’s “use now and partly pay later” policy to defer full payment for the diesel used by the government (in particular that used for power generation). No evidence could be found that the UNIDO-GSEII SKN SEP had led to any tangible RE or EE changes in St Kitts.

In contrast, the government of Nevis (the autonomous Nevis Island Administration – NIA – the smaller and autonomously governed island of the SKN Federation) was very focused on the practical uptake of renewable energy (RE) to reduce diesel used for power generation. A 2.2MW fully privately funded wind farm has been supplying electricity to the Nevis grid since July 2010 at a cost lower than the diesel cost of the baseline power generation alternative. A fully privately funded 10MW geothermal energy development is also underway in Nevis. However, it is not clear how much the SKN SEP contributed toward the wind and geothermal development in Nevis as the SKN SEP outputs and recommendations were very general and did not identify the specific wind and geothermal developments subsequently undertaken in Nevis, nor did the SKN SEP identify the need for professionally developed RE resource laws and proper PPA (Power Purchase Agreements) as key RE enabling steps. As Nevis is administered rather autonomously

¹¹ Petrocaribe S. A. is a Caribbean oil alliance with Venezuela to purchase oil on conditions of preferential payment.

from the SKN Federation, it is also not clear if any SKN SEP could ever have reasonably been expected to be very meaningful for Nevis.

2. The St Kitts and Nevis (SKN) Bioenergy Study was a replacement for the original UNIDO-GSEII activities in Grenada and St Lucia that were found to be not feasible for a variety of reasons. The context was that in December 2004 the government of SKN had formally closed their sugar industry after many years of growing financial losses. The SKN sugar industry had been at the core of the SKN economy for 350 years, had been nationalized in the 1960's, but with the loss of guaranteed prices the SKN sugar industry had been uneconomic for two decades, losing more than \$35 million per year since 2002, and had an accumulated debt amounting to \$315 million with no realistic financial turnaround in sight. However, by 2006 world oil prices were rising steadily and the government of SKN, in common with many other SIDS, was very interested in exploring new biomass or Municipal Solid Waste (MSW) alternatives for diesel used for power generation and transport fuels. In September 2006 a Stakeholders meeting was held in SKN that was led by OAS and ESG, and in December 2006 a mission to SKN presented the preliminary results and conclusions of the Biomass to Energy study to senior policymakers and stakeholders. The budget for this activity was \$57,000 (\$10,000 to come from the Government of Italy) with the work led by ESG. This work was completed in August 2007. It was found that: the cost of labor was too high; the area available for sugar production was too small; that there was insufficient flat enough land available where mechanical harvesting could be used; and the competing uses of land were more compelling for household plots for small farming by the large numbers of former sugar cane laborers. In addition, the government of St Kitts appears to instead have focused on the supply of oil from Venezuela under the Petrocaribe scheme where some of the oil cost is deferred to be paid later.

3. Work started on a Dominica, Grenada and Republic of Marshal Islands (RMI) Energy Efficient Lighting project led by CI (Climate International) that was to be funded by the UNIDO-GSEII project. The aim was for Dominica, Grenada and RMI to each receive 10,000 energy efficient CFLs (Compact Fluorescent Lamps) from Climate Care UK¹². It appears that 10,000 CFLs were received and distributed in St Lucia and RMI. It appears that the Marshalls Energy Company (MEC) installed these CFLs in RMI. However, there was an unknown level of success or sustainability of these CFLs in St Lucia and RMI. The delivery of CFLs in Dominica and Grenada from Climate Care through UNIDO-GSEII efforts did not ultimately proceed, as Dominica instead

¹² Climate Care is a UK company that sold CO2 emission reductions achieved through RE and EE projects as voluntary carbon offsets to individuals and companies.

apparently received 100,000 bulbs and Grenada apparently received 250,000 CFLs from the Cuban Government, along with technical assistance for installation and monitoring. However, the Cuban CFL project was apparently not successful due the poor quality CFLs received which meant that CFLs were not seen as a successful sustainable energy technology in Dominica and Grenada.

4. In June 2006, work started by UNIDO and its GSEII partner OAS on two project proposals (to the new EU Energy Initiative (EUEI) - ACP-EU Energy Facility) for successor projects to the UNIDO-GSEII project - whose then available funds had at that point been fully committed.

The OAS led CSEP (Caribbean Sustainable Energy Program) policy-focused proposal concentrated on expanding the work of the UNIDO-GSEII project on sustainable energy planning and successfully obtained EUR 1.4 million funding from the ACP-EU Energy Facility, for a three-year duration project in seven Caribbean countries¹³, with a start date of 01 November 2008. The stated CSEP strategy is (1) the establishment of national sustainable energy goals/targets through the adoption of Sustainable Energy Plans (SEPs), and (2) targeted support for the implementation of activities (as outlined in each national SEP), including by a range of human capacity building and institutional strengthening activities. The success of this policy focused project in obtaining EU funding tends to illustrate that donors generally like such projects, even although the earlier OAS and then subsequent UNIDO-GSEII SEP work could not show any specific actions implemented as a result of similar earlier policy and capacity building efforts.

The UNIDO-led technically-focused ACP-EU Energy Facility project proposal involved the promotion and demonstration of a regional large scale solar thermal technology deployment project for heating and cooling applications in the commercial, tourism and industrial sectors. This “Sustainable Energy Development of Caribbean Island States through solar energy technologies” technology focused project had an overall budget of EUR 1,890,257. A 25% co-financing guarantee for EUR 474,500 was approved by the UNIDO Programme Approval Committee. The UNIDO proposal passed the second evaluation stage for (February 2007) and reached but did not pass the third and final funding evaluation stage in early 2008.

5. UNIDO developed and obtained funding from the Government of Italy for a stand-alone replication of the CSFP (Caribbean Solar Financing Program) activities in Grenada. The CSFP activities in Grenada started in June 2006

¹³ St. Lucia; Dominica; Grenada; St. Kitts & Nevis; St. Vincent and the Grenadines; Antigua and Barbuda; and

and included some additional training activities compared to the CSFP in St. Lucia, including training SWH installers on best installation practices and hurricane resistant mountings. The Grenada CSFP funds were provided on a grant basis and envisaged to be part of a revolving credit facility rather than as a loan from the UNIDO-GSEII CSFP as was done on St Lucia. At the time of the evaluation it was not clear if the Grenada CSFP intervention has been successful.

6. Outreach activities in calendar 2006 for the UNIDO-GSEII project were primarily focused on the organization and delivery of a UNIDO-GSEII Side Event at the 14th Session of the UN Commission on Sustainable Development held in New York in May 2006 - where there were about 50 attendees at the side event (which was one of 63 side events). High-level representatives from island nations participated in the UNIDO GSEII Side-Event and delivered presentations and speeches. This activity was undertaken by CI (the Climate Institute) and had a budget of \$30,000, of which the Government of Italy funded \$10,000.
7. As specified in the GSEII ProDoc and 2006 working plan, an independent mid-term evaluation (MTE) of the project was supposed to be undertaken in July/August 2006. The independent MTE was initially postponed to the end of 2007 in light of various early project delays encountered and to enable the first group of UNIDO-GSEII project activities to be fully implemented, in particular the development of the SEPs and for the updated CSFP in St Lucia to have a chance to implement its mid-course changes.

5.4 Calendar 2007

In 2007 there was a pause in new project operations and a refocus of the UNIDO-GSEII project on new future project activities, primarily determined by funding availability and timing issues. By February 2007 all of the viable original UNIDO-GSEII projects were in the process of being completed, and no new projects were being initiated, as there were no uncommitted project funds available. In March 2007 the project received a contribution of \$146,000 from the Government of Austria (UE/GLO/07/009). UNIDO then convinced the UN Foundation to accept the Austrian parallel contribution to the GSEII project as matching funds to unlock an equivalent amount from the remaining UNF funds earmarked for the UNIDO-GSEII project, which amounted to a further \$146,000 USD. Thus the project then had an additional \$292,000 funding available to fund new activities to replace the four out of six original projects that had turned out to be infeasible to implement for a variety of reasons. The planning for the new project activities was completed in October 2007, and implementation started as appropriate.

The Bahamas, with Barbados as an observer country.

1. Further work was undertaken on the SKN Bioenergy alternatives with US State Department funding provided through OAS. A further very detailed biofuels study by Brazilian consultants was completed in April 2008 under the US-Brazil Biofuels Initiative for the potential use of sugar cane, jatropha and sunflowers for biofuels on St Kitts. This study found that even at the high and rising international crude oil prices then in place, that sugar cane was the most promising biofuels crop (followed by jatropha) but that only limited areas of land were suitable unless manual harvesting was used, and with the high cost of labor in St Kitts, biofuels production in St Kitts was unlikely to be economic.
2. As previously mentioned, 2007 saw the completion of the UNIDO-GSEII SEP (sustainable energy plan) activities, although the funding for this work had been committed in 2006.
3. As previously mentioned, 2007 also saw the further implementation of SWH financing support through the CSFP (Caribbean Solar Financing Program) in St Lucia and Grenada (Grenada was separately funded by the government of Italy). The funding for these CSFP activities was committed in 2006.
4. 2007 saw the cancellation of the independent mid term evaluation (MTE) that was specified in the UNIDO-GSEII ProDoc. The MTE was cancelled on UNIDO advice that a mid-term evaluation would not have been particularly useful at this stage of the project and that an MTE might also further have served to divert the project's focus on the design and implementation of the further activities using the \$292,000 of additional funding obtained in 2007. Although cost and management distraction are good arguments, an independent MTE may have helped prevent further efforts being spent on trying to get stalled projects to work, such as the CSFP in St Lucia where it was evidently not successful in spite of ongoing strenuous efforts.

5.5 Calendar 2008 - 2010

The last instalment of UNF funds were received by UNIDO in May 2008, which enabled new UNIDO-GSEII project activities to be undertaken in 2008 and 2009, and to be completed in 2010. Six new activities were undertaken as described in the following sections. The seventh proposed activity could not be undertaken for timing issues regarding the release of UNF funds and the necessary contracting lead times. This seventh activity was to be a Sub-regional meeting in partnership with the Government of Iceland to catalyze the interest of Icelandic investors and project developers in the geothermal energy resources and undertakings of a number of Caribbean SIDS, i.e. Dominica, St. Lucia and St. Kitts and Nevis.

- 1 A new UNIDO-GSEII project started in 2008 covering Energy Efficiency in Water Utilities. A US based water utilities energy efficiency consultant undertook this work. Initial work for the UNIDO-GSEII project was undertaken in Dominica, St Kitts and Nevis and then provided to a wider audience at a training workshop held in St Lucia. The project concept was developed by UNIDO in January 2007. In October 2008 data was collected from the water departments of St. Kitts and the Nevis Island Administration, and this was verified in December 2008 with the mission of the international expert on energy efficiency in water utilities to St. Kitts and Nevis, when training on pump systems optimization was also provided. Further work was undertaken in 2009 in Dominica. The budget for this work was \$55,000.

Water utilities in the OECS (Organisation of Eastern Caribbean States) region are a major energy user, and the cost of energy is a significant cost as nearly all the electricity used for water utilities' pumping is provided by diesel generated electricity. Many of the utilities are run as government departments with inadequate metering, undercharging of water, and a lack of payment from government's own water utilities usage.

The UNIDO-GSEII water utilities energy efficiency work has proved to be a very useful and highly regarded pilot project that is now available for scale up to more OECS countries and to be undertaken in more depth. This work is also a good example of UNIDO playing to its comparative advantages, in particular in motor-drive system energy efficiency where UNIDO is a recognised world-leader.

- 2 Following the work in 2007 supporting the development of a National Sustainable Energy Policy for St Kitts and Nevis (SKN) it became clear that there was a need to clarify how to deal with private developers who were interested in developing geothermal energy, as well as wind energy, on Nevis. In particular the identified need was to clarify the wind and geothermal resource ownership as being with the government, the need for any concession to develop the geothermal or wind resource to be strictly time-bound. Such an RE "use it or lose it" clause is critical to address the common problem of developers obtaining a concession and then sitting on the concession with an endless series of excuses for delays and not actually developing the RE resource (as has been the case for geothermal on Dominica) - and hence denying the resource to others who may be in a better position to successfully develop the RE resource.

The TOR for a UNIDO-GSEII funded consultancy to provide legal technical assistance to St. Kitts and Nevis on Geothermal and Wind Energy was finalised in February 2008 and by May 2008 a Draft Geothermal Resources Bill and a Draft Geothermal Developer Master Contract had been drafted by the highly

experienced and highly respected international legal expert recruited for this work. The Geothermal Resources Bill developed by the UNIDO-GSEII consultant was passed into law in Nevis in July 2008¹⁴. A geothermal commissioner has been appointed to administer the Nevis geothermal resources law. Subsequent further technical assistance provided by OAS was extremely valuable in supporting the NIA (Nevis Island Administration) in negotiating suitable wind and geothermal PPAs (Power Purchase Agreements) with private developers that would protect the interests of Nevis and ensure that electricity costs would be lower than continuing with the baseline 100% diesel generated power situation and that the wind and geothermal developers would only be paid for power they actually produced and that was provided to NEVLEC (Nevis Electricity Company Ltd).

A 2.2MW fully privately funded wind farm has been supplying electricity to the Nevis grid since July 2010 at a cost lower than the diesel cost of the baseline power generation alternative. This wind PPA is very favorable to Nevis as it has no inflation clause and it only commits NEVLEC to take 1.1MW of wind power (representing a conventional maximum 20% wind power fraction at NEVLEC's 5.5MW minimum load level) - with any more windpower that is taken above 1.1 MW being entirely at NEVLEC's discretion. A 10MW geothermal energy development is currently also being developed by a private promoter on Nevis.

There is little doubt amongst geothermal experts that Nevis has an excellent geothermal resource and that geothermal base load power can in principle be produced and can be competitive with diesel based power generation on Nevis - as is the case of the nearby French island of Guadeloupe. However, it is not clear if the current geothermal project promoter (WIP – West Indies Power) has really adequately proven the necessary geothermal resource for 10MW of base load geothermal power through the three slimline test wells that have been drilled, as it appears that there have been less than convincing results. However, it is hard to know for sure whether a specific production-ready 10MW geothermal resource has really been proven as no independent (aside from WIP claims and press releases) test data results or assessment is apparently available. It is also not clear if WIP actually has the full necessary level of committed funding in place to physically build a 10 MW operating geothermal plant on Nevis. The geothermal PPA in place committed WIP to having a 10MW geothermal power plant in place and selling power to NEVLEC by December 2010 or the concession was to have been automatically cancelled. This deadline has already been extended several times by the Nevis Island Administration

¹⁴ See <http://www.caribbeanpressreleases.com/articles/3280/1/OAS-and-UNIDO-Experts-Help-With-Nevis-Draft-Geothermal-Legislation/Appropriate-legislation-important.html> and <http://www.renewableenergyworld.com/rea/news/story?id=52887>.

(NIA), and it is now claimed that the plant will be in place by early 2012¹⁵. It is hoped that either the WIP geothermal project is successful or that NIA will cancel the concession and let other developers have a chance to develop the geothermal resource - rather than allow the Nevis geothermal resource to be tied up indefinitely.

The UNIDO-GSEII budget for this geothermal and wind resources law work was \$65,000, supplemented by additional funding for geothermal and wind PPA negotiation support from OAS. The evaluation feedback was that this UNIDO-GSEII and OAS funded work was critical in the success of the wind project, as well as ensuring that Nevis keeps pressure on the current geothermal developer to either produce a working 10MW geothermal in a timely manner or get out of the way and let other potential developers come in and access the geothermal resource. The resolve of NIA in actually enforcing the time bound nature of the Nevis geothermal resource development with WIP could be the critical factor in the ultimate success of developing base load power generation and hence independence from volatile and generally rising international oil prices on Nevis.

- 3 Grenada "Sustainable and Energy Efficient Housing Program". Earlier UNIDO-GSEII work had supported the development of a Grenada SEP (Sustainable Energy Policy) to underpin the rebuilding necessary after the devastation of Hurricane Ivan in September 2004. However, the Grenada SEP work did not seem to make much of an impact, due apparently to a lack of real local ownership of the process and the results, and due to political changes that have apparently not been properly addressed in the OAS updated SEP. One element that came out of the earlier UNIDO-GSEII funded SEP updating exercise in 2006-07 was the opportunity for more sustainable housing technologies to be utilised in the ongoing Grenada post-Hurricane Ivan housing rebuilding. Following November 2009 and March 2010 GSEII missions, it was decided that an Earth Home would be built as a model home for a future middle income sustainable and energy efficient housing program. This model home was to be completed by October 2010. The Earth Home uses clay with Portland cement and white lime instead of the concrete block or reinforced concrete construction used in most middle or higher value homes in Grenada (lower income people use treated and painted plywood which with suitable Hurricane clips on the roof has proven to be suitably hurricane resistant. The Earth Home construction would be more breathable than concrete but would be a comparable cost, presumably such Earth Home construction can be designed to withstand earthquakes too. Training and awareness elements will be implemented once the model home is built. The UNIDO-GSEII budget for this activity was \$30,000.

However, any Earth Home technology in Grenada replication is likely to be

¹⁵ See <http://thinkgeoenergy.com/archives/6910>

extremely slow even with substantial ongoing support, and mass uptake or significant market transformation is highly questionable¹⁶ - as Earth Homes are not a mainstream construction technology in any developed country, and it is therefore hardly realistic to expect them to become a significant construction technology in Grenada either.

- 4 Policy and legal technical assistance to St. Lucia on geothermal and wind energy. The consultant used in Nevis to successfully develop the wind and geothermal resource laws and support the development of suitable PPA's with NEVLEC was engaged to review past unsuccessful wind and geothermal energy development efforts and recommend a way forward to develop the clearly promising wind and geothermal resources on St Lucia. This is a highly relevant activity and builds on past successes in this area and utilises the same proven consultant successfully used in Nevis. The budget for this activity was \$30,000. Depending on the commitment of the government of St Lucia and the relevant power utility (LUCELEC) to make and implement the necessary decisions, this could be a very promising area for the UNIDO-GSEII project to spend the \$46,000 St Lucia CSFP funds that were not expended in spite of being formally committed and in spite of ongoing and strenuous effort over nearly 6 years (in fact the clear CSFP failure on St Lucia should have been abandoned much earlier instead of keeping spending time and money trying to make a clearly unsuccessful project somehow work by working harder with the same fundamental approach).
- 5 Demonstrating and promoting grid-tied photovoltaic systems in St. Lucia. The objective of this task was to promote and support deployment of grid-connected PV systems in St. Lucia and other SIDS in the region by demonstrating the technical and economical viability of grid integration of renewable energy sources. However, the LUCELEC power utility on St Lucia did not show any real interest in implementing a suitable interconnection policy to connect the already installed three major PV systems on the island to the grid. This is not entirely surprising as LUCELEC is apparently not really very interested in private sector RE, as this would dilute their monopoly supply of electricity, nor are LUCELEC apparently keen to invest their own capital and take on extra debt for RE when they can just continue to enjoy comfortable revenue with their current diesel based grid. While this hypotheses has not been confirmed by LUCELEC, this was clear from their actions and their lack of interest was reasonably easy to

¹⁶ See <http://erc.undp.org/evaluationadmin/downloaddocument.html?docid=1776> for the final evaluation by the author of super insulated buildings in Mongolia, in particular where a completely new building technology of straw bales was promoted (although straw bales were not in fact a mainstream construction technology anywhere in the world). Although straw bale buildings are relevant and highly effective in Mongolia, only a modest replication rate was achieved. In contrast, ger insulation blankets are achieving mass uptake, as they are a variant of an accepted extra insulation approach in traditional Mongolian nomad extended family housing in portable felted wool tents (ger).

determine when talking off-the-record with key people in St Lucia and in the region and examining their incentive structure. So St Lucia is probably not in practice a very promising location for this activity.

Therefore this PV interconnection activity was instead moved to Grenada, where the local power utility GRENLEC in 2008 developed and implemented their interconnection policy that also allows net metering for RE systems of up to 10kW. This policy was also partly due to the Grenada Government's working with GSEII and aggressive efforts to promote renewable energy policy in Grenada. The budget for this activity was \$30,000.

- 6 Support for the 2009 St Lucia energy week. This activity formed part of the project's work on raising the awareness of sustainable energy in the relevant SIDS. The UNIDO-GSEII project funded CI (the Climate Institute) to assist the Government of St. Lucia in organizing their annual Energy Week in November 2009. The theme of the St Lucia energy week was "Combating Climate Change through Renewable Energy and Energy Efficiency." As is common with such activities, no specific impacts can be evaluated from such support. The budget for this activity was \$10,000.

5.6 Activities and related funds allocation

Activity – Sub-activities	Time Period	Relevant Project Objectives	Approx Cost USD	Outputs	Measurable Outcomes
1. Mauritius International Meeting on SIDS	Jan 2005	4. Outreach and funds mobilization for SIDS	30,000	<ul style="list-style-type: none"> ➤ Side-event delivered ➤ Raised awareness of UNIDO-GSEII 	<ul style="list-style-type: none"> ➤ Additional Italian funding (€200,000) mobilized for Grenada (CSFP)
2. DOMLEC Loss Reduction Study	May-Oct 2005	1. Development and implementation of SEPs	40,000	<ul style="list-style-type: none"> ➤ Power loss reduction study carried out ➤ Strengthened capacity of DOMLEC staff 	<ul style="list-style-type: none"> ➤ Study recommendations largely implemented by DOMLEC ➤ Losses decreased from 18% to 10% - 1/3 reduction from loss reduction study measures, 2/3 from new electronic meters installed - on track to 4.5% losses

Activity – Sub-activities	Time Period	Relevant Project Objectives	Approx Cost USD	Outputs	Measurable Outcomes
3. Caribbean Solar Finance Program in St. Lucia	Sept 2005 - Mar 2010	1. Development and implementation of SEPs 2. Build local capacity for RE & EE 3. Catalyze private investment in RE & EE	130,000		Number of SWH systems sold in St. Lucia has doubled since beginning of CSFP, but attribution to UNIDO-GSEII actions is unclear. Further data collection and analysis needed.
3.1. Training of Credit Unions lending personnel	Sep 2005		33,000	a. Training manual on lending for SWH systems produced b. Workshop held and 11 officers from 10 credit unions trained	➤ Two credit unions (Workers and Hospitality) issued SWH (solar water heating) loans as result of the training and awareness campaign, initially without using the lending facility
3.2. Awareness and Promotion Campaign	Dec05–Feb06, Oct06–Feb07, Jul07-Aug07		12,000	a. 3 advertising campaigns carried out through radio, TV, and print media b. Increased public awareness of cost effectiveness of SWH	Further analysis to be done (July 2010) to better estimate the impact of the CSFP Awareness and Promotion campaign on the doubling of SWH sales during the CSFP execution period
3.3. Pilot lending facility	Dec 2005 – Mar 2010		85,000 (46,000 loan)	a. Pilot lending facility to offer discounted and longer-term loans for SWH purchase by credit unions' members established	➤ 4 loans issued by two credit unions making use of the CSFP pilot lending facility. ➤ About \$40,000 to be returned to the UNIDO-GSEII project
4. Side Event at UN CSD14	Mar-May 2006	4. Outreach and funds mobilization for SIDS	20,000	➤ Side-Event delivered ➤ Raised awareness on project	Measurable outcomes not known.

Activity – Sub-activities	Time Period	Relevant Project Objectives	Approx Cost USD	Outputs	Measurable Outcomes
5. Review of Sustainable Energy Plans (SEP) in Dominica and St. Lucia	Apr 2006 – Mar 2007	1. Development and implementation of SEPs 2. Build local capacity for RE and EE	30,000	<ul style="list-style-type: none"> ➤ SEPs revised and submitted to Governments 	No measurable outcomes.
6. Energy Efficiency Lighting Program Support (St. Lucia, Dominica, Grenada and Marshall Islands)	Jun 2006 – Jun 2007	1. Development and implementation of SEPs	40,000	<ul style="list-style-type: none"> ➤ 10,000 EE bulbs deployed in St. Lucia ➤ 5,000 EE bulbs deployed in Marshall Islands ➤ Work in Dominica and Grenada did not lead to EE bulbs deployment due to much larger Cuban TA program 	Information about the impact of the UNIDO-GSEII initiated EE bulbs installed is not known. Cuban supplied EE bulbs (CFLs) apparently poor quality and almost certainly had negative impact on credibility of CFLs.
7. Development of Sustainable Energy Plan in St. Kitts and Nevis	May 2006 – Oct 2007	1. Development and implementation of SEPs 2. Build local capacity for RE and EE	55,000	<ul style="list-style-type: none"> ➤ Raised awareness of local stakeholders about SKN sustainable energy development needs and opportunities ➤ SEP developed through a Federation-wide stakeholders consultative process and submitted to SKN Government 	<ul style="list-style-type: none"> ➤ Wind and Geothermal energy resources development in Nevis followed SKN SEP development, but actual linkage unclear. ➤ Foundation work for subsequent OAS-CSEP policy development activities
8. Detailed study on Bio-energy potential in St. Kitts and Nevis	May 2006 – Nov 2007		65,000	<ul style="list-style-type: none"> ➤ Detailed Bioenergy study carried out ➤ Enhanced understanding of Bioenergy potential in SKN with local 	<ul style="list-style-type: none"> ➤ St. Kitts and Nevis included as recipient of TA under the US-Brazil Biofuels Initiative ➤ No biofuels development

Activity – Sub-activities	Time Period	Relevant Project Objectives	Approx Cost USD	Outputs	Measurable Outcomes
				stakeholders	followed
9. Promotion of Sustainable Energy Housing in Grenada - Workshop	Sep 2006	2. Build local capacity for RE & EE 3. Catalyze private investment in RE & EE	20,000	<ul style="list-style-type: none"> ➤ Workshop on Sustainable housing delivered ➤ Raised awareness and enhanced local stakeholders understanding 	<ul style="list-style-type: none"> ➤ Request for further TA support to develop a "Sustainable and Energy Efficient Housing Program"
10. Development of UNIDO and OAS led project proposals for EU ACP Energy Facility	May-Sep 2006	4. Outreach and funds mobilization for SIDS	20,000	<ul style="list-style-type: none"> ➤ OAS proposal on sustainable energy policy development and institutional strengthening was successful and is being implemented ➤ UNIDO proposal on solar thermal technology for large-scale heat and cooling applications in the hotel, public and industrial sectors submitted, reached final stage but not funded 	<ul style="list-style-type: none"> ➤ OAS Caribbean Sustainable Energy Program (CSEP) continues (with 3 additional SIDS) sustainable energy policy/plan development and implementation work ➤ As result of UNIDO project development work, Austrian solar thermal technology provider (S.O.L.I.D) project partner has established a commercial partnership with a Jamaican company, delivered training to Jamaican personnel, developed several project proposals, and set up a network of service

Activity – Sub-activities	Time Period	Relevant Project Objectives	Approx Cost USD	Outputs	Measurable Outcomes
					providers in Central America
11. Policy and legal TA on Geothermal and Wind energy to St. Kitts and Nevis	Mar-Oct 2008	1. Development and implementation of SEPs 3. Catalyze private investment in RE & EE	65,000	<ul style="list-style-type: none"> ➤ Geothermal Energy Resources Law for Nevis developed ➤ Master Power Purchase Agreement between NEVLEC (Nevis Power Utility) and Geothermal and Wind Energy Project Promoters developed and signed 	<ul style="list-style-type: none"> ➤ Geothermal Energy Resources Law passed by Nevis Island Administration in July 2008 ➤ Power Purchase Agreement between NEVLEC and Geothermal Developer signed. Test wells drilled, but results unclear. Drilling of production well planned ➤ Power Purchase Agreement between NEVLEC and Wind Developer signed, 2.2. MW wind farm constructed and supplying energy to grid
12. Energy Efficiency in Water Utilities	Jan-Dec 2009	1. Development and implementation of SEPs 2. Build local capacity for RE & EE	55,000	<ul style="list-style-type: none"> ➤ Training on energy management, field measurements and pump system optimization delivered to 3 water utilities (Dominica, St. Kitts, and Nevis) ➤ Measuring equipment provided to 3 water utilities ➤ Benchmarking exercise 	<ul style="list-style-type: none"> ➤ Energy Management Plan developed and established by 3 water utilities (Dominica, St. Kitts, and Nevis) ➤ Some EE measures/projects developed and implemented ➤ Project proposal for

Activity – Sub-activities	Time Period	Relevant Project Objectives	Approx Cost USD	Outputs	Measurable Outcomes
				<ul style="list-style-type: none"> ➤ Regional workshop on EE in water utilities delivered (St. Lucia) 	follow-up TA and expansion of the program to other SIDS being developed
13. Support to the development of a “Sustainable and Energy Efficient Housing Program” in Grenada	Oct 2009 – Oct 2010 Not finished yet	1. Development and implementation of SEPs 2. Build local capacity for RE & EE 3. Catalyze private investment in RE & EE	30,000	<ul style="list-style-type: none"> ➤ Sustainable and EE Housing concept promoted with relevant Grenada stakeholders ➤ Sustainable and EE model home (Earth Home) built (end of summer 2010) ➤ Business plan for multi-units sustainable housing programs developed (end of summer 2010) 	<p>Expected outcomes:</p> <ul style="list-style-type: none"> ➤ Housing developers in Grenada incorporate, entirely or partially, the Earth Home model in some of their new developments <p>Additional possible outcomes:</p> <ul style="list-style-type: none"> ➤ Training program to be initiated with the help of local contractors association ➤ Awareness campaign to be launched with support for the Government and other partners
14. Policy and legal TA on Geothermal and Wind energy to St. Lucia	Oct 2009 – Oct 2010 Not finished yet	1. Development and implementation of SEPs 3. Catalyze private investment in RE & EE	30,000	<ul style="list-style-type: none"> ➤ Policy and legal framework, and agreements in place for Wind and Geothermal Energy Resources development in St. Lucia reviewed by international expert 	<p>Expected outcomes:</p> <ul style="list-style-type: none"> ➤ Reactivation of Wind and Geothermal energy developments in St. Lucia ➤ Development of a sound private sector investment conducive regulatory framework
15. Demonstration	Oct 2009 –	1. Development	30,000	<ul style="list-style-type: none"> ➤ Raised awareness of 	Expected outcomes:

Activity – Sub-activities	Time Period	Relevant Project Objectives	Approx Cost USD	Outputs	Measurable Outcomes
of On-grid PV project in St. Lucia	Dec 2010 Not finished yet	and implementation of SEPs 3. Catalyze private investment in RE & EE		local stakeholders about techno-economic feasibility of residential On-Grid PV ➤ Promotion of PV with local stakeholders ➤ Pilot 1.5 kW PV system installed	➤ Support of residential PV systems connection-to-the-Grid policy in Grenada (instead of in St Lucia) ➤ Increased deployment of On-Grid PV systems in Caribbean SIDS
16. Support Energy Week in St. Lucia	Oct-Nov 2009	1. Development and implementation of SEPs 2. Build local capacity for RE & EE	10,000	➤ Support provided to raise RE and EE awareness with students and the general public in St. Lucia	Measurable outcomes not known.
Total			670,000		

6. Assessment

6.1. Relevance

The increased uptake of renewable energy and energy efficiency (sustainable energy) is clearly relevant to the four Caribbean countries that were the focus of the UNIDO-GSEII project, as well as for the wider community of SIDS (Small Island Developing States). Donors such as UNF/UNFIP (the core funder of the UNIDO-GSEII project) can be found who will support such sustainable energy activities, and UNIDO has a core competence in (industrial sector) sustainable energy project design, fundraising and project management. All the specific activities in the UNIDO-GSEII design, and all those later added to replace the activities that were not able to be implemented for a variety of reasons, were also (in principle) relevant sustainable energy activities. Hence, in principle, UNIDO-GSEII is a relevant initiative for UNIDO to initiate and manage (at least for its industrial sector focussed components) and for UNF/UNFIP and the other project donors to fund in the applicable four eastern Caribbean countries.

However, in retrospect, the project started off with important relevance weaknesses in its design. In particular, there were implicit assumptions made that: (1) Sustainable Energy Plans/Policies (SEPs) would intrinsically be relevant as it was assumed that

implementation actions would automatically follow such SEPs being endorsed by the appropriate government; (2) that for increased sales of solar water heater (SWH) the most relevant target was middle income households and that the best way to increase sales was to slightly reduce the interest rate on SWH loans provided through credit unions; (3) that relevant power utilities (regardless of whether they were private sector owned and/or commercially focussed or not) would automatically want to implement sustainable energy initiatives in spite of having automatic diesel fuel price pass-through mechanisms already in place (through which high oil prices do not provide an incentive for switching to RE) and also in spite of their business model being to only sell kWh of electricity; and (4) that UNIDO could rely on the expertise of its GSEII project partners with regard to ensuring the relevance of its non-industrial sector sustainable energy components.

From this independent terminal evaluation (ITE) it has become clear that the most relevant individual activities undertaken under the UNIDFO-GSEII project were those that seem to have been initiated by UNIDO once the project was underway – hence benefiting from an inception or “learning” phase - and where UNIDO had a comparative advantage and particular expertise - in particular the Dominica electricity utility loss reduction study, the water utilities energy efficiency project, and the Nevis wind and geothermal resource law, concession agreement and power purchase agreement (PPA) support. In fact, it seems that more resources should have been devoted to these activities with particular UNIDO expertise and comparative advantage and less resources should have been devoted to those activities where UNIDO had to rely on its project partners to determine the relevance of specific activities.

The UNIDO-GSEII work on sustainable energy policies (SEPs), solar water heater (SWH) financing, and energy efficient housing / earth buildings (Grenada) were all in-principle relevant sustainable energy activities but have produced less than promising results and notably they are all activities where UNIDO had the least in-house expertise and comparative advantage. The work on wind power, geothermal and PV support in St Lucia is in principle relevant, but in practice the relevant utility (LUCELEC) apparently does not really seem very interested and the government apparently does not seem inclined to force LUCELEC to implement serious RE options, so the relevance of this work for St Lucia is unclear.

The UNIDO-GSEII project’s field of activity is relevant to UNIDO in general terms since it fits into the UNIDO programmes of renewable energy and energy efficiency. However, the way UNIDO-GSEII activities have been planned and implemented has sometimes reduced their relevance as there was not any explicit explanation of how the interventions were expected to contribute to the process of sustainable industrial development (e.g. through capacity building of institutions engaged in renewable energy, through the replication of demonstration projects, through the provision of

energy for productive uses, and so forth).

Overall, the UNIDO-GSEII activities undertaken are assessed to be of satisfactory relevance.

6.2. Efficiency

The efficiency of UNIDO-GSEII throughout its operations was generally very high. The UNIDO-GSEII ProDoc was developed in a reasonably short period of time (around six months), the ProDoc contained a suitable list of proposed activities that had been developed to a pre-feasibility study (PFS) level of detail, and the ProDoc had a contingency plan in place in the event of only partial initial funds mobilisation. UNIDO had partnered with OAS who obtained initial co-funding of \$104,000 for the project, and thus the project was implemented from late 2004 with a project budget of \$458,000 (including project support costs). The initial programmed activities were initiated in a very short time period, those activities that were no longer relevant were quickly put aside, and substitute activities were initiated in a timely fashion. Expenditure of around 90% of that budgeted was achieved in each respective calendar budget year. Where there were delays in implementation of particular activities, such as in the development of SEPs, this seems to have been primarily for activities that were being implemented by UNIDO-GSEII project partners and not by UNIDO itself, and as such were less under the direct control of UNIDO. By February 2007 the existing funds had been nearly fully spent.

In March 2007 the project received a contribution of \$146,000 from the Government of Austria. UNIDO then convinced the UN Foundation to accept the Austrian parallel contribution to the GSEII project as matching funds to unlock an equivalent amount from the remaining UNF funds, thus an additional \$292,000 became available to fund new activities. The planning for seven new project activities was completed in October 2007, which represents very efficient work by UNIDO. The last instalment of UNF funds was received by UNIDO in May 2008, and this then enabled six (out of the seven) new project activities to be undertaken in 2008 and 2009 and completed in 2010.

In terms of efficiency, the UNIDO-GSEII project seemed to be generally very efficiently implemented. The feedback from stakeholders in the four Caribbean countries covered by UNIDO-GSEII operations was that UNIDO was at least as easy to deal with as other comparable development organisations or donors and that UNIDO was suitably responsive.

In terms of efficiency the UNIDO-GSEII project is thus assessed as very satisfactory.

6.3. Effectiveness and Impact

The effectiveness and impact of UNIDO-GSEII activities varies across the different individual initiatives supported by the project.

The sustainable energy plan (SEP) activities do not seem to have been very effective in general, largely due to serious questions of their relevance in leading to practical and implemented sustainable energy changes. However, such SEP activities are generally regarded favourably by donors as evidenced by OAS successfully obtaining funding to continue the UNIDO-GSEII SEP development work. This further funding is in spite of two phases of SEP development by OAS (the second phase being under the UNIDO-GSEII project) which has not seemed to lead to any tangible implemented sustainable energy impacts. Other evidence of the limited practical effectiveness of the SEP work done under the UNIDO-GSEII project is that UNIDO and the recipient governments struggled to provide the evaluator with copies of the finalised SEPs produced by the UNIDO-GSEII project. It is possible that the St Kitts and Nevis (SKN) SEP may have indirectly led to the later highly effective work on wind and geothermal laws and PPA in Nevis, but even this is not very certain as Nevis is administered rather autonomously from St Kitts and it does not seem likely that the SKN SEP, which concentrated mostly on St Kitts, would have been used as a guide for concrete action in Nevis.

The solar water heating (SWH) financing support activities (the CSFP or Caribbean Solar Financing Program) on St Lucia did not seem to be very effective in a direct sense as it seems that only four SWH loans were made directly through UNIDO-GSEII actions in spite of around \$100,000 being spent on this activity. The delays in implementing the CSFP in St Lucia did not come from a lack of UNIDO efficiency in implementation of the activity, but were due to the intrinsic difficulty of implementing any new financing activity, a number of questionable design assumptions made, an attempt to fine-tune the activity rather than to radically simplify it, and a lack of re-examination of its target market for SWH growth. Even the subtle shift from the ProDoc defined SWH target market of middle-income households to low-middle income households during implementation is probably not the primary cause of its lack of direct financing uptake success. It is quite possible that the marketing and awareness components of this activity did contribute towards the positive impact achieved of doubled SWH annual sales in St Lucia, however there was no evidence of any linkage between the awareness and the finance components, in spite of this being asked for during the evaluation from the implementing agency, namely OAS. In September 2005 parallel funding from the Government of Italy enabled work to start on similar CSFP SWH financing support activities in Grenada, but given that the Grenada CSFP design and target market were substantially similar to the CSFP implemented under UNIDO-GSEII in St Lucia, no greater effectiveness and direct

impact can be expected of the CSFP initiative in Grenada.

The DOMLEC (Dominica) electricity loss reduction study and the water utilities energy efficiency support activities have been effectively implemented and have achieved some initial impact during the UNIDO-GSEII project's operational phase. However, in both cases an increased budget and an extended time frame for the intervention would have greatly increased their impact. Both activities were more aligned with UNIDO's area of comparative advantage, and both activities would have been good candidates for being extended to further countries. The DOMLEC loss reduction study could have been usefully replicated to other countries in the second phase of UNIDO-GSEII projects from 2007 onwards. The water utilities work could usefully have had funds re-prioritised to support further work in this area. This could have utilised UNIDO's world leading work on improving the energy efficiency of motor-drive systems as well as the development of company or institution-wide energy management programmes through UNIDO's leading role on the development of Energy Management Standards.

The SKN bioenergy study funded by the UNIDO-GSEII project and the subsequent separate US State Department funding through OAS for a very detailed biofuels study by Brazilian consultants were not ultimately effective in making a case for a refocused bioenergy activity on St Kitts to replace its closed sugar industry. However, this lack of impact should not be judged too critically, as with the seemingly inexorable rise in oil prices at the time such a review of biofuels options for SKN was both timely and prudent.

The UNIDO-GSEII geothermal and wind resources law development technical assistance for Nevis has been very effective and has already achieved a significant positive impact with the success of a 2.2MW privately funded wind farm that is now commissioned and successfully supplying electricity to the grid on Nevis. The geothermal development prospects in Nevis are in principle very promising, with three test wells drilled and a production well underway, although this production well drilling start has been delayed several times. Having an appropriate geothermal resources law in place has been very effective in setting up the terms of the Nevis geothermal concession to protect the interests of Nevis. The geothermal concession explicitly states that the developer has to develop the resource to produce the agreed 10MW of electrical output to a tight timeframe or otherwise the concession can be cancelled. However, the project is already running late, it has already had several project extensions, and it is not clear if the test wells actually proved the necessary geothermal resource required for ongoing sustainable 10MW of geothermal operation. It may be that the key success factor will be the willingness of the NIA (Nevis Island Administration) to cancel the current geothermal concession if delays continue and then reopen the concession to other developers who may be in a better position to complete the project to a defined timescale.

The policy and legal technical assistance to St. Lucia on geothermal and wind energy was developed late in the UNIDO-GSEII project and in principle is a highly relevant activity by the same consultant as in Nevis to develop the wind and geothermal resource laws and support the development of suitable PPA's with NEVLEC (Nevis Electricity). It is not clear how effective this activity on St Lucia has been to date, but there is a risk that the government of St Lucia may not be prepared to free up the land for wind and geothermal resource development from existing or proposed land users or concession holders, nor to ensure that the relevant power utility (LUCELEC) actually implements any resulting PPA's.

Overall, the UNIDO-GSEII project in regard to effectiveness and impact is assessed as satisfactory

6.4. Sustainability

Overall, the sustainability of the UNIDO-GSEII projects interventions varies among the different initiatives.

Some activities, such as the DOMLEC electricity loss reduction study have already led to sustainable results that will far exceed those that were envisaged - with losses already down at the expected 10% level and on track to be reduced to 4.5%. Most of the extra loss reduction impact has come and will continue to come from a reduction in non-technical losses rather than from the technical losses that were the narrow objective of the UNIDO-GSEII funded study. However, the UNIDO-GSEII intervention was clearly the catalyst for DOMLEC seriously starting work to reduce all types of losses.

The UNIDO-GSEII project supported Nevis wind project is very likely to be sustainable, however there is always a risk of wind turbine cyclone damage even with the use of wind machines that can be quickly lowered to avoid extreme wind exposure. The turbines being used are fairly conventional and proven Vergnet 275kW models that are widely used in hurricane and cyclone prone islands, so there is a good prospect of a reasonable wind turbine service life being achieved.

The now doubled solar water heater (SWH) sales level in St Lucia are probably sustainable, and an unintended but very positive development is the emergence of a new supplier using a different (evacuated tube) technology to provide strong competition for the incumbent flat plate collector manufacturer. However, it remains unclear as to what extent the UNIDO-GSEII supported Caribbean Solar Financing Program (CSFP) activity contributed to these doubled SWH sales figures.

It is still too early to say if the Nevis geothermal project will be sustainable as it is not producing any grid power yet. The production wells do not yet appear to be drilled, so

it is not clear if the necessary geothermal resource will eventuate, let alone if the promoter really has the necessary funds for the geothermal power plant development phase. It is not yet clear if in the event of the current Nevis geothermal promoter continuing with development delays that the NIA (Nevis Island Administration) will exercise its powers under the geothermal concession to void the current concession and open up the development to other developers who may be more able to properly test the geothermal resource and bring it into production.

It is not yet clear if the very useful early work undertaken by the UNIDO-GSEII project on Caribbean water utilities energy efficiency will prove to be sustainable. Whether the initial highly appreciated work under UNIDO-GSEII proves to be sustainable largely depends on some project proponent obtaining the necessary multi-year ongoing donor funding support to remove the many barriers faced by water utilities in a comprehensive and integrated fashion. In particular, the Caribbean water utilities face major governance issues around their generally government ownership and their revenues often going directly to the government and with government users often not paying for their water use, as well as major structural issues with their water tariffs being held at unrealistically low levels.

The sustainable energy plans (SEP) upgrading (and in the case of SKN the production of its first ever SEP) activities supported by the UNIDO-GSEII project may ultimately contribute towards sustainable clean energy investments that make a tangible impact. However, any attribution of the ultimate impact to the UNIDO-GSEII SEP work will be very indirect and will be only one contribution amongst three phases of SEP development and many other drivers to the tangible sustainable energy project implementation of any SEP policy or target.

For the Grenada Sustainable and Energy Efficient Housing Program and its proposed construction of a demonstration Earth Home, it is too soon to tell how sustainable this will be. However, that probability of earth homes being a significant future housing technology in Grenada is not high. Radically new housing construction methods are generally a very conservative area of technology uptake as a home represents one of the largest investments that most people make in their whole life. It is also not clear that earth homes offer major advantages from the owner's perspective over conventional reinforced concrete or concrete block construction technologies. Finally, earth homes do not seem to be a mainstream construction method anywhere in the world yet, so expecting a single modest intervention in Grenada to kick-start the technology to mainstream Grenada status appears to be unrealistic.

The study of the bio-energy potential on St Kitts and Nevis (SKN) led to the more detailed US-Brazil Biofuels Initiative, although ultimately a new biofuels industry was not initiated in SKN. However, in the context of the rapidly and apparently inexorably

rising oil prices at the time, just producing the two studies and getting the SKN government to look at the key issues involved can be seen as a useful impact from this work.

As for the St Lucia wind and geothermal technical assistance, it is not clear what results have yet been achieved. This is a very useful enabling activity that potentially could unlock the clear wind potential in St Lucia that has been held up by land ownership and priority uses issues. A contract has apparently been signed in July 2010 between the government of St Lucia and a geothermal developer to start geothermal field drilling within 18 months or lose its concession¹⁷. This time-bound contract may be a positive result of the UNIDO-GSEII technical assistance, in which case this could be a sustainable development for reasons similar to those stated above for the Nevis geothermal development support activities from the UNIDO-GSEII project.

For the various outreach activities, the UNIDO-GSEII participation at the Mauritius Meeting on SIDS in January 2005 apparently led to the project obtaining additional Italian government funding of EUR 200,000 for the Grenada CSFP (SWH financing) activities. Given that it is not reasonable to expect every outreach activity to lead to tangible results, this is a reasonable level of outreach activity impact achieved.

A final area of project sustainability and impact is the success or otherwise of obtaining funding for suitable follow-on projects. The OAS led CSEP (Caribbean Sustainable Energy Program) policy-focused proposal successfully obtained EUR 1.4 million funding from the ACP-EU Energy Facility for a three-year duration project in seven Caribbean countries - to expand the work of the UNIDO-GSEII project on sustainable energy planning. The UNIDO-led technically focused solar heating and cooling deployment project proposal involved the promotion and demonstration of a regional large-scale solar thermal technology deployment project and obtained EUR 474,500 funding from UNIDO. Although the project proposal reached its last evaluation stage, it was unsuccessful in obtaining the balance of its EUR 1,890,257 funding from the ACP-EU Energy Facility and therefore did not proceed any further. Obtaining funding for one out of two follow-on project proposals is a respectable success rate and means that at least the sustainable energy policy work of UNIDO-GSEII will be sustained through its successor CSEP project.

Overall, this area of project sustainability and impact is thus assessed as being satisfactory.

¹⁷ http://www.huffingtonpost.com/2010/07/27/st-lucia-geothermal-energy_n_660401.html

7. Recommendations

The UNIDO-GSEII project comprised a wide portfolio of individual project activities in four eastern Caribbean countries. The project activities originated from a variety of sources, namely: (a) from UNIDO project partners' work under the wider GSEII project development umbrella prior to UNIDO's involvement in 2002 (in particular work on sustainable energy plans – SEPs for three Caribbean countries); (b) from UNIDO project partners' areas of focus where UNIDO deferred to the project partner's analysis (and their assumptions) underlying the particular activity (e.g. the Caribbean Solar Financing Program for SWH); (c) activities where UNIDO and project partners seem to have jointly shared responsibility for the design; and (d) activities developed by UNIDO in the ProDoc (e.g. Dominica loss reduction study) or in 2007 when \$292,000 of new funds became available (e.g. Nevis geothermal and the wind resource law and PPA and water utilities energy efficiency study).

Some of the UNIDO-GSEII project activities fell within UNIDO's particular skills and expertise (UNIDO comparative advantage) of: design of industrial sector focussed sustainable energy applications/activities and packaging into an integrated project; project fundraising; managing procurement/contracting on consultants etc; and project implementation management. However, many of the UNIDO-GSEII individual activities did not make particular use of UNIDO's areas of comparative advantage – and these were generally the projects that were less successful.

There is also an issue of the integration of the activities undertaken under the UNIDO-GSEII project, in particular whether there should have been a greater integration or whether the UNIDO-GSEII project by necessity was, and should have been, a portfolio of mostly individual activities with few links between them. In practice, attempts were made to trial activities in one country and then extend them in further countries but this was not always successful, for example with the SWH CSFP implemented with modest direct success in St Lucia and then implemented with few changes in Grenada. The analysis and assessment of the UNIDO-GSEII project in the body of this review has revealed some patterns regarding the relative success and impacts of the individual project activities. From this analysis five (inter-related) recommendations for future UNIDO-led projects of the UNIDO-GSEII type have been identified as follows:

1. *There is a need for Greater Focus on Underlying Intervention Logic and assumptions, in particular with a view to ensure impact of demonstration projects.*

It is recommended that UNIDO should not just rely on its project partners' (implicit) assessment of the relevance and applicability of proposed interventions. In the UNIDO-GSEII project, a number of well meaning activities that in principle should lead to improved sustainable energy

outcomes were implemented - but there was little realistic prospect of actual significant impacts, no matter how efficiently the activities were implemented (see example of the Grenada Earth Home initiative).

2. *UNIDO Energy activities should concentrate on areas of UNIDO comparative advantage, in particular within the industrial sector.*

It is recommended that UNIDO focus on activities where UNIDO has a comparative sustainable energy advantage in terms of industrial sector applications, links to productive uses, fundraising, or project implementation management.

3. *Reinforce Success and Abandon Failure* – It is recommended that project resources are shifted from initiatives that fail to produce the expected results to those that proved to work. In the UNIDO-GSEII project there are examples of the natural tendency to devote excessive project management focus trying to fix those interventions that are not meeting their proposed success indicators (i.e. not abandoning failure). Follow-on interventions should learn from early experience - a UNIDO-GSEII project example is the SWH financing focused CSFP being implemented in Grenada with only modest changes when it should have been clear that the CSFP in St Lucia was not working for fundamental design reasons. A UNIDO-GSEII example of not reinforcing success is in the water utilities energy management activity area where excellent early work was undertaken with a very appropriate consultant and with keen water utility counterparts in three countries, and yet follow-up efforts were not undertaken even although it seems that funds would have been available from the residual \$46,000 St Lucia CSFP funding.

4. *Actively Project-Manage UNIDO Funded Partner Activities* - UNIDO should take firmer control of partner activities that are funded through UNIDO, even if other project partners initiated the activity and are supposed to have expertise in the relevant area. A UNIDO-GSEII example is the OAS initiated and implemented SEP updating and development activities, where UNIDO seems to have played a fairly passive role - as shown by UNIDO not appearing to have a copy of the final version of the output (the relevant country SEPs) nor did UNIDO seem aware of their status with the recipient government which was supposed to own the SEP.

5. *Avoid Design Drift Lacking Explicit Analysis* – in a number of UNIDO-GSEII project activities there appears to have been an important and significant shift in the target market or output or intervention logic where a clear justification is not apparent. Examples include where the quite appropriate Sustainable Housing Promotion objective in the Grenada CSFP somehow shifted to the building of a fringe technology Earth Home concept, and also where the St

Lucia CSFP SWH financing support intervention somehow shifted to a low-middle income target market (with in addition a clearly too low income cut-off level for both low and middle income brackets) from its more appropriate design stage ProDoc middle income target market.

8. Lessons Learned

From the UNIDO-GSEII experience, some lessons can be learned for the planning and implementation of similar sustainable energy initiatives by UNIDO in the future: -

1. *Project activities are generally more successful where they play to UNIDO comparative advantages* – in particular UNIDO's core competencies of technical support and development of implementation-focused policies in industrial sector applications or where there were real implementation partners and real funding sources to utilise any sustainable energy policies/laws/plans (e.g. the UNIDO-GSEII and OAS support for Nevis wind resources law and power purchase agreement).
2. *Developing unsupported RE and EE policy visions and targets is not an area of UNIDO comparative advantage* (e.g. the development of updated SEPs where there is no clear champion or funding path to specific implementation) - however this is an area that many players, including UNIDO, want to operate in and that donors often view favorably for funding and it is a seductively attractive area. The trick here then is to ensure that there is real action-oriented government and national stakeholder and donor buy-in (e.g. the Tonga Energy Road Map) – all these players are needed for any sustainable energy policy vision and/or target to be any more meaningful than the hundreds of energy policy visions and plans produced worldwide each year that lead nowhere. The great majority of sustainable energy visions and plans do not lead to any significant discernable tangible implementation - which needs champions, funding and proper project design and implementation expertise to lead to real impacts.
3. *Further work on interventions with little tangible impact is likely to be an ongoing waste of time and resources* - e.g. the SWH CSFP financing work in Grenada that was largely based on the CSFP initiative in St Lucia that was already not producing any discernable useful results (i.e. need to *abandon failure*). Equally, successful activities should be replicated by utilizing spare funds (i.e. *reinforce success*) as could have been usefully done in the water utilities energy management area.

In summary, UNIDO needs to take greater control of activities developed or implemented by any project partners. Delegation not abdication is required, as ultimately UNIDO will be judged as to the success or otherwise of any UNIDO managed activity regardless of whose idea it was or who implemented it. This need for greater UNIDO scrutiny of individual activities critically includes the explicit and implicit assumptions of target market, intervention logic, whether the technology being promoted is already a mainstream technology somewhere else, and so forth. This is particularly applicable when new financing mechanisms are assumed to be the key means of achieving a sustainable energy outcome in a particular technology (e.g. SWH in the CSFP part of the UNIDO-GSEII project). There is no substitute for a comprehensive, integrated and explicit barrier and barrier removal analysis, something that was observed to be missing in many of the UNIDO-GSEII project elements.

Annex A: List of Documents Consulted

General

ProDoc - Annex A - Logical Framework - 2004
ProDoc - Annex B – Budget - 2004
ProDoc - Annex C – Workplan - 2004
ProDoc - Annex D - Project Options - 2004
ProDoc - Annex E - Financial Work Ups for Identified Clean Energy Projects - 2004
ProDoc (Full) for UNF-UNFIP Funding
Project Extension to end of 2009 - request to UNF - 20070816
Progress Overview for UNIDO Global Forum for Sustainable Energy Meeting - 20071122
Progress Report – 2008 - 20081201
St Lucia ITE Mission Report by Christine Wilkinson - 20100520
Activity Cost - Experts & Contractors – Breakdown - 20100702

CSFP Estimated Financials - 20040311
CSFP Subcontracting TOR - 20041217
CSFP Credit Union Lending Manual Final v01
CSFP Review re St Lucia Experiences - 20070619
CSFP St Lucia Review Final Report by OAS - 20090531
CSFP Grenada Contract Amendment Note - 20090609
CSFP Attribution Estimation Info Requirements - 20100629

GeoCaraibes UNEP-GEF Full Scale Project Proposal Exec Summary - 20050922
GeoCaraibes OAS-GEF PDF-B annex gc v1-4 - 20060301
GFSE-7 (Global Forum on Sustainable Energy Meeting #7) Final Programme - 20071119
CSEP ProDoc - Application to EU – Final - 20081002
CSEP Project Brochure - 20090723

Dominica - DOMLEC

Operating Margin GHG Emission Factor for 2002 - 20040519
Loss Reduction Study - TOR - Final Version - Rev ADM-GES
Loss Reduction Study Final Report - 20051010
Loss Reduction Study Summary - 20051020
DOMLEC Annual Report for Calendar 2005 - 20051231
DOMLEC Annual Report for Calendar 2006 - 20061231
DOMLEC Financial Statistics 2002- 2006 - 20070518
Operating Statistics for 2002- 2006 - 20070607
Calculation of 2005- 2007 DOMLEC Savings - 20071119
Loss Reduction Strategy Report to UNIDO draft - 20071127
SEP Draft - 20080107
DOMLEC Operating Statistics for 2004 - 2008 Calendar Years - 20081231

St Kitts and Nevis

Bioenergy Initial Stakeholders Meeting – Presentation - 20060613
Bioenergy Project Meeting Agenda - 28 Aug 2007 - 20070827
Bioenergy Background Discussion Paper on Potential in SKN – 20070823

Bioenergy Stakeholder Meeting List of Participants - 20070828
Bioenergy Draft Issues Paper - 20071003
Bioenergy Sustainability Maps for Biofuels in St Kitts - US-Brazil Biofuels Initiative – 20080409
Bioenergy Webpage on US-Brazil Biofuels Initiative – OAS - 20100414
Geothermal and Wind Law et al TOR - 20080228
Geothermal Resources Bill NIA Draft for Minister - 20080507
Geothermal and Wind Mission to Nevis - Press release – 20080520
Geothermal Project to Provide Jobs for Nevisians - Renewable Energy World Online- 20080708
Geothermal Contract and PPA Signing Ceremony Memo - 20090428
Geothermal and Wind - NIA Action Schedule - 20080728
Geothermal and Wind Consultancy Documentation Produced for UNIDO - 20080728
SEP and Bioenergy Consultancy TOR – Final - 20060217
SEP Initial Stakeholders Meeting – 20060613
SEP Work Plan w Actions - 20060801
SEP Draft Plan - 20070619

St Lucia

SEP of 2001 w 2006 Update - 20060525
SEP 24-month Implementation Workplan - 20061031
SEP National Energy Policy – final version - 20100122

Caribbean Water Utilities Energy Efficiency Project

Project Concept - 2007
TOR for Proposed Phase I in Jamaica and SKN - 20080728
TOR for Phase I in Dominica - 20090218
Overall Project Report - Bolles and Muir - 20090428
TOR for Phase II in SKN and Dominica - 20090625
Project in SKN & Dominica Overview Presentation - 20090701
Workshop Agenda and Expert Report - 20091113
Energy Plan Guidance Manual - 20091201

Annex B: People Consulted During Evaluation

Institution	Meeting with	Contact Details
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Caribbean Water Basin Management Program	Mr. Victor Poyotte Executive Director	Tel: 011 758 458 0601 vpoyotte@cbwmp.org
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St. Lucia Teachers Credit Union	Mr. Vincent Patrice Manager	Tel: 011 758 451 9146 sltcc@candw.lc
St. Lucia Workers Credit Union	Ms. Celina Hercules Manager	Tel: 011 758 451 6883 Sluwcu_manager@candw.lc
Ecosun St. Lucia (new manufacturer of evacuated tube SWHs) - by phone	Mrs. Alison Plummer Manager	Tel: 011 758 450 0124 beverley@ecosunproducts.com
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BEEQ Inc.	Mrs. Geralinde Lendor-Gabriel (formerly Treasurer of League of Credit Unions)	Tel: 011 758 451 7202 beequinvestments@gmail.com
St. Lucia Civil Service Credit Union	Mrs. Evelyn Monroe	Tel: 011 758 452 5873
Solar Dynamics (pre GSEII SWH manufacturer – subsidiary of original Barbados Caribbean flat plate SWH technology)	Mr. Robert Blanchard General Manager Ms. Angela Sales Manager	Tel: 011 758 458 8400 robertb@mandcgroup.com
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Annex C: Evaluation Terms of Reference

Independent Terminal Evaluation of the UNIDO Project:

UE/GLO/04/162

GLOBAL SUSTAINABLE ENERGY ISLAND INITIATIVE

I. PROJECT BACKGROUND

Small Island Developing States (SIDS) face unique challenges associated with the generation and use of energy. In the Caribbean most island nations depend almost exclusively on imported petroleum for their energy needs, including both electricity generation and transportation. This high level of dependence leaves these countries vulnerable to the volatility of international oil prices and results in tremendous drain on capital for imports. Small island nations produce a tiny fraction of global greenhouse gas emissions but they are among the most vulnerable to the effects of climate change, such as the increased strength and frequency of hurricanes and the rise in sea level. Aware of all that small island nations have started to express strong commitment to sustainable energy development and have showed positive and progressive political attitudes towards renewable energy and energy efficient technologies.

In partnership with the Organization of American States, Climate Institute and Energy and Security Group, UNIDO has developed the Global Sustainable Energy Island Initiative (GSEII) project.

The final objective of the GSEII is to promote and support Small Island Developing States (SIDS) efforts in transitioning away from energy consumption and supply patterns based on conventional fossil fuels towards more sustainable energy development based on environmentally sound renewable energy technologies and more efficient use of energy. A principal focus of the project was to support the consolidation of efforts made by the Caribbean island States of Dominica, Grenada, St. Kitts and Nevis and St. Lucia in orienting their national energy policy and development towards renewable energy and energy efficient technologies. In line with their national priorities, the project aims to help these islands to lay the foundations of improved energy security, reduced electricity tariffs and improved allocation of resources. In parallel, the project focus on expanding its sustainable energy planning and implementation activities to other SIDS and member nations of the Alliance of Small Island States (AOSIS) and to provide on-going international outreach to demonstrate SIDS commitment and efforts for a more sustainable energy development.

UNIDO and GSEII partners, in collaboration with country counterparts, have designed a wide set of technical assistance activities, which has included expert advisory services to develop and formulate national sustainable energy plans;

technical assistance to strengthen the policy and legal frameworks for renewable energy resources development (geothermal and wind energy in particular); power utility loss reduction study; bio-energy and other renewables technical and feasibility studies; mitigation of market barriers to increased penetration of solar thermal technologies; development of sustainable and energy efficient housing program; energy efficient lighting programs; capacity building and support of education, awareness and outreach initiatives; mobilization of further technical assistance and resources for the SIDS sustainable energy development.

Project fact sheet

Start date:	22 December 2004
Total project budget:	850,000 USD, including psc18
Expected completion date:	31 December 2009
Originally expected completion date:	31 December 2007

Summary of project funding

Project No.	Title	Donor	Total allotment (in US\$)	Disbursements (in US\$)
UE/GLO/07/009	GLOBAL SUSTAINABLE ENERGY ISLAND INITIATIVE (GSEII)	Austria Euro a/c	144,287	143,579
FI/RLA/03/298	GLOBAL SUSTAINABLE ENERGY ISLAND INITIATIVE	Un Fund For International Partnerships	575,239	538,013
UE/GLO/04/162; US/GLO/04/162	GLOBAL SUSTAINABLE ENERGY ISLAND INITIATIVE	Italy, Euro Account	100,939	98,130
Total			820,46519	779,722

Source: UNIDO Infobase, 24 February 2010

Objectives of the Project (as per project document)

The overall objective of the project is to promote and support Small Island Developing States (SIDS) efforts in transitioning away from energy consumption and supply patterns based on conventional fossil fuels towards more sustainable energy development based on environmentally sound renewable energy technologies and more efficient use of energy.

18 The UNIDO Global Sustainable Energy Island Initiative project has received in March 2007 a contribution of 146,000 USD from the Government of Austria (UE/GLO/07/009). UNIDO has then convinced the UN Foundation to accept the Austrian parallel contribution to the GSEII project as matching funds for the remaining UNF "conditioned" funds earmarked for the UNIDO-GSEII project, which amounted to 146,000 USD.

The immediate objectives of the project are:

To assist the Government of Dominica, Grenada and St. Lucia in consolidating and enforcing their National Sustainable Energy Plans by supporting the development and implementation of a set of clean energy projects through the provision of technical assistance, including encouraging private investments and promoting sustainable business models

To expand the initiative to 4 additional AOSIS member nations in which initiate the policy and technical consultative work for the development and implementation of National Sustainable Energy Plans

To build and strengthen capacity at national and regional levels to continue to develop and implement sustainable energy options and approaches

To catalyze private investment in renewable energy (biomass, geothermal, hydropower, photovoltaic, solar thermal and wind technologies) and energy efficiency projects

To demonstrate that energy can be used as a tool for sustainable development and poverty reduction, thereby contributing to attainment of the Millennium Development Goals (MDGs)

II. EVALUATION PURPOSE

The purpose of the independent terminal evaluation is to facilitate decision making for the Government counterparts, donors and UNIDO on the basis of up-to-date information with regards to the following:

the past and continuous relevance of the project's objectives and of the activities promoted, outputs produced and outcomes achieved;

summary of information available on the following aspects:

the extent to which outputs have been produced and objectives achieved, as compared to those planned (effectiveness);

the efficiency of implementation: quantity, quality, cost and utilization of resources, timeliness of inputs and activities, and project management and coordination;

the impact and sustainability of results, effects and benefits.

It is envisaged that the terminal evaluation will focus on the assessment of the actual results achieved, especially at the outcome level and on the assessment of current and/or future impact. Furthermore the evaluation will assess the support provided by UNIDO (value added) and recommendations regarding the follow up of the project as well as lessons learned for similar projects will be formulated.

III. METHODOLOGY

The terminal evaluation is to be conducted in compliance with UNIDO's Evaluation Policy and the Technical Cooperation Guidelines. It will also aim at identifying factors that have

¹⁹ This amount does not include project support costs (psc).

facilitated or impeded the achievement of the objectives.

The terminal evaluation will be carried out through analyses of various sources of information including relevant documents produced by the project such as annual reports, work programmes, publications, self evaluation reports, survey data, reports of Expert Group Meetings, workshops and training programmes, training material, feed-back forms of participants in workshops/seminars, minutes of meetings.

The evaluation team will also seek the views and opinions of projects partners (the Organization of American States, the Climate Institute and the Energy and Security Group), stakeholders and beneficiaries through interviews with counterpart and UNIDO staff members, representatives of the participating Governments and beneficiaries at the project sites. The views expressed will be cross-validated with other primary and secondary information and data.

The evaluation team will also visit selected project sites and partner institutions in order to assess actual or potential interactions and synergies with these institutions and to draw from the experience gained by them.

The analysis will include a review of relevant UNIDO policies and strategies, activities implemented, outputs produced, management mechanisms applied (in particular planning and monitoring) and project specific conditions. While maintaining independence, the evaluation will be carried out based on a participatory approach, which seeks the views and assessments of all parties.

IV. KEY EVALUATION QUESTIONS

Relevance

The evaluation will assess in how far:

The project has been and is in line with the strategies and priorities of target countries as well as UNIDO (e.g. mandate, medium term planning framework, long term vision statement, etc.);

The outputs produced and developed are being demanded, used and beneficial for the partner countries;

The "right" participants were targeted for various events and activities

There is ownership from the counterpart and Government side

Other international organizations and donors contribute to the project objectives and/or there are synergies between the project and the related activities of others.

Design, coordination and management

The evaluation will assess in how far:

A clear intervention logic exists, including a causal chain from activities to outcomes, explicit assumptions and risks, measurable indicators and means of verification;

The design is based on a comprehensive process of consultations involving all relevant stakeholders;

The project's organisational structure and management are appropriate with regard to the objectives;

The UNIDO HQ based project management, coordination, substantial guidance, quality control and technical inputs have been appropriate and in line with project requirements. The budget and staffing are adequate.

Gender and environmental issues are mainstreamed in the project design.

Issues related to effectiveness, impact and sustainability

What were the project's core outcomes and impacts, including unintended effects?

Are the project activities/outputs effective means to produce outcomes and contribute to impact?

Were the planned outputs produced and objectives achieved or are likely to be achieved?

Are systems for monitoring, reporting and self-evaluation in place and do they produce useful information, based on suitable indicators for outputs, outcomes and impact?

Efficiency of implementation and approach

The extent to which:

UNIDO and Government/counterpart inputs have been provided as planned and were adequate to meet requirements.

The quality of UNIDO inputs and services (expertise, training, equipment, methodologies, etc.) was as planned and led to the production of outputs.

Would a different project approach have achieved the same results with less inputs/cost?

The future

The evaluation will produce a set of recommendations to UNIDO, the Government counterparts and other stakeholders (if applicable) with a view to improved relevance, effectiveness, efficiency, impact and sustainability.

The evaluation will identify lessons learned, benchmarks and good or bad practices, applicable to other UNIDO interventions, in particular in the field of renewable energy.

V. EVALUATION TEAM

The evaluation team will be composed of the following:

One independent international evaluator (consultant, team leader)

one regional evaluator (a consultant with ample experience in the region),

The international evaluator and the regional evaluator will be contracted by UNIDO. The international consultant will act as team leader of the evaluation and will coordinate the work with the other team members. The specific tasks of the international evaluation consultant are specified in the job description attached to these Terms of Reference.

The members of the evaluation team must not have been directly involved in the design and/or implementation of any project related activities. The staff of UNIDO/PTC staff at Headquarters will provide support to the evaluation team. The staff of the national offices of the Organization of American States, UNIDO partner in the GSEII, will provide support to the evaluation team during the evaluation mission.

VI. TIMING and REPORTING

The terminal evaluation is scheduled to take place in the period March to April 2010. The draft report will be submitted within two weeks of completion of the field mission and shared with UNIDO and main project stakeholders. A final report will be submitted within two weeks after receipt of feedback on the draft report. The final report will be published on the UNIDO website. The evaluators will take comments into consideration when preparing the final version of the report. The reporting language will be English. The format for the report will be based on the template in Annex 1 to this TOR and will be adapted as necessary.

Annex D: Evaluation report quality assessment by UNIDO Evaluation Group

Report quality criteria	UNIDO Evaluation Group Assessment notes	Rating
Did the report present an assessment of relevant outcomes and achievement of project objectives?	Yes, outcomes are discussed in relation to original objectives.	6
Were the report consistent and the evidence complete and convincing?	in some cases more evidence could have been presented.	5
Did the report present a sound assessment of sustainability of outcomes or did it explain why this is not (yet) possible?	Yes, sustainability is discussed and well argued.	6
Did the evidence presented support the lessons and recommendations?	Yes	6
Did the report include the actual project costs (total and per activity)?	Yes	6
Quality of the lessons: Were lessons readily applicable in other contexts? Did they suggest prescriptive action?	The lessons are mostly the same as the recommendations.	4
Quality of the recommendations: Did recommendations specify the actions necessary to correct existing conditions or improve operations ('who?' 'what?' 'where?' 'when?'). Can they be implemented?	Recommendations are useful, but partly rather generic without a clearly defined target group ("UNIDO").	5
Was the report well written? (Clear language and correct grammar)	mostly yes	5
Were all evaluation aspects specified in the TOR adequately addressed?	yes	6
Was the report delivered in a timely manner?	no	2

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Rating system for quality of evaluation reports

A number rating 1-6 is used for each criterion: Highly Satisfactory = 6, Satisfactory = 5, Moderately Satisfactory = 4, Moderately Unsatisfactory = 3, Unsatisfactory = 2, Highly Unsatisfactory = 1, and unable to assess = 0.