Evaluation Office of UN Environment

Terminal Evaluation of the Project: "Global Solar Water Heating Market Transformation and Strengthening Initiative" (GEF ID 2939)

April 2017

Evaluation Office of UN Environment

This report has been produced as part of the Terminal Evaluation of the project entitled 'Global Solar Water Heating Market Transformation and Strengthening Initiative' (GEF ID 2939) co-implemented by UN Environment and United Nations Development Programme (UNDP). The UN Environment led global knowledge management component and UNDP implemented country programmes in Albania, Chile, Lebanon and Mexico were evaluated under supervision of the Evaluation Office of UN Environment in 2016. The country programme of India was evaluated in 2013. The findings and conclusion in this report are informed by these country specific evaluations. The country specific evaluation reports are available at UN Environment webpage (web.unep.org/evaluation/) and UNDP Evaluation Resource Centre (erc.undp.org) as applicable.

The Evaluation Office of UN Environment also acknowledges that one of the country components, the *Country Programme of Albania under the Global Solar Water Heating Market Transformation and Strengthening Initiative*, was extended with government cost sharing until the end of 2017. Since the performance of this one country programme has only marginal influence on the overall findings presented in this evaluation report, it was agreed with the project stakeholders at UNEP and UNDP to finalize this Terminal Evaluation of the Global Solar Water Heating Market Transformation and Strengthening Initiative considering the current status of the Albania component.

This terminal evaluation was undertaken prior to a new UN Environment Programme directive on the visual identity of the organisation, which replaces previous reference to the organisation as 'UNEP' , with 'UN Environment'. This terminal evaluation report, having reached an advanced stage prior to the official directive, has retained the name 'UNEP' throughout the main report to refer to the organisation

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DISCLAIMER

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ABOUT THE EVALUATION[1]

Report Language(s): English

Evaluation Type: Terminal Project Evaluations

Brief Description: This is a terminal evaluation of a UN Environment/Global Environment Facility (GEF) project co-implemented with the United Nations Development Programme (UNDP). The project consisted of the Global Knowledge Management component and five country components in Albania, Chile, India, Lebanon and Mexico. The evaluation consists of the main evaluation report that is also informed by the country level evaluations. India component was evaluated in 2013 (report available at erc.undp.org) and the other country level components were evaluated by UN Environment Evaluation Office in 2016 to feed in the main evaluation (these country level evaluation reports are also available at web.unep.org/evaluation/). The evaluation has two primary purposes: (i) provide evidence of results to meet accountability requirements, and (ii) promote operational improvement, learning and knowledge sharing through results and lessons learned among UN Environment, UNDP, GEF and other partners, especially in terms of co-implemented global projects.

Key words: TE; Terminal Evaluation; GEF; GEF Project; climate change; solar water heating; market transformation; energy efficiency, UNDP, Albania, Chile, India, Lebanon, Mexico

[1] This data is used to aid the internet search of this report on the Evaluation Office of UN Environment Website

Table of contents

List of tables, figures & diagrams

List of acronyms & abbreviations

Acronym/Abbreviation	Meaning
AWP	Annual work plan
BSP	Bali Strategic Plan
CONUEE	Ministry of New and Renewable Energy in Mexico
CP	Country programme (Component 2)
CSO	Civil society organization
DEX	Direct execution (by UNDP)
DGEF	Division of Global Environment Facility Coordination of UNEP
DTIE	Division of Technology, Industry and Economics of UNEP
EOP	end of project
ESCO	Energy Service Company
ESES	Environmental, Social and Economic Sustainability
ESTIF	European Solar Thermal Industry Federation
GEF	Global Environment Facility
GHG	Greenhouse Gas
GSWH	Global Solar Water Heating
ICA	International Copper Association
IIEC	International Institute of Energy Conservation
ISES	International Solar Energy Society
JNNSM	Jawaharlal Nehru National Solar Mission of the Government of India
KM	Knowledge Management
KP	Knowledge product
LCEC	Lebanese Center for Energy Conservation
LF	logical framework
M&E	Monitoring and Evaluation
MdE	Ministry of Energy in Chile
MEW	Ministry of Energy and Water in Albania
MNRE	Ministry of New and Renewable Energy in India
MTE	Mid-term Evaluation
MTS	Medium-Term Strategy of UNEP
NAACP	Indian Prime Minister's National Action Plan on Climate Change
NAMA	Nationally Appropriate Mitigation Action
NEX	National execution
OME	Observatoire Méditerranéen de l'Energie
OLADE	Organización Latinoamericanade Energía
PIF	Project Identification Form
PIR	Project Implementation Report
PMC	Project Management Committee
POPP	UNDP Program Operations, Policies and Procedures
Prodoc	Project Document
PTA	Principal Technical Advisor

Acronym/Abbreviation	Meaning
QC	quality control
RCREEE	Regional Centre for Renewable Energy and Energy Efficiency
RE	renewable energy
ROtI	Review of outcomes to impacts
RTA	Regional Technical Advisor
SHAMCI	Middle eastern solar water heating standards
SMART	Specific Measurable Achievable Realistic and Tangible
SSCo	South-South Cooperation
SWH	Solar Water Heating
TE	Terminal evaluation
TOC	Theory of Change
UNDAF	United Nations Development Assistance Frameworks
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UVI	University of the Virgin islands

Table 1: Project Identification Table

Executing Agency:	The overall project is jointly implemented by UNEP and UNDP, UNDP being the lead GEF implementing agency and responsible for national execution in 6 countries. UNEP/DTIE is the co-executing agency with responsibility for global project management, monitoring and technical assistance for financial mechanisms component.		
Project partners:	International Copper Association (ICA), United Nations Development Programme (UNDP), Organización Latinoamericana de Energía (OLADE), Regional Center for Renewable Energy and Energy Efficiency (RCREEE), Observatoire Méditerranéen de l'Energie (OME), European Solar Thermal Industry Federation (ESTIF), University of the Virgin Islands (UVI), UNEP DTU (Risoe)		
Geographical Scope:	Global		
Participating Countries:	Albania, Chile, India, Lebanon, Mexico (Algeria was cancelled)		
GEF project ID:	2939	**IMIS number:**	GFL-5070-2721-4A54
UNDP PIMS ID:	3611		
UNEP PIMS:	n/a		
UNDP Project ID (ATLAS) :	Albania 00062847	Chile 00063281	India 00061121
	Lebanon 00062901	Mexico 00063034	
Focal Area(s):	Climate Change	**GEF OP #:**	1, 6
GEF Strategic Priority/Objective:	Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs	**GEF approval date:**	July 29, 2008
GEF grant total:	12,000,000 USD		
GEF grant UNEP:	3,750,000	**GEF grant UNDP:**	8,250,000

UNEP specific details			
UNEP approval date:	May 7, 2009	**Date of First Disbursement:**	May 13, 2009
Actual start date:	May 1, 2009	**Planned duration:**	68 months
Intended completion date:	December 1, 2013	**Actual completion date:**	February 28, 2016
Project Type:	FSP	**GEF Allocation:**	US$ 3,750,000
PPG GEF cost:	N/A	**PPG co-financing:**	N/A
Expected MSP/FSP Co-financing:	US$ 1,970,000	**Total Cost:**	US$ 5,720,000
Mid-term review/eval. (planned date)[2]:	May 2013	**Terminal Evaluation (actual date):**	February 2017
Mid-term review/eval. (actual date):	May 2014	**No. of revisions:**	5
Date of last Steering Committee meeting:	May 2015	**Date of last Revision:**	December 22, 2014
Disbursement as of 30 June 2015:	US$ 2,241,968.60	**Date of financial closure:**	N/A
Total co-financing realized as of 30 June 2015[3]:	US$ 1,108,000	**Actual expenditures reported as of 30 December 2015 (GEF):**	US$ 2,241,968.60
Leveraged financing:	N/A		

[2] This implies to the Evaluation of the Global Knowledge Management component under UNEP's management.
[3] estimate

Executive summary

Project Background

Global Solar Water Heating Market Transformation and Strengthening Initiatives (herein referred to as the Project) was funded by the Global Environment Facility and introduced to compliment the UN Environment's work plan in September 2006. This Project was a response to strong solar water heating development observed in other countries, notably in China and Turkey as well as Cyprus, Greece and Israel. A key impetus behind this global Project was the technological simplicity of solar water heating, its cost effectiveness in low incomes countries, and potential for generating significant greenhouse gas emission reductions.

To enhance the likelihood of solar water heating market transformation on a global scale, this Project was proposed with two co-implementing agencies with the following roles on the Project:

1. UN Environment undertaking the management of a "Global Knowledge Management and Networking Component" to accelerate the advancement of knowledge of solar water heating in several countries and regions; and
2. United Nations Development Programme undertaking the management of a "Country Program component" consisting of managing solar water heating market transformation in 5 countries, Albania, Chile, India, Lebanon and Mexico that would contribute to global knowledge on best practices and lessons learned in the market transformation of solar water heating in these countries.

Purpose of Terminal Evaluation

This Terminal Evaluation was prepared during 2016 to assess the performance of the Project in meeting its intended goal to "accelerate global commercialization and sustainable market transformation of solar water heating, thereby reducing the current use of electricity and fossil fuels for hot water preparation in residential, private service sector and public buildings and, when applicable, industrial applications". Separate terminal evaluations were also prepared for each of the five country programs, the findings of which were fed into this Terminal Evaluation. Executive summaries of these country programme terminal evaluations are found in Annexures V to IX and full reports at Evaluation Office of UN Environment webpage.

Two key issues for this Terminal Evaluation include:

- The effectiveness of UN Environment and UN Development Programmes as co-implementing agencies to determine the value of such management arrangements on projects that focus on global market transformation. Challenges to this arrangement were examined included the challenges of diversity of approaches by each agency and country programs, and how information from country programs would be integrated into one global program; and
- The effectiveness of knowledge products generated from the Global Knowledge Management and Networking Component. This Project had challenges related to the coordination of information inflow into country programs prior to their commencement, and incorporating lessons learned from country programs into a global knowledge management network for the benefit of future country programs.

To improve the understanding of the outputs, drivers and assumptions as contributors towards the intended long-term outcomes of the project, a Theory of Change approach was undertaken to strengthen the description of Project logic from a baseline prior to the commencement of the Project, to the expected direct outcomes from intended Project inputs, intermediate states of the transformation of the solar water heating market, expected long-term outcomes and intended impacts (paragraphs 24 to 31).

This Project performance was evaluated against this Theory of Change towards the intended impacts of "reduced use of fossil fuels and electricity generated from fossil fuels" and "reduced GHG emissions" through market transformation of the solar water heating market. In this approach, four direct outcomes were identified t (Figure 2, Page 16):

1. effective initiation and coordination of country specific support needs in solar water heating are available;
2. institutionalized knowledge management support resulting in wider dissemination of lessons learned and international experiences;
3. improved access to national experts, state-of-the-art solar water heating information, technical backstopping, training, international experiences and lessons learned; and
4. successfully developed solar water heating markets in participating countries.

Evaluation findings

The overall project performance is rated as Moderately Satisfactory. This Project was one of the earliest attempts by the Global Environment Facility to co-implement a project in the Climate Change Mitigation focal area. As such, design of this Project did not have any precedence notably in the details of the implementation arrangements and collaborative mechanisms between UN Environment and United Nations Development Programme (paragraphs 94, 95 and 137). This led to the Project only partial achievement of the four intended direct outcomes from the Theory of Change:

- In providing effective initiation and coordination of country specific support for solar water heating, the UN Environment experienced difficulties, primarily with the different starting dates of all the country programs:
  - Much of this was due to the complexities and delays in the processes of country approvals for GEF projects, making it difficult for personnel of the Knowledge Management and Networking Component on providing initiation assistance (paragraph 47);
  - Changes in Government led to changes in market conditions for some of the Country Programs making the provision of coordination for country specific support more difficult, notably in Chile and Mexico. Despite these difficulties, UN Environment team were able to produce useful reports of high-quality complete with analysis tools for policymakers to *support specific countries* to enable them to prepare high-level evaluations of national market development opportunities for solar water heating, and to assess their country's readiness for such opportunities. However, the issuance of these reports close to the end of the Project in late 2014 only constrained the Project's ability to meet one of its key replication targets, finalizing proposals for 10 additional countries (paragraph 47);
- Institutionalized knowledge management support was set up in partnership with the International Copper Association and its hosting of the solarthermalworld.org website that serves as a global repository for solar water heating information and a global platform for webinars. However, during Project implementation, there were limitations of this website to disseminating lessons learned and international experiences as indicated by the site's lack of hits in countries where English is not the native language, and a lack of timely delivery of experiences and lessons learned on their website due to slow implementations of some of the country programs (paragraph 48);
- While access was improved to national experts, state-of-the-art solar water heating information technical backstopping, training and international experiences on the solarthermalworld.org website, there was little demand for the services of national and international experts on the website global roster, likely due to country programs and local solar water heating programs having already identified and partnered with their own solar water heating experts and suppliers (paragraph 50). In addition, with only 4 international workshops held throughout the 7-year duration of the project, there were only limited opportunities for regional partners to share international experiences with stakeholders of solar water heating projects globally (paragraph 50);
- There were varied successes in developing solar water heating markets in the five country programs illustrating the varied nature of all the solar water heating markets:
  - Despite the differences in sizes of the solar water heating markets of Lebanon and India, both programs had strong government support and engagement in the setting of standards and support for financial mechanisms that were keys to meeting installed capacity targets as well as growth rate targets at the end of the Project;
  - Another small program in Albania experienced delays and shortfalls in funding but also growth of the solar water heating program despite the absence of financial incentives suggesting that these incentives are not required. Sustainability of this growth, however, can be threatened by lack of enforcement of quality certification of the equipment and the installers, the absence of a financial mechanism and the lack of institutionalized support. This country programme is still ongoing (until end of 2017);
  - The Chile program experienced delays due to several changes in Government resulting in delays in the delivery of awareness raising outputs, a strengthened regulatory framework, and training programs for solar water heating professionals and failures in delivering a functional financial mechanism (paragraphs VI-7 to 11 in annex). Limited outreach of awareness raising outputs was a likely factor in the Chile program not meeting its growth targets;
  - The Mexican program delivered key outputs including new solar water heating standards and certifications for the quality of solar thermal installers, all with the impact of improving the quality of solar water heating installations. Despite the country program not meeting its growth rate targets, there is a likelihood of impact of GHG emission reductions (Para IX-6). However, further work is required to support strong solar water heating market development through the enforcement of the building code (paragraphs IX-8 in annex).

A key Project target of "replicating similar market transformation of solar water heating in 10 other countries" was not met towards achieving the goal of "accelerating global commercialization and sustainable market transformation of solar water heating in residential, private service sector and public buildings and when applicable, industrial applications" (paragraph 139). Notwithstanding, there is a moderate likelihood that this Project will have an impact on GHG emission reductions in future years. This can be attributed to the high quality

knowledge products on the solarthermalworld.org website along with a commitment from the International Copper Association and regional partners (who had worked with the Project) to continue the financing of solar water heating technology promotion and technical assistance in the use of guidebooks for preparing proposals for funding of solar water heating market support (paragraphs 57). In addition, only one country program, India, implemented a successful industrial application for solar water heating technology. The replication of this solar water heating industrial application has excellent potential (paragraphs 57).

Improved Project implementation and management could have increased the likelihood of achieving the Project goal. During the 6-year duration of the Knowledge Management Component, only 4 Project Management Committee meetings were conducted between personnel from the UN Environment, the United Nations Development Programme headquarters and the International Copper Association on Project delivery. These meetings did not generate improvements in the collaborative mechanisms and information flows for the purposes of dissemination of solar water heating information at the country levels (paragraphs 102-104) and for Global Environment Facility reporting (paragraph 105). Moreover, these meetings would have benefited from the presence of personnel from country programs (paragraph 101). This had the impact of key Project personnel being unable to effectively apply adaptive management to improve delivery of Project outcomes (paragraph 107). Due to the lack of clear roles of the UN Environment and the United Nations Development Programme in meeting the overall objectives of the project, neither agency was able to provide strategic leadership towards achievement of accelerating global commercialization of solar water heating technologies (paragraph 140).

With the completion of this Project, much work still remains to sustain acceleration in global commercialization of solar water heating including the five country programs on this Project. For most of the countries, there are still not sufficient budgetary allocations in place to support financial incentives to increase access to solar water heating technology to lower income households (paragraph 61), and to conduct market surveillance of solar water heating companies to ensure that they provide after sales support (paragraph 62). Without after sales support, greenhouse gas emission reductions from solar water heating would be suppressed (paragraph 67). Despite pledged support by regional partners of the project to continue the promotion of solar water heating technology through assistance to prepare Nationally Appropriate Mitigation Actions proposals, governments on this Project as well as several others globally still do not have the capacities to collect solar water heating energy baseline information that would significantly strengthen the quality of a Nationally Appropriate Mitigation Actions proposal and increase the likelihood of funding (paragraph 66).

Recommendations and Lessons Learned

There is development value in projects jointly implemented by UN Environment and United Nations Development Programme especially in assembling global information for dissemination. To optimize the value of joint implementation where UN Environment's primary role would be to assemble global information for dissemination, project design documents involving UN Environment and country-based agencies such as United Nations Development Programme need to ensure streamlined and maximized collaboration through well-defined and budgeted collaboration protocols (Recommendation #1, Recommendation #6). This will require that project preparations for design activities have sufficient budgetary and time resource allocations to ensure communications between the two agencies are functional and effective.

The future of co-implemented UN Environment and United Nations Development Programme market transformation projects involving solar water heating as well as other low carbon technologies should incorporate the following elements:

- More emphasis on enhancing the sustainability of energy savings and GHG emission reductions. With the lack of appropriate after-sales technical support observed in several countries for solar water heating technologies as well as other low carbon technologies, host governments need to be familiarized with typical operation and maintenance problems of these technologies, and what actions should be taken to ensure sustained operation and maximized service life of a technology (Recommendation #2, Recommendation #7);
- Provide and mobilize more resources to governments to institutionalize collection of baseline energy use data that would assist countries in the quality of their action plans to implement policies, formulate realistic strategic plans and increase the likelihood of appropriate budget allocations for such actions (Recommendation #3, Recommendation #8);
- Promotion of industrial applications of solar water heating or other low carbon technologies. Replication of the energy service company (that executes an energy performance contract) implemented solar water heating industrial application in India needs to be replicated (Recommendation #4).

The key lessons learned from implementing the Global Solar Water Heating Initiative includes:

- The need for agencies (on market transformation projects) that disseminate global information to have effective outreach to end-users of knowledge products. In addition, this effective outreach will also include feedback on the quality of the products (Lesson #1);
- Project management teams of market transformation projects should possess certain required attributes including technical strength, strong project management skills, and strong outreach skills and communication capacity. These attributes are necessary to ensure high quality of information disseminated, timely and least costly delivery of knowledge products, and effective engagement of the end users (Lesson #2).

1 INTRODUCTION

1. The Global Solar Water Heating Market Transformation and Strengthening Initiative (referred to herein as "GSWH", the "Project" or the "GSWH Project") is a full-size GEF project that was placed in the UN Environment's (UNEP) work program in September 2006, and approved by GEF in May 2009. While originally planned as a 60-month project, the GSWH Project was completed on 28 February 2016.

2. The goal of the GSWH Project was to accelerate global commercialization and sustainable market transformation of Solar Water Heating (SWH), thereby reducing the current use of electricity and fossil fuels for hot water preparation. The Project was designed on a foundation of encouraging market development rates already achieved in some GEF program countries such as China and Turkey, and the prospects of achieving successful expansion into the markets of other GEF program countries, where the potential and necessary prerequisites for market uptake such as favorable climatic conditions seem to exist.

3. The GSWH Terminal Evaluation (TE) was intended to assess the GSWH Project performance (in terms of relevance, effectiveness and efficiency), the actual and potential outcomes and impacts, and sustainability. This TE of the GSWH Project evaluates the performance of the 2 co-implementing agencies, UNEP and UNDP, in the implementation of the 2 components of the GSWH Project:

   - Component 1: *The global knowledge management and networking component.* This component included activities implemented by UNEP to foster global knowledge management and networking to promote and advance the knowledge of solar water heaters (SWH). The findings of the evaluation of Component 1 were integrated with relevant findings under the country specific evaluations under Component 2, to shape the overall project evaluation findings and conclusions; and
   - Component 2: *The country program component* that includes the specific country programs in 5 countries (Albania, Chile, India, Lebanon and Mexico with a sixth country program in Algeria being cancelled) that was executed by UNDP. This would include separate evaluations of the UNDP Programs in Albania, Chile, Lebanon and Mexico against the evaluation criteria specified in Section 4 of the TE ToR. A Terminal Evaluation of the India component was completed in June 2013.

4. As per GEF Guidelines, the Terminal Evaluation of the GSWH Project was undertaken over the period of March to December 2016 under the supervision of the UNEP Evaluation Office. The TE for the GSWH project was conducted by an evaluation team of 3 consultants:
   - Mr. Roland Wong served as the team leader for the evaluation of Component 1 and the overall evaluation of the GSWH project incorporating the findings of Component 2 from separate evaluations of the country programs;
   - Ms. Nadia Bechraoui who served as the supporting consultant for the country programs in Lebanon and Albania under Component 2; and
   - Ms. Amandine Gal who served as the supporting consultant for the country programmes in Chile and Mexico under Component 2.

1.1 Evaluation objectives

5. The objective of the GSWH Terminal Evaluation was to assess Project performance (in terms of relevance, effectiveness and efficiency), and to determine outcomes and impacts (actual and potential) stemming from the Project, and their sustainability. The primary purposes of the TE were to: (i) provide evidence of results to meet accountability requirements, and (ii) promote operational improvement, learning and knowledge sharing through results and lessons learned among UNEP, UNDP, and other partners. The GSWH TE complies with the UNEP Evaluation Policy[4] and the UNEP Programme Manual[5].

1.2 Evaluation approach and methodology

6. This Terminal Evaluation was approached by using information primarily from the following sources:
   - in person or phone interviews with selected stakeholders ranging from the implementing agencies (UNEP and UNDP), regional and national partners, government counterparts, financial institutions, CSOs and other important stakeholders involved in market transformation activities (Annex II). For a number of stakeholders, interviews were conducted more than once in an effort to triangulate the evidence received, and to provide assurance that the conclusions of the evaluation are robust.
   - project documentation including all project reports and information posted on the project website that will be assessed for its value in disseminating solar thermal information to global stakeholders and in improving the quality of SWH installations (Annex III).

[4] http://www.unep.org/eou/StandardsPolicyandPractices/UNEPEvaluationPolicy/tabid/3050/language/en-US/Default.aspx
[5] http://www.unep.org/QAS/Documents/UNEP_Programme_Manual_May_2013.pdf

7. This TE also uses a **Review of Outcomes to Impacts** (ROtI)[6] method to assess the likelihood of impact that identifies project's *intended impacts* against a *review of the projects logical framework analysis*, followed by the analysis and modelling of the project's *outcomes-impact pathways*. To analyze and model these pathways, the evaluation employs a **Theory of Change** (ToC) approach to depict the impact pathways of the project. A reconstructed ToC for this TE is provided in Section 2.8 (Paras 24 to 33).

8. With 5 country programs of Component 2 that were implemented by UNDP, the evaluation team utilized UNDP specific guidance on evaluations[7] and programme policies (POPP)[8] when deemed necessary. This included consultations with the UNDP Evaluation Office to ensure alignment with the UNDP specific requirements. The GEF evaluation requirements were already integrated in the UNEP approach to evaluations.

9. Limitations to this evaluation include the limited time available in the participating countries to fully assess the impact of the project amongst the key beneficiaries including government stakeholders, building and technology professionals, and end-users of SWH technology. The evaluation schedule and budget were set too tight. For example, only 2 and 3 days were spent in Albania and Lebanon respectively to interview all stakeholders while only 5 days were spent in both Mexico and Chile interviewing SWH beneficiaries as well as project management teams. This limited amount of time in country did not generate opportunities for the evaluators to meet all relevant stakeholders; attempts were made to follow up after these missions to talk with all relevant stakeholders resulting in some successes. The key to optimizing the time used in-country to interview stakeholders was to be well prepared and focus on primary issues with the wide variety of stakeholders that would facilitate triangulation of their responses. In the case of the Chilean mission, very little notice was provided to the country office of the evaluator's mission resulting in some key stakeholders not being interviewed; this was mainly caused by UNEP administrative processes and a resulting tight schedule from the limited availability of key stakeholders.

1.3 Main evaluation criteria and questions

10. The evaluation assesses the project performance against the following criteria: (1) Strategic Relevance; (2) Attainment of objectives and planned result, which comprises the assessment of outputs achieved, effectiveness and likelihood of impact; (3) Sustainability and replication; (4) Efficiency; and (5) Factors and processes affecting project performance, including preparation and readiness, implementation and management, stakeholder participation and public awareness, country ownership and driven-ness, financial planning and management, supervision and backstopping, and project monitoring and evaluation. The evaluation consultants can propose other evaluation criteria as deemed appropriate.

11. The assessment of Project performance were based on a set of key questions within the evaluation framework[9] including:
    - Did project design incorporate the realities of participating countries in terms of institutional and policy framework and if so, was the project approach relevant in terms of linkages between outputs and outcomes?
    - Were all outputs and targets achieved and were there any deviations from planned activities?
    - What were the actual impacts of the project against the outcomes achieved as well as against intended outcomes and the project results framework?
    - What was the overall approach to risk management strategies of the project?
    - To what extent will the generation of benefits from implementing the Project's activities be sustained?
    - To what extent has the project facilitated catalytic actions being taken resulting in replication and scale up?
    - To what extent has the project been implemented in a cost effective and timely manner?
    - With a global knowledge management component under UNEP, how is cooperation between UNEP and UNDP, and is there a value of joint implementation of such types of projects?

12. Responses to these key questions will be influenced by:
    - The assessment of cooperation between UNEP and UNDP to determine the value of joint implementation on such types of projects. Assessment of the effectiveness of the information generated from the country program evaluations to global knowledge management towards a long-term outcome of "acceleration of global commercialization and sustainable market transformation of SWH"

[6] GEF Evaluation Office (2009). ROtI: Review of Outcomes to Impacts Practitioners Handbook. https://www.thegef.org/gef/sites/thegef.org/files/documents/M2_ROtI%20Handbook.pdf
[7] Handbook on planning, monitoring and evaluating for development results (UNDP) http://web.undp.org/evaluation/evaluations/handbook/english/documents/pme-handbook.pdf
[8] UNDP Programme and Operations Policies and Procedures https://info.undp.org/global/popp/Pages/default.aspx
[9] These questions were revised from those provided in the ToR to better serve the purpose of the TE

was deemed essential in assessing the value of joint cooperation. Given the actual outcomes of the Project (including a less than effective collaborative relationship between UNEP and UNDP), a number of implementation factors needed to be closely examined including the impact of different implementation periods for each of the country programs, the challenges of the diversity of approaches by each of the country programs, and how information from these programmes were integrated into one global program;

- Effectiveness of the knowledge products (or KPs) generated from Component 1 on:
  - *initiating and/or acceleration of market transformation of SWH technology in each of the country programs (under Component 2)*, and the reduced use of fossil fuels for hot water (fossil fuels either used as a primary fuel or through electricity generation). It is likely that such contributions would not be documented, and thus, the linkage of knowledge products to the country programs needs to be confirmed through meetings or phone discussions during the evaluation;
  - *improving the capacity of national SWH experts* to promote solar water heating and provide services in technical support and training based on their knowledge of best international practices;
  - *enhancement of the country program's institutional, legal and regulatory frameworks* to promote sustained growth in SWH markets;
  - *raising awareness of SWH technology in each program country* with end-users and other relevant stakeholders such as students, educational institutes and financing entities;
  - *the creation of new financing mechanisms* to catalyze adoption of SWH in each participating country; and
  - *national quality control and certification schemes* in each participating country to increase consumer confidence of the SWH market;
- The findings from the GSWH midterm evaluation (MTE) which was conducted in 2013. The GSWH MTE raised issues of UNEP/UNDP cooperation as well as cooperation with other key stakeholders; improved definition of the responsibilities of the co-implementing agencies; lack of sufficient platforms for stakeholder feedback on program execution for global knowledge dissemination; and the lack of SMART indicators impacting the effectiveness of the M&E system and agreement amongst the implementing agencies on the common "Theory of Change" (TOC) for the GSWH project;
- The evaluations (both midterm and terminal) for each of the "UNDP country programs". Each of these evaluations should have findings and conclusions on the effectiveness and efficiency of implementation of the UNEP KM component to the acceleration of SWH technology adoption in each country. This will be crucial in determining the impacts of this project as well as its sustainability.

2 PROJECT BACKGROUND

2.1 Context

13. The design of the GSWH Project was based on the successes of developing the solar water heating (SWH) market in other GEF program countries, notably in China and Turkey. Available market information in 2008 determined that SWH technology had economic feasibility potential in several countries due to its lower cost and potential energy savings that would benefit even lower income households, many of whom do not have access to clean energy services or products. While SWH was viewed in 2008 and still is currently an economic, commercially viable technology available to a wide variety of consumers, market penetration has been limited due to a number of barriers that exist in various solar water heating markets.

14. During the Project design phase of the GSWH Project in 2008 and 2009, GEF had approved only 3 projects that specifically deal with solar water heating. One of the reasons for the lack of country-specific SWH projects was likely the complexity and uniqueness of market infrastructure for SWH for each country. Despite SWH technology not being too complex, the decentralized nature of the SWH market poses challenges for SWH technology to become mainstreamed. Facilitating and sustaining SWH market transformation on a global scale would require strengthening of decentralized and diverse SWH market infrastructure (that is diverse for each country) and support for the development of stable financial support mechanisms. This would include the SWH markets of:
    - Albania where the focus has been on the residential sector as well as public buildings and the adoption of a regional technical standard for SWH equipment. There has not been a strong focus on financial mechanisms for this market due to the availability of highly subsidized electricity;
    - Chile where at the beginning of the project, 90% of water heaters are fuelled by natural gas or liquid propane gas (LPG) with the other 10% from electricity. With target sectors for SWH technology of both the residential sector in the mining industry, the lack of capacity within the country to supply and install SWH equipment was certainly an issue at the beginning of the project in 2009;
    - India which required an emphasis on transposing regulations to local ordinances, financial mechanisms to support market transformation, and training to ensure quality installations of SWH equipment;
    - Lebanon that focuses on the residential and commercial sectors where most hot water heating was dependent on electric water heaters in a country where electricity is heavily subsidized but also not

reliable (power cuts ranging from 2 to 9 hours). As such, the demand for SWH technology was higher, and made available through an SWH subsidy for the purchase of EU-certified SWH equipment;

- Mexico where the primary drivers for SWH equipment has been rising energy costs, mainly LPG and natural gas for hot water heating in the residential sector as well as the commercial, tourism and industrial sectors.

2.2 Project Objectives and Components

2.2.1 Objectives

15. The ***objective of the GSWH Project*** was to accelerate global commercialization and sustainable market transformation of SWH, thereby reducing the current use of electricity and fossil fuels for water heating in residential, private sector and public buildings and wherever applicable, in industrial applications. The Project sought to support SWH market developments for 6 countries through strengthening their supply chain by supporting the establishment of enabling policy frameworks, enhancing the awareness of key stakeholders on the use of SWH systems, and facilitating global information exchange and networking to advance learning on the experiences, results, lessons learned and best practices in other countries. The impact of the successes of these countries in SWH market transformation would be the generation of interest and subsequent replication of these successes in other countries.

2.2.2 Components

16. The GSWH Project consisted of 2 components: (1) global knowledge management and networking, and (2) country programs to develop SWH markets:
    - Component 1: Global knowledge management and networking: This component was executed by UNEP and a network of global and regional partners in an effort to deliver coordinated, timely and professional technical backstopping for country-specific activities required to develop SWH markets; to develop and disseminate SWH materials to increase public awareness of SWH technology on a regional or international basis; and to monitor, analyse and disseminate results of the results and experiences of the country programs implemented as a means of facilitating global growth of the SWH market. An intended but immediate outcome from this component was the improved access to national and international SWH experts as well as the institutionalization of knowledge management support with a wider dissemination of lessons learned and international experiences; and
    - Component 2: UNDP Country Programs: This component was executed by UNDP in an effort to overcome barriers to stimulate SWH market development within specific countries including the creation of an enabling regulatory, legal and institutional framework supportive of SWH market development; building capacity and knowledge of local stakeholders to build sustainable demand for SWH systems; increasing the availability of financing mechanisms to end-users to enhance demand for SWH systems; enhanced capacity of the SWH supply chain to improve end-user confidence in SWH installations; and institutionalized support of results, lessons learned, and experiences to enhance sustainability of SWH market development. An intended but immediate outcome of this component is the country adoption of institutional, legal and regulatory frameworks for SWH market transformation; the availability of feasible financial mechanisms for end-users; and enhanced business skills, awareness and capacity of end-users and professionals to integrate SWH systems;

A summary of the intended GSWH project outputs and outcomes are provided on Table 3. The full GSWH logical framework (LF) is provided in Annex XIII.

Table 2: Project Logical Framework

Components	Outputs	Outcomes
Component 1: Global knowledge management (KM) and networking	**1.1** Global SWH market assessment and analysis **1.2** Finalization and adoption of proposals for at least 10 additional countries for phase II **1.3** A network of international and regional agencies established **1.4** A virtual SWH information clearing house and training facility established **1.5** Other internationally or regionally applicable public awareness raising, training and	Effective initiation and co-ordination of the country specific support needs and improved access of national experts to state of the art information, technical backstopping, training and international experiences and lessons learnt

Components	Outputs	Outcomes
	knowledge management material published **1.6** A draft design and a strategy for adopting more harmonized international product standards, schemes **1.7** A regularly updated, "quality controlled" roster and team of international SWH experts **1.8** Regional and international thematic or general SWH workshops **1.9** Regular newsletters and market monitoring reports **1.10** The results, experiences and lessons learnt of the overall program compiled, analyzed and disseminated	
Component 2: UNDP Country Programs	**2.1** Market development activities in 6 initial countries successfully finalized meeting the stated targets as per the country specific log frames of the National country programs[10]	Specific SWH market transformation targets of the first 6 participating countries reached by the end of the project, conducive to the overall, global market transformation goals of the project[11]

[10] This is not properly worded as an output. As such, outputs will be assessed as services or products coming from the Country Programs (as defined by CP logical frameworks).
[11] The evaluation will assess the number of market transformation targets attained as a measure of the success to which this outcome is achieved

2.3 Target areas/groups

17. Targeted stakeholders in each country included SWH suppliers, the general public, as well as researchers and trainers to ensure the most robust and advanced SWH equipment is deployed in each country. Moreover, with the target of a wide range of stakeholders, the Project would also be able to reach out to local SWH promoters and persons involved in the environmental advocacy on the use of SWH. In addition, another project target group would have been the national authorities dealing with quality control of SWH, and the local and regional partner institutions that would disseminate best international practices to these national authorities.

2.4 Milestones in Project Design and Implementation

18. Table 3 presents the milestones and key dates in GSWH Project design and implementation.

Table 3: Milestones and key dates in GSWH Project design and implementation

Milestones	Completion dates
Preparation grant approved	13 December 2005
Concept approved (under GEF-3[12])	2 August 2006
Approval of Project by GEF	29 July 2008
Commencement of India CP	21 November 2008
Commencement of CPs for Chile and Lebanon	1 March 2009
Commencement of Mexico CP	July 2009
Commencement of Albania CP	September 2009
Inception Phase	25-26 February 2010
Terminal date of India CP	30 June 2013
Mid-Term Evaluation (KM component)	December 2013
Terminal date of Lebanon CP	30 April 2014
Terminal date of Albania CP (on-going)	31 December 2017[13]
Terminal date of Chile CP	31 December 2015
UNEP Component of GSWH Project closed	28 February 2016
Terminal date of Mexico CP	April 2016

2.5 Implementation Arrangements and Project Partners

19. According to the Project Document:
    - UNDP-GEF was to be the lead agency to report to GEF;
    - UNEP-DTIE (formerly UNEP-DGEF) was to be responsible for:
        - consolidation of monitoring activities and knowledge across 6 country programs[14];
        - the provision of technical design assistance to the country programs of Mexico and Chile; and
        - the provision of technical design assistance for Algeria, Albania and Montenegro under an Italian funded SWH program
    - The Project Management Committee (PMC) was to consist of UNDP-GEF, UNEP-DTIE and the International Copper Association (ICA). The functions of the PMC were to prepare and update work plans for the project.

20. The Project Document further elaborates on the roles of UNEP and UNDP as jointly acting as GEF implementation agencies on project management and supervision roles for the GSWH Project:
    - UNEP-DTIE was to execute Component 1 or the KM component. Execution of work in the KM component was to be subcontracted to international or regional expert institutions as deemed appropriate by UNEP. In addition, UNEP-DTIE was tasked with overall responsibility for project monitoring and progress reporting including the preparation of quarterly progress reports (QPRs) to the PMC and PIRs to GEF. This somewhat contradicts an earlier statement in the project document that UNDP GEF would be the lead agency reporting to GEF as further explained in Paras 102 to 103;
    - Country programs under Component 2 were to be nationally executed (NEX) following UNDP standard guidelines and procedures for NEX projects unless there were specific reasons for direct execution (DEX) by UNDP or UNEP.

[12] While the GEF-4 period started July 1, 2006, the GSWH project was approved under a special work program of all left over GEF-3 proposals during a special Council session in South Africa held in August 2006.
[13] The country programme was extended with government cost-sharing (Steering Committee decision, April2015)
[14] Page 34 of the Project Document

2.6 Project Financing

21. The total project cost was USD 36,377,000 [15]. This cost is broken down into the USD 12.0 million in GEF grants and USD 24.377 million from co-financing partners as shown in Table 4.

Table 4: Project budget summary

Particulars	Amount (USD)
GEF grant to UNEP	3,750,000
GEF grant to UNDP	8,250,000
ICA (Private)	2,654,000 (cash + in-kind)
Regional partners and NGOs	450,000 (in-kind)
NGOs	105,000 (cash)
Participating governments	15,122,000 (cash)
Participating governments	2,714,500 (in-kind)
Bilateral agencies	2,631,500 (cash)
UNEP EP Co-financing (Implementing agency)	450,000 (in-kind)
UNDP Co-financing (co-implementing agency)	250,000 (cash)
Total Cost of the Project	36,377,000

2.7 Changes in design during implementation

22. During the first PMC meeting of the GSWH Project in Tunisia in March 2010, clarifications were made in the implementation arrangements of the Project as well as the roles of all members of the PMC including UNEP and UNDP:
    - UNEP was responsible for ensuring Component 1 that the objectives and expected outcomes for this component were to be achieved in an efficient and effective manner and in compliance with GEF policies and criteria. Overall project reporting (i.e. PIRs) to GEF would be under the responsibility of the UNEP project task manager. In addition, the PMC noted that demand for technical assistance on financial mechanisms did not exist for all participating countries[16]; as such, the PMC decided that this technical assistance would be managed on a case-by-case basis under UNEP DTIE who would respond to requests from country programs for such assistance through UNDP-GEF's Principal Technical Advisor (PTA);
    - UNDP was responsible for implementation of the country programs under Component 2. In addition, while they were also responsible for providing PIRs to UNEP that would contribute to the overall project reports to GEF, UNDP was to serve as an interface towards GEF regarding any issues directly related to the CPs. At the time this decision was made, all country programs had had different commencement dates leading to issues of how UNEP could effectively and efficiently assemble information from all country programs into a global platform;
    - The role of ICA was to host the global platform website for SWH technology, and to serve as a global resource for SWH technology.

23. There was a realization by the PMC (as early as the 2nd PMC meeting in Chile June 2011) that some of the KM component outputs would not be achieved in a timely manner, namely Output 1.2 involving the preparation of SWH proposals for another 10 countries. The lack of interest in SWH at this time was related to the lack of end-user confidence in SWH quality, and a lack of related SWH information that would boost this confidence. As such, UNEP DTIE shifted its focus in late 2011 to quality assurances for SWH technology (namely through more focus on Output 1.6 and the preparation of a quality assurance guidebook[17] and implementation of regional certification schemes such as SHAMCIE); however, no changes were made to the design, outcomes and outputs of the GSWH project. Later on design changes were made to the global component due to cost deviations identified during the course of the project. This included 3 Project extensions with the first extension being requested in September 2012. Most of the activities that received additional Project support were not design changes. The only design change consisted of additional and global efforts in 2013 to harmonize solar thermal collectors and development of the first regional solar water

[15] Project Document
[16] For example, UNEP was supposed to have come up with the financial mechanisms to help promote SWH market transformation. This was then supposed to be disseminated in the country offices for implementation in the lessons learned of implementation sent back to UNEP to improve the global knowledge products on financial mechanisms. This was not the case generally speaking since UNDP country programs would start at different periods and at different paces; personnel changes were experienced in Chile and Mexico and in fact, the quality of personnel had deteriorated to the point where the project had lost its SWH champions
[17] "Guidebook on Standardization and Quality Assurance for Solar Thermal"

heating certification scheme for developing countries (likely related to Output 1.6). All budget reallocations on the KM component were documented in detail to which the evaluators had access.

2.8 Reconstructed Theory of Change of the Project

24. A Theory of Change (TOC) for the GSWH Project was not prepared during its design phase nor was it a requirement of GEF for the approval of its projects in 2008. The GSWH Mid-Term Evaluation (MTE) provided an initial TOC analysis. The evaluation team closely examined the TOC from the MTE, particularly in the context of actual project outcomes and the nature of the outputs, drivers and assumptions that contributed to the actual outcomes of the project. On this basis and using the logical framework (LF) from the GSWH project document, the TOC for the GSWH project was reconstructed to depict how the project was to function in achieving the intended direct outcomes as explained in the UNEP project document as well as the UNDP project documents for each country programme (CP). The CP project documents include a paragraph on key assumptions and sometimes risk mitigation measures to be taken. However, impact drivers are not explicitly defined in the project documents, and as such, have been placed in the reconstructed TOC in Figure 1 and 2.

25. The primary objective of the GSWH project was the "acceleration of the global commercialization and market development of solar water heating in residential, private service sector and public buildings and when applicable, industrial applications". This objective was to be achieved through activities involving the two co-implementing agencies:
    - UNEP to initiate and coordinate support for country specific needs, and to improve the overall SWH knowledge and information of the country; and
    - UNDP to implement activities leading to specific SWH country market transformation targets for six countries.

26. Moreover, the activities of two agencies were designed to be intertwined: UNDP activities were designed to initiate and infuse best international practices within UNDP activities towards successful development of SWH markets. In turn, the lessons learned from the UNDP country program activities would inform and strengthen UNEP's global knowledge platform for SWH market development on which other countries can replicate examples of successful SWH country programs. Figures 1 and 2 provide a depiction of the reconstructed TOC diagram for the entire GSWH project. The logic of the diagram flows in an upward direction from the baseline, to project outputs which generate direct GSWH project outcomes. These lead to intermediate states of the SWH markets that lead to long term outcomes and eventually long term impacts of the project. An important aspect of the reconstruction of the logic for the GSWH project is taking the 2 outcomes in the project design document and separating these into 4 distinct outcomes. This would provide the proper frame under which a Review of Outcomes to Impacts (ROtI) [18] of the GSWH project can be conducted.

27. On Figure 2, above the baseline in the central area of the diagram, the outputs of Component 1 being implemented by UNEP are listed in light green boxes. These outputs are divided into three different groupings that lead to three direct outcomes from the GSWH project (as well as other interlinkages where some output groupings lead to different outcomes):
    - Outputs 1.1, 1.2, 1.3 and 1.6 contribute to a Direct Outcome 1 of "effective initiation and coordination of support for the needs of specific UNDP country programs";
    - Outputs 1.4, 1.5, 1.8 and 1.10 contribute to a Direct Outcome 2 of the "institutionalization of knowledge management (KM) support resulting in wider dissemination of lessons learned and international experiences in SWH market development". This group of outputs also contribute towards Direct Outcomes 1 and 3; and
    - Outputs 1.7, 1.8 and 1.9 contribute to a Direct Outcome 3 of "improved access to the SWH national experts, state-of-the-art SWH information, technical backstopping, training, international experiences and lessons learned".

28. On the same Figure 2 above the baseline but on the right-hand side of the diagram in a dark green box are the five outputs coming from the country program level that contribute to a 4th direct GSWH project outcome on the reconstructed TOC, "successfully developed SWH markets in participating countries"[19].

29. Direct GSWH project outcomes, if sustainable, will lead to "intermediate states" in the transformation of the SWH market including:
    - "Increased consumer confidence in SWH technology" if Direct Outcome 4 is sustained through drivers such as UNEP and UNDP cooperation and increased stakeholder awareness of SWH technology;

[18] GEF Evaluation Office (2009). ROtI: Review of Outcomes to Impacts Practitioners Handbook. https://www.thegef.org/gef/sites/thegef.org/files/documents/M2_ROtI%20Handbook.pdf

[19] In fact, this outcome is actually Output 2.1 in the Project Document. To clarify the outcome to impact pathway of Component 2, this "Output 2.1" was reclassified as the 4th GSWH Direct Project outcome.

- "Improved access for lower income households to sustainable clean energy sources", if increases in consumer confidence in SWH technology are sustained and supported through the presence of functional financial mechanisms that can be utilized by low income households to access SWH technology;
- "Replication of large-scale replacement of fossil fuel or electricity driven water heating systems with SWH in other countries", that would result from:
    - A sustained Direct Outcome 1 driven by the readiness of other countries to undertake SWH market transformation activities as well as continued cooperation between UNEP and UNDP;
    - A sustained Direct Outcome 2 driven by strengthened SWH information dissemination through regional partners; and
    - A sustained Direct Outcome 3 driven by the readiness of other countries to undertake SWH market transformation activities, continued cooperation between UNEP and UNDP to generate implement successfully developed SWH markets; and a resulting increased awareness of SWH technology amongst all key stakeholders in each country;
    - The positive lessons garnered from "increased consumer confidence in SWH technology" and the proven successes of "improved access for lower income households to sustainable clean energy sources".

30. The long-term outcome from these intermediate states is "acceleration of the global commercialization and sustainable market transformation of SWH". This acceleration would be a result of the replication of large-scale replacement of fossil fuel or electricity driven water heating systems with SWH and other countries as well as increased global consumer confidence in SWH technology and improved access for lower income households to sustainable clean energy solutions. Drivers towards this long term outcome include:
    - increased awareness of SWH technology;
    - UNEP-UNDP cooperation;
    - compliance to global best practices; and
    - international and regional agencies that promote SWH technology.

31. The long-term impact of the GSWH project is the "reduced use of fossil fuels and electricity generated from fossil fuels" and the consequent "GHG emissions reduced". Key assumptions to ensure the GSWH long term outcome and impact includes:
    - sustained political and administrative support of host governments;
    - continued competitiveness of SWH technology with alternative energy sources; and
    - sustained government oversight of certification and quality control schemes for SWH technology and installation that will sustain consumer confidence in SWH technology in each country.

Figure 1: Re-constructed Theory of Change (TOC) – Outputs to Impact Analysis for Component 1

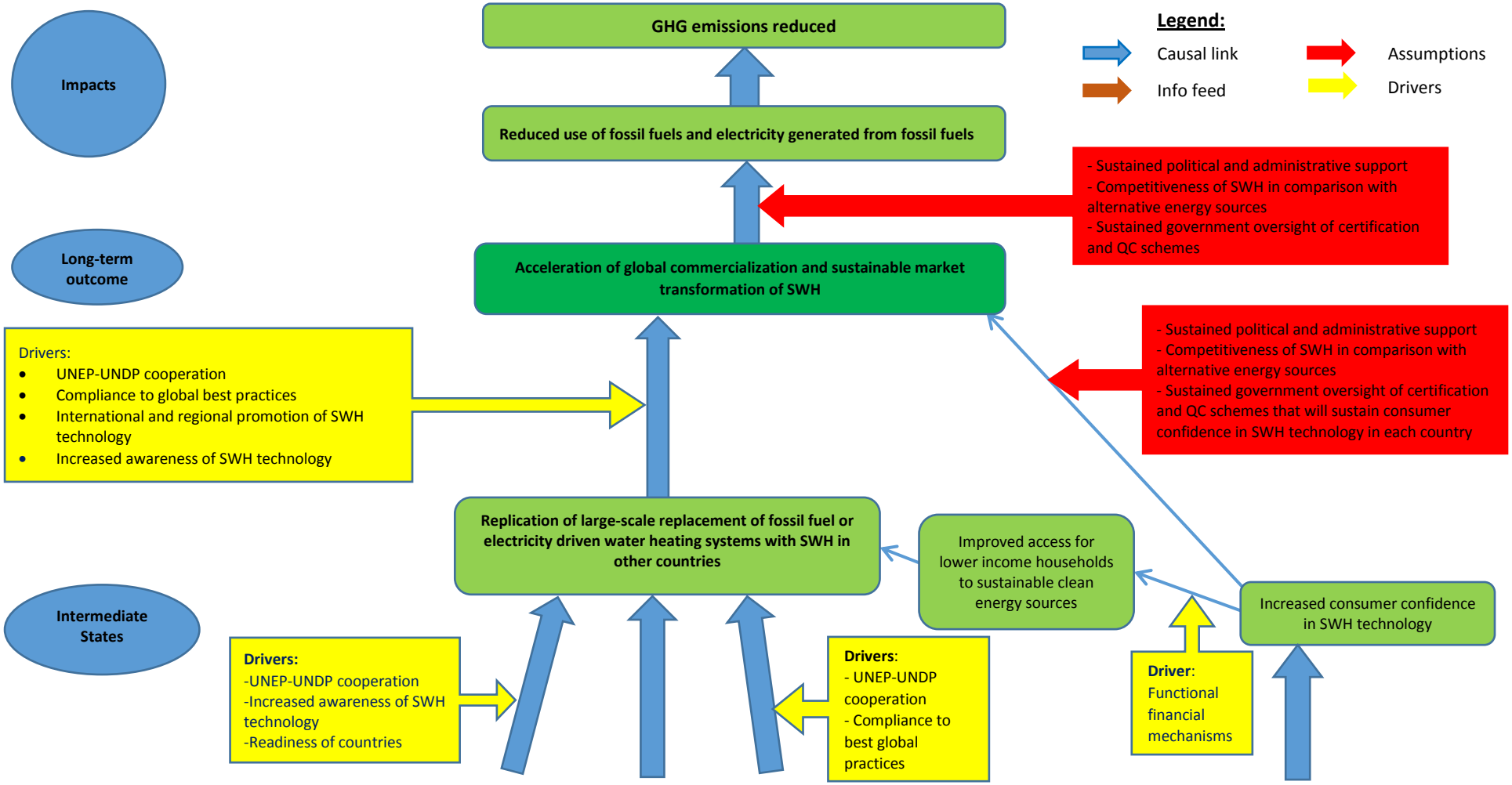
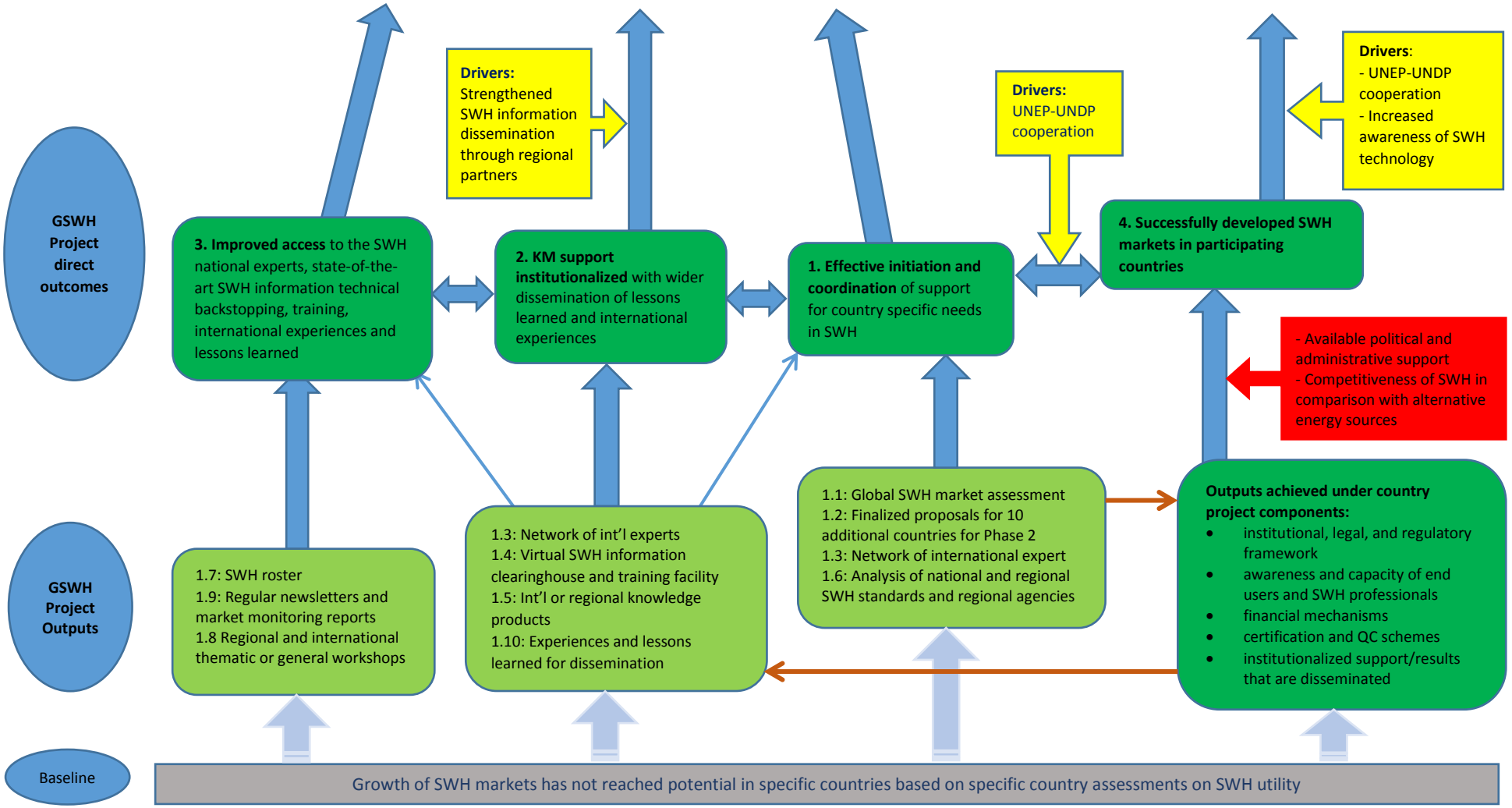


Figure 2: Re-constructed Theory of Change (TOC) – Outputs to Impact Analysis for Component 1 (con'd)



3 EVALUATION FINDINGS

3.1 Strategic Relevance

3.1.1 Alignment with UNEP's strategy, policies and mandate

32. UNEP Medium-Term Strategy (MTS) 2014 to 2017 identifies an Expected Accomplishment (EA2/low emission growth) through the use of renewable energy in partner countries to reduce GHG emissions and other pollutants as part of their low emission development pathways. UNEP's MTS of 2010 to 2013 also identifies similar EAs including assisting countries to make sound policy, technology and investment choices that lead to GHG reductions and potential co-benefits with a focus on clean and renewable energy sources, energy efficiency and energy conservation. The GSWH Project is highly relevant to both of these UNEP MTSs and has made tangible contributions consistent with these MTSs to the development of SWH market transformation in all participating countries.

33. The CPs within the GSWH Project have high relevance to the respective United Nations Development Assistance Frameworks (UNDAF) for the country programs of Albania, Chile, India, Lebanon and Mexico.

34. The *Bali Strategic Plan* (BSP)[20] has the objectives of "strengthening the capacity of governments of developing countries through targeted capacity building within the mandate of UNEP, using and sustaining the capacity are technology obtained through training or other capacity building efforts, and developing national research, monitoring and assessment capacity that supports national institutions in data collection, analysis and monitoring of environmental trends and in establishing infrastructure for scientific development and environmental management (that will ensure sustainability of capacity building efforts)". The GSWH Project was strongly aligned to the BSP through its efforts to achieve this objective, the results of which are discussed in the following sections of this report.

35. In addition, the BSP has a specific objective, amongst others, to "strengthen cooperation amongst UNEP, multilateral agreement secretariats (that take into account their autonomous decision-making processes), and other bodies engaged in environmental capacity building including UNDP and GEF in particular". The GSWH Project is strongly aligned to this objective.

36. In the context of *gender balance*, the GSWH Project does not strongly address issues related to gender inequalities, specific vulnerabilities of women and children to environmental degradation, and the role of women in mitigating or adapting to environmental changes or engaging in the SWH sector. This is likely related to the fact that this Project was designed as a GEF-3 Project, during which the emphasis on gender balance was not strong. In addition, the KM component had a strong technical focus, somewhat marginalizing gender issues related to awareness and technical training. Similarly for the CP component, none of the participating countries addressed gender balance issues within their projects.

37. With regards to *South-South Cooperation* (SSCo), the GSWH project has been designed to foster information exchanges with other countries developing SWH markets. With DTIE responsible for initiation and coordinating support of the CPs, the CPs in turn become a source of information of experiences and lessons learned for developing SWH markets that would be disseminated to catalyze interest in SWH market transformation in other developing countries. The reconstructed TOC confirms this assumption. The GSWH Project has fostered a modest level of SSCo with Project sponsored international and regional workshops, and support for the solarthermalworld.org website (hosted by ICA) that provides global information to SWH professionals, manufacturers, suppliers and proponents. This would have included sharing information of SWH successes in financial mechanisms of other countries such as India.

38. *Safeguard management instruments* were not completed for this Project at the time of its design in 2007. The UNEP ESES only came into effect in 2015 while UNDP's Social and Environmental Procedures were only launched in 2012. Despite the lack of compliance to both the ESES and SES, the GSWH Project has made efforts to introduce and sustain the use of international best practices for SWH equipment and technology with all participating CPs. In addition, GSWH activities designed to result in a growth of SWH businesses and SWH installations are not considered to be high or medium environmental or social risks.

3.1.2 Alignment with GEF focal areas and strategic priorities

39. The GEF provides grants for projects in focal areas of biodiversity, climate change, international waters, land degradation, the ozone layer, persistent organic pollutants, and chemicals and waste. The GEF funds for the

[20] http://www.unep.org/GC/GC23/documents/GC23-6-add-1.pdf

GSWH Project were approved at the end of the GEF-3 Operational Phase. As such, with the commencement of the GSWH project in 2009, the GSWH Project delivered outcomes consistent with the strategic programming objectives of the overlapping GEF-4 (2007 - 2010) and GEF-5 (2011 - 2014). For GEF-4, the GSWH project was highly relevant with Strategic Program 1 for "promoting energy efficiency in residential and commercial buildings". For GEF-5, the GSWH project was highly relevant to the Climate Change Objective 1: "The demonstration, deployment and transfer of innovative low carbon technologies". The GSWH project, however, had a target for preparing another 10 (GEF) SWH proposals which was not met by the end of the GSWH Project. This was not due to any diminishing relevance of SWH technology to GEF; rather, many of the countries approached during project implementation did not have sufficient GEF-5 allocations, and alternatively, chose to pursue SWH technology through the preparation of a NAMA project through the technical assistance of UNEP-DTIE (as further detailed in Para 57).

3.1.3 Relevance to global, regional and national environmental issues and needs

40. The GSWH Project was a response to support strong SWH market development observed in other GEF program countries, notably the large markets of China and Turkey. Since SWH technology was viewed as a potential feasible and cost effective energy solution for lower income sectors of many countries and a generous source for GHG emission reductions, the opportunity to utilize the successful SWH implementation experiences of these countries (as well as those of Cyprus, Israel and Greece) to transform other country markets on a global scale was the key impetus behind the GSWH Project.

41. An assessment of the relevance and consistency of the GSWH Project objectives, implementation strategies and objectives of each Country Programme[21] is as follows:
    - Albania: Strong relevance of the CP to Albania's National Energy Strategy (NES) for 2006-2020 to develop an energy sector that guarantees security of energy supplies, promotes the efficient and economic use of energy with a minimal environmental impact. This includes the promotion of solar thermal energy for hot water supplies and the services sectors in the action plan of the NES;
    - Chile: Relevance to the 2014-2018 Energy Programme plans to extend and improve the fiscal incentives for solar water heating, as well as providing subsidies for installation of solar water heaters with a focus on reconstruction of disaster-affected areas, and the new National Strategy for the Energy Sector (of February 2012) aimed at supporting non-conventional renewable sources and promoting sustainable financing of these sources;
    - India: Strong relevance of the CP to the Government's promotion of SWH from 2002 to 2008, followed by the Prime Minister's National Action Plan on Climate Change (NAACP) in 2008, and the launching of the Ministry of New and Renewable Energy (MNRE)-supported Jawaharlal Nehru National Solar Mission (JNNSM) mission in January 2010[22]. The JNNSM Phase I was to promote and increase the use of SWH through a financial mechanism with a subsidy scheme; the provision of testing facilities at MNRE's Solar Energy Center; a range of activities to support SWH manufacturers and dealers; and the development and uptake of a range of policy and administrative measures to transform the SWH market. The immediate aim of JNNSM Phase I was to focus on setting up an enabling environment for solar technology penetration in the country both at a centralized and decentralized level to the end of 2013. The JNNSM Phase II was to scale-up solar energy installations in India until 2017;
    - Lebanon: Strong relevance of the CP to the National Energy Strategy (2010-2015), notably with the promotion of the use of renewable energy to achieve 12% target of the electric and thermal supply by 2020;
    - Mexico: Strong relevance to the 2007 laws to introduce renewable energy in the Mexican regulation framework including the Law for Sustainable Use of Energy (LASE) and the Law for the Use of Renewable Energies and Financing of the Energy Transition (LAEFERTE). These laws accelerated the formation of the Ministry of New and Renewable Energy or CONUEE, and the launching of the PROCALSOL program in 2007 as Mexico's first long-term scheme to support solar water heating (PROCALSOL ended in December 2012). In addition, this CP has strong relevance to the government's National Climate Change Strategy which is a part of the General Law on Climate Change, which entered into force in 2012, and sets climate related activity areas including amongst others, the reduction of GHG emissions by 30% by the year 2020 and by 50% by 2050.

The overall rating for project relevance is Satisfactory.

[21] Algeria was one of the original CPs but was dropped in 2013 as detailed in Para 96

[22] JNNSM Phase I was a major initiative with the combined efforts of Government of India and its State Governments to promote ecologically sustainable growth while addressing India's energy security challenge, and scoping India's contribution of solar energy generation to mitigate global climate change.

3.2 Achievement of outputs

3.2.1 Component 1: Global knowledge management and networking

42. The KM component was to deliver 10 outputs for effectively initiating and coordinating support for country programs with interests in SWH market transformation, and to improve access to SWH experts, state-of-the-art SWH information, technical backstopping, training, international experiences and lessons learned. Table 5 provides a summary of the status of the outputs from Component 1.

43. The difficulties experienced by UNEP in executing this component are related to the different periods over which the CPs were implemented. GEF approval for the GSWH Project was received on July 29, 2008. UNEP approval to implement the GSWH Project was received on May 7, 2009 which allowed DTIE to effectively and efficiently deliver Outputs 1.1, 1.3, 1.5 and 1.6 to initiate and coordinate support for CPs at their nascent stages, all CPs needed to be started at the same time. However, India's CP received UNDP approval to start implementation in late 2008, largely from the strong drivenness of the Government of India. With UNEP approval of the GSWH Project in May 2009, and the remaining CPs starting at various dates from mid-to late 2009, the notion of providing initial support for these CPs was no longer feasible for India and challenging for the remaining countries. This required DTIE to adaptively manage its activities on the KM component by focusing on delivery of specific technical outputs that could be used by CP management personnel and stakeholders to improve the quality of implementation of SWH market transformation in their countries.

Table 5: Summary of the achievement of outputs of Component 1

Component	Expected Outcome (as per Project Document)	Outputs	Status at the end of the project
1. Global knowledge management and networking	Effective initiation and coordination of the country specific support needs and improved access of national experts to state-of-the-art information, technical backstopping, training and international experiences and lessons learned.	**1.1** Global SWH market assessment and analysis	Completed and available on the solarthermalworld.org website. Quality of these reports is satisfactory.
		1.2 Finalization and adoption of proposals for at least 10 additional countries for phase II	Only 4 proposals were finalized including one CEO endorsed GEF Project from Panama[23], and 3 NAMAs from Bolivia, Costa Rica and Ecuador, due to shortages of GEF allocations of each country, and the availability of a SWH NAMA guidebook in 2014, near the end of the GSWH project, leaving little time to complete a certain number of NAMAs to meet a target of 10 additional countries[24].
		1.3 A network of international and regional agencies established	Completed with the engagement of ICA (internationally) and regional agencies such as ESTIF, RCREEE, OLADE and UVI, all of whom are engaged in the promotion and development of SWH technology in their regions.
		1.4 A virtual SWH information clearing house and training facility established	Completed with the establishment of the solarthermalworld.org website hosted by ICA.
		1.5 Other internationally or regionally applicable public awareness raising, training and knowledge management material published	Completed with knowledge products delivered to developing countries by regional partners including guidebooks on SWH awareness raising campaigns, SWH standards and quality assurance, market and market readiness assessments for several countries and regions. More than 40 knowledge products have been posted on the solarthermalworld.org website. Quality of knowledge products has been highly satisfactory[25].

[23] Solar Water Heater Market Development Project for Panama (GEF ID 5287)
[24] The NAMA guidebook and adaptive management action undertaken by UNEP-DTIE in response to providing other countries with alternative means of accessing climate funding for SWH market transformation.
[25] This includes the development of 6 Solar Thermal Application Factsheets that covered different solar thermal including possible ranges of use, energy saving effect and GHG, with perception of the competitiveness, investment cost and economic

Component	Expected Outcome (as per Project Document)	Outputs	Status at the end of the project
		1.6 A draft design and a strategy for adopting more harmonized international product standards, schemes	Completed with a review and updating of the "Guidebook on Standardization and Quality Assurance for Solar Thermal", and support through promoting the SHAMCI SWH certification scheme for the Arab region on the solarthermalworld.org website. Quality of this guidebook has been highly satisfactory.
		1.7 A regularly updated, "quality controlled" roster and team of international SWH experts	Completed regional rosters that are administered and maintained by regional partners. However, the roster has been underutilized due to lack of demand from CPs and other countries
		1.8 Regional and international thematic or general SWH workshops	Completed with the delivery of 4 international SWH workshops[26]
		1.9 Regular newsletters and market monitoring reports	Completed with the issuance of monthly newsletters.
		1.10 The results, experiences and lessons learnt of the overall program compiled, analyzed and disseminated	Partially completed for Chile, Mexico, and Lebanon. Reports of the Indian and Albanian SWH CP were not completed at the EOP.

The overall rating on the delivery of outputs related to Component 1 is satisfactory.

3.2.2 Component 2: Country Programs

44. In the original GSWH Project design, 6 countries were targeted as the initial SWH country programs. At the conclusion of the GSWH Project, only 5 CPs were implemented including Albania, Chile, India, Lebanon and Mexico. The CP for Algeria was not finalized as a part of the GSWH Project since the Government of Algeria wanted to focus more on SWH deployment in the industrial sector, a concept that deviates away from the GSWH focus on the residential sector.

45. Details of the delivery of outputs for the other CPs can be found in the section entitled "Achievement of Outputs" in each of the CP Terminal Evaluations[27]. A summary of the delivery of outputs for each of the CPs follows:
    - Albania: Interim evaluation of the on-going CP rates the progress towards delivering the outputs as highly satisfactory notwithstanding that the CP did not deliver financial incentives and mechanism

value. Examples of implementation and success stories, and application factsheets covered for different solar thermal technologies disseminated by the regional project partners and available on the project's web portal includes:
- Solar thermal collectors for production of domestic hot water in the residential sector (Domestic Water Heaters Multi-family Houses);
- Solar thermal collectors for production of domestic hot water in the residential sector (Domestic Water Heaters Single family Houses);
- Solar thermal collectors for production of hot water used in low temperature industrial processes (Solar Heat for Industrial Processes – SHIP);
- Solar thermal collectors for the production of hot water in non-residential buildings (Domestic Water Heaters for Social Amenities);
- Solar thermal collectors for the production of hot water used in district heating networks; and
- Thermally driven cooling using solar thermal collectors.

[26] Webinars were conducted under solarthermalworld web site as a substitute for additional regional workshops such as:
- Industrial Scale Solar Thermal Heating for Leaching Processes (March 2012);
- Solar Heaters Arab Mark and Certification Initiative (SHAMCI) towards a regional certification scheme for solar water heaters (May 2013);
- New Business Models for Commercial Solar Thermal Applications (June 2015).

[27] Terminal evaluations for the CPs for Albania, Chile, Lebanon and Mexico were completed in September 2016. The terminal evaluation for the India CP was completed in June 2013

outputs intended to remove financial barriers to the procurement and installation of SWH systems in the residential sector. This was mainly due to the cancellation of the Italian government's co-financing contribution and delayed contribution by the Government of Albania towards a National RE/EE fund. Moreover, despite the absence of financial incentives, the Albanian SWH market has experienced growth from 2009 to 2015 suggesting for until now that these incentives are not required;

- Chile: Delivery of outputs from this CP was moderately satisfactory due to a number of factors including additional time required to deliver awareness raising and strengthened legal and regulatory framework outputs, and the failure of the program to deliver a functional financial mechanism and an adopted SWH certification and quality control scheme;
- India: Output delivery for this CP was rated highly satisfactory. This can be attributed to strong support from government (such as personnel under the MNRE's JNNSM Programme that served as the "technology champion" in India) and regional partners (such as ICA), a functional financial mechanism, and a very capable project management team;
- Lebanon: The highly satisfactory delivery of outputs from this CP could be attributed to the excellent support of the Government of Lebanon through technology champions in the Lebanese Centre for Energy Conservation (LCEC), and the proactive participation of RCREEE, one of UNEP's regional partners in the introduction of regional solar water heating standards of SHAMCI;
- Mexico: Delivery of outputs from this CP was overall satisfactory as most of the outputs were delivered but with some delays. Utility of some outputs (such as those related to financial mechanism) might be limited by stakeholders low interest in the use of such mechanisms and in terms of certification and testing services for SWH equipment (where the CP utilized resources to support a new testing facility instead of strengthening existing ones).

The overall rating on the delivery of outputs related to Component 2 is satisfactory.

3.3 Effectiveness: Attainment of objectives and planned results

3.3.1 Achievement of direct outcomes as defined in the reconstructed TOC

46. As discussed in Section 2.8 (Reconstructed TOC), the Project sought to achieve outcomes that were supposed to contribute to an overall objective of "acceleration of the global commercialization and market development of solar water heating in residential, private service sector and public buildings and when applicable, industrial applications". The evaluation of the effectiveness of the GSWH Project is based on the extent to which the objective was achieved, based on the reconstructed TOC, and assessing the causal pathways from the baseline to the outputs of the Project to resulting outcomes and impacts. This section evaluates the achievement of intended direct project outcomes as defined in the reconstructed TOC including:
    - Intended Direct Outcome 1 of "effective initiation and coordination of the country specific support needs in SWH;
    - Intended Direct Outcome 2 of "KM support institutionalized with wider dissemination of lessons learned and international experiences";
    - Intended Direct Outcome 3 of "improved access to the SWH national experts, state-of-the-art SWH information, technical backstopping, training, international experiences and lessons learned"; and
    - Intended Direct Outcome 4 of "successfully developed SWH markets in participating countries".

47. With regards to *Direct Outcome 1*, the Project only partially achieved this outcome:
    - The Project did provide (from Outputs 1.2, 1.3 and 1.6) a general framework for the ProDoc of each of the CPs during the project preparation stages that included a logical framework with 5 components that included legal regulatory issues, raising awareness, increased availability of financial mechanisms, certification and quality control schemes, and institutionalized knowledge support. This framework could also be adopted for additional countries wanting to initiate SWH market transformation activities;
    - Efforts by DTIE to initiate and coordinate country specific needs were limited by the difficulties of efficiently providing this assistance given the different implementation periods of all CPs. The inception workshop was only held in February 2010, 9 months after the start of the project, with all 5 CPs (who had signed their project documents in late 2009) in attendance. However, the Indian CP commenced in December 2008, 15 months prior to the GSWH inception workshop; as such, there was no opportunity for DTIE to initiate or coordinate activities of the Indian CP. At the first PMC and global inception meeting of the GSWH Project in February 2010, the PMC made a decision that internal project communication between DTIE and with all CPs was to be undertaken using an extranet as a platform for fostering regional and global cooperation and communication amongst the CPs;
    - Efforts by DTIE under Output 1.3 to provide support to the Chilean and Mexican CPs (especially with regards to global experience on financial mechanisms), were made increasingly difficult with changes in CP personnel (around 2011 and 2012 respectively) and changing market conditions in Mexico. This had

the impact of weakening linkages between the CPs and UNEP especially with regards to technical backstopping, training, and the sharing of SWH experiences and lessons learned from other CPs;

- UNEP produced a very useful document entitled "*Solar Water Heating TechScope Market Readiness Assessment Report and Analysis Tool"* that essentially provides policymakers with a replicable public methodology (from Output 1.5: International or regional knowledge products) that can "evaluate SWH policy, finance and investment, business and quality control infrastructure across several countries" and provide "a high level evaluation of national market development opportunities for SWH". Unfortunately for the GSWH Project, this report along with its analysis tools were not available on the website until early 2014, close to the end of the project (this was due to the necessity of reviewing the lessons learned and best practices of each of the 5 CPs in establishing and sustaining growth of a national SWH program). With the intention of fostering replication of SWH CPs in 10 other countries (through the delivery of Output 1.2: Finalize proposals for 10 additional countries for Phase 2), the late posting of this report as well as SWH information from ongoing CPs on these websites constrained the Project's ability to meet this target.

48. With regards to the *Direct Outcome 2 of* institutionalized KM support, the Project achieved this outcome through its partnership with ICA with the setup of the solarthermalworld.org website (Output 1.4) in 2008 that would serve as a global repository for SWH information. The website was set up and currently serves as a global platform for webinars and other forms of information dissemination on solar thermal technologies, particularly the 42 high quality knowledge products that includes guidebooks on SWH awareness raising, certification and standards, SWH market assessments, and the aforementioned TechScope report. While the website provides wider dissemination of international experiences and the lessons learned of SWH projects implemented globally outside of the GSWH Project (this is part of the delivery of Output 1.10), the effectiveness of this Project outcome had the following limitations:
    - The project website had less hits in countries where English is not the primary language. In Latin America for example, there were fewer website hits that limited the exposure of the solarthermalworld.org website, despite a few project documents being translated into Spanish and Arabic. Similarly, there were also fewer website hits in Eastern Asia, particularly China, Viet Nam and Thailand where there is interest in solar thermal heating applications;
    - The lack of full delivery of Output 1.10: Experiences and lessons learned for dissemination, in part due to the slower progress being made in some of the CPs, and only 3 out of 5 CPs who had prepared a report on lessons learned for each of the CPs (see Table 6, Output 1.10 for the status of delivery);
    - Limited engagement of the network of international experts (Output 1.3) within CPs. To improve its delivery of technical backstopping for the CPs, DTIE made a decision in 2011 to increase the involvement of regional partners who would be able to provide more responsive and appropriate technical advice to the CPs; this was intended to serve as a driver towards replication of larger-scale SWH replacement programmes within the CPs as well as other countries in the regions. This included increased involvement of OLADE for Latin America, ESTIF for Albania, and RCREEE for Lebanon. The involvement of ICA in India at this time was already starting to show successes. While engagements of ICA in India and RCREEE in Lebanon were deemed successful, the engagement of regional partners was not as successful in Chile and Mexico, and to some extent Albania. Instead, these regional partners, ESTIF, OLADE and UVI were engaged to provide technical assistance to DTIE in the preparation of guidebooks and market assessments of Output 1.5 without much involvement in assisting CP implementation.

49. With regards to the *Direct Outcome 3* of improved access to the SWH national experts, state-of-the-art SWH information, technical backstopping, training, international experiences and lessons learned, the Project partially achieved this outcome through the delivery of plethora of SWH-related information on the solarthermalworld.org website (Output 1.4) that contains:
    - over 42 high quality knowledge products includes guidebooks on SWH awareness raising, certification and standards, SWH market assessments, and the aforementioned TechScope report (Output 1.5);
    - global experiences and lessons learned in SWH (Output 1.10). The visitor traffic to the project website indicates this site is very well used[28]; and
    - regular newsletters and market monitoring reports (Output 1.9).

    Moreover, the website became a main reference for any solar thermal news as validated by the ranking of this website on different search engines including Google.

50. Aspects of the Direct Outcome 3 that were less than effective in helping potential SWH project proponents to improve their access to various SWH knowledge products and expertise included:
    - Output 1.7: SWH roster. CPs sourced their own national or international experts on state-of-the-art SWH information, notably during the early phases of all CPs. As such, the demand for a global SWH roster

[28] http://www.clustrmaps.com/map/Solarthermalworld.org?utm_source=widget

with national or international experts was not established with any of the CPs. While DTIE did deliver an SWH expert roster, this effort was not effective in that the roster was developed from experts who were previously used by the CPs, posted on regional partner websites, with reportedly very little demand (according to all regional partners) for the services of these experts; and

- Output 1.8: Regional and international thematic or general workshops. During the 7-year duration of the GSWH Project, a total of 4 international workshops were held in Tunisia, Chile, Albania and Lebanon (details of these workshops can be found on the solarthermalworld.org website). While the purpose of these workshops was to share SWH development experiences as well as SWH best practices, efforts to follow up on further collaborations between SWH project developers and regional partners did not effectively materialize. Only the workshop in Albania managed to establish business-to-business (B2B) linkages between project proponents and the private sector. As such, the effectiveness of these workshops was moderately satisfactory.

51. With regards to *Direct Outcome 4*, the Project only partially achieved this outcome measured by the set indicators:
    - The specific SWH installed capacity targets was achieved in all 5 participating countries despite the fact that 6 CPs were envisaged in the original project design. Moreover, the total installed capacity target for the entire GSWH Project was in the order of 4.8 million m², exceeding the 3.0 million m² target the project document;
    - Targets for the growth rate of SWH installations at the EOP were only met for 3 out of the 5 programme countries. Only Chile and Mexico did not meet their growth targets. For Chile, the SWH growth rate at EOP was only 30%, far below the target of 45%, primarily attributed to the fact that the mandate of the current Government of Chile does not include renewable energy. For Mexico, an SWH growth rate of 18.2% was noted at EOP, also below their target of 25%; this could be attributed to the drastic personnel changes in 2012 resulting in changes in the Mexican Government that hindered the progress and effectiveness of the CP.

Table 6 provides a tabular but more detailed summary of the intended outcome targets and the achievements for the country programs of Component 2 by the end of the project.

The rating for overall achievement of direct project outcomes is moderately satisfactory.

Table 6: Summary of the achievement of outcomes of Component 2

Component	Expected Outcome as per Project Document	Outcome Level Targets for each CP[29]	Status at the end of the project
2. Country Programs	The specific SWH market transformation targets of the first 6 participating countries reached by the end of the project, conducive to the overall, global market transformation goals of the project.	Direct Project Outcome 4 as per reconstructed TOC: Successfully developed SWH markets in participating countries	
		Key Albania targets: • At least 75,000 m^2 of new installed collector area by EOP; • Annual sale of 20,000 m^2 reached by EOP; • Positive experience by over 80% of the clients who have purchased a SWH system.	Most Albanian CP targets were met by the time of the evaluation: • 109,375 m^2 of new collector area has been installed by the EOP in December 2014; • Annual sales of over 20,000 m^2 has been recorded since 2011; • No marketing survey was conducted on the satisfaction of clients who have purchased an SWH system.
		Key Chile targets: • Accelerate and ensure sustainable growth rate of 45%-50% for the SWH market in Chile; • 35,700 m^2 installed by EOP in 2011.	Most Chilean CP targets were not met: • SWH growth rate in Chile was estimated at 30% in 2014, roughly 15% below target; • 139,309 m² of collector area was installed by 2013.
		Key India targets: • 2 million m^2 market acceleration contributing to (10 million m^2/ 1 billion inhabitants) • A steady, average growth rate of >30 % in India reached by EOP; • Over 90% customer satisfaction on new installations on the basis of problem free good quality products and installation services;	Most Indian CP targets were met: • 2.4 million m^2 installations were achieved during the Project period; • Average growth rate of 26.7% was achieved based on growth of SWH installed areas from 5.6 million m^2 (March 2012) to 7.1 million m^2 (March 2013) • While no customer satisfaction surveys have been conducted for SWH installations, good quality installation services are likely the norm given that MNRE has recently started to monitor this service as well as after-sales service using third party observers and non-compliance to MNRE norms by suppliers and installers would lead to manufacturer being dropped from the listing of MNRE channelled partners for SWH installations and consequently would not have access to capital subsidy.

[29] These are the country level indicators and targets from the UNDP CP documents.

Component	Expected Outcome as per Project Document	Outcome Level Targets for each CP[29]	Status at the end of the project
		Key Lebanon targets: • At least 190,000 m^2 of new installed collector area during the project; • Annual sale of 50,000 reached by EOP; • Average growth rate of 15-20 % reached by EOP • Positive experience by over 80% of the clients, who have purchased a SWH system on the basis of problem free good quality products and after sale services.	Most Lebanon CP targets were met: • 271,101 m^2 of new collector area installed by the end of 2014; • Annual sales have exceeded 50,000 m² since 2012; • Growth rate at EOP was 15%; • No customer satisfaction surveys were conducted. However, the growth rate of SWH in Lebanon is an indicator of a high level of satisfaction and positive experiences of end-users.
		Key Mexico targets: • 2,500,000 m² by EOP in 2013; • 25-30% growth rate at EOP; • 14% of all installed capacity are residential systems.	Some of the Mexican CP targets were met: • 2,800,000 m² by EOP in 2014; • Growth rate of SWH at EOP was only 18.2%; • 50% of installed capacity is within the residential sector.

3.3.2 Likelihood of impact

52. The Review of Outcomes towards Impacts (ROtI) approach is used to assess the likelihood of impact by using the reconstructed Theory of Change (Section 2.8) and its outcomes, intermediate states, long-term outcomes and impacts as a basis for assessment. The ROtI approach provides ratings for the various outcomes achieved by the GSWH Project and the progress made towards the "intermediate states" at the time of this evaluation. The assessment of the Project's progress towards achieving its intended impacts is presented in Table 7 and is based on a rating system as presented in Table 8 and a 6-point rating scale used in UNEP project evaluations, as shown in Table 9.

53. Based on actual GSWH project outcomes, some TOC issues are identified at this stage of the evaluation for further discussion. These are listed as follows:
    - two key project drivers includes UNEP-UNDP cooperation and international and regional promotion of SWH technology. The issue for the evaluators is whether or not these agencies have sufficient incentives to sustain SWH technology promotion after the conclusion of the GSWH Project, and without assistance from GEF or any other donor agency;
    - an assumption that "there is sustained oversight of certification and quality control (QC) schemes" is extremely important. However, there does not appear to be any direct internal or external driver that would ensure this assumption remains true.

54. Actual Direct Project Outcome ratings 1, 2, 3 and 4 were delivered by most of the achieved outputs as described in Section 3.3.1. While this should encourage other countries to replicate successfully demonstrated SWH CPs (related to Direct Project Outcome 4), the Project has developed the SWH NAMA guidebook that was disseminated to all regional partners to support and assist other countries in preparing SWH proposals in the form of NAMAs and PIFs. Most of the UNDP Country Programs, however, were able to meet their market transformation targets (albeit with variances in effectiveness) to the extent that the experience and lessons learned from implementing the CPs in Albania, Lebanon and Mexico were disseminated through delivery of Output 1.10 by 2014 and 2015, late in the GSWH Project. The primary issue for the Evaluators was the timing of the disseminated information, which if issued earlier could have been used to catalyse interest in SWH market transformation in another 10 countries during the GSWH Project. As such, only 4 countries at the end of the GSWH project had prepared GSWH proposals with none adopted at the terminal date of the project of December 2015. While the outcomes for Direct Project Outcome 4 are rated as "B", ICA has stated a strong commitment and confirmed funding to promote SWH technology on a global scale with some of the regional partners (specifically OLADE in Latin America for promoting SWH NAMAs in 3 countries); despite the SWH NAMA guidebook and support of regional partners, there is currently no formal mechanism or process or funding with these regional partners to support preparation and approval of SWH NAMAs. **The overall rating of progress towards Outcomes is rated "B".**

55. With regards to progress towards intermediate states and long term outcomes as defined in the reconstructed TOC, meeting of installed capacity targets for all CPs is an indication of increased consumer confidence in SWH technology coupled with availability of excellent SWH information on the solarthermalworld.org website. However, despite the successes of some of the CPs in SWH market transformation, the GSWH Project has not resulted replication of large-scale SWH programs in 10 additional countries. A primary reason for this may have been an overestimation during the design phase of the project of the readiness of other GEF program countries to undertake an SWH market transformation program. Only 4 proposals at the terminal date of GSWH have been prepared but not yet adopted by these additional countries, below the target of 10, and below the critical mass required for a Phase II for the GSWH Project. In addition, a replicable public methodology (the *Solar Water Heating TechScope Market Readiness Assessment Report)* to provide "a high level evaluation of national market development opportunities for SWH" for policymakers was delivered in 2014, near the end of the project; earlier delivery of this report may have resulted in more proposals for additional countries being prepared and adopted. While the SWH markets for the Indian, Lebanon and Albania CPs are likely to flourish (as well as Mexico and Chile to some extent), global commercialization and sustainable market transformation of SWH is ongoing but at a slower pace than targeted. **Rating of progress towards the Intermediate States is rated "C".**

Table 7: Overall Likelihood of Achieving Impact

Global Solar Water Heating Market Transformation and Strengthening Initiative (GSWH project)						
Actual Direct Project Outcomes	Rating (D – A)	Intermediate states and long-term outcome	Rating (D – A)	Impact (GEB)	Rating (+)	Overall
Actual Direct Outcome 1: Limited initiation and coordination support for country specific needs in SWH (due to reasons as explained in Para 47).	C	-Replication of large-scale replacement of fossil fuel or electricity driven water heating systems with SWH did not occur in countries under GSWH due to the lack of coordination between UNEP and UNDP resulting in: • different implementation periods for all CPs, limiting UNEP support to the CPs and additional countries for SWH (related to Output 1.2); • successful SWH market transformation for some of the CPs could only be demonstrated 3 to 5 years into GSWH implementation, resulting in a shorter period of time during the project to disseminate positive SWH development experiences, and to disseminate useful guidelines (such as the "*Solar Water Heating TechScope Market Readiness Assessment Report"* for policymakers to provide "a high level evaluation of national market development opportunities for SWH"); -This will not likely lead to a long-term outcome under the GSWH Project of the "acceleration of global commercialization and sustainable market transformation of SWH" due to: • the absence of full and effective UNEP-UNDP cooperation; • late delivery (2014) of a compilation of global best practices in SWH leaving little time during GSWH to demonstrate best practices; and • less time during GSWH for international and regional partners to promote SWH technology.	C	GHG emissions have not been reduced from SWH market transformation proposals for Panama, Bolivia, Costa Rica and Ecuador		
Justification for rating: While most of the outputs supporting this outcome have been delivered, there is insufficient or unconfirmed funding identified at this time to continue initiation and coordination support for SWH market transformation in other countries. ICA, however, will continue to support the hosting of the solarthermalworld.org website which is key for continuation of supporting country		**Justification for rating:** Only 5 SWH market transformation proposals were in preparation (one PIF for Panama and 3 NAMA documents for 3 NAMAs from Bolivia, Costa Rica and Ecuador), none of which were operational as of end of 2015.				

Global Solar Water Heating Market Transformation and Strengthening Initiative (GSWH project)						
Actual Direct Project Outcomes	Rating (D – A)	Intermediate states and long-term outcome	Rating (D – A)	Impact (GEB)	Rating (+)	Overall
specific needs in SWH market development.						
Actual Direct Outcome 2: Knowledge management support has been institutionalized with wider dissemination of lessons learned and international experiences through the solarthermalworld.org website, with its linkages to websites of other regional and international partners, and with some limitations in effectiveness as described in Para 48.	B	-Replication of large-scale replacement of fossil fuel or electricity driven water heating systems with SWH did not occur under GSWH primarily due to the lack of coordination between UNEP and UNDP resulting in the late (after 2014) delivery of strengthened SWH information that was to be disseminated through regional partners to facilitate replication. -This will not likely lead to a long-term outcome under the GSWH Project of the "acceleration of global commercialization and sustainable market transformation of SWH" due to: • a disconnect between UNEP and UNDP CPs to further accelerate transformation of the SWH market (no resources available for UNDP to continue local promotion of SWH technology, and hence, no official communication with UNEP on cooperation on SWH promotion); • the need for a more multilingual website that could increase SWH market outreach to regions where English is not a first language (such as South America and East Asia).	C	There are no additional countries generating GHG emission reduction benefits as a result of the GSWH project (as of August 2016) despite institutionalized KM support		
Justification for rating: Most of the outputs supporting this outcome have been delivered. ICA has confirmed continuation of its support for hosting of the solarthermalworld.org website which is key for continuation of institutionalized KM in SWH market development.		**Justification for rating:** The solarthermalworld.org website will remain in place as a resource to provide useful and updated information to encourage replication of replacements of fossil fuel or electricity driven water heating systems with SWH, and to provide experience and lessons learned from other SWH projects internationally. It is difficult to forecast the uptake of the services of international SWH experts to reach the long term impact of "acceleration of global commercialization and sustainable market transformation of SWH".				
Actual Direct Outcome 3: Access has improved for potential SWH project proponents and regulators through the solarthermalworld.org website and various regional partners (i.e. RCREEE, ESTIF, OLADE) to the services of SWH national experts and technical backstopping, obtaining state-of-the-art SWH information and international SWH experiences, and to SWH training webinars and workshops.	C	-Replication of large-scale replacement of fossil fuel or electricity driven water heating systems with SWH did not occur under GSWH due to: • a lack of coordination between UNEP and UNDP adding to the difficulties of creating demand for SWH technical services within CPs as well as additional SWH countries; • need for sustained SWH awareness raising efforts in additional countries that could create local SWH champions; • many countries not being ready for a SWH market transformation project due to lack of timely exposure during GSWH Project (after 2013) to state-of-the-art information and international SWH experiences.	C	Despite the improved availability of SWH expertise and state-of-the-art information, there has not been any GHG emission reduction benefits from additional countries as of		

Global Solar Water Heating Market Transformation and Strengthening Initiative (GSWH project)						
Actual Direct Project Outcomes	Rating (D – A)	Intermediate states and long-term outcome	Rating (D – A)	Impact (GEB)	Rating (+)	Overall
However, there is no process in place to encourage sustained use of technical services from national (or international) SWH experts for technical backstopping.		-This will not likely lead to a long-term outcome under the GSWH Project of the "acceleration of global commercialization and sustainable market transformation of SWH" due to: • the lack of UNEP-UNDP cooperation to promote these technical backstopping services leading sluggish demand for SWH expertise; • 2014 delivery of UNEP knowledge products leaving little time during the GSWH Project to demonstrate global best practices; • Lack of follow-up on strengthening potential collaborations made during international and regional workshops that were promoting SWH technology.		August 2016.		
Justification for rating: Most of the outputs supporting this outcome have been delivered. ICA has stated its intention to continue its support for hosting of the solarthermalworld.org website which is key resource for improving access to SWH national experts, state-of-the-art information, technical backstopping, training and international experiences and lessons learned.		**Justification for rating:** The solarthermalworld.org website will remain in place as a resource to provide useful and updated information to encourage replication of replacements of fossil fuel or electricity driven water heating systems with SWH, and to provide experience and lessons learned from other SWH projects internationally. Despite the expression of support from regional partners to avail their services to promote and develop SWH markets in other countries (in particular, regional partners such as OLADE and RCREEE in assisting new countries with the preparation of SWH-NAMA documents), it is difficult to forecast the state of readiness of many additional countries for SWH technology and if the long term impact of "acceleration in the global commercialization and sustainable market transformation of SWH" will be achieved.			+	
Actual Direct Outcome 4: Three SWH markets, Albania, India and Lebanon have been successfully developed through meeting transformation targets for installed capacity and growth of their respective SWH markets. SWH markets for Chile and Mexico did contribute to the overall global market transformation goals of the Project but not as strongly and successfully as the other CPs.	B	- There has been increased consumer confidence in SWH technology based on the implementation experience on some of the CPs. There has been no replication of SWH market transformation in additional countries; - There have been increases in access for lower income households to sustainable clean energy sources for India and Lebanon through financial mechanisms to encourage the use of SWH. However, these mechanisms do not exist in Albania, Chile and Mexico (although Mexico has demonstrated a financial mechanism for the tourism sector that could be replicated to the residential sector) - Despite these intermediate states, replication of large-scale replacement of fossil fuel or electricity driven water heating systems with SWH did not occur under GSWH due to	C	GHG emission reductions have resulted from project interventions in CPs. However, there have been no GHG emission reductions generated from additional countries		

Global Solar Water Heating Market Transformation and Strengthening Initiative (GSWH project)						
Actual Direct Project Outcomes	Rating (D – A)	Intermediate states and long-term outcome	Rating (D – A)	Impact (GEB)	Rating (+)	Overall
		limited uptake of financial mechanisms demonstrated by the India and Lebanon CPs. The 2010 report on the Indian financial mechanism[30] was not posted on the solarthermalworld.org website until 2014, leaving limited time for dissemination on the global platform; -This will not likely lead to a long-term outcome under the GSWH Project of the "acceleration of global commercialization and sustainable market transformation of SWH" due to: • The absence of full UNEP-UNDP cooperation to promote the technology on a global and country scale; • The current absence of government oversight of certification and QC schemes that will sustain consumer confidence in SWH technology in each country; • Different completion dates of the CPs that diluted the effectiveness of the global component to raise awareness of SWH technology in additional countries.				
Justification for rating: The "B" rating is averaged out as follows: "A" ratings are justified for the Indian and Lebanese CPs were both CPs are supportive of ongoing existing programs such as India's JNNSM and the involvement of Lebanon's LCEC and government-backed subsidy and certification schemes. For Albania and Mexico, a "B" rating is justified: the Government of Albania continues to place its efforts in recovering lost electricity revenue from the illegal connections and unpaid bills, and Mexico has CONUEE as the government agency responsible for their SWH program. A "C" rating for Chile results is justified with the lack of high-		**Justification for rating**: Despite earlier completion of the Indian and Lebanese CPs (in 2013 and 2014 respectively) that produced results as indicated by sustained growth of SWH through subsidies and involvement of local financial institutions, the CPs for Chile and Mexico were completed in December 2015 and April 2016. By this time, the UNEP Global Component was also being completed without much opportunity for promoting lessons learned from implementing these CPs. The CP of Albania is ongoing until 2017.				

[30] http://www.solarthermalworld.org/sites/gstec/files/story/2014-10-17/new_financing_mechanisms.pdf

Global Solar Water Heating Market Transformation and Strengthening Initiative (GSWH project)						
Actual Direct Project Outcomes	Rating (D – A)	Intermediate states and long-term outcome	Rating (D – A)	Impact (GEB)	Rating (+)	Overall
level political support for SWH technology.						
	B		**C**			**BC**

Table 8: Rating Scale for Outcomes and Progress towards Intermediate States

Outcome Rating	Rating on progress toward Intermediate States
D: The project's intended outcomes were not delivered	D: No measures taken to move towards intermediate states.
C: The project's intended outcomes were delivered, but were not designed to feed into a continuing process after project funding	C: The measures designed to move towards intermediate states have started, but have not produced results.
B: The project's intended outcomes were delivered, and were designed to feed into a continuing process, but with no prior allocation of responsibilities after project funding	B: The measures designed to move towards intermediate states have started to produce results, which give no indication that they can progress towards the intended long term impact.
A: The project's intended outcomes were delivered, and were designed to feed into a continuing process, with specific allocation of responsibilities after project funding.	A: The measures designed to move towards intermediate states have started and have produced results, which clearly indicate that they can progress towards the intended long term impact.

Table 9: 'Overall likelihood of impact achievement' on a six point scale.

Highly Likely	Likely	Moderately Likely	Moderately Unlikely	Unlikely	Highly Unlikely
AA AB BA CA BB+ CB+ DA+ DB+	BB CB DA DB AC+ BC+	AC BC CC+ DC+	CC DC AD+ BD+	AD BD CD+ DD+	CD DD

NB: projects that achieve documented changes in environmental status during the project's lifetime receive a positive impact rating, indicated by a "+".

56. **The aggregate rating for the GSWH project is "BC".** As such, the GSWH Project can therefore be rated as "moderately likely" to achieve an impact of GHG emission reductions. This would be consistent with the evaluation team assessment that global commercialization and sustainable market transformation of SWH is ongoing albeit at a slower pace.

The project is considered "moderately likely" to achieve impact.

3.3.3 Achievement of the formal project objectives as presented in the Project Document

57. Recalling the formal objective of the GSWH Project as the "acceleration of the global commercialization and market development of SWH in residential, private service sector and public buildings and when applicable, industrial applications", global commercialization and market development was accelerated but not quite to the extent as envisaged in the project document. This can be attributed to:
    - the difficulties experienced by the Project to meet the targets of Output 1.2 for finalization and adoption of proposals for at least 10 additional countries for a Phase II of the GSWH Project. During the early phases of the project (2011 and 2012), there were unsuccessful attempts to influence countries into a decision to prepare an SWH proposal without sufficient background information on successfully implemented SWH programs. Positive lessons learned and best international practices collected from implementing the CPs were to be fed into a global platform to provide confidence to other countries wanting to replicate SWH programs. There was also the late delivery (early 2014) of a public methodology for policymakers to provide a high level evaluation of national SWH market development opportunities entitled "Solar Water Heating TechScope Market Readiness Assessments"; this only catalysed interest in 4 additional countries including Panama (a PIF), and Costa Rica, Ecuador and Bolivia who had prepared their NAMA documents with the assistance of the Project and using UNEP's Solar Water Heating NAMA guidelines;
    - achievement of outcome targets for SWH installed capacity and growth rate for 3 out of the 5 CPs (as detailed in Table 7). However, the lessons learned from implementing these CPs has not been fully compiled and disseminated which would have imparted valuable experience and encouragement to other countries wanting to implement SWH market development;
    - only one CP, India, that successfully demonstrated industrial applications of SWH technology. Other participating CPs did not have any demonstrations on industrial SWH applications. For India, the industrial SWH demonstration should serve as a useful template for replicating similar industrial SWH applications with the proviso that India can strengthen the capacities of ESCOs to install and service industrial SWH installations[31].

[31] Aspiration Energy (AE) served as a demonstration of a successful ESCO business model for solar water heater installations for the industrial sector in India. AE was started in 2010 based on the need for industry to reduce their operating costs. Since

The overall rating for the achievement of project goals and objectives is moderately satisfactory.

3.4 Sustainability of Outcomes

58. Sustainability is understood to mean the probability of continued long-term project-derived results and impacts after the project funding and assistance has ended. Taking into consideration the knowledge platform left behind by the Project as well as the experiences and lessons learned in the CPs in developing SWH market transformation, there are some threats to the sustainability of the GSWH Project that are identified in the following sections. First and foremost, there is an absence of financial assistance to developing countries that potentially want to develop an SWH market. For the proper assessment of the sustainability of the GSWH Project and its potential for replication, 4 sustainability dimensions were analysed.

The overall rating for Sustainability of Outcomes is moderately likely.

3.4.1 Socio-political sustainability

59. In general, SWH technology is regarded by most governments as a means of addressing climate change as well as energy security. With the exception of the Chile CP, all participating CPs are supportive of SWH technology notwithstanding changes in government. An example of this is the Mexican CP where the Conuee way program continued through changes in government during the implementation of the GSWH Project. With regards to the sustainability of SWH global platform set up by ICA and its regional partners, there are no political barriers that would constrain the continuation of SWH support by the stakeholders. There should also not be any sociological barriers to the sustainability of SWH growth given the increased sales being an indicator of increased consumer confidence in SWH technology.

The rating for socio-political sustainability is likely.

3.4.2 Sustainability of Financial Resources

60. The continuation of GSWH outcomes will be dependent on future financial support, especially to continue SWH promotion and sustain heightened awareness of the benefits of SWH technology over conventional fossil fuel alternatives. With regards to the knowledge platform, ICA has stated its continued support for the website as a primary repository for all global knowledge products on solar thermal heating and cooling. While the regional partners have also promised to maintain a roster of SWH experts, the demand for such experts may not be sustained, due to the current lack of confirmed financial resources to recruit these experts, with a likelihood that the roster would no longer be maintained by regional partners.

61. Support for financial incentives to increase the access of SWH technology to lower income households will also be required. In India and Lebanon, these mechanisms are in place; however, Albania, Chile and Mexico do not have such financing incentives in place at the time of the evaluation, for a variety of reasons including lack of budgets, lack of political will to support renewable energy (as is the case in Chile), and the presence of more convenient alternatives to water heating such as natural gas and electricity. In case of Albania the project related activities are still on-going.

62. Finally, governments currently do not have budgets to conduct market surveillance of SWH companies to ensure their provision of technical backups in the event that SWH equipment malfunctions. This concern is raised by the Evaluators amidst by reports from stakeholders that most of these countries do not have sufficient capacities for after sales support. Notwithstanding that there is an improvement in the quality of SWH equipment within the CPs, this is a concern that governments do not have sufficient budgets to conduct the necessary market surveillance to sustain the quality of SWH installations.

The rating for the financial sustainability is moderately likely.

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most industries do not have sufficient time or knowledge to properly implement an investment plan for reducing fuel usage, AE provided this service to industries by advising them on specific measures to reduce their energy consumption, designing the measure to the client's needs, providing the financial resources to purchase equipment, install and operate the system, and monitor operations to measure energy savings. This allowed industries to "pay for energy services as they save". Energy savings as the basis for AE's ESCO contracts are jointly monitored and verified by AE and client staff with the client's system instrumentation. Payback periods of these investments are in the order of less than 4 years for the clients that included government subsidies of 30% (based on 2012 SWH costs). More information is provided on the UNDP's June 2013 Terminal Evaluation of the India GSWH CP (PIMS 3611) on pg 25.

3.4.3 Sustainability of Institutional Frameworks

63. With regards to the institutional framework that will allow for the global knowledge platform to be sustained, the ICA and regional partners who worked with the GSWH Project have pledged to carry on these promotional activities. ICA has stated their intention to continue hosting and maintaining the solar thermal world.org website. A number of the regional partners, most prominently OLADE, have pledged to support and promote SWH technology to other countries especially those that have prepared NAMA proposals.

64. With regards to the Government institutional frameworks to sustain SWH market transformation in the participating CPs, there are strong agencies dedicated in the promotion of SWH technology and market transformation in all participating CPs (ranging from MNRE in India to the Lebanese Center for Energy Conservation as well as regional partners such as RCREEE and OLADE). An example includes RCREEE that has developed a regional solar thermal certification scheme under the name of SHAMCIE for the Arab region that was harmonized with the European Solar Keymark certification, with an aim to reduce trade barriers and flood the market with higher quality solar thermal products.

65. However, participating governments do not have the confirmed budgetary allocations and capacities to conduct market surveillance of SWH companies to sustain the quality of SWH installations. This issue is elaborated on Para 62.

66. In addition, participating governments on the GSWH Project still do not have the required capacities to collect energy end-use information within the residential and industrial sectors. This has resulted in a systematic lack of monitoring and data collection on baseline energy consumption for water heating. The Project has provided guidance on the collection of end-use energy information in the NAMA guide book; however, governments of the CPs have not yet demonstrated commitment to prepare and adopt NAMA proposals with strengthened energy baselines. The importance of collecting baseline energy end-use information cannot be overstated if governments want to increase the likelihood of funding for designing support programs for SWH market transformation.

The rating for the institutional sustainability is moderately likely.

3.4.4 Environmental sustainability

67. SWH technology contributes to the reduction of GHG emissions by displacing fossil fuel that is primarily used to heat water or to generate electricity that would be used for heating water. As such, SWH technology should be environmentally sustainable provided that the SWH technologies are reliable, durable and serviceable in the event that they break down. For most of the participating CPs with the exception of Chile, there appears to be a well-developed SWH market complete with suppliers that can service malfunctioning SWH equipment. However, GHG emission reductions will be suppressed by reports from stakeholders that most of these countries do not have sufficient capacities for after sales support. Notwithstanding that there is an improvement in the quality of SWH equipment within the CPs, this is a concern that will require stronger government action to enforce certification of SWH installers and suppliers, and to finance on-going training of SWH technical personnel who can provide the required technical backup in the event SWH equipment malfunctions and GHG emission reductions are no longer being generated by this equipment. With regards to the Chile CP, further strengthening of their SWH supply chain is required to improve after sales servicing of malfunctioning SWH equipment.

The rating for the environmental sustainability element is moderately likely.

3.4.5 Catalytic Role and Replication

68. *Catalysed behavioural changes*. Behavioural changes in the use of SWH related technologies and knowledge were mainly experienced at the CP level. UNDP's role in implementing CPs in the 5 participating countries and catalysing these behavioural changes was significant. For all participating countries, the UNDP country offices (COs) implemented nationally executed projects (otherwise referred to as NEX modality) in partnership with national government agencies, and implemented activities related to training and raising awareness, most of which were rated satisfactory.

69. UNEP did play a more passive role in catalysing behavioural changes. The inception workshop held in Tunisia in February 2010 was the first opportunity for UNEP to meet with all CPs to improve their understanding of each SWH market, identify areas where UNEP could assist CPs, strengthen the linkages and design of the global KM website (solarthermalworld.org), and foster cross-country discussions and identify areas for collaboration and partnerships with different regional entities. Only after this inception workshop did UNEP realize that more assistance was required at the regional level to more effectively manage a global knowledge management component. Adding to these challenges, the Indian CP had

commenced operations in December 2008, further marginalizing UNEP in terms of providing start-up assistance.

70. To be able to deliver technical backstopping services 2 or 3 years after the commencement of the CPs, UNEP and their regional partners collected available but relevant information from the various CPs on their experiences and lessons learned in implementing an SWH market development. The information was compiled in the form of market readiness assessment reports and tech scope reports that are available on the global website. These are excellent and well prepared reports which a number of CPs do acknowledge using for their own SWH market development. These reports have catalysed behavioural changes of regional partners such as OLADE (in the preparation of NAMA documents in Latin America) and RCREEE (in the adoption of SWH regional standards for the Middle East). As such, UNEP's role in catalysing behavioural changes in terms of the use and application of SWH technologies knowledge was satisfactory.

71. *Provided incentives*. UNDP's role in providing incentives was variable amongst the CPs:
    - for the Albanian CP (project on-going), to date no financial mechanisms were adopted to increase the access to financing for SWH installations for low income households;
    - the Chile CP, no financial mechanisms were delivered by the project due to the unsuccessful attempt to pilot the mechanism with a social housing project;
    - for the India CP, financial incentives were provided in the form of government-sponsored buy-downs of SWH installations under the JNNSM program managed by the Ministry of New and Renewable Energy;
    - for the Lebanon CP, financial incentives included government-backed USD 200 subsidy and a (up to) 5-year interest-free loan for residential SWHs, aimed at subsidizing 7,500 SWH systems for a total amount of USD 1.5 million. The executing agency of the CP, LCEC, provided technical assistance for reviewing applications and technical backstopping;
    - for the Mexico CP, green mortgages and financial mechanisms were successfully demonstrated for the tourism sector. The SWH program and Mexico is now in a position to expand these financial mechanisms to other sectors such as the residential and industrial sectors.

72. The role of UNEP in providing incentives was passive. At the commencement of the project, UNEP did provide guidelines on formulating incentives and financial mechanisms to catalyze SWH market development. Despite the Project Document specifying that UNEP was to undertake a lead role in initiating and monitoring effectiveness of Outcome 3 of the CPs[32], UNEP was unable to follow up on these tasks. In part, this was due to an already high level of country ownership of the CPs, and CPs already having their own network of SWH experts that were more trusted than experts from the global component. In addition, there was also a protocol developed during the first PMC meeting in March 2010 that specified "technical assistance will only be provided upon official request by the national project teams through the UNDP-GEF Global Task Manager to UNEP to avoid miscommunication that have happened in the past". This limited contact between UNEP, DTIE and the CP personnel further and eroded UNEP's efficiency to collect information on financial mechanisms being developed within the CPs.

73. *Contribution to institutional changes*. Again, UNDPs role in contributing to institutional changes was mostly significant given that the success of all CPs was attributable to UNDP's close collaborations with in-country institutions that strengthened their capacities to affect SWH market transformation:
    - Ministry of Energy and Industry (MEI) in Albania that serves as the executing agency for the CP, whose capacities were strengthened to manage a larger-scaled SWH programme, in line with the growth targets for SWH technology in the National RE Action Plan for Albania. However, MEW or other institutions of the Government of Albania have not yet made commitments to enforce the new RE law, the CP is still on-going;
    - Ministry of Energy (MdE) in Chile realized benefits from the GSWH project in terms of strengthened knowledge of SWH technologies, certifications and standards. However, they were unable to affect SWH market transformation changes, mainly due to the lack of high level political support for renewable energy by the current government;
    - Ministry of New and Renewable Energy (MNRE) in India benefitted from the activities of the CP by improving its outreach to agencies relevant in SWH market transformation activities in India. This includes the Quality Council of India that developed certification and testing procedures for SWH equipment to meet *"Indian Standard IS:12933 for FPC SWH"* as set by MNRE to qualify for the SWH buy-down, and market surveillance inspectors who conduct regular performance audits of partner SWH suppliers and installation companies;
    - The Lebanese Center for Energy Conservation (LCEC) serves as an independent technical national center organization operating under the direct supervision of the Ministry of Energy and Water, and served as the government agency that coordinated and managed the GSWH CP. Their strengthened

[32] Pages 70 and 71 of the UNEP Project Document

capacities on SWH technology and its market development in Lebanon can be directly attributed to the GSWH Project;
- The Ministry of New and Renewable Energy (CONUEE) has emerged as the institution that promotes and regulates SWH market transformation in Mexico that has benefited from the activities of the CP, especially in the development of SWH standards, and creation of a financial mechanism to encourage SWH usage in the tourism sector.

74. The role of UNEP in contributing to institutional changes on the GSWH Project was passive given that CPs recruited their own national experts for such advice as mentioned in Para 72.

75. *Contribution to policy changes*. UNDP contributions to policy changes were as follows:
    - In Albania, the CP provided technical assistance in the drafting of SWH-related chapters of the RE Law, targets in the National RE Action Plan, all of which were adopted by the parliament of Albania in 2013. However, the government has not yet committed to enforcement of the RE law which has held up full adoption of the certification and quality control schemes for SWH technology in Albania;
    - In Chile, contributions to policy changes were limited. The CP contributions in this regard were limited to enforcement of the 2009 Regulatory Framework for Solar Water Thermal (Law 20.365) that provides technical standards, certification systems and fiscal incentives for solar water heating systems;
    - In India, the CP supported development of a system of SWH standards, labels and quality control for MNRE. This has catalysed formation of an association, Quality Council of India, to develop certification systems for SWH equipment with test procedures;
    - In Lebanon, the CP supported development of a draft energy conservation law and national quality standards for SWH technology, both of which have yet to be adopted. The national quality standards, however, have led to adoption of the regional SHAMCI certification programme for SWH technology for the Arab Region;
    - In Mexico, the CP is supported development of mandatory standards for SWH products, and standards to certify SWH installation personnel.

76. UNEP's contribution to catalysing policy changes again has been passive, with their role being confined to the "Guidelines for Policy and Framework Conditions", a review of SWH technologies, assessing SWH market potential and market barriers, and policy measures to promote SWH market development. This document is likely be used by other countries interested in initiating SWH market transformation activities in the future.

77. *Contribution to catalytic financing.* UNDP contributions to catalytic financing varied between the CPs:
    - In Albania, the CP managed to establish a grant cost-sharing scheme to implement pilot projects within municipalities. However, the CP was not able to mobilize other catalytic funding including Italy's co-financing which was cancelled, the project extension was co-financed by the government;
    - In Chile, there were no contributions to catalytic financing. There were unsuccessful attempts to pilot financial mechanisms for SWH end-users in a social housing project;
    - In India, the CP managed to leverage its market transformation activities for USD 40 million in co-financing from the Government of India that was disbursed as direct buy-downs of SHW installations;
    - In Lebanon, the CP was able to mobilize catalytic funds (from the Government of Greece) for the setup of a testing facility for SWH equipment to comply with EU standards (EN 12975-1) for thermal solar systems;
    - In Mexico, the CP has not triggered any catalytic financing due to the Project only managing to demonstrate an SWH financial mechanism for the tourism sector which needs to be replicated in other sectors.

78. *Creation of opportunities for technology champions to catalyze change*. UNDPs role in this regard has varied amongst the different CPs:
    - in Albania, personnel within MEI are much more knowledgeable on SWH issues, and have improved capabilities to manage and promote SWH technology in Albania. Notwithstanding that there have been no emerging SWH technology champions, growth of SWH technology in Albania has been growing due to pressure by the government to ensure utility bill payments and reducing energy subsidies;
    - in Chile, no technology champions have emerged likely due to the lack of strong support from the federal government;
    - in India, a number of regional technology champions have emerged;
    - in Lebanon, LCEC emerged as the technology champion that was responsible for catalysing changes to water heating in the country;
    - in Mexico, the CP lacked a sectorial focus, reducing the opportunities of CONUEE program managers and the private sector to catalyze change.

79. Similar to some of the other assessed dimensions, UNEP's role during the GSWH Project in creating technology champions was constrained by the availability and recruitment of national experts by UNDP CPs as mentioned in Para 72. However, the knowledge products left behind by UNEP such as on the "Guide on Standardization and Quality Assurance for Solar Thermal" and their various tech scope reports will provide the basis on which technology champions can organically develop within countries where market conditions for SWH growth are ripe.

80. The *replication* strategy of the Project is provided in the GSWH project document, and was to be driven by successful SWH demonstrations generating positive information which would be disseminated on the global knowledge platform. With no defined activities to strengthen dissemination and encourage other countries to adopt and propose SWH programs (other than global and regional workshops, support for finalizing SWH proposals for 10 additional countries, and in-kind contributions by regional partners), a dissemination strategy was developed by UNEP in February 2016 for use by regional partners after the project's completion. The objective of the strategy was to:
    - further engage SWH stakeholders through dissemination of guidelines on how to most effectively present the work and results of the GSWH Project;
    - provide stakeholder identification, analysis and interaction process to raise awareness of the project's deliverables to those who could most benefit from SWH technology (including a matrix with targeted stakeholder groups and information profiling potential demand for SWH technology;
    - identify and recommend the most relevant knowledge products and tools to targeted stakeholder groups.

81. During the 2nd PMC meeting in 2011 fuelled by concerns on not meeting the targets for the preparation and adoption of 10 PIFs, UNDP and UNEP made the decision to each develop 5 PIFs based on countries each agency has identified with high potential for solar thermal market development combined with political will. The promotion of SWH technology in potential replication countries was to be done with a paucity of global knowledge products from UNEP, which at this time had not been fully developed due to lack of information generated from the CPs. Furthermore, only a few if any SWH market assessments were done for other countries.

82. The process was further complicated by identification of the need to contact national GEF focal points to ensure the availability of GEF allocations and the willingness of the governments to move forward. Despite a number of countries interested in preparing PIFs, there were an insufficient number of countries that placed SWH development as a high priority to pursue SWH PIFs. In addition, many of these countries did not have sufficient GEF-5 allocations that could be programmed into a GSWH Phase 2 project[33] that was exacerbated by changes in the system of GEF resource allocations from GEF-3 and GEF-4[34]. Furthermore, the level of readiness of many of the potential replication countries appears to have been underestimated with "high level" SWH market assessment tools not being available to policymakers until early 2014. To remove constraints of GEF funding allocations, UNEP proposed an alternative approach for SWH proposals in May 2015 in the form of NAMAs that could attract the attention of funding agencies and development banks[35]. UNEP prepared a "pilot" NAMA using the momentum built from the growth of the Lebanese SWH market, followed by the preparation of a "Guidebook for the Development of a NAMA for SWH".

83. In summary, the GSWH Project catalysed replication in the form of one GEF CEO endorsed project (Panama) and 3 NAMA proposals (Bolivia, Costa Rica and Ecuador). However, the 3 NAMAs at the time of writing of this report, have not yet been adopted. As such, the scale of replication catalysed by the GSWH Project only appears to have happened on a small scale but only in Latin America, notwithstanding the fact that the commencement dates of these proposals was during the very late stages of the GSWH Project. Furthermore, in line with the global objectives of the GSWH Project, the project was not able to facilitate replication of SWH market transformation in other regions such as Africa and Southeast Asia. The GSWH Project, however, has left in place a number of knowledge products along with regional partners whose capacities are strengthened to develop potential SWH technology champions of other countries, laying a solid foundation and serving as a driver for future SWH replication in other countries.

The project's catalytic role and replication is rated as moderately satisfactory.

[33] PMC minutes of April 2014
[34] The GSWH Project was approved at the end of GEF-3 where funding proposals were approved on a "first come first serve" basis. In GEF-4, a new system of resource allocation was introduced, allocating defined envelops of resources to each country (called initially the RAF) that was renamed in GEF-5 with some changes as STAR and continuing into GEF-6.
[35] PMC minutes of May 2015

3.5 Efficiency

3.5.1 Cost efficiencies

84. *Component 1 cost efficiencies*. In assessing the cost efficiencies under the KM component, resources were used in setting up the global platform and setting up partnerships with regional partners with project funds. In addition, there were over 40 completed knowledge products that were posted on the global website during the Project duration. To increase the cost efficiencies, the Project placed an emphasis on working with regional partners after the 2010 Global Inception Workshop when there was a realization that a global approach using solely global partners for knowledge dissemination would not be practical. The role of regional partners was to improve the effectiveness of outreach on behalf of the GSWH Project, collect information and develop knowledge products to address needs of their member countries.

85. In addition, annual workshops were conducted up until 2013 (Tunisia in 2010, Chile in 2011, Lebanon in 2012 and Albania in 2013) meeting the minimum target of the project but with no efforts to exceed this target. With no monitoring available within M&E reports of CP feedback of the uptake of global knowledge products and a resulting minimal outreach of UNEP to the CPs during the course of the Project, UNEP did not feel the need to deliver more regional workshops. In the opinion of the evaluators, more resources could have been spent on a communication strategy within the KM component team that would have provided a more effective strategy to provide technical backstopping to the CPs. Considering that there was over USD 500,000 remaining in the KM component budget from budgetary efficiencies (as detailed in Paras 97-98 and 109) that could have been used on implementing a communications strategy, the efficiency of resource use within the KM component was moderately unsatisfactory.

86. *Component 2 cost efficiencies*. Cost efficiencies of the various CPs varied considerably considering the results:
    - For Albania, the achievements delivered by the CP with a GEF grant of USD 1 million included raising awareness of SWH technology amongst decision-makers, coordination of all relevant SWH stakeholders, installed SWH capacity of 109,000 m² (resulting in annual SWH sales of more than 20,000 m² since 2011 exceeding targets) and catalysed interest amongst donors in Albania to mobilize additional funds on SWH. A 2-year extension with government cost-sharing was agreed in 2015 without any significant modifications to the project log frame. As such, the cost efficiencies for the Albanian CP were moderately satisfactory;
    - For Chile, delivery of outcomes with a GEF grant of USD 1.5 million has been moderately satisfactory considering that there has been a lack of enforcement of new regulations to promote SWH, and no delivery of any financial mechanisms to increase access to SWH technology to lower income households;
    - For India, the delivery of all outcomes including an additional incremental 300,000 m² of installed capacity for USD 2 million is highly satisfactory;
    - For Lebanon, the delivery of all intended outcomes and targets for installed capacity and growth rates for USD 1 million is highly satisfactory;
    - For Mexico, the CP delivered standards for SWH products and certification personnel, a successful demonstration on a SWH technical and financial mechanism for the tourism sector, raised awareness of SWH technology, and an installed capacity of 2,800,000 m² of SWH equipment (exceeding the target by 300,000 m²) for USD 1.75 million. However, this did not result in meeting targeted growth rates of 25 to 30% (18.5% is only achieved). As such, cost efficiencies for the Mexico CP were satisfactory.

3.5.2 Timeliness

87. The CPs did not start simultaneously affecting the timeliness of the delivery of outputs of the KM component. To some extent, the different implementation periods also affected the pace of development of the 5 CPs, and the generation of information on CP implementation and lessons learned. While the first years of the project from 2009 and 2010 were spent completing the website design and operation and setting up funding agreements with regional partners, CP implementation experiences and lessons learned were not available to UNEP and its regional partners to prepare knowledge products. By 2015, much of this information was available resulting in more than 40 knowledge products. The late delivery of these KPs was a primary factor in the failure of the project to deliver SWH proposals for 10 additional countries, and the subsequent long-term outcome of acceleration of global commercialization and sustainable market transformation of SWH.

88. Another issue in the context of timeliness, the project experienced administrative issues and delayed payments to its regional partners and their delivery of knowledge products. Delayed payments occurred after 2014 with the migration to a new UNEP financial system, “UMOJA”. These delayed payments also delayed delivery of knowledge products to 2015 such as the NAMA guide.

89. The timeliness of the delivery of CP outputs varied considerably:

- the Albania CP commenced in September 2009 is still on-going. This CP required 2 extensions. As such, the timeliness of delivery was moderately satisfactory;
- the Chile CP commenced in May 2009 and was completed in a 6-year period ending December 2015. Considering the resulting outcomes of the CP, timeliness of delivery was unsatisfactory;
- the India CP commenced in December 2008 (prior to the global inception workshop in February 2010) and was completed in late 2013. In consideration of the actual size of the India CP, its timeliness of delivery was highly satisfactory;
- the Lebanon CP commenced in March 2009 and was completed in April 2014 over a period of 4.5 years. The timeliness of this delivery was satisfactory;
- the Mexico CP commenced in July 2009 and was completed in April 2016. The efficiencies of the CP were affected by several administrative burdens related to changes in government, amongst other difficulties. The timeliness of this delivery was moderately unsatisfactory.

The overall rating for efficiency is moderately unsatisfactory.

3.6 Factors affecting performance

3.6.1 Preparation and readiness

90. The basis for the GSWH Project design were the baseline market assessments of SWH of participating countries that expressed an interest, and the successful SWH experiences in GEF program countries such as China and Turkey as well as the national program experiences in Cyprus, Israel and Greece. For the 6 original participating GSWH countries of Albania, Algeria (who later dropped out), Chile, India, Lebanon and Mexico, information on the growth of SWH without the Project was collected, along with existing SWH costs and details of existing government financing incentives; from this, the growth rate of the SWH adoption was estimated for targets in their respective project results framework. These targets were justified through a number of in-depth consultations in-country, where barriers in each of these countries to significant SWH market transformational shifts were identified.

91. The GSWH project document identified the common barriers to growth that generally apply to the participating GSWH countries as well as several other countries including amongst other factors, subsidized low prices of competing energy sources (usually fossil fuels); high upfront costs for installation; lack of established market infrastructure; general low awareness of the energy and environmental benefits of SWH technology; lack of consumer confidence in the technical performance of SWH technology; and lack of international standards and certification as well as labelling schemes and market surveillance. The design of the GSWH Project needed to address these barriers and incorporated principles from a 2002 review on global incentives for the successful promotion of SWH. This resulted in an holistic approach to SWH market transformation including the participation of appropriate government agencies, local SWH manufacturers, installers and dealers, financial entities, local electrical utilities, and targeted end-users. The inclusion of a global knowledge management and networking component (Component 1) was intended to harmonize the quality of these country programmes to international standards and best practices for implementation, and to coordinate technical backstopping services and continued provision of global best practices and standardization of SWH technology. The outcome of such harmonization would accelerate global commercialization and the market transformation of SWH technology.

92. On this basis, concrete targets for Component 2 were set for the Country Programs (referred to in the Project document as Phase I) to build national SWH market demand and strengthen their supply chains. These targets would be achieved through activities bundled into 5 common components to address the need for enabling policies, SWH related information, access to financing, SWH supply side strengthening, and sustainable institutional support for SWH. Moreover, the design of Component 2 would generate common national and local benefits for each one of the participating countries including: i) providing an alternative for direct cost savings with competing energy sources; ii) reduced dependency and national expenditures on imported fossil fuels; iii) reduced peak demand on power generation systems; iv) reduced pollution from conventional energy sources; v) generation of SME employment opportunities to service SWH installations; and vi) enhancement of SWH product quality to boost consumer confidence and market transformation.

93. Component 1 (KM Component) was designed to strengthen support for each individual CP through increasing the availability of international expertise and knowledge of leading regional partners in SWH technology. This included the International Copper Association, and a number of other reputable SWH global and regional partners that were to be identified during Project implementation. One of the key intended benefits of Component 1 was to facilitate a global information exchange and networking that would provide useful lessons learned and experiences and best practices in other countries successfully adopting SWH technology. Other key benefits of Component 1 were to: i) set up knowledge management infrastructure in participating countries that would support and stimulate replication of the initial SWH

market activities in at least 10 other countries; ii) set up of a "hotline" for international SWH experts for technical backstopping assistance; and iii) global review of existing national and regional SWH standards and quality control schemes that can be shared through various global platforms.

94. Despite these well-intentioned objectives, a primary weakness of the GSWH Project design lies in its implementation arrangements that assigned UNEP and UNDP as the 2 agencies to implement this Project. The design issue is related to ensuring complementarity between the activities of UNEP who are implementing the KM Component, and UNDP who are implementing the CP Component. The institutional arrangements in the UNEP project document do not provide clarity on the specific roles and responsibilities of UNEP and UNDP nor is there an obvious lead agency to report on the overall benefits of the Project. UNEP appeared to be cast in a lead role based on their responsibility of providing initial coordination and support to the UNDP country programs, and disseminating useful lessons to 10 more countries for replication; as such, during the first PMC meeting in March 2010, UNEP was nominated to serve as the project's GEF interface for direct transmission of GEF progress reports.

95. While the outputs of Component 1 served to build and support SWH knowledge management, the design does not specify mandatory activities related to outreach of DTIE activities to the UNDP country programs. The design of Component 1 seems to expect that demand for global SWH knowledge would grow organically from the country programs, and from 4 international and regional workshops from Output 1.8. The effectiveness of these workshops to stimulate interest in SWH technology and the efforts for follow-up after these workshops were unsatisfactory. Moreover, regular follow-up meetings between regional partners and the CPs were not provided in the project results framework or in the implementation arrangements.

96. Conversely, the outputs of Component 2 were designed to facilitate market transformation of SWH in each program country. With the GSWH Project design specifying UNDP implementing activities to encourage SWH market transformation, the design also specifies that UNEP would be involved in the overall project monitoring and progress reporting, and assessments of the effectiveness of market transformation activities, notably financial mechanisms to catalyse SWH market transformation. In addition, DTIE would organize training workshops based on the needs of the UNDP country programs, and adapt the training to the country as required. From this particular interaction between UNEP and UNDP, demand for specialized technical assistance in SWH would be generated from the stakeholders, a request that would be channelled through the Project Management Units (PMUs) of each UNDP CP. The PMUs with information on the need for this specialized technical assistance, would facilitate its delivery. The effectiveness of these arrangements has been unsatisfactory, due to the lack of an effective and streamlined UNEP-UNDP communication mechanism, lack of follow-up after workshops, lack of SWH proponent preparedness on the type of external assistance required, and a cumbersome protocol to process the request by a CP for UNEP assistance (that required routing of the request through the country office and UNDP-GEF PTA).

97. Changes in GSWH Project design for Component 1 are summarized on 5 project design change summaries (prepared by UNEP dated from November 2010 to December 2014). The main driver behind these design changes were cost deviations identified during the course of the project that were reallocated into Project activities that required more or less support of Project resources[36]. This included 3 Project extensions with the first extension being requested in September 2012. Most of the activities that received additional Project support were not design changes. The only design change consisted of additional and global efforts in 2013 to harmonize solar thermal collectors and development of the first regional solar water heating certification scheme for developing countries (likely related to Output 1.6).

98. Budget reallocations on the KM component were documented in detail to which the evaluators had access. During project implementation, budget reallocations consisted of:
    - increased budgets to ensure knowledge products and developed services under global management and networking are applied and improved through its continual use. This was requested in September 2013 and December 2014 and likely involves Outputs 1.5 and 1.6 though this is not specified in the Project design change summaries;
    - increased project management budget to cover requested extension in September 2013;
    - increase in budget line 2101 in September 2013 to develop a module on global SWH standards harmonization;
    - continuation of assistance to the GEF eligible countries to develop national SWH programs (probably related to Output 1.2); and
    - creating project technical backstopping support in 2015 in an effort to finalize Component 1 and to support global harmonization of solar thermal collectors under a regional certification scheme.

[36] This included higher costs of SSFAs (2010), reduced travel expenditures (2011), no office rent (2009 and 2010), savings and budget line 2102 from low-cost knowledge dissemination through webinars (2013), and not meeting target expenditures during the first 4 years of the project.

99. A proposed Algerian SWH country programme was cancelled in 2013. The issue for the Algerian government was to support SWH technology in the industrial sector, contrary to the GSWH Project which primarily supports SWH technology diffusion to the residential sector.

100. Since there were no country specific allocations under GEF-3, Algeria did not forfeit any GEF allocation; the funds were simply returned into a pool of GEF-3 funds.

Overall, the project preparation and readiness was moderately unsatisfactory

3.6.2 Project implementation and management

101. Project plans were discussed and agreed upon at Project management committee (PMC) meetings. The main project partners had agreed that PMC meetings would be held after each regional workshop since all project partners would be present. Unfortunately, only 4 PMC meetings were held during the course of the project, February 2010, June 2011, April 2014 and May 2015, where many of the decisions on how UNEP and UNDP as well as ICA would collaborate to meet the targets and deliver the outputs of the Project[37]. It is likely the project would have benefited from these PMC meetings being held on an annual basis or more frequently considering the inefficiencies of collaboration between UNEP and UNDP, and the presence of CP personnel who were not represented at the PMC meetings. PMC discussions attended by DTIE, UNDP-GEF HQ and ICA on these collaborative mechanisms were necessary given that the original Project design lacked any clarity on the specific roles of UNEP and UNDP.

102. It is noteworthy that when the Project was being prepared, a co-implementing project between UNEP and UNDP was conceived by GEF. According to the ProDoc, both UNEP and UNDP were co-implementing the GSWH project with "UNDP-GEF as the lead GEF agency reporting to GEF while UNEP-DTIE, overseen by UNEP-DGEF will consolidate monitoring and knowledge across the 6 national projects and from the global knowledge management network". However, during the PMC meeting of February 2010, UNEP-DTIE was tasked with overall responsibility for project monitoring and progress reporting including the preparation of quarterly progress reports (QPRs) to the PMC and PIRs to GEF, somewhat contradicting the ProDoc. UNDP's interface with GEF was to be towards any issues relating directly to CPs under Component 2. Furthermore, there was insufficient detail in the ProDoc on any collaborative mechanisms between UNEP and UNDP, which in the end, were not well thought out, requiring the efforts of the task managers of UNDP and UNEP to prepare them during implementation.

103. Implementation of technical backstopping and implementation guidance from UNEP to the CPs at the commencement of the Project was only through the global workshop in Tunisia in 2010. In total, only 4 global and regional workshops (Output 1.8) were held during the entire GSWH Project duration. During the workshops, there was good interaction between the CP delegates and DTIE personnel, to the extent that follow-ups were needed to strengthen cooperation between CPs and other countries. However, despite the best of intentions, there is little to no evidence of follow-ups with CPs after the regional workshops due to the following difficulties:
    - the perceived high cost and effort of the KM component to visit all CPs;
    - the inability of the CPs to identify specific issues where external technical assistance from UNEP would be required; and
    - the intensity of the workload of each CP leaving CP personnel very little time to interact with DTIE and other external assistance.

104. The outcome of the difficulties of UNEP to interact with the CPs was the increasing difficulties of DTIE to deliver a number of the outputs in the KM component. Moreover, these difficulties presented a new risk to the Project on delivering on its objective of accelerating global commercialization of SWH technology.

105. One of the key collaborative mechanisms developed during the PMC meetings was the flow of information from CPs to UNEP for the purposes of GEF reporting. The resulting coordination mechanism to support this flow of information in the end was long and tedious; it involved generation of information in PIRs from the CPs annually in July that would be routed to the country office to the respective RTAs for review. Once the RTA review was completed prior to the end of August, the PIR information was to be forwarded to the PTA at UNDP GEF HQ for transmittal to UNEP by each September. The entire information transfer process would generally take around 3 months.

[37] Since ICA representatives were not able to attend the 2012 and 2013 regional workshops in Lebanon and Albania respectively on short notice, these meetings were cancelled without the possibility of reorganizing another PMC meeting.

106. A similar collaborative mechanism was used for providing technical assistance as required by the CPs from UNEP. A request from a stakeholder or the CP would be initiated, and forwarded by the UNDP CO which would then be routed through the RTA and eventually to the PTA whose office would make an official request for technical assistance for the CP. The difficulty with this arrangement was the initiation of the request for UNEP assistance given that the CP was likely not able to formulate such a request. In one instance, a request came from a CP for assistance to formulate a financial mechanism to encourage and facilitate an increase in SWH installations. The request was never executed since the CP felt that the UNEP-UNDP process was too long, opting to source their own consultant in less time.

107. The project document stated that a component manager was required for the KM component. During Project implementation, neither UNEP nor UNDP made much effort until the PMC meeting of May 2015 to improve their collaboration, instead focusing on ensuring that their delivery of outputs and outcomes of their respective components was met. By May 2015, it became obvious to the UNEP task manager that DTIE's outreach to CPs was ineffective and not highly visible, leading to a lack of exposure of UNEP and its regional partners at the country level. Adaptive management could have rectified the issue of poor exposure of UNEP through the recruitment of a communications manager within the KM component. The recruitment of such a person (or a person with a rare combination of technical and communications skills) could have potentially focused on the details and removal of barriers to improve information flow of global SWH knowledge from UNEP to the UNDP CPs, and possibly improved overall project performance.

108. The lack of effective interaction between UNEP and UNDP on co-implementing the GSWH project is the primary reason for assessing implementation and management of the GSWH Project as moderately unsatisfactory. Despite this rating, the GSWH Project was able to deliver most of its intended outputs and outcomes based on hard and diligent work of all the project management teams in both UNEP and UNDP. However, given that the impetus of the GSWH Project was to promote global commercialization of SWH technology through 2 agencies that would complement local and global implementation, the importance of the efficient and effective interaction between UNDP and UNEP was deemed very important to the evaluators.

109. Lastly, there did not appear to be any adaptive management to improve the visibility of the global knowledge management at the CP levels resulting in an estimated USD 500,000 of surplus GEF funds in the KM component. Given the lack of exposure of UNEP and their regional partners at most of the CPs as well as the lack of interest in other countries to utilize their available GEF allocations for developing national SWH projects, surplus funds in Output 1.2 could have been allocated to improving the KM component outreach which may have resulted in wider diffusion of global SWH knowledge, and a higher number of SWH proposals adopted at the terminal date of the project in December 2015. Both UNEP and UNDP did have discussions in early 2015 on how to utilize the remaining budget of the KM component (including specific suggestions for spending the balance on preparing a more focused NAMA proposal for Lebanon which was not implemented); however, this did not result in any further KM expenditures in late 2015.

The project's performance in implementation and management is rated moderately unsatisfactory.

3.6.3 Stakeholder participation, cooperation and partnerships

110. The delivery of outputs from the KM component was reliant on the cooperation and partnerships with global and regional partners. DTIE accessed its wide network of partners to identify appropriate global and regional partners to advance SWH technology for the project. This included a number of excellent institutions such as the International Copper Association (ICA), the European Solar Thermal Industry Federation (ESTIF), the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE), Observatoire Méditerranéen de l'Energie (OME), Latin America Energy Organization (OLADE) and the University of the Virgin Islands (UVI), all of whom made significant contributions to the knowledge products on SWH technology including market assessments, TechScope assessments, GHG analysis tools, quality controls and standards.

111. The engagement of project partners within the CPs in country level was also successful since CP project designs had a strong participatory approach to identify the appropriate project partners, most of whom were dedicated units within the national governments. Some CPs, however, experienced difficulties in retaining good personnel such as Chile and Mexico, in part caused by changes in government resulting in changes of project personnel, which only served to hinder progress given the required time for new personnel to familiarize themselves with the SWH CPs.

112. As previously mentioned in Paras 101 to 108, the collaboration between UNEP and UNDP could have been improved to increase the awareness of CP stakeholders to the global knowledge products of UNEP. A few synergies, however, were developed between the 2 agencies with regards to meeting the objectives of accelerating global commercialization of SWH technologies:

- UNEP requested and used information from CPs to develop a number of TechScope and SWH market assessments that have been posted on the global website;
- During the 2014 regional workshop held in Albania, DTIE facilitated opportunities for business-to-business (B2B) partnerships between qualified SWH manufacturers and local Albanian businesses in an effort to accelerate SWH installed capacity in Albania;
- RCREEE, one of UNEP's regional partners, was instrumental in developing a regional certification scheme, SHAMCI, for SWH products in the Middle East. The scheme was successfully taken up by the CP in Lebanon, and shows potential for replication of SWH technology in 2 other Middle Eastern countries.

113. Documentation of the valuable experience and lessons learned from implementation of completed CPs was completed at a late stage of the project in 2 stages. In January 2014, the 5 CPs were profiled in the SWH TechScope Methodology. In December 2015, 3 comprehensive full case studies of the SWH CPs for Lebanon, Chile and Mexico were developed complete with lessons learned in establishing and growing a sustainable SWH market. Experiences from these CPs are now in place to inform other potential stakeholders in other countries to advance global commercialization of SWH technology.

Stakeholder participation, cooperation and partnerships is rated Moderately Satisfactory

3.6.4 Communication and public awareness

114. According to stakeholders interviewed, efforts to raise public awareness by the CPs were satisfactory within all participating countries. On the CPs, resources were used to raise public awareness of SWH benefits and to inform the public of the availability of training programs to improve the quality of SWH installations and the standards that they need to comply with. For all participating CPs, pamphlets and guidebooks were produced in all countries followed by training modules and technical materials targeting local technicians and building professionals. Towards the latter stages of the CPs, some of the SWH CP outcomes, progress and lessons learned were compiled and shared with UNEP to produce knowledge products on market and techscope assessments designed to sustain SWH market transformation within each country, and to catalyse SWH installations in new countries. These knowledge products have been posted on the solarthermalworld.org website. However, due to the late issuance of these knowledge products in 2015, it is difficult to assess the effectiveness of these KPs which could be measured in terms of the number of SWH proposals that have been adopted by other countries. To date, only one full project in Panama was endorsed and 3 NAMA SWH proposals have been prepared (Costa-Rica, Ecuador and Bolivia) with none yet having been adopted.

The project's performance in ensuring communication and public awareness is rated Satisfactory.

3.6.5 Country ownership and drivenness

115. For all CPs, government involvement with SWH project implementation was very strong. In all cases, there were dedicated units assigned to implementing SWH market transformation. In most cases, CPs did receive some assistance from UNEP to initiate their programmes, namely Albania, Chile, Lebanon and Mexico. The India CP commenced in late 2008, prior to full approval of the KM component being implemented by UNEP. The KM component did not significantly contribute to the stimulation and encouragement of country ownership since many of the KPs from the KM component were not available until 2014 in 2015. The lack of success in the Chile CP can be attributed to a lack of high-level political support for renewable energies in the current government, notwithstanding the fact that the Ministry of Energy and Water still employs a dedicated unit to promote SWH installations nationally.

Country ownership and drivenness is rated Satisfactory

3.6.6 Financial planning and management

116. The estimated and actual costs as well as the expenditure ratio (actual/planned) of the project are summarized in Table 11. Unfortunately, the budgets kept by UNEP on KM component expenditures during the entire duration of the GSWH Project were not divided into subcomponents and outputs notwithstanding changes to UNEP financial system to UMOJA in 2014. As such, KM component expenditures are reported according to set budget lines such as staff salaries and consultancies as provided in Annex VI. As one can observe in Table 11, the actual project cost was 16% lower than the estimated cost at design. As can be observed on Table IV-1 in Annex IV, the original budgets for "global outreach" and "knowledge

dissemination and engaging additional countries" of USD 555,000 and USD 630,000 were only 55% and 58% expended respectively. This resulted in a Project surplus of USD 589,215.

117. KM component expenditures were planned with annual work plans that made the best attempts to anticipate the expenditures of each fiscal year. On the basis of the AWPs, cooperation agreements with regional partners were negotiated and prepared with special service financing agreements (SSFAs) signed. DTIE did experience difficulties in planning financial expenditures due to the different starting dates of each of the CPs, and the difficulties of anticipating the needs of the CPs and the information they were to generate to develop KPs. This resulted in many of the targets of the Project not being met during the first 4 years of operation. However, in the end, more than 40 KPs were delivered for the entire GSWH Project.

118. Changes in GSWH Project design for Component 1 are summarized on 5 project design change summaries (prepared by UNEP dated from November 2010 to December 2014). The main driver behind these design changes were cost deviations identified during the course of the project that were reallocated into project activities that required more or less support of project resources. These have already been discussed in detail in Paras 97 and 98.

Table 10: Summary of project expenditures (GEF funds)

Component/ Sub-component/Output	Estimated cost at design	Actual cost	Expenditure ratio (actual/planned)
KM component	3,750,000	3,160,785	0.84
UNDP country programs:			
Albania	1,000,000	1,000,000	1.00
Algeria[38]	1,000,000	0	0
Chile	1,500,000	1,500,000[39]	1.00
India	2,000,000	1,997,151	1.00
Lebanon	1,000,000	1,000,000	1.00
Mexico	1,750,000	1,750,000[40]	1.00
Total	**12,000,000**	**10,407,936**	**1.00**

119. In addition, there is an estimated USD 590,000 of surplus GEF funds in the KM component due to reasons explained in Para 109.

120. Budgets on the UNDP country program component were also properly planned according to UNDP POPP standards for budget planning.

121. The GSWH Project leveraged the following co-financing:
- for the KM component, contributions by ICA were in the order of USD 1.79 million, an important contribution that includes its investment into the global website, and in-kind contributions to setting up and maintaining the website. There were also in-kind contributions by the regional partners including ESTIF, RCREEE, OLADE and UVI;
- for the UNDP CPs:
  - Albania, the CP leveraged USD 330,710 from the Government of Albania to complete market transformation activities. Other forms of co-financing such as the USD 1.2 million from the Italian Fund did not materialize as well as other co-financers named in the signed project document. This had an effect on Albanian access to Italian SWH equipment, and a slower growth rate of SWH deployment. The project was also extended until 2017 with government cost-sharing;
  - in India, USD 42.31 million was leveraged as co-financing, mainly from the Government of India to provide funds for buy-downs of SWH installations from certified suppliers and installers;
  - in Lebanon, the CP managed to leverage USD 1.96 million in co-financing mainly from the Government of Lebanon as well as the Swedish International Development Agency (SIDA), the Spanish Agency for International Cooperation, the Hellenic Aid, the Lebanon Recovery Fund and private SWH system manufacturers, importers and installers;
  - Co-financing estimates for the CPs in Chile and Mexico have not been provided.

Table 11: Summary of project co-financing

Co-financing Source	Amount (USD)	
	Planned	Actual
International Copper Association	1,200,000	1,202,000

[38] Algerian CP was cancelled in 2011 with no disbursements
[39] To be confirmed by CP
[40] To be confirmed by CP

Co-financing Source	Amount (USD)	
	Planned	Actual
UNEP-DTIE	370,000	279,000
Regional Partners	400,000	309,000
Subtotal (Component 1)	**1,970,000**	**1,790,000**
UNDP CPs:		
Albania	1,750,000	330,710[41]
Chile	1,831,500	n/a
India	13,100,000	42,310,000
Lebanon	2,160,500	1,960,000[42]
Mexico	16,820,000	n/a
Subtotal (Component 2)	**35,662,000**	**44,270,000**
Total (Component 1 and 2)	***37,632,000***	***46,060,000***

122. In summary, the KM component of the GSWH project was financially managed by DTIE in a manner designed to optimize the outputs of knowledge products (and as detailed on Paras 96 and 97), and to manage the project during its 3 extensions. Unfortunately, this was done at the expense of savings realized in "global outreach" and eventually to "knowledge dissemination and engaging additional countries". These savings were realized from the UNEP-UNDP collaborative mechanism (as detailed in Paras 101 to 106) which forced UNEP to focus more on the delivery of knowledge products.

123. The quality of financial management of the UNDP CPs was varied considering the outcomes achieved on each CP. Reporting of GEF expenditures and co-financing from the India and Lebanon CPs was satisfactory. The evaluators were unable to assess financial reporting against the deliverable from the CPs in Albania, Chile, and Mexico given the lack of financial information broken down into component expenditures.

Overall project financial planning and management was moderately satisfactory.

3.6.7 Supervision, guidance and technical backstopping

124. Supervision of the KM component of the GSWH Project was difficult considering that the supervision was intended to kickstart the CPs and then provide technical backstopping and guidance during implementation. The primary issue with the difficulty of supervision of the KM component was the different commencement dates and implementation periods of the CPs that would each generate differing demands for guidance and technical backstopping. Many of these difficulties are reflected in the PMC meeting minutes where the need for activities to meet certain project targets and deliver outputs was identified.

125. For example, during the 2nd PMC meeting, the need to focus efforts on developing PIFs to meeting the target of 10 was identified. The task of developing these PIFs was divided between UNDP and UNEP with each agency agreeing to undertake the development of 5 PIFs each. In addition, key decisions were made to continue efforts to develop more proposals through focusing in one or 2 regions with similar conditions.

126. Despite key decisions made during the first 3 PMC meetings, the PMC meeting minutes reflect an absence of strategic thinking in implementing the Project to meet the overall objective of accelerating global commercialization of SWH technology. For example, both UNEP and UNDP agreed during the 2nd PMC meeting (in June 2011 in Santiago, Chile) to start identifying countries with high potential for SWH market development combined with strong political will. In addition, the successes of the Indian industrial SWH installations by an ESCO were not promoted either by UNEP or UNDP onto the global platform by the GSWH Project; this did not serve the overall GSWH project objective of "acceleration of the global commercialization and market development of solar water heating in residential, private service sector and public buildings and, when applicable, *industrial applications"*.

127. The 3rd PMC meeting was not convened until April 2014 (almost 3 years after the 2nd PMC meeting). During this meeting, it was acknowledged that development of new SWH proposals was not on track due to difficulties in developing new proposals due to limitations of GEF-5 funds as well as a lack of global knowledge products on SWH best practices and lessons learned from the 5 CPs. However, to address a need to improve the readiness of potential replication countries, UNEP did complete the development in early 2014 of an "SWH TechScope Market Readiness Tool" that could be used to identify countries with high

[41] Excludes the 2-year extension with government cost sharing
[42] Mainly from the Government of Lebanon as well as the Swedish International Development Agency (SIDA), the Spanish Agency for International Cooperation via the Lebanon Recovery Fund and the Hellenic Aid. However, the co-financing reported here may be uunderreported since co-financing does not include the MEW-Central Bank of Lebanon financial mechanism-subsidy programme for SWH totalling more than USD 1.5 million.

potential for solar thermal national programs; this is an excellent tool that would have been useful at an earlier date to develop SWH programs in other countries.

128. In addition, UNEP also developed a "Guidebook for the Development of a NAMA for Solar Water Heaters" in early 2015 which provided additional technical backstopping as another means of developing SWH proposals in the absence of GEF funds. This guidebook in tandem with the aforementioned SWH TechScope Market Readiness Tool provides appropriate resources for countries interested in fostering national SWH development. This has resulted in the recent preparation of 3 NAMAs for Costa-Rica, Ecuador and Bolivia. At the time of this evaluation, these NAMAs have not yet been adopted.

129. The first 3 PMC meeting minutes also did not reflect the lack of visibility of UNEP involvement on the project at the CP levels. The impact of this lack of visibility would have been a lesser uptake of UNEP KPs that would result in a slower rate of acceleration of global commercialization of SWH technology. During the 4th PMC meeting (of May 2015), UNEP had made suggestions on increasing the participation of personnel from CPs to contribute to the PMC meetings. This suggestion was not followed through since the Project was not going to have another PMC meeting.

130. In summary, the supervision guidance and technical backstopping from UNEP and UNDP on this project could have been improved. The minutes of the PMC meetings do reflect a lack of strategic approaches to meet the overall objectives of accelerating global commercialization of SWH technology. Instead, it appears that both UNDP and UNEP would basically undertake the tasks agreed-upon during PMC meetings to meet their own respective outputs and targets.

Overall UNEP/UNDP supervision and backstopping were Moderately Satisfactory/Satisfactory.

3.6.8 Monitoring and evaluation

131. *M&E design*. The M&E designs for the GSWH Project complies with standard monitoring and evaluation procedures of GEF, UNEP and UNDP. A review of the indicators in the UNEP and UNDP project results frameworks (PRFs)[43] included objectively verifiable indicators with targets, and the sources and means of verification for the project objective, outcomes and outputs. Budgets for UNEP M&E activities in the GSWH Project design were adequate included Project Manager's time for preparing semi-annual reports on co-financing and progress reports, preparing annual reports on self-evaluation, spot checks and PIRs, and for the completion of a midterm review, final report and a terminal evaluation report.

132. For the UNEP project document, the M&E design includes indicators and targets for Outcome 1 as well as *Outcome 3 within the UNDP country program ProDoc* pertaining to financial mechanisms where DTIE was to provide initial inputs and monitor progress on the availability and increased use of financial mechanisms to catalyze SWH markets within the CPs. Most of the indicators in the UNEP M&E design meet SMART criteria[44] with some exceptions as follows:
    - Output 1.5 – "use of and the feedback received on the available public awareness raising, training and knowledge management materials by the targeted countries" that has a nonspecific target of "relevant public awareness raising, training and knowledge management materials prepared made available and actively used by the targeted countries with positive feedback". Moreover, the means of verification for this indicator was only the number of publications produced and the number of downloads on the publications developed by the global KM website. A more effective means of verification would have been to conduct the survey on feedback on the quality of KPs on the website with a target on the percentage of those surveyed who were satisfied with the KP quality;
    - Output 3.1 – "level of interest created" that has a nonspecific and unmeasurable target of "all key financial sector stakeholders and local suppliers informed on the specific characteristics and opportunities provided by local SWH market, and on the experiences and lessons learned from financing models tested in other countries". However, the means of verification for this indicator included field surveys that evaluate different aspects of the financial mechanisms developed.

133. On the UNDP project documents, the M&E design for all CPs is identical but without any reference to DTIE and their role in initiating the development of these financial mechanisms as well as monitoring the progress and effectiveness of these mechanisms developed within Outcome 3. Moreover, there is an absence of any reporting mechanism to UNEP within the M&E design. As such, the absence of UNEP-UNDP collaborative mechanisms necessitated the development of such mechanisms during implementation. In addition, the M&E design also assumed that the operation of the KM component would precede the start-up dates of any of the CPs, especially in the context of initiating the development of financial mechanisms.

[43] Sometimes referred to in some of the Prodocs as a logical framework matrix
[44] Specific, Measurable, Attainable, Relevant, Time-bound

The M&E design is rated as moderately satisfactory.

134. *M&E plan implementation*. The provision of overall project M&E reports in the form of internal semi-annual progress reports and PIRs to GEF was the responsibility of UNEP. As such, a reporting protocol to obtain M&E information from UNDP CPs was developed during the first PMC meeting, with efforts in subsequent PMC meetings to reduce the 3 to 4- month period during which CP progress information is transmitted from CP personnel to DTIE. With CP personnel preparing the PIRs, completed PIRs would be routed through the country office, the UNDP Regional Technical Advisor, and finally to the Principal Technical Advisor in UNDP HQ for transmittal to DTIE in Paris. Submission of this information would generally take between 3 to 4 months with PIRs submitted to GEF generally in October of each year. The quality of the internal semi-annual progress reports and PIRs submitted were satisfactory, sufficiently detailed and credible. Contents of the final PIR of 2015 and the semi-annual progress report of December 2015 coincide with the findings of this evaluation.

135. The weakness in the implementation of the M&E plan was more related to monitoring of the uptake of KPs generated by the KM component, notably with respect to the Output 1.5. While the M&E design called for verifying the delivery of Output 1.5 through monitoring the number of times a document has been downloaded from the global website, there was no feedback surveys conducted to gauge the opinions of the users on the usefulness of the document. In some ways, this justified that there was no need for DTIE to travel to CPs or to conduct additional outreach events (such as more than the target of 4 global or regional workshops). However, no adjustments were made to the M&E plan to assess a more realistic indicator of the uptake of the KPs generated under the KM component. On the global website, the evaluators observe that the number of hits was very low in Latin America. This was confirmed by ICA. Furthermore, the evaluation found that the visibility of UNEP and its regional partners within the CPs was very low.

136. Another weakness of the M&E plan implementation was related to the monitoring of the development of financial mechanisms within each CP under Outcome 3 of the UNDP country program component (Component 2). With the different starting dates of each of the CPs, implementation of the M&E plan for financial mechanisms by UNEP became more difficult. For example, the start-up date for the India CP was December 2008, 15 months prior to the actual inception workshop for the KM component. By February 2010, development of financial mechanisms for the India CP was well underway with UNEP not having participated in its development as per the Project design. As such, demand for UNEP-DTIE technical assistance to develop financial mechanisms for SWH markets was marginalized.

The M&E plan implementation is rated as moderately satisfactory.

4 CONCLUSIONS, RECOMMENDATIONS & LESSONS LEARNED

4.1 Conclusions

137. The GSWH Project was one of the earliest attempts by GEF for a UNEP and UNDP co-implementation project in the Climate Change Mitigation (CCM) focal area. As such, the design of this Project appears not to have any precedence leading to an outcome of the GSWH Project design that lacked details on effective implementation arrangements and interagency collaborative mechanisms. Despite these issues, the GSWH Project did generate a number of positive results including:
    - the provision of a framework as well as a template to address SWH barriers that could be adopted in a number of countries (Para 47);
    - provision of an excellent global platform for informative dissemination and training through webinars (Para 48);
    - energizing of regional stakeholders who are interested in promoting SWH NAMAs and disseminating knowledge products developed by the Project as a means to sustain SWH market transformation momentum built in some of the CPs by the Project (Para 63); and
    - strengthened capacities of participating CPs in managing an SWH promotional program, particularly in Lebanon, India and Albania.

138. The lack of an inter-agency collaborative mechanism between UNDP and UNEP certainly diminished the effectiveness of UNEP-DTIE to provide “effective initiation and coordination of country specific support needs and improved access to experts”. UNDP CPs all received their GEF and UNDP approvals at different dates between late 2008 and late 2009, while UNEP-DTIE was only able to initiate the KM component in February 2010 with the global inception workshop in Tunisia, at a time when many of the CPs (especially the

India CP) were well underway (Para 47). Ideally, knowledge products from the KM component should have been developed prior to the start-up of all the CPs.

139. With the overall objective of "acceleration of global commercialization of solar water heating", a key indicator and target for the GSWH Project was *Output 1.2: Finalization and adoption of proposals for at least 10 additional countries for Phase II*. Unfortunately for the GSWH Project, only 5 countries had prepared proposals with the status of their adoption unknown at this time. The failure to meet the target of this particular output highlights a number of implementation issues on the GSWH Project:
    - During the early phases of the project (2011 and 2012), there were unsuccessful attempts to influence countries into a decision to prepare an SWH proposal without sufficient background information on successfully implemented SWH programs. The KM component was unable to deliver such information until January 2014 near the end of the GSWH Project when a number of the CPs were able to report tangible results (Para 57);
    - CPs all had different implementation periods making it difficult for UNEP to forecast when it could deliver information on successfully implemented SWH programs;
    - The Project only realized in 2012 that mechanisms were lacking in gauging the readiness of other countries to replicate successfully implemented SWH CPs. It was only in early 2014 that the KM component delivered a very useful "high level" SWH market assessment tool that would be useful for policymakers to trigger decisions on pursuing SWH development (Para 55);
    - During the entire 7-year period of the GSWH Project, only 4 PMC meetings were held to discuss the progress of Output 1.2 amongst other issues. These meetings were held far too infrequently leading to some of the implementation issues between UNEP and UNDP such as assistance on financial mechanisms. Moreover, the PMC did not include any attendees from the country programs, who may have had useful inputs on implementation (Para 101).

140. Due to the lack of clear roles of UNEP and UNDP (as well as ICA) to meet the overall objectives of the GSWH Project, neither agency provided strategic leadership to meet the overall objectives of accelerating global commercialization of SWH technologies. This included a lost opportunity to promote SWH applications in the industrial sector as successfully demonstrated on the Indian CP (Paras 57 and 126). Instead, the GSWH Project was implemented with UNDP CPs generating SWH implementation experience and lessons learned, and UNEP-DTIE synthesizing information from CPs and global experience to produce knowledge products posted on the global knowledge platform. The M&E plan of the Project did not provide an indicator to gauge the opinions of the users on the quality and usefulness of the KPs (such as through a feedback survey) which would have exposed less website hits in some of the geographical regions (such as in Latin America or parts of Eastern Asia where English is not a first language). As such, UNEP-DTIE did not utilize available funds for additional travel to CPs for additional outreach events (such as Output 1.8 target for regional and international workshops beyond the target of 4 for the Project); this contributed to UNEP being unaware of its low-profile within CPs (Para 135). By only conducting the minimum required workshops, the Project lost the opportunity to raise its global component profile that would have:
    - improved the sharing of information on SWH markets (with residential, commercial and industrial applications) and their development with participating countries and potential replication countries;
    - provided a global discussion forum to raise the profile on common SWH issues and solicit feedback from stakeholders (such as the absence of quality assurance and the poor quality of SWH equipment); and
    - increased the likelihood of effectively catalysing interest in other countries into preparing SWH proposals (although at Project closure, 3 reports on regional SWH assessments reports and the work of the regional partners were completed and issued as follow-up to their member countries).

141. Lastly, despite the efforts of the CPs to catalyse market transformation, there are still concerns within the CPs of:
    - insufficient capacity for SWH after sales support. Currently, there does not appear to be government or regional partner willingness and the financial resources to continue training in the QA of SWH installations (Para 67). This would be a threat to the growth of SWH installations as well as the realization of substantial energy savings and GHG emission reductions; and
    - no improvement to the systematic lack of monitoring and data collection on baseline energy consumption for water heating. This includes no improvements in government capacities to collect energy end use information, importantly on the residential and industrial sectors (Para 66);

142. Table 12 presents the project ratings as per the assessments provided in the earlier sections of this report. The overall rating was informed by the country level evaluations; it is not an aggregation of those (full country level evaluation reports are available at web.unep.org/evaluation/).

Table 12: Summary of the evaluation criteria ratings

Criterion	Albania[45]	Chile	Mexico	Lebanon	India[46]	Overall Rating[47]
A. Strategic relevance	**S**	**S**	**S**	**S**	**S**	S
B. Achievement of outputs	**S**	**MS**	**S**	**HS**	**S**	S
C. Effectiveness: Attainment of objectives and planned results	**S**	**MU**	**MS**	**S**	**S**	MS
1. Achievement of direct outcomes as defined in the reconstructed TOC	S	MU	MS	S	-	MS
2. Likelihood of impact using ROtI approach	L	MU	L	L	-	ML
3. Achievement of formal project objectives as presented in the Project Document	S	MS	MS	HS	-	MS
D. Sustainability and replication	**ML**	**ML**	**ML**	**ML**	**ML**	**ML**
1. Socio-political sustainability	L	ML	ML	ML	ML	L
2. Financial resources	L	L	L	L	L	ML
3. Institutional framework	ML[48]	ML	ML	HL	ML	ML
4. Environmental sustainability	L	L	L	L	L	ML
5. Catalytic role and replication	S	MS	S	S	-	MS
E. Efficiency	**S**	**MS**	**S**	**HS**	**S**	**MU**
F. Factors affecting project performance						
1. Preparation and readiness	MS	MU	MS	S	S	MU
2. Project implementation and management	S	MU	MS	S	S	MU
3. Stakeholders participation, cooperation and partnerships	S	MS	S	S	S	MS
4. Communication and public awareness	HS	MS	MS	HS	-	S
5. Country ownership and drivenness	S	MS	HS	S	HS	S
6. Financial planning and management	S	MS	MS	HS	S	S/MS[49]
7. Supervision, guidance and technical backstopping	S	S	S	S	S	S/MS[50]
8. Monitoring and evaluation	S	MS	S	S	S	MS
i. M&E design	S	MS	MS	S	MS	MS
ii. M&E plan implementation	S	MS	S	S	S	MS
Overall project rating	**S (Interim assessment)**	**MU**	**MS**	**S**	**S**	**MS**

[45] The Albanian country component is extended until the end of 2017 with government cost-sharing (Steering Committee, July 22, 2015). The ratings provided here are interim ratings taking into account the new timeframe of the project.
[46] The terminal evaluation was conducted in 2013. All the evaluation criteria required by UNEP EO were not rated during the UNDP led evaluation process.
[47] The overall assessment looks at the performance of the overall project as defined in the global Prodoc. It is not an aggregation of country level ratings; only informed by those.
[48] Evaluation rating of "Moderately Likely" is based on the situation during the evaluation period looking at the status of the project in the end of 2015 (as per the evaluation TOR), and information available during the country mission which was conducted in April 2016. As per the information received from UNDP (March 2017): "A recent Agency on Energy Efficiency is created end of 2016 as per the provisions of the new Energy Performance in Buildings law (endorsed on November, 2016), so I don't see any risk of lack of institutionalization." Evaluation Office notes that situation might have changed towards more favourable sustainability rating of the Albanian country component. Nevertheless considering the evaluation period the rating remains as ML.
[49] Country and global component levels are rated separately: Country components/Global components
[50] Country and global component levels are rated separately: Country components/Global components

4.1 Recommendations

4.1.1 UNEP Recommendations

143. The following is a presentation of the main recommendations for UNEP that have been generated from the evaluation findings:

Context:	The lack of a collaborative mechanism between UNEP and UNDP certainly diminished the effectiveness of UNEP-DTIE to provide "effective initiation and coordination of country specific support needs and improved access to experts" in the implementation of the GSWH Project (Para 138).
Recommendation #1	As the primary role of UNEP is to assemble global information for dissemination, UNEP should support this mandate in projects that involve another agency such as UNDP by ensuring inter-agency collaboration protocols are setup with sufficient detail with the aim to ensure streamlined and maximized collaboration; this would result in an increased likelihood of efficient implementation and successful project outcomes. Moreover, the efforts to develop and implement these collaborations should be defined as a budgeted activity or project management function within the budget of a project preparation or a project. The following includes some suggested elements to the protocol: • The protocol should have sufficient detail to define the roles of UNEP and another agency. This would include the naming of the lead agency and chair of a PMC, responsible for strategic decisions to meet the overall objectives of a project; • Joint activities involving interaction between UNEP and another agency and the use of the protocol should be specifically defined in the project documents, and include the agency responsible for initiating the activity and the mode of communication between each agency. These activities should also be defined in the project log-frame analysis and the Theory of Change to maximize the success of inter-agency collaboration; • Project designs should include sufficient budgetary and time resources allocations to ensure functional interagency communication including funds for travel, teleconferencing, planning and debriefing meetings; • Project design activities need to include sufficient time for consultations with local stakeholders channelled through the local implementing agency. For UNEP, this needs to be done through a focal point (from UNDP or another agency) that would have oversight of projects in each country. Again, sufficient time and budget for such an activity needs to be allocated in the project design budget; • Project documents should be developed to meet the demands of the target country. As such, UNEP should provide a framework with global elements (covering issues that are common throughout all countries) that the agency in the country (such as UNDP) with their project designers can adopt into a local context; • Since one of UNEP's primary roles is to disseminate global practices, the project design should include the sequencing of activities where appropriate knowledge products from UNEP are completed in advance of country level implementation activities; • Project management or steering committee meetings that involve UNEP and another agency such as UNDP should be held on an annual basis or more frequently if required. Persons designated in each agency to attend to these meetings should have sufficient time for preparation and follow-up on actions items emanating from the meetings; • Code of conduct of UNEP personnel with other agencies should be one of flexibility and transparency which has been an issue in the past including protocols of reporting to agencies that are already in-country (such as UNDP) and ensuring that the activities of each agency in the country are understood by both parties.
Responsibility:	UNEP and UNDP
Time-frame:	Design phase for follow-on projects

Context:	Many of the CPs currently have insufficient capacity for SWH after sales support. Without continued support from government, regional partners and donors, there is a threat that energy benefits and GHG reductions from SWH installations may not be realized (Paras 67 and 141).
Recommendation #2	Future UNEP market transformation projects should incorporate elements that enhance the sustainability of energy savings and GHG emission reductions from low carbon technologies. These types of projects should include knowledge dissemination that demonstrates the benefits of strengthening linkages between national government agencies and regional partners that oversee, for example, the marketing and quality assurance of SWH equipment. The purpose of initial meetings would be to familiarize host governments with typical operation and maintenance problems of SWH equipment (or other low carbon equipment) of a particular country or region, and what further actions would be recommended to ensure sustained operation and maximize the service life of a technology including review of the certification process, staffing of certification bodies, and policies towards noncompliance.
Responsibility: Time-frame:	UNEP and the respective governments of the country programs Design phase for follow-on project
Context:	The GSWH project resulted in no improvement to the systematic lack of monitoring and data collection on baseline energy consumption for water heating with acknowledgement that such data collection is difficult (Paras 66 and 141).
Recommendation #3:	UNEP should provide assistance to governments that are undertaking preparation of market transformation of low carbon technologies (such as SWH) to institutionalize the collection of baseline energy end use, or as add-ons to existing projects (such as those implemented in-country by UNDP, UNIDO or another agency). With its global network, UNEP can provide assistance to various countries in need of such assistance, notably the mobilization of resources and methodologies of data collection. The GSWH Project provides an excellent example of the framework of guidance that can be provided with the "Guidebook for the Development of Nationally Appropriate Mitigation Action for Solar Water Heaters" under the section on "Methodology for measuring, reporting and verifying". In the experience of the Evaluators, baseline data collection and monitoring is often an overlooked activity or an activity that concerns governments and local stakeholders as being too costly or not useful. UNEP could alleviate these concerns through assistance in scoping baseline survey and monitoring programs that provide appropriate levels of confidence in data collection surveys, and within reasonable budgets.
Responsibility: Time-frame:	UNEP and the respective governments of the country programs Design phase for follow-on project
Context:	The GSWH project successfully demonstrated industrial applications of SWH technology in India (Para 57). The successes of the Indian industrial SWH installations by an ESCO were not promoted either by UNEP or UNDP onto the global platform by the GSWH Project; this did not serve the overall GSWH project objective of "acceleration of the global commercialization and market development of solar water heating in residential, private service sector and public buildings *and, when applicable, industrial applications*" (Para 126).
Recommendation #4:	UNEP should promote industrial applications of SWH technology through the successes of the Aspiration Energy example in India. While this application was successfully implemented in 2012 on the basis of higher SWH unit costs in 2012 and a 30% subsidy from the Government of India, this application should be revisited in 2016 or 2017 in light of different and likely lower costs for SWH technology today, and the possibility that subsidies would no longer be needed in some countries. The evaluators also observe that the ICA-supported solarthermalworld.org website contains several articles of SWH industrial applications which could be reviewed for successful ESCO-implemented installations and compiled for sharing with emerging industrial markets globally.

Responsibility: Time-frame:	UNEP, ICA and the respective governments of the country programs Design phase for follow-on project
Context:	The GSWH Project does not strongly address issues related to gender inequalities, specific vulnerabilities of women and children to environmental degradation, and the role of women in mitigating or adapting to environmental changes or engaging in the SWH sector. This is likely related to the fact that this Project was designed as a GEF-3 Project, during which the emphasis on gender balance was not strong. In addition, the KM component had a strong technical focus, somewhat marginalizing gender issues related to awareness and technical training (Para 36).
Recommendation #5:	While this is likely being implemented, UNEP managers need to ensure future UNEP Projects should address gender balance commencing at the project design stages in line with UNEP's "Policy and Strategy for Gender Equality and the Environment (2014-17)"[51]. At the design stage of low carbon market transformation projects, gender balance needs to be addressed, for example, in the role of women in the supply chain of low carbon technologies (from installation personnel to the ownership and operation of a business), and what measures that can be taken by the project to ensure more gender balance during implementation. These activities should be included in the project LF with SMART indicators to measure the impact of the project on gender balance where possible on project activities. In addition, the LF should also provide indicators on how the Project improves the quality of life and mitigates specific vulnerabilities of women and children.
Responsibility: Time-frame:	UNEP Design phase for follow-on project

4.1.2 UNDP Recommendations

144. The following is a presentation of the main recommendations for UNDP that have been generated from the evaluation findings:

Context:	The lack of a collaborative mechanism between UNEP and UNDP certainly diminished the effectiveness of UNEP-DTIE to provide "effective initiation and coordination of country specific support needs and improved access to experts" in the implementation of the GSWH Project (Para 138).
Recommendation #6	Where UNDP is tasked to partner with another agency (such as UNEP to assemble global information), UNDP should support this assistance by setting up streamlined protocols for the participation of an external agency (such as UNEP) on a UNDP project to access local stakeholders and information. This should be defined as a budgeted activity or project management function within the UNDP project that is designed to streamline and maximize collaboration between the 2 agencies. The following includes some suggested elements to the protocol: • Project designs should have sufficient detail to define the roles and responsibilities of UNDP and the incoming agency. This would include the naming of the lead agency and chair of a PMC who would be responsible for strategic decisions to meet the overall objectives of the project; • Joint activities involving interaction between UNDP and the incoming agency (such as UNEP) should be specifically defined in the UNDP project documents, and include the agency responsible for initiating the activity and the mode of communication between each agency. These activities should also be defined

[51] Available on: http://www.unep.org/gender/Portals/24117/Reports/Policy_and_Strategy_for_Gender_Equality_and_the_Environment.pdf

	in the project log-frame analysis and the Theory of Change to maximize the success of inter-agency collaboration; • Sufficient budgets and time resources should be allocated in the design to ensure functional interagency communication including funds for travel, teleconferencing, planning, preparations and debriefing meetings; • Project design activities need to include sufficient time for a UNDP project focal point who oversees and monitors incoming agency consultations with local stakeholders. Alternatively, this focal point could be an RTA or someone working under the RTA at one of UNDPs Regional Hubs provided these personnel can provide appropriate time for these tasks; • The UNDP focal point should monitor inter-agency consultations and outputs to ensure that information collection can be useful in developing a project document that meets the demands of the country. The focal point can then liaise with UNDP project designers or project personnel to ensure the information can be placed into a local context to meet the demands of the country; • A Project Manager managing a jointly implemented UNDP project with another agency (such as UNEP) should closely liaise with the focal point of the agency to coordinate the sequencing of project activities where appropriate knowledge products from the incoming agency (such as UNEP) are completed in a timely manner and in advance of critical project activities; • Project management or steering committee meetings for joint UNDP-UNEP (or other agencies) projects need to be conducted on an annual basis or more frequently, if required. The UNDP Project shall have sufficient budget for the UNDP focal point or designated project personnel to prepare, travel and attend these meetings with sufficient time to follow-up on actions items emanating from the meetings. Alternatively, RTAs or someone working under the RTA could attend these meetings on behalf of UNDP.
Responsibility: Time-frame:	UNDP Design phase for follow-on projects
Context:	Many of the CPs currently have insufficient capacity for SWH after sales support. Without continued support from government, regional partners and donors, there is a threat that energy benefits and GHG reductions from SWH installations may not be realized (Paras 67 and 141).
Recommendation #7	UNDP should address issues of after-sales support for low carbon technologies on current and future market transformation projects. Since UNDP is in the unique position of being well integrated with most country governments on development programs through the CPAP, UNDP should address this recommendation through meeting national associations that oversee the marketing and quality assurance of low carbon technologies (such as SWH equipment) and their installations. The purpose of initial meetings would be to gauge awareness of these associations of the need for sustained diligence on maintenance of such technologies, assessment of their capacities to address shortcomings, and required actions to assist these associations to provide sustained technical back-up support. Actions may include review of the certification process, proper staffing of certification bodies, training to improve surveillance of operating low carbon technologies, upgrading local repair skill sets to best practices, and implementing penalties for noncompliance. UNDP focal points or RTAs should be diligent in identifying the need for external assistance that may come from another agency (such as UNEP) or a reputable consultant (international or national).
Responsibility: Time-frame:	UNDP and the respective governments of the country programs Design phase for follow-on project
Context:	The GSWH project resulted in no improvement to the systematic lack of monitoring and data collection on baseline energy consumption for water heating. With acknowledgement that such data collection is difficult (Paras 66 and 141)
Recommendation #8:	UNDP need to make concerted efforts (as a follow-up to the GSWH project as well as other low carbon market transformation projects) to encourage governments to institutionalize the collection of baseline energy end use. In the experience of the

	Evaluators, baseline data collection and monitoring is often an overlooked activity or an activity that concerns governments and local stakeholders as being too costly or not useful. UNDP could alleviate these concerns through assistance in scoping baseline survey and monitoring programs that provide appropriate levels of confidence in data collection surveys, and within reasonable budgets and schedules. The existence of credible baseline information would improve the drivenness and quality of action plans to implement policies, formulate realistic strategic plans and obtain appropriate budgets for implementation. For example, on SWH technology, some countries are interested in and are undertaking preparation of SWH NAMAs where the framework for the collection of this data can follow the guidance provided by UNEP's "SWH Techscope GHG Reductions Calculator Tool" (an Excel-based evaluation tool) and "Guidebook for the Development of Nationally Appropriate Mitigation Action for Solar Water Heaters" under the section entitled "Methodology for measuring, reporting and verifying". One means of collecting this information would be through SWH suppliers who should be able to determine baseline energy sources that will be offset with the use of SWH equipment. The collection of this information could be a condition for accessing any incentives under an SWH NAMA. Governments will then need to be supportive in setting up an appropriate database on which to deposit baseline energy information and SWH installation details, which can then serve as a basis for national strategic action plans for SWH market transformation.
Responsibility: Time-frame:	UNDP and the respective governments of the country programs Design phase for follow-on project
Context:	The CP component of the GSWH Project does not strongly address issues related to gender inequalities, specific vulnerabilities of women and children to environmental degradation, and the role of women in mitigating or adapting to environmental changes or engaging in the SWH sector. This is likely related to the fact that this Project was designed as a GEF-3 Project, during which the emphasis on gender balance was not strong. In addition, the KM component had a strong technical focus, somewhat marginalizing gender issues related to awareness and technical training (Para 36).
Recommendation #9:	While this is likely being implemented, UNDP project designers and managers need to ensure UNDP Projects address gender balance commencing at the project design stages in line with UNDP's "UNDP Gender Equality Strategy 2014-17"[52]. At the design stage of low carbon market transformation projects, gender balance needs to be addressed, for example, in the role of women in the supply chain of low carbon technologies (from installation personnel to the ownership and operation of a business), and what measures that can be taken by the project to ensure more gender balance during implementation. These activities should be included in the project LF with SMART indicators to measure the impact of the project on gender balance where possible on project activities. In addition, the LF should also provide indicators on how the Project improves the quality of life and mitigates specific vulnerabilities of women and children.
Responsibility: Time-frame:	UNDP Design phase for follow-on project

4.2 Lessons Learned

145. The following is a summary of the main lessons that have been learned from some of the project's successes as well challenges:

Context:	Due to the lack of clear roles of UNEP and UNDP (as well as ICA) to meet the overall objectives of the GSWH Project, neither agency provided strategic leadership to meet the overall objectives of accelerating global commercialization of SWH technologies. Instead, the GSWH Project was implemented with UNDP CPs generating SWH implementation experience and lessons learned, and UNEP-DTIE synthesizing information from CPs and global experience to produce knowledge

[52] Available on: http://www.am.undp.org/content/dam/armenia/docs/GenderEqualityStrategy2014-17.pdf

	products posted on the global knowledge platform. The M&E plan of the Project did not provide an indicator to gauge the opinions of the users on the quality and usefulness of the KPs which would have revealed geographical regions where there were less website hits. By not gauging feedback mechanisms on its knowledge products, the Project lost the opportunity to improve the sharing of information on SWH markets and their development with participating countries and potential replication countries; to discuss common issues on a global platform (such as the absence of quality assurance and the poor quality of SWH equipment); and to effectively catalyze interest other countries into preparing SWH proposals (Para 140).
Lesson # 1:	Effective outreach is essential for project activities involving production and dissemination of knowledge products. Uptake of KPs cannot be expected to be organic but requires promotion as well as consultations with end-user stakeholders to determine what knowledge materials are required to maximize usage of the KPs, and to receive feedback from the end-users on the quality of the information as a means for further improvement of the KPs.
Application:	Design of market transformation projects
Context:	By May 2015, it became obvious to the implementing agency UNEP that DTIE's outreach to CPs was ineffective and not highly visible, leading to a lack of exposure of UNEP and its regional partners at the country level (Para 107). While the quality of the knowledge products from the KM component were of high quality, there were no feedback surveys conducted to gauge the opinions of the users on the usefulness of the document (Para 135).
Lesson # 2:	Future project management teams involving the production and dissemination of knowledge products must possess the necessary attributes of technical strength and strong project management skills combined with strong outreach and communication capacity; this will increase the likelihood of uptake of knowledge products. On the GSWH Project, the KM Component management team should have employed a Communications/ Outreach Officer along with the Project Manager or one Project Manager with a rare combination of strength in project management and technical knowledge along with strong outreach capabilities.
Application:	Implementation of market transformation projects
Context:	With regards to the SWH roster, CPs sourced their own national or international experts on state-of-the-art SWH information, notably during the early phases of all CPs. As such, the demand for a global SWH roster with national or international experts was not established with any of the CPs (Para 50). The use of unqualified technical experts or experts who cannot deliver global best practices on market transformation activities substantially raises the risk of a project not being properly implemented or not generating the planned benefits.
Lesson # 3:	GEF projects are an opportunity for program countries to access qualified experience professionals to provide specialized inputs into specific problems using best practices. Overcoming reluctance to use qualified personnel through a GEF project should be the task of UNDP RTAs (or UNEP-DTIE) who can play a stronger role in defining specific technical assistance to country offices, notably in countries where there is a lack of qualified technical personnel of that particular subject. Failure to do so places higher risks that a country program or project would not meet its objectives.
Application:	Implementation of market transformation projects
Context:	There was an absence of adaptive management on the KM component. Only 4 PMC meetings were held during the 6-year duration of the GSWH Project. Exacerbating this situation, CP personnel were not represented at the PMC meetings (Para 101) which would have provided valuable inputs into increasing uptake and effectiveness of the knowledge products.
Lesson #4:	To facilitate adaptive management, a project needs to have a lead agency,

	constitution of a Steering Committee or Project Management Committee that has broad representation of all major stakeholders on the project (including personnel at the project operational level), and PMC meetings on an annual basis or more frequently if required.
Application:	Implementation of market transformation projects

5 ANNEXES

ANNEX I. TERMS OF REFERENCE FOR THE EVALUATION[53]

Objective and Scope

I-1. The Terminal Evaluation is undertaken at completion of the project to assess project performance (in terms of relevance, effectiveness and efficiency), and determine outcomes and impacts (actual and potential) stemming from the project, including their sustainability. The evaluation has two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote operational improvement, learning and knowledge sharing through results and lessons learned among UNEP, UNDP, and other partners. As the evaluation is managed by the UNEP evaluation office it is conducted in line with the UNEP Evaluation Policy and the UNEP Programme Manual.

I-2. In addition to the UNEP executed Global Knowledge Management component the evaluation will assess the country programmes (Albania, Chile, India, Lebanon, Mexico, and Algeria as applicable) managed by UNDP. Thus, UNDP specific guidance on evaluations and programme policies (POPP) will be consulted if/when deemed necessary. The UNDP Evaluation Office will be consulted at different stages of evaluation to ensure alignment with the UNDP specific requirements. The GEF evaluation requirements are already integrated in the UNEP approach to evaluations.

I-3. This evaluation will also identify lessons of operational relevance for formulating and implementing on-going and future project. Particular attention will be paid to the cooperation of UNEP and UNDP.

Overall approach and methods

I-4. The Terminal Evaluation of the Project will be conducted by independent consultants under the overall responsibility and management of the UNEP Evaluation Office in consultation with the UNEP Task Manager and UNDP programme officers.

I-5. It will be an in-depth evaluation using a participatory approach whereby key stakeholders are kept informed and consulted throughout the evaluation process. As the project consists of a global component and national programmes as well as receives significant support from regional offices/partners, special attention will be paid in ensuring sufficient participation from all of these different levels. It is highly recommended that the consultants maintain close communication with the project teams at all levels and promotes information exchange throughout the evaluation implementation phase in order to increase stakeholders' ownership of the evaluation findings.

I-6. The Terminal evaluation will assess the overall project as it is described in the project document for "Global Solar Water Heating Market Transformation and Strengthening Initiative" (GSWH Initiative). Each country programme under GSWH Initiative (Albania, Chile, Lebanon and Mexico) will be assessed separately against the evaluation criteria specified in this TOR (see section 4). These country specific assessments will feed into the findings and conclusions of the overall project evaluation. The suggested structure for the evaluation report is presented in the Annex 2.

I-7. As the country programme of India under GSWH initiative has been evaluated in 2013, the evaluation team should utilize this existing evaluation as far as possible. If gaps are identified, additional data can be obtained as deemed necessary.

I-8. Both quantitative and qualitative evaluation methods will be used to determine project performance and achievements against the expected outputs, outcomes and impacts. The findings of the evaluation will be based on a desk review, interviews, evaluation visits to the participating countries.

Key evaluation principles

I-9. Evaluation findings and judgements should be based on sound evidence and analysis, clearly documented in the evaluation report. Information will be triangulated (i.e. verified from different sources) to the extent possible, and when verification was not possible, the single source will be mentioned. Analysis leading to evaluative judgements should always be clearly spelled out.

[53] Full TOR available on request at Evaluation Office of UN Environment

I-10. The evaluation will assess the overall project and the country programmes with respect to a minimum set of evaluation criteria grouped in five categories: (1) Strategic Relevance; (2) Attainment of objectives and planned result, which comprises the assessment of outputs achieved, effectiveness and likelihood of impact; (3) Sustainability and replication; (4) Efficiency; and (5) Factors and processes affecting project performance, including preparation and readiness, implementation and management, stakeholder participation and public awareness, country ownership and driven-ness, financial planning and management, supervision and backstopping, and project monitoring and evaluation. The evaluation consultants can propose other evaluation criteria as deemed appropriate.

I-11. The evaluation will apply the minimum set of evaluation criteria to assess country programmes. Overall project evaluation will draw conclusions also from the assessments of the country specific programmes. The focus will be in assessing UNEP's and UNDP's support and contribution to overall project performance.

I-12. Ratings. All evaluation criteria will be rated on a six-point scale. Annex 3 provides guidance on how the different criteria should be rated and how ratings should be aggregated for the different evaluation criterion categories. As the evaluation criteria will be applied to assess the overall project and country programmes, also the ratings will be provided accordingly. This will help the evaluation team to assess and summarize the overall performance of the project

I-13. Baselines and counterfactuals. In attempting to attribute any outcomes and impacts to the project intervention, the evaluators should consider the difference between what has happened with, and what would have happened without, the project. This implies that there should be consideration of the baseline conditions, trends and counterfactuals in relation to the intended outcomes and impacts. It also means that there should be plausible evidence to attribute such outcomes and impacts to the actions of the project. Sometimes, adequate information on baseline conditions, trends or counterfactuals is lacking. In such cases this should be clearly highlighted by the evaluators, along with any simplifying assumptions that were taken to enable the evaluator to make informed judgements about project performance.

I-14. The "Why?" Question. As this is a terminal evaluation and follow-up projects have been already initiated particular attention should be given to learning from the experience. Therefore, the "Why?" question should be at the front of the consultants' minds all through the evaluation exercise. This means that the consultants need to go beyond the assessment of "what" the project performance was, and make a serious effort to provide a deeper understanding of "why" the performance was as it was, i.e. of processes affecting attainment of project results (criteria under category F – see below). This should provide the basis for the lessons that can be drawn from the project. In fact, the usefulness of the evaluation will be determined to a large extent by the capacity of the consultants to explain "why things happened" as they happened and are likely to evolve in this or that direction, which goes well beyond the mere review of "where things stand" at the time of evaluation.

I-15. A key aim of the evaluation is to encourage reflection and learning by UNEP and UNDP staff and key project stakeholders. The consultants should consider how reflection and learning can be promoted, both through the evaluation process and in the communication of evaluation findings and key lessons.

I-16. Communicating evaluation results. Once the consultants have obtained evaluation findings, lessons and results, the Evaluation Office will share the findings and lessons with the key stakeholders. Evaluation results should be communicated to the key stakeholders in a brief and concise manner that encapsulates the evaluation exercise in its entirety. There may, however, be several intended audiences, each with different interests and preferences regarding the report. The Evaluation Manager will plan with the consultant(s), in collaboration with the implementing agencies, which audiences to target and the easiest and clearest way to communicate the key evaluation findings and lessons to them. This may include some or all of the following; a webinar, conference calls with relevant stakeholders, the preparation of an evaluation brief or interactive presentation.

Strategic relevance

I-17. The evaluation should assess the project's alignment/compliance with UNEP's and UNDP's policies and strategies. The evaluation should also provide a brief narrative of the following aspects (where applicable):

(a) *Alignment with the Bali Strategic Plan (BSP)*[54]. The outcomes and achievements of the project should be briefly discussed in relation to the objectives of the UNEP BSP.

(b) *Gender balance*. Ascertain to what extent project design, implementation and monitoring have taken into consideration: (i) possible gender inequalities in access to and the control over natural resources; (ii) specific vulnerabilities of women and children to environmental degradation or disasters; and (iii) the role of women in mitigating or adapting to environmental changes and engaging in environmental protection and rehabilitation. Are the intended results of the project

[54] http://www.unep.org/GC/GC23/documents/GC23-6-add-1.pdf

contributing to the realization of international GE (Gender Equality) norms and agreements as reflected in the relevant Gender Policies.

(c) *Human rights based approach (HRBA) and inclusion of indigenous peoples issues, needs and concerns*. Ascertain to what extent the project have applied the UN Common Understanding on HRBA. Ascertain if the project is in line with the UN Declaration on the Rights of Indigenous People, and have pursued the concept of free, prior and informed consent.

(d) *South-South Cooperation.* This is regarded as the exchange of resources, technology, and knowledge between developing countries. Briefly describe any aspects of the project that could be considered as examples of South-South Cooperation.

(e) *Safeguards*. Whether the project have adequately considered environmental, social and economic risks and established whether they were vigilantly monitored. Was the safeguard management instrument completed and were UNEP ESES and UNDP SES[55] requirements complied with?

I-18. The evaluation will assess the overall project relevance in relation to UNEP's mandate and its alignment with UNEP's policies and strategies at the time of project approval. UNEP's Medium Term Strategy (MTS) is a document that guides UNEP's programme planning over a four-year period. It identifies UNEP's thematic priorities, known as Sub-programmes (SP), and sets out the desired outcomes of the Sub-Programmes [known as Expected Accomplishments (EAs)]. The evaluation will assess whether the project make a tangible/plausible contribution to any of the EAs specified in the MTS 2010-2013 and 2014-2017. The magnitude and extent of any contributions and the causal linkages should be fully described.

I-19. The evaluation will assess the relevance of the country programmes in terms of UNDP strategic plan(s), United Nations Development Assistant Frameworks (UNDAFs), and other relevant strategic programming documents.

I-20. The evaluation will assess, in retrospect, whether the project objectives and implementation strategies as well as the project objectives were consistent with global, regional and national environmental issues and needs. The evaluation team needs to consider the context of each country programme and assess the relevance against national and regional programmes/strategies and global agendas (i.e. MDGs).

I-21. In addition the evaluation will assess, in retrospect, whether the project's objectives and implementation strategies were consistent with the GEF Climate Change focal area, strategic priorities and operational programme(s).

Achievement of Outputs

I-22. The evaluation will assess, for each component and country programme, the success in producing the programmed outputs (products and services delivered by the project itself) and milestones as per the UNEP and UNDP ProDocs and any modifications/revisions later on during project implementation, both in quantity and quality, as well as their usefulness and timeliness. It is recommended to use tables when presenting the findings in the evaluation report.

I-23. The evaluation will explain the reasons behind the success (or failure) of the project in producing its different outputs and meeting expected quality standards, cross-referencing as needed to more detailed explanations provided under Section F, which covers the processes and factors affecting attainment of project results in more details.

Effectiveness: Attainment of Objectives and Planned Results

I-24. The evaluation will assess the extent to which the project's objectives and planned results were effectively achieved or are expected to be achieved.

I-25. The evaluation will utilize **Theory of Change** (ToC) approach to depict the impact pathways of the project. The TOC depicts the causal pathways from outputs (goods and services delivered by the project) through outcomes (changes resulting from the use made by key stakeholders of project outputs) towards impact (long term changes in environmental benefits and living conditions). The ToC will also depict any intermediate changes required between project outcomes and impact, called 'intermediate states'. The ToC further defines the external factors that influence change along the major pathways; i.e. factors that affect whether one result can lead to the next. These external factors are either drivers (when the project has a certain level of control) or assumptions (when the project has no control). The ToC also clearly identifies the main stakeholders involved in the change processes.

[55] http://www.undp.org/content/dam/undp/library/corporate/Social-and-Environmental-Policies-and-Procedures/UNDPs-Social-and-Environmental-Standards-ENGLISH.pdf

I-26. As the project was developed at the time when ToC was not a requirement in the project design stage **the evaluation teams should reconstruct the ToC of the project during the evaluation inception phase.** As the project consists of several components and country programmes with distinctive contexts the evaluation team should consider whether each country programme requires its own TOC in addition to the overall project ToC. The ToC(s) will be developed based on a review of project documentation, logical frameworks, and stakeholder interviews. The evaluators will be expected to discuss the reconstructed TOC with the relevant stakeholders during evaluation missions and/or interviews in order to ascertain the causal pathways identified and the validity of impact drivers and assumptions described in the TOC. This exercise will also enable the consultant to address some of the key evaluation questions and make adjustments to the TOC as appropriate (the ToC of the intervention may have been modified / adapted from the original design during project implementation).

I-27. The assessment of effectiveness will be structured in three sub-sections:

(a) Evaluation of the **achievement of outcomes as defined in the reconstructed ToC**. These are the first-level outcomes expected to be achieved as an immediate result of project outputs. For this project, the main question will be to what extent the project has contributed to immediate outcomes.

(b) It is recommended to apply Review of Outcomes to Impacts (ROtI) approach[56] to assess of the **likelihood of impact**. The evaluation will assess to what extent the project has to date contributed, and is likely in the future to further contribute to identified intermediate states and the likelihood that those changes in turn to lead to positive changes in the natural resource base, benefits derived from the environment and human well-being. The evaluation will also consider the likelihood that the intervention may lead to unintended negative effects (project documentation relating to Environmental, Social and Economic Safeguards)

(c) Evaluation of the **achievement of the formal project overall objective, overall purpose, goals and outcomes** using the project's own results statements as presented in the Project Document[57]. This sub-section will refer back where applicable to the preceding sub-sections (a) and (b) to avoid repetition in the report. To measure achievement, the evaluation will use as much as appropriate the indicators for achievement proposed in the most recent and relevant Logical Framework (Logframe) of the project, adding other relevant indicators as appropriate. Briefly explain what factors affected the project's success in achieving its objectives, cross-referencing as needed to more detailed explanations provided under Section F. Most commonly, the overall objective is a higher level result to which the project is intended to contribute. The section will describe the actual or likely **contribution** of the project to the objective.

(d) The evaluation should, where possible, disaggregate outcomes and impacts for the key project stakeholders. It should also assess the extent to which Human rights (HR) and Gender Equity (GE) were integrated in the project's programming documents of the intervention and to what degree participating institutions/organizations changed their policies or practices thereby leading to the fulfillment of HR and GE principles (e.g. new services, greater responsiveness, resource re-allocation, etc.)

Sustainability and replication

I-28. Sustainability is understood as the probability of continued long-term project-derived results and impacts after the external project funding and assistance ends. The evaluation will identify and assess the key conditions or factors that are likely to undermine or contribute to the persistence of benefits. Some of these factors might be direct results of the project while others will include contextual circumstances or developments that are not under control of the project but that may condition the sustainability of benefits. The evaluation should ascertain to what extent follow-up work has been initiated and how project results will be sustained and enhanced over time. The reconstructed ToC will assist in the evaluation of sustainability, as the drivers and assumptions required to achieve higher-level results are often similar to the factors affecting sustainability of these changes. The evaluation will also take into account both demand and supply side measures and their effect on the sustainability of the global market demand for solar water heating.

I-29. The project and country programmes are at the different stages of implementation, as some of the programmes are still on going and some have been operationally closed for a significant period of time. The evaluators need to consider how to address the sustainability criteria in each case.

I-30. It is suggested to assess the following four aspects of sustainability:

(e) *Socio-political sustainability.* Are there any social or political factors that may influence positively or negatively the sustenance of project results and progress towards impacts? Are there sufficient government and other key stakeholder ownership, awareness, interests, commitment and incentives to support market transformation in solar water heating? Did the project or its country

[56] Guidance material on Theory of Change and the ROtI approach is available from the Evaluation Office.

[57] Or any subsequent **formally approved** revision of the project document or logical framework.

programmes conduct 'succession planning' or developed an 'exit strategy'? To what extent the project and programme activities, such as capacity building, supported sustainability of the aspects of the overall project?

(f) *Financial resources.* To what extent are the continuation of project and programme results and the eventual impact of the project dependent on financial resources? What is the likelihood that adequate financial resources[58] will be or have become available to use capacities built by the GSWH initiate and its country programmes? Are there any financial risks that may jeopardize sustenance of project and programme results and onward progress towards impact?

(g) *Institutional framework.* To what extent is the sustenance of the results and onward progress towards impact dependent on issues relating to institutional frameworks and governance especially in the country level (in Albania, Chile, India, Lebanon, and Mexico)? How robust are the institutional achievements such as governance structures and processes, policies, agreements, legal and accountability frameworks required to sustaining project results and to lead those to impact on human behaviour and environmental resources, goods or services?

(h) *Environmental sustainability.* Are there any environmental factors, positive or negative, that can influence the future flow of project and country programme benefits, especially in the country level? Are there any project outputs or higher level results that are likely to affect the environment, which, in turn, might affect sustainability of project benefits? Are there any foreseeable negative environmental impacts that may occur as the project and programme results are being up-scaled?

I-31. **Catalytic role and replication**. In UNEP evaluations the *catalytic role of interventions* is addressed in terms of UNEP's approach of supporting the creation of an enabling environment and of investing in pilot activities which are innovative and showing how new approaches can work. In this evaluation the catalytic role of the UNEP and UNDP will be assessed in terms of support activities that enable up-scaling new approaches introduced by the project at the national, regional or global level. The evaluation will assess the catalytic role played by UNEP and UNDP, namely to what extent these have:

(a) *catalyzed behavioural changes* in terms of use and application of new SWH related technologies and knowledge, by the relevant stakeholders;

(b) provided *incentives* (social, economic, market based, and competencies) to contribute to catalyzing changes in stakeholder behaviour;

(c) ©contributed to *institutional changes* that would support uptake of project-demonstrated SWH technologies, practices, or management approaches, ;

(d) contributed to *policy changes* that support SWH market transformation (on paper and in implementation of policy);

(e) contributed to sustained follow-on financing (*catalytic financing*) from Governments, private sector, donors etc.;

(f) created opportunities for particular individuals or institutions ("*champions*") to catalyze change (without which the project would not have achieved all of its results).

I-32. *Replication* is defined as lessons and experiences coming out of the project that are replicated (experiences are repeated and lessons applied in additional geographic areas) or scaled up (experiences are repeated and lessons applied in the same geographic area but on a much larger scale and funded by other sources). The evaluation will assess the strategy and approach adopted by the project and its components to promote replication effects and determine to what extent actual replication has already occurred, or is likely to occur in the near future. The evaluation will look in what extent the SWH related technologies promoted by the project are or are expected to be applied in countries beyond the directly participating countries. The evaluation will also assess to what extent the SWH specific lessons on replication could transfer to other technologies.

I-33. The evaluation will pay attention to the factors influencing the replication and scaling of the project and country programme lessons in different country and regional contexts. Special attention will be paid to the role of the Global Knowledge Management component in terms of promotion of lessons and experiences in a wider scale.

Efficiency

I-34. The evaluation will assess the cost-effectiveness and timeliness of project execution. It will describe any cost- or time-saving measures put in place by UNEP and UNDP in attempting to bring the project as far as possible in achieving its results within its budget and timeframe(s). It will also analyse how delays have affected project execution, costs and effectiveness. Attention will be paid to the different timeframes of different components and country programmes and assess whether this affected the project efficiency overall or in country level.

[58] Those resources can be from multiple sources, such as the national budget, public and private sectors, development assistance etc.

I-35. Wherever possible, costs and time over results ratios of the project will be compared with that of other similar interventions. The evaluation will also assess the extent to which HR and GE were allocated specific and adequate budget in relation to the results achieved.

I-36. The evaluation will give special attention to efforts by the project teams to make use of/build upon pre-existing institutions, agreements and partnerships, data sources, synergies and complementarities with other initiatives, programmes and projects to increase project efficiency.

Factors and processes affecting project performance

I-37. Performance of the project and its country programme will be assessed in reflection to the following factors and processes.

I-38. **Preparation and readiness**. This criterion focuses on the quality of project design and preparation. Were project stakeholders[59] adequately identified and were they sufficiently involved in project development? Were the project's objectives and components clear, practicable and feasible within its timeframe? Are potentially negative environmental, economic and social impacts of projects identified? Were the capacities of executing agencies properly considered when the project was designed? Was the project document clear and realistic to enable effective and efficient implementation? Were the partnership arrangements properly identified and the roles and responsibilities negotiated prior to project implementation? Were counterpart resources (funding, staff, and facilities) and enabling legislation assured? Were adequate project management arrangements in place?

I-39. This evaluation will especially pay attention to what extent were the lessons from other relevant projects incorporated in the project design? How the lessons from previous GEF funded SWH projects were taken into account? What factors influenced the quality-at-entry of the project design, choice of partners, allocation of financial resources etc.? Was there any design weaknesses mentioned in the Project Review Committee/Project Appraisal Committee minutes at the time of project approval adequately addressed?

I-40. **Project implementation and management**. This includes an analysis of implementation approaches used by the project and its country programmes. The evaluation will pay attention to the implementation arrangements between UNEP and UNDP. This section assesses management frameworks, adaptation to changing conditions and responses to changing risks including safeguard issues (adaptive management), relevance of changes in project design, and overall performance of project management. Special attention should be paid to the jointly implemented by UNEP and UNDP.

I-41. The evaluation will:

(a) Ascertain to what extent the project implementation mechanisms outlined in the project document have been followed and were effective in delivering project milestones, outputs and outcomes. Were pertinent adaptations made to the approaches originally proposed?
(b) Evaluate the effectiveness and efficiency of project management and how well the management was able to adapt to changes during the life of the project.
(c) ©Assess the role and performance of the teams and working groups established and the project execution arrangements at all levels.
(d) Assess the extent to which project management responded to direction and guidance provided by the UNEP Task Manager, UNDP programme officers, and project steering bodies.
(e) Identify operational and political / institutional problems and constraints that influenced the effective implementation of the project, and how the project tried to overcome these problems.

I-42. **Cooperation, partnerships and stakeholder participation.** The Evaluation will assess the effectiveness of mechanisms for information sharing and cooperation between UNEP and UNDP and draw lessons learned for future UNEP-UNDP-initiatives. Equally the evaluation will look at the cooperation and exchange between the different project components and country programmes during the project implementation as well as the cooperation with other UNEP and UNDP initiatives, and external stakeholders and partners.

I-43. The term stakeholder should be considered in the broadest sense, encompassing both project partners and target users of project products. The TOC and stakeholder analysis should assist the evaluators in identifying the key stakeholders and their respective roles, capabilities and motivations in each step of the causal pathways from activities to achievement of outputs, outcomes and intermediate states towards impact. The assessment will look at three related and often overlapping processes: (1) information dissemination to and between stakeholders, (2) consultation with and between stakeholders, and (3) active engagement of stakeholders in project decision making and activities.

[59] Stakeholders are the individuals, groups, institutions, or other bodies that have an interest or 'stake' in the outcome of the project. The term also applies to those potentially adversely affected by the project.

I-44. The following aspects will be considered by the evaluators in terms of the overall project and the country programmes separately:

(a) the approach(es) and mechanisms used to identify and engage stakeholders (outside UNEP and UNDP core teams) in project design and at critical stages of project implementation. What were the strengths and weaknesses of these approaches with respect to the project's objectives and the stakeholders' motivations and capacities?
(b) How was the overall collaboration between different functional units of UNEP and UNDP involved in the project? What coordination mechanisms were in place? Were the incentives for internal collaboration adequate?
(c) Was the level of involvement of the regional offices in project design, planning, decision-making and implementation of activities appropriate?
(d) Has the project made full use of opportunities for collaboration with other projects and programmes including opportunities not mentioned in the Project Document? Have complementarities been sought, synergies been optimized and duplications avoided?
(e) What was the achieved degree and effectiveness of collaboration and interactions between the various project partners and stakeholders during design and implementation of the project? This should be disaggregated for the main stakeholder groups identified in the inception report.
(f) To what extent has the project been able to take up opportunities for joint activities, pooling of resources and mutual learning with other organizations and networks?
(g) How did the relationship between the project and the collaborating partners (institutions and individual experts) develop? Which benefits stemmed from their involvement for project performance, for UNEP, UNDP and for the stakeholders and partners themselves? Do the results of the project (strategic programmes and plans, monitoring and management systems, sub-regional agreements etc.) promote participation of stakeholders, including users, in environmental decision making?

I-45. **Communication and public awareness**. The evaluation will assess the effectiveness of any public awareness activities that were undertaken during the course of implementation of the project and country programmes to communicate the project's objective, progress, outcomes and lessons to relevant audiences. Did the project identify and make us of existing communication channels and networks used by key stakeholders? Did the project provide feedback channels?

I-46. **Country ownership and driven-ness.** The evaluation will assess the degree and effectiveness of involvement of governments and public sector agencies in the project implementation, in particular in those countries that were participating in the execution of GSWH country programmes. The evaluation will assess to what extent have Governments assumed responsibility for the country programmes and provided adequate support to project execution. In addition the actions of Global Knowledge Management component and country programmes will be assessed in terms of stimulation and encouragement of country ownership.

I-47. **Financial planning and management**. Evaluation of financial planning requires assessment of the quality and effectiveness of financial planning and control of financial resources throughout the project's lifetime. The assessment will look at actual project costs by activities compared to budget (variances), financial management (including disbursement issues), and co-financing at the level of project components and country programmes. The evaluation will assess each component and country programme in terms of following aspects:

(a) Verify the application of proper standards (clarity, transparency, audit etc.) and timeliness of financial planning, management and reporting to ensure that sufficient and timely financial resources were available to the project and its partners;
(b) Assess other administrative processes such as recruitment of staff, procurement of goods and services (including consultants), preparation and negotiation of cooperation agreements etc. to the extent that these might have influenced project performance;
(c) Present the extent to which co-financing has materialized as expected at project approval (see Table 1). Report country co-financing to the project overall, and to support project activities at the national level in particular. The evaluation will provide a breakdown of final actual costs and co-financing for the different project components (see tables in Annex 4).
(d) Describe the resources the project has leveraged since inception and indicate how these resources are contributing to the project's ultimate objective. Leveraged resources are additional resources—beyond those committed to the project itself at the time of approval—that are mobilized later as a direct result of the project. Leveraged resources can be financial or in-kind and they may be from other donors, NGO's, foundations, governments, communities or the private sector.

I-48. Analyse the effects on project performance of any irregularities in procurement, use of financial resources and human resource management, and the measures taken UNEP and UNDP to prevent such irregularities in the future. Determine whether the measures taken were adequate.

I-49. **Supervision, guidance and technical backstopping.** The purpose of supervision is to verify the quality and timeliness of project execution in terms of finances, administration and achievement of outputs and outcomes, in order to identify and recommend ways to deal with problems which arise during project execution. Such problems may be related to project management but may also involve technical/institutional substantive issues in which UNEP or UNDP has a major contribution to make.

I-50. The evaluators should assess the effectiveness of supervision, guidance and technical support provided by the different supervising/supporting bodies including:

(a) The adequacy of project supervision plans, inputs and processes;
(b) The realism and candour of project reporting and the emphasis given to outcome monitoring (results-based project management);
(c) How well did the different guidance and backstopping bodies play their role and how well did the guidance and backstopping mechanisms work? What were the strengths in guidance and backstopping and what were the limiting factors?

I-51. **Monitoring and evaluation**. The evaluation will include an assessment of the quality, application and effectiveness of monitoring and evaluation plans and tools applied at different levels of the project taking into account the implementing arrangements between UNEP and UNDP. The evaluation will assess the overall project M&E system as well as the country programme specific arrangements. This includes an assessment of risk management based on the assumptions and risks identified in the project document. The evaluation will assess how information generated by the M&E system during project and country programme implementation was used to adapt and improve project execution, achievement of outcomes and ensuring sustainability. M&E is assessed on three levels:

(a) *M&E Design*. The evaluators should use the following questions to help assess the M&E design aspects:
- Arrangements for monitoring: Did the project have a sound M&E plan to monitor results and track progress towards achieving project objectives? Have the responsibilities for M&E activities been clearly defined? Were the data sources and data collection instruments appropriate? Was the time frame for various M&E activities specified? Was the frequency of various monitoring activities specified and adequate?
- How well was the project logical framework (original and possible updates) designed as a planning and monitoring instrument?
- SMART-ness of indicators: Are there specific indicators in the logframe for each of the project objectives? Are the indicators measurable, attainable (realistic) and relevant to the objectives? Are the indicators time-bound?
- Adequacy of baseline information: To what extent has baseline information on performance indicators been collected and presented in a clear manner? Was the methodology for the baseline data collection explicit and reliable? For instance, was there adequate baseline information on pre-existing accessible information on global and regional environmental status and trends, and on the costs and benefits of different policy options for the different target audiences? Was there sufficient information about the assessment capacity of collaborating institutions and experts etc. to determine their training and technical support needs?
- To what extent did the project engage key stakeholders in the design and implementation of monitoring? Which stakeholders (from groups identified in the inception report) were involved? If any stakeholders were excluded, what was the reason for this? Was sufficient information collected on specific indicators to measure progress on HR and GE (including sex-disaggregated data)?
- Did the project appropriately plan to monitor risks associated with Environmental, Economic and Social Safeguards?
- Arrangements for evaluation: Have specific targets been specified for project outputs? Has the desired level of achievement been specified for all indicators of objectives and outcomes? Were there adequate provisions in the legal instruments binding project partners to fully collaborate in evaluations?
- Budgeting and funding for M&E activities: Determine whether support for M&E was budgeted adequately and was funded in a timely fashion during implementation.

(b) *M&E Plan Implementation*. The evaluation will verify that:
- the M&E system was operational and facilitated timely tracking of results and progress towards project objectives throughout the project implementation period;
- PIR reports were prepared (the realism of the Task Manager's assessments will be reviewed)
- Half-yearly Progress & Financial Reports were complete and accurate;
- Risk monitoring (including safeguard issues) was regularly documented
- the information provided by the M&E system was used during the project to improve project performance and to adapt to changing needs.

- the country programme specific M&E requirements were fulfilled

The Consultants' Team

I-52. For this evaluation, the evaluation team will consist of a Team Leader and two Supporting Consultants. Details about the required background, specific roles and responsibilities of the team members are presented in Annex 1 of these TORs. The Team Leader should have extensive evaluation experience, including of large, regional or global programmes and using a diversity of evaluation approaches; and a broad understanding of large-scale, consultative assessment processes and factors influencing use of assessments and/or scientific research for decision-making. The supporting consultants should have suitable educational background and adequate professional experience in the field of renewable energy; adequate monitoring and evaluation experience; and experience in managing partnerships, knowledge management and communication.

I-53. The Team Leader will coordinate the evaluation process and preparation of the main evaluation report (see annex 2 for the suggested content), with substantive contributions by the supporting consultants. The evaluation team, with the lead of the Team Leader, will develop the evaluation approach, and a plan for data collection and analysis. The consultants will ensure together that all evaluation criteria and questions are adequately covered. The actual data collection, analysis and report writing concerning the evaluation of different components is suggested to follow the below work division:

- Team Leader: Overall project evaluation (including the Global Knowledge Management Component), main author of the evaluation report with substantive inputs from the supporting consultants
- Supporting Consultant 1: Assessment of the Country Programmes of Mexico and Chile with substantive inputs to the main evaluation report.
- Supporting Consultant 2: Assessment of the Country Programmes of Lebanon and Albania with substantive inputs to the main evaluation report.

I-54. By undersigning the service contract with UNEP/UNON, the consultants certify that they have not been associated with the design and implementation of the project in any way which may jeopardize their independence and impartiality towards project achievements and project partner performance. In addition, they will not have any future interests (within six months after completion of the contract) with the project's executing or implementing units.

Evaluation Deliverables and Review Procedures

I-55. The evaluation team will prepare an **inception report** (see Annex 2(a) of TORs for Inception Report outline) containing a thorough review of the project context, project design quality, a draft reconstructed Theory of Change of the project, the evaluation framework and a tentative evaluation schedule.

I-56. It is expected that a large portion of the desk review will be conducted during the inception phase. It will be important to acquire a good understanding of the project context, design and process at this stage. The review of design quality of the project components and each country programme will cover the following aspects:

- Strategic relevance of the project and its components
- Preparation and readiness;
- Financial planning;
- M&E design;
- Complementarity with relevant strategies and programmes;
- Sustainability considerations and measures planned to promote replication and up-scaling.

I-57. The project design of the overall project (as per ProDoc) will be assessed following the UNEP project design assessment guidelines (see Annex 7 for the detailed project design assessment matrix).

I-58. The inception report will present a draft, desk-based **reconstructed Theory of Change** (ToC) of the project and its country programmes. It is vital to reconstruct the ToC *before* most of the data collection (review of progress reports, in-depth interviews, surveys etc.) is done, because the ToC will define which direct outcomes, drivers and assumptions of the project need to be assessed and measured – based on which indicators – to allow adequate data collection for the evaluation of project effectiveness, likelihood of impact and sustainability.

I-59. The inception report will also include a stakeholder analysis identifying key stakeholders, networks and channels of communication. This information should be gathered from the Project document and discussion with the project team.

I-60. The evaluation framework will present in further detail the overall evaluation approach. It will specify for each evaluation question under the various criteria what the respective indicators and data sources will be. The evaluation framework should summarize the information available from project documentation against each of

the main evaluation parameters. Any gaps in information should be identified and methods for additional data collection, verification and analysis should be specified. Evaluations/reviews of other large assessments can provide ideas about the most appropriate evaluation methods to be used.

I-61. Effective communication strategies help stakeholders understand the results and use the information for organisational learning and improvement. While the evaluation is expected to result in a comprehensive document, content is not always best shared in a long and detailed report; this is best presented in a synthesised form using any of a variety of creative and innovative methods. The evaluator is encouraged to make use of multimedia formats in the gathering of information eg. video, photos, sound recordings. Together with the full report, the evaluator will be expected to produce a 2-page summary of key findings and lessons. A template for this has been provided in Annex 10.

I-62. The inception report will also present a tentative schedule for the overall evaluation process, including a draft programme for the country visit and tentative list of people/institutions to be interviewed.

I-63. The inception report will be submitted for review and approval by the Evaluation Office before the any further data collection and analysis is undertaken.

I-64. When data collection and analysis has almost been completed, the team leader will prepare a short **note on preliminary findings and recommendations concerning the Project** for discussion with the project team. The purpose of the note is to allow the evaluation team to receive guidance on the relevance and validity of the main findings emerging from the evaluation.

I-65. **The main evaluation report** should be written to the point in plain English. The report will follow the annotated Table of Contents outlined in Annex 2. **Changes to this outline need to be discussed and agreed with the UNEP Evaluation Office.** The report must explain the purpose of the evaluation, exactly what was evaluated and the methods used (with their limitations). The report will present evidence-based and balanced findings, consequent conclusions, lessons and recommendations, which will be cross-referenced to each other. The report should be presented in a way that makes the information accessible and comprehensible. Any dissident views in response to evaluation findings will be appended in footnote or annex as appropriate. To avoid repetitions in the report, the authors will use numbered paragraphs and make cross-references where possible.

I-66. **Review of the draft evaluation report**. The evaluation team will submit a zero draft report, covering the assessments of overall project and country programmes, to the **UNEP Evaluation Office** and revise the draft following the comments and suggestions made by the EO. The UNEP EO will consult the UNDP evaluation office as deemed necessary. Once a draft of adequate quality has been accepted, the EO will share this first draft report with the UNEP Task Manager and UNDP Programme Officers, who will alert the EO in case the report would contain any factual errors. The Evaluation Office will then forward the first draft report to the other project stakeholders, in particular regional partners (identified in the beginning of the TOR) for their review and comments. Stakeholders may provide feedback on any errors of fact and may highlight the significance of such errors in any conclusions. It is also very important that stakeholders provide feedback on the proposed recommendations and lessons. Comments would be expected within two weeks after the draft report has been shared. Any comments or responses to the draft report will be sent to the UNEP EO for collation. The EO will provide the comments to the evaluation team for consideration in preparing the final draft report, along with its own views.

I-67. The evaluation team will submit the final draft report no later than 2 weeks after reception of stakeholder comments. The project team will prepare a **response to comments**, listing those comments not or only partially accepted by them that could therefore not or only partially be accommodated in the final report. They will explain why those comments have not or only partially been accepted, providing evidence as required. This response to comments will be shared by the EO with the interested stakeholders to ensure full transparency.

I-68. **Submission of the final evaluation report.** The final report shall be submitted by Email to the Head of the UNEP Evaluation Office. The Evaluation Office will finalize the report and share it with the interested Divisions and Sub-programme Coordinators in UNEP and in UNDP. The final evaluation report will be published on the UNEP Evaluation Office web-site www.unep.org/eou.

I-69. As per usual practice, the UNEP EO will prepare a **quality assessment** of the zero draft and final draft report, which is a tool for providing structured feedback to the evaluation consultants. The quality of the report will be assessed and rated against the criteria specified in Annex 3.

I-70. The UNEP Evaluation Office will assess the ratings in the final evaluation report based on a careful review of the evidence collated by the evaluation consultants and the internal consistency of the report. Where there are differences of opinion between the evaluator and UNEP Evaluation Office on project ratings, both viewpoints will

be clearly presented in the final report. The UNEP Evaluation Office ratings will be considered the final ratings for the project.

I-71. At the end of the evaluation process, the Evaluation Office will prepare a Recommendations Implementation Plan in the format of a table to be completed and updated at regular intervals by the Task Manager at UNEP. After reception of the Recommendations Implementation Plan, the UNEP Task Manager is expected to complete it and return it to the EO within one month. S/he is expected to update the plan every six month until the end of the tracking period. As this is a Terminal Evaluation, the tracking period for UNEP's part will be 18 months, unless it is agreed to make this period shorter or longer as required for realistic implementation of all evaluation recommendations. Tracking points will be every six months after completion of the implementation plan. Likewise the UNDP counterparts will address the recommendations concerning their respective areas/countries and prepare a management respond and an action plan as per UNDP accountability mechanism for evaluation follow-up. The UNDP management respond action plan will be tracked as per the UNDP requirements and progress recorded in the Evaluation Resource Centre (online-platform).

Logistical arrangements

I-72. This Terminal Evaluation will be undertaken by three independent evaluation consultants contracted by the UNEP Evaluation Office. The consultants will work under the overall responsibility of the UNEP Evaluation Office and will consult with the EO on any procedural and methodological matters related to the evaluation. It is, however, the consultants' individual responsibility to arrange for their travel, visa, obtain documentary evidence, plan meetings with stakeholders, organize online surveys, and any other logistical matters related to the assignment.

I-73. The UNEP Task Manager and project teams in Paris and programme countries will, where possible, provide logistical support (introductions, meetings etc.) allowing the consultants to conduct the evaluation as efficiently and independently as possible.

Schedule of the evaluation

I-74. Table 7 below presents the tentative schedule for the evaluation. The schedule will be discussed with key stakeholders and adapted as deemed necessary.

Table I-1: Tentative schedule for the evaluation

Milestone[60]	Deadline
Inception Mission – Paris / Conference call[61]	February 19, 2016
Initial desk review/Inception Report	February 29, 2016
Evaluation Mission – 6 days, Lebanon and Albania	March 31, 2016
Evaluation Mission – 6 days, Paris and Brussels	March 31, 2016
Evaluation Mission – 7 days, Chile and Mexico	March 31, 2016
Telephone interviews, surveys etc.	April 15, 2016
Preliminary findings	April 22, 2016
Zero draft report	April 30, 2016
Draft Report shared with UNEP Task Manager and UNDP Programme Officers	May 15, 2016
Revised Draft Report shared with other stakeholders	May 29, 2016
Final Report	June 15, 2016

[60] Days required for missions will depend on the travel time and locations of the consultants
[61] Due to relocation of UNEP Paris office in January and February the inception mission to Paris might not be feasible

ANNEX II. EVALUATION PROGRAM[62]

Date	Persons Met	Function	Topic of Discussion	Means of Contact
21 March 2016	Dr. S.N. Srinivas	Programme Officer (Energy for Development), UNDP India	KM component interaction with India CP	Skype
21 April 2016	Ms Ruth Cuotto Mr. Amr Abdelhai Mr. Geordie Colville	DTIE Task Manager for GSWH Former UNEP GSWH PM Former UNDP RTA involved with GSWH (now with UNEP)	Orientation to UNEP KM component	Skype
2 May 2016	Mr. Amr Abdelhai	Former UNEP GSWH Project Manager	History and current status of UNEP KM component	Meeting in UNEP Office in Paris
3 May 2016	Mr. Mark Radka Ms Ruth Cuotto Mr. Amr Abdelhai Mr. Julien Lheureux	DTIE Bureau Chief DTIE Task Manager for GSWH Former UNEP GSWH PM UNEP Consultant	Project implementation	Meeting in UNEP Office in Paris
4 May 2016	Mr. Nigel Cotton Mr. Francesco Gattiglio	Director, European Copper Institute Association Manager, Kellen	ICA role on GSWH Project	Meeting at ICA offices in Brussels
6 May 2016	Mr. Mark Radka Ms Ruth Cuotto Mr. Amr Abdelhai Mr. Julien Lheureux Dr. Zitouni Ould-Dada Mr. Patrick Blake	DTIE Bureau Chief DTIE Task Manager for GSWH Former UNEP GSWH PM UNEP Consultant Head of Technology Unit, DTIE Consultant and Policy Expert or United for Efficiency (U4E)	Project implementation	Meeting in UNEP Office in Paris
20 May 2016	Dr. Ashraf Kraidy	RCREEE SHC Executive Committee Member in Cairo	RCREEE role on KM component	Skype
20 May 2016	Ms. Myriem Touhami	Former GSWH Project Designer for UNEP in Morocco	GSWH Project design	Skype
24 May 2016	Mr. Marcel Alers	Head of Energy, UNDP-GEF, New York	UNDP interactions with UNEP on KM component	Skype
May 26, 2016	Mr. Alejandro Espin	OLADE Executive Director	OLADE role on KM component	Skype
June 3, 2016	Mr. Pedro Dias	ESTIF Secretary General	ESTIF role on KM component	Skype
June 21, 2016	Mr. Wayne Archibald	University of Virgin Islands	UVI role on KM component	Skype
June 26, 2016	Ms Ruth Cuotto Mr. Marcel Alers Mr. Amr Abdelhai Mr. Julien Lheureux Mr. Geordie Colville	DTIE Task Manager for GSWH Head of Energy, UNDP-GEF, New York Former UNEP GSWH PM UNEP Consultant Former UNDP RTA involved with GSWH (now with UNEP)	GSWH evaluation preliminary findings	Skype

[62] Country programme (CP) specific stakeholders interviews are listed in the respective CP evaluation reports.

ANNEX III. BIBLIOGRAPHY[63]

1. UNEP GSWH Project Document of July 2008;
2. UNEP GSWH Mid-Term Evaluation, December 2013;
3. UNEP GSWH PIRs 2010-2015;
4. UNEP GSWH Half-Yearly Progress Reports July 2009 to December 2015;
5. UNEP GSWH Project Revisions from February 2011 to December 2014;
6. Minutes from 4 PMC meetings from 2010 to 2014;
7. UNDP MTE Report for Albania SWH, October 2012;
8. UNDP TE (draft) Report for Albania SWH, 2016;
9. UNDP MTE Report for Chile SWH, September 2012;
10. UNDP TE (draft) Report for Chile SWH, 2016;
11. UNDP TE Report for India SWH, June 2013;
12. UNDP MTE Report for Lebanon SWH, October 2011;
13. UNDP TE (draft) Report for Lebanon SWH, 2016;
14. UNDP MTE Report for Mexico SWH, February 2013;
15. UNDP TE (draft) Report for Mexico SWH, 2016;
16. All UNEP GSWH knowledge products and tools from: http://www.solarthermalworld.org/taxonomy/term/53161;
17. UNEP Bali Strategic Plan for Technology Support and Capacity Building, December 2004;
18. UNEP Biennial Programme of Work 2016-17, April 4, 2014.

[63] Country programme (CP) specific documents reviewed are listed in the respective CP evaluation reports.

ANNEX IV. PROJECT COSTS AND CO-FINANCING TABLES

Table IV-1: GSWH Project Costs[64]

Component within Outcome 1	Budget (from Project Document)	2009[65]	2010	2011	2012	2013	2014	2015[66]	Actual Cost	Remainder for Project	Expenditure Ratio (actual/ planned)
Global outreach (outreach workshops) and establishment of KM repository	**555,000**	65,000	57,550	56,600	52,600	51,500	10,000	10,000	**303,250**		0.55
Generation of knowledge products and technical backstopping services	**1,375,000**	51,600	107,750	136,300	172,552	215,500	288,560	416,321	**1,388,583**		1.01
Knowledge dissemination and engaging additional countries	**630,000**		17,500	25,000	29,200	25,400	26,000	240,300	**363,400**		0.58
Project Management Unit	**800,000**	97,738	127,777	142,582	145,288	156,351	161,417	163,900	**995,053**		1.24
Monitoring and Evaluation	**150,000**	0	0	0	0	31,975	0	78,000	**109,975**		0.73
Miscellaneous , Equipment and Premises components: (Office rent, Reporting costs, Operation of equipment, communication, postage and freight)	**240,000**	0	0	205	0	319	0	0	**524**		0.00
Total (Actual)	**3,750,000**	**214,338**	**310,577**	**360,687**	**399,640**	**481,045**	**485,977**	**908,521**	**3,160,785**	**589,215**	**0.84**
Total (Cumulative Actual)		214,338	524,915	885,602	1,285,242	1,766,287	2,252,264	3,160,785			

Table IV-2: GSWH Project Costs (Component 1 only)

[64] Cost monitoring in UNEP was not setup to monitor the various components within Outcome 1, and thus, Project expenditures within these components from 2009 to 2015 were estimated.
[65] From May 2009
[66] Up to December 31, 2015

Co-financing (type/source)	UNEP own financing (million USD)		Government (million USD)		Partner Agency (million USD)		Private Sector (million USD)		Total (million USD)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Grants					1,200,000	1,202,000[67]			1,200,000	1,202,000
Loans									0	0
Credits										
Equity Investments										
In-kind support	370,000	279,000[68]			400,000	309,000[69]			770,000	588,000
Other[70]									0	0
Totals	370,000	279,000	0	0	1,600,000	1,511,000	0	0	1,970,000	1,790,000

[67] From ICA
[68] From UNEP-DTIE
[69] From regional partners of project including RCREEE, OLADE, ESTIF, UVI and OME
[70] Mobilized funds for the GSWH Project from multilateral agencies, bilateral development cooperation agencies, NGOs, the private sector and beneficiaries

Table IV-3: Aggregate rating provided based on an average of the various component ratings listed in the table below.

Financial management components			Rating	Evidence/ Comments
Attention paid to compliance with procurement rules and regulations			S	
Contact/communication between the PM & FMO			S	
PM & FMO knowledge of the project financials			S	
FMO responsiveness to financial requests			U	EO: Official financial statement was requested but not received.
PM & FMO responsiveness to addressing and resolving financial issues			S	
Were the following documents provided to the evaluator:				
	A.	An up to date co-financing table	Y	
	B.	A summary report on the projects financial management and expenditures during the life of the project - to date	Y	
	C.	A summary of financial revisions made to the project and their purpose	Y	
	D.	Copies of any completed audits	N	
Availability of project financial reports and audits			U	EO: Official financial statement was but not received.
Timeliness of project financial reports and audits			S	
Quality of project financial reports and audits			MS	Financial reports were not setup to monitor expenditures of components or activities within components
FMO knowledge of partner financial requirements and procedures			S	
Overall rating			**MS**	

ANNEX V. EXECUTIVE SUMMARY OF ALBANIA COUNTRY PROGRAMME EVALUATION

Country Programme Background

V-1. Albania is a small Mediterranean country (covering a total area of 28,748 km^2 and with a population of 2.89 Million in 2016[71]), benefiting form a generous amount of sunshine (average solar radiation: 1460 Kwh/m^2 per year[72]). Until 1990, its domestic hydropower generation met over 90% of the country's electricity demand. However, with the likelihood of climate change having an adverse effect on hydropower in the future, it is expected that the average electricity output from Albania's hydropower plants will be reduced by as much as 15%.

V-2. The country is also experiencing a growing electricity demand-supply imbalance which is mainly due to the growth of the residential and commercial sectors which represent over 60% of the total energy demand and 62% of the electricity demand. The deficit from this imbalance, a trend that was accentuated by low electricity prices and poor discipline in paying electricity bills, was tentatively addressed by the Government through electricity imports and the planning of fossil fuel power plant construction. In 1999, the "non-technical losses", occurring as a result of electricity taken from the network by means of illegal connections to the network, more generally amounting to unpaid electricity, hit the 50% mark of the total amount of electricity produced. The 50% mark was reduced to 38% in 2002 and it is presently being further reduced thanks to very strict measures taken by the Ministry of Energy and Industry (MEI) and by the Group of Donors in co-operation with KESH, the local utility provider. The government is currently engaged in the process of implementing programmes aiming at raising the price of electricity and at enforcing electricity bill payment discipline on the one hand while at the same time aiming at improving energy savings and renewable energy opportunities.

V-3. Electric boilers take care of over 70% of the domestic hot water needs of the country's household and service sector. According to studies conducted as a part of the National Energy Strategy preparation (2002) and which followed baseline development trends, demand for hot water in Albania is projected to reflect, in the residential sector alone, a growth in consumption from 600 GWh in 2000 to 875 GWh in 2015.

V-4. The market review conducted in early 2006 identified 6 Albanian companies that supply solar thermal equipment. Three out of these six companies were assembling the SWH systems themselves by relying on Greek (2) or Turkish (1) technology while the other three companies were relying on equipment that is imported, with, as matters stood in the early 2006, Greece, Italy, Germany and Austria as the main countries of origin. SWH systems have also been imported by on an individual purchase basis. With regard to the technology used, the flat plate collectors were estimated to account for about 79% of the total installed area and a typically relatively inexpensive technology, the so-called thermosiphon, characterized the SWH systems serving the residential sector. When the CP was launched in September 2009, there were at the time about 15 older, large solar water heating demonstration systems funded by a variety of donors[73].

V-5. The SWH market was affected by the following barriers:

- The low subsidized prices of electricity, illegal connections and un-paid electricity bills;
- The high upfront costs for SWH installation;
- The overall low level of awareness of the energy and environmental benefits of the SWH technology;
- The absence of an established market infrastructure;
- The lack of consumer confidence in the technical performance of the SWH technology;

[71] Source: countrymeters.info
[72] UNDP Project document of the Albania component of the GSWH project
[73] 1)Solar water heating for the Administration and Education Center at Prespa National Park, funded by UNDP; 2) 48 m2 of solar panels and solar water heating system installed on Hospital 5 in Tirana (1993), by the Center for Energy Efficiency;3)Solar water heating system for an elderly people's home in Tirana (1995), by the Center for Energy Efficiency; 4)Solar water heating systems in three SME's in Tirana, Fieri, and Durres, by the Center for Energy Efficiency (1999);5) Solar water heating systems in 2 high schools in Tirana and Rrogozhina, by the Center for Energy Efficiency (1998); and 6) Solar panels installed under the ASIPE (Archaeological Site Protection implementing Renewable Energy Resources) project at Butrint Archaeological site in Southern Albania, and funded by the EU under the PECO programme.

- The absence of attractive and specifically tailored financial mechanisms to assist end-users with removing high up-front costs;
- The absence of motivated and skilled installation workforce and
- The absence of international standards and certification as well as of labeling schemes and market surveillance.

V-6. The long term goal of the CP has been to accelerate a sustainable market development of solar water heating in Albania with good quality products and services. The specific objective of the CP during its lifetime was to accelerate the market development of solar water heating in Albania, with the aim of facilitating the installation of a 75,000 m^2 new solar water heating capacity during the project and to reach the target of an annual sale of 20,000 m^2 by the end of the project (in 2014) and, allowing for predictions for continuing growth to be fulfilled, to reach the stated longer-term goal of 520,000 m^2 of total installed capacity by 2020.

V-7. The CP has targeted the residential (individual houses and buildings) and the commercial and services sectors mainly. SWH dealers and installers, SWH manufacturers and importers, engineers and architects, professional associations, and students will benefit from the SWH Project's activities or will be involved as stakeholders.

V-8. The benefits of this CP have been estimated to correspond to avoiding over 300 MW of new fossil fuel power capacity by replacing electricity with solar power for water heating, and reducing an estimated cumulative GHG emissions potential of over 800,000 tons of CO_2 by the end of 2020, from the project start[74]. CP interventions are designed towards outcomes: sustainable growth in SWH demand by an i) enabling policy framework, ii) enhanced awareness and iii) available financing, iv) supply of reliable technology and services and v) replication, which together will achieve the project objective.

V-9. The total budget for the Albania CP under the control of the UNDP amounted to USD 2,105,000 of which USD 1,000,000 was provided by GEF, USD 150,000 by UNDP's TRAC resources and USD 955,000 by the Albanian government.

Evaluation Conclusions

V-10. Today, the SWH market in Albania could be safely described as being an emerging market. It has steadily developed since 2009 at an average growth rate of 25% between 2009 and 2015, attributed to the CP which has boosted its profile by addressing various issues that were barriers to progress, such as the lack of awareness and information as well as the technical know-how. However, a slowdown in the growth rate has been observed since 2013.

V-11. According to the interviewees met during the evaluation mission, there is still a large potential for SWH market expansion. The Government of Albania has undertaken a series of reforms including measures to reduce unpaid electricity bills, increase in the electricity tariffs, and the EU integration process. UNDP was a key player in the SWH market development in Albania.

V-12. The CP's main achievements includes: 1) the raising of the awareness and of the interest of all the stakeholders including the decision makers, mainly from the demonstration projects 2) the pivotal role of the CP team in inter-linking all national players and in ensuring effective communication channels between all parties, 3) The interest of other donors located in Albania that resulted in the mobilization of additional funds.

V-13. Sustainability, however, is to date not ensured if the following issues are not addressed: enforcement of the RES law, quality certification of the equipment and the installers, the absence of a financial mechanism and the lack of institutionalized support. Unfortunately, the CP has been operating as a stand-alone project with weak linkages with the UNEP-managed KM and networking component. Roles and responsibilities of UNEP and UNDP were never clearly explained resulting in several missed opportunities of collaboration.

[74] In calculating the CO_2 emission reduction impact, it has been assumed that the SWH systems will reduce the need for new fossil fuel based power generation capacity running on oil and the direct use of LPG, resulting an average annual emission reduction factor of 0,28 tons of CO2eq per installed m^2.

Recommendations

V-14. Albania needs to take advantage of the **2-year extension** obtained to sustain its efforts to consolidate the results achieved by the CP to date:

- The CP team should be persistent and advocate resolution of outstanding issues with the SWH market including enforcement of the RES law, the operationalization of the EE/RE fund, establishment of quality standards and certification schemes (the latter of which plays a critical role towards guaranteeing good quality products and competent installations for the consumers as well as for developing maintenance-oriented work);
- For the government to justify efforts to develop a SWH financial mechanism to allow access to SWH technology for lower income households and commercial establishments, a study is required to collect information and calculate the opportunity cost to the SWH sector of not having a financial mechanism. This could be proposed by the CP team during the next project steering committee meeting;
- The MEI should continue to push for removal of the heavy subsidies in the electricity sector;
- The MEI and other relevant stakeholders should develop promising SWH market segments such as SWH installations in new and retrofitted buildings, hotels, industry that would all contribute to market sustainability;
- With regard to joint UNDP/UNEP initiatives, roles and responsibilities must be clearly defined at the level of the project's design with further coordination required between the two UN agencies during implementation;
- For such types of UNEP-UNDP projects/programmes, the adoption of an approach that brings together geographically close countries (in the Balkan region) might bring benefits in terms of experience-sharing for trouble-shooting, collaboration and trade opportunities.

ANNEX VI. EXECUTIVE SUMMARY OF CHILE COUNTRY PROGRAMME EVALUATION

Project Background

VI-1. Chile's average solar radiation is 1,606 kWh/m2.year[75] offering good conditions for the use of SWH in the majority of the country's regions. Chile SWH sector was classified as a very small market with a total installed capacity of only 6,700 m^2 prior the start of the CP. The annual production was approximately 8,861 MWh.

VI-2. Chile's SWH was market review conducted in early 2006 having identified 25 SWH companies operating in the country: 58% of these companies were solely involved in the commercialization of SWH equipment, as a complement to sales of other types of equipment and 40% of these local companies directly sold and installed the equipment. Independent installers did not exist in Chile. Only 25% of installed capacity came from nationally manufactured products by small and undercapitalized firm with very limited marketing capacities. Flat plate SWH collectors were estimated to account for about 75% of the total installed area.

VI-3. The SWH market was affected by the following barriers:

- Prohibitively high up-front costs of SWH systems;
- Lack of consumer awareness,
- Lack of fully operational technical standards or quality control of the systems and their installation,
- Lack of quality control and trust on product quality, installations and after-sale services; and
- Lack of suitable and attractive financing mechanism to alleviate the higher up-front costs of SWH systems
- Lack of access to capital markets for the Chilean SWH manufacturers

VI-4. The goal of this CP was to accelerate and sustain SWH market growth in Chile and to use the experiences and lessons learnt in promoting a similar growth in other countries. The CP was to develop a supportive regulatory environment, build up the market demand and strengthen the supply chain with the aim to facilitate the installation of 29,000 m^2 of additional SWH capacity to reach a target of 35,700 m^2 of installed SWH systems in Chile by 2011 and a continuing, sustainable growth rate of 45% (in total installed capacity) by the end of the project. Interventions were to focus on: i) enhancing the awareness of the key stakeholders on the use of SWH systems; ii) supporting the establishment of a supporting regulatory environment for sustainable development of the SWH market in Chile, including a voluntary quality control and certification scheme for SWH systems; iii) building the capacity of the supply chain; and iv) supporting the establishment of attractive consumer financing mechanisms in co-operation with local financial institutions.

VI-5. The CP design document (ProDoc) was signed on March 31, 2009 with formal Project operations commencing with the Inception Workshop on November 19, 2009. The ProDoc indicated that the CP was a 4.5 year project. The CP was extended for another 1.5 years to its current terminal date at the end of 2015. The total budget of USD 3,331,500, with a GEF financial contribution of USD 1.5 million and co-financing of USD 1,831,500 from the State of Chile and other institutions participating in the project as defined in the ProDoc.

Evaluation Conclusions

VI-6. The Chilean country program has been on-going for over 6.5 years under three governments. Yet, the SWH market penetration in Chile remains low with 5.7 kW_{th}/1000 people[76], the country level target in terms of installed m^2 of SWH was reached during the project implementation. However, the growth rate was estimated to be lower than the set target (+30% in 201477).

VI-7. Based on the findings, the majority of the newly installed SWH systems during the CP implementation were due to the enforcement of the Law 20.365 with a tax incentive that was approved prior implementation of the CP. Nevertheless, the CP had a role in providing technical support to the national partners by developing several technical reports contributing to the implementation and renewal of this fiscal incentive law. At the same time the CP supported the integration of the SWH quality requirements under the law 20.365

[75] Source : Clean Energy Solutions Center – Daily average 4.4 kWh/m^2/day
[76] Mauthner & Weiss, 2015
[77] Source: Solar Water Heating Market Evaluation – Case Study of Chile, November 2015, Prepared for UNEP, Division of Technology, Industry and Economics, Global Solar Water Heating Initiative

VI-8. The evaluation concludes that the CP contributed to the enhanced quality of the SWH systems in Chile and supported the enabling legal and regulatory framework in the country. The evaluation also recognizes the CP's contribution to the SWH related capacity and knowledge through activities that were developed with 7 universities and more than 10 technical high schools and several other partners. Training of a significant number of SWH professionals in Chile is expected to have positive impacts in terms of the quality.

VI-9. At the same time, several shortcomings were found. The CP had a role in supporting and enhancing existing law with the fiscal incentive; further analysis of the first phase concerning the long-term effectiveness of the law could have helped the partners to enhance the future effectiveness of the incentive. In addition, the CP did not sufficiently contribute to increased end-user demand. This was assessed to be caused by the unsuccessful completion of the end-user financing mechanisms and related initiatives as well as limited communication activities targeting general public.

VI-10. The political context affected strongly the implementation of the CP. Each change of government slowed down the CP implementation. The programme director changed three times during the project. Also, the coordinator changed once during the course of the CP. The structure of the project with few people in charge affected the overall project strategy and implementation, which focused mainly on tackling technical barriers of the SWH market.

VI-11. The evaluator also considers that the partner selection was not necessarily suitable to deliver the financial mechanisms. At the same time, CP could have also considered working with the diversity of commercial sectors such as the tourism or health sectors, which were also identified in the ProDoc.

Recommendations

VI-12. **Methodologies need to be defined to evaluate the target indicators and review the list of target indicators to match with the outputs at the beginning of the program.** There is no methodology or guidance given in the ProDoc for the CP to calculate the target indicators. The target indicators reflect the achievement of the outcomes and by calculating them each year, they help to plan the effort to put in each activity. These methodologies and parameters to calculate the indicators should be defined in the M&E plans. In this particular program of market transformation, the end-user awareness and the cost of the SWH systems were not defined as indicators whereas they allow understanding the market evolution. The definition of adapted target indicators together with the development of clear methodology to monitor these indicators would help UNDP, UNEP and the country counterparts to understand the progress towards the project goals.

VI-13. **Develop a market analysis at the beginning of the implementation for project with market transformation objective.** The ProDoc was developed several years before the implementation started and the situation might have changed in-between. Moreover, in order to develop a program meeting the specific needs of the context, exact information of the situation is vital to develop the specific solutions to tackle the main barriers. It is recommended that a timely market analysis is needed at the beginning of program involving market transformation activities, to ensure integration of all the important market stakeholders and address the country specific, real existing barriers of the market. This market study should be used as a baseline in order to compare the former situation with the market at the end of the program.

VI-14. **Establish a system for information collection and monitoring energy performance of SWH installations.** The MdE needs to capture the positive impact of the SWH market through the setup of a robust monitoring and reporting system to evaluate the capacity and the energy performance of the installed SWH systems. Currently, the area of installed SWH in m2 is established by the AEE INTEC, but the methodology is based on estimation and the MdE should monitor more accurately the SWH market.

Lessons learned

VI-15. The key persons in charge of the CP influenced significantly the program development and the achievement of the outputs. Therefore, the recruitment process of the project management unit should be carefully planned to ensure that all required expertise to implement such programmes are included, not only technical skills but also, in management and planning.

VI-16. UNDP should take a more active role in the risk management. Several situations created burdens which influenced the effectiveness of the CP: failed financing mechanism development, failed pilot project with MINVU, change of the management unit and lack of local experts. UNDP should take a more active role in

the risk management of the programmes asking the partners to assess carefully the risks of the activities or situations and to develop a risk management plan, if required.

VI-17. The national counterparts should be closely involved in the project design and planning in order to fulfill objectives defined in the ProDoc. The country management unit which is often in charge of the project management and implementation, not always have the experience and capacities to plan, manage and monitor such comprehensive program. UNDP could further contribute to training on national partners in terms of project design and management and ensure their close involvement in the design stage of projects/programmes.

VI-18. UNDP country office doesn't necessarily have the sufficient technical capacity to analyze in details the program of activities proposed by the management unit. In this case UNDP's role was to solely validate whether the proposed activities were aligned with the program objectives. The activities can be aligned with the program objectives but are not necessarily appropriate considering the country context. One example reflecting the capacity gap was the failed financing mechanism which should have been developed in closer collaboration with relevant Chilean institutions and by expert in renewable energy financing mechanism.

VI-19. UNDP played an important role during institutional transition. The Chilean government changes had significant consequences in terms of turnover of key project personnel: the program implementation was slowed down and the person in charge of the program in MdE had to change. This situation created a discontinuity in the project's activities and the directions that were taken since the beginning were modified in the middle of the program. UNDP played a crucial role in the redeployment of CP after the managerial transition.

VI-20. Regional/global relationship and feedback should have more focus to promote exchange of lessons learned and best practices between countries. The experience in other countries, especially in the same region, should be enhanced to ensure information sharing on the barriers in promotion of SWH and how these countries overcame these barriers. Brainstorming sessions or workshops could help each country to find more adapted solutions to their issues.

ANNEX VII. EXECUTIVE SUMMARY OF INDIA COUNTRY PROGRAMME EVALUATION

Project Background

VII-1. The Project was developed from between 2005 and 2008 as part of a UNEP/UNDP 6-country global project. India has a large and growing demand for hot water in the approximate temperature range of 40^{o} to 80^{o}C. The hot water is used in:

- houses and apartment buildings for bathing particularly in urban areas;
- hotels and hostels in the growing hospitality sector; and
- the industrial sector for various cleaning and process needs.

VII-2. The large and growing demand for hot water in India can be attributed to:

- significant geographical regions with cool or cold winters making ambient temperature bathing water uncomfortably cool or cold;
- a rising middle class, of which a significant fraction want warm water for bathing;
- a large and growing hospitality sector; and
- growing industrial activities where hot water is required for various cleaning activities and processes.

VII-3. At the national level, more than 70% of India's energy generation is from fossil fuels. Within this 70%, 40% is from coal, 24% from oil and 6% from natural gas. In 2009, fossil fuel imports of crude oil amounted to 160 ktoe that represents 80% of its total crude oil consumption of 200 ktoe[78]. Recent trends indicate that the proportion of oil consumption in India is growing, and with fossil fuels being so heavily subsidized in India, there is a considerable impetus to reduce these subsidies by increasing diesel and furnace oil prices to world market levels.

VII-4. Small capacity storage water heaters (called geysers in India) that provide most of the low temperature hot water for personal bathing in urban areas, use electricity that mainly uses coal as its primary energy source. Most hot water for large hotels and industrial facilities is fuelled using furnace oil since natural gas is not widely available in India. Biomass and fuel wood are the energy sources for water heating in rural areas. The process of producing hot water for rural areas is generally highly inefficient and polluting; moreover, the excessive use of firewood is unsustainable on the country's limited forestry resources, and smoke pollution from these inefficient stoves largely impacts the health of women and children.

VII-5. A major challenge in India is adding new electricity capacity rapidly enough to keep pace with its steadily developing economy and its growing electricity demand. With widespread power cuts and rising electricity prices, several industries, commercial establishments, private residences and apartment buildings have standby diesel generation sets to sustain power supplies throughout the day, albeit at a high fuel cost. As such, electric geysers are associated with high energy costs and do not provide reliable hot water supplies unless they are supplied by expensive back-up diesel power generation. From 2002 to 2008, the Government of India (GoI) was promoting the use of solar water heaters (SWH) through their support of a programme that subsidized interest rates for loans for SWH purchases and installations; the subsidy did not have desired impact to transform the market, resulting in less than 1% market penetration after 8 years. One explanation for this low impact was that only the smaller banks participated in the interest rate subsidy scheme, limiting the number of SWHs sold on the market[79].

VII-6. On June 30, 2008, the Prime Minister of India launched India's National Action Plan on Climate Change, and raised the profile and importance of transforming the market for solar energy applications in India, of which SWH installations were being supported to offset the use of fossil fuels for hot water heating. Efforts to transform the SWH market received a further boost when the Ministry of New and Renewable Energy (MNRE) launched the Jawaharlal Nehru National Solar Mission (JNNSM) mission on 11th January 2010. JNNSM Phase I was a major initiative with the combined efforts of GoI and State Governments to promote ecologically sustainable growth while addressing India's energy security challenge, and scoping India's contribution of solar energy generation to mitigate global climate change. The immediate aim of JNNSM Phase I was to focus on setting up an enabling environment for solar technology penetration in the country both at a centralized and decentralized level to the end of 2013. JNNSM Phase II is the scale-up phase for solar energy installations in India until 2017[80].

[78] http://www.iea.org/stats/balancetable.asp?COUNTRY_CODE=IN
[79] Personal communication with Dr. Sameer Maithal
[80] http://mnre.gov.in/file-manager/UserFiles/draft-jnnsmpd-2.pdf

VII-7. A component of JNNSM Phase I was to promote and increase the use of SWH through a financial mechanism with a subsidy scheme; the provision of testing facilities at MNRE's Solar Energy Center SEC; a range of activities to support SWH manufacturers and dealers; and the development and uptake of a range of policy and administrative measures to transform the SWH market. The Indian CP of the GSWH Project commenced in December 2008 to accelerate the transformation of the SWH market through awareness raising on SWH technologies, and provide a structured approach for MNRE on the creation of the enabling investment environment for SWH installations.

Evaluation Conclusions

VII-8. With regards to the design of this CP, its goals and objectives as expressed in the LFA were clear; however, the design or intended incremental impact of GEF activities on the Project was not clear. As a result, the Project was adaptively managed mainly through the AWPs and frequent PSC and PEC meetings to meet the overall Project goal of increasing SWH installations by 2.4 million m^2 over the baseline. This adaptive management also included an estimation of the baseline scenario of SWH growth in the absence of the Project which was only based on regional SWH sales figures; this estimate, however, did not have information on the number of functional SWH installations since 2002;

VII-9. This estimation of the baseline scenario did not address the MTR recommendation for a full baseline study. At the time the MTR recommendations were finalized in mid-2012, a significant portion of Project resources were already committed. Hence, with the manner in which the baseline estimation was characterised based on MNRE information, the Evaluators believe that a baseline scenario taken in 2013 is more accurate and valuable due to SWH installations being tied to the subsidy. As per the current SWH growth trends, the number of working SWH installed prior to subsidy will gradually become insignificant.

VII-10. The GSWH Project contributed to the accelerated growth of the SWH market in India since 2009:

- This Project provided a structured approach to removing barriers to SWH market transformation by focusing GEF resources on improving the institutional and regulatory framework, raising awareness, strengthening the SWH supply and the financial mechanisms, and sharing lessons learned and experiences (domestically and globally) on SWH installations;
- Key stakeholders were brought together including city officials and SWH manufacturers to state and central government officials, to raise awareness and remove some of the identified barriers;
- The Project generated useful SWH information products including excellent promotional materials, an informative SWH website, and a SWH toll-free helpline. These knowledge products and services helped to raise awareness of SWH systems to a wide range of stakeholders using the Project's structured approach during JNNSM Phase I;
- Capacity of the SWH supply chain (from manufacturers to installation and maintenance personnel) was strengthened to meet certain level of product quality through the minimum technical criteria by the manufacturer to receive MNRE subsidy. MNRE confirmed that future sales of SWH will be backed by an after-sales service. For a manufacturer to be registered with MNRE under the JNNSM Phase II program, they will need to meet these criteria as well as provide a commitment to after-sales services which will be subject to third party verification. This should provide domestic end-user confidence of the SWH installation program;
- The studies and stakeholder consultations through workshops conducted under the Project assisted MNRE in their formulation and implementation of financial mechanisms (both for the residential and industrial applications), certification of SWH suppliers and quality control of the installations, all of which are closely linked to the Government's 30% subsidy payments.

VII-11. The Project sponsored the preparation of a CDM-PoA project which has been registered for SWH installations. While this is an excellent outcome that provides a sound UNFCCC-approved monitoring plan for GHG reductions to be implemented by a private Coordination Management Entity (CME), the impact of this CDM project, unfortunately, is likely to be minimal unless there is a recovery from low global carbon prices.

VII-12. To meet JNNSM Phase II goals of an additional 8.0 million m^2 of SWH installations by the end of 2017, and a further addition of 5.0 million m^2 by 2022, more SWH suppliers and manufacturers will be required to meet this demand. Currently, based on 2010 to 2012 sales information from MNRE, an average of 92,000 m^2 was being installed on a monthly basis. Phase II targets will require an average installation rate of 166,000 m^2 per month, almost double the current installation rate. This will essentially require a doubling of the current SWH installation capacity in India which will require more SWH trainees. There will also be a need for further capacity improvements within MNRE to regulate and enforce Government Orders for SWH installations and monitor SWH installations for reductions in fossil fuel consumption and GHG emissions. MNRE are fully aware of these scale-up issues where JNNSM Phase II *targets at least 15-*

20 cities where solar water heaters would become the main source of heating water replacing electric geysers. The MNRE strategic plan for SWH market expansion until 2017 outlines:

- Division of a national SWH plan into appropriate geographic regions;
- Determination of unique hot water demands and SWH end-user applications for each region;
- Determination of appropriate technologies, prices and further segmentation of market potential;
- Clearly defined strategies to provide strong growth by implementing prioritized high potential regions through utilities, mandatory regulations and strengthened supply chains.

VII-13. The Project's activities have been complementary to JNNSM Phase I activities in the identification and removal of financial barriers to increased market penetration of SWH and the provision of a partial Capital Subsidy (30% of capital cost of SWH) and additional 80% depreciation benefit to the industries for SWH installations.

VII-14. The Project has provided an excellent demonstration of a functional ESCO model for SWH installations in the industrial sector. Moreover, SWH applications in the industrial sector has demonstrated that fuel savings and GHG reductions are significant in these applications since hot water is required for more than 8 hours per day, in comparison to domestic hot water demand which is estimated to be 2 hours daily. The replication of this ESCO model, however, will require additional efforts mainly to assist in building the capacity of ESCO entrepreneurs and employees, and to improve the confidence of lending entities to finance SWH installations by ESCOs.

VII-15. GSWH project funds were exhausted on December 31, 2012, 6 months before the actual GSWH terminal date of June 30, 2013. This UNDP oversight and the lack of Project funds in 2013 affected some of the Project activities such as:

- the ESCO not receiving all GSWH funds that were committed;
- deployment of a 12.5 lpd SWH for the Himalayan Region for targeted end users after the prototype was modified on the basis of field tests;
- follow-up with the city governments to obtain feedback on the impact of amending by-laws on SWH installations; and
- tube collectors and fixed plate collectors at three different locations in India the opportunity to share results of comparative analysis of SWH efficiencies of evacuated which would help buyers as well as policy makers to make informed decisions.

VII-16. All of the aforementioned activities could have provided valuable inputs to the scoping of MNRE's scaled-up activities for SWH under JNNSM Phase II.

VII-17. Notwithstanding this oversight, the GSWH Project has provided good incremental value to India's National Solar Mission that has accelerated growth of the SWH after the launch of mission in 2010. MNRE's co-financing contribution after the launch of JNNSM Phase I increased significantly including USD 8.0 million (Rs 40 crore) in 2010-11 from its own budget and USD 12.0 million (Rs 64 crore) in 2011-12 from the National Clean Energy Fund towards the SWH subsidy. Overall, MNRE's co-financing contribution towards the Project greatly exceeded the original targets.

Recommendations

VII-18. Recommendation 1: Strengthen energy labelling to promote best SWH models. With the scale-up of SWH installations forecast over the next 24 months, MNRE needs to select a system for labelling the various approved SWH models within JNNSM Phase II. The current preference of the PSC is the development of a "Star Rating" on SWHs from various manufacturers for which MNRE should closely collaborate with the Bureau of Energy Efficiency (BEE) to define an appropriate labelling program applicable to SWH. During several PEC and PSC meetings, the discussion on developing Minimum Energy Performance Standard for SWH, had reached a certain stage; dialogue between MNRE and BEE needs to be resumed. The development of the Star Rating system will strengthen confidence among end-users and ensure the best quality products are deployed under the accelerated SWH program of JNNSM Phase II. Additionally, MNRE should review international trends in the development of the SWH technical standards and consider, to the extent practically feasible, harmonize them with international standards.

VII-19. Recommendation 2: Improve programme management capacity of MNRE through setting up a system for information collection and monitoring energy performance of new SWH installations. With the establishment of a SWH energy labelling system, MNRE will need to capture the positive energy performance impact of the JNNSM Phase through the setup of a robust monitoring and reporting system. Since the Project had contributed to the setup of a proposed CME, Nuetech Solar Systems Pvt. Ltd., for a CDM-PoA for SWH installations, MNRE should link its MRV improvements with Nuetech as they have already have in place an MRV system approved by the UNFCCC. Their system as outlined in the PoA-DD,

provides the structure to allow SWH managers to monitor, report and verify compliance of minimum technical criteria (MTC) for SWHs. Since compliance to these MTC is required to qualify the manufacturer for the MNREs capital subsidy of 30%, SWH MEPS compliance should be high. This recommendation should be implemented in close collaboration with capacity building efforts under Recommendation 2.

VII-20. Recommendation 3: Re-assess and build state and municipal-level capacities to manage JNNSM Phase II SWH installations. Capacity building for local government personnel will be required in the 15-20 cities targeted under JNNSM Phase II. An assessment should detail the capacity building needed for scaled-up activities of Phase II that may include training on how SWH systems function and save energy, MRV systems for new SWH installations, database management, systems to facilitate diligent and timely reporting of sales and installations, and strengthening enforcement of Government Orders, local bylaws and quality control standards.

VII-21. Recommendation 4: Increase the training of semi-skilled and skilled workers who will be needed for the additional SWH installations to meet the targets of JNNSM Phase II. By 2014, the number of installations will need to increase from the current 92,000 m2 per month to more than 166,000 m2 per month by the end of 2014. In addition to SWH installations, these trainees will also need to be able to provide after sales maintenance. Hence, a more intense SWH training program needs to be designed to train a sufficient number of installation technicians who will install SWH systems in the 15 to 20 cities defined under the JNNSM Phase II targets.

VII-22. Recommendation 5: Strengthen financial mechanisms for SWH under JNNSM Phase II. Financial support in the form of accelerated capital subsidy depreciation needs to be continued to encourage and catalyze SWH installations in the industrial sector for medium temperature hot water system. However, the subsidy should be phased out over a five-year period as the demand for solar water heater begins to grow. Efforts are required to support the ESCOs that offer and implement measures for industry to reduce energy consumption. The two pilots in Tamil Nadu supported under GSWH demonstrate the vast potential for the use of SWH in the automobile manufacturing sector. Some of these ESCO supportive efforts include informing and raising the confidence of lending institutions to provide financing to fledgling ESCO businesses. Due to the large potential of SWH applications for low process heat in the industrial sector, MNRE should consider the support of bi-lateral and multi-lateral agencies with experience to assist in the demonstration of SWH installations in other industrial sectors such as textile, food processing, dairy, pulp and paper, and device financial risk mitigating mechanism to the extent that prospective ESCO entrepreneurs can receive bank loans to finance SWH projects in the industrial sector.

VII-23. Recommendation 6: Include solar water heaters as an option under the Solar specific Renewable Purchase Obligation (RPO) for industrial consumers with demand exceeding 1 MW. While the RPOs are being enforced by certain states by the state electricity regulatory commission through the electricity distribution company, this restricts and interferes with the industrial entity's choice of installing SWHs which provides reduced fossil fuel consumption versus a solar photovoltaic system which results in minimal reduction in electricity consumption. To encourage the growth of SWH in the industrial sector, it is suggested that MNRE review the RPO and Renewable Energy Certificate (REC) issuance requirements to include SWH installations.

VII-24. Recommendation 7: MNRE should provide resources to conduct surveys and develop a 2013 or 2014 baseline for SWH installations in India in the domestic sector. This was not done formally during the Project, and would significantly contribute to more effectiveness in managing SWH expansion and added confidence in meeting JNNSM targets for 2017 and 2022. Such a survey needs to be disaggregated to different climatic regions and to a regional or city level. The survey should inform the current SWH knowledge base on the functionality of existing SWH systems, typical maintenance and operational problems that persist with certain SWH models, SWH service life, and energy savings realized. If possible, the survey could also provide baseline information on SWH systems that have been installed between 2002 and 2009 (if these sales records could be located) where the number of functional SWH systems is unknown. This would address the information gaps on functional SWH systems and bring more confidence to the reported energy savings of JNNSM Phase I and II.

Lessons Learned

VII-25. A concise LFA with SMART indicators and a proper baseline assessment is required for effectiveness in measuring the incremental impact of a project. In the case of this CP, a proper LFA would have identified that there was a lack of baseline information, and that Project resources could have been used to conduct some baseline surveys which could be improved during the term of the Project. More importantly, the baseline survey could have also provided some information on the number of functional SWH systems;

this would have provided improved confidence on the actual energy saved for SWH systems installed prior to the Project.

VII-26. Subsidies can be effectively linked with quality control of the items that are being subsidized. In the case of CP, the 30% subsidy was being paid from MNRE to the supplier or SWH manufacturer. Their qualification for the 30% subsidy was linked to SWH manufacturers submitting samples to MNRE appointed test centers, rating agencies, and third party quality assessments to ensure compliance of the SWH supplier and manufacturer on meeting minimal technical standards, efficiencies in their installation of SWH systems, after sale-services, and their response times to complaints and break-downs. To a large extent, compliance to these standards is self-enforced to qualify for the subsidy.

VII-27. Certain business pre-conditions are required for successful SWH installations by ESCOs in India:

- Availability of financing of an ESCO business from lending institutions or equity partners. Aspiration Energy is equity financed with current bank loans that are written against their assets, and not the potential income from the ESCO projects. Given the lack of ESCO-implemented projects for SWH installations, there are no records of loans to ESCOs for SWH installations in India;
- The prospective client is too busy to invest time to seek improvement to efficiencies in their energy consumption. This would characterize industrial clients who are often so entrenched in maintaining their production lines, and are unable to spend the required time to design measures to reduce their energy consumption. In the case of Aspiration Energy, they provided a service and measures for two small car part factories to reduce their fossil fuel consumption;
- For industrial clients, the SWH system must be sufficiently complex to require ESCO services to identify the best SWH layout. In addition, the size of the industrial enterprise should be medium to large. In Viet Nam, there were a number of ESCO projects that did not work since the client was an SME and at a later stage, was unwilling to share energy savings with ESCO. Instead, these SMEs decided after the first ESCO contract to hire the ESCO as a consultant for the EE measures, and purchased the EE appliances with their own funds. Functional ESCOs in Viet Nam had larger industries as clients; this is parallel to the business model being followed by Aspiration Energy in Chennai that has more potential for replication of ESCO contracts;

VII-28. For industrial clients, the SWH system must be implemented without significant costs to the factory owner. This would include the owner being able to minimize opportunity costs (resulting from down time required to install a SWH) or not being obligated to provide a large down payment to implement the project. In these cases, much of the Aspiration Energy installation was done during factory downtime on weekends, and using its own equity and working capital loan. The lack of available low interest loans is a barrier for entrepreneurs to operate as ESCOs and provide installation services for low-temperature hot water requirements in the industrial sector.

ANNEX VIII. EXECUTIVE SUMMARY OF LEBANON COUNTRY PROGRAMME EVALUATION

Project Background

VIII-1. Lebanon is a small Mediterranean country (with a total area of 10,400 $km^{2)}$ benefiting form a generous amount of sunshine (the average solar radiation is 1,825 Kwh/m^2, year[81]). During the 1990s and the 2000s, Lebanon enjoyed a sustained economic growth and improved political stability that translated into a substantial growth of electricity demand surpassing additional capacity of the current electricity generation levels. In 2009, the energy required was estimated at 15,000 GWh while the energy produced and purchased amounted to 11,500 GWh, leading to a deficit of 23%. The deficit was a result of the ageing and poorly maintained power plants, a sub-optimal use of power plants fuels (gasoil instead of natural gas) and losses estimated at 40%, which include (15% technical losses, 20% non-technical losses and 5% uncollected bills)[82]. An estimated 7.5%[83] of the total electricity requirements in 2009 were imported from Syria and Egypt through grid interconnections. Electricity is also produced through renewable sources, mainly hydro-power plants, with an estimated capacity of 274 MW in 2010[84]. Lebanon also imports almost all of its other energy and is highly dependent on fossil fuels (95%[85]) making its economy very vulnerable to world oil fluctuations. In addition, the country does not strategically stock up on its energy and retail prices are inevitably affected by market fluctuations.

VIII-2. Hot water needs for the domestic sector as well as for commercial end-users are for the most part provided by electric water heaters. This is mainly due to the relatively low and subsidized electricity tariff making electric heating more accessible than other means of heating. The use of diesel and gas for hot water needs has been observed mainly with commercial end-users.

VIII-3. However, due to the growing electricity demand, Electricité du Liban (EDL) is not always able to supply the electricity needed and there are often power-cuts which range from 9 hours to 12 hours per day, across the year. Therefore, the majority of households and commercial end-users turn to alternatives, such as individual private generators or using battery storage systems (which they charge when supply is available from EDL, and then discharge during power-cuts).

VIII-4. Solar water heating systems started to make their mark on the Lebanese market in the early 1990s. The expected financial savings and reduced electricity bills were the main motivation for their installation. However, the high installation and up-front cost proved to be a major burden which turned away many users from considering this purchase. At the time when the CP was launched in 2009, a substantial number of barriers affected the SWH market[86]:

- No public institution in place to actively promote a sustainable market growth of SWH financing mechanisms and new delivery models;
- No certification and training system in place for SWH systems installers;
- No specific building regulations, fiscal or public financial incentives in place;
- No specific regulation for SWH standards, certification or quality control mechanisms and no availability of a testing facility for SWH;
- No results and experiences documented and disseminated;
- No specific facilitated financing and new delivery mechanisms offered and marketed for the SWH purchase;
- Lack of effective and focused public awareness efforts and initiatives;
- Lack of capacity of the supply side to offer equipment and associated services at the required level to sustain the market growth; and
- Lack of local capacity in the SWH market.

VIII-5. In terms of market situation, there were only 8 small SWH manufacturers and 15 importing and installation companies in 2005. With regard to manufacturing, the majority of manufacturers only construct the water tanks with very few manufacturers of the solar panels. Products are essentially imported from China and Turkey.

[81] Project document of the Lebanon component of the GSWH project
[82] Prof Raymond Ghajar, Senior Energy Advisor at MEW « Policy paper for the electricity sector », September 2010
[83] Marc Ziade, American University of Beirut, September 2012
[84] In "Regional Market assessment report in the Mediterranean countries" OME/UNEP, 2014
[85] In "Regional Market assessment report in the Mediterranean countries" OME/UNEP, 2014
[86] In « Solar Water Heaters' Market Evaluation: case-study of Lebanon, UNEP, November 2015

VIII-6. The CP aimed at accelerating and sustaining the market development of solar water heating in Lebanon with an objective to 1) facilitate the installation of 190,000 m^2 of new installed collectors over the period 2009-2014, an annual sale target of 50,000 m^2 reached by the year 2014 and, most importantly, it aimed at laying the foundation for an expected continuing growth to reach the set target of 1,050,000 m^2 of total installed solar water heaters capacity by 2020, 2) reach 75 m^2 per 1,000 inhabitants target with a steady average growth rate of 15-20% and continuation until the expected saturation point of 75 /1,000 inhabitants, by the conclusion of the project to reach an additional 200-225 m^2 /1,000 inhabitants by 2020; and 3) ensure that over 80% of clients who purchased a SWH system report a good experience on the basis of problem-free good quality products and after-sales services.

VIII-7. The CP has mainly targeted the residential (individual houses and buildings) and the commercial and services sectors. SWH dealers and installers, SWH manufacturers and importers, engineers and architects, professional associations, students were involved as stakeholders. In terms of energy saving, this corresponds to over 1.0 million MWh of new fossil fuel power capacity waste through the use of solar power instead of electricity for water heating, as well as an estimated cumulative GHG reduction potential of over 3 million tons of CO_2 by the end of 2020. The CP interventions were designed to achieve sustainable SWH growth by delivering i) an enabling policy framework, ii) enhanced awareness and iii) available financing, iv) supply of reliable technology and services and v) replication, which together will achieve the project objective.

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Evaluation Conclusions

VIII-8. Today, the SWH market in Lebanon could be safely described as mature. It has steadily developed since 2009 at an average growth rate of 15%, although it has been experiencing a slowdown in the last two years because of the economic and political crisis in the country.

VIII-9. According to the various parties interviewed during this evaluation, the successful growth of the SWH sector can be attributed to implementation of the CP. The most optimistic assessments claim that the SWH market would have represented only 5 to 10% of its present volume while the more conservative estimations perceive the CP's achievement as having been able to "accelerate" a trend that was already developing in Lebanon. The CP came at the right time to boost the momentum of the SWH market by addressing various issues that were barriers to progress, such as the lack of technical know-how and of financial means which were hampering the political will. Several initiatives related to SWH were being implemented, the CP team succeeded in coordinating them into synergies.

VIII-10. While the CP is part of a global UNEP initiative, the CP worked as a stand-alone project. There was limited collaboration between the two UN agencies involved (UNDP, UNEP). However, knowledge products produced under the UNEP implementing component have been used as a means of building the capabilities of the CP team.

VIII-11. The CP's main achievements include: 1) the raising of the awareness of all the stakeholders including the awareness of decision-makers and the information campaigns organized, 2) the pivotal role in inter-linking all national players and in ensuring effective communication channels between all parties, and 3) the financial mechanism involved (NEEREA and the 200 US$ subsidy) which is unanimously recognized to be the main driver of this tremendous development. However, issues that could affect the sustainability of the SWH market are still to be addressed, namely the quality of the equipment, the certification of the installers, matters of maintenance, the lack of fiscal incentives.

Recommendations

VIII-12. Lebanon needs to sustain its efforts to maintain the market transformation momentum achieved by the SWH market:

- The UNDP together with the LCEC should be persistent and advocate resolution of all outstanding issues with concerned stakeholders, in particular for the establishment of quality standards and certification schemes, the latter playing a critical role towards guaranteeing good quality products and competent installations for the consumers as well as for developing maintenance-oriented work;
- The MEW should continue to push for reforms in the domain of electricity, in particular in respect of the removal of the heavy subsidies in the electricity sector;
- The LCEC and the MEW should develop other market segments such as the collective SWHs or SWH systems used for heating rooms to contribute to the market sustainability;
- The Ministry of Education and Higher Education (MEHE) should consider regular in-service teacher training to make it possible for tutors to keep up with technological advances in the field;

- With regard to joint UNDP/UNEP initiatives, roles and responsibilities must be clearly defined at the level of the project's design and further coordination is needed between the two UN agencies during implementation; and
- For such types of projects/programmes, the adoption of an approach that brings together geographically close countries might bring benefits in terms of experience-sharing for trouble-shooting, collaboration and trade opportunities.

Lessons Learned

VIII-13. The setting up of a national financing mechanism at a very early stage of the CP's implementation played a vital role towards the successful growth and transformation of the SWH market.

VIII-14. Operational financial incentives was also a good trigger for SWH market development and its sustainability.

VIII-15. Regular and continuous awareness-raising and information campaigns were of critical importance for boosting the SWH market, in particular, in targeting the public.

VIII-16. Once the market development has indicated effective results in volume of products produced and installed, the issue of the quality of the products, of the systems, and of the competence of the installation arises, which if not rapidly attended to, could put market development at risk.

VIII-17. A project management structure that is hosted by the government during the implementation phase then governmentally integrated/institutionalized after the project's completion is the key to sustaining the level of achievement and leading to stronger ownership by the country. It is fair to mention that this is not always feasible and actually this only happened in Lebanon after 10 years of projects by UNDP and the MEW.

ANNEX IX. EXECUTIVE SUMMARY OF MEXICO COUNTRY PROGRAMME EVALUATION

Project Background

IX-1. Mexico's average solar radiation is 1,898 kWh/m^2.year offering good conditions for the use of SWH in the majority of its provinces. Demand for water heating with fossil fuels is a significant component of national energy consumption accounting for an estimated 8% of total demand; this does not even include fuel wood. In assessing the total energy demand of the building sector in Mexico, the energy consumed for hot water was estimated to be 33% in 2008. In 2009, the installed capacity of SWH in Mexico can be broken down as follows: 78% in swimming pools, 14% in industrial and commercial buildings, and 8% in the residential sector. The sales of SWH technology before the start of the program were expanding into the commercial and light industrial sectors. Prior to the commencement of the national program, SWH technology was sourced mainly from small scale local factories. Mexican SWH sector was classified as an emerging market. In 2005, the penetration rate was 6.9 m^2 per 1,000 inhabitants.

IX-2. In 2007, the Mexican government through its energy efficiency agency (CONAE, called nowadays CONUEE) launched a program to promote the use of SWH in collaboration with the association of solar panel manufacturers (ANES) and the German International Cooperation agency (GIZ, formerly GTZ). This program, called PROCALSOL, had a global objective to reach 1.8 million m^2 of installed SWH panels by 2012. This objective was set based on a potential market of more than 2 million m^2 of thermal solar panels defined taking into account the existing SWH installation in 2007, the energy consumption, the equipment replacement rate, the economy growth and the building stock. It was not just an incentive program, but rather a platform for several actions taken to promote solar thermal energy in Mexico. Although PROCALSOL was officially managed by the CONUEE, it was the cooperation of many private and public stakeholders which brought to life an impressive number of initiatives. Each year, these stakeholders came together again to agree on a new schedule.

IX-3. The CP objective was to accelerate and sustain the solar water heating market in Mexico as a part of the Global SWH Market Transformation and Strengthening Initiative with an objective to reach total capacity of 2.5 million m^2 of installed collector area by the end of the project (2014); and expected continuing growth to reach a target of 23.5 million m^2 of total installed SWH capacity by 2020. This has been estimated to correspond to an estimated cumulative GHG reduction potential of over 27 million tons of CO_2 by 2020.

IX-4. CONUEE, the implementing partner of the CP, has emerged as the relevant and primary institution for promoting SWH technology in Mexico. CONUEE has supported a range of activities to promote the use of SWHs since 2001. The CP reportedly builds on the following parallel programs:

- Cooperation with CONUEE and GIZ to design and implement the PROCALSOL Program;
- The CONAVI pilot project to install SWH in new housing;
- Cooperation with the Municipality of Mexico DF to promote SWH through the municipal building code;
- The joint CONUEE-INFONAVIT pilot program on green mortgages.

Evaluation Conclusions

IX-5. The The Mexican CP has been operating over 8 years under two governments in close cooperation with national SWH programmes. Despite the several administrative issues and delays in project implementation due to the government change in 2012, the CP has performed well. The country level target of installed SWH capacity measured in m2 was achieved during the course of project implementation. The CP worked closely with national SWH initiatives, which can be seen a strength of the CP to promote sustainable SWH market development in Mexico. At the same time, it is difficult to assess to what extent the CP as an individual GEF project contributed to acceleration SWH market in Mexico.

IX-6. Despite the SWH market growth rate not reaching the intended level (as defined in the project document), the likelihood of impact towards sustaining the SWH market development and reduction of GHG emissions is assessed as satisfactory. The CP managed in its final years of its operations to create a momentum in the SWH market gathering the market stakeholders around the national executing partner Conuee. Continued support of several national partners (mainly INFONAVIT and Conuee through PROCALSOL) to the SWH market development is expected to contribute to increase of the penetration rate of SWH in Mexico in the future.

IX-7. As a result of the CP activities, the quality of SWH systems and installations has greatly increased and should increase even more due to the future standard on SWH panels and systems. Considering the

context of Mexico the programme was considered successful and the satisfaction level was among those interviewed for the evaluation was high.

IX-8. The CP managed to tackle the whole supply chain of the SWH market. However, further work is required to support the SWH market development in the building sector, which is strongly linked with enforcement of building codes. The main achievements of the program are the following:

- Proposal of an official Mexican Official Mandatory Standard (NOM) for solar water heating product: PROY-NOM-027-ENER Financial mechanism for the tourism sector;
- Creation of the Solar community with around 3,000 users receiving news about SWH market monthly;
- Development of a Diploma "Metrology and Quality Management Test Laboratory SWH" and conducting six modules to train testing laboratories technicians;
- Development of the new reformed DIT, now DTESTV as a quality standard for Green Mortgage program of INFONAVIT;
- Creation of two standards of competence to certify solar thermal installers: EC-0325: Installation of solar water heating thermosiphonic sustainable housing. EC-0473: Installation of solar water heating with hot water tank forced circulation;
- Development of a technical financial SWH system pilot mechanism initially focused on the hotel sector in the Yucatan peninsula.

Recommendations

IX-9. There is no methodology or guidance given in the ProDoc for the Mexican CP to calculate the target indicators. The target indicators reflect the achievement of the outcomes and by calculating them each year, they help to plan the effort to put in each activity. These methodologies and parameters to calculate the indicators should be defined in the M&E plans. In this particular program of market transformation, the end-user awareness and the cost of the SWH systems were not defined as indicators whereas they allow understanding the real market evolution. **The definition of adapted target indicators together with the development of clear methodology to monitor these indicators would help UNDP, UNEP and the country counterparts to understand the progress towards the project goals.**

IX-10. The ProDoc was developed several years before the implementation started and the situation might have changed in-between. Moreover, to develop a program, exact information of the situation is needed to find the specific solutions to tackle the main barriers. **It is recommended a market analysis at the beginning of program involving market transformation activities, to ensure integration of all the important market stakeholders and address the country specific, real existing barriers of the market.** This market study should be used as a baseline to compare the former situation with the market at the end of the program.

Lessons Learned

- **Program timeframe was not in all cases adapted considering the time needed to deliver planned outcome.** In the case of Mexico, the mandatory standard and the financial mechanism for hotel were designed under the CP but due to time constraints, their enforcement and implementation will be done after the program end.
- **The key persons implementing the CP influenced significantly the program progress and the achievement of the outputs.** The recruitment process of the project management unit should be carefully planned and the required expertise to implement such a program is not only technical but also, in management and planning.
- **UNDP played an important role during institutional transition.** The Mexican government changes in 2012 had significant consequences in terms of turnover of key project personnel. The program implementation was interrupted and the person in charge of the program in Conuee had to change. This situation created a discontinuity in the project's activities and the directions that were taken since the beginning were modified in the middle of the program. UNDP played a crucial role in the redeployment of CP after the managerial transition.
- **The national counterparts should be closely involved in the project design and planning to fulfill objectives defined in the ProDoc.** The country management unit, which is the unit in charge of the CP operation, might not have the experience and capacities to design a comprehensive program. Training on program design could help the management unit to define an efficient and successful program.
- **UNDP country office does not necessarily have the sufficient technical capacity to analyze in details the Program of Activity proposed by the management unit.** UNDP's role was to solely validate

whether the proposed activities were aligned with the program objectives. The activities can be aligned with the program objectives but are not necessarily appropriate considering the country context. One example reflecting the capacity gap was the funding of a laboratory which created a market distortion in term SWH testing services.

- **Establish a system for information collection and monitoring energy performance of SWH installations.** Conuee needs to capture the positive impact of the SWH market through the setup of a robust monitoring and reporting system to evaluate the capacity and the energy performance of the installed SWH systems. Currently, the area of installed SWH in m2 is established by the ANES association, but the methodology is not transparent and Conuee is looking for other information source as the national survey made by INEGI, the statistical institute of Mexico.
- **Promote the enforcement of mandatory building codes to install SWH. ICA Procobre worked on this issue with several municipalities.** They manage to develop some successful case studies. Conuee, as a renowned governmental institution, could promote the enforcement of such regulation in municipalities with high solar radiation.
- **Extend the financial mechanisms to other sectors.** Once the pilot project in the Yucatan peninsula will be running and optimized, Conuee could open the financial mechanisms to other sectors which also meet the technical and financial requirements stated in the operation manual of the credit line.
- **Create a dedicated webpage for SWH information.** The information is currently shared through the Solar Community for the market stakeholders. But there is no easily accessible and adapted communication channel for the public. A dedicated webpage maintained and broadcasted by the government would help to spread good practices among the public.

ANNEX XI. CONSULTANTS' RÉSUMÉ

Name:	ROLAND WONG	
Position:	Chief Executive Officer of Clean Energy Alternatives Inc. International Energy and Environment Expert	
Nationality:	Canadian	
Education:	M.Eng., Civil Engineering (Water Resources and Environment), University of British Columbia, 1981 B.Eng., Civil Engineering, McGill University, Montreal, 1977	
Professional Affiliations:	Registered Professional Engineer in British Columbia	
Areas of Expertise:	Renewable energy development with a focus on waste to energy, hydropower and solar energy Energy efficiency in transport Evaluations of climate change mitigation projects	
Countries of work experience:	Canada, Bangladesh, India, Pakistan, the Maldives, Cambodia, China, Malaysia, Thailand, Viet Nam, the Philippines, Indonesia, Fiji, Solomon Islands, Tuvalu, Tonga, Samoa, Georgia, Belarus, Bosnia and Herzegovina, Serbia, Slovakia, Romania, Russian Federation, Montenegro, Turkey, Kyrgyz Republic, Kazakhstan, Tajikistan, Egypt, Ethiopia, South Africa, Costa Rica, Dominican Republic, Haiti, St. Vincent and the Grenadines, Dominica and Peru.	
Employment:	Clean Energy Alternatives Inc President, Vancouver, Canada Manager, Business Development, Vancouver, Canada *Klohn Crippen Consultants Limited*	2005 to date 2002-2005
	Environmental Management Specialist, Dhaka, Bangladesh and Halifax, Nova Scotia, Canada *KPMG Consulting*	1999-2002
	Manager, Watershed Division, Richmond, B.C., Canada *Klohn Crippen Consultants Limited*	1993-1999
	Water Resources Technical Advisor, Dhaka, Bangladesh *Northwest Hydraulics Consultants*	1988-1993
	Area Engineer/President, Williams Lake, B.C., Canada *Ducks Unlimited/Cariboo Engineering Limited*	1984-1988
	Hydropower Intermediate and Area Engineer, North Vancouver, B.C. and Nipawin, Saskatchewan, Canada *Klohn Crippen Consultants Limited*	1981-1984
	Junior Hydraulics Engineer, Montreal, Quebec, Canada *Montreal Engineering Company Limited*	1978-1980

Roland has over 25 years' experience with a recent focus on the development and management of projects in sustainable transport, green city development, renewable energy and energy efficiency. These projects encompass his experience in environmental management, institutional capacity building, policy and economic analysis, planning, management, monitoring and evaluation for projects in more than 35 countries. His demonstrated abilities and experience include adoption and market transformation of sustainable low carbon technologies; formulation and preparation of low carbon and climate change investment projects; partnership building as a means to achieving adoption of clean technologies and energy efficiency practice; development and mentoring of energy, environmental and water resource professionals; networking, coordinating and negotiating projects in low carbon and climate change in several countries.

Key assignments that he is undertaken in climate change mitigation includes:

- Serving as a Senior Director since 2008 for a private sector company based in Vancouver, Canada developing investments in biomass waste-to-energy and solar power development using patented technologies. This includes the use of a unique gasification / thermo-oxidizer unit to produce heat sufficient for 5.7 MW of power generation. This has involved preparation of "white papers" for the firm, studies on the comparative advantages of the WTE technology to competitors and dissemination of technical and financial information to prospective investors, financers, government policymakers and international donor institutions;
- Lead consultant in the formulation, preparation and evaluation (midterm and terminal) of several GEF projects since 2008 in low carbon/renewable energy development, energy efficiency, sustainable transport and green cities for several countries mainly in Asia, Eastern Europe and the Caribbean. Also involved with providing technical assistance in the management of these projects, sourcing of technical experts, strategic planning and strengthened monitoring and evaluation activities;
- Principal designer and international team leader for UNDP Bangladesh and UNDP-GEF (2002-2010) for a project to reduce GHGs from the brick making industry in Bangladesh. Completed concept formulation and PDF B (project preparation) phase that resulted in GEF commitment for full project funding in August 2006. GHG emission reductions based on market transformation and adoption to cleaner coal-fired kiln technology from China, increased awareness of the economic, environmental and social benefits on the use of a cleaner technology, increasing industry capacity to attract financial support for clean technologies, dissemination of a cleaner burning kiln throughout the industry. Facilitated discussions with stakeholders in the brick industry in Bangladesh, and provided a logical framework analysis in collaboration with a high calibre Bangladeshi team consisting of engineers, economists, financial and ex-government officers, and facilitated South-South cooperation on the project to access less energy intensive Chinese brick making technology. Provided assistance and negotiations to develop carbon finance that served as a means to reduce debt servicing costs for entrepreneurs;
- Served as environmental management specialist (1999-2002) for a CIDA-funded demonstration project in Bangladesh to introduce natural gas as an alternate fuel to mitigate urban air pollution for the Government of Bangladesh's Department of Environment. Activities were geared towards providing better stakeholder outreach in the planning and implementation of environmental management projects, to demonstrate credible efforts required to effect changes in environmental quality, to allow DoE an opportunity to review their policies and standards against project results, and to improve enforcement capacities. The project started with the conversion demonstration of the highly polluting two-stroke auto-rickshaws to CNG, a domestically available fuel. A monitoring program comparing CNG and gasoline-fueled auto-rickshaws revealed operational costs and emissions of CNG converted auto-rickshaws were reduced by over 75%. The project was widely viewed by all to be a major success since it catalyzed the alternate fuel debate and industry development and transformed the alternate fuels market in Bangladesh where over a 24-month period, the number of alternate fuel vehicles rose from 1,000 to over 20,000, and the sale of compressed natural gas (CNG) increased 10-fold.

Name:	NADIA BECHRAOUI
Position:	Energy and Environment Economist with a background in Energy Management and Policy
Nationality:	French and Tunisian
Education:	Master of Science in Energy Management and Policy, University of Pennsylvania, Philadelphia, USA, 1986 -1987 DESS de Production et Distribution d'Energie (Post-graduate degree), University of Paris I- Sorbonne, Paris, France, 1984-1985 Maîtrise de Sciences Economiques, Option Econométrie, University of Social Sciences of Grenoble, France, 1983-1984 Licence es Sciences Economiques, University of Social Sciences of Grenoble, France, 1982-1983
Areas of Expertise:	Programme and Project Management (more than 25 years of experience in designing, monitoring and evaluating programmes and projects) Sectoral areas of expertise: 1) Energy (energy efficiency, renewable energies mainly wind and solar, adapted technologies, policy and strategy development; 2) Environment: mainly Climate Change issues related to the UNFCCC/ Kyoto Protocol negotiations, CDM, INDCs, Mitigation and Adaptation, mainstreaming CC issues into national and local/sectorial policies/strategies/plans; 3) policy development and dialogue, capacity building, resources mobilization, local environmental governance Secondary areas: poverty alleviation, gender issues, crisis recovery, local governance, MDGs and now the SDGs, industrial pollution Successful completion of the on-line course (MOOC) on Disasters and Ecosystems: Resilience in a Changing Climate (Jan-March 2015/ UNEP - Cologne University of Applied Sciences) Member of the UN ECE's evaluation roster in Geneva (since 2013) Member of the UNDP Evaluation Office roster in New York (since 2012) Member of the UNDP Pretoria data base of Climate Change Adaptation Experts (2011) after a selection process Certified facilitator by the GTZ (German Cooperation) on project planning and facilitation techniques (March 2010)
Countries of work experience:	Tunisia, Algeria, Morocco, Mauritania, Niger, Togo, Senegal, Mali, Sao Tome and Principe, Côte d'Ivoire, Cape Verde, Albania, Montenegro, Jordan, Burkina Faso, Kenya and Gabon

Ms. Bechraoui has over 25 years of professional experience as an Energy and Environment Economist with a background in Energy Management and Policy. Her professional experience is mainly with developing countries, in collaboration with international cooperation programs (World Bank, USAID, CIDA, GTZ, French Cooperation, UNDP, UNEP, OIF, UNIDO). As a project/programme manager, she has proven experience in designing, implementing, monitoring and evaluating regional and national) development projects and programmes. Her areas of expertise relate to the fields of Energy and Environment and in particular Climate Change related issues, mitigation (energy efficiency and renewable energies) and adaptation as well as climate finance and economics matters.

Name:	AMANDINE GAL
Position:	**Engineer, International Project Manager**
Nationality:	Switzerland

Education:	European Master in Building Engineering, specialty Integration of Energy Efficiency and Renewable Energy in Building (Master's degree), Université de La Rochelle, France, 2005 IUP Industrial Systems / Master degree and Licentiate in Industrial Engineering Speciality: Heat and Energy Industrial Process (Bachelor's degree) Université Joseph Fourier, Grenoble, France, 2004 3rd year of Industrial Engineering Speciality: Mechanical Engineering Universidad Politécnica de Cartagena (Spain), 2002 University technician's diploma (2 years) (DUT) Speciality: Thermal Engineering and Energy *Université* Joseph Fourier, Grenoble, France, 2000
Areas of Expertise:	Monitoring and evaluation of international projects and programmes Monitoring, evaluation and design of projects and programs in Canada in energy efficiency and demand-side management programs in the energy sector Program design for energy efficiency projects Innovation in energy efficiency performance contracting (ESCOs) Energy efficiency in the water sector Measurement and verification for energy efficiency programs implemented by ESCOs Financing mechanisms for energy efficiency Energy efficiency policies Standards and labelling Marketing studies Building codes Training
Countries of work experience:	Anguilla, Antigua and Barbuda, Australia, Austria, Bahamas, Bangladesh, Barbados, Belize, British Virgin Islands, Canada, Chile, Colombia, Croatia, Dominica, Dominican Republic, Ecuador, Finland, Grenada, Ireland, Jamaica, Mexico, Montserrat, Saint Lucia, Serbia, St. Kitts and Nevis, St. Vincent and the Grenadines, Switzerland, Tunisia and USA

Ms. Amandine Gal is a Project Manager and a Sustainable Energy Specialist at Econoler, working primarily for the firm's International Department. A French national, she is currently residing in Geneva from where she travels to conduct many international assignments, particularly in Latin America. She is fluent in French, Spanish, and English. Ms. Gal holds a graduate degree in integration of energy efficiency and renewable energies in buildings from La Rochelle University, France, and also degrees in thermal engineering and energy and in mechanical engineering. She has over ten years of professional experience in energy efficiency and renewable energy, project design, project management and energy studies. Prior to joining Econoler she worked as an energy engineer in prominent infrastructure companies including SNC Lavalin (Canada) and ACCIONA (Spain). She has acquired a solid international expertise, from consultancy assignments conducted in 20 countries of Latin America and the Caribbean, in projects financed by leading international organizations including the Inter-American Development Bank (IDB), the International Finance Corporation (IFC), the Asian Development Bank (ADB), the World Bank, the EBRD as well as USAID and KfW among others. Ms. Gal also has a good knowledge of United Nations.

ANNEX XII. GSWH PROJECT RESULTS FRAMEWORK

Project Strategy	Indicator	Baseline	Target	Sources of verification	Assumptions
Objective: Acceleration of the global commercialization and market development of solar water heating in residential, private service sector and public buildings and, when applicable, industrial applications.	The amount of installed SWH systems in participating countries. The annual market growth rate in the participating countries. Level of interest in and start-up of replication of similar activities in other countries.	As per the initial country specific market assessments and baseline analysis	An additional 3 million m2 of installed SWH capacity compared to the expected baseline development by the end of the project. Sustainable market growth of at least 20 % in average in the participating countries by the end of the project. Interest in and start-up of replication of similar activities in other countries	Project monitoring and evaluation reports	Available political support from the participating countries. Competitiveness of SWH with alternative energy sources (an issue related, in particular, to eventual subsidized electricity and fossil fuel prices)
Outcome 1: Effective initiation and co-ordination of the country specific support needs and improved access of national experts to state of the art information, technical backstopping, training and international experiences and lessons learnt.	The number of countries with SWH market transformation and strengthening activities initiated Availability of timely and cost-effective technical backstopping responding to the needs.	No proactive and coordinated effort to support the targeted GEF programme countries to accelerate and promote the SWH market.	SWH market transformation and strengthening activities supported initially in 6 countries during phase I and expanded later to at least 16 GEF programme countries in phase 2. The technical backstopping needs of the countries met at the adequate level and timely manner leading to effective implementation of country specific SWH market transformation strengthening activities	Project monitoring and evaluation reports.	Stated demand of selected representative countries for the type of project under consideration.
Output 1.1 Global SWH market assessment and analysis with the specific focus on GEF	Status of the global SWH market assessment and analysis.	No global SWH market assessment and analysis on GEF Programme countries	Global SWH market assessment and analysis with the specific focus on GEF programme countries finalized.	Project monitoring reports	N/A

Project Strategy	Indicator	Baseline	Target	Sources of verification	Assumptions
Output 1.2 Finalization and adoption of proposals for at least 10 additional countries for Phase II	Number of proposal approved and financed.	Support for SWH market development in countries missing.	10 additional country specific proposals approved and the implementation started.	Project monitoring reports	See above
Output 1.3 A network of international and regional agencies established	The network in operation	No global SWH expert network	The network in operation	Project reports	
Output 1.4 A virtual SWH information clearing house and training facility established with the specific focus on GEF programme countries	A virtual SWH information clearing house and training facility established and regularly updated.	No virtual SWH information clearing house and training facility with the specific focus on GEF programme countries exist	A virtual SWH information clearing house and training facility established and regularly updated also after the project.	Project monitoring reports. Project ex-post evaluations.	Indicated demand of selected representative countries for the type of services offered.
Output 1.5 Other internationally or regionally applicable public awareness raising , training and knowledge management material published (which can be used as such or as raw materials for national public awareness raising and training activities and products)	The use of feedback received on the available public awareness raising, training and knowledge management materials by the targeted countries.	No systematic and coordinated joint effort to produce and disseminate public awareness raising, training and knowledge management materials accessible to several countries.	Relevant public awareness raising, training and knowledge management materials prepared made available and actively used by the targeted countries with positive feedback.	Project monitoring and evaluation reports.	Indicated demand of selected representative countries for the type of services offered.

Project Strategy	Indicator	Baseline	Target	Sources of verification	Assumptions
Output 1.6 A global review and analysis of the existing national and regional SWH standards, and draft design and a strategy for adopting more harmonized international product standards, schemes.	A strategy for advising the national level activities	Limited co-ordination	Enhance harmonization of the standards and certification schemes in the countries participating to the project.	Project mid-term and final evaluations	
Output 1.7 A regularly updated, "quality controlled" roster and team of international SWH experts to support national level activities	Feedback received from the targeted countries on the experts used.	No quality controlled" roster of international SWH experts to support national level activities exist	The international expert support needs of the participating countries met on a timely and effective manner responding to the actual needs	Project monitoring and evaluation reports Mission evaluation reports	Indicated demand of selected representative countries for the type of services offered
Output 1.8 Regional and international thematic or general SWH workshops	The number of workshop organized and the number of countries and stakeholders participating to the workshop.	No systematic effort to facilitate effective networking and information exchange on the SWH issues with the specific focus on the markets of GEF programme countries.	At least 2 international and 2 regional workshops organized during the lifetime of the project in co-operation with the relevant international, regional or national interest groups.	Project monitoring reports	Indicated demand of selected representative countries for the type of services offered.
Output 1.9 Regular newsletters and market monitoring reports.	The release of annual SWH market monitoring reports and quarterly newsletters with a specific focus on the GEF programme countries	Annual SWH market monitoring reports and quarterly newsletters with a specific focus on the GEF programme countries not	Annual SWH market monitoring reports and quarterly newsletters with a specific focus on the GEF programme countries.	Project monitoring reports	Indicated demand of selected representative countries for the type of services offered.

Project Strategy	Indicator	Baseline	Target	Sources of verification	Assumptions
		available.			
Output 1.10 The results, experiences and lessons learnt of the overall program compiled, analysed and disseminated	Publishing and dissemination of the project final report	No compilation, analysis and dissemination of the results, experiences and lessons learnt	The project final report published and disseminated including the compilation, analysis and dissemination of the results, experiences and lessons learnt	Project terminal report	Indicated demand of selected representative countries for the type of services offered.
Outcome 2 The specific SWH market transformation targets of the first 6 participating countries reached by the end of the project, conducive to the overall, global market transformation goals of the project[87]. 24	Market characteristics of the 6 participating countries. The total installed capacity and the annual growth rate of the SWH market in the participating countries in the end of the project compared to the baseline.	Basic conditions for accelerated and sustainable SWH market development in most GEF programme countries still missing as per the initial country specific market assessments and baseline analysis	A supportive legal and regulatory framework in 6 participating countries adopted (including an applicable quality assurance, certification and labelling scheme). The level of awareness of the targeted end users. The capacity of the key local stakeholders built as per the targets of individual country components. Access to suitable financing to cover the higher up-front costs of SWH systems The total installed SWH capacity and the annual growth rate in the end of the project as per the stated, country specific targets	The monitoring and evaluation reports of the single country components	Available political support from the participating countries and committed "local champions" to promote the SWH market.
Output 2.1 The market development activities in the 6 initial countries successfully finalized meeting the stated targets as per the country specific log frames of the national country programmes	The success in meeting the country specific targets in the initial 6 countries (as per the separate, country specific log frames).	As per the country specific project documentation	All the country specific output targets for the initial 6 countries met at the satisfactory level.	Project monitoring and evaluation reports	See above

[87] For further details about the country specific targets, see the logframes in each country program document

ANNEX XIII. RESPONSE TO STAKEHOLDER COMMENTS

Terminal Evaluation of the Project: "Global Solar Water Heating Project" (GEF project ID: 3807)

CONSOLIATED STAKEHOLDER COMMENTS TO THE DRAFT EVALUATION REPORT AND RESPONSES

#	*Paragraph / section*	*Stakeholder comment*[88]	*UNEP EO suggestion / response*	*Consultant response /action*
	The main report			
1	***Para 23 (regarding discussion on the lack of changes made on the original GSWH design)***	*Changes were not required to the design and output on the SWH technology quality assurance aspects, as this was already covered under the project's Output 1.6 (review and analysis of the existing national and regional SWH standards and draft design and a strategy for adopting more harmonized international / regional product standards and schemes), resulting in us providing more focus to this output.* *As a result, the global component at first developed a comprehensive "Guidebook on Standardization and Quality Assurance for Solar Thermal", aiming at explaining the relevance of quality assurance for a sustainable market development and suggesting possible steps to set up a quality assurance system in a country…..* *Secondly, the project assisted and supported in the implementation of a new regional certification scheme, and through one of the project's regional partners, RCREEE), to assist with the development of the first regional standards and certification of solar thermal products in developing countries and focusing in the Arab Region with the name SHAMCIE, and in harmonization with the European's Solar Keymark scheme.*		A detailed description of UNEP activities on SWH technology quality assurance aspects has already been provided in Para 23.

[88] There might be several comments addressing one paragraph or a report section

#	Paragraph / section	Stakeholder comment[88]	UNEP EO suggestion / response	Consultant response /action
2	**Para 24 (the theory of change on the GSWH project)**	*It is not correct to say a TOC was not prepared during the design phase of the GSWH project. It is true that it wasn't called a TOC (at that time that term had not yet emerged), but the project had a logical framework, which is essentially the same, just under another name.*	It is justified to say that a TOC was not prepared during the design phase.	No changes were made in response to this comment.
3	**Para 37 [the role of regional partners in SSCo on SWH information dissemination]**	*Dissemination activities were also conducted through our regional partners who played an important role and will remain to promote for the SWH technology even after the end project, depending mainly on all the KP developed and the lesson learned from the CPs, and also by implementing the regional dissemination sustainability strategy report developed by the project.*	When planning this evaluation, UNEP's concern was that MTE did not take into account the work with regional partners. Work with them is considered as an important driver in the reconstructed TOC contained in this evaluation. However, we might want think whether their role in the change process is sufficiently considered in this evaluation.	No changes made in para 37. However, changes have been made in Paras 48 and 54 to strengthen the descriptions of the consideration of the role of regional partners in the change process of this GSWH project.
4	**Table 6 (with regards to achievements of Output 1.2)**	*After the PIF development, a full project document for Panama was developed for which GEF endorsement was obtained*		The consultant acknowledges the new information, and has made changes in Table 6 under Output 1.2.
5	**Para 47 (regarding achievements in direct Outcome 1)**	*Actual start date of the global component of project is May 2009, so the delay is 9 months and not 20 months, this delay was due to the fact that a number of countries didn't sign their nation Project document until late of 2009.*		The consultant acknowledges the new information provided by UNEP with changes made in the Para 47.
6	**Para 47 [regarding delivery of the SWH tech scope assessment report and analysis tool**	*By using the SHW Techscope methodology, the 5 project countries were evaluated by reviewing each of the 5 country's best practices to address and evaluate their experiences in establishing and growing a sustainable SWH market; this was not possible to do at the start of the project and before they could materialize some of their project activities.*		The consultant acknowledges UNEP clarifications on delayed delivery of the SWH tech scope methodology and analysis, and has made appropriate additions to the Para 47.
7	**Para 48 (regarding the project site where there**	*Please note that some of the project's main documents were translated to Spanish and Arabic and available on the*		The consultant understands that there were translations made of

#	Paragraph / section	Stakeholder comment[88]	UNEP EO suggestion / response	Consultant response /action
	were less hits in countries where English was not a primary language)	*web portal KP section of UNEP.*		some documents into Spanish and Arabic. However, these translated documents were not easily accessible on the website unless the user had prior information on where to access these documents. No changes were made to Para 48.
8	***Para 48 (regarding limited engagement of the network of international expertise on Output 1.3)***	*The SWH TechScope Report and Analysis tool were developed in close cooperation with the project countries as they provided valuable information and inputs to the report.* *The regional partners were to promote SWH technology and provide TA to countries in their region, and not just to the CPs.*	Why doesn't this close collaboration come out anywhere in CP reports? Consider the driver that could be discussed here.	While the consultant agrees that there was close collaboration with the CPs as a means of preparing the SWH TechScope report, this does not change the evaluation assertion that there was limited engagement of international expertise in most of the CPs. The text has been edited to reflect regional partner involvement in information dissemination in driving replication of SWH replacement programmes in the CPs as well as other regional countries.
9	***Para 49 (regarding an assessment of Direct Outcome 3)***	*It is important to mention that the web portal became the main reference web site for any solar thermal areas and latest news, and that can be validated from the ranking of the web portal on different search engines and especially on Google.*		Agreed. This information has been added to Para 49.
10	***Para 50 (regarding assessment of Output 1.8)***	*During the project regional workshops, participating countries including the CPs provided valuable feedback and recommendations about the knowledge products that they require, as well as the structured methodology of the SWH TechScope that helped them improve their understanding of potential benefits and challenges in their countries with regard to the development of vibrant SWH markets*	This is a view of the stakeholder. Ensure that your judgement of a "poor" rating is based on something	The effectiveness should be assessed instead as moderately satisfactory. This is based on the fact that while valuable SWH information was disseminated, there was little to no follow-up on future collaborations between SWH project developers and regional partners. Changes have been made in the text.

#	Paragraph / section	Stakeholder comment[88]	UNEP EO suggestion / response	Consultant response /action
11	**Para 54 (regarding the lack of a formal process to assist other countries in preparing SWH proposals in the form of NAMAs and PIFs**	*The project developed:* *-a model and template PIF sent to the regional partners to facilitate the process of preparing the PIF document despite the challenges due to the lack of interest of the countries to assign allocated GEF funds;* *- the SWH NAMA Guidebook that was disseminated to all regional partners and translated to Spanish and Arabic languages, with sustained support from regional partners mainly OLADE and RCREEE.*	Consider again what are outputs, when taking into account the stakeholder comments, and factors supporting longer term results (factors sustaining the results, change mechanisms).	Consultant agrees to clarify the assessment that there is a guidebook and regional partners support to assist other countries in preparing SWH proposals in the form of NAMAs. However, despite the availability of these resources, funding for this support has not yet been confirmed. Edits have been made in Para 54 to reflect this clarification.
13	**Para 60 (regarding sustainability of financial resources)**	*The regional partners are playing an important role for sustaining the efforts developed under the project behind maintaining regional rosters. The global component of the project was able to support and build the capacity of the regional partners to promote for the SWH technology in their region and member countries. For example, the project's regional partners (RCREEE, UVI and OLADE) conducted and developed three Regional Solar Water Heating Market Readiness Assessments, by applying the Solar Water Heating Market Readiness Assessments TechScope standardized Methodology and Analysis Tools on a number of countries in their respective regions.*	Please ensure that this TOC driver (role of the regional partners) is sufficiently discussed.	The consultant has edited Para 60 to reflect the lack of confirmed financial resources to recruit roster experts. In addition, the roles of the regional partners as a TOC driver towards replication of SWH replacement programmes has been further discussed in Para 83.
14	**Paras 69-70 (regarding catalyzing behavioral changes)**	*This rating did not consider the catalyzed behavioral change on the regional partners who are now able to promote and provide technical backstopping to their member countries from all the KP developed under the project, if that aspect to be considered I think the rating can be re-considered.*	Could be a good point. Do we have any indications on the catalytic effect in regional level?	Consultant agrees that this is a good point. In particular, OLADE and RCREEE appear as regional partners who have provided assistance in the preparation of NAMAs and the SHAMCIE regional standards for SWH in the Middle East. Edits have been made in Para 70.
15	**Paras 72 (regarding project impact in**	*This protocol was meant to ensure improved coordination and communication. I don't think there was anything*		The consultants agree with UNDP's comment and regrets omitting their

#	Paragraph / section	Stakeholder comment[88]	UNEP EO suggestion / response	Consultant response /action
	providing incentives)	*wrong with this protocol, but it is true that in spite of this, it doesn't seem to have led to increased use of TA from the global component to the country components. UNEP seems to interpret the protocol as a constraint. I don't think this is correct. The real reasons for limited uptake of TA was that the participating countries had their own network of experts, in which they seem to have placed higher trust than in the global component. In general there was a high level of country ownership in the country components and they felt that this was compromised when dealing with the global component, which was often perceived as top-down. This has nothing to do with the protocol, which was just an administrative arrangement to channel the requests. From what I recall, there were very few requests and that was not because of the protocol. I wonder if the evaluators were able to get the views of the country clients on this.*		perspective. Edits have been made in Para 72 to more fully reflect the difficulties in coordination and communication between UNDP and UNEP.
16	**Para 74 (regarding role of UNEP in contributing to institutional changes on the project)**	*Similar to Para 72, this gives the misleading impression that the protocol (here presented as a "constraint") was the reason for UNEP limited role in contributing to institutional changes*		The consultants agree with UNDP's comment for reasons mentioned in Para 72. Edits have been provided in para 74 to reflect this.
17	**Para 79 (regarding UNEP role in creating opportunities for technology champions to catalyze change)**	*As above, this seems a general "line of defense" followed to explain below expectation performance by UNEP. I don't agree with this*	Possibly worth indicating this in the report based on the interviews. UNEP and UNDP will disagree on these issues	Again, the consultants agree with the UNDP's perspective, and have made adjustments to the text in Para 79.
18	**Para 80 (regarding UNEP role in replication strategy)**	*A dissemination strategy for sustainability report was developed and used by regional partners after the project's completion, aiming to: a) further disseminate and engaging SWH stakeholders in the promotion of the SWH technology after the project's completion by providing a blueprint/ guidelines to follow in disseminating the work and results of the GSWH Project, ….; b) provide stakeholder identification, analysis and interaction process to create an impact that will last beyond the end of the project by*		Edits have been made in Para 80 to reflect the contents of the February 2016 dissemination strategy for GSWH.

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		making the project's deliverables known to those who could benefit from them including a matrix with targeted stakeholder groups and useful information on why we want to reach them…..; and c) map the project's deliverables to different targeted stakeholder groups by identifying and recommending the most appropriate project's material, knowledge product and tools available for each stakeholder.		
19	***Para 82 (regarding a low number of PIFs prepared under the project)***	*Regarding the statement that "many countries did not have sufficient GEF-5 allocations that could be programmed into a GSWH Phase 2 project", we feel this is not just because of lack of GEF-5 allocations, but also a lack of enough countries prioritizing this high enough to pursue SWH PIFs. This is not something to drive in a top down fashion: it has be driven by country priorities and commitments. Further, it has to be understood, that from the time this program was approved (at the end of GEF-3), a new system of resource allocation was introduced in GEF-4, allocating defined envelops of resources to each country (called initially the RAF, then renamed with some changes as STAR as of GEF-5 and continuing into GEF-6). This was a fundamental change in the way the GEF operated and how it allocates and approves funding proposals. Before, up till end of GEF-3, it was just one big common pot, with first come first serve applications.*		The consultants appreciate the added clarity of the UNDP comment, and have provided edits in Para 82 to reflect the additional information.
20	***Para 83 (regarding assessment of project's catalytic impact on replication projects)***	*For the catalyzed replication effect, the project's global and regional partners will continue to play the role of knowledge hubs, after the completion of the project. The regional partners contributed in generating knowledge products and services to the countries in their respective region, and will continue to ensure that these products are effectively disseminated*		The consultant agrees with this comment as it is similar to the comment for Para 60. Edits have been made to reflect the increased role of regional partners as a driver towards replication of SWH programs in other countries.
21	***Para 84 (Clarification of Component 1 cost***	*The main role of the regional partners was to develop knowledge products with specific tasks and agreed*		The consultant has made edits IN Para 84 to reflect new information

#	Paragraph / section	Stakeholder comment[88]	UNEP EO suggestion / response	Consultant response /action
	efficiencies)	*responsibilities according to their capacities and comparative strengths, The knowledge products developed are mainly addressing the needs of their member countries.*		from UNEP-DTIE on the main role of the regional partners.
22	**Para 101 (regarding frequency of PMC meetings)**	*It was agreed with the project main partners that all the PMC meetings will be held as a back-to-back meeting with each the planned regional workshops, since all the main project partners are present in those workshops. In 2012 (regional workshop in Lebanon) and 2013 (Regional workshop in Albania), the ICA representative was not able to attend so the PMC meetings were cancelled at the last minute with no possibility of re-organizing meetings during those 2 years due to conflicting schedule of the partners.*		The consultant appreciates the additional details on why there were no PMC meetings during 2012 and 2013. Edits have been provided in Para 101 to reflect this new information.
23	**Para 103 (assessment of follow-ups after regional workshops)**	*The global component was able to visit most of the countries, since the regional workshops were organized in one of the project countries. Field visits were also conducted to a number of SWH sites and a SWH testing facility.*		The consultant is aware of KM personnel visiting every CP. However, the issue being discussed in this section is related to the lack of follow-ups to strengthen collaboration after the workshops. Edits have been provided in Para 103 to clarify this point.
24	**Para 112 (regarding the lack of a completed document on lessons learned during implementation)**	*The experience and lessons learned were documented through 2 knowledge products developed. The first time was in January 2014, by profiling the five project countries using SWH TechScope methodology in: Albania, Chile, India, Lebanon, and Mexico with an overview of the current SWH market conditions in five geographically diverse project countries. The second time was by January 2015, by developing three separate comprehensive full case study reports on the SWH National Programs in Lebanon, Chile and Mexico, that analyzed and evaluated SWH development of those CPs.*		The consultant appreciates the updated information, and has provided edits in Para 113 accordingly
25	**Para 119 (regarding the surplus GEF funds**	*This was a rough estimate of remaining budget that was provided to the evaluator upon his request, and the*	If the project doesn't even know this figure, it will be mentioned in	The consultant acknowledges UNEP-DTIE comments, and prefers

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	remaining at the end of project)	*evaluator was informed that this amount would never be considered official, and that the exact final figure should be provided by the project FMO after financial closure of the project. I would suggest removing or just mentioning that the amount would be around USD 500,000.* *Please also consider that Output 1.2 budget allocation was not fully utilized due to the lack of interest of other countries to allocate part of their GEF funding to develop national SWH projects.* --- *We made specific suggestions for spending the balance, focused on a better NAMA proposal for Lebanon, but this was never acted on.*	the report. I suggest we ask for updated specific figures UNEP EO would suggest considering that lack of adaptive management and unspent funds are more about unsuccessful project management (not that much about the flaws in financial management).	to mention an estimate of the surplus funds as this is integral to the evaluation. The consultants agree with the EO's comment and have moved this discussion to Para 109 under Section 3.6.2 "Project Management and Implementation" Edits of the Output 1.2 surplus have been provided in Para 109. We have added UNDP's comment to Para 109.
26	***Para 123 (regarding the quality of CP financial management***	*Not sure that you can conclude that "financial reporting … was unsatisfactory" because of the "lack of financial information disclosed during the evaluation". At best you could say that you were unable to assess this.*	*Availability of financial data for evaluation is one sub-criteria as also indicated in the GEF defined table for financial stuff. But better articulate this better.*	Consultants agree with these comments and have provide edits accordingly.
27	***Para 127 (regarding the gap between dates of the 2nd and 3rd PMC meetings)***	*What was the reason for this long break?*		Reasons are provided in Para 101 by UNEP-DTIE.
28	***Para 137 (regarding statement that the GSWH Project was one of the***	*This may be true at least in the CCM focal area. There had been other examples in BD and IW and LD.*	We may want to specify this.	Edits have been made in Para 137 to specify that the project was one of the earliest attempts for co-

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	earliest attempts by GEF for a UNEP and UNDP co-implemented projects			implementation of a CCM project.
29	***Para 139 (regarding the presence of CP personnel at PMC meetings)***	*I definitely recall country rep's at the first PMC meeting in Tunisia.*		The name of the country representative is not indicated on the PMC meeting minutes. As such, no changes have been made in Para 139.
31	***Para 140 (regarding usefulness of the KPs and the lack of additional outreach events to raise UNEP profile on Project)***	*The statement "UNEP-DTIE did not see the necessity for additional travel to CPs for additional outreach events" is not accurate. As mentioned before, regional workshops were mainly organized in project countries to have better interaction. Regional partners also disseminated KPs developed by the project to their member countries.*	Based on the CP reports, country partners were not aware of UNEP	The consultants believe that the statements still reflect the situation accurately. One change to clarify Para 140 includes "UNEP-DTIE did not use available funds for additional outreach events ……to raise their profile"
32	***Para 140 (regarding only conducting the minimum required workshops that resulted in a lost Project opportunity)***	*a) on "improved sharing of information on SWH markets", we developed 6 Solar Thermal Application Factsheets that covered different solar thermal including possible ranges of use, energy saving effect and GHG, with perception of the competitiveness, investment cost and economic value;* *b) on "discussing common issues on a global platform" this was done through webinars conducted under the solarthermalworld web site; and* *c) on "effectively catalyzing interest other countries into preparing SWH proposals", we developed 3 main regional SWH assessments reports and the work of the regional partners to follow up with their member countries after the project's closure*		The consultant's main issue was the lack of UNEP profile amongst all CPs. A possible remedy to this could have been additional regional workshops and additional events to contact with CPs and their stakeholders. Webinars and KPs help disseminate information but there is little evidence of stakeholder feedback and follow-up. Edits have been made in Para 140 to more strongly reflect the evaluation position on this.
33	***Para 142 – Recommendation #1 (regarding joint activities involving interaction between UNEP and another agency should be***	*Is the logframe the right place to mention elements of coordination?*	It could be as log frame defines the accountability and monitoring mechanisms.	The log-frame serves as the proper tool to define the elements of coordination as the indicators in the logframe would serve as a means towards achieving project objectives and outcomes.

#	Paragraph / section	Stakeholder comment[88]	UNEP EO suggestion / response	Consultant response /action
	defined in the project log-frame analysis and the Theory of Change ….. including sufficient budgetary and time resources in project design budget…. to maximize the success of inter-agency collaboration)	*Sufficient budgetary time and resources could have a significant impact on PMC costs, exceeding the GEF threshold.* *The statement "Code of conduct of UNEP personnel with other agencies should be one of flexibility and transparency which has been an issue in the past" needs clarification*		UNEP-DTIE is correct in its assertion. However, the consultant believes that this is a necessary investment if there is to be effective interagency cooperation. Edits have been provided for clarification in Para 142.
34	***Para 143 – Recommendation #8 (regarding examples of what UNDP could do to improve the lack of systematic monitoring of baseline energy information for water heating)***	*The project also developed the SWH Techscope GHG Reductions Calculator Tool…..that provides complementary functions designed to help policymakers quantify GHG emissions reductions associated with increased development of SWH systems*		The consultants regret the omission of this important tool developed by UNEP-DTIE. It has been added to the recommendation.
35	***Para 144 - Lesson #3 regarding the use of unqualified technical experts***	*In the statement "the use of unqualified technical experts who cannot deliver global best practices on market transformation activities substantially raises the risk of a project not being properly implemented or not generating the planned benefits", do the evaluators have clear evidence that this was the case. And if so where? It would be useful to know.* *Regarding the statement "Overcoming country reluctance to use qualified personnel through a GEF project should be the responsibility of UNDP RTAs and UNEP-DTIE who can play a stronger role in defining specific technical assistance to country offices", This seems to indicate that this was not done. I don't think this is correct. RTAs definitely did provide guidance on which consultants to*		We have a specific example in one of the CPs which we could disclose to UNDP separately. This is an example of CPs and other UNDP offices where technical recruitment decisions are made without the benefit of a qualified technical person (in this case in energy). This is where the involvement of an RTA as an advisor is not only essential but mandatory for the project. The consultants do agree with UNDP's assertion that a central pool of experts is not the most effective means of dealing with this issue.

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		select. What the evaluators do not seem to know is that the RTAs are just "advisers" to the Country Offices, which have the principal responsible entities for implementing. In addition, the "reluctance" usually comes from the country stakeholders (not from the CO). One should also review/assess whether the "qualified personnel" being offered, actually was "qualified", or could objectively be seen as the best available (or at least better than what they had sourced themselves). Often lacking from the "centrally provided assistance through the global component", was a lack of country specific experience, lack of understanding of local context. This is understandable, as a central global team cannot be expected to have expertise that covers all countries. This in itself points to a weakness in the idea of having a central pool of experts, as the most effective way of dealing with this. One would need to carefully reflect which types of expertise lend themselves to be provided effectively in this way.		However, this does highlight the weaknesses of recruitment in CPs and some UNDP offices, and for RTAs to play a stronger role in recruitment. The consultants have provided edits to the Lesson Learned for clarification.
	Other inputs/feedback			
36	***Table V-1: GSWH Project Costs***	*This table was provided as a rough estimate of the amounts as requested by the evaluator, but financial accounting system and the project budget presented in the project document were not developed to track expenditures by outcomes. So please kindly use UNEP's project budget format in project document.* *The evaluator was informed that these amounts would never be considered official. The exact final figures should be provided by the project FMO and based on the project budget presented in the project document, and after the financial closure of the project document.*	The official financial statement (with UNEP budget lines) has been requested from the FMO, not received. The report is following the basic GEF requirements.	This is the format prescribed by GEF. Changes made in the document are in Footnote 53 that mention the amounts in the table as "estimates".

ANNEX XIV. QUALITY ASSESSMENT OF THE EVALUATION REPORT

All UNEP evaluations are subject to a quality assessment by the Evaluation Office. The quality assessment is used as a tool for providing structured feedback to the evaluation consultants.

The quality of both the first draft report and final evaluation report is assessed and rated against the following criteria:

		UNEP Evaluation Office Comments	Draft Report Rating	Final Report Rating
Substantive report quality criteria				
A.	***Quality of the Executive Summary:*** *Does the executive summary present the main findings of the report for each evaluation criterion and a good summary of recommendations and lessons learned? (Executive Summary not required for zero draft)*	Draft report: n/a Final report: EO requested the team to complete the executive summary based on the 2017 guidance (which doesn't require discussion about each criterion). It presents the evaluation context, overall rating and summarises the key findings, recommendations and lessons of the evaluation.	n/a	5
B.	***Project context and project description:*** *Does the report present an up-to-date description of the socio-economic, political, institutional and environmental context of the project, including the issues that the project is trying to address, their root causes and consequences on the environment and human well-being? Are any changes since the time of project design highlighted? Is all essential information about the project clearly presented in the report (objectives, target groups, institutional arrangements, budget, changes in design since approval etc.)?*	Draft report: A concise but sufficient description of the context and project design including description of the changes in project focus. Final report: EO comments addressed in the final version	5	6
C.	***Strategic relevance:*** *Does the report present a well-reasoned, complete and evidence-based assessment of strategic relevance of the intervention in terms of relevance of the project to global, regional and national environmental issues and needs, and UNEP strategies and programmes?*	Draft report: Some gaps in the presentation due to missing information from some of the country programmes Final report: Covers the TOR requirements well.	4	5
D.	***Achievement of outputs:*** *Does the report present a well-reasoned, complete and evidence-based assessment of outputs delivered by the intervention (including their quality)?*	Draft report: Component 2 output section was about outcome level achievements (country targets/indicators) needed to be revised. Component 1 output section lacked assessment of quality of deliverables, Final report: Component 2 outputs are now well summarized based on the country programme evaluation findings. Component 1 outputs are described in a satisfactory manner (still minor gaps in output quality assessment)	2	5
E.	***Presentation of Theory of Change:*** *Is the Theory of Change of the intervention clearly presented? Are causal pathways logical and complete (including drivers, assumptions and key actors)?*	Draft report: Lacks sufficient breakdown of outcomes, identifies many drivers and assumptions but their role in the change process should be further specified Final report: TOC revised as per EO feedback, providing a sufficient framework for further analysis.	2	5
F.	***Effectiveness - Attainment of project objectives and results:*** *Does the report present a well-reasoned, complete and evidence-based assessment of the achievement of the relevant outcomes and project objectives?*	Draft report: The logic of the effectiveness analysis is there but the presentation is slightly confusing and the linkage to the TOC at times poor.	3	5

	Final report: EO comments integrated in the report and presentation clarified		
G. ***Sustainability and replication:*** *Does the report present a well-reasoned and evidence-based assessment of sustainability of outcomes and replication / catalytic effects?*	Draft report: Well detailed section with some overlap with effectiveness section (replication as an intermediate state). Final report: EO comments mostly addressed. Some overlap remains with the effectiveness section which could have been further addressed.	4	5
H. ***Efficiency:*** *Does the report present a well-reasoned, complete and evidence-based assessment of efficiency? Does the report present any comparison with similar interventions?*	Draft report: Timeliness and cost efficiency aspects specified. Final report: Final version further elaborated, some	5	5
I. ***Factors affecting project performance:*** *Does the report present a well-reasoned, complete and evidence-based assessment of all factors affecting project performance? In particular, does the report include the actual project costs (total and per activity) and actual co-financing used; and an assessment of the quality of the project M&E system and its use for project management?*	Draft report: Detailed sections, some inconsistency in the ratings and gaps in information. Final report: EO comments mostly addressed and information gaps filled	4	5
J. ***Quality of the conclusions:*** *Do the conclusions highlight the main strengths and weaknesses of the project, and connect those in a compelling story line?*	Draft report: a well presented summary Final report: same as above	5	5
K. ***Quality and utility of the recommendations****: Are recommendations based on explicit evaluation findings? Do recommendations specify the actions necessary to correct existing conditions or improve operations ('who?' 'what?' 'where?' 'when?)'. Can they be implemented?*	Draft report: Useful and concrete, deriving from the evaluation findings Final report: same as above	6	6
L. ***Quality and utility of the lessons:*** *Are lessons based on explicit evaluation findings? Do they suggest prescriptive action? Do they specify in which contexts they are applicable?*	Draft report: not finalized yet (only a draft available) Final report: well formulated and based on the evaluation findings	4	6
Report structure quality criteria			
M. ***Structure and clarity of the report:*** *Does the report structure follow EO guidelines? Are all requested Annexes included?*	Draft report: yes Final report: same as above	6	6
N. ***Evaluation methods and information sources:*** *Are evaluation methods and information sources clearly described? Are data collection methods, the triangulation / verification approach, details of stakeholder consultations provided? Are the limitations of evaluation methods and information sources described?*	Draft report: mostly yes Final report: same as above	5	5
O. ***Quality of writing:*** *Was the report well written? (clear English language and grammar)*	Draft report: a well written report Final report: same as above	6	6
P. ***Report formatting:*** *Does the report follow EO guidelines using headings, numbered paragraphs etc.*	Draft report: yes Final report: same as above	6	6
OVERALL REPORT QUALITY RATING		**4.5**	**5.4**

The quality of the evaluation process is assessed at the end of the evaluation and rated against the following criteria:

	UNEP Evaluation Office Comments	**Rating**
Evaluation process quality criteria		
Q. ***Preparation:*** *Was the evaluation budget agreed and approved by the EO? Was inception report delivered and approved prior to commencing any travel?*	The EO had designed the evaluation with very tight schedule. Thus, the inception report was delivered, but there wasn't enough time to review and revise the inception report prior missions.	4
R. ***Timeliness:*** *Was a TE initiated within the period of six months before or after project completion? Was an MTE initiated within a six month period prior to the project's mid-point? Were all deadlines set in the ToR respected?*	The project included several relatively independent components (global component and 5 country components). There was	3

		variation in the end-dates of these components, which proved to be problematic to meet this timeliness criterion of 6-months.	
S.	***Project's support:*** *Did the project make available all required documents? Was adequate support provided to the evaluator(s) in planning and conducting evaluation missions?*	In terms of UNEP and most of the country programmes mostly yes.	5
T.	***Recommendations:*** *Was an implementation plan for the evaluation recommendations prepared? Was the implementation plan adequately communicated to the project?*	Will be prepared concerning the UNEP related recommendations. UNDP related recommendations will be communicated forward.	6
U.	***Quality assurance:*** *Was the evaluation peer-reviewed? Was the quality of the draft report checked by the evaluation manager and peer reviewer prior to dissemination to stakeholders for comments? Did EO complete an assessment of the quality of the final report?*	First draft reports were peer-reviewed (including country programme evaluation reports of Albania, Chile, Lebanon and Mexico)	5
V.	***Transparency:*** *Were the draft ToR and evaluation report circulated to all key stakeholders for comments? Was the draft evaluation report sent directly to EO? Were all comments to the draft evaluation report sent directly to the EO and did EO share all comments with the commentators? Did the evaluator(s) prepare a response to all comments?*	TOR was circulated to UNEP and UNDP focal points. The global draft report was circulated to the above parties and evaluation participants, as well as to the participating UNDP country offices (COs). Country component evaluations were circulated to UNDP COs and those national partners that were identified as key persons in project implementation. Most comments were handled directly by the EO but due to language barriers some comments were submitted via UNDP Chile (CO).	4
W.	***Participatory approach:*** *Was close communication to the EO and project maintained throughout the evaluation? Were evaluation findings, lessons and recommendations adequately communicated?*	The preliminary findings session to discuss about the key global findings was held in June 2016, while the evaluation findings and recommendations were finalized Feb 2017 (due to delayed country component evaluation outputs).	4
X.	***Independence:*** *Was the final selection of the evaluator(s) made by EO? Were possible conflicts of interest of the selected evaluator(s) appraised?*	yes	6
		OVERALL PROCESS RATING	**4.6**

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

The overall quality of the evaluation report is calculated by taking the mean score of all rated quality criteria.