



**GEF UNDP India / MNRE Project 61121 – Global Solar Water Heating Market Transformation and Strengthening Initiative (India GSWH) Project**

**Final Report  
MID TERM REVIEW**

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# 1. EXECUTIVE SUMMARY

India has a growing demand for low temperature hot water (40 – 60°C) for use primarily for personal hygiene/washing. The default provision of low temperature hot water for residential use in India is by low initial cost but expensive to operate small electric storage cylinders (geysers in India) and by furnace oil fired boilers for commercial and industrial uses in India. This low temperature<sup>1</sup> hot water demand is increasingly being met in India by the globally mature technology of solar water heaters (SWH).

India is potentially the second largest SWH market in the world - after China which is by a considerable margin the largest global SWH market and SWH manufacturing and exporting nation, primarily of evacuated tube collector (ETC) systems (flooded systems in the tropical/temperate south and heat pipe systems in the North with its long cold winters).

The Global Solar Water Heating Market Transformation and Strengthening Initiative (India GSWH) project is a \$2 million India GEF (Global Environmental Facility) grant funded project. The project was developed from 2005 – 2008 as part of a UNEP and UNDP six-country project, with the knowledge management component managed as one project by UNEP, and the individual country implementation aspects managed by UNDP as six individual nationally executed projects. The India GSWH project was approved within the overall 6-country (Global) consolidated project. Hence no detailed quantitative overall, component and activity project baseline nor detailed specific Indian SWH incremental analysis was undertaken for the India-specific GSWH project before its approval - although the development of country-specific baselines and individual country incremental analysis was specified as a key design activity to be undertaken in the 6-country ProDoc that was the basis for the 6-country GEF funding approval. This lack of a specific baseline or incremental design for India gave the India GSWH project a very general design with very non-specific component and activity level indicators and unclear links of how the component and activities were expected to contribute towards the achievement of the overall objective. The specific activities and project success indicators presumably were to be added later, although this detailed project analysis and specification has not yet been undertaken for India. The project's stated overarching objective was to facilitate an incremental 2 million m<sup>2</sup> of SWH in India, over and above an assumed baseline increase of 3 million m<sup>2</sup>. No analysis could be found of how the project activities were expected to lead to an addition 2 million m<sup>2</sup> of SWH in India. The only known background analysis, baseline analysis, and incremental analysis are very generic and qualitative and not quantitative in nature, and are to be found in the Global 6-country and India-specific ProDocs (the India ProDoc is identical in both places), and they do not seem to be the result of any specific quantitative analysis of or for SWH in India. The derivation of the 3 million-m<sup>2</sup> baseline increase and 2 million m<sup>2</sup> of incremental project derived SWH increase in India seems to come from the application of well-rounded arbitrary annual growth rate projections.

The Government of India (GOI) has supported the increased uptake of SWH in India for many years, in particular through: a SWH subsidy scheme; the provision of testing facilities at SEC (MNRE's (the Ministry of New and Renewable Energy) Solar Energy Center); a range of SWH manufacturer and dealer support activities; and the development and uptake of a range of policy and administrative measures.

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<sup>1</sup> Medium temperature process heating is being dealt with by the GEF MNRE-UNDP Market Development and Promotion of Solar Concentrators based Process Heat Application in India (India CSH) project that is now being separately implemented.

The India GSWH project is being implemented by MNRE, which is the main India GSWH project in-cash co-funder (\$10.8 million scheduled) through its ongoing India SWH subsidy program (with scheduled \$10 million, actual \$16 million to January 2012 according to MNRE). The International Copper Promotion Council of India (ICPCI) is also a major in-cash project co-funder (scheduled co-funding of \$0.3 million).

The India GSWH ProDoc (Project Document) was signed by the India government on 21 November 2008, which is then the nominal or official project start date. The project inception workshop was held in March 2009, which is taken as the project's actual tangible start date. The project had a scheduled duration of 4.5 to 5 years. The project scheduled end date is December 2012. The project end date could be considered for a six-month extension to remove the spending rate pressure that has been a clear focus of the project's implementation to date, and to allow time for the proposed mid-term corrections made in this MTR to be fully implemented.

As required for all GEF projects, an independent mid-term review (MTR) was commissioned, although this was initiated around 9 – 13 months later than would have been ideally required to provide its findings and recommendations by the mid-term of the project, and thus give adequate time to consider and implement any project mid-course corrections. When the MTR evaluation mission was fielded in January 2012, only \$513,000 out of the project GEF funding of \$2.0 million then still remained uncommitted. The project implementation agency, MNRE, has indicated that co-financing from the MNRE administered SWH subsidy scheme already exceeds planned co-financing levels to the end of the project. Exceeding co-funding levels well before the end of the project is very positive, however, it should be noted in passing these co-financing levels could not be independently verified for this MTR.

Early India GSWH project activities were initiated in a very timely fashion, with a pivotal SWH Market Assessment study findings available by December 2009. This study found that more than 80% of the existing annual sales of SWH m<sup>2</sup> in India were in the residential sector, and that by 2022 the total SWH annual m<sup>2</sup> sales in India were still expected to be more than 80% residential, although with a shift to apartment buildings' SWH. However, there is no evidence that knowledge of this residential market dominance was then used to guide any subsequent India GSWH project specific activity or expenditure prioritisation.

The project implementation management has been clearly strongly focused on maintaining a rate of project expenditure such that project funds would be fully expended by Dec 2012 – and the project has clearly been successful to date in its timely expenditure of project funds.

In terms of specific project outcomes and outputs (which is the specific language terms used in this project, but these are more commonly known as components and activities in GEF projects), the project has produced a number of reports and funded numerous SWH support activities. In evaluating the impact of the reports and activities, while they are relevant in principle to the growth in SWH m<sup>2</sup> in India, there is a general lack of specific independently verifiable baseline and incremental indicators to judge the effectiveness of baseline and incremental (additional and due to the project) effectiveness and impacts. It is also difficult to judge the post-project sustainability of project activities.

The project formulation is assessed as being Marginally Satisfactory as the project baseline situation and incremental activities and end-points are entirely reasonable in general qualitative terms, however there is no evidence available to judge their validity or otherwise in India-specific quantitative terms. In addition, although the project's stated overall objective was to increase the total m<sup>2</sup> of SWH installations in India, yet the project lacked a clearly up-to-date and independently verifiable baseline value for the

total and annual m<sup>2</sup> of SWH installed in India. Finally, the project's baseline and incremental annual SWH m<sup>2</sup> installation rates lacked any quantitative justification for the values chosen in the ProDoc, which is not to say that the figures are wrong, just that one has no way of telling how realistic or otherwise these figures are.

With regards to country ownership and/or country drivenness of the overall India GSWH project national objective of expanding the total m<sup>2</sup> of SWH installed in India, this was clearly an idea that had strong national ownership during the design process for the GEF funded GSWH project in India. Strong and active stakeholder participation is clear for the project inception from the attendance of 80 participants at the India GSWH project Inception Workshop held from March 4-6, 2009. As regards to the replication approach at the project's design stage, the ProDoc elaborated a generally sound project replication strategy. However, there is no evidence that any replication is currently being actively monitored beyond that supported by the ongoing MNRE subsidy support for SWH in India. So any non-MNRE subsidy SWH installations in India are not being captured in the M&E approach followed to date in the India GSWH project.

The project's implementation to date is assessed as *Marginally Satisfactory*. Strong SWH sales increases are reported, but these values are not independently verifiable, and it is also not possible to tell what the sales figures would have been in the absence of the India GSWH project. Numerous individually useful reports, training activities, and awareness events have been produced by the project. Although the work undertaken by the project to date contains the necessary information to quantify and priorities project activities, however there is no evidence that the project's implementation to date has been directly and explicitly linked to achieving the overarching stated objective of the project, which is achieving the maximum total m<sup>2</sup> of SWH sales and installations in India. While the residential sector has been clearly established as the current and future sector accounting for at least 80% of SWH sales in India, the project's efforts to date have instead been scattered across all applicable sectors, and without any rationale why the other minor SWH sales sectors have been so strongly focused on instead of focusing on the dominant residential sector for SWH in India. In addition, the project's implementation still lacks a detailed quantitative based baseline or incremental plan, and also lacks independently verifiable indicators of both the initial and the current situation of project related activities and the total installed (let alone still working) m<sup>2</sup> of SWH in India. So for example: there were apparently 20 Government Orders applying to SWH in India in 2004-06 prior to the project and 100 SWH related GO's in place in October 2011, but the actual enforcement and hence impact of such additional GO's is unknown; also unknown is the role the India GSWH played, if any, in their increased numbers; useful SWH market studies were commissioned and completed but there is no evidence of their findings being applied in the subsequent project prioritisation; no discernable progress is apparent in developing proper formal BIS technology-neutral SWH performance standards; an ongoing bias towards flat plate collectors is apparent in MNRE published material; only flooded ETC (evacuated tube collectors) are generally mentioned in the project literature and there is almost no mention of heat pipe ETC which are highly relevant for the many SWH applications in India where freeze protection, use of high dissolved solids water, and/or mains pressure hot water are desired; project results are mentioned and available on six project related websites, but no hotlinks are provided between the various websites; and the around 9 -13 month delay in initiating the MTR meant that less than 25% of project funds was still uncommitted when the draft MTR report was produced by the MTR consultants.

As per MNRE advice, the project's GEF expenditure versus target was 90% in 2009, 104% in 2010, and 88% in calendar 2011. As per MNRE advice during the MTR mission in January 2012, \$513,000 then remained unspent and uncommitted. From the tracking of expenditure by Outcome (noting that it was

not possible to check that project expenditure have been accurately coded to the proper Outcome), it is clear that the main focus of the India GSWH project's implantation to date has been on the Outcome 2: Awareness and Capacity area, with some focus on Outcome 1: Policy and Outcome 3:Financing, but with little focus to date on Outcome 4: Certification, Quality Control, and Training and Outcome 5: Knowledge Management.

MNRE has clearly been a committed project implementation agency in terms of: ensuring strong and timely project manager staffing of the project: providing ongoing high-level chairing of project meetings: ensuring that project expenditure rates remain on track; and ensuring that generally appropriate project activities are undertaken as specified in the project document.

## 1.1 Recommendations

In its remaining operations, it is recommended that the India GSWH project: -

1. **Establish Independently Verifiable Baseline and Progress Indicators** - that a suitable independent consultant be retained to undertake an independent study of the applicable project baseline and of the indicators of project inputs and results so that a useful final project evaluation can be undertaken.
2. **Focus Remaining Project Funds on Residential SWH Market** - if necessary the project end date should also be extended by six months to enable these and other recommendations to be fully implemented.
3. **Consolidate and Learn from Completed SWH Studies** - that consultants with expertise in capturing and synthesizing lessons learned and looking forward to future needs be recruited for this task.
4. **Expedite MNRE Subsidy Payments to SWH Manufacturers** - that MNRE urgently address this issue of the timely reimbursement of SWH subsidies to approved SWH manufacturers, for a target maximum reimbursement period on receipt of paperwork by SWH manufacturers of say 2 - 6 weeks. The MNRE SWH subsidies are the main part of the India GSWH project co-funding, and delays in the MNRE subsidy's disbursement (as was reported to the MTR reviewers) would undo much of the benefit of the SWH growth support provided by the India GSWH project.
5. **Start Planning for Eventual MNRE SWH Subsidy Phase Out** - that the project fund considerations and criteria for an exit strategy for the current SWH subsidy scheme, as no subsidy lasts forever.
6. **Urgently Start Work on BIS Technology-Neutral SWH Standards** - that a key project priority be the urgent development of whole-system, performance oriented and technology neutral BIS standards.
7. **Project / MNRE Literature to Better Describe SWH Tech Options** - that the India SWH project literature be urgently updated to describe the full range of the four main SWH technology systems options available, and low/high pressure configurations, and their applications in different sectors.

## 2. LIST OF ABBREVIATIONS AND ACRONYMS

APR	Annual Project Review
AWPs	Annual Work Plans
BIS	Bureau of Indian Standards
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
DOE	Designated Operation Entity (a UNFCCC accredited CDM PDD auditor)
ESCO	Energy Service Company
ETC	Evacuated Tube [SWH] Collector
EU-ETS	EU [GHG] Emission Trading Scheme
FPC	Flat Plate [SWH] Collector
FSP	Full Scale Project (of GEF)
GEF	Global Environmental Facility
GEF-4	GEF 4 <sup>th</sup> replenishment funding cycle
GEFSEC	GEF Secretariat
GHG	Greenhouse Gas
GO	Government Order
GOI	Government Of India
GSWH	Global Solar Water Heater (project)
ICPCI	International Copper Promotion Council of India
IREDA	Indian Renewable Energy Development Agency
JNNSM	Jaharawal Nehru National Solar Mission (of India)
KM	Knowledge Management
LogFrame	Logical Framework
M&E	Monitoring and Evaluation
MCS	Municipal Corporations
MNRE	Ministry of New and Renewable Energy (an India Union Ministry)
MOEF	Ministry of Environment and Forests (the GEF focal point in India)
MTR	Mid Term Review
NGOs	Non Government Organisations
PEC	Project Executive Committee
PDF	Project Design Facility (a GEF project development funding mechanism)
PIRs	Project Implementation Reviews
PMU	Project Management Unit
PoA	Program of Activities (of CDM)
ProDoc	Project Document
PSC	Project Steering Committee
QPRs	Quarterly Progress Reports
SEC	Solar Energy Center (of MNRE)
SMART	Specific, Measurable, Achievable, Realistic and Time-Bound
SNAs	State Nodal Agencies
STAP	[GEF] Scientific and Technical Advisory Panel
SWH	Solar Water Heater
TBT	Technical Barriers to Trade (under the WTO)
TOR	Terms Of Reference
ULBs	Urban Local Bodies
UNEP	UN Environmental Programme

UNDP  
WTO

UN Development Programme  
World Trade Organisation



### 3. INTRODUCTION

India has a large and growing demand for low temperature (approximately 40 to 60<sup>0</sup>C) hot water for:

- houses and apartment buildings for bathing by the population (in particular in urban areas);
- hotels and hostels in the growing accommodation sector; and
- industrial and process industries' low temperature<sup>2</sup> water heating needs.

The large and growing low temperature hot water demand is due to the fact that India has:

- 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;
- religious pressures to wash daily;
- a large and growing accommodation sector; and
- growing industrial and process industries sectors.

Small capacity storage electric water heaters (called geysers in India) provide most of the low temperature hot water for personal bathing in urban areas. Most low temperature hot water for larger accommodation facilities and for industrial and process uses is provided by furnace oil (as natural gas is not widely reticulated in India). Biomass and fuelwood are also used for water heating in rural areas.

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. Hence electricity prices are generally rising, as well as there being widespread power cuts from electricity demand regularly exceeding available electricity supply. Many industries and commercial establishments therefore have standby diesel generation sets, with high intrinsic fuel cost to operate. Therefore, electric geysers are not only expensive to run but also often do not provide a reliable hot water supply either unless they are supplied by expensive back-up diesel generation.

India imports most of its oil demand and the amount of oil imports is growing. So there is a considerable impetus to increase diesel and furnace oil prices to world market levels and to reduce current unsustainable and distorting oil product subsidies. Hence SWH are highly relevant to industrial and commercial low temperature hot water supply in India.

Biomass stoves used in rural areas are generally highly inefficient and polluting, the excessive use of firewood puts great stress on limited forestry resources, the smoke pollution from inefficient stoves is largely faced by women and children, and women and children often have to spend many hours

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<sup>2</sup>Medium temperature process heating is being dealt with by the recently approved GEF MNRE-UNDP Market Development and Promotion of Solar Concentrators based Process Heat Application in India (India CSH) project

obtaining biomass and fuel wood. Hence SWH are highly relevant in rural India as well, although SWH affordability remains a major challenge.

Solar water heaters (SWH) are an increasingly mature technology that can in principle replace the majority of low temperature hot water demand in India. SWH has been strongly supported by the Government of India (GoI) for at least the last ten years. SWH is also of growing interest to Indian consumers, businesses and industry that are increasingly looking at controlling their water heating costs.

However, SWH is still not a fully mature and available technology in all regions of India, and therefore the India SWH market uptake is still only a small fraction of its full potential. The GoI have supported the increased uptake of SWH in India for many years, in particular through:

- a SWH subsidy scheme paid directly to approved SWH manufacturers who meet a basic SWH prescriptive SWH system quality control and product assurance specification ,
- the provision of testing facilities at SEC (MNRE's (the Ministry of New and Renewable Energy) Solar Energy Center),
- a range of SWH manufacturer and dealer support activities, and finally
- a range of policy and administrative measures at both the Union (i.e. India wide) and state and local levels.

There are some mandates to install SWH in government and other buildings, but it is understood that enforcement of these "administrative orders" is still very uneven.

The potential to significantly address the key barriers to the enhanced uptake of SWH in India provides the core rationale for the GEF funded \$2 million India GSWH (Global Solar Water Heater) full-scale project (FSP) that is the subject of this mid term review (MTR). UNDP is the India GSWH project implementing agency, and MNRE is the project executing agency.

The India GSWH project was conceived, developed and approved as part of the "Global Solar Water Heating Market Transformation and Strengthening Initiative" (the (6-country) GSWH project). The global GSWH project is being jointly implemented by the United Nations Development Programme (UNDP) for its individual country implementation aspects, and by the United National Environment Programme (UNEP) for its global replication and knowledge management aspects. The core international grant-funding component of the GSWH project comes from the Global Environment Facility (GEF). The GSWH project covers six countries, comprising Albania, Algeria, Chile, India, Lebanon and Mexico. The International Copper Association (ICA) has been included from the early inception stage in the project design as the main co-financing and private sector partner of both the wider regional GSWH umbrella project and also of the specific India GSWH project.

All GEF Medium Sized Projects (MSP) and Full Scale Projects (FSP) are subject to mid-term and final evaluations. This MTR (evaluation) covers the period of India GSWH project operations from its project signature in September to 21 November 2008 (the formal project start date) and in particular from its inception workshop in March 2009 (the start of significant project activities) until the MTR mission was fielded in India in mid-January 2012. This MTR report therefore covers three years of the India GSWH project's four years of scheduled operations.

For this India GSWH project's MTR (mid term review), a large number of project background and project related documents were emailed to the reviewers starting from 09 January 2012. From 11 to 18 January 2012, the India GSWH MTR international and national reviewers fielded a review mission in India. The field mission included a wide range of evaluation mission interviews and discussions held with key project stakeholders in Delhi and Pune. A preliminary report-back presentation was provided on 18 January 2012 to the 30<sup>th</sup> Project Executive Committee (PEC) in Delhi. The report back presentation was followed by very useful discussions with the Project Manager (PM) and Deputy Project Manager (DPM) at MNRE (the Ministry of New and Renewable Energy – who are the national implementing agency of the India GSWH project) and UNDP (see Annex E for an updated copy of the preliminary findings' report-back presentation). A wide range of email exchanges followed the India GSWH MTR mission between the reviewers and UNDP to attempt to clarify issues around the existence and provisions of project baseline and implementation prioritization and progress data to cover issues specified in the MTR TOR. These outstanding data issues were clarified in emails sent to UNDP, UNEP, MNRE and ICPCI, for which replies for some issues have been received from UNEP and MNRE.

This India GSWH MTR (Mid Term Review), as should be done for all reviews, logically started by examining the project's development history to clarify how the project (as designed and as approved) was linked (or not) to the available information regarding its background context and relevant (then existing) project analyses. It should be noted that to date no India-specific or comprehensive pre-project baseline information has been identified for perusal during the MTR.

The India GSWH MTR reviewers then looked at the baseline problem definition, the incremental activity analysis, and the barrier removal activity specification in the project design. This sort of information would typically be defined in a comprehensive Logical Framework Analysis exercise undertaken by specialist GEF funded consultants under a specific PDF-A or PDF-B grant and presented in a comprehensive LogFrame table in the applicable Project Document (ProDoc). However, no specific LogFrame or baseline or incremental analysis was included in the ProDoc and it would appear that such baseline and incremental analyses were not produced for the design phase of the India GSWH project. It does not seem that specific GEF funding was approved for any specific design of the India GSWH project. The only GEF approval process that could be found was for the wider six-country global GSWH project.

This MTR then looked at the appropriateness of what the project set out to do. In the case of the India GSWH project, the overarching goal was to reduce GHG emissions (as is required for GEF funding) and the overall objective was to grow the consolidated total m<sup>2</sup> of SWH installations in India as fast as possible. No specified priorities of sectoral or geographical coverage were included in the India GSWH design. There was no stated rationale or internal logic (or not as the case may be) of why the proposed India GSWH project aimed to do certain things, and not do other things, in pursuit of its overarching goal and overall objective.

The mid term review then looked at the links and alignment of its activities (as planned and as undertaken) with the overarching stated project goal and objective. This MTR then looked closely at the various project related documents and visible project outputs to date to ascertain how well the various activities were undertaken compared to what was expected in its original design, or in any conscious and documented changes in the project's approach. This MTR then finishes by looking at the current project status, the remaining project budget and the remaining project duration - to develop appropriate recommendations for the best use of the remaining project budgets and timescales, and to develop lessons learned for future similar GEF projects.

The MTR also looked closely at the quality, completeness, relevance and evidence of project operational priorities in the project's ongoing reporting through: its AWP (Annual Work Plans); its QPRs (Quarterly Progress Reports); its monthly PEC (Progress Executive Committee) minutes; its 3-monthly PSCs (Project Steering Committee) minutes; its annual APR/PIRs (Annual Project Reviews/Project Implementation Reports); and the alignment of its activities with its original and any updated project descriptions.

This mid term review report has overviewed and examined a wide range of project related documents (see Annex C), and has greatly benefited from the very helpful inputs received from the many project stakeholders met during the evaluation mission interviews and meetings (see Annex B). Specific and helpful input to the draft report formulation was received from Dr AK Singhal (Director MNRE and the current India GSWH Project Manager (PM)), Dr Butchaiah Gadde (Regional Technical Advisor - Climate Change, UNDP Regional Centre in Bangkok), and Dr SN Srinivas (Programme Officer, Energy and Climate Change, UNDP Delhi). The assistance of the national expert Dr Naval Karrir to the evaluation mission and to the initial draft of the analysis in section 4 of this report was very helpful in the development of the mid term review. Inputs provided to the draft MTR report from the above people were very informative and were greatly appreciated, but the analysis and conclusions reached and any remaining errors or omissions remain the responsibility of the author alone.

The structure of this MTR report broadly follows that specified in the MTR TOR.

### **3. THE PROJECT AND ITS DEVELOPMENT CONTEXT**

#### **3.1 Project Evolution, Stated Purpose(s), and Duration**

The logical starting point for this MTR's analysis of the India GSWH project and its development context is to review its development path to funding approval and its stated GEF funding purposes. This will be done for both for the wider global UNEP-led six-country GSWH project and for the specific UNDP-led India GSWH project. In particular, it is very informative to look at the timescales and any evolution or additional clarification in their stated objectives and targets as the global GSWH and the India GSWH projects moved through their GEF funding approval steps, and then look into the further evolution during the implementation phase of the India GSWH project. The final step of this MTR's analysis is to look at where the India GSWH project is recommended to go with its remaining operational funding and timescale (including its proposed six-month extension of its end date).

The earliest manifestation of the GEF GSWH project's purpose (that the MTR reviewers are aware of) can be found in the November 2005 Project Initiation Document prepared by UNDP for GEF for a PDF-A (Project Design Facility category A (of GEF)) \$25,000 grant.

The stated purpose of the PDF-A was to undertake "An initial global market analysis and an improved and agreed (supported by a letter of the GEF Operational Focal Point for 3-5 selected countries) conceptual design of the project, by building on selected stakeholder consultations (drawing from country specific, regional and international experiences, best practices and lessons learnt)". This original project initiation document was for a proposed global UNDP/UNEP project entitled "Solar Water Heating Market Transformation and Strengthening Initiative" (the Global GSWH project).

The November 2005 PDF-A project initiation document was followed in December 2005 by a UNDP/UNEP GEF Pipeline Entry paper for a PDF-B grant of \$260,000 to develop the Global GSWH project in up to 15 countries. A GEFSEC (GEF Secretariat) ID of 2939 was already allocated for the Global GSWH project, which shows that the project had been formally entered into the GEF pipeline at that point.

By August 2006 a Draft ProDoc and a separate parallel (GEF format) Project Executive Summary document for GEF Council Resubmission (Executive Summary Resubmission) had been prepared for a \$12 million GEF grant funded project. An initial group of six countries, namely Albania, Algeria, Chile, India, Lebanon and Mexico was identified as leading candidates for inclusion in the first phase of countries in the proposed multi-country proposed GEF FSP (Full Scale Project - i.e. a project with GEF funding of more than \$1 million).

The proposed Global GSWH project was a joint UNDP and UNEP project, with National Execution (NEX) by the (relevant national agencies in the) countries involved. The co-financing commitments for the initial six countries were already then apparently well advanced at this point<sup>3</sup>, with up to 10-15 (unspecified) additional countries expected to follow in an anticipated second phase of the Global GSWH project. Overall targets of 1 million m<sup>2</sup> of additional SWH installed (across all the countries involved in the global project) and a minimum overall sustainable annual SWH m<sup>2</sup> growth rate of 20% by the end of the project were specified at this point in the project's development<sup>4</sup>. A useful overall analysis of relevant factors for accelerated SWH uptake and barriers to be addressed and the indicative means to address the barriers was already well developed. A general Incremental Cost Analysis (ICA) and a Logical Framework Analysis (LFA) for the consolidated phase one proposed countries were included in the August 2006 Global GSWH project Executive Summary Resubmission.

However, the very general ICA and LFA produced at this point do not seem to be based on any Phase One specific country analyses at that point. The International Copper Association (ICA) had already at that point apparently indicated its interest in being a major private sector co-financing support partner of the proposed Global GSWH project. Individual country-specific LogFrames were clearly expected to be developed for each participating country and a LogFrame template was provided for this purpose in the Executive Summary Resubmission. It was not explicitly, stated, but can be logically assumed, that the LogFrames were expected to be based on appropriately reality-based and participatory LFA exercises in each participating country. A formal extensive STAP (GEF Scientific and Technical Advisory Panel) review and responses from UNDP-UNEP were included in the Executive Summary Resubmission document.

It seems that it had already been agreed at that point<sup>5</sup> that a fully detailed work plan and project documents (ProDoc) would be produced for each Phase One Global GSWH project participating country at the point of GEF CEO Endorsement. However, there was no mention in the Global GSWH ProDoc of 2006 of any GEF funding to undertake such detailed work plan development or the writing of a ProDoc

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<sup>3</sup> At this stage, Indian \$2 million in parallel (cash) co-financing had apparently been confirmed in a letter provided by the Maharashtra Energy Development Agency

<sup>4</sup> ref para 13 of the Aug 2006 Global GSWH project Executive Summary document

<sup>5</sup> Reference footnote 11 on p31 of Aug 2006 Draft global GSWH ProDoc which states "It is expected that fully detailed work plans and project documents for each participating country will be ready at CEO endorsement. The first candidate countries for this are Algeria, Chile, India, Mexico and Lebanon, for which an initial market analysis has been conducted and with which, as applicable, the negotiations on the finalization of the country components can be concluded on the basis of the criteria discussed later in this proposal.

for each participating country. So it was then implicit that there would be no need for an individual country-by-country detailed design phase, incremental analysis, and LogFrame being funded, finalised and scrutinised by GEF. In other words, it was apparently agreed that individual specific country GSWH projects (e.g. the India GSWH project) would not be individually designed with funding by GEF, and that furthermore such individual country projects would not be funded by GEF on a case-by-case basis – the funding instead would be approved for all Phase One Global GSWH countries in one consolidated GEF funding process, and based on detailed designs and project documents that would somehow be developed without the need for specific GEF funding support.

The next major step in the project evolution occurred in October 2006 when an application for a \$260,00 GEF PDF-B grant was made for the development of the Global GSWH project. This PDF-B proposal stated that the Global GSWH project development would involve a range of global and individual SWH market surveys and the development of financial mechanisms for the wider Global GSWH project, as well as in particular the development of a FSP (Full Scale Project) document, where the individual phase-one specific country programs would be finalised and included as Annexes to the FSP. However, no evidence of the results of any Global GSWH project PDF-B (or other) market surveys has yet been found, including any baseline SWH surveys for India.

The final substantive step in the Global GSWH project approval process occurred in July 2008 when a final ProDoc of the UNEP-UNDP six-country Global GSWH project was approved by the GEF CEO and sent to the GEF Council for its endorsement on a no-major-objection basis. The global GSWH ProDoc contained six separate individual country ProDocs as an Annex, including one for India. The overarching analysis part of the Global GSWH ProDoc was very general. The Global GSWH project was approved under the GEF-4 (the GEF 4<sup>th</sup> replenishment funding cycle) SP1 Buildings Energy Efficiency Strategic Program (under GEF-3, when the project was conceived, it apparently came under SP1 Market Transformation).

Compared to the other individual country ProDocs included as Annexes within the Global GSWH ProDoc, the Indian GSWH ProDoc was very general and lacked a justification for any particular focus on specific applicable building sectors, nor were the proposed interventions specifically linked to the overall SWH growth targets for SWH in India.

The Global GSWH ProDoc lacked the specific and detailed analyses for India that would normally be expected in a ProDoc for a \$2 million GEF grant funded project if the India GSWH project had been considered and approved on a stand-alone basis.

It appears that the Global GSWH project was approved in July 2008 and that the applicable CER with attachments (502 pages in total) constituted the necessary approval process by GEF for the overall project and also for the individual constituent county GSWH projects. In particular for our purposes it apparently constituted GEF approval for GEF \$2 million funding for the India GSWH project. The global GSWH project inception workshop was held in Tunisia from 25th to 26th of February 2010, and was primarily focused on the wider Knowledge Management (KM) aspects of the project - that are being managed by UNEP.

The UNDP India Country Director signed the India GSWH ProDoc on 21 November 2008. This 21 November 2008 signed India GSWH ProDoc appears to be identical to the ProDoc in the Annex in the Global GSWH project that was approved by GEF in July 2008.

The practical start of the India GSWH project's activities is taken for the purposes of this MTR as the date of the inception workshop, which was held on 04-06 March 2009 in Delhi.

Unusually for a \$2 million GEF grant funded project, no India-specific quantified baseline analysis, incremental project contribution analysis, or results of any Logical Framework Analysis (LFA) workshop are included or referred to in the India GSWH ProDoc, nor in any other documents that could be found in the MTR review process, including from requests to UNDP, UNEP and MNRE. No substantive documents other than the ProDoc that apply to the India GSWH project design or approval process could be found. There is no project entry in the GEF website for the specific India GSWH project, only for the global GSWH project<sup>6</sup>. No relevant India GSWH background documents are listed under the Global GSWH project in the GEF website.

So the only design, baseline, incremental analysis and Log Frame data that could be found for the India GSWH project are those that can be found in the India GSWH ProDoc. The April to July 2008 versions (as far as could be ascertained they are all the same) of the UNDP format India GSWH ProDoc thus give the only underlying rationale, baseline data, incremental analysis, and expected outputs of the India GSWH project's \$2 million GEF grant core funding that could be found for this MTR exercise.

In terms of the project duration, the Global GSWH project implementation completion date was given as August 2013 in its June – July final FSP that comprised its GEF approval documentation. However, given the slow start of many of its component countries (India was one of the earliest single country projects to start), and the delay in the start of the Global GSWH project with its inception workshop only being held in February 2010 the Global GSWH project end date in its inception report of March 2010 had then been moved to the end of 2014<sup>7</sup>. Some key activities such as the finalization of market development activities in the 6 initial countries are now only scheduled to start in the 4<sup>th</sup> quarter of 2013. So, if the India GSWH project finishes before the end of the 3<sup>rd</sup> quarter of 2013 its results will not start to be used before that date for the global 6-country UNEP Knowledge Management (KM) part of the Global GSWH project.

The India GSWH ProDoc Atlas (financial) tables show project expenditure over a five financial year project duration, and in the short form UNDP ProDocs of April and November 2008 (and the India Annex of the Global GSWH FSP as approved by GEF) the India GSWH project duration was given as 4.5 years and the programme Period was given as 2008 -2013 in the final signature page. Hence, with the project signature being on 21 November 2008, the end date of the project would then logically be at the end of April 2014. This aligns with the recommendation in this MTR that the project's end date be extended to the end of June 2013 to give time for the MTR findings to be fully considered and for appropriate changes to be made in the project's operations, including but not limited to its M&E elements, to maximise the project's impact and to facilitate a more positive final project evaluation.

## **3.2 Problems Addressed and Objectives of the Project**

As already stated in Section 2, in the India GSWH project the overarching (GEF grant funding) project goal was by definition (to successfully obtain GEF funding) for the project to reduce GHG emissions. The overall objective (the specific measure of success) stated for the India GSWH project was to grow the

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<sup>6</sup> See <http://www.gefonline.org/projectDetailsSQL.cfm?projID=2939> for the GEF links to the global project

<sup>7</sup> In the 2011 PIR it is stated that November 2013 is the revised planned close date of the project.

total m<sup>2</sup> of SWH installations in India by an additional 2 million m<sup>2</sup> during the project's operation<sup>8</sup>. It is not known how the proposed project interventions were modeled, nor what if any assumptions were used to derive the target of an additional 2 million m<sup>2</sup> of SWH installation in India to come from the India GSWH project interventions, or how the anticipated 3 million m<sup>2</sup> of additional SWH installations in the absence of the GEF India GSWH project was calculated either.

The baseline situation, as stated in the India GSWH ProDoc in its Situation Analysis section, was "Solar water heating systems are now being manufactured on a commercial scale [in India] at around 250,000 m<sup>2</sup> collector area annually. In the last five years the turnover has increased from 50,000 m<sup>2</sup> to 250,000 m<sup>2</sup> (2005) bringing the total installed collector area to a total of one million m<sup>2</sup>." In contrast, in the Country Drivenness section of the India GSWH project ProDoc it was stated "According to the most recent information (Nov. 2007), nearly 2 million square meters of collector area should have already been installed, of which nearly half was done in the last two years."

What is of interest here in this MTR is that 2005 figures for SWH installations in India are used in one part of the ProDoc while anticipated November 2007 figures are used in another part of the ProDoc, but in any case the anticipated Nov 2007 figures were not updated to use actual firm figures by July to November 2008 when the ProDoc was being signed off by GEF and UNDP-MNRE respectively. This reinforces the conclusion that the India GSWH ProDoc was not formulated (near the time of its finalization in 2008) with the input of any up to date detailed surveys or detailed analysis regarding the uptake of SWH in India undertaken at that time. Rather it appears that figures in different parts of the ProDoc were added at different times and that the whole document is not fully internally consistent. It appears likely that available data used in early versions of the India GSWH ProDoc was not subsequently updated as the India GSWH ProDoc went through its various GEF<sup>9</sup>, Gol and UNDP approval steps to November 2008. For reference, it should be noted that at the India GSWH project Inception Workshop in March 2009, it was stated that "A total of 2.6 million sq. m. of collector area has so far been installed in the country for solar water heating, of which about 1.55 million sq. m. has been installed since 2005-06."<sup>10</sup> This also reinforces the impression that 2005 was the real India GSWH project ProDoc's SWH baseline data year for the m<sup>2</sup> of SWH installed in India.

Looking through the India GSWH ProDoc, it is mentioned that the bulk of SWH installations in India have been for cleaning [washing] in urban areas. No specified priorities of sectoral or geographical coverage for enhanced SWH installations are mentioned in the India GSWH ProDoc. There was no mention of which sector or geographical part of India the additional 2 million m<sup>2</sup> of SWH was envisaged to be installed in due to the incremental interventions of the India GSWH project. In Section II: Strategic Results Framework and GEF Increment of the India GSWH project ProDoc, the overall project indicators of success included<sup>11</sup> "The total, estimated amount of installed SWH systems measured as m<sup>2</sup> per 1000 inhabitants." This would suggest that it was envisaged that the bulk of SWH installed under the GSWH

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<sup>8</sup> The summary on the cover page of the India GSWH ProDoc states "...this country programme of India aims at accelerating the market development of solar water heating with an objective to facilitate the installation of 10 million m<sup>2</sup> of installed collector area by 2012 (11th Five year plan). In the absence of any intervention the market was projected to reach 3 million m<sup>2</sup> during this period. The GEF project will contribute partially to the achievement of India's new target in the amount of about 2 million m<sup>2</sup>..."

<sup>9</sup> The GEF approval steps were in the context of India being one of the original phase one six countries of the Global GSWH project. There would seem to have been little scrutiny by GEF of individual country components of the Global GSWH project.

<sup>10</sup> The 2.55 million m<sup>2</sup> of WH apparently installed as on 30 September 2008 can be considered as the project's baseline. This data comes from MNRE. MNRE collects SWH information from State Nodal Agencies and SWH manufacturers. As MNRE is also the India GSWH project implementation agency, it is strongly recommended that these MNRE figures of baseline and current m<sup>2</sup> of SWH installations be independently verified for the India GSWH project's final evaluation.

<sup>11</sup> The other two indicators of project success were: "Growth of the annual sale of SWH systems"; and "The level of customer satisfaction with the systems installed".



project's implementation would continue to be in residential areas. In the India GSWH ProDoc Output 2.3 has an objective of "Broadening the application range of solar" but again no specific indicators of success for this objective are given.

The stated barriers to enhanced SWH uptake in the India GSWH project ProDoc are very general, and are stated as "At this phase of market development, two main barriers for further growth are identified as follows: i) the supply side of the market should rapidly reform to a more professional level in order to meet the growing demand for quality issues and ii) the successes in parts of India should be duplicated in up to now less explored areas where demand may exist."

The proposed measures that were proposed to be taken in India to remove the stated barriers are also very general, and as stated in Part II Project Goal and Objective of the India GSWH ProDoc were also very general and were stated as being: "The focus will be on: i) a reform of the supply chain to a higher level of professionalism ii) awareness building and iii) refinement and replication of incentives programs throughout India."

In a number of places in the text of the India GSWH Project ProDoc there is reference to a Project Logical Framework Approach being included in Section II. However, in fact Section II is entitled "SECTION II: STRATEGIC RESULTS FRAMEWORK AND GEF INCREMENT". There is no evidence that any stakeholder inclusive and quantitative LFA analysis and LFA workshop lies behind the list of Indicators, Baselines, Targets, Sources of Verification or Assumptions for each of the Outcomes and Outputs in the Strategic Results Framework. This is not to say that the contents of the list are necessarily wrong. Rather, all that can be said is that there is no evidence of any detailed analysis behind the contents of the list, nor is there any evidence that the list was developed in an open and inclusive manner with key stakeholders in a formal LFA approach, as would normally be required for such a project to receive funding by GEF.

### **3.3 Main Stakeholders**

The main stakeholders of the India GSWH project are, in approximate order of ownership and involvement: -

- MNRE (Ministry of New and Renewable Energy Resources) as the National (Indian) Executing Agency and its subsidiary bodies of SEC (Solar Energy Center) which undertakes SWH testing and R&D support, and IREDA (Indian Renewable Energy Development Agency) which serves as the key Indian RE (Renewable Energy) funding agency. MNRE is also the main India GSWH project co-funder with \$10.8 million of co-financing (a committed \$10 million of in-cash SWH grant subsidies and \$800,000 in-kind contribution). MNRE also provides the India GSWH National Project Director (NPD), provides the chair (the MNRE Joint Secretary) of the Project Steering Committee (PSC) which provides policy guidance to the project, recommends the full time National Project Manager (NPM) comprising initially former and now current MNRE senior staff, and provides the chair through the NPD of the Project Executive Committee (PEC), that oversees the implementation of the project;
- UNDP as the implementing agency of the India GSWH project for the core \$2 million GEF grant cash funding, and also of the other five national projects under the Global GSWH project umbrella. UNDP is responsible to GEF for project implementation, funds disbursement, and monitoring and accountability;

- ICPCI (International Copper Promotion Council of India), which is a significant India GSWH project co-funder to the amount of US\$ 300,000 (comprising a mixture of in-cash and in-kind contributions);
- MOEF (Ministry of Environment and Forests) which acts as the GEF focal point in India, and thus is responsible for India's GEF funding priorities in a whole-of-Government-of-India sense;
- UNEP as the implementing agency for the wider 6-country Global GSWH project aspects, in particular the KM (Knowledge Management) aspects of the wider project. It should be noted that the Knowledge Management component has a substantive budget of US\$ 5.2 million, including GEF financing of US\$ 3.45 million and co-financing of US\$ 1.77 million.

### 3.4 Results Expected

The India GSWH project design had a very ambitious stated direct project reduction target of 11 million tonnes of CO<sub>2</sub>. The 11 million tonnes of CO<sub>2</sub> reduction figure was derived from the anticipated 15 years average SWH systems equipment lifetimes of the total 2 million m<sup>2</sup> of extra SWH capacity that were expected to be installed in India during the India GSWH project implementation from project incremental activities<sup>12</sup>.

A Global GSWH spreadsheet of GHG reduction calculations for each of the six Global GSWH component country programs was provided by UNEP to the India GSWH project MTR reviewers. This 6-country Global GSWH project GHG reduction spreadsheet was apparently produced in December 2007. The December 2007 Global GSWH spreadsheet's page for India shows an assumed 1.0 million m<sup>2</sup> of SWH total installed capacity in India in 2005 and an estimated 1.3 million m<sup>2</sup> total for 2006 (this aligns reasonably well with the MNRE website figures of 1.1 million m<sup>2</sup> by 31 March 2005 and 1.5 million m<sup>2</sup> by 3 March 2006).

The end of project (2012) expected total SWH installed area of 10 million m<sup>2</sup> is stated to be the project alternative. This 10 million m<sup>2</sup> of SWH total figure by 2012 is a figure that is in fact set by external definition - as it is the official India 11<sup>th</sup> 5-year plan total m<sup>2</sup> of SWH figure for 2012. This 10 million m<sup>2</sup> total installed SWH area figure is arrived at by what are clearly arbitrary assumptions of 50% p.a. compounding annual growth each year from 2006 to 2009 and then a 45% p.a. compounding annual growth from 2010 to 2011 and 40% from 2011 to 2012. The baseline total SWH installed in India figures are derived from the same (as the alternative) assumed 50% growth rate from 2006 to 2007, giving an assumed 2007 additional SWH m<sup>2</sup> added in India of 450,000 m<sup>2</sup>, and then a 40% growth rate from 2007 to 2008 and a 35% p.a. compounding annual growth rate from 2009 to 2012.

It is not shown in the spreadsheet, nor in the ProDoc, nor in any other document available to the MTR reviewers, how the India GSWH project incremental activities, which are very general and are not at all specific, are supposed to lead to this additional 2 million m<sup>2</sup> of SWH installations. Incidentally, the India GSWH ProDoc elsewhere states that the baseline m<sup>2</sup> of SWH in India in 2012 is 3 million m<sup>2</sup> and the GEF project's activities will increase this by 2 million m<sup>2</sup> to a total of 5 million m<sup>2</sup> of SWH in India by 2012. So at least the assumption that the GEF project activities will add 2 million m<sup>2</sup> of SWH in India by 2012 is a consistent figure across different project background documents.

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<sup>12</sup> Reference: Summary box on cover page of India GSWH ProDoc

The project also had a GEF Cumulative Incremental (direct + indirect) GHG emissions reduction figure to be achieved by 2020 of 62,168,639<sup>13</sup> tonnes of CO<sub>2</sub>. These indirect emission reductions figures were calculated by assuming that the compound annual growth rate for SWH installations in India from 2012 to 2020 would be 20% in the baseline scenario and 30% p.a. compounding in the alternative scenario. Clearly such compound annual growth rate figures are suspiciously rounded off numbers and almost certainly do not reflect the result of any detailed analyses. In particular, with the India GSWH ProDoc not specifying specific outputs by component or by activity, without a detailed PDF-B funded baseline or incremental analyses, and in the absence of the results of a professionally run formal Logical Framework Analysis (LFA), it is hard to see how the anticipated incremental (additional) GHG reductions from the India GSWH project's (undefined) specific investments at its design could be anything other than unsubstantiated estimates. This is not to say that the projected India GSWH project's GHG emission reductions are necessarily wrong, rather instead to say that we have no way of telling how they were calculated or projects and therefore no way of evaluating how realistic they are or are not.

An emissions factor of 0.37 tons CO<sub>2</sub>/m<sup>2</sup>.year was used in the December 2007 GHG emission reduction calculations. Apparently this 0.37 tons CO<sub>2</sub>/m<sup>2</sup>.year emissions factor figure is based on an IEA 2005 survey<sup>14</sup> (a copy of this survey was requested, but was not provided to the India GSWH MTR project reviewers). In the December 2007 GHG calculation spreadsheet, a calculation is shown that apparently comes from the 2005 IEA SWH market assessment of 2005) that gives a presumably India wide electricity generation mix of 5% hydro, 10% NG (natural gas), 45% coal, and 40% oil for an overall GHG emissions factor of 0.526 tonnes CO<sub>2</sub>/MWh. It appears that it was assumed that all the SWH installed would replace electricity, and not partly replace fossil fuel use, as would be the case in practice. At a stated annual SWH yield of 700 kWh/m<sup>2</sup>.year in the spreadsheet this then was used to give the emissions factor of 0.37 tons CO<sub>2</sub>/m<sup>2</sup>.year that is used in the table seems to be too low but it is evidently the source of the GHG emission calculations used in the ProDoc and hence in the official India GSWH project ProDoc's overall results expected.

An India GSWH GHG emissions calculation spreadsheet was provided to the MTR reviewers by UNDP. This spreadsheet uses a figure of SWH energy production figure of 775.63 kWh/m<sup>2</sup>.year and a country specific emissions factor of 0.89 tonnes CO<sub>2</sub>/MWh<sup>15</sup>. It would be useful if the derivation of these figures could be substantiated and fully documented from independent sources before the eventual final project review.

To double check the GHG emission calculations used in the ProDoc and hence in the official India GSWH overall results expected, as well as the UNDP provided calculations, one can refer to the UNFCCC AMS-1.J Version 01 EB 60 (April 2011) CDM "indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories" that is now available specifically to apply to GHG reductions from the application of SWH in residential (and commercial) applications. In para 10 (c) (ii) "for applications that cannot be reasonably demonstrated to have substantial hot water consumption

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<sup>13</sup> Calculated over 15 years from the incremental square meters of SWH facilitated by and installed during the project implementation and resulting from the continuing, sustainable growth of the SWH market as per the stated targets and market transformation objective of the project in the six "phase I countries".

<sup>14</sup> In the Dec 2007 Global GSWH project background GHG calculations spreadsheet, the emission factors used were apparently derived from the shares of difference grid electricity generation sources from an IEA SWH market assessment in 2005

<sup>15</sup> This figure of 0.89 is identical to the figure for the combined margin (CM) of all grids [of India] for FY 2009-10 (adjusted for inter-grid and cross-border electricity transfers), in tCO<sub>2</sub>/MWh, refer CO<sub>2</sub> Baseline Database for the Indian Power Sector, User Guide, Version 6.0, March 2011, Government of India Ministry of Power, Central Electricity Authority.

demand year round.<sup>16</sup> a single value of 300 kWh/year per square meter of collector area is stipulated for energy savings.” AMS-I.J also states in para 10 (c) (i)“ For applications that can be reasonably demonstrated to have substantial hot water consumption demand year round: a single value of 450 kWh/year per square meter of collector area is stipulated for energy savings and is based on 5 kWh/m<sup>2</sup>/day solar resource, 25% solar water heater efficiency, and 365 days/year of hot water use;” So if one uses the more realistic and conservative figure of 300 kWh/m<sup>2</sup> of SWH/year useful heat energy production figure, as 80% of India SWH applications are residential with most being in temperate areas (eg Bangalore and Pune), and if one uses the official 2007-08 grid GHG emission factor of 0.79 tonnes CO<sub>2</sub>/MWh then one gets a emissions factor of 0.237 tonnes CO<sub>2</sub>/m<sup>2</sup> of SWH/year, which is a reduction of 36% in the calculated CO<sub>2</sub> reductions over that used to derive the figures used in the ProDoc, and a similar reduction over the figures used in the UNDP supplied GHG reduction spreadsheet.

Another issue that is confusing in establishing the baseline for the results of the India GSWH, project is determining what actually the total m<sup>2</sup> of SWH in India at the project start was. On p5 of the ProDoc it is stated, “Around 1,000,000 m<sup>2</sup> collector area for water heating has been installed. Solar water heating systems are now being manufactured on a commercial scale at around 250,000 m<sup>2</sup> of collector area annually. In the last five years the turnover has increased from 50,000 m<sup>2</sup> to 250,000 m<sup>2</sup> (2005) bringing the total installed collector area to a total of one million m<sup>2</sup>.” So this 0.25 million m<sup>2</sup>/year and 1 million m<sup>2</sup> total of SWH in India is clearly a 2005 baseline figure. In contrast, under “Country Drivenness” on p17 of the ProDoc it is stated “According to the most recent information (Nov. 2007), nearly 2 million square meters of collector area should have already been installed, of which nearly half was done in the last two years”. So a total of 2 million m<sup>2</sup> of SWH is the nominal Nov 2007 baseline in the ProDoc, and is in reasonable alignment with the December 2007 Global GEF project GHG reductions spreadsheet where the total installed SWH in India is expected to be 1.75 million m<sup>2</sup> in 2007. Then on p17 under SECTION II: STRATEGIC RESULTS FRAMEWORK AND GEF INCREMENT of the ProDoc it is stated under Outcome 2 that “750,000 m<sup>2</sup> a year” is the baseline SWH installation rate.

Approaching the total m<sup>2</sup> in India issue from another angle, the 2010 India GSWH APR/PIR (Annual Project Report/Project Implementation Report) under the DP Rating Tab and the “Heading Progress towards reaching the development objective in India”, it is stated that “India has made considerable progress in terms of installed collector area and market growth since April 2008 (data are only provided per Financial Year (FY) from April to March). During FY 2008-09, 550,000 m<sup>2</sup> of solar collector area have been installed, and during FY 2009-10, 620,000 m<sup>2</sup>. The market growth is reported as of 13% during FY 2009-10.” To corroborate this figure, the MTR reviewers were advised by the India GSWH PM (Project Manager) on 11 February 2011 that 560,000 m<sup>2</sup> of SWH were added in 2008-09 and 600,000 m<sup>2</sup> in 2009-2010 (presumably to 31 March 2009 and 31 March 2010 respectively as this is the GoI financial year end date). The PM advised that the total m<sup>2</sup> of SWH was 2 million m<sup>2</sup> by 30 September 2009<sup>17</sup>, which taking half the 2009-2010 figures as being installed from 01 April to 30 September 2009, would give a total installed SWH in India figure of 1.7 million m<sup>2</sup> by 31 March 2009.

Considering the impact of the India GSHW project’s significant influence started from it Inception Workshop on March 2009, the actual baseline SWH installations were then running probably at an annual rate of 550,000 m<sup>2</sup>. So it looks like the project inception rate of annual SWH installations should be taken as 550,000 m<sup>2</sup> (in the year to 31 March 2009), with the baseline March 2009 total SWH

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<sup>16</sup> “Such applications can be residences that are temporary or seasonal housing or located in regions with very hot summers, for example, during which season(s) there is no or limited demand for hot water.”

<sup>17</sup> These annual SWH m<sup>2</sup> addition figures are available on the MNRE website, see <http://go4india.org/solar/page.php?pid=62>  
There is apparently no independently verified published report on these figures.

installation in India being somewhere between 1.7 to 2.9 million m<sup>2</sup> at the start of the project, based on firstly the advice from MNRE and secondly on the data on the MNRE website – and not using the baseline data presented in the ProDoc as it had clearly been overtaken by events on the ground by the time the India GSWH project actually started.

Clearly this area of what exactly is the India GSWH project baseline total and annual m<sup>2</sup> rate of SWH installations should be clarified for the upcoming 2012 APR/PIR and for the eventual final project review. This MTR review is not able to define such figures from the data supplied, and in any case the various SWH m<sup>2</sup> figures provided by MNRE are not independently verifiable.

## **4. FINDINGS AND CONCLUSIONS**

### **4.1 Project Formulation**

The project's formulation processes are assessed (see following text for this assessment's rationale) as *Marginally Satisfactory*

#### **4.1.1 Conceptualization and Design**

As noted in previous sections of this MTR report, the baseline problem and barriers definition, the incremental activity and cost analyses, and the barrier removal activity specifications were weak in the India GSWH project's design documentation. In a GEF project such as this India GSWH project, one could normally expect the project conceptualization and design to be explicitly and clearly defined in a comprehensive Logical Framework Analysis exercise undertaken by specialist GEF funded consultants under a specific PDF-A or PDF-B grant and presented in a LogFrame table in the applicable Project Document (ProDoc).

However, no formal baseline analysis, GEF alternative, incremental analysis, or results of any Logical Framework Analysis (LFA) workshop were included or referred to in the India GSWH ProDoc, nor in any other documents that could be found in the MTR review process, nor could such information be obtained from requests to UNDP, UNEP and MNRE. It is fairly clear that these critical GEF project-underpinning analyses were not in fact undertaken.

The project documents reviewed (including in particular the ProDoc) do not record sufficiently quantifiable and verifiable SMART (Specific, Measurable, Achievable, Realistic and Time bound / Tangible) Indicators that could have been used for monitoring and recording the Project progress in a satisfactory manner.

#### **4.1.2 Country Ownership / Drivenness**

With regards to country ownership and/or country drivenness of the overall India GSWH project national objective of expanding the total m<sup>2</sup> of SWH installed in India, this was clearly an idea that had strong

national ownership during the design process for the GEF funded GSWH project in India. Specific evidence of the strong national drivenness can be seen in the 11<sup>th</sup> Five Year Plan (covering the period 2007 – 2012) of India's ambitious target of a total of originally 5 million m<sup>2</sup> of SWH being installed in India by 2012, later increased to 10 million m<sup>2</sup> in the JNNSM (Jaharawal Nehru National Solar Mission) – all from a 2008 total installed SWH baseline figure of around 2 million m<sup>2</sup>. So while the exact origin of the specific India GSWH project idea with respect to India is unclear, it is clear that there was strong county ownership of the role that the India GSWH project could play - to work alongside the principal MNRE/GOI SWH baseline support mechanism of ongoing subsidies per m<sup>2</sup> of SWH installations.

### **4.1.3 Stakeholder Participation**

Strong and active stakeholder participation in the project's early implementation is clear for the project inception from the attendance of 80 participants at the India GSWH project Inception Workshop held from March 4-6, 2009. The Inception Workshop Report provides evidence of considerable inputs from stakeholders on how the project could be best implemented. This active level of engagement is good evidence of strong stakeholder participation, at least at the project launch. The key stakeholders who participated in the project Inception Workshop included NGO's, financial institutions, academics, consultants, and SWH equipment suppliers.

However, no formal documentary evidence of any stakeholder participation in the earlier project design stage of the India GSWH project has been found to date.

### **4.1.4 Replication Approach**

As regards to the replication approach at the project's design stage, the ProDoc elaborated a generally sound project strategy based on: -

- a) Strengthening the supply side of the SWH market in order to lift it to a level to meet the expected demand for professionalism and aimed at introducing a 'learn and improve' cycle, comprising technical and quality standards, labeling, strengthening the distribution sector, revisions of relevant BIS (Bureau of Indian Standards) technical standards, strengthening the knowledge base for SWH engineering, and improving the skills of installers;
- b) Enhancing awareness and promotion of SWH in, up to now, not involved regions of India, focusing on dissemination of current support mechanisms in urban areas and adding rural areas with demonstration projects and possibly ESCOs;
- c) Coordination with green energy programs including Carbon Finance to reinforce investment in the SWH market.

The replication strategy in the ProDoc proposed to facilitate cooperation amongst various stakeholders through seminars, workshops and other public events. It was also stated in the ProDoc that UNEP and UNDP would be developing carbon financing initiatives – which if successful would be supportive of post-project replication of the SWH market development initiatives undertaken during the project.

## 4.2 Project Implementation

As discussed in section 4.1.1 above, the India GSWH project lacks: -

- Any detailed and India-specific project background and design phase - which seems never to have occurred, and which as such is a highly unusual omission for a \$2 million GEF grant funded project;
- Any meaningful detailed Indian SWH market or project alternative background analysis;
- A set of suitably detailed SMART indicators being available at the project design or project inception phases;
- An independently verifiable figure of the total installed (and still working) m<sup>2</sup> of SWH at the project's inception meeting date (its start date).

Therefore, the outcomes and outputs in this section necessarily have had to be assessed on the basis of the more general indicators provided in the table entitled SECTION II: STRATEGIC RESULTS FRAMEWORK AND GEF INCREMENT of the India GSWH ProDoc. There was also some guidance of the original implementation intentions of the India GSWH project to be found in the documentation provided to the project's Inception Workshop held from 04 – 06 March 2009, but no new SMART Indicators were developed then, or subsequently (as far as can be ascertained).

The documents that were reviewed to inform the project's implementation assessment in particular include the minutes of the Project Steering Committee (PSC) Meetings, APRs/PIRs, QPRs and PEC Reports and the inputs received from various stakeholders during the MTR mission from 11-19<sup>th</sup> January 2012.

In light of the clearly weak India GSWH project formulation processes, a key issue that has been considered in the overall assessment of the India GSWH project's implementation to date is the extent to which the project's early implementation results and strategic findings were used to inform the project's subsequent prioritization of activities. With a weak design formulation, "learning from doing" become particularly important, as does the development of a suitable emerging strategic approach during the project's implementation, rather than just a focus on producing unconnected outputs as per the ProDoc. It is also important that there is more than just a focus on achieving the necessary rate of expenditure of available project funds so that the project ends with no more funds available on its projected end date – spending all the project funds is not a very compelling project success factor.

The project's implementation to date is assessed (see following text for this assessment's more detailed rationale by project outcome and activity) as Marginally Satisfactory.

### 4.2.1 Overall Project Goal and Objective

The UNDP Solar Water Heating Market Transformation and Strengthening Initiative for India (India GSWH) project's stated goal was (a very general and permissive) "to accelerate and sustain the SWH

market growth in India and to use the experiences and lessons learnt in promoting similar SWH growth in other countries” in particular, including through the Global (six country) GSWH project.

The India GSWH project proposed to establish a supportive regulatory environment, build up the market demand and strengthen the supply chain to foster 2 million m<sup>2</sup> of the total cumulative target of a total 10 million m<sup>2</sup> of installed SWH systems in India by 2012. The 2 million m<sup>2</sup> of SWH to be fostered by the project was to come from an average growth rate of 50% p.a. each year from 2006 to 2009, 45% p.a. from 2010 to 2011, and 40% from 2011 to 2012.

The project focus was proposed to be on: -

- i) “reform [ing] the supply chain to a higher level of professionalism;
- ii) awareness building; and
- iii) refinement and replication of incentives programs throughout India”.

The long-term goal of the project was to accelerate the sustainable market development of solar water heating in India through the provision of high quality products and services.

At the project conception stage it was stated that, at the then current rates of SWH installations under the Business As Usual (BAU) Scenario, 3 million m<sup>2</sup> of new solar thermal panels would be installed in India by 2020. Under the Alternative Scenario, total solar thermal installations of a clearly aspirational 10 million m<sup>2</sup> were expected by 2012, to which the India GSWH GEF project was expected to contribute at least 2 million m<sup>2</sup>. The GHG emission reduction resulting from this alternative enhanced SWH uptake scenario were calculated at 11 million tonnes of CO<sub>2</sub> (over a 15 years lifetime for individual SWH’s) for the GEF increment of 2 million m<sup>2</sup> of SWH and over 50 million tonnes of CO<sub>2</sub> for the wider aspirational target of 10 million m<sup>2</sup> of SWHs by 2012. UNEP and UNDP proposed to independently support the development of carbon finance opportunities, aggregated through the banks or other mechanisms that could ultimately replace government subsidies and sustain the necessary SWH market growth in India (post-project sustainability).

#### **4.2.2 Project Outcomes and Outputs**

In line with GEF project experience to date, the barriers being removed in the India GSWH project were planned to broadly relate to five market characteristics: policy; finance; business skills; information; and technology.

This analysis will: -

- examine the India GSWH project’s stated (as per ProDoc and Inception Workshop) Outcomes and Outputs and their respective Indicators, Baselines and Targets;
- under each outcome and output, summarise and analyse the observed results, and review their contribution towards the overall project objectives and goal, including any contribution towards a more strategic and specific coherence for the overall India GSWH project as it was implemented.

The specific outcomes/outputs and indicators and baselines as follows are quoted from the ProDoc, as this still seems to be the only available and relevant comprehensive project-planning framework for the



India GSWH project.

## **Outcome 1: Policy**

An enabling institutional, legal and regulatory framework to promote sustainable SWH market

**Overall Ranking:** *Marginally Successful*

**Indicator:** The adoption and effective enforcement of new legal and regulatory provisions promoting sustainable SWH market

### **Baseline:**

- a) Currently only a minor part of India is affected by legal and regulatory requirements for SWH by relevant institutional entities;
- b) The standards do not reflect all the needed quality issues;
- c) Listings of suppliers with products complying with the current BIS standards valid for interest subsidy;
- d) Regulations are not well disseminated throughout India.

### **Targets:**

- a) Expansion of solar program to other states of India;
- b) Update current standards;
- c) All government support should be linked to a certification system guaranteeing better quality;
- d) Dissemination of existing regulations throughout India (states and cities).

### **Review:**

As per the ProDoc, the outputs and activities under this outcome were expected to raise the awareness of the key national policy makers on the benefits of SWH, and to facilitate the development and adoption of a legal and regulatory framework conducive for sustainable development of the SWH market in India.

As per Outcome 1 in the ProDoc, typical policy instruments that were proposed to promote the SWH market in India were stated to include:

- 1) obligations to use solar water heaters in certain types of buildings, such as the Spanish, Cyprus, Mexico City and Israeli models
- 2) Solar Water Heater requirements in the building code and regulations;
- 3) a regulatory framework for quality control and certification; and
- 4) different direct or indirect financial and fiscal incentives

It was noted in the ProDoc that the model Indian Energy Conservation Building Code (ECBC) included SWH in its coverage. It was also noted in the ProDoc that the individual Indian states could be encouraged to adopt the SWH provisions in the ECBC.

However, it is notable that at the starting point of the project it was rather unclear as to exactly which specific policy instruments were proposed to be used to promote the uptake of SWH in India. In addition, a further key issue that was not raised in the project documentation, nor in the project's implementation to date (as far as could be seen), was that having a SWH policy in place may be a necessary pre-condition for enhanced SWH uptake, but merely having a policy measure in place is an insufficient success factor if the policy is not effectively enforced. So having a larger number of Government Orders (GO) in place is a positive start, but to be fully effective, the real question is what actual impact any such new government orders are having on the enhanced uptake of SWH in India. The study undertaken for the project on SWH Bye Laws suggests that most of the SWH GO's were, and continue to be, voluntary and that there is minimal effective enforcement or penalties for non-compliance. As far as can be seen, the question of enhancing the enforcement of SWH mandates or GO's has not yet been addressed in the India GSWH project.

A CDM PoA approach is under development supported by the India GSWH project, which in principle could be used to fund a new standard ten-year warranty and maintenance support mechanism for applicable SWH. In principle, a CDM PoA approach could be a practical and effective new additional SWH support mechanism post India GSWH project-end, and one that utilises international market set international carbon financing, and that is not dependent on the vagaries of ongoing Indian government funding policies or administration systems.

In terms of this outcome's target (a) Expansion of solar program to other states of India; and target (b) Dissemination of existing regulations throughout India (states and cities); while apparently<sup>18</sup> 100 MCs/ULBs now have amended bye-laws or implementing GOs (Government Orders) mandating SWH, it is not clear what role the India GSWH project has played in this, nor how effective any such additional GOs might be. So it is unfortunately not possible, with the evidence available to the MTR reviewers, to judge the overall effectiveness of the activities undertaken under this activity.

(b) The standards that apply to SWH in India by BIS have not yet been updated. The current BIS standards only apply to flooded thermosyphon FPC systems, and even then they only apply to the panels and not to the whole system. FPC systems with glycol-water working fluid and heat exchangers, and flooded and heat pipe ETC systems are still not covered by applicable BIS standards for the collectors, let alone for the whole SWH systems.

(c) Government (MNRE) support is now usefully linked to a published list (on the MNRE website) of approved SWH manufacturers. However, the technical performance criterion for SWH manufacturer approval by MNRE appears weak. This MNRE list of approved manufacturers approach still falls short of being a transparent certification system, let alone one based on sound and transparent consensus based formal BIS technical SWH performance and test standards.

**Output 1.1:** Enhanced capacity of public institutions to support sustainable SWH market

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<sup>18</sup> MNRE presentation to Hon'able Minister (MNRE) of 15 October 2011

**Indicator:** Availability of public support to promote the SWH market in up to now unexplored regions in India

**Ranking:** *Successful*

**Baseline:** Only a minor part of India is actively involved in support for SWH market

**Target:** Disseminated over main market regions of India.

**Review:**

The project has funded SWH market assessments in five (5) states, namely Gujarat, Maharashtra, Andhra Pradesh, Tamil Nadu and NCR (National Capital Region) Delhi covering fifteen cities (15) namely Ahmedabad, Rajkot, Surat, Nasik, Nagpur, Pune, Vishakapatnam, Hyderabad, Vijayavada, Chennai, Coimbatore, Madurai, Delhi, Noida/Greater Noida and Gurgaon. The project has also commissioned a SWH market assessment for the Himalayan Region of India.

The India GSWH project has also funded market assessment studies for SWH in key industrial sectors. The India GSWH project has funded campaigns in six cities (Noida, Jaipur, Lucknow, Aijwal, Nagpur and Coimbatore) for promotion of SWH in the health and education sectors. Awareness campaigns were also funded and undertaken in the wider hospitality and healthcare sectors. However, there is no visible evidence that the results of such India GSWH funded market studies have been used to more effectively focus SWH policy support activities in India.

Various meetings, seminars, and training sessions were also funded and undertaken to promote the increased use of SWHs in public institutions.

However, the project's MTR has been unable to ascertain how, if at all, the various market studies and awareness raising activities, have led to any additional support of public institutions in supporting SWH. It is also problematic not having a pre-project baseline, or SMART indicators of success, to evaluate any progress in this area.

**Output 1.2:** Adoption of a system of standards, labels and adequate quality control of SWH systems (including regulations, recommended institutional set-up etc)

**Ranking:** *Marginally Unsuccessful*

***Indicators:***

- Updated BIS Standards
- System for certification, labeling, branding or recognition based on the received standards

***Baseline:***

- Current standards reflect mostly the collector
- Listings ('recognition') in relation to the interest subsidy scheme.

***Targets***

- Extensions towards the complete system, including a performance indicator looked at the EN and ISO standards and best practices.

- All government support should be linked to a certification system showing quality of products, systems, production and installation work.

**Review:**

In collaboration with International Copper Association, the project has installed three testing facilities at Delhi, Pune and Hamirpur to undertake comparative performance analysis of FPC (flat plate collectors) and Evacuated Tube Collectors (ETC) SWH in India – noting that however only simple thermosyphon systems are being evaluated and that only flooded FPC and ETC systems are being considered. In principle, such comparative tests could assist in evolving suitable standards for certification, labeling and branding.

The tests are in progress and the site visits to the Pune test site enabled the MTR reviewers to assess the ongoing progress and provided on-site recommendations for strengthening the testing procedures.

However, it is not clear how the whole SWH system tests relate to international norms, if any, of whole system SWH performance. In addition, there seems to have been no consideration yet given to performance testing of FPC using water-glycol working fluid with heat exchangers, or of heat pipe ETC – yet these two system types have significant market applications in India where the water being heated has high levels of dissolved minerals and/or where winter/clear night sky collector sub-cooling freeze protection are important issues.

The existing (2003) BIS standard for SWH has not yet been updated, and it is still only applicable to FPC collector panels. There is a MNRE requirement for ETC systems’ that is a requirement for manufacturers to receive MNRE subsidies, but it has minimal relevant technical requirements (and assumes that only flooded ETC will be used. The MNRE requirements also have a statement “Storage Tanks, Piping, Support structure etc (To be all indigenous & not imported)” which as it stands very likely violates WTO Rules on Technical Barriers to Trade (TBT). In addition, the MNRE requirements have not yet been formalized into formal BIS standards, nor are any discernible processes underway to do this.

Meetings have been held regarding new BIS SWH standards, but no clear impetus and no clear timetable was apparent to develop technology neutral (i.e. covering on a proper equivalent basis for flooded and heat exchanger FPC and flooded ETC and heat pipe ETC) SWH system requirements. A list of MNRE approved SWH suppliers is available and applicable to manufacturers who are eligible to utilise the MNRE SWH subsidy scheme, but without an updated technology neutral SWH *system* requirements set in BIS standards it is not clear how meaningful this is for SWH quality or ongoing SWH system performance over an expected 15-25 year SWH overall system life.

**Output 1.3:** Adoption of new regulations to consider or oblige the integration of SWH systems into the design and construction of new buildings

**Ranking:** *Marginally Successful*

**Indicator:** Dissemination and updates of currently existing (in some parts of India) mandatory building regulations

**Baseline:** Only valid for a limited number of bigger cities and states

**Target:** Widespread implementation of these mandatory building regulations

**Review:**

The project commissioned a study (undertaken by CTRAN Consulting) entitled “Building Sector Policies and Regulations for Promotion of SWH” that first reported its results in September 2009 and that was completed in March 2010.

The study found that, for the period 2004-6, twenty-one (21) states had some form of regulatory frameworks for SWH, primarily GOs issued by the relevant State Governments. This then can be taken as the baseline condition of SWH regulatory requirements at the start of the India GSWH project. However, it appears that most of the requirements are voluntary and/or no penalties apply for non-compliance. The study also developed a draft uniform policy and regulatory framework for SWH requirements.

MNRE reports<sup>19</sup> that 100 MCs (Municipal Corporations) /ULBs (Urban Local Bodies) had amended bye-laws or were implementing GOs to support SWH as at October 2011.

However, it is not clear what role the project played in this greater number of SWH GO’s, nor how effective any such additional GOs might be, nor to what extent the India GSWH project contributed to any greater effectiveness of existing GO’s. It would appear that the MNRE and state SWH incentives are more effective in promoting SWH uptake than (the essentially voluntary compliance) GO’s.

**Output 1.4:** Adoption of additional, public financial and fiscal incentives to promote SWH market.

**Ranking:** *Marginally Successful*

**Indicator:** to be decided as applicable

**Baseline:** to be decided as applicable

**Target:** to be decided as applicable

**Review:**

The India GSWH project commissioned studies on the ‘Design and Implementation of New Financing Mechanisms and Instruments for Promotion of SWH Systems in India (by ABPS Infra, completed in March 2010), a “Scheme and Framework for Promotion of SWH Systems by Utilities and Regulators” (by ABPS Infra, completed in January 2010) as well as “Development of an Area based Energy Service Company (ESCO) Model for SWH in India” (by Mercados Emi, completed in September 2010). Unfortunately, there is no apparent evidence that the outputs of these studies have had any practical influence on any existing or new financial or fiscal incentives to promote the growth of the SWH market in India.

However, the India GSWH project has supported the development of a Clean Development Mechanism (CDM) Program of Activities (PoA) SWH project, a market based financing mechanism that is intended to promote the growth of the SWH market in India. Although the average CDM Certified Emission Reduction (CER) price has dropped dramatically since the beginning of 2012 to under EUR4 per ton of

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<sup>19</sup> MNRE presentation to Hon’able Minister (NRE) of 15 October 2011

CO<sub>2</sub> this CER price drop was not widely predicted nor could have been predicted by the India GSWH project, as it is largely related to the economic downturn in Europe reducing energy demand and hence the need for CDM credits by the EU ETS (Emission Trading Scheme). In principle CDM still remains a highly appropriate market based financial mechanism to support the enhanced uptake of SWH in India. The CDM PoA project appears to be making good progress and to be broadly soundly based. Two areas where the CDM PoA could be improved would be to simplify the tripartite agreement between the SWH user, the SWH system supplier, and the CDM bundling agent to a one-page simple English (and simple Hindi or local regional language on the reverse side) agreement from its current four-page long dense legal form, and to simplify the value proposition to the SWH heating user to a simple single option of a 10 years warranty and maintenance offer in exchange for the assignment of CDM benefits to the bundling agent and SWH system supplier.

## **Outcome 2: Awareness and Capacity**

“Enhanced awareness and capacity of the targeted end-users and building professionals to consider and integrate SWH systems into different types of buildings”.

**Overall Ranking:** *Marginally Successful*

**Indicator:** Annual sale[s] of SWH system[s]

**Baseline:** 750,000 m<sup>2</sup> a year

**Target:** >2 million m<sup>2</sup> a year at the end of the project

### **Review:**

In most of India and in the many applicable applications and sectors, SWH is not yet perceived as the standard default option to supply low temperature hot water. Various market assessment studies have been funded by the India GSWH project to date. The Indian SWH market seems to be growing towards the target total 2 million [additional] m<sup>2</sup> target at the end of the project [i.e. 5 million m<sup>2</sup> in total]. The GSWH project is providing useful awareness and capacity building supportive activities towards this SWH growth. However, the baseline level appears not to have been surveyed, and the enhanced overall level of SWH awareness and capacity due to the India GSWH project remains unclear.

In addition, a general lack of strategic coherence and prioritization in the India GSWH project awareness and capacity building activities was observed throughout the MTR analysis. The findings of the December 2009 Greentech Knowledge Solutions report that over 80% of the SWH market in India is currently in the residential sector and that this residential sector dominance of Indian installed m<sup>2</sup> of SWH is likely to remain (with a gradual shift from detached houses to multi-family apartment buildings) does not yet seem to have been internalized nor to have been used to date to guide the India GSWH project’s awareness and capacity building priorities. The India GSWH project’s awareness and capacity building efforts do not yet seem to be prioritised on the residential sector which is, and will clearly remain, the clearly dominant sector of overall SHW m<sup>2</sup> growth in India.

**Output 2.1:** Materials for public awareness raising and marketing campaigns developed or adapted into Indian conditions.

**Ranking:** Marginally Successful

**Indicators:**

- a) Availability of materials
- b) Certification system showing quality of products, systems, production and installation work

**Baseline:**

- a) Materials only fitted for a limited part of India
- b) Government linked recognition system

**Targets:**

- a) Fitting materials for different parts of India
- b) Self contained system to be effective after government incentives stop

**Review:**

(a) Under its co-funding support for the India GSWH project, the International Copper Promotion Council (India) has prepared a “Users Handbook on SWH” (dated Aug 2010) that is clearly shown and is readily available for free downloading on the ICPCI website. The ICPCI SWH handbook is also available on the India GSWH project website and on the UNDP India website<sup>20</sup>. The ICPCI SWH handbook is a very useful publication, and was clearly produced with wide and appropriate stakeholder input. The handbook covers both FPC and ETC SWH systems in a comprehensive and even-handed manner, and at least mentions heat pipe ETC systems - although without explaining their advantages or rationale for applications in certain markets (mains pressure, and/or where water has high dissolved mineral salts, and/or where freeze protection is important – as is clearly the case for some regions and specific market segments for SWH in India).

The India GSWH project has apparently funded some Utilities and State Nodal Agencies (SNAs) in the preparation of Detailed Project Reports (DPRs) for the promotion of SWH. However, no examples of such DPRs were made available to the MTR consultants, nor were examples provided of DPRs leading to SWH related bank loans. So the quality of the DPR’s could not be evaluated, nor could any evidence be found of the impacts of such DPR’s on the growth of SWH in India.

(b) A de-facto government SWH recognition scheme is in place in that certain SWH manufacturers are available (in a downloadable list) as approved channel partners on the MNRE website (under “Manufacturers”, then MNRE Channel Partners”). However, the technical or quality-based SWH evaluation criteria used to determine if SWH should be channel partners is unclear, and the de-facto MNRE recognition scheme would be unlikely to influence SWH purchase decisions when the MNRE subsidy support ends - as it must someday. So the SWH recognition scheme is not really a long-term sustainable SWH quality mark for India.

**Output 2.2:** Public awareness raising and marketing campaigns implemented in co- operation with relevant public entities and private SWH suppliers and manufacturers.

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<sup>20</sup> See: [http://www.in.undp.org/content/india/en/home/library/environment\\_energy/?page-1202895727=7](http://www.in.undp.org/content/india/en/home/library/environment_energy/?page-1202895727=7)

**Ranking:** *Marginally Successful*

**Indicator:** The visibility of the public awareness raising and marketing campaign

**Baseline:** Only parts of India are reached and mostly aimed at end users

**Targets:**

- a) Create awareness for the whole of India, focusing on domestic, commercial, industrial or agricultural applications whatever is fitted for a certain region (geographical, cultural, urban or rural)
- b) Aim at state agencies, municipals, banks and end users

**Review:**

Various SWH marketing materials have been produced and some SWH campaigns have been undertaken with India GSWH project funding - aiming at different sectors, applications and regions. Clearly, such awareness raising activities will have made some impact in raising public awareness of SWH in India. No evidence was available to the MTR reviewers as to the incremental effectiveness of such activities compared to baseline activities.

**Output 2.3:** Broadening the application range of solar.

**Ranking:** *Very Successful*

**Indicator:** Penetration rate of solar on rural and urban industrial areas

**Baseline:** Mainly domestic and commercial buildings in cities

**Targets:**

- Awareness of possibilities for solar in industrial and agricultural applications in rural/industrial areas through demonstration projects or SESCOs.
- Two demonstration projects or one SESCO.

**Review:**

The India GSW project has funded studies to assess the market potential of SWH in the industrial, healthcare and educational sectors. In addition, a 'Survey /Audit assessment of the potential of SWH and Rooftop SPV' has been carried out in Gurgaon/Manesar area of Haryana (dated Sept 2010).

The outputs and activities funded under this subcomponent were undertaken to complement the marketing efforts of the private sector by raising the awareness of the targeted end-users on the benefits, economic feasibility and other characteristics influencing a positive decision to purchase SWH.



The SWH enterprises that assemble systems in India generally do not have facilities for sputtering of low emissivity coatings, nor is there any manufacture of evacuated tube collectors underway in India yet. When ongoing SWH market growth is more firmly established in India, the associated certainty and economies of scale will inevitably encourage additional SWH manufacturing to take place in India. In particular, the clear bias by MNRE in India towards supporting locally manufactured FPC rather than the use of imported ETC collector tubes needs to change as ETC have certain cost and performance attributes that make them a growing part of most SWH markets worldwide. In particular, heat pipe ETC are still barely visible in India but they can be the basis of an important market niche where mains pressure hot water, and/or poor quality water supplies are used and give significant mineral scaling issues, and/or freeze protection from cold winter or night conditions are valuable SWH attributes. Such new to India technologies and niche application would have been good examples of India GSWH demonstration projects.

The India GSWH project has established contacts and entered into cooperation with various information channels and program formats in TV and radio and also the use of print media materials (newspaper and magazine articles, leaflets, posters), public discussion events etc., in promoting SWH. New strategies for the future that may be worth considering include partnering SWH promotion with industry associations, banks and other Government agencies as the Petroleum Conservation Research Association (PCRA).

It would also be helpful to expand cooperation and contacts with organizations such as the European Solar Thermal Industry Federation (ESTIF), the International Solar Energy Society (ISES) as well as with SWH projects in other countries, from where results, experiences and best practices can be taken and applied for local conditions. Materials can also be drawn from the already existing, highly visible SWH demonstration projects that have already been implemented in India.

In absence of an explicit communication strategy or a media plan elaborated in the project design or documented during the project implementation stage the project has adopted a flexible approach to meet the objectives of this output.

As per information made available to MTR reviewers by MNRE, the following is the summary of the awareness campaigns, development of training manuals and training programs undertaken under the India GSWH project: -

- a) Market Development of SWHs in Himalaya Region (by M/s Greentech Knowledge Solutions, Delhi)**
  - Awareness seminars: 8 Nos. organized at Dehradun, Shimla, Katra, Srinagar, Dharmshala, Nainital, Silliguri and Shilong
  - Training programs: Local consultants: 5 organized at Shimla, Guwahati, Sringer, Dehradun and Haldwani; SNAs and Program Administrators: 3 organized at Shimla, Guwahati and Srinagar; Installers: 2 organized at Kolkata and Haldwani
  
- b) Market Development of SWHs in Urban Clusters (by M/s C-Tran Consultancy)**
  - Awareness seminars: 5 Nos. organized at Nasik, Coimbatore, Ahmedabad, Madurai and Chandigarh. 3 more being organized at Rajkot, Thane and Panchkulha
  - Training programs for Builders and Architects, Installers/ Technicians and Local consultants: 2 Nos. organized at Coimbatore and Madurai. 6 more being organized at Rajkot, Ahmedabad, Thane, Nasik, Chandigarh and Panchkulha
  - 3 nos. of Training Manuals developed for different types of Stakeholders

- c) Market Development of SWHs in Industrial Sector (by M/s Dalkia Energy)
  - Awareness seminars: 3 Nos. organized at Gurgaon, Faridabad and Baddi. 5 more being organized at Ludhiana, Pune, Hyderabad, Vapi and Roha.
  - Training programs for Technicians / Engineers and Industrial consultants: 4 Nos. being organized at Faridabad, Pune, Baddi and Gurgaon.
  - Potential assessed in pharmaceuticals, chemical, metal and auto component industries. Booklet being prepared.
- d) Campaign on SWHs and other RETs in Hospitality Sector (by TERI, Delhi)
  - Awareness Seminars: 4 nos. organized at Delhi, Pune, Bengaluru and Kolkata.
  - 1 National Seminar organized at Delhi in association with FHRAI (Federation of Hotel and Restaurant Associations of India)
  - On-line tools for deciding about requirement of various RE technologies in Hospitality sector developed.
  - Fact sheets, Reference Manual, Checklists and Case studies also prepared for use of hoteliers
- e) Campaign on SWHs and other RETs in Healthcare Sector and Educational Campuses (by IT Power, Gurgaon)
  - Awareness Seminars: 6 organized at Noida, Aizawl, Coimbatore, Jaipur, Nagpur and Lucknow
  - 4 sets of Case studies, 2 each in Health and Educational sectors being prepared

Though the exact contribution of the India GSWH project to the growth of SWH in the market cannot be ascertained in the MTR, the project outcome is rated as Satisfactory based on the strong efforts and initiatives taken under the project in this area. With respect to the second target of “Two demonstration projects or one SESCO” apparently one ESCO is under progress, so overall this output area is rated as being very successful.

### Outcome 3: Financing

The ProDoc states that the strategy for this component is “Increased demand for SWH systems by the availability of attractive end-user financing mechanisms or other delivery models”.

**Overall Ranking:** *Marginally Successful*

**Indicator:** The amount of financing leveraged through new financing models specifically tailored for SWH market needs.

**Baseline:** No specific longer term financing and new delivery mechanisms offered and marketed for the SWH purchase.

**Target:** The agreed financial support mechanisms and new delivery models in operation to meet the announced MNRE target to reach 10 [million] m<sup>2</sup> of installed SWH capacity by 2020<sup>21</sup>.

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<sup>21</sup> Noting that this 10 million m<sup>2</sup> of SWH installed by 2020 target subsequently had its target date advanced to 2012 as part of

**Review:**

The new MNRE SWH channel partner focused capital cost reduction subsidy scheme, although simpler in principle than the previous end user interest rate subsidy scheme, seems to have generated a new issue of very slow subsidy reimbursements to SWH channel partners, which if not promptly and comprehensively addressed, could undo the actual market enhancing value of the MNRE subsidy scheme for SWH in India. So it is not clear that the new MNRE SWH subsidy scheme is actually a significant improvement in practice over the former scheme. In addition, the India GSWH project's contribution towards the new MNRE subsidy scheme is also unclear.

**Output 3.1:** Enhanced awareness of the key financial sector stakeholder and local suppliers on the specific characteristics and financing opportunities in the SWH market.

**Ranking:** *Marginally Successful*

**Indicator:** The level of interest created

**Baseline:** Lack of information on the specific SWH market characteristics and financing models tested in other countries.

**Target:** All the key financial sector stakeholders and local suppliers informed on the specific characteristics and opportunities provided by the Indian SWH market (by building on the results of the market analysis), and on the experiences and lessons learnt from the financing models tested in other countries.

**Review:**

The India GSWH project has funded SWH awareness and consultative workshops and seminars in various sectors of the Indian economy including hospitality, industrial, and health and education sectors, along with the main SWH market sector of the residential sector. The workshops have involved both the public and private sector banks and financial institutions, and key barriers to SWH financing have been discussed along with possible strategies for their mitigation. However, it is also not clear if any awareness of SWH financial models tested in other countries have been transferred to India through India GSWH project funded or affiliated activities.

**Output 3.2:** Design, the financial structuring and the implementation arrangements for the specific purpose financing vehicles responding to specific SWH market needs finalized and agreed with the key stakeholders, and integrated into the overall SWH marketing package.

**Ranking:** *Marginally Successful*

**Indicator:** New financing instruments and, as applicable, delivery models made available.

**Baseline:** No financing and delivery models specifically tailored for SWH market requirements available.

**Target:** New financing instruments and business models (such as specific purpose bank loans, vendor financing, SESCOs etc.) specifically tailored and marketed for the SWH purchase offered to the end users

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the JNNSM aspirational 'stretch' target.

as a part of the overall marketing package and integrating the available public incentives.

**Review:**

The India GSWH project commissioned a study on the 'Design and implementation of new financing mechanisms and instruments for promotion of SWH in India (March 2010) as well as 'Development of an Area based Energy Service Company (ESCO) Model for SWH in India' (September 2010). However, it is not clear to the MTR if, or how, these two studies have led to any new specific purpose financing vehicles relating to enhanced SWH sales in India.

However, the project has supported the development of a SWH Clean Development Mechanism (CDM) project. This CDM SWH project development is a promising approach towards developing an ongoing successful performance based SWH financial support approach, which if successful, could provide a major boost to SHW uptake in India.

**Output 3.3:** Trained staff of the local financing institutions to finance SWH investments.

**Ranking:** *Marginally Successful*

**Indicator:** Dissemination of system for interest subsidies throughout all regions of India.

**Baseline:** Limited to south east part of India

**Target:** Implemented at an effective level.

**Review:**

Fiscal incentives (additional to those for all of India provided by MNRE) for SWH at the start of the India GSWH project varied from state to state and included electricity rate reductions, and property tax rebates. These other fiscal incentives may have increased since the India GSWH project started, and any such increases may have been assisted by the project, but no information is available on this.

Presently as per MNRE provided information, a new financing mechanism is in place and was designed to provide direct subsidies and soft loans from banks/ FIs (Financial Intermediaries) to beneficiaries. The implementation of the new financing mechanism is through various channel partners, which have been specifically registered with MNRE, following a standardized criteria and agreement process. Designated SNAs (State Nodal Agencies) are also financing SWH in India. The soft loan scheme is now being strengthened and in the near future the electricity utilities are expected to be involved in the SWH financial support program. It was apparently anticipated that the new scheme would be administratively simpler, and hence easier to access by prospective SWH users, and hence drive enhanced SWH sales.

MTR review has not been able to assess the actual contribution of the India GSWH project towards development of the new MNRE subsidy financing support and disbursement scheme. The impact of the project in fostering incremental positive growth of the SWH market also seems to be uncertain.

Feedback obtained from SWH manufacturers in Pune (the most important SWH manufacturing and sales center in India) to the MTR reviewers was that since the new scheme had been introduced (apparently in mid-2010) some SWH channel partners had not yet actually been paid any of the subsidies owed to them, forcing such channel partners to have to go to their banks for extended lines of credit to make up

for the delayed subsidy payments. It was suggested that these reimbursement delays were due to MNRE not staffing up quickly enough in anticipation of its new need to meet the payment administration requirements itself, as formerly this was dealt with by relevant state nodal agencies. Unless this delay in obtaining subsidy payments by channel partners situation is quickly sorted out, the manufactures could soon reach their credit limits, and the new subsidy scheme could end up causing a SWH sales rate that would be lower than the baseline “do-nothing” situation. Based on the evaluation of the initiatives that have been undertaken, and for which information was available to the India GSWH MTR reviewers, this output is therefore assessed as only *Marginally Satisfactory*.

## **Outcome 4: Certification, Quality Control, and Training**

“A certification and quality control scheme applicable for Indian conditions in place and enhanced capacity of the supply chain to respond to the growing demand with good quality services sustaining the market growth”.

**Overall Ranking:** *Marginally Successful*

**Indicator:** The level of marketing, product and installation services available in the market.

**Baseline:** Generally, the supply side capacity is not up to the required level of professionalism.

**Target:** Enhanced capacity of the supply chain to respond to the growing demand with good quality services sustaining the market growth.

### **Review:**

As per the India GSWH ProDoc, this outcome was expected to have two main themes: -

- a) *“Product Standards and Certification* - component 4 is about ensuring that consumers have a satisfactory experience with it [SWH]. Certification and quality assurance contribute to a trouble free use of solar water heating and subsequently increase consumer confidence in the technology. As such, it can be seen as an explicit part of SWH awareness campaigns and all other incentives to stimulate the market and gain public acceptance.”
- b) *“Capacity Building of the Local Hardware Supply Chain* - The establishment of the quality control/improvement scheme discussed above will be complemented by technical assistance to the local SWH supply chain to meet the requirements and to improve the quality of their products and services in general. This technical support is not going to be limited to local manufacturers, but can also facilitate the access of international manufacturers to enter the market, either alone or through joint ventures, so as to promote competition and, as applicable, technology transfer.”

In terms of part (a) *Product Standards and Certification*, the achievements of the India GSWH project are mixed. No discernible progress has been made in updating the outdated BIS standard that only applies to FPC panels, and not whole systems using FPC. For ETC, MNRE has developed its own requirements, which in principle is a good start, but unfortunately these requirements are very simplistic. The MNRE ETC requirements have not been exposed to the rigor of a formal standards development body, let alone any attempt to develop neutral standards that apply equally to FPC and ETC systems and which

refer to suitable international standards. Issues like the stated requirement in the MNRE requirements that “Storage Tanks, Piping, Support structure etc. (to be all indigenous & not imported)” would clearly not be compatible with a formal BIS standard - which would at least have to consider conformity with WTO rules regarding the use of technical barriers to trade (TBT). There is also the issue that there are actually four main SWH technology types, but the MNRE requirements only refer to 2.5 different technologies (FPC used in indirect heating are mentioned, but it is not mentioned that they need a heat exchanger in the tank or manifold. There is also confusion between thermosyphon systems and low-pressure systems – most thermosyphon systems are indeed low pressure, but there can be mains pressure thermosyphon systems using heat pipe ETC.

In terms of part (b) *Capacity Building of the Local Hardware Supply Chain*, the achievements of the India GSWH project are mixed. Some useful training has been provided, but as far as could be ascertained, no standard training modules for the various key stakeholders in the SWH supply chain have yet been developed, let alone been made available through the internet as was envisaged in the ProDoc for this component.

**Output 4.1:** Proceedings and physical facilities for adequate testing and quality control of SWH systems developed and effectively taken into use

**Ranking:** *Marginally Successful*

**Indicator:** Availability of adequate testing facilities and proceedings for compliance checking.

**Baseline:** Testing facilities fitted to the current BIS standards.

**Target:** Adequate testing facilities and proceeding for compliance checking developed and effectively taken into use aimed at the updated standards and the type of certification adopted.

**Review:**

In collaboration with ICPCI (International Copper Promotion Council of India) under their contribution to the India GSWH project, three testing facilities have been established at Delhi, Pune and Hamirpur to undertake comparative performance analysis of FPC and ETC SWH systems. The comparative FPC and ETC SWH performance tests in Pune were reviewed by the MTR reviewers and seem to be generally soundly based. In principle this comparative FPC and ETC SWH system oriented testing could assist in evolving standards for technology and application neutral SWH certification, labeling and branding in India.

However, there are still no BIS led standards on how whole system SWH performance should be measured for FPC, let alone any BIS standards for ETC tubes and systems. So although the test results currently being generated at Delhi, Pune and Hamirpur are representative of key Indian climatic zones, it is not clear if the results generated will be compatible with any future SWH technology neutral standard test of SWH performance for India.

**Output 4.2:** A certification and training system in place for SWH system installers

**Ranking:** *Marginally Successful*

**(a) Indicator:** The availability of a training system.

**Baseline:**

- Only a minor portion covered by a 'dealership' of a full service manufacturer.
- No specific accessible training system in place for SWH system installers.

**Targets:**

- Widespread system for recognition (listings) and dealer networks, including rules for good craftsmanship for installing and after sales.
- Training infra structure in place for SWH system installers.

**Review:**

The India GSWH project has funded various training programs and capacity building activities for various parts of the SWH supply chain across potentially viable SWH sectors and organized training programs for installers and suppliers. However, it does not seem that a proper SWH quality mark is under development. The MNRE certification of channel partners is a useful start to a quality system, but it needs to be extended to apply open and technology neutral certification and not just be linked to access to MNRE subsidies. One day the MNRE subsidies will end, and then the MNRE certification scheme will lose its rationale for manufacturer compliance. So a neutral industry administered scheme, with MNRE support but not MNRE operation, still apparently needs to be developed and applied in India.

**(b) Indicator:** Design and engineering course or handbook for system designers and engineers.

**Baseline:** None

**Target:** Information regarding design and engineering in printing or electronically available. Integration of material in existing schooling

**Review:**

The India GSWH project has funded the development by TERI of an 'online' tool for calculation of SWH installation parameters for placement in the public domain (essentially the India GSWH project website) that would build capacities of SWH installers. However, the on-line tool is not yet available on the India GSWH project website, and a process to check and validate the tool and a timescale for this to occur is not known to the MTR reviewers.

**(c) Indicator:** Dissemination of available (global) technology regarding solar applications for high temperatures

**Baseline:** Only minor (vacuum tube collectors)

**Target:** Boosting demand for more scientific technology regarding solar thermal and high tech applications through creating joint ventures with foreign companies.

**Review:**

This activity is no longer applicable, as this area of concentrated solar heat for process applications is now covered by a separate new 5 year specific project entitled "Market Development and Promotion of Solar Concentrators based Process Heat Application in India" (India CSH), which has had its core GEF funding of \$4.4 million approved by the GEF CEO in December 2011.

**Output 4.3:** SWH system installers trained and certified

**Ranking:** *Successful*

**Indicator:** The number of SWH system installers trained.

**Baseline:** None

**Target:** 500 at the end of the project

**Review:**

As per MNRE reporting, in collaboration with ICPCI, the India GSWH project is apparently progressing the development of 1000 trained technicians of ITIs (Indian Technical Institutes) for installation of SWHs.

A total of 74 trainers (teachers of ITIs are expected to be trained in programs in respective regions. These trainers will then train 1000 trainees/installers (students of ITIs) in 37 programs

41 training programs (4 for trainers and 37 for installers) have been envisaged in 16 cities of four different regions of country. The cities identified are:

- Delhi, Dehradun, Chandigarh and Jaipur of Northern Region
- Pune, Nasik, Ahmedabad and Rajkot of Western Region
- Bangalore, Coimbatore, Kochi and Hyderabad of Southern Region
- Kolkata, Guwahati, Ranchi and Raipur of Eastern Region

**Output 4.4:** Trained local suppliers and manufacturers to produce and market their products.

**Ranking:** *Marginally Successful*

**Indicators:**

- a) Availability of information
- b) Dissemination level.
- c) The number of SWH system suppliers and manufacturers trained.
- d) Monitored system performance on installed systems

**Baselines:** None

**Targets:**

- a) Guidelines for design and engineering of (more) complex solar systems based on a scientific approach.
- b) 100 manufactures, technical consultants or (larger) installers
- c) 100 manufactures, technical consultants or (larger) installers



- d) Introduction of the 'learn and improve' cycle, by 200 systems monitored and reported to key stakeholders like manufacturers, technical consultants and (larger) installers

**Review:**

At the MTR stage most of the project activities in this area are apparently still a work in progress and specific information with regards to implementation status has not been provided.

## **Outcome 5 - Knowledge Management**

"The provided support institutionalised and the results, experiences and lessons learned documented and disseminated (including monitoring, learning, evaluation and other feedback for adaptive management)".

**Overall Ranking:** *Marginally Successful*

**Indicator:** Access to project related information by local and international experts.

**Baseline:** No results and experiences documented and disseminated

**Target:** The reports and other public material from the project can be easily found and accessed.

**Review:**

- Data on SWH installations is available on the MNRE website. However, this data does not seem to be independently verified.
- India GSWH project website is in operation and it contains working links that enable key reports funded under the India GSWH project to be downloaded. However, the project website does not contain any mention, let alone working web links, to other relevant SWH information. Equally the other India SWH related websites have no mention of, or working, web links to the India GSWH project website.
- The mid-term review (MTR) was started around 9 months late, and hence only at most 25% of project funds will remain unspent when the MTR is completed.

**Output 5.1:** The reporting framework and arrangements for SWH market monitoring established.

**Ranking:** *Marginally Successful*

**Indicator:** The reporting framework and arrangements for SWH market monitoring under implementation.

**Baseline:** None

**Target:** The reporting framework and arrangements for SWH market monitoring successfully under implementation.

**Review:**

A reporting framework and arrangement for SWH market monitoring is apparently in place at MNRE

that apparently provides information on SWH installations that have received MNRE SWH subsidies. However, no independent monitoring of this MNRE total installed SWH is apparent, so it does not conform to the standard GEF requirement of being *an independently verifiable/verified indicator*.

**Output 5.2:** The national project web site and network successfully established and marketed.

**Ranking:** *Marginally Successful*

**Indicators:**

- a) Number of visits in the project website
- b) The level and type of information in the website.
- c) The frequency of updating.

**Baseline:** None

**Targets:**

- Project web site and network successfully established with information on the scope and results of the project.
- (The details to be specified later)

**Review:**

- A project website is in place (see <http://www.go4india.org/solar/page.php?pid=69> ), where copies of some of the key reports undertaken in the India GSWH project, and other useful documents, are available for downloading. UNDP, GEF, MNRE, and STFI logos are displayed on this website, but no web links to any related sites are provided. No links are provided to any other relevant India GSWH project related websites.
- The MNRE website has a webpage on SWH (see <http://mnre.gov.in/schemes/decentralized-systems/solar-systems/solar-water-heatres-air-heating-systems/>). No mention is made of the India GSWH project on this MNRE website. No links are provided to any other relevant India GSWH project related websites.
- The ICPCI website (see <http://go4india.org/solar/index.php> and <http://www.copperindia.org/cu/wcms/en/home/programs/see/swh/index.html#id9> ) has some useful information regarding SWH in India, and UNDP, GEF and MNRE are listed as SWH partners of ICPCI but the India GSWH project is not in itself mentioned. No links are provided to any other relevant India GSWH project related websites.
- The Solar Thermal Federation of India (STFI) operates a 0800 helpline with funding from MNRE, and has useful links on its website (see <http://www.stfi.org.in/index.php> and <http://www.stfi.org.in/archives.php> ) to a solar map of India and to its current and past issues of its newsletter. No links are provided to any other relevant India GSWH project related websites.
- The UNEP led 6-country Global GSWH project has a project website hosted by the Global Solar Thermal Energy Council (GSTEC - see [www.solarthermalworld.org](http://www.solarthermalworld.org)). This GSTEC hosted website has a link to the wider 6-country GSWH project (<http://www.solarthermalworld.org/node/3301>), where a link is provided to the India

component of the Global GSWH project through a “website of the Indian Ministry of New and Renewable Energy with more information about this project” [the India GSWH project], but the link does not work. No other working links could be found to any other relevant India GSWH project related websites.

So there are no apparent links, or no apparent working links from any of these India GSWH project related websites to the other SWH in India related websites.

It is not known if the number of hits on the website, and/or the number of downloaded documents from the website, are being recorded.

**Output 5.3:** Mid-term and final evaluation

**Ranking:** Unsuccessful

**Indicator:** The reporting framework and arrangements for SWH market monitoring under implementation.

**Baseline:** None

**Target:** The mid-term and final evaluations finalized on time.

**Review:** Unsuccessful

The project was signed on 21 November 2008, which can be considered to be the formal project start date. The project had a scheduled 4.5 years duration (as per India component of Global GSWH ProDoc), so the MTR should have been finalised around February 2011. According to the ProDoc, “An independent Mid-Term Evaluation will be undertaken at the end of the second year of implementation”, which would have placed the timing of the MTR as be undertaken at the year ending March 2011.

However, for the mid-term review, the recruitment of consultants was only initiated in November 2011. Around 3 – 5 months lead time would generally be required to recruit and mobilise consultants, field the review mission, obtain a draft MTR report, provide stakeholder feedback, and finalise the report.

Therefore, the recruitment of MTR consultants should have started in September to November 2010. The around 12 -14 month delay in initiating the MTR means that less than 25% of project funds will remain uncommitted at the point that the draft MTR report is produced by the MTR consultants. Hence, the value of the MTR report in guiding any project mid-term corrections will inevitably be greatly diminished.

**Output 5.4:** Final report prepared and published

**Ranking:** N/A

**Indicator:** The reporting framework and arrangements for SWH market monitoring under implementation.

**Baseline:** N/A

**Target:** Final report delivered in the end of the project

**Review:** Not yet applicable

### 4.2.3 Monitoring & Evaluation (M&E) Plan

The India GSWH ProDoc specifies a specific and appropriate monitoring and evaluation (M&E) plan and budget development process. Specifically: -

- the project to be monitored and reported to the GEF as a part of the global SWH umbrella project and India SWH will follow the standard UNDP and GEF procedures for nationally executed UNDP/GEF projects;
- the Logical Framework Matrix as provided in section II of the ProDoc will form the basis on which the project's specific M&E system will be built.

The India GSWH ProDoc specified that the main objective of the Inception Workshop would be to assist the project team to understand and take ownership of the project's goals and objectives, as well as finalizing the Annual Work Plan (AWP) with precise and measurable performance indicators, and in a manner consistent with the expected outcomes of the project.

However, at the inception workshop precise and measurable performance indicators (in other words SMART indicators) were not formulated.

A schedule of project review meetings conceived at the Inception workshop (04 - 06 March 2009) including (i) time frames for Tripartite Reviews, Steering Committee Meetings, (or relevant advisory and/or coordination mechanisms) and (ii) project related Monitoring and Evaluation activities has been followed along with the assigned roles and responsibilities of the PMU.

It seems that, in absence of suitable SMART Indicators being developed at the Inception Workshop, the India GSWH PMU has not appreciated the need and critical relevance of a quantifiable project M&E framework, and the need for independent project progress indicators to be gathered.

So, for example, the project still does not have an independently verifiable baseline or current total of m2 of SWH in place in India, even although this is the key India GSWH, and indeed Global 6-country GSWH, project success indicators.

The *Periodic monitoring* of implementation progress has been reported by the PMU through PSC Meetings, PEC Meetings, QPRs, APRs / PIRs. However there is no record of Tripartite Reviews (TPR) with the involvement of UNEP-Global PMU to record the absence of a suitable and effective M&E Framework based on SMART and independently verifiable Indicators.

In addition, the start of the MTR was 12 – 14 months too late, and hence the effectiveness of taking any corrective course corrective actions based on any MTR findings and recommendation will inevitably be seriously constrained.

The India GSWH project management meetings were primarily focused on the timely expenditure of project funds, in which the project has been very successful.

However, there was minimal observable evidence in the India GSWH project making use of the results of project-funded studies to fine-tune the project's ongoing priorities. For example, by December 2009, it was clear from the Greentech study that more than 80% of SWH installations in India were in the residential sector, and that this trend was almost certain to continue until 2022, yet there was no discernible refocus of the project on the residential sector. Equally, the growth of ETC SWH systems is reported to have reached a level where they account for 50% of new sales, yet the MNRE website's literature still talk as though FPC are still the predominant SWH technology in India.

### **4.2.3 Stakeholder Participation**

The ProDoc has identified the following key stakeholders who were expected to be involved in the implementation of the project, as follows: -

- MNRE as the responsible Indian Central Government (Union) agency with overall responsibility for the formulation and operation of solar energy support programs in India;
- State Nodal Agencies and municipalities that enact [and hopefully enforce] local legislation to support SWH uptake through subsidies, awareness activities and Government Orders [and other voluntary/mandatory regulatory] proposals that are generally developed at the Indian Union level.
- The Bureau of Energy Efficiency (BEE) – which is responsible for Indian national energy efficiency programs for buildings, including SWH, most notably through the (Indian) Energy Conservation Code for Buildings.
- The banks (27 at the India GSWH ProDoc stage) involved in the MNRE SWH subsidy and soft loan programs in India
- UNEP for sharing international SWH experiences [Knowledge Management] from the other five Global GSWH project countries.
- Solar Thermal Federation of India (STFI) and individual SWH manufacturers and providers;
- Solar Energy Society of India for networking and meetings advocating solar energy research and deployment; and
- ICPCI (International Copper Promotion Centre India) as a formal India GSWH project co-funding partner.

The MTR review has identified an active participation of the key stakeholders as above in the India GSWH project's Inception Workshop. There has been regular involvement of MNRE, BEE and ICPCI, along with the India GEF Focal Point (MoEF – Ministry of Environment and Forestry) in the India GSWH project's PSC (Project Steering Committee) and PEC (Project Executive Committee) meetings.

### **4.2.4 Financial Planning and Expenditure**

As detailed in "SECTION III: Total Budget And Workplan" of the India GSWH ProDoc, the project's \$2 million GEF grant funding was expected to be supported by \$10.8 million of Government of India (GoI) funding, of which the majority (\$10 million in cash) was expected to be applied to financial incentives for SWH users, with the other \$0.8 million to be in-kind support from MNRE - and from BIS for standards development work under Outcome 4. The \$0.3 million contribution from "Others" was to come from ICPCI (International Copper Promotion Council of India). UNEP contributions to Knowledge Management aspects of the India GSWH project were to be funded under the 6-country Global GSWH project.

### Planned Project Financing (as per ProDoc Table 6)

OUTCOMES	TOTAL USD	GEF BUDGET USD	GOV'T MNRE USD	OTHERS USD
Outcome 1: Policy	465,000	325,000	100,000	40,000
Outcome 2: Awareness and Capacity	631,000	481,000	100,000	50,000
Outcome 3: Financing	10,250,000	250,000	10,000,000	
Outcome 4: Certification, Quality Control, and Training	1,008,000	458,000	400,000	150,000
Outcome 5: Knowledge Management	536,000	356,000	150,000	30,000
Project management unit SEC India	210,000	130,000	50,000	30,000
GRAND TOTAL (INCL. CONFIRMED COFINANCING)	13,100,000	2,000,000	10,800,000	300,000

As per MNRE advice, the project's GEF expenditure to January 2012 has been as follows:

UNDP/GEF Budget: USD 2 million

Year	Target (USD)	Expenditure (USD)
2009	289,000	245,155 (90%)
2010	572,000	589,454 (104%)
2011	740,000	652,324 (88%)
2012	513,000	-

India GSWH project related GoI expenditure towards promotion of SWH (from the MNRE signing of ProDoc on 30 Sept 2008 which for their purposes they take as the project start) to February 2012 is apparently over \$16 Million. This GoI co-funding is expected by MNRE to reach \$25 million by the end of the India GSWH project. So this already compares favorably with the GoI co-funding budget of \$10.8 million in the India GSWH project's ProDoc.

### Actual Project GEF Expenditure versus Budget (as per MNRE advice in February 2012)

OUTCOMES	GEF BUDGET USD	GEF EXPENDITURE USD
Outcome 1: Policy	325,000	140,000
Outcome 2: Awareness and Capacity	481,000	682,000
Outcome 3: Financing	250,000	138,000
Outcome 4: Certification, Quality Control, and Training	458,000	127,000
Outcome 5: Knowledge Management	356,000	82,000
Project management unit SEC India	130,000	x
GRAND TOTAL (INCL. CONFIRMED COFINANCING)	2,000,000	1,169,000+x

The known project expenditure is \$1,169,000 as at 11 February 2012 (as per MNRE advice in February 2012). To this \$1,169,000 must be added committed funds on new activities (presumably including the MTR) and funds earmarked for work that has started but which was not yet been completed and which remains to be paid for, plus PMU costs. As per MNRE advice during the MTR mission in January 2012, \$513,000 then remained unspent and uncommitted.

It is worth noting that the expenditure on Outcome 2: Awareness and Capacity is running well above budget (142% of budget), while expenditure on the other Outcomes is well below budget. In particular relatively less has been spent on Outcome 3: Financing (52% of budget) and Outcome 1: Policy (43% of budget). Relatively even less has been spent on Outcome 4: Certification, Quality Control, and Training (28% of budget) and Outcome 5: Knowledge Management (23% of budget). This tracking of expenditure by Outcome (presuming that expenditure has been accurately coded to the proper Outcome) reinforces the analysis results in Section 4.2.2 of this MTR report (regarding Project Outcomes and Outputs) that the main focus of the India GSWH project's implantation to date has been on the Outcome 2: Awareness and Capacity area, with some focus on Outcome 1: Policy and Outcome 3: Financing, but with little focus on Outcome 4: Certification, Quality Control, and Training and Outcome 5: Knowledge Management.

#### 4.2.4 Sustainability

The India GSWH MTR has to date not been able to identify an explicit project sustainability strategy in the ProDoc or documented in subsequent reports that would ensure sustainability of the project initiatives beyond the end of the project's GEF funding. However, looking at what has been produced and whether the activities undertaken are likely to support continued growth in SWH sales in India post project end, it is possible to summarise the project's sustainability as follows: -

In Outcome 1: Policy – the increased number of GO's and requirements supporting the uptake of SWH by the private sector and in-principle requirements for the government sector to install SWH (and that may or may not have been fostered by the India GSWH project) will probably remain in place post-project. However, the effectiveness of these GO's and other requirements will be more due to their effective enforcement than to their mere existence as on-the-books requirements. With expenditure at only 43% of budget, this outcome does not seem to have been a high priority for the India GSWH project to date. It should be noted that in this outcome area, the India GSWH project seems to have had more emphasis on increasing the number of GO's, than on improving their effectiveness to date – from the evidence made available to the MTR reviewers to date.

In Outcome 2: Awareness and Capacity – in spite of the high expenditure to date (142% of total project original budget and 58% of known India GSWH project expenditure to date – see table as above) being spent for this outcome (in a rather unfocussed fashion), the awareness activities funded by the project have a high probability of leaving the SWH market in India at an ongoing higher level of sales post India GSWH project end. However, the capacity building activities undertaken to date do not yet seem to have been embedded in any enduring institutional settings, and to not yet be implemented in a way that has any post-India GSWH project end sustainable funding sources in place. In addition, the awareness activities do not seem to have been focused on the residential sector, which is currently and for the next 10 years clearly is going to account for around 80% of SWH sales in India – so if one focused on the overarching project objective of increasing overall m<sup>2</sup> of SWH installed in India, then one would inevitably strongly focus on the residential sector – which has not yet happened. The post project desired broadening and deepening of the SWH market to maximize the total m<sup>2</sup> of SWH installations in India is clearly going to be driven by the residential sector, but the residential sector is not where the majority of India GSWH project funds have been spent to date.

In Outcome 3: **Financing** – various financing mechanism studies have been funded by the India GSWH project, but only the CDM PoA (Program of Activities or Programmatic CDM) initiative seems to have been a promising option to be sustainable post-India GSWH project end. Expenditure for the Financing

Outcome has also been low, at only 52% of budget to date. A CDM PoA Project has apparently been successfully registered for Tunisia, so developing CDM for SWH financing support seems to be a very promising approach. With the methodology available for SWH, proving CDM additionality for SWH in India should not be the major constraint it often is for CDM projects. However, for a variety of reasons that could have not been predicted by the India GSWH project, the price of CDM CERs (Certified Emission Reductions - or UN certified Carbon Credits) has dramatically declined in the last year and shows no sign of a rapid recovery. But this India GSWH project's CDM PoA financing initiative was an appropriate, timely and well-resourced effort in a promising area of post-project financing at the time the decision was made to pursue this.

Outcome 4: Certification, Quality Control, and Training – has funded various training activities, which seem to have been broadly useful overall. However, the training activities undertaken to date seem rather disjointed, and no post-project end sustainability strategy for institutionalizing the training activities to continue in an autonomous self-alternative funding fashion seem to have been considered past the end of the India GSWH project. Little significant progress or sustainability could be found in the certification and quality control areas of this outcome – with no updating or widening of the BIS standard for FPC collectors to ETC collector systems and also to cover whole system performance, or to establish a genuine independent SWH performance or quality mark. An internal MNRE system of ETC certification appears to be rather arbitrary (including its call for tanks and manifolds to be strictly of indigenous (Indian) manufacture. The comparative tests of thermosyphon FTC and ETC systems at three sites that are underway is a good start but this needs to be widened into a proper formal BIS standards development process for SWH performance and quality testing that could underpin a robust and international best practice neutral certification process that is independent of MNRE and that would remain viable after the end of the India GSWH project's GEF funding. The low priority given to this Outcome to date is reinforced by its low level of expenditure to date, at only 28% of its GEF budget amount.

Outcome 5: Knowledge Management – at only 23% of budgeted ProDoc expenditure to date, this outcome has clearly not been a priority area of project endeavour. The project outputs are found in a number of websites, but with no links between the websites. There is little evidence that the conclusions of many for the key project funded studies has been acted on, nor is any emerging compendium apparent of knowledge gained in the India GSWH project's implementation to date. There is also little evidence of any knowledge gained in the other five countries of the Global GSWH project being transferred to the India GSWH project's priorities and activities. So the sustainability of the knowledge gained in the India GSWH project is not looking very promising at the current point in time.

#### **4.2.5 Project Execution and Implementation**

As per the terms of reference (TOR) of the India GSWH project's MTR, a specific review was required of the project under the following headings: -

- *Comment on the effectiveness of the current project activities in enabling regulatory frameworks in the states to promote use of SWHs.*

According to MNRE reports, twenty-one (21) states had some form of regulatory framework such as Government Orders (GOs) on mandatory use of solar water heaters and other supportive measures in 2004-6, which can then be taken as the baseline condition at the start of



the India GSWH project. As per MNRE reports, currently 100 MCs (Municipal Corporations) /ULBs (Urban Local Bodies) amended bye-laws or are implementing GOs.

Unfortunately, it is not clear exactly what specific role the India GSWH project had in this increase in the number of state level SWH regulatory requirements. In addition, in the absence of evidence on the before and after enforcement of these regulatory frameworks for SWH in the states, it is also impossible to meaningfully evaluate the effectiveness of these regulatory frameworks.

- *Have the modes of dissemination and public awareness programs reached out to a wide audience across the intended sectors? Have public entities and private suppliers of SWHs been aptly involved in the promotional activities?*

The India GSWH funded public awareness project funded activities have clearly reached out to a wide audience across the intended sectors (domestic, commercial, industrial etc) for SWH growth in India. However, the MTR reviewers could not find any documentation that could provide specific information to gauge this SWH awareness in India in any before and after quantitative way. The India GSWH ProDoc did not specify a communications strategy for the enhancement of SWH awareness, nor does such a strategy seem to have been developed by the project to date. No information on the impacts on SWH sales resulting from any awareness creation during workshops and seminars and other forms of communication has yet been seen that could be used to assess the specific contributions made by awareness creation initiatives and their impact on the project goals. The SWH awareness activities of the project have been implemented along with activities of MNRE, IREDA, other government agencies, donor agencies, NGOs, private manufacturers and vendors to create awareness and impacts on the SWH market in India. It is not clear how the awareness impacts of the India GSWH project could be separated out from these other awareness activities, nor does this seem to have been attempted to date.

- *Have the financial mechanisms for SWHs established in other 6 [actually there are 5 other Global GSWH project] project countries been researched and applied as per local Indian requirements?*

There is little evidence that could be seen that financial mechanisms established in the other five Global GSWH project countries have been researched with a serious intention to adapt such financial mechanisms and apply them in India. This is presumably partly due to the India GSWH project having been initiated sooner than the projects in the other five countries. And partly it would seem to be due to a lack of apparent cross-country knowledge management and cross-fertilization to date between the six applicable countries - as was clearly envisaged in the Global GSWH ProDoc.

- *Comment on the effectiveness of the campaigns/training / capacity building programs conducted across various levels in the supply chain and their impacts.*

The campaigns/training / capacity building programs conducted across various levels in the SWH supply chain in India by the India GSWH project clearly have had some useful impact, although no documentation was found to specifically assess and comment on the effectiveness and impacts of the specific activities funded by the India GSWH project.

- *Are the existing activities sufficient to bring about certification and quality control of SWHs and [a suitable] strategy to create a national standard for SWHs across the states?*

Under the India GSWH project, comparative tests are underway at three test sites between comparable output individual-residence scale simple FPC and flooded ETC low-pressure thermosyphon systems. However, no tests of the performance of SWH systems for use in apartment buildings, hotels, areas of poor water quality or areas where freeze protection is required yet seem to be envisaged – where heat exchange FPC and heat pipe ETC systems for example and/or pumped systems may be indicated. In addition, no meaningful progress in developing new BIS SWH technology-neutral whole SWH system standards seems to be underway. The current BIS standards only cover FPC panels and do not cover whole FPC SWH systems, and the MNRE ETC requirements for ETC systems fall well short of what would be required in a BIS standard that was developed in terms of best international technical performance standards practice. So, little meaningful progress seems to have been achieved yet in this area, nor is any corrective action yet planned as far as can be seen.

- *A commentary on the on “Expected situation at the End of the Project” at MTR stage and recommendations to accelerate the pace of work.*

On current settings, by the end of 2012 (the current project end date) the India GSWH project will have expended its available GEF funds (inputs) on generally relevant SWH related activities in India. The market for SWH in India will be larger than at the start of the India GSWH project, and the larger SWH sales rate will be generally sustainable and the overall cumulative total target of 5 million m<sup>2</sup> of SWH sold/installed in India looks likely to have been achieved. Co-funding by ICPCI looks like being mostly achieved, and MNRE co-funding through its SWH subsidies is almost certain to exceed that envisaged in the India GSWH ProDoc. More GO's will be in place at the State and Municipality level, and MNRE SWH requirements will be linked to manufacturers being able to access MNRE SWH subsidies.

However, on current settings, the India GSWH project will struggle to link its expenditure of GEF funds and its specific outputs (studies and reports completed, meetings held, etc) with incremental specific India GSWH attributable SWH m<sup>2</sup> growth outcomes. In particular, it will be difficult to link the India GSWH project's expenditure and its outputs to the 2 million additional total m<sup>2</sup> incremental SWH installations impact that GEF was in effect buying with its \$2 million grant funding. In addition, the project will struggle to find independently verifiable indicators to support the MNRE figures of initial and end of project m<sup>2</sup> of SWH sold in India, let alone how much is still operating. The MNRE SWH requirements will only be effective as long as MNRE continues to subsidise new SWH sales in India (and such subsidies cannot continue forever), and no appreciable progress will have been made in developing suitable relevant BIS standards that are applicable to most SWH systems and to the key different SWH technologies and applications in India.

- *Policy impact of the project on MNRE vision and policy decisions towards implementation of SWHs including any changes in decision making at the ministry level, if any happened/ envisaged.*

The findings of the India GSWH project MTR have not been able to identify any discernible specific impacts of India GSWH project activities on MNRE's SWH vision or policies or support/subsidies decisions.

- *Enabling conditions created, if any, as a result of the project, linkages brought with other partners/ Ministries and their impacts on the overall outcomes of the project.*

Some useful linkages with various other partners/Ministries are indicated in the PSC Meeting Minutes in particular, as well as in other project documentation. However, the contribution of such linkages to the India GSWH project objectives, and whether such linkages will persist after the end of the project, is not clear. A specific example of this lack of integration of project and project partners' activities relating to the core project objective of the tangible promotion of SWH in India, is the various project related websites not being integrated (as previously detailed). The project has provided very useful SWH market studies that had not taken place earlier, and these will help stakeholders to better plan their marketing and other activities around SWHs in India.

- *The capacity building initiatives undertaken with various sectors, the approach adopted, and its impact on the project/ sector for replication or otherwise including the confidence level of the implementing agencies to handle unfinished agenda of the project.*

The capacity building initiatives undertaken includes the awareness campaigns, development of training manuals and training programs undertaken under the project as detailed in section 4.2.2. However, the confidence level is unclear that one can have of the various implementing agencies to handle any unfinished agenda of the project at its end.

- *Comment on how the GEF's overall objective of Green House Gases (GHG) emission reduction will be met with (1) during the life of the project; and (2) for the replication potential.*

The project is in principle on-track to achieve the GEF overall objective of the project in achieving GHG reductions, both during and post-project end. However, the 'in-principle' caveat is due to: the lack of an independently verifiable quantitative project baseline and incremental total and annual SWH installations, and the lack of a proper articulated incremental logic in the project design/inception workshop/implementation to date; the lack of clarity around what MNRE would have done anyway and how the various project policy and market studies influenced (or not) the overall direction of MNRE SWH support activities; the lack of progress in developing independent and credible SWH technical performance and quality certification independent of MNRE subsidy support; and the lack of clarity around what the claimed useful hot water output and GHG emission factor of relevant SWHs in India is supposed to be.

- *Appropriateness of the institutional arrangement and whether there was adequate commitment to the project. Will the project be sustainable on its conclusion?*

MNRE has clearly been a committed and appropriate project implementation agency in terms of: ensuring strong and timely project manager staffing of the project: providing ongoing high-level MNRE chairing of the Project's PSC and PEC meetings: ensuring that project expenditure rates remain on track while working towards the scheduled project end date; and ensuring that generally appropriate project activities are undertaken as specified in the project document.

However, the noteworthy MNRE commitment to the India GSWH project did not unfortunately extend to fully utilising the India GSWH project as an integral, but yet separately identified/branded, part of its overall MNRE SWH mission, and the India GSWH project funded study results were also not apparently used to support subsequent MNRE or project SWH prioritisation or policy/implementation efforts.

UNDP as the project-executing agency seems to have initially been rather 'hands-off' in terms of identifying and then pushing MNRE to address the missing project elements – in particular including quantifying the project baseline and impact of incremental activities, fleshing out the project incremental logic, and ensuring that independently verifiable indicators of project achievements and progress were developed and tracked as the project was implemented.

- *Utilization of resources (including human and financial) towards producing the outputs and adjustments made to the project strategies and scope;*

The utilisation for human and financial resources by the project is clearly rather mixed. On the one hand, the project made good progress in initiating and managing the various project activities to a timely fashion in terms of expenditure rates and the production of outputs. However, on the other hand, the outputs produced do not seem to have been fully utilised to adapt the project's future activities to learn from and fully utilise the knowledge gained from previous activities.

- *Comments on Information dissemination activities undertaken for the development and benefit of the sector.*

A comprehensive commentary on information dissemination activities undertaken by the project is provided in section 4.2.2.

- *Comments on the Awareness Programmes, Trainings undertaken and the quality of awareness material, like quarterly newsletter, project website and the brochure/ other documents, if generated any.*

A comprehensive commentary on information dissemination activities undertaken by the project is provided in section 4.2.2.

- *Methodology adopted for generation and validation of the energy efficiency [SWH] data under the project.*

No discernible methodology seems yet to have contemplated or adopted for generation or validation of SWH initial, incremental (that is due to project activities), still operating, or useful output or displacement of electrical or furnace oil baseline energy use that the increased SWH sales would be displacing.

- *The effectiveness of current monitoring and overseeing systems such as Project Steering Committee and suggestion on improvements if any.*

The current project monitoring and overseeing systems such as the PSC, PEC, AWP, QPR, and APR/PIR are almost exclusively focused on budgets, expenditure, and numerical outputs. Very little focus could be seen in the current monitoring and overseeing systems on the links or

impacts between expenditure and outputs and the overarching outcome of incremental (that is due to project activities) impacts/results. This lack of focus and connection between India GSWH project financial inputs and numerical outputs, and outcomes and outcomes/results is the main problem encountered in undertaking and reporting on this MTR.

- *Details of co-funding provided (GoI subsidies, and others) and its impact on the activities.*

A “Financial Planning Co-financing” format is enclosed in Annex 3 for reporting;

## **5. LESSONS LEARNED**

### **5.1 Need Proper Baseline for Useful Incremental Analysis of Results**

A common thread throughout this MTR review is that without a proper quantified baseline and alternative scenario based on transparent analyses, it is effectively impossible to assess the incremental contribution of specific outputs towards the project goal and objectives of the very many in-principle relevant outputs and outcomes (components and activities) funded by the India GSWH project. Even the starting point of the total m<sup>2</sup> of installed (let alone still working) of SWH in India at the start of the project is still unclear as the figures given are not independently verifiable. The spreadsheet file of baseline conditions prepared at the time of GEF CEO endorsement is very confusing, the figures given for the baseline and alternative are clearly well rounded estimated figures, and no background reports (let alone independent reports) are available to back up the figures used as the baseline and alternative scenarios. Equally, the number and effectiveness of administrative policies (esp. GO’s) at the start of the project is unclear, and so on for most other project interventions as well. So the lesson here is that even if GEF approve the funding for a project without a proper quantified baseline, establishing such independently quantifiable baselines should be a priority at the inception workshop or under the project’s early implementation, as otherwise there is literally no way to tell if the project has really been successful, or not.

### **5.2 Need SMART and Independently Verifiable Indicators**

A common point made throughout this MTR review is that without specific, measurable, action oriented/actionable, realistic, and time-bound (SMART) indicators of project progress, it is almost impossible to judge whether the project has made suitable progress towards its expected results. In addition, although there is no evidence that MNRE are anything but professional about the reporting of results, it is still a critical project implementation practice to have key progress indicators independently verifiable, just to remove any doubt regarding their accuracy. The lesson here is that in project design and implementation, indicators need to be both SMART and to be independently verifiable.

### **5.3 Money Spent and Outputs Not a Good Measure of Progress /Success**

As detailed in the MTR, the project has clearly been strongly focused on the rate of expenditure of project funds, and has also been focused on producing specific outputs. However, although a critical

project input, the rate and total of project expenditure is an input not an output. Even specific outputs are only really relevant if they can be linked to a desired project outcome. The lesson here is that project implementation needs to focus on results, and the results need to be linked to an articulated plan. The plan can be as specified in the ProDoc used as the basis of funding, or it can be defined at the Inception Workshop, or it can be even developed during the project's implementation, but without an articulated plan, there is just no way of judging if the outputs are what was expected, or not.

#### **5.4 Focus On Largest Market if Overall Growth is the Objective**

The India GSWH project design in its ProDoc was quite explicit that the overall project goal was to reduce GHG emissions, and the objective was to meet the goal by growing as much as possible the total m<sup>2</sup> of SWH installed (and presumably still working) in India. By December 2009 the Greentech Market Study had clearly established that more than 80% of the then current annual SWH sales market in India was in the residential sector, and that by 2022, more than 20% of the Indian annual SWH sales market would still be in the residential sector<sup>22</sup>. Clearly with an overall project objective of growing the total m<sup>2</sup> of SWH in India, the bulk of this SWH growth will have to come from the residential sector. However, in its implementation since December 2009, as far as can be seen, the project has ignored the Greentech Market Study findings, has expressed a varying mix of sectoral priority rationales for its sectoral funding priorities, and has not clearly focused on growing the residential sector SWH market in India. Thus the India GSWH project's implementation priorities have not been aligned with the project goal and project objective. The lesson here is that a project must keep focusing on its overall goal and objective and not get distracted into supporting interesting sectors that are not of major significance in achieving the overall project goal and objectives.

## **6. RECOMMENDATIONS**

### **6.1 Establish Independently Verifiable Baseline and Progress Indicators**

As per numerous mentions in the text of this MTR and the Lessons Learned as above, this India GSWH project suffers from a general lack of and independently verifiable pre-project baseline of total installed/working SWH in India, the number and effectiveness of administrative measures to support SWH (GO's and similar), and applicable GHG emission factors for SWH in India. In addition, the inputs applied, and the outputs that have apparently been produced by the India GSWH project generally lack independent means of verification beyond that asserted by MNR, the responsible project implementation agency. As it stands, the project will struggle to establish independent indicators of project inputs by Outcome and Output (actually Component and Activity in normal GEF nomenclature) and project results for its final evaluation. It is therefore recommended that before the end of the project that a suitable independent consultant is retained to undertake an independent study of the applicable project quantified baseline and of the indicators of project inputs and results so that the final project evaluation can be undertaken.

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<sup>22</sup> With a shift from detached houses to apartment buildings and Indian urban areas grow and become more dense

## **6.2 Focus Remaining Project Funds on Residential SWH Market**

As detailed in the body of this MTR report, at this late stage of the India GSWH project's implementation a number of key residential sector SWH focused activities are apparently not yet started or remain unfinished. In particular: (1) it is unclear what level of enforcement and hence impact the apparent growing number of policy measures (esp. GO's) is having on the growth of the SWH market in India; (2) there is an urgent need for a clear SMART process to be got underway without delay to develop whole-system performance-oriented, international best practice and WTO compliant, and technology-neutral BIS standards for SWH in India; and (3) the CDM PoA (the only actual) SWH financial support measure implemented by the India SWH project needs to be registered by the UNFCCC by December 2012 if the subsequent carbon credits (UNFCCC endorsed CERs) are to be able to be sold within Europe (the largest carbon market in the world). It is therefore recommended that these three areas be the focus of remaining India GSWH funding and project activities. If necessary the project end date should also be extended to enable these and other recommendations to be fully implemented.

## **6.3 Consolidate and Learn from Completed SWH Studies**

Although the India GSWH project has clearly not focused to date from its primary objective to grow the SWH market in India (necessarily through the residential market as the residential market is and will remain 80% of the total SWH market in India), a useful by-product is that a wide range of very useful studies have been undertaken of SWH markets and prospects for non-residential sectors in India and also of potential SWH support mechanisms. It is therefore recommended that this India-specific SWH studies' consolidation and learning from the large amount of useful work undertaken by the India GSWH project be captured and actively disseminated in India to guide post-project SWH efforts by MNRE and other key SWH stakeholders. It is recommended that consultants with expertise in capturing and synthesizing lessons learned and looking forward to future needs be recruited for this task. The results of this task will also be useful inputs to UNEP as part of its six-country Global GSWH project with its emphasis on Knowledge Management aspects of SWH for the wider developing country context.

## **6.4 Expedite Subsidy Payments to SWH Manufacturers**

A potentially critical negative SWH financial support mechanism issue that was found during the MTR is that the revised MNRE SWH scheme relies on approved SWH manufacturers passing on the MNRE SWH subsidy to customers at the point of sale, and the SWH manufacturers then subsequently have this subsidy reimbursed by MNRE. So the approved SWH manufacturers are providing free financing of the MNRE SHW subsidy until it is reimbursed. Apparently some SWH manufacturers have been waiting unsuccessfully for this subsidy reimbursement for 18 months, and have had to extend their credit lines with their banks. It is only a matter of time before such manufacturers are forced to reduce their SWH sales - from reaching the limits of their bank credit lines. It is therefore recommended that MNRE urgently address this issue of the timely reimbursement of SWH subsidies to approved SWH manufacturers, for a target maximum reimbursement period of say 6 weeks.

## **6.5 Start Planning for Eventual MNRE SWH Subsidy Phase Out**

The principal and largest budget government SWH support mechanism in India is the MNRE subsidy scheme. With the apparent steady and ongoing growth of the SWH market in India, the cost of providing SWH subsidies will inevitably be growing and the policy rationale for providing a generous subsidy will also inevitably be weakening. There does not seem to have been much thought on how the SWH subsidy might be refocused on areas of India where residential SWH sales are still embryonic, or on sectors which to date have only seen a limited SWH uptake. It is therefore recommended that the India SWH project fund some work on considerations or, and criteria for, how the MNRE subsidy scheme could be usefully refocused in the future.

## **6.6 Urgently Start Work on BIS Technology-Neutral SWH Standards**

As has already been detailed in the body of this report, little progress seems apparent in the implementation of the India GSWH project to date on the development of BIS whole-SWH system and technology neutral performance certification. The flat plate collector (FPC) BIS standard only refers to the collector and the MNRE evacuated tube collector (ETC) requirements for receiving MNRE subsidies only refers to flooded ETC systems (in particular it ignores heat pipe ETC systems) and it contains a requirement that “Storage Tanks, Piping, Support structure etc. (To be all indigenous & not imported)” which requirement does not seem relevant in a prospective BIS standard. It is therefore recommended that one of the highest priorities of the India GSWH project be the urgent development of whole-system, performance oriented and technology neutral BIS standards for SWH.

## **6.7 Project / MNRE Literature to Better Describe SWH Tech Options**

The India GSWH project and MNRE literature on SWH essentially describes 2 ½ different types of SWH system as being appropriate for India. The main system types described are low pressure and thermosyphon FPC and flooded ETC (which are widely described as having a much shorter physical life than FPC systems). There is some mention (the ½ system described) of FPC systems that use a water-glycol primary loop and heat exchanger – for mains pressure applications and for applications with high dissolved solids and/or mains pressure. There is only a brief mention of heat pipe ETC systems, which are then dismissed as being irrelevant to India. The ratios of FPC to ETC are described as being 75% and 25% respectively in the Indian market.

However, the reality is that: (1) the MTR review was informed that the ratio of FPC to ETC system sales in India was already 50% : 50% FPC:ETC and it appears that there is an ongoing growth in ETC systems vis-à-vis FPC; (2) ETC systems now comprise around 75% of worldwide SWH sales, and that (3) heat pipe ETC systems are now generally specified where there is appreciable dissolved mineral solids in the water supply (e.g. Pacific Island atoll countries) or where mains pressure hot water and/or winter night sky SWH working fluid freeze protection is required (e.g. New Zealand), and/or pumped SWH systems are being used. Further, with the India SWH market projected to move towards apartment buildings, it is no longer safe to assume that future SWH systems will be predominantly direct-coupled thermosyphon low-pressure systems. It is therefore recommended that the India SWH project literature be urgently updated to describe the full range of the four main SWH technology systems available, both thermosyphon and pumped applications, and the difference between low pressure thermosyphon closely coupled storage tank applications and mains pressure, pumped, and other desired attributes. It would be an advantage if this change could also be reflected in MNRE SWH literature on its website.



## Annex A: Itinerary and People/Organisations Interviewed for MTR

Schedule of mission visit of Frank Pool [IC] and Naval Karrir [NC] for Mid Term Review of project "61121 – Solar water Heating Market Transformation & Strengthening Initiative."

11<sup>th</sup> to 19<sup>th</sup> January 2012, New Delhi and Pune, INDIA

Date	Time	Place/ Meeting with	Relevance to MTR study	Contact	Status
11 <sup>th</sup> Jan 2012 [Wednesday] [New Delhi]	2.30 to 3.30 pm	Dr. S N Srinivas, Ms. Chitra Narayanswamy & Ms. Manju Narang Meeting Room, UNDP, 55 Lodhi Estate, New Delhi 110003	Introduction to project and discuss MTR administrative details	Ms. Manju Narang: 01146532216/09871342227 Ms. Chitra Narayanswamy: 07760946309	Confirmed & held
	4.15 to 5.15 pm	Dr. Amit Kumar, Director and Senior Fellow Energy - Environment Technology Development Division The Energy and Resources Institute (TERI), Darbari Seth Block, India Habitat Centre, Lodhi Road, New Delhi - 110 003	Campaign on SWH in Hospitality Sector	Dr Amit Kumar: Mob : +91 9873144968 Off: 011 2468 2100/ 41504900	Confirmed & held
12 <sup>th</sup> Jan 2012 [Thursday] [New Delhi]	11.30 to 2.30pm	Dr. Sameer Maithel Greentech Solutions Pvt Ltd., 197, Indraprastha Apt, Pocket 3, Sector 12, Dwarka, ND 110078	Conducted studies on SWH potential in Himalayan region, states, NCR	Dr. Sameer Maithel: 09811392256	Confirmed & held
	4 to 5pm	Mr Pankaj Kumar, DPM, Dr SK Singhal & Mr	Dy. PM, NPM and NPD of the GSWH project	Mr. Pankaj Kumar: 01124363638/08860840739	Confirmed & held

		Tarun Kapoor (Joint Secretary and NPD of the project), Room no 220 of the Ministry of New & Renewable Energy, Block No 14, CGO Complex, Lodhi Road, New Delhi. Also Dr. S N Srinivas and Ms. Chitra Narayanswamy			
13 <sup>th</sup> Jan 2012 [Friday] [New Delhi]	10.30 to 12.30 pm	Mr. Balwant Joshi, Director ABPS Infrastructure Advisory Private Ltd A-309, Kohinoor City Kiroi Road, Off L B S Marg Kurla (West), Mumbai-400070	Conducted studies on SWH promotion with utilities & regulators; new financing mechanisms;	Tel : 022-61240410 (Direct) Mob.+91 9821421630	Confirmed [conducted on the phone]
	2.40 to 3.30pm	Mr. Dwipen Boruah Head - Renewable Energy Solution, ITP Senergy Advisory Services Pvt. Ltd. (Formerly known as IT Power India Pvt. Ltd), 10th Floor, Tower C, Building No. 8, Cyber City, DLF Phase 2, Gurgaon -122002, India	Awareness building in Hospital sector/ Performance & monitoring center for the project	Mr. Dwipen Boruah: <a href="tel:+91-124-4305568">Tel:+91-124-4305568</a> (Direct), 4305500 Mobile:+919560550075	Confirmed & held
	4.00 to 5.30pm	Solar Energy Center Mr. J. P. Singh, Dr Banyopadhyay,	Performance of ETC/FPC based SWHS (Solar Energy	Mr. J.P.Singh: <a href="tel:0124-2579215">Tel:0124-2579215</a> ; Mob:+91 9811480790	Confirmed & held

		Director, Solar Energy Centre, Gurgaon	Centre, MNRE)		
16 <sup>th</sup> Jan 2012 Monday [PUNE]	10am to 12.30pm	Visit to Testing unit at Pune University Prof. S.V. Ghiasas, Director School of Energy Studies, Dept. of Physics, Pune - 411007	Established performance & monitoring test center for GSWH program	Prof Ghiasas: Off (direct): 020 25601419/25695201 Contact also: Jaydeep Malaviya: <a href="tel:+91-20-26166162">Tel:+91-20-26166162</a> Mob.+91 9890033399/ VK Gupta: .+91 9766696516	Confirmed
	1.00 to 5pm	Mr.Jaideep N.Malaviya, CEO Solar Thermal Federation of India, T-301, Ashoka Mall, Opp.Hotel Sun & Sand, Bund Garden Road, Pune-411001	Publishes newsletter; manages helpline for the project	Mr. Jaydeep Malvia: <a href="tel:+91-20-26166162">Tel:+91-20-26166162</a> Mob.+919890033399	Confirmed & held
	5.00pm to 7.45pm	Meeting with SWH vendors of Pune, facilitated by STFI	SWH vendors as stakeholders of the project	Ms. Jaydeep Malvia: <a href="tel:+91-20-26166162">Tel:+91-20-26166162</a> Mob.+91 9890033399	Confirmed & held
17 <sup>th</sup> Jan 2012 Tuesday [PUNE]	12.45pm to 3pm	Mr. Gopal Kabra, CEO G.K. Energy Marketers Pvt Ltd, F.No 350, B.No 25, Ground Floor Lokmanya Nagar, LBS Main Road, Near Dandekar Bridge Circle Pune-411030	Consultant for development of problematic CDM project for SWH installation	Mr. Gopal Kabra: <a href="tel:+91 20 24321115">Tel:+91 20 24321115</a> Mob.+91 9970450000	Confirmed & held
16 <sup>th</sup> and 17th	3 separate meetings	Mr. V K Gupta, Sr. Consultant, ICPCI, Mumbai, Mob.+91 9766696516	Senior Consultant, ICPCI; Performance monitoring, produced user's guide manual,	VK Gupta: .+91 9766696516	Confirmed & held

			developing SWH design guide manual		
18 <sup>th</sup> Jan 2012 Wednesday [ New Delhi]		Consultants meet to prepare draft preliminary findings	Prepare Presentation & draft preliminary presentation on MTR findings	Dr Naval Karrir: Off: 011 26495015 Mob: 09871672034	
	12.30 – 1.30 pm	Meeting with Dr Nayanika Singh, Consultant to GEF OFP, Ministry of Environment and Forests	Brief meeting to present the findings and hear on the strategic importance of the project from GEF OFP perspective	S N Srinivas: 011 46532251/ 009818844798	
19 <sup>th</sup> Jan 2012 Thursday [New Delhi]	12.45 – 2.40pm am	Presentation by IC/NC to members at PEC meeting MNRE building	Presentation of findings of mission visit towards MTR	Dr S N Srinivas: 011 46532251/ 09818844798	Confirmed & held
	3.15 – 5.15pm	Mr Pankaj Kumar, DPM, Dr SK Singhal (MNRE) and Dr. S N Srinivas, Ms. Chitra Narayanswamy (UNDP)	Further detailed discussion on preliminary MTR findings	Dr S N Srinivas: 011 46532251/ 09818844798	Arranged at PEC meeting

Contact persons at UNDP: Chitra Narayanswamy: 07760946309; Manju Narang: 011 46532216/09871342227; S N Srinivas: 011 46532251/009818844798  
Consultants: Frank Pool: 006421457789; Naval Karrir: 011 26495015/09871672034

## Annex B: List of Documents Reviewed

List of documents given to Midterm review team

1	"Solar Water Heating Market Transformation & Strengthening Initiative" - Flyer for Goa meet with GEF in 2011
2	Solar Water Heating Market Transformation & Strengthening Initiative - UNDP Factsheet

3	Annual Work Plans (AWP) - 2009, 2010, 2011, 2012 (draft)
4	Project Development Facility- PDF A Project Initiation Document
5	UNDP Project Document - PDF B Project
6	The Country Programme of India under the Global "Solar Water Heating Market Transformation and Strengthening Initiative (PIMS 3611)"-Project Document India SWH Apr 9 2008
7	"Global Solar Water Heating Market Transformation and Strengthening Initiative: India Country Program" - Project document GSWH final
8	Quarterly Progress Reports - 2009, 2010, 2011 [3 quarters]
9	PO quarterly reports - 2009, 2010, 2011 [3 quarters]
10	Project Implementation Reports - 2010, 2011
11	Project Steering Committee minutes (1st to 11th)
12	Project Executive Committee minutes 1st to 30th
13	Back To Office Reports - 20 Jan 2011 Shimla Anil Arora; 24 - 28 Feb 2010 SN Srinivas
14	UNDP/GEF Assisted project on Solar Water Heater Systems - Status: presentation by Dr Singhal, NPC
15	Final Report on Market Assessment of SWH systems in Industrial Sector by ABPS
16	Market Assessment of SWHS in Himalayan region by Greentech
17	Market Assessment of SWH systems in potential 5 states/NCR region by Greentech
18	Survey/Audit and Assessment of potential of SWH and roof top SPV systems in Gurgaon-Manesar area by Greentech
19	Final Report on Scheme & Framework of SWH systems by utilities & regulators by ABPS
20	Reports of awareness programme of seminar/workshop organised by M/s TERI (Consultative workshop, Regional workshop and National Workshop).
21	Awareness seminar report by IT Power
22	SWH in India: market Assessment Studies & Surveys for different sectors & demand segments by Greentech
23	Development of an area based ESCO for SWH in India by Mercados
24	Final report on Design & Implementation of Financing Mechanisms & Instruments for promotion of SWH systems in India by ABPS
25	Users handbook on SWH by ICPCI
26	Building sector policies & regulations for promotion of SWH systems by CTRAN
27	RFP for development of programmatic CDM project for SWH installations
28	RFP for Validation of programmatic CDM project for SWH installations
29	Clean Development Mechanism Small Scale Program Activity Design Document - Version 1
30	Clean Development Mechanism Small Scale Program Activity Design Document - Specific
31	Clean Development Mechanism Small Scale Program Activity Design Document - Generic
32	CO2 calculations Dr SN Srinivas notes for PIR 2011; & revised by Dr Butch Gadde
33	Six nation GHG emission reduction calculations - Isabella Judy
34	GEF CC Mitigation Tracking Tool
35	Request for Clarifications & Inputs from UNDP India & MNRE: response by SN Srinivas
36	UNDP/GEF Global Solar Water Heating Project: India Country Programme Report of Inception Workshop held at New Delhi during March 4-6, 2009
37	GSWH market transformation & strengthening initiative - Global Inception report
38	Presentations at India Inception Workshop

## Annex C: Financial Planning Co-Financing

Co financing (Type/Sourc e)	IA Own Financing (million USD)		Government		Other* (million USD)		Total (million USD)		Total Disbursement (million USD)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
- Grants	0	0	10,000,000	16,000,000	100,000	50,000	10,000,000	16,000,000	10,100,000	16,050,000
- Loans/ Concessional (compared to market rate)	0	0	0	0	0	0	0	0	0	0
- Credits	0	0	0	0	0	0	0	0	0	0
- Equity investments	0	0	0	0	0	0	0	0	0	0
- In-Kind support	0	0	800,000	400,000	200,000	100,000	0	0	1,000,000	500,000
- Other (*)	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>0</b>	<b>0</b>	<b>10,800,000</b>	<b>16,400,000</b>	<b>300,000</b>	<b>150,000</b>	<b>10,000,000</b>	<b>16,000,000</b>	<b>11,100,000</b>	<b>16,550,000</b>

## **Annex D: Report Back Presentation**

Mid Term Review:  
**UNDP-MNRE GEF India GSWH**

### **Global Solar Water Heating (GSWH) Market Transformation and Strengthening Initiative**

**Presentation to PEC**

**Frank Pool, Clean Energy Consultant, New Zealand  
and  
Dr Naval Karrir, Consultant, India  
MNRE, New Delhi  
19 January 2012**

•1

### **Objectives of the Assignment (1)**

Report on the progress against Objectives, each Outcome, Output, Activity (including sub activity) and Impact Indicators listed in the project document.

Specific points to be covered in the review include: -

1. Comment on the effectiveness of the current project activities in enabling regulatory frameworks in the states to promote use of SWHs.
2. Have the modes of dissemination and public awareness programs reached out to a wide audience across the intended sectors? Have public entities and private suppliers of SWHs been aptly involved in the promotional activities?
3. Have the financial mechanisms for SWHs established in other 6 project countries been researched and applied as per local requirements.

•2

## Objectives of the Assignment (2)

4. Comment on the effectiveness of the campaigns/training / capacity building programs conducted across various levels in the supply chain and their impacts.
5. Are the existing activities sufficient to bring about certification and quality control of SWHs. Will it ensure a national standard for SWHs across the states?
6. Validation and completion of appropriate sections in tracking tool for mid-term review of climate change mitigation projects.

\*3

## Objectives of the Assignment (3)

Commentary on “Expected situation at the End of the Project” and recommendations (if required) for accelerating the pace of work.

Policy impact of the project on MNRE vision and policy decisions towards implementation of SWHs, including change in decision making at the ministry level, if any happened/ envisaged.

Enabling conditions created, if any, as a result of the project, linkages brought with other partners/ Ministries and their impacts on the overall outcomes.

The capacity building initiatives undertaken with various sectors , the approach adopted, and its impact on the project/ sector for replication or otherwise, including the confidence level of Implementing agencies to handle the unfinished agenda of the project.

\*4



## Objectives of the Assignment (4)

Comments on how the GEF's overall objective of Greenhouse Gases (GHG) emission reduction will be met with (1) during the life of the project ; and (2) for the replication potential.

Appropriateness of the institutional arrangement and whether there was adequate commitment to the project. Will the project be sustainable on its conclusion?

Utilization of resources (including human & financial) towards producing the outputs and adjustments made to the project strategies and scope;

Details of co-funding provided (GOI subsidies, and others) and its impact on the activities. Reporting on 'Financial Planning Co-Financing'.

•5

## Objectives of the Assignment (5)

Comments on the Information Dissemination activities undertaken for the development and benefit of the sector.

Comments on the Awareness Programs, Trainings undertaken and the quality of awareness material, like quarterly newsletter, project website and the brochure/ other documents, if generated

Methodology adopted for generation and validation of energy efficiency data under the project.

The effectiveness of current monitoring and overseeing systems such as Project Steering Committee and suggestions on improvements, if any

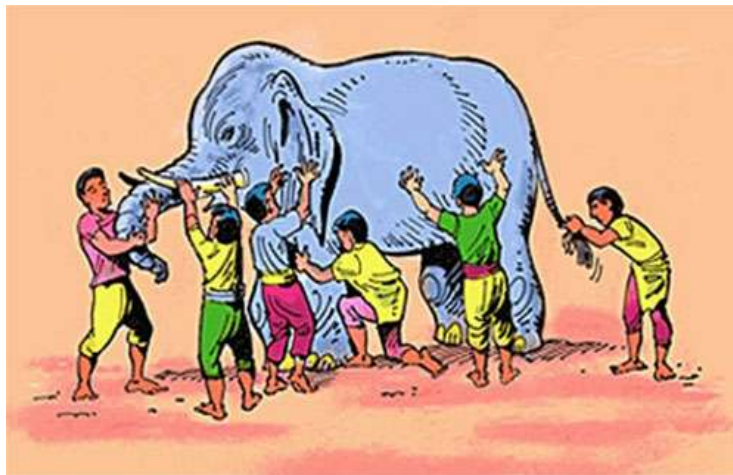
•6



# India GSWH Project Design

- 2005-2008 6 country UNEP led GSWH project developed
- PDF-A and PDF-B covered wider project – not India specific
- 2008 India GSWH ProDoc, has no LogFrame (Logical Gramework Analysis), no specific baseline or alternative scenarios, no SMART (Specific, Measurable, Achieveable, Realistic and Time-Bound) Indicators = a very permissive & generic GEF project design
- Project design is very unfocussed – anything to do with SWH
- No clear project strategy articulated to: (a) increase m<sup>2</sup> first, then economies of scale will reduce SWH prices for other sectors to follow; or (b) focus on sectors with greatest barriers to remove - ie more important than total SWH m<sup>2</sup>

•7



# India – Current SWH Situation

- 4.47 million m<sup>2</sup> – India growing at 20/30% p.a. towards #2 after China
- Diesel/furnace oil prices rising – a strong driver for non-residential SWH
- Residential electricity cross subsidies reducing, rising middle class
- Solar Thermal Federation of India formed, around 40 members
- No Indian FTP and ETC whole-SWH system technical standards available
- No standard Indian approach for SWH output measurement / claims
- Pockets of strong SWH industry, but much of India still undeveloped
- MNRE subsidies' modality of payment in principle usefully restructured to go to manufacturers and not individual buyers, but: -
  1. Maharashtra SWH manufacturers 14 mths subsidy payment arrears
  2. Subsidy still based on m<sup>2</sup> installed, not kWh performance basis

•9

## Current Achievements/Status

- Greentech Nov 2009 All-India Market Assessment – its key conclusion was that 80% of SWH market is residential - and this will continue
- Major market, sectoral, financing, etc studies now completed
- No clear strategy to prioritise project funds (eg Pareto 20:80 rule)
- DPRs supported for some non-residential sector SWH applications
- 3 comparative FPC and ETC annual performance tests underway
- Some useful SWH training and awareness developed /supported
- \$20m MNRE SWH subsidy (TBC) + \$152,000 ICPC-India co-funding
- CDM POA project under validation, could drive 10 yr SWH warranty
- \$513,000 left of \$2 million GEF funds
- Project scheduled to end Dec 2012
- SWH market has grown, strong MNRE co-financing, but will be hard to evaluate results in absence of India GSWH baseline indicators

•10

# Draft Conclusions

1. 2012 AWP budget is spread across too many small activities and sectors – it will be very hard to evaluate the impact of so many diffuse and small primarily promotional and awareness activities
2. Past emphasis has been on studies and assessments. Project needs to consolidate these results. Project needs some clear choices on intervention priorities with the limited project budget and time left
3. Financing mechanisms seem vague and not yet any action. At least CDM approach is specific and underway – the risk is CER price
4. SWH calculator needs to be validated and made publicly available
5. Need technical review of “so-called” DPRs. And are they effective?
6. Comparative tests’ monitoring & analysis protocols need validation
7. Solar resource compendium needs publicising and wide use
8. Subsidies & 20% DPR withholding - penalizes participants’ cash flow

•11

# Draft Recommendations

1. Recommend GSWH implementation focus - building on results to date
2. Recommend clear strategic implementation focus on one sector after review of reports – noting residential market is clearly key for economies of scale. SWH will naturally expand into other sectors as SWH prices fall
3. Recommend evaluate awareness and communication activities to date and focus strategically on a few significant and strategically prioritised areas
4. Recommend focus on SWH plumbers, local manufacture / entrepreneur and local dealer training module development and deployment
5. Recommend urgent start via BIS of development of FPC/ETC system technical standards & standardised performance measurement protocols
6. Recommend simplify CDM project to just 10 year SWH warranty approach, a one page plain-English and Hindi end user agreement, and simplify monitoring with only residential SWH focus using AMS I.J methodology
7. Recommend focus on prompt MNRE reimbursement of SWH subsidies to manufacturers – they are running out of bank credit, so will reduce sales
8. Recommend extend project end date to mid or end 2013 - to give time to refocus project and achieve measurable impacts in a few specific areas

•12

## Annex E: Evaluation Terms of Reference

### INDIVIDUAL CONSULTANT PROCUREMENT NOTICE



Date: 1<sup>st</sup> November 2011

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**Country: INDIA**

**Description of the assignment: International Consultant for MID TERM REVIEW**

**Project name: Project 61121 – Global Solar Water Heating Market Transformation and Strengthening Initiative**

**Period of assignment/services (if applicable): 21 working days**

Proposal should be submitted at the following address: Procurement Division, United Nations Development Programme, 55 Lodi Estate, New Delhi-110003 or by email to [ic.in@undp.org](mailto:ic.in@undp.org) no later than **10<sup>th</sup> November 2011**.

Any request for clarification must be sent in writing, or by standard electronic communication to the address or e-mail indicated above. UNDP, India will respond in writing or by standard electronic mail and will send written copies of the response, including an explanation of the query without identifying the source of inquiry, to all consultants.

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#### 1. BACKGROUND

Urban and rural India is largely dependent on non-renewable sources of energy for heating water. While water for domestic use is commonly heated with electricity, which costs Rs. 3-4 per kWh, most industrial units depend on oil, making India a major Importer of energy. Demand for energy set to increase given the increasing population and industrialization.

One of the key initiatives by the Ministry of New and Renewable Energy, Government of India, is to support the application of solar thermal systems. As a segment of the six-country project (Albania, Algeria, Chile, India, Lebanon and Mexico), this project aims to accelerate and strengthen the growth of solar water heater market in India and to use the experiences and lessons learnt in other countries. It will establish supportive regulatory environment, build up the market demand and strengthen the supply chain with the aim of reaching the target of 10 million sq. metres of installed solar water heating systems in India by 2012. An average growth rate of 50 percent during the heavily supported market scale-up years would enable this. The focus is on: (i) A reform of the supply chain to a higher level of professionalism (ii) Awareness building, and (iii) Refinement and replication of incentive programmes throughout India. The long-term goal of the project is to accelerate a sustainable market development of solar water heating in India with good quality products and services.

In accordance with UNDP/GEF M&E policies and procedures, all regular projects supported by the GEF should undergo a mid-term review and final evaluation. The mid-term review is intended to assess the relevance, performance and success of the project. It looks at early signs of potential impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. It will also identify/document lessons learnt and provide recommendations that might improve design and implementation of other UNDP/GEF projects. *The review team will comprise of an international and a local consultant.*

## **2. SCOPE OF WORK, RESPONSIBILITIES AND DESCRIPTION OF THE PROPOSED ANALYTICAL WORK**

The international consultant will be the team leader and coordinate the consultancy to ensure quality of the report and timely submission. The local consultant will provide supportive roles both in terms of professional back up, translation etc.

Report on the progress against Objective, each Outcome, Output, Activity (including sub-activities) and Impact Indicators listed in the project document. How far the project has reached on the overall objective and outcome; the timelines and how these will be completed within the project duration, i.e. 31 December 2012. Also the following points must be covered in the review specifically;

- Comment on the effectiveness of the current project activities in enabling regulatory frameworks in the states to promote use of SWHs
- Have the modes of dissemination and the public awareness programs reached out to a wide audience across the intended sectors? Have public entities and private suppliers of SWHs been aptly involved in the promotional activities?
- Have the financial mechanisms for SWHs established in other 6 project countries been researched and applied as per local requirements
- Comment on the effectiveness of the campaigns/training/capacity building programs conducted across various levels in the supply chain and their impacts
- Are the existing activities sufficient to bring about certification and quality control of SWHs. Will it ensure a national standard for SWHs across the states?
- Validate and complete appropriate sections in tracking tool for mid-term review of climate change mitigation projects.

### **Management arrangements:**

Throughout the period of review, the review team will liaise closely with the UNDP Country Director/Assistant Country Director/Programme Analyst, the concerned agencies of the Government, any members of the international team of experts under the project and the counterpart staff assigned to the project. The team can raise or discuss any issue or topic it deems necessary to fulfill its task, the team, however, is not authorized to make any commitments to any part on behalf of UNDP/GEF or the Government.

## **3. REQUIREMENTS FOR EXPERIENCE AND QUALIFICATIONS [International Consultant]**

### I. Years of experience:

- Professional background in development field, energy or climate change. A minimum of 10 years work experience is required;

## II. Competencies:

1. Highly knowledgeable of participatory monitoring, review and evaluation processes, and experience in review and evaluation of technical assistance projects with major donor agencies;
2. Familiar with renewable energy policies/conditions in India and abroad through management and/or implementation or through consultancies in review and evaluation of donor funded projects. Understanding of CO<sub>2</sub> emission reduction calculations (including IPCC, GEF procedure), especially from the energy audit and implementation of its recommendations, that contribute to global benefits;
3. Familiar with GEF rules, regulations, project reviews and evaluations;
4. Demonstrated ability to assess complex situations, succinctly, distil critical issues, and draw forward-looking conclusions and recommendations;
5. Ability and experience to lead multi disciplinary and national teams, and deliver quality reports within the given time.
6. Writing and communication will be in English, and he/she must have excellent communication skills in English. The consultant must bring his/her own computer/ laptop and related equipment.

## **4. DOCUMENTS TO BE INCLUDED WHEN SUBMITTING THE PROPOSALS.**

Interested individual consultants must submit the following documents/information to demonstrate their qualifications:

### 1. Proposal:

- (i) Explain why individual consultant (IC) is most suitable for the work
- (ii) Provide a brief methodology on how they will approach and conduct the work (if applicable)

### 2. Financial proposal

- (i) Professional rate per day, total days and the total professional cost
- (ii) Travel costs [include per diem]: 1. Travel to Delhi (one no.), 2. Travel for field visits in India (2 visits envisaged to be taken, Pune, Hamirpur/Bangalore (will be confirmed subsequently))

3. Personal CV including past experience in similar projects and at least 3 references (with their full contact details, including e-mail, phone numbers)

## **5. FINANCIAL PROPOSAL**

### **Lump sum contracts**

The financial proposal shall specify a total lump sum amount, and payment terms around specific and measurable (qualitative and quantitative) deliverables (i.e. whether payments fall in installments or upon completion of the entire contract). Payments are based upon output, i.e. upon delivery of the services specified in the TOR. In order to assist the requesting unit in the comparison of financial proposals, the financial proposal will include a breakdown of this lump sum amount (including travel, per diems, and number of anticipated working days).



## **Travel**

All envisaged travel costs must be included in the financial proposal. This includes all travel to join duty station/repatriation travel. In general, UNDP should not accept travel costs exceeding those of an economy class ticket. Should the IC wish to travel on a higher class he/she should do so using their own resources.

In the case of unforeseeable travel, payment of travel costs including tickets, lodging and terminal expenses should be agreed upon, between the respective business unit and Individual Consultant, prior to travel and will be reimbursed.

## **6. EVALUATION**

IC will be evaluated based on the following methodologies:

### **1. Cumulative analysis**

*When using this weighted scoring method, the award of the contract should be made to the IC whose offer has been evaluated and determined as:*

- a) responsive/compliant/acceptable, and*
- b) Having received the highest score out of a pre-determined set of weighted technical and financial criteria specific to the solicitation.*

*\* Technical Criteria weight; [70%]*

*\* Financial Criteria weight; [30%]*

*Only candidates obtaining a minimum of 70% would be considered for the Financial Evaluation*

<b>Criteria</b>	<b>Weight</b>	<b>Max. Point</b>
<i>Technical</i>		
• <i>Qualification of the Consultant</i>	<i>20</i>	<i>20</i>
• <i>Relevant work Experience</i>	<i>25</i>	<i>25</i>
• <i>Proposed Work Plan for undertaking the task</i>	<i>20</i>	<i>20</i>
• <i>Time Line for completion of the Task</i>	<i>05</i>	<i>05</i>
<i>Financial</i>	<i>30</i>	<i>30</i>

## ANNEX

### ANNEX 1 - TERMS OF REFERENCES (TOR)

**Post Title:** : **International** Consultant to conduct Mid Term Review (MTR) as per the UNDP-GEF guidelines for the project “**Project 61121 – Global Solar Water Heating Market Transformation and Strengthening Initiative**”

**Organization:** GEF-UNDP-MNRE Project “**Project 61121 – Global Solar Water Heating Market Transformation and Strengthening Initiative**”

**Supervisor** : Head/Programme Analyst of Energy and Environment Unit, UNDP, New Delhi

**Duration** : Maximum of 21 working days (over a period of 45 days)

**Duty Station** : Home based consultancy and travel to New Delhi, as part of the assignment.

**UNDP strives to have a workforce which reflects diversity and gender balance, and applies an equal opportunities approach. UNDP does not solicit or screen for information in respect of HIV or AIDS status. All selection is on merit.**

#### **1. Background**

Urban and rural India is largely dependent on non-renewable sources of energy for heating water. While water for domestic use is commonly heated with electricity, which costs Rs. 3-4 per kWh, most industrial units depend on oil, making India a major Importer of energy. Demand for energy set to increase given the increasing population and industrialisation.

One of the key initiatives by the Ministry of New and Renewable Energy, Government of India, is to support the application of solar thermal systems. As a segment of the six-country project (Albania, Algeria, Chile, India, Lebanon and Mexico), this project aims to accelerate and strengthen the growth of solar water heater market in India and to use the experiences and lessons learnt in other countries. It will establish supportive regulatory environment, build up the market demand and strengthen the supply chain with the aim of reaching the target of 10 million sq. metres of installed solar water heating systems in India by 2012. An average growth rate of 50 percent during the heavily supported market scale-up years would enable this. The focus is on: (i) A reform of the supply chain to a higher level of professionalism (ii) Awareness building, and (iii) Refinement and replication of incentive programmes throughout India. The long-term goal of the project is to accelerate a sustainable market development of solar water heating in India with good quality products and services.

In accordance with UNDP/GEF M&E policies and procedures, all regular projects supported by the GEF should undergo a mid-term review and final evaluation. The mid-term review is intended to assess the relevance, performance and success of the project. It looks at early signs of potential impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. It will also identify/document lessons learnt and provide recommendations that might improve design and implementation of other UNDP/GEF projects. *The review team will comprise of an international and a local consultant.*

#### **2. Functions and key results expected:**

The international consultant will be the team leader and coordinate the consultancy to ensure quality of the report and timely submission. He/She will work with the local consultant who will provide supportive roles both in terms of professional back up, translation etc.

- Report on the progress against Objective, each Outcome, Output, Activity (including sub-activities) and Impact Indicators listed in the project document. How far the project has reached on the overall objective and outcome; the timelines and how these will be completed within the project duration, i.e. 31 December 2012. Also the following points must be covered in the review specifically;
  - a. Comment on the effectiveness of the current project activities in enabling regulatory frameworks in the states to promote use of SWHs
  - b. Have the modes of dissemination and the public awareness programs reached out to a wide audience across the intended sectors? Have public entities and private suppliers of SWHs been aptly involved in the promotional activities?
  - c. Have the financial mechanisms for SWHs established in other 6 project countries been researched and applied as per local requirements
  - d. Comment on the effectiveness of the campaigns/training/capacity building programs conducted across various levels in the supply chain and their impacts
  - e. Are the existing activities sufficient to bring about certification and quality control of SWHs. Will it ensure a national standard for SWHs across the states?
  - f. Validate and complete appropriate sections in tracking tool for mid-term review of climate change mitigation projects.
- A commentary is required on the “Expected Situation at the end of the Project” as envisioned at the mid-term review and recommendations, if any required, for accelerating the pace of work.
- Policy impact of the project, if made, on the MNRE vision and policy decisions towards implementation of Solar Water Heaters (SWHs), including change in decision making at the ministry level, if any happened/envisaged.
- Enabling conditions created, if any, as a result of the project, the linkages brought with other partners/Ministries and their impacts on the overall outcomes.
- The capacity building initiatives undertaken with various sectors, the approach adopted, and its impact on the project/sector – for replication or otherwise, including the confidence level of Implementing Agencies to handle the unfinished agenda of the project.
- Comments on how the GEF’s overall objective of Greenhouse Gases Emission reduction will be met with – (1) during the life of the project; and (2) for the replication potential.
- Appropriateness of the institutional arrangement and whether there was adequate commitment to the project. Will the project be sustainable on its conclusion?
- Utilization of resources (including human and financial) towards producing the outputs and adjustments made to the project strategies and scope;
- Details of co-funding provided (GoI subsidies, and others) and its impact on the activities. A “Financial Planning Co-financing” format is enclosed in Annex 3 for reporting;
- Comments on Information dissemination activities undertaken for the development and benefit of the sector.

- Comments on the Awareness Programmes, Trainings undertaken and the quality of awareness material, like quarterly newsletter, project website and the brochure/ other documents, if generated any.
- Methodology adopted for generation and validation of the energy efficiency data under the project.
- The effectiveness of current monitoring and overseeing systems such as Project Steering Committee and suggestion on improvements if any.

**Annex 2** contains guidance on the GEF Project review criteria and explanation of terminology provided in the GEF Guidelines to Evaluations.

### **3. Cross Cutting Issues:**

Considering that UNDP is concerned about poverty reduction, local governance and promotion of gender equity, the team may look at these cross-cutting issues and comment if the project had any linkages and any achievement on these objectives has been through.

At its discretion, the team is free to include any other additional comments that are felt worth reporting.

### **4. PRODUCTS EXPECTED FROM THE REVIEW:**

The total duration of the review and the finalization of report are 21 days, including a four to six days visit to the field. At the end of 12 days, the team leader i.e. IC will submit and present, for comments, his/her draft report to a meeting consisted of UNDP, MNRE, Implementing/Partnering Agencies, and/or other members of the Project Executive Committee/Project Steering Committee. The draft report and the final report will also be shared with UNDP's Regional Coordinating Unit, GEF M&E office, in addition to UNDP for comments. After incorporating the comments, the team leader will submit the final report to UNDP, New Delhi (including an electronic copy). The length of the main report should not exceed 50 pages, in total. While the contract will be for 21 days, incorporating the comments, reviewing the draft report/its finalization and formal submission, in no case, should exceed a total period of 45 days.

If there are discrepancies between the impressions and findings of the evaluation team and the aforesaid parties, these should be explained in a separate sheet to be attached to the final report.

The Evaluation Report Outline should be structured along the following lines:

1. Executive Summary
2. Introduction
3. The project and its development context
4. Findings and Conclusions
  - 4.1 Project formulation
  - 4.2 Implementation
  - 4.3 Results
5. Completed tracking tool
6. Recommendations
7. Lessons learned
8. Annexes

### **5. METHODOLOGY OR REVIEW APPROACH:**

The review approach will combine methods such as documentation review (desk study); interviews; and field visits. All relevant project documentation will be made available by the project management team, facilitated by UNDP. After studying the documentation the team will conduct interviews with all relevant partners including the beneficiaries. Validation of preliminary findings/reports with stakeholders will happen through circulation of initial reports for comments or other types of feedback mechanisms.

The consultants should provide details in respect of:

- Documents reviewed and brief summary of them in an annexure;
- Interviews and brief summary wherever relevant;
- Field visits and brief summary in annexure or where relevant;
- Questionnaires, if any;
- Participatory techniques and other approaches for gathering and analysis of data; and
- Participation of stakeholders and/or partners.

## **6. IMPLEMENTATION ARRANGEMENTS:**

Management arrangements:

Throughout the period of the review, the review team will liaise closely with the UNDP Country Director/ACD/Programme Analyst, the concerned agencies of the Government, any members of the international team of experts under the project and the counterpart staff assigned to the project. The team can raise or discuss any issue or topic it deems necessary to fulfill its task, the team, however, is not authorized to make any commitments to any part on behalf of UNDP/GEF or the Government.

Time-frame: As already described.

The team may include four to six days of site visits, the details of which can be worked out with the mission in due course. This visit will also include meetings with the officials of the Implementing Agency, State Nodal Agencies and any other stakeholder related to the project, including end-users, SWH manufacturers, SWH vendors and financial institutions.

After the initial briefing by UNDP Country Director/ACD/Programme Analyst, the review team will meet with the National Project Director, the officials of IREDA, GEF Focal Point, Ministry of Environment & Forests and other officials of MNRE as required.

### I. Years of experience:

- Professional background in development field, energy or climate change. A minimum of 10 years of working experience is required;

### II. Competencies:

- Highly knowledgeable of participatory monitoring, review and evaluation processes, and experience in review and evaluation of technical assistance projects with major donor agencies;
- Familiar with renewable energy policies/conditions in India and abroad through management and/or implementation or through consultancies in review and evaluation of donor funded projects. Understanding of CO<sub>2</sub> emission reduction calculations (including IPCC, GEF procedure), especially from the energy audit and implementation of its recommendations, that contribute to global benefits;
- Familiar with GEF rules, regulations, project reviews and evaluations;

- Demonstrated ability to assess complex situations, succinctly, distil critical issues, and draw forward-looking conclusions and recommendations;
- Ability and experience to lead multi disciplinary and national teams, and deliver quality reports within the given time.
- Writing and communication will be in English, and he/she must have excellent communication skills in English. The consultant must bring his/her own computer/ laptop and related equipment.

## **ANNEX 2 - Guidance on the GEF Project review criteria and explanation of terminology provided in the GEF Guidelines to Evaluations**

This Annex providing more detailed guidance on the GEF Project review criteria and explanation of terminology provided in the GEF Guidelines to Evaluations is an integral part of the attached TOR.

### **I Project Review Criteria**

Please note that some of the categories in the findings and conclusions need to be rated in conformity with the GEF guidelines for final evaluations.

#### **1. Executive summary**

- Brief description of project
- Context and purpose of the review/evaluation
- Main conclusions, ratings, recommendations and lessons learned

#### **2. Introduction**

- Purpose of the review/evaluation
- Key issues addressed
- Methodology of the review/evaluation
- Structure of the review/evaluation

#### **3. The project(s) and its development context**

- Project start and its duration
- Problems that the project seek to address
- Immediate and development objectives of the project
- Main stakeholders
- Results expected

#### **4. Findings and Conclusions**

In addition to a descriptive assessment, all **criteria marked with (R) should be rated** using the following divisions: Highly Satisfactory, Satisfactory, Marginally Satisfactory, Unsatisfactory.

##### **4.1. Project Formulation**

- Conceptualization/Design (R). This should assess the approach used in design and an appreciation of the appropriateness of problem conceptualization and whether the selected intervention strategy addressed the root causes and principal threats in the project area. It should also include an assessment of the logical framework and whether the different project components and activities proposed to achieve the objective were appropriate, viable and responded to contextual institutional, legal and regulatory settings of the project. It should also assess the indicators defined for guiding implementation and measurement of achievement and whether lessons from other relevant projects (e.g., same focal area) were incorporated into project design.

- Country-ownership/Driveness. Assess the extent to which the project idea/conceptualization had its origin within national, sectoral and development plans and focuses on national environment and development interests.
- Stakeholder participation (R). Assess information dissemination, consultation, and “stakeholder” participation in design stages.
- Replication approach. Determine the ways in which lessons and experiences coming out of the project were/are to be replicated or scaled up in the design and implementation of other projects (this also related to actual practices undertaken during implementation).
- Other aspects. To assess in the review of Project formulation approaches would be UNDP comparative advantage as IA for this project; the consideration of linkages between projects and other interventions within the sector and the definition of clear and appropriate management arrangements at the design stage.

#### **4.2. Project Implementation**

- Implementation Approach (R). This should include assessments of the following aspects:

(i) The use of the logical framework as a management tool during implementation and any changes made to this as a response to changing conditions and/or feedback from monitoring and evaluation (M&E) activities if required.

(ii) Other elements that indicate adaptive management such as comprehensive and realistic work plans routinely developed that reflect adaptive management and/or; changes in management arrangements to enhance implementation.

(iii) The project's use/establishment of electronic information technologies to support implementation, participation and monitoring, as well as other project activities.

(iv) The general operational relationships between the institutions involved and others and how these relationships have contributed to effective implementation and achievement of project objectives.

(v) Technical capacities associated with the project and their role in project development, management and achievements.

- Monitoring and evaluation (R). Including an assessment as to whether there has been adequate periodic oversight of activities during implementation to establish the extent to



which inputs, work schedules, other required actions and outputs are proceeding according to plan; whether formal reviews/evaluations have been held and whether action has been taken on the results of this monitoring oversight and review/evaluation reports where applicable.

- Stakeholder participation (R). This should include assessments of the mechanisms for information dissemination in project implementation and the extent of stakeholder participation in management, emphasizing the following:

(i) The production and dissemination of information generated by the project.

(ii) Local resource users and NGOs participation in project implementation and decision making and an analysis of the strengths and weaknesses of the approach adopted by the project in this arena.

(iii) The establishment of partnerships and collaborative relationships developed by the project with local, national and international entities and the effects they have had on project implementation.

(iv) Involvement of governmental institutions in project implementation, the extent of governmental support of the project.

- Financial Planning: Including an assessment of:

(i) The actual project cost by objectives, outputs, activities

(ii) The cost-effectiveness of achievements

(iii) Financial management (including disbursement issues)

(iv) Co-financing<sup>23</sup>

- Sustainability. Extent to which the benefits of the project will continue, within or outside the project domain, after it has come to an end. Relevant factors include for example: development of a sustainability strategy, establishment of financial, environmental and economic instruments and mechanisms, mainstreaming project objectives into the economy or community production activities.

- Execution and implementation modalities. This should consider the effectiveness of the UNDP counterpart and Project Co-ordination Unit participation in selection, recruitment, assignment of experts, consultants and national counterpart staff members and in the definition of tasks and responsibilities; quantity, quality and timeliness of inputs for the project with respect to execution responsibilities, enactment of necessary legislation and budgetary provisions and extent to which these may have affected implementation and

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<sup>23</sup> Please see guidelines at the end of Annex 2, Part II “Financial Planning Co-financing” of these TORs for reporting of co-financing

sustainability of the Project; quality and timeliness of inputs by parties responsible for providing inputs to the project, and the extent to which this may have affected the smooth implementation of the project.

#### **4.3. Results**

- Attainment of Outcomes/ Achievement of objectives (R): Including a description *and rating* of the extent to which the project's objectives (environmental and developmental) were achieved using Highly Satisfactory, Satisfactory, Marginally Satisfactory, and Unsatisfactory ratings. If the project did not establish a baseline (initial conditions), the reviewers/evaluators should seek to determine it through the use of special methodologies so that achievements, results and impacts can be properly established.
- This section should also include reviews of the following:
- Sustainability: Including an appreciation of the extent to which benefits continue, within or outside the project domain after GEF assistance/external assistance in this phase has come to an end.
- Contribution to upgrading skills of the national staff.
- The positive and negative results, and foreseen and unforeseen, changes to and effects produced by a development intervention. In GEF terms, results include direct project outputs, short-to-medium term outcomes, and longer-term impact, including global environmental benefits, replication effects and other, local effects.

#### **5. Recommendations**

- Corrective actions for the design, implementation, monitoring and review/evaluation of the project
- Actions to follow up or reinforce initial benefits from the project
- Proposals for future directions underlining main objectives

#### **6. Lessons learned**

This should highlight the best and worst practices in addressing issues relating to relevance, performance and success.

#### **7. Review/Evaluation report Annexes**

- Review/Evaluation TORs
- Itinerary
- List of persons interviewed
- Summary of field visits
- List of documents reviewed
- Questionnaire used and summary of results
- Comments by stakeholders (only in case of discrepancies with evaluation findings and conclusions)

## **II Explanation of Terminology Provided in the GEF Guidelines to Reviews/Evaluations**

**Implementation Approach** includes an analysis of the project's logical framework, adaptation to changing conditions (adaptive management), partnerships in implementation arrangements, changes in project design, and overall project management.

Some elements of an effective implementation approach may include:

- The logical framework used during implementation as a management and M&E tool
- Effective partnerships arrangements established for implementation of the project with relevant stakeholders involved in the country/region
- Lessons from other relevant projects (e.g., same focal area) incorporated into project implementation
- Feedback from M&E activities used for adaptive management

**Country Ownership/Driveness** is the relevance of the project to national development and environmental agendas, recipient country commitment, and regional and international agreements where applicable. Project Concept has its origin within the national sectoral and development plans

Some elements of effective country ownership/driveness may include:

- Project Concept has its origin within the national sectoral and development plans
- Outcomes (or potential outcomes) from the project have been incorporated into the national sectoral and development plans
- Relevant country representatives (e.g., governmental official, civil society, etc.) are actively involved in project identification, planning and/or implementation
- The recipient government has maintained financial commitment to the project
- The government has approved policies and/or modified regulatory frameworks in line with the project's objectives

For projects whose main focus and actors are in the private-sector rather than public-sector (e.g., IFC projects), elements of effective country ownership/driveness that demonstrate the interest and commitment of the local private sector to the project may include:

- The number of companies that participated in the project by: receiving technical assistance, applying for financing, attending dissemination events, adopting environmental standards promoted by the project, etc.
- Amount contributed by participating companies to achieve the environmental benefits promoted by the project, including: equity invested, guarantees provided, co-funding of project activities, in-kind contributions, etc.
- Project's collaboration with industry associations

**Stakeholder Participation/Public Involvement** consists of three related and often overlapping processes: information dissemination, consultation, and "stakeholder" participation. Stakeholders

are the individuals, groups, institutions, or other bodies that have an interest or stake in the outcome of the GEF-financed project. The term also applies to those potentially adversely affected by a project.

Examples of effective public involvement include:

#### *Information dissemination*

- Implementation of appropriate outreach/public awareness campaigns

#### Consultation and stakeholder participation

- Consulting and making use of the skills, experiences and knowledge of NGOs, community and local groups, the private and public sectors, and academic institutions in the design, implementation, and review/evaluation of project activities

#### Stakeholder participation

- Project institutional networks well placed within the overall national or community organizational structures, for example, by building on the local decision making structures, incorporating local knowledge, and devolving project management responsibilities to the local organizations or communities as the project approaches closure
- Building partnerships among different project stakeholders
- Fulfillment of commitments to local stakeholders and stakeholders considered to be adequately involved

**Sustainability** measures the extent to which benefits continue, within or outside the project domain, from a particular project or program after GEF assistance/external assistance has come to an end. Relevant factors to improve the sustainability of project outcomes include:

- Development and implementation of a sustainability strategy
- Establishment of the financial and economic instruments and mechanisms to ensure the ongoing flow of benefits once the GEF assistance ends (from the public and private sectors, income generating activities, and market transformations to promote the project's objectives)
- Development of suitable organizational arrangements by public and/or private sector
- Development of policy and regulatory frameworks that further the project objectives
- Incorporation of environmental and ecological factors affecting future flow of benefits
- Development of appropriate institutional capacity (systems, structures, staff, expertise, etc.)
- Identification and involvement of champions (i.e. individuals in government and civil society who can promote sustainability of project outcomes)
- Achieving social sustainability, for example, by mainstreaming project activities into the economy or community production activities
- Achieving stakeholders consensus regarding courses of action on project activities

**Replication approach**, in the context of GEF projects, is defined as lessons and experiences coming out of the project that are replicated or scaled up in the design and implementation of other projects. Replication can have two aspects, replication proper (lessons and experiences are replicated in different geographic area) or scaling up (lessons and experiences are replicated

within the same geographic area but funded by other sources). Examples of replication approaches include:

- Knowledge transfer (i.e., dissemination of lessons through project result documents, training workshops, information exchange, a national and regional forum, etc)
- Expansion of demonstration projects
- Capacity building and training of individuals, and institutions to expand the project's achievements in the country or other regions
- Use of project-trained individuals, institutions or companies to replicate the project's outcomes in other regions

**Financial Planning** includes actual project cost by activity, financial management (including disbursement issues), and co-financing.

Effective financial plans include:

- Identification of potential sources of co-financing as well as leveraged and associated financing<sup>24</sup>.
- Strong financial controls, including reporting, and planning that allow the project management to make informed decisions regarding the budget at any time, allows for a proper and timely flow of funds, and for the payment of satisfactory project deliverables
- Due diligence in the management of funds and financial audits

*Co financing includes:* Grants, Loans/Concessional (compared to market rate), Credits, Equity investments, In-kind support, Other contributions mobilized for the project from other multilateral agencies, bilateral development cooperation agencies, NGOs, the private sector and beneficiaries. Please refer to GEF Council documents on co-financing for definitions, such as GEF/C.20/6.

*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. Please briefly describe the resources the project has leveraged since inception and indicate how these resources are contributing to the project's ultimate objective.

**Cost-effectiveness** assesses the achievement of the environmental and developmental objectives as well as the project's outputs in relation to the inputs, costs, and implementing time. It also examines the project's compliance with the application of the incremental cost concept. Cost-effective factors include:

- Compliance with the incremental cost criteria (e.g. GEF funds are used to finance a component of a project that would not have taken place without GEF funding) and securing co-funding and associated funding

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<sup>24</sup> Please refer to Council documents on co-financing for definitions, such as GEF/C.20/6. The following page presents a table to be used for reporting co-financing.

- The project completed the planned activities and met or exceeded the expected outcomes in terms of achievement of Global Environmental and Development Objectives according to schedule, and as cost-effective as initially planned
- The project used either a benchmark approach or a comparison approach (did not exceed the costs levels of similar projects in similar contexts)

**Monitoring, Review & Evaluation.** Monitoring is the periodic oversight of a process, or the implementation of an activity, which seeks to establish the extent to which inputs, work schedules, other required actions and outputs are proceeding according to plan, so that timely action can be taken to correct the deficiencies detected. Evaluation is a process by which program inputs, activities and results are analyzed and judged explicitly against benchmarks or baseline conditions using performance indicators. This will allow project managers and planners to make decisions based on the evidence of information on the project implementation stage, performance indicators, level of funding still available, etc, building on the project's logical framework.

Monitoring, Review and Evaluation includes activities to measure the project's achievements such as identification of performance indicators, measurement procedures, and determination of baseline conditions. Projects are required to implement plans for monitoring and evaluation with adequate funding and appropriate staff and include activities such as description of data sources and methods for data collection, collection of baseline data, and stakeholder participation. Given the long-term nature of many GEF projects, projects are also encouraged to include long-term monitoring plans that are sustainable after project completion.

## Financial Planning Co-financing

Co financing (Type/ Source)	IA own Financing (million USD)		Government (million USD)		Other* (million USD)		Total (million USD)		Total Disbursement (million USD)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Plan- ned	Actual
Grants										
Loans/ Concessional (compared to market rate)										
Credits										
Equity investments										
In-kind support										
Other (*)										
<b>Totals</b>										

\*

Other is referred to contributions mobilized for the project from other multilateral agencies, bilateral development cooperation agencies, NGOs, the private sector and beneficiaries.

## Leveraged Resources -

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. Please briefly describe the resources the project has leveraged since inception and indicate how these resources are contributing to the project's ultimate objective.

## ANNEX 3 - List of Documents to be reviewed by the evaluators

### INTERNAL:

1. Project Document;
2. Project Implementation Review Report for the period 01 July 2008 to 30 June 2009;
3. Minutes of National Steering Committee/Project Steering Committee meetings;
4. Back-to-Office Reports of UNDP staff and PMC staff (if any);
5. Terminology in the GEF Guidelines to Terminal Evaluation and the Project Review Criteria – part II, Annex 1 of this TOR.
6. Study reports/Conference proceedings/government guidelines, etc.
7. Any other documents the evaluators feel necessary for conducting the evaluation.

### EXTERNAL:

1. Familiarization with policy guidelines, subsidies and developments relating to Solar Thermal sector in India and abroad;
2. GEF/World Bank guidelines on GHG emission reduction calculations;
3. Any other documents essential for the successful conduct of the above evaluation.

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# Tracking Tool for Climate Change Mitigation Projects (For Mid-term Evaluation)

### Special Notes: reporting on lifetime emissions avoided

**Lifetime direct GHG emissions avoided:** Lifetime direct GHG emissions avoided are the emissions reductions attributable to the investments made **until the mid-term evaluation**, totaled over the respective lifetime of the investments.  
Please refer to the Manual for Calculating GHG Benefits of GEF Projects.

[Manual for Energy Efficiency and Renewable Energy Projects](#)  
[Manual for Transportation Projects](#)

For LULUCF projects, the definition of "lifetime direct" applies. Lifetime length is defined to be 20 years, unless a different number of years is deemed appropriate. For emission or removal factors (tonnes of CO<sub>2</sub>eq per hectare per year), use IPCC defaults or country specific factors.

General Data	Results at Mid-term Evaluation	Notes
Project Title	Global Solar Water Heating	Market Transformation and Strengthening Initiative: India Cour
GEF ID	2939	
Agency Project ID	<b>PIMS 3611</b>	
Country	India	
Region	EAP	
GEF Agency	UNDP	
Date of Council/CEO Approval	July 01, 2008	Month DD, YYYY (e.g., May 12, 2010)
GEF Grant (US\$)	2,000,000	
Date of submission of the tracking tool	June 30, 2012	Month DD, YYYY (e.g., May 12, 2010)
Is the project consistent with the priorities identified in National Communications, Technology Needs Assessment, or other Enabling Activities under the UNFCCC?	1	Yes = 1, No = 0
Is the project linked to carbon finance?	1	Yes = 1, No = 0
Cumulative cofinancing realized (US\$)	36,150,000	
Cumulative additional resources mobilized (US\$)	26,000,000	additional resources means beyond the cofinancing committed at CEO endorsement

### Objective 1: Transfer of Innovative Technologies

#### Please specify the type of enabling environment created for technology transfer through this project

National innovation and technology transfer policy	1	Yes = 1, No = 0
Innovation and technology centre and network	1	Yes = 1, No = 0
Applied R&D support	1	Yes = 1, No = 0
South-South technology cooperation		Yes = 1, No = 0
North-South technology cooperation		Yes = 1, No = 0
Intellectual property rights (IPR)		Yes = 1, No = 0
Information dissemination	1	Yes = 1, No = 0
Institutional and technical capacity building	1	Yes = 1, No = 0
Other (please specify)		
Number of innovative technologies demonstrated or deployed	1	

#### Please specify three key technologies for demonstration or deployment

Area of technology 1		
Type of technology 1		specify type of technology
Area of technology 2		
Type of technology 2		specify type of technology
Area of technology 3		
Type of technology 3		specify type of technology
Status of technology demonstration/deployment	4	0: no suitable technologies are in place 1: technologies have been identified and assessed 2: technologies have been demonstrated on a pilot basis 3: technologies have been deployed 4: technologies have been diffused widely with investments 5: technologies have reached market potential
Lifetime direct GHG emissions avoided		tonnes CO <sub>2</sub> eq (see Special Notes above)

Objective 2: Energy Efficiency		
Please specify if the project targets any of the following areas		
Lighting		Yes = 1, No = 0
Appliances (white goods)		Yes = 1, No = 0
Equipment		Yes = 1, No = 0
Cook stoves		Yes = 1, No = 0
Existing building		Yes = 1, No = 0
New building		Yes = 1, No = 0
Industrial processes		Yes = 1, No = 0
Synergy with phase-out of ozone depleting substances		Yes = 1, No = 0
Other (please specify)		
Policy and regulatory framework	0	0: not an objective/component 1: no policy/regulation/strategy in place 2: policy/regulation/strategy discussed and proposed 3: policy/regulation/strategy proposed but not adopted 4: policy/regulation/strategy adopted but not enforced 5: policy/regulation/strategy enforced
Establishment of financial facilities (e.g., credit lines, risk guarantees, revolving funds)	1	0: not an objective/component 1: no facility in place 2: facilities discussed and proposed 3: facilities proposed but not operationalized/funded 4: facilities operationalized/funded but have no demand 5: facilities operationalized/funded and have sufficient demand
Capacity building	2	0: not an objective/component 1: no capacity built 2: information disseminated/awareness raised 3: training delivered 4: institutional/human capacity strengthened 5: institutional/human capacity utilized and sustained
Lifetime energy saved		MJ (Million Joule, IEA unit converter: <a href="http://www.iea.org/stats/unit.asp">http://www.iea.org/stats/unit.asp</a> ) Fuel savings should be converted to energy savings by using the net calorific value of the specific fuel. End-use electricity savings should be converted to energy savings by using the conversion factor for the specific supply and distribution system. These energy savings are then totaled over the respective lifetime of the investments.
Lifetime direct GHG emissions avoided		tonnes CO <sub>2</sub> eq (see Special Notes above)

Objective 3: Renewable Energy		
<b>Please specify if the project includes any of the following areas</b>		
Heat/thermal energy production	1	Yes = 1, No = 0
On-grid electricity production		Yes = 1, No = 0
Off-grid electricity production		Yes = 1, No = 0
Policy and regulatory framework	4	0: not an objective/component 1: no policy/regulation/strategy in place 2: policy/regulation/strategy discussed and proposed 3: policy/regulation/strategy proposed but not adopted 4: policy/regulation/strategy adopted but not enforced 5: policy/regulation/strategy enforced
Establishment of financial facilities (e.g., credit lines, risk guarantees, revolving funds)	5	0: not an objective/component 1: no facility in place 2: facilities discussed and proposed 3: facilities proposed but not operationalized/funded 4: facilities operationalized/funded but have no demand 5: facilities operationalized/funded and have sufficient demand
Capacity building	4	0: not an objective/component 1: no capacity built 2: information disseminated/awareness raised 3: training delivered 4: institutional/human capacity strengthened 5: institutional/human capacity utilized and sustained
<b>Installed capacity per technology directly resulting from the project</b>		
Wind		MW
Biomass		MW el (for electricity production)
Biomass		MW th (for thermal energy production)
Geothermal		MW el (for electricity production)
Geothermal		MW th (for thermal energy production)
Hydro		MW
Photovoltaic (solar lighting included)		MW
Solar thermal heat (heating, water, cooling, process)	917	MW th (for thermal energy production, 1m <sup>2</sup> = 0.7kW)
Solar thermal power		MW el (for electricity production)
Marine power (wave, tidal, marine current, osmotic, ocean thermal)		MW
<b>Lifetime energy production per technology directly resulting from the project (IEA unit converter: <a href="http://www.iea.org/stats/unit.asp">http://www.iea.org/stats/unit.asp</a>)</b>		
Wind		MWh
Biomass		MWh el (for electricity production)
Biomass		MWh th (for thermal energy production)
Geothermal		MWh el (for electricity production)
Geothermal		MWh th (for thermal energy production)
Hydro		MWh
Photovoltaic (solar lighting included)		MWh
Solar thermal heat (heating, water, cooling, process)	589,500	MWh th (for thermal energy production)
Solar thermal power		MWh el (for electricity production)
Marine energy (wave, tidal, marine current, osmotic, ocean thermal)		MWh
Lifetime direct GHG emissions avoided	7,869,825	tonnes CO2eq (see Special Notes above)

Objective 4: Transport and Urban Systems		
<b>Please specify if the project targets any of the following areas</b>		
Bus rapid transit		Yes = 1, No = 0
Other mass transit (e.g., light rail, heavy rail, water or other mass transit; excluding regular bus or minibus)		Yes = 1, No = 0
Logistics management		Yes = 1, No = 0
Transport efficiency (e.g., vehicle, fuel, network efficiency)		Yes = 1, No = 0
Non-motorized transport (NMT)		Yes = 1, No = 0
Travel demand management		Yes = 1, No = 0
Comprehensive transport initiatives (Involving the coordination of multiple strategies from different transportation sub-sectors)		Yes = 1, No = 0
Sustainable urban initiatives		Yes = 1, No = 0
Policy and regulatory framework		0: not an objective/component 1: no policy/regulation/strategy in place 2: policy/regulation/strategy discussed and proposed 3: policy/regulation/strategy proposed but not adopted 4: policy/regulation/strategy adopted but not enforced 5: policy/regulation/strategy enforced
Establishment of financial facilities (e.g., credit lines, risk guarantees, revolving funds)		0: not an objective/component 1: no facility in place 2: facilities discussed and proposed 3: facilities proposed but not operationalized/funded 4: facilities operationalized/funded but have no demand 5: facilities operationalized/funded and have sufficient demand
Capacity building		0: not an objective/component 1: no capacity built 2: information disseminated/awareness raised 3: training delivered 4: institutional/human capacity strengthened 5: institutional/human capacity utilized and sustained
Length of public rapid transit (PRT)		km
Length of non-motorized transport (NMT)		km
Number of lower GHG emission vehicles		
Number of people benefiting from the improved transport and urban systems		
Lifetime direct GHG emissions avoided		tonnes CO <sub>2</sub> eq (see Special Notes above)

Objective 5: LULUCF		
<b>Area of activity directly resulting from the project</b>		
Conservation and enhancement of carbon in forests, including agroforestry		ha
Conservation and enhancement of carbon in nonforest lands, including peat land		ha
Avoided deforestation and forest degradation		ha
Afforestation/reforestation		ha
Good management practices developed and adopted		0: not an objective/component 1: no action 2: developing prescriptions for sustainable management 3: development of national standards for certification 4: some of area in project certified 5: over 80% of area in project certified
Carbon stock monitoring system established		0: not an objective/component 1: no action 2: mapping of forests and other land areas 3: compilation and analysis of carbon stock information 4: implementation of science based inventory/monitoring system 5: monitoring information database publicly available
Lifetime direct GHG emission avoided		tonnes CO <sub>2</sub> eq
Lifetime direct carbon sequestration		tonnes CO <sub>2</sub> eq

Objective 6: Enabling Activities		
<b>Please specify the number of Enabling Activities for the project (for a multiple country project, please put the number of countries/assessments)</b>		
National Communication		
Technology Needs Assessment		
Nationally Appropriate Mitigation Actions		
Other		
Does the project include Measurement, Reporting and Verification (MRV) activities?		Yes = 1, No = 0