MID TERM EVALUATION

Malaysian Building Integrated Photovoltaic Project (MBIPV)

Government of Malaysia
United Nations Development Programme
Global Environment Facility

FINAL DRAFT VERSION

November 2008

LIST OF ABBREVIATIONS

ASEAN	Association of South-East Asian Nations
APR-PIRs	annual project implementation reviews
BIPV	building integrated PV
CETREE	Centre for Education and Training in Renewable Energy and Energy Efficiency
CO_2	carbon dioxide
DOS	Department of Statistics
EC	Energy Commission (= *ST*)
EE	energy efficiency
EPU	Economic Planning Unit (of Prime Minister's Office)
ESCO	energy services company
GCPV	grid connected PV
GEF	Global Environmental Facility
GHG	greenhouse gas
IEA	International Energy Agency
IEA-PVPS	IEA Implementing Agreement on Photovoltaic Power Systems
IEM	Institution of Engineers of Malaysia
IKRAM	IKRAM Structure Assessment Sdn Bhd
k	kilo
kW	kilo Watt
kWp	kilo Watt peak
KTAK	*Kementarian Tenaga, Air dan Komunikasi* (= MEWC)
MBIPV	Malaysian Building Integrated Photovoltaic Project
MEPA	Malaysian Energy Professionals Association
MEWC	Ministry of Energy, Water and Communications (= *KTAK*)
MPIA	Malaysian Photovoltaic Industry Association
MIDA	Malaysian Industrial Development Agency
NPD	National Project Director
NPL	National Project Leader
NSC	National Steering Committee
OPP3	Third Outline Perspective Plan (2001-2010)
PRC	Project Review Committee
PTM	*Pusat Tenaga Malaysia* (Malaysia Energy Centre
PV	Photovoltaic
RM	Malaysian Ringgit
REEF	Renewable Energy & Energy Conservation Fund
SIRIM	Standards and Industrial Research Institute of Malaysia
SREP	Small Renewable Energy Programme
ST	*Suruhanjaya Tenaga* (= EC)
tCO_2	tonnes of CO_2
TNB	*Tenaga Nasional Berhad*
UNDP	United Nations Development Programme
UNITEN	*Universiti Tenaga Nasional*
UTM	*Universti Teknologi Mara, Malaysia*
US$ / USD	United States dollar

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1. EXECUTIVE SUMMARY

Renewable energy at the national level was first stated in the Eighth Malaysia Plan (2001-2005), and in the Third Outline Perspective Plan 2001-2010. Renewable energy is again explicitly addressed in the (current) Ninth Malaysia Plan (2006-2010). Photovoltaic (PV) technology is one the fastest growing renewable energy technologies on the world market with a recognized huge potential given the expected cost reductions are met. Many countries and regions have introduced enabling frameworks for PV in anticipation of its growing competitiveness and importance as an environmental benign source of electricity. Without such an enabling framework many barriers hamper the deployment of PV:

- Still high cost; cost reductions have been ongoing and are expected to continue leading to grid parity in many regions in the coming decade;
- Limited awareness of PV technologies and their added values associated with building integrated applications;
- Limited access to information on PV technologies and performance benchmarks for PV technologies;
- Unwillingness of investors to incur what are perceived to be the 'high-cost / high-risk' transactions;
- Insufficient linkages to or synergies with energy conservation measures;
- Insufficiently energy regulations;
- Few PV technology demonstration projects, if any;
- Inadequate and low-quality local PV industry and support services;
- Lack of financiers that are prepared and interested in financing PV investments as well as appropriate financing/support mechanisms;
- Lack of a coherent, recognized and approved national renewable energy policy and action plan with sufficient mid to long term range;
- Insufficient financial resources for the adequate staffing of the implementing agencies involved (such as PTM) as well as for the implementation of PVenabling measures.

To address such barriers to the introduction and deployment of building integrated PV (BIPV) in Malaysia, the Government of Malaysia initiated the **Malaysian Building Integrated PV Programme (MBIPV)** in 2005. Support and funding has been provided by the Global Environment Facility (GEF), the United Nations Development Programme (UNDP) as well as the Government of Malaysia and the private sector. UNDP is the project's implementing agency on behalf of the GEF. The Ministry of Energy, Water and Communications (MEWC), was appointed the project's executing agency, whereas Pusat Tenaga Malaysia (PTM) is the designated implementing agency.

The MBIPV is intended to induce the long-term cost reduction of the non-emitting GHG PV technology via integration of the PV technology within building designs and envelopes. It is aimed at creating a sustainable BIPV market in Malaysia that will generate widespread BIPV applications The MBIPV project will specifically focus on the market development for BIPV technology, and building the national capacities on three major areas: (a) policy and education; (b) technical skill and market implementation; (c) technology development support. The project will catalyze BIPV technology acceptance among the public, policy makers, financiers and building industry, which will lead towards a sustainable BIPV market beyond the completion of the project. The project objectives will be achieved via a multi-pronged approach: (1) BIPV information services, awareness and capacity building programs; (2) BIPV market enhancement and infrastructure development; (3) BIPV policies and financing mechanisms program; (4) BIPV industry development and technology localization program.

In accordance with regulations of UNDP and GEF, a Mid Term Evaluation has to be carried out under the responsibility of the GEF-implementing agency (i.e. UNDP), of which the results are presented in this report. An international consultant was fielded from 12-23 October 2008 to undertake the evaluation. During the mission, extensive discussions were held with the project team at PTM and representatives from UNDP Malaysia, MEWC, MIDA, EC, TNB, industry and end users. Relevant project documents were also analysed.

The **achievements** of the project so far can be summarised as follows[1]:

- Overall Project Goals and Objectives
  - 878 kWp awarded, 239 kWp commissioned[2]; at ~1100 kWh/kWp/y GHG emissions presently reduced by 163 t/y, the electricity generating mix. of Malaysia unchanged at 0.62 t CO_2/MWh; project ahead of targets and times chedule;
  - Cost reduction of 14 % (to USD 7,269/kWp) against a target of 6 %;
  - Capacity building (policy, planning, institutional, industrial, technical and financial) carried out in the public and private sectors beyond numerical interim targets;
  - Efforts to integrate a national BIPV program in the 10th Malaysian Plan are ongoing;
  - 17 milestone reports; 6 major publications; +100 public references; successful website (+60,000 hits & ~6,000 downloads) and MBIPV outreach;
  - Industry & Localization effort achievements well beyond targets.
- Objective 1: BIPV Information Services, Awareness and Capacity Building Programs
  - MBIPV (PTM), Energy Commission and TNB actually process BIPV project applications;
  - Local industry implements more than 20 BIPV projects/year, against a target of 3;
  - Building owners and developers are aware of MBIPV: Suria calls 1, 2 and 3 exhibit about 90 applications and 50 awards. Suria call 4 being processed;
  - Malaysia Photovoltaic Industry Association (MPIA) established with about 50 member companies;
  - About 20 BIPV projects implemented per year by Approved Service Providers against a target of 3.
- Objective 2: BIPV Market Enhancement and Infrastructure Development Program
  - Standard for BIPV electrical installation compiled (MS 1836-2005);
  - 6 showcases implemented at 140 kW against a target of 125 kW;
  - 36 applications for demonstration projects received and 14 awarded at 199 kW against a traget of 205 kW. 8 projects at 39 kW commissioned;
  - Suria 1, 2, 3 and 4 calls have resulted in about 125 applications received. In Suria 1, 2 and 3 about 50 awards have been granted at 540 kW with about 210 kW commissioned – Suria 4 call still under processing;
  - Monitoring center established at UiMT presently monitoring 29 BIPV systems.
- Objective 3: BIPV Policies and Financing Mechanisms Program
  - The overall enabling framework for PV and BIPV in Malaysia is still very much under discussion in the government and between key market actors;
  - A net metering scheme for GCPV has in princple been agreed with the TNB;
  - Import duties and sales tax has been waived for PV;
  - Fiscal incentives for PV enhanced in the Natioal Budget 2008;
  - Around 30 BIPV systems registered at the Energy Commission as providing electricity to the grid.
- Objective 4: BIPV Industry Development and Technology Localization Program
  - 18 actions on business partnerships and technology transfers carried out – 4 international PV manufacturers established in Malaysia at a considerable foreign investment – the direct contribution of the MBIPV to this being somewhat uncertain;
  - Take up of local production of PV system components prepared, but awaits a more firm national enabling framework for the sector;

[1] Targets here signify project targets at end of project.

[2] In Suria a time delay of 12 months is accepted from award to commissioning for retrofits and 24 months for new buildings; follow up on awarded projects takes place regularly at quarterly intervals on the initiative of MBIPV.

- Business models developed and described, but local take up awaits a more firm national enabling framework for the sector;
- Testing center for PV inverters established at the UTM. Testing of support structures established at the IKRAM.

In overall terms the MBIPV project can be said to be ahead both as to targets and time schedules.

Major **conclusions** resulting from the evaluation analysis are as follows:
The MBIPV project, in the view of the Evaluator, has made important and real contributions to removing barriers for BIPV, in particular awareness creation and capacity building in important areas such as benchmarking, best practices, monitoring and not in the least demonstration of BIPV technology and demonstration of cost reduction. MBIPV exhibits by mid term impact on factors and key actors affecting decision-making concerning PV and renewable energy at several levels, e.g. government, agencies and institutions, utilities, academia and industry as well as consultancies, architects, developers and other professionals. During the MBIPV project 4 international PV companies have established operation in Malaysia. The MBIPV project has and is generating insights into the technical and economic potential for PV initiatives and the options available to government to realise that potential.

While these achievements at the projects mid term are real and while the projects final objectives and targets at this stage can only by the Evaluator be deemed realistically to be reached or even overachieved, *their longer-term sustainability will be in doubt* without on-going – after the MBIPV project period - government support and legislative and financial interventions, which enabling framework is currently not yet in place. However, discussions with key actors including the MEWC indicate, that such an enabling framework indeed may be in place in time.

In addition, a main barrier to increased use of PV and RE in Malaysia remains the subsidised energy prices. However, there is little the MBIPV project can do directly to remove that barrier except for providing relevant policy recommendations.

The Evaluator has the following **recommendations:**

- An increasing risk of awards defaulting or loss of interest in future calls have been found due to the global economic crisis leading to considerations of the eventual need of an extension of the MBIPV. The MBIPV is recommended closely to monitor this risk and to take appropriate actions;
- The MBIPV could strengthen its flow of information towards other ongoing RE and energy conservation activities in Malaysia in order to facilitate common understanding and coordination among stakeholders;
- A rather fragmented situation with regard to creating a decent Malaysian enabling framework is found. It is consequently recommended to establish a National PV Working Group (WG) with representatives from all major stake holders, and initially with a 6-months brief to streamline the existing institutional set-up around BIPV implementation, to compile a draft national PV Strategy and to propose the instruments needed to implement the strategy. If successful, such a national PV WG could later be the nucleus of a RE WG or an RE & Energy Conservation WG. (RE & energy conservation measures often goes hand in hand and synergies are obvious).
- At the end of the MBIPV project a vacuum will be created in the field of GCPV in Malaysia, if nothing is done, and industry and the public will most likely experience

a collapse of the now emerging GCPV sector. To avoid this it is recommended to start a process leading to a smooth transition of the MBIPV activities and results to the PTM, PTM seen as a natural national anchoring of GCPV and MBIPV facilitating functions in the future. Whether this new PTM entity shall manage financial incentives or head externally funded projects has to be determined, and the basic role of PTM may have to be redefined in this context. A prerequisite in this context will be to allocate sufficient resources including human resources to the PTM. In parallel, the PV Monitoring Center at the UiMT should receive official recognition to enable the centre to continue monitoring (with permanent staff) - local data is crucial for future policies and strategies - and at the same time be a PV conduit to the educational system.

- Regional (ASEAN) dissemination via the NRE-SSN should be better structured and strengthened; Malaysia has the opportunity to take a leading role.

One **lesson learned** is that care must be taken not to focus on a single RE technology or applications such as BIPV and GCPV. RE and for that matter energy conservation present a palet of options to addressed in a coordinated manner, and as such policy planners should look into the bigger perspective when creating a future enabling frame work for BIPV.

Despite low local energy cost and initial low awareness the MBIPV has managed to deploy more GCPV installations than expected and to create more interest/demand, than can be fulfilled within the frame work of the program, this way exhibiting real impact. While such enthousiastic participation is laudable in an initial phase, PV and BIPV promotion and implementation need to be an integral part in the Government’s long-term public climate and energy policy.

2. INTRODUCTION

2.1 Background

Renewable energy at the national level was first stated in the Eighth Malaysia Plan (2001-2005), and in the Third Outline Perspective Plan 2001-2010. Renewable energy is again explicitly addressed in the (current) Ninth Malaysia Plan (2006-2010). Photovoltaic (PV) technology is one the fastest growing renewable energy technologies on the world market with a recognized huge potential given the expected cost reductions are met. Many countries and regions have introduced enabling frameworks for PV in anticipation of its growing competitiveness and importance as an environmental benign source of electricity. Without such an enabling framework many barriers hamper the deployment of PV:

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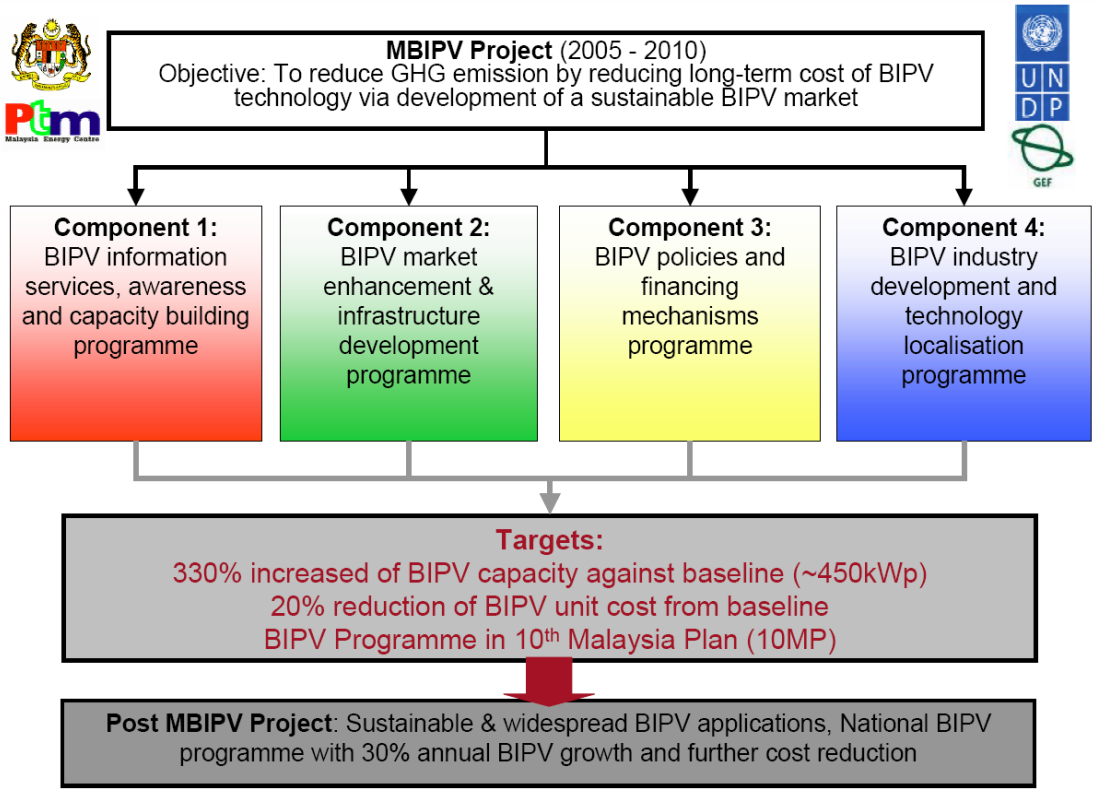
2.2 Project objectives and strategy

The MBIPV is intended to induce the long-term cost reduction of the non-emitting GHG PV technology via integration of the PV technology within building designs and envelopes. It is aimed at creating a sustainable BIPV market in Malaysia that will generate widespread BIPV applications The MBIPV project will specifically focus on the market development for BIPV technology, and building the national capacities on three major areas: (a) policy and education; (b) technical skill and market implementation; (c) technology development support. The project will catalyze BIPV technology acceptance among the public, policy makers, financiers

and building industry, which will lead towards a sustainable BIPV market beyond the completion of the project.

The project objectives will be achieved via a multi-pronged approach: (1) BIPV information services, awareness and capacity building programs; (2) BIPV market enhancement and infrastructure development; (3) BIPV policies and financing mechanisms program; (4) BIPV industry development and technology localization program.

The structure of MBIPV project is illustrated below.



The Project Document further details that these objectives are to be achieved through the four Project Components with the immediate objectives as listed below.

Component 1: BIPV Information Services, Awareness and Capacity Building Programs

- Relevant GoM agencies processing applications for BIPV project implementation by Yr3.
- Local PV industry implementing at least 3 BIPV projects each year starting Yr3.
- Building owners and developers consider the incorporation of BIPV systems in their planned building projects starting Yr2.
- MPIA established as an umbrella organization and leader of BIPV quality program by Yr1.
- At least 3 BIPV projects implemented annually by trained PV service providers, engineers and BIPV designers by Yr3.

Component 2: BIPV Market Enhancement and Infrastructure Development Program

- Developed BIPV standards and guidelines enforced by Yr4.
- Locally manufactured BIPV products comply with standards by end Yr5
- 4 BIPV showcases and 4 BIPV demonstration projects implemented starting Yr2.

- BIPV demonstration projects operated and monitored for performance starting Yr2
- About 20 prospective clients apply for BIPV projects (as part of the National BIPV program) each year starting Yr2.
- Information on BIPV showcases and demonstration projects disseminated through seminars and the national BIPV campaign starting from Yr3.

Component 3: BIPV Policies and Financing Mechanisms Program

- BIPV policy and institutional framework supported with financing mechanism for a sustainable follow-up program integrated in the 10th Malaysian Plan by Yr4, and implemented by Yr5.
- About 30% annual increase in BIPV applications spurred by policy implementation supported with appropriate financing mechanism starting from Yr5 until end of 10th Malaysian Plan.

Component 4: BIPV Industrt Development and R&D Enhancement Program

- At least 2 business partnerships and technology transfer for harnessing enhanced R&D activities for two locally manufactured BIPV products established and implemented by Yr5.
- Developed business models for at least 5 local BIPV entities successfully implemented by Yr5
- Established BIPV testing facility providing quality control with possible upgrade towards certification center by Yr 5.

The document of the full-size project was formally signed in May 2005 with a total budget of US$ 24.96 million with GEF financing of US$ 4.70 million, government co-financing in cash of US$ 8.84 million and in-kind of US$ 3.71 million and private/international sector cash contributions of US$ 3.86 million and in-kind US$ 3.85. Implementation of the project started in 2005 and is supposed to be completed by September 2010.

2.3 Evaluation methodology and structure of the report

In accordance with regulations of the UN Development Programme (UNDP) and the Global Environment Facility (GEF), a Final Evaluation of MIEEIP has to be carried out under the responsibility of the GEF-implementing agency (i.e. UNDP). The results of the evaluation are presented in this report. The **purpose of the mid term evaluation** is to **review, rate the performance** of the project from the start of the project implementation up to the present and **recommend possible** corrective actions if any. The review will include evaluating the:

1. Progress in project implementation, measured against planned outputs set forth in the Project Document/Inception Report with latest revision in accordance with rational budget allocation, and
2. An assessment of the overall impact of the project to the country, and
3. Identify corrective measures, lessons learned and best practices which could be applied to future activities and other on-going/new projects.

An international consultant, Mr. Peter Ahm (Denmark), hereinafter referred to as the "Evaluator", was engaged by UNDP-Malaysia to conduct the evaluation. He conducted a mission in Malaysia from 12 October to 23 October 2008. During the mission, extensive discussions were held with the project management team and with representatives from i.a. UNDP Malaysia, Ministry of Energy, Water and Telecommunications (MEWC), The Energy Commission, the TNB, the MIDA and important private sector stakeholders, such as beneficiary companies (Approved Service Providers & developers) and end users. The list of people met is provided in Annex B.

During the mission, the Evaluator drew up an agenda that covers the issues to be addressed as mentioned in its Terms of Reference (see Annex A) and follows the structure of this report:

- Introduction (project description and evaluation method);
- Findings on project progress
  - Project's performance in terms of results (achieving objectives and outputs in terms of realised activities and inputs used) and impacts, quantitatively and qualitatively measured by indicators (as set in the project document and the annual project review documents),
  - Description of awareness raising and other project impacts,
  - The Evaluator's assessment of the project design and execution;
- Conclusions and recommendations
  - Conclusions taking into account sustainability and replicability issues,
  - Lessons learned and recommendations.

The Evaluator adopted the following **methodology of evaluation**:

i) Review of project reports, in particular the Project Brief, the Inception Report, APR-PIRs (annual project implementation reviews), minutes of meeting of the National Steering Committee (NSC) and the Project Steering Committee, as well as other background information such as Audit Reports, Quarterly Reports, reports and documents produced so far under the MBIPV and media/publication articles;
ii) Meetings with the main project partners and stakeholders in Malaysia;
iii) Site visits.

The report is divided into four sections. This first section provides general background of the project, purpose of evaluation, project implementation setup, partners/stakeholders and evaluation methodology. The next section dwells on findings derived from analysis of selected reports and from interactions with the stakeholders interviewed.

The evaluation findings are described following the logical framework design of the project of outputs and indicators, as given in the APR-PIRs. In the third section, conclusions from the observations and findings are discussed in the context of the project objectives. These also pertain to sustainability and replicability of project. Section 3 ends with lessons learnt and some general recommendations.

2.4 Project set-up and stakeholders

The project is executed by the MPIPV team (or the NPT) hosted at the Pusat Tenaga Malaysia (PTM) on behalf of the Ministry of Water, Energy and Communications (MEWC), which represents the Government of the Republic of Malaysia, and in co-operation with key national actors and stakeholders.

Ministry of Energy, Water and Communications (MEWC) is the National Executing Agency (NEX) for this project where the Secretary General of MEWC will serve as the Chairman of the National Steering Committee (NSC). The NSC is established to provide overall guidance for the successful implementation of the project. In addition to the MEWC, the NSC consists of nominated representatives from the key Government agencies, professional institutions, industry representatives, non-governmental organizations (NGOs), research institutions, Pusat Tenaga Malaysia (PTM), and UNDP. The NSC will review the project on a bi-annual basis.

A Project Review Committee (PRC) is established to provide technical advice and specific recommendations to improve the project impact and implementation to the National Project Team (NPT). The PRC will monitor and evaluate the implementation and success indicators of the project activities and outcomes. The Chairman of Energy Commission (EC)

will chair the PRC.

Pusat Tenaga Malaysia (PTM) executes the Full Project activities on behalf of MEWC. The Chief Executive Officer (CEO) of PTM is appointed as the National Project Director (NPD). PTM has mobilised a National Project Team (NPT) or the MBIPV Team to be responsible for the overall operational and financial management and reporting of the UNDP-GEF funds in accordance with the rule and regulations for nationally executed project. The NPT will also be responsible for the human resource, planning and implementation of project activities, provide mechanisms and technical inputs necessary to integrate the results of various activities, ensure satisfactory performance of the project members and contractors, and provide official reports to the NPD, the PRC and the NSC as required. The NPT is appointed by PTM and will comprise of national and international consultants

3. FINDINGS

3.1 Implementation: assessment of progress of outcomes and outputs

For each of the four components including sub-components this section assesses the progress in the implementation of the project's outcomes and outputs, and provides recommendations for actions if any, following the format as given in the ToR, see annex A.

(NB! Targets means final project targets)

Overall objective	Planned overall targets	Status vs. targets	Actions
1. Project Goal			
1. The annual growth rate of GHG emissions from fossil fuel fired power generators is reduced via the widespread implementation of BIPV application to replace part of the current fossil fuel use in Malaysia, and via the cost reduction of the BIPV technology.	• GHG emissions from fossil fuel-based power generation in the country is reduced by 65,100 tons CO_2 over the lifetime of the installed PV capacity by the year 2010, relative to the baseline in year 2005. • GHG emissions avoided from forecast replications beyond the MBIPV project are about 868,000 tons CO_2 over the lifetime of the total installed PV capacity in the year 2020.	• Electricity generating mix. of Malaysia unchanged at 0.62 t CO_2/ MWh. • Of 878 kWp awarded, 239 kW are commissioned; at ~1100 kWh/kW/y GHG emissions presently reduced by 163 t/y • Forecast replication unchanged.	• None
2. Project Purpose			

Overall objective	Planned overall targets	Status vs. targets	Actions
2. The overall capacity (technical, policy, planning, institutional, fiscal, financial) both in government and the private sectors, to develop, design and make use of the BIPV energy potential and to develop local industry is significantly improved.	• Increased installed BIPV capacity by about 330% and a unit cost reduction of 20% by the year 2010. • A National BIPV program is integrated in the 10th Malaysian Plan enabling about 30% annual growth in installed BIPV capacity from the end of the project to Year 2020, leading to a further 30% BIPV unit cost reduction within the 10 year period.	• Increase from baseline of 175 % (to 1,287 kW - awarded) against a target of 101 %. • Cost reduction of 14 % (to USD 7,269/kW) against a target of 6 % . • Efforts to integrate a national BIPV program in the 10th Malaysian Plan are ongoing. • 17 milestone reports; 6 major publications; +100 public references; successful website and outreach. • Industry & Localization effort achievements in general well beyond targets.	• As indicated by the overall political situation and the lack of coherence between major stakeholders a National PV (BIPV) Working Group (WG) is proposed. Main objective: to facilitate coherence between PV (BIPV) stakeholders thus facilitating the inclusion of a a BIPV program in the 10th Malaysian Plan. • The WG could also be instrumental in forming links to other RE and energy conservation actions. • Monitoring of off-grid PV should be included; ressources from the MEWC will be neded

Component:	Activity/output planned:	Activity/output actual	Action
Component 1: BIPV Information Services, Awareness and Capacity Building Programs	• Relevant GoM agencies processing applications for BIPV project implementation by Yr3. • Local PV industry implementing at least 3 BIPV projects each year starting Yr3. • Building owners and developers consider the incorporation of BIPV systems in their planned building projects starting Yr2. • MPIA established as an umbrella organization and leader of BIPV quality program by Yr1. • At least 3 BIPV projects implemented annually by trained PV service providers, engineers and BIPV designers by Yr3.	• MBIPV (PTM), Energy Commission and TNB process applications. • Local PV industry implements more than 20 BIPV projects each year. • Building owners and developers fully aware of BIPV; Suria calls 1 & 2 & 3 exhibit ~90 applications and ~50 awards. • MPIA established with now ~50 members. • Approx. 20 BIPV projects implemented/y by Approved Systems Providers.	• Increased information flow to ongoing relevant RE and energy conservation actions to increase common understanding and coordination. • Application processes to be more streamlined with less delay between processing steps.
1.1. Integrated information and awareness building program on BIPV	Creation and operation of a BIPV cell in the information center at PTM by Q2 Yr1, where one staff is able to become a BIPV spokesperson.	10 MBIPV staff act as resource persons. Monthly internal MBIPV meetings, most info go to website. Training in May 2005 for MBIPV staff and PTM in general. Many inquiries - heavy work load on staff - shift to the Approved Service Providers (MPIA) as a one stop shop. (Responsibility of approving Service Providers still at MBIPV, but MPIA membership obligatory, see also 1.4 & 1.5). IEA PVPS participation in 8 meetings.	None

	BIPV website developed by Q3 Yr1 and operational by Q4 Yr1, with average 120 hits per annum.	Website very use full. ~65,000 hits; ~6,000 downloads. Complex and time consuming effort – update every day. User feed back received. End users call back. Website of hight priority for MBIPV. Split of effort between the four components as to input. Operational from the MBIPV start.	None
	Mechanics for the information exchange and promotion activities set-up by Q3 Yr1, where BIPV information and facts are readily available.	Well in hand, numerous reports distributed. MBIPV calendar produced; 2000 units distributed annually like "an annual report", Stakeholders, media, endusers and students come to PTM for information.	None
	Rollout of the national BIPV campaign targeting the public starting Q3 Yr1. Five seminars or workshops, five conferences, one road show, two exhibitions conducted by end of project.	Every year conferences and seminars. One big annual event by component 1 – other components their own workshops. 10 events organized. Exhibition with MPIA members. Poster at Valencia PVSEC in 2008; booth at international events still found premature. No. of publications > 150; +30 media advertisements; +40 public talks	Increased information flow to ongoing relevant Malaysian RE and energy conservation actions to increase common understanding and coordination.
1.2. National BIPV database	Creation of a publicly accessible BIPV database and link to website by Q3 Yr1, and fully operational by Q4 Yr1, with average 50 users accessing the database annually.	Concept of database is integrated in the website: follows the components of the project. Operational since beginning 2007. Server facilities established at professional company (outside PTM).	None.

1.3. BIPV training courses	In-house training course for support staff (PTM) completed by Q2 Yr1 with at least 1 staff member fully trained.	Two workshops by Geoff Stapleton , ISP[3] training in 2006. Almost all staff fully trained to act as resource person. Technical training handbook compiled. Arsenal has conducted ISP training to MBIPV; ISP accreditation received.	None
	Design and preparation of training materials completed by Q1 Yr2 and updated a month before each training course.	Training manual by Geoff Stapleton, ISP. Training manual localized. Minor updating continuously. Feed back after every training session – many suggestions from trainees. Full course 10 days.	None
	2 training courses on BIPV for service providers, architects and engineering consultants in Yr2 and Yr3 each. More than 80% of the local PV industry in the country trained on BIPV application by Q4 Yr5.	Training only started 2008: Contract with outside partners fell through – restart – reallocation of budget. Training of trainers twice. Now four trainings completed with ~40 participants. Passing grade 30 % initially, passing grade 60 % by end of 2008 (4th training).- improving all the time. Saturation not in sight. Backlog of training – catch up needed. PV industry Service Providers almost all trained;no training - not certified.	None
1.4. MPIA	Representation from NGOs, academia, government, industry, consumers, etc. meet twice a year starting from Q1 Yr1, with at least 10 representations for the first meeting.	May 2006, first AGM in November 2006. MBIPV provided some seed-money in a two phases. About 45 members, half full half associated members. MPIA found sustainable if Malaysia continues the MBIPV activities beyond 2010.	None
1.5. Quality control programs for local industry	National PV Council implementing BIPV user watchdog scheme by Q3 Yr2 with at least 1 consultant appointed.	For Approved Services Providers; quality control rests with MBIPV. Random check of installations. If fault found: go and fix it, or - -. 4-5 staff trained in doing so.	None

[3] ISP: Institute for Sustainable Power

	National PV Council (now MPIA) approves (in long-term – accredits) local service providers who completed and passed the required training course. Implementation of one-stop concept for BIPV service providers by Q4 Yr2. Four applications received by Q4 Yr2. At least eight local PV industries (engineering firms and service providers) are registered as one-stop service provider by end of the project.	MBIPV is the custodian. Has been left to the MPIA, but they could not implement. Conflict, but taken back. Service Providers act as a one stop shop. In reality it is shared task with MBIPV. 13 registered Approved Service Providers. + two under way.	None
	Annual award ceremony for BIPV installations starting from Yr3 with at least one winner.	First ceremony now targeted for 2009 and again in 2010. At present two few installations to select from. Ceremony to motivate both industry, developers and end users.	None
1.6. Capacity building and awareness programs for policy makers and financial sector	Ten government officials and decision makers from the finance sector completed in total 5 visits to local BIPV demonstration projects and 2 study tours to countries with outstanding BIPV installations by end of the project.	One overseas study trip. Local capacity building by visiting local plants, 7 visits with 85 participants.	Participation of finance sector could be improved.
1.7. International BIPV event for decision makers	An international BIPV event is hosted in Malaysia every 2 years starting from Yr2 with at least 50 participants.	Not yet, being planned for 2009 and 2010. Insufficient national participation not expected to be an issue.	Can maybe piggy back on known international event? PVSEC? IEA arrangement?
1.8. Disseminate information and lessons learn to regional ASEAN countries	BIPV incorporated into ASEAN plan of action via NRE-SSN with Malaysia as the focal country by Q3 Yr1. Malaysia reports progress during annual NRE-SSN meeting for dissemination of information starting Q1 Yr2.	Two presentations in Bali and Brunei (2006). Sharing of lessons learned, however impact appears low. Regional dissemination effort not found very effective so far.	Regional dissemination via the NRE-SSN should be better structured and strengthened; Malaysia has the opportunity to take a leading role.
1.9. Impact assessment of BIPV technology development	Initial survey conducted by Q4 Yr1 and final survey by Q2 Yr5. Survey results identify minimum 20% BIPV cost reduction and assess BIPV replicability beyond project scope.	Two surveys – baseline and later impact. Baseline done in 2006, the final survey in 2010.	None

Component 2: BIPV Market Enhancement and Infrastructure Development Program	• Developed BIPV standards and guidelines enforced by Yr4. • Locally manufactured BIPV products comply with standards by end Yr5 • 4 BIPV showcases and 4 BIPV demonstration projects implemented starting Yr2. • BIPV demonstration projects operated and monitored for performance starting Yr2 • About 20 prospective clients apply for BIPV projects (as part of the National BIPV program) each year starting Yr2. • Information on BIPV showcases and demonstration projects disseminated through seminars and the national BIPV campaign starting from Yr3.	• Electrical installation standard compiled (MS 1836-2005). • 6 showcases implemented at 140 kW against a target of 125 kW. • For demonstration projects 36 applications received, 14 evaluated and approved, 199 kW awarded against a target of 205 kW. 8 installations at 39 kW commissioned. • Suria 1, 2, 3 & 4 calls: 123 applications received; Suria 1, 2 & 3 ~50 awards equaling ~540 kW. About 210 kW commissioned. • Monitoring center established at UiMT; 29 systems under monitoring.	• Standards on mechanical issues (mechanical structures and building integration) should eventuallly be promoted. Industry asks for it. • Monitoring should be expanded to stand-alone systems, given MEWC funds provided.
2.1. Standards and guidelines development	Dept Standard Malaysia (DSM) publishes PV Code of practice by Q4 Yr1. Code of practice is integrated in training courseware and website, and utilized by service providers.	PV standard for installation in Sept. 2006. Conform to the IEC. Requirement to follow the standard, but not mandatory.	None – finished To be reviewed periodically.
	Standard on building practice (MS 1525) is revised by Q3 Yr5 and utilized by building developers	Transferred to component 4. Green building codes later, seen as premature at present.	-

2.2. Review and final design of the planned BIPV showcases	Confirmed/approved designs of the technically and economically feasible BIPV applications completed by Q2 Yr1. Detailed engineering designs completed by Q3 Yr1. Tender documents are out by Q3 Yr1.	Tender documents for showcases (office building (1), government building (1), public access building (2) and residential property (2)) completed by end of 2007.	None – finished.
2.3. Hardware installation and operation of the BIPV showcases	Showcases are completed by Q4 Yr2 - MECM-LEO: 4kWp - Hotel Park&Ride: 44kWp - Gazebo: 40kWp - Residential houses: 3x4 kWp *Revised from 100 to 125 kW*	Hardware installed in 2007 & 2008, total about 140 kW against a target of 100 (125) kW. Finished by June 2008 against target of end of 2008. Official launching with officials & media.	None - finished. (Wish to do more show cases on schools?)
2.4. Evaluation of demonstration sites	Proposed demonstration sites and newly identified sites are evaluated by Q2 Yr3. At least 10 sites are confirmed	36 GCPV applications received against a target of 13. Show of interest. Distribution per year uneven as a result of limited capacity at MBIPV.	None - finished
2.5. Design and evaluation of technical and commercial viability for the demonstration projects	Evaluation report and detailed engineering designs completed by Q3 Yr3. Tender documents available by Q3 Yr3. Project developers able to secure financing.	Incentive level is from 25 % -28 % of total cost. Application forms on website. Open timing.	None - finished.
2.6. BIPV demonstration implementation and operation at government and private buildings	Construction of all demonstration projects (400kWp) completed by Q2 Yr5 where BIPV systems are commissioned and operational. *Revised from 400 to 205 kW.*	Achieved (awarded, not installed) 199 kW against the target of 205 in 2010. 8 systems commissioned totalling 38,5 kW.	None - finished. (Target may be increased again in a possible balancing with the Suria.)
2.7. Review and promotion of national PV program "Suria 1000"	Revised bidding concept for the national program and approval by Q3 Yr1.	Main deployment activity of the project. In time. Concept report approved by stakeholders by August 2006.	None - finished
	Extensive marketing campaign to launch the program 'Suria 1000' targeting the public sector is carried out by Q4 Yr1. At least 20 interested bidders are identified.	Fair and unbiased procedure. 7 advertisements against a target of 5. No. of bidders for the first three calls 91 against target of 20.	None.
2.8. Implementation and operation of "Suria 1000"	Launch of the program by Q1 Yr2. First equipment procurement and delivery contract signed by Q3 Yr2.End of the program with 1 MWp installed by Q4 Yr5.	4 calls so far; call 4 now under assessment. Plan for 7 calls, but may change. Total of 539 kW awarded, about 40% installed and commissioned.	Risk of awards defaulting increases with lower support level. If project take up due to the

		Implementation shall be inside 12 months for existing, and 24 months for new houses following award. So far less than 5 awards not using the grant (defaulting). Grant level from initial 75 to 40 % of cost at the 7. call.	international financial crisis decreases more time may be needed and a project extension could be viable. To be closely monitored by the MBIPV.

2.9. Monitoring and evaluation of BIPV projects	Monitoring campaign for all BIPV projects starting Q2 Yr2 and ending Q4 Yr5. Monitoring equipment in place 2 weeks after commissioning of the PV system.	Monitoring centre established at the UiMT. The support in kind from the UiMT is considerable. MBIPV funds only equipment, about 25 % of the total effort. 5 analytical (extensive) monitoring, the rest global (kWh only.).	If possible quicker reaction on faulted monitoring equipment by Service Providers – data is lost due to non-functional monitoring equipment.
	An evaluation report for the demonstration projects highlighting the operating and economic performance by Q2 Yr5. Report is utilized for further system improvement and capacity development.	A report will be published in 2008 as a milestone report. (By end of project about 200 installations expected.)	None.
2.10. Dissemination and promotion of demonstration program results	The results of evaluated showcases and demonstration projects are disseminated through information service (PTM) starting Q1 Yr3, generating visitation from interested stakeholders and public.	Results displayed on the website of the monitoring centre and are being updated monthly Later maybe a book/publication. .	None
	A national workshop presenting the results of the demonstration program and Suria 1000 is held in Q2 Yr5 with at least 50 participants	To come – if really needed? The stakeholders will be aware in advance.	None.
2.11. Sustainable follow-up program design	Based on the activities and outcomes from component 3, a follow-up program is designed for the 10th Malaysian Plan by Q3 Y4 and submitted to EPU.	Awaiting the governmenst expected new enabling framework - at present under political discussion.	-

Component 3: BIPV Policies and Financing Mechanisms Program	• BIPV policy and institutional framework supported with financing mechanism for a sustainable follow-up program integrated in the 10th Malaysian Plan by Yr4, and implemented by Yr5. • About 30% annual increase in BIPV applications spurred by policy implementation supported with appropriate financing mechanism starting from Yr5 until end of 10th Malaysian Plan.	• Net metering scheme in principal agreed with the TNB. • Import duties and sales tax waived for PV. Fiscal incentives enhanced in the National budget 2008. • About 30 installations registered at the Energy Commission for supplying power to the grid.	• A new overall enabling framework for GCPV is expected from GoM; until more decisions and details are available MBIPV can only make limited progress in this.
3.1. Techno-economic analysis for grid-connected BIPV	Completion and submission of assessment report highlighting cost benefits of BIPV, peak tariff and technical issues to NSC by Q3 Yr1. Report becomes reference for other project activities	Report done but delayed to mid 2007. Reason: contract with a univ. defaulted. Mostly initial findings. Too few installations yet for a decent assessment. Eventual revision will be based on data from the monitoring centre.	None.
3.2. Design and implementation of government incentives to utility and manufacturing industry	Recommendations of incentives for the grid-connection of BIPV and the power production by Q4 Yr1, incentives for local manufacturing by Q1 Yr2. Endorsed by NSC by Q2 Yr2.	Manufacturing promotion activities "transferred" to MIDA. Discussed with TNB but not reported. Report not done yet but will come in 2008.	Report to be done.
3.3. Analysis on existing and new financial mechanism and fiscal incentives	Assessment report and recommendations for supportive fiscal incentives and financing mechanism for BIPV submitted to NSC by Q3 Yr2.	Done in advance 2006 and part of the fiscal incentives adopted 2007. Tax incentives do not apply for private. Exemption of import duties and sales tax by 29 august 2008; reduction in system prices of 5-10 % expected. Report finished. Ongoing follow up process.	None.

3.4. Implementation of a fiscal and financial framework for a sustainable follow-up program	An appropriate framework for BIPV, encompassing fiscal aspects and financial mechanism, including favorable power tariff and industry support policy is formulated and submitted to NSC by Q4 Yr3.	REEF (renewable energy & energy conservation fund to be considered. Basis: 1 % levy on the electricity. FIT: 1 ringit/kWh for PV leads to around 15 years payback time. Estimated to be politically acceptable. REEF found likely to come. Implementing agency could be PTM but funding and HR needed. Reports submitted to ministry - not on the website.	None.
	Endorsement of favorable financing schemes and power tariff policy for BIPV by Q4 Yr5.	Waiting.	-
3.5. Study on past experience and impact on international regulatory schemes	Findings of different regulatory schemes worldwide regarding BIPV and recommendations completed and submitted to NSC by Q3 Yr2. Findings report becomes reference for other activities.	Report done 2006, see website.	None – finished.
3.6. Review and integration of BIPV in existing regulatory schemes	Evaluation report of the SREP, solar roadmap and other existing regulatory schemes to determine contextual relevance to BIPV completed and submitted to NSC by Q4 Yr1.	SREP (small renewable energy program). Report done 2007, not on the website.	None – finished.
	Adoption of BIPV in the SREP by Q2 Yr2.	Net metering in principle OK, but different opinions of the concept. Different tariffs. 0,46 MR and 0,30 MR/kWh.	None - finished
	Relevant recommendations on policy improvements or for new regulatory provisions submitted to MECM by Q2 Yr3.	Registration and licensing confirmed by the regulator. Submitted by 2006 approved 2008.	None – finished.
3.7. Implementation of an institutional and policy framework for a sustainable follow-up program	An appropriate institutional and policy framework for a sustainable follow-up BIPV program is formulated and submitted to MECM by Q1 Yr4.	Decision on funding needed first, an enabling framework, an RE act, a REEF. Preparations have been done. Awaits the political decisions on the enabling framework and funding.	-

	A clear GoM policy on the promotion, development and utilization of BIPV is endorsed in the 10th Malaysian Plan by Q4 Yr5.	To follow. See above.	-
3.8. Policy and financial framework implementation, monitoring and impact assessment	An annual assessment of the policy implementation supported with an appropriate financing mechanism starting Yr5 until end of 10th Malaysian Plan.	Impact assessment not yet possible. Awaits decisions on enabling framework. See above.	-
	Annual policy impact assessment completed and reviewed by MECM for further action by Yr5.	MEWC finds it valuable. Min of Finance wants it for monitoring. See above.	-
3.9. Government liaison and dissemination of results	A final seminar targeting the policy sector with all relevant stakeholders and the utility presenting the policy framework and the financial schemes by Q2 Yr4, with minimum 50 participants.	Is at present not seen to bring any additional value. Stakeholders will already be aware. But to be considered.	-
Component 4: BIPV Industry Development and R&D Enhancement Program	• At least 2 business partnerships and technology transfer for harnessing enhanced R&D activities for two locally manufactured BIPV products established and implemented by Yr5. • Developed business models for at least 5 local BIPV entities successfully implemented by Yr5 • Established BIPV testing facility providing quality control with possible upgrade towards certification center by Yr 5.	• 18 actions on business partnerships and tech. transfers. 3-4 international PV manufacturers established at foreign investment of ~RM 12 b. Local production of components awaits market development and the enabling framework. • Business models developed and reported; awaits enabling framework. • Testing of inverters established at the UTM. Testing of support structures established at the IKRAM	• None
4.1. R&D activities enhancement on cost reduction of local BIPV products and system optimization for local condition	2 research projects from universities and industry on BIPV starting Q2 Yr1, with at least 2 universities and 2 industries are involved.	Focus on inverter. Contract to Univ. Malaya (UM) – ongoing – two prototypes. Industry not involved. Not very successful – pointed out in quarterly reports. Termination? Funding from the Malaysian government – no GEF funding	None (eventually termination of contract?)

		involved. However, certain capacity building at the UM. Contract on R&D of mounting structures considered but not found viable due to expected low industrial take up. Min. of Science does their own R&D. UiTM does limited R&D (external to the MBIPV).	
4.2. International collaboration and transfer technology program	Three international collaborations and transfer technology schemes established by Q4 Yr2. At least 2 collaborations between international and local partners materialized.	MBIPV helped facilitate bringing in new companies: SunPower, First Solar, Q-cells, etc.. Reporting to MIDA. 5 Malaysian industry international missions incl. PVSEC Valencia. Facilitating more than 15 international collaborations/transfers against target of 4. 7 matchmakings generated against target of 5.	None.

4.3. Upgrading local industry capabilities	Assessment of capabilities of local industry and manufacturers completed by Q2 Yr2. Report becomes reference for further industry development activities.	Local report: not much available. International report "standard PV scene", both reports 2007. Report on university R&D 2007. Report on support for PV industry 2007.	None.
	Three business opportunity meetings for the local industry with international participation held once a year starting in Yr3. At least 2 matchmakings generated.	+25 meetings/seminars/workshops for local industry. Matchmakings implemented.	None.

	Business development models are developed and implemented by local industry by Q4 Yr5. At least 2 companies implement the model.	Business model developed. 3 business plans compiled – on target. Training carried out. Business plans waiting to be implemented when viable – lack of enabling framework. Min. 2 MW of GCPV/y business level needed. (Off-grid market around 1,5 MW/y.) Industry growth program with 7 companies against a target of 6.	None.
	One commercial (BIPV mounting structure) and one pre-commercial (10 inverters pilot tested) product are available in local market by Q4 Yr 5.	2 pilot inverters available from UM. Industry take up uncertain – no ownership. Again local production awaits enabling framework	None.
4.4. Testing facility, with potential to upgrade as certification institute	A testing facility for R&D activities on local manufactured products, as well as for quality control of imported PV components is established by Q4 Yr5.	UTM tests inverters. UTM and Arsenal MoU. Australian input to UTM. Persons training. UTM does good work. Business perspectives. Test on mounting structures (IKRAM) IQCC & MSQCC operational by mid 2008.	UTM to investigate business opportunities as a accredited test lab.
	Collaboration with international certification bodies is established by Q1 Yr4. National testing facility is upgraded and testing of at least 15 products carried out annually.	Both on IQCC & MSQCC have international collaboration been established in 2008: UTM to Arsenal and IKRAM to BSD (Singapore) 6-10 tests of inverters /year. Test of mounting structures not really needed/appreciated by the service providers.	None.
4.5 Building Codes & BIPV	Start in 2009. MSQCC.	Seen as premature.	To be observed.

3.2 Implementation: Assessment of Budget Utilisation

For each of the four components including sub-components this section assesses the (GEF) budget utilisation and recommend actions if any, following the format as given in the ToR, see annex A. The below overview is per September 30 2008.

Project Strategy	Objectively Verifiable Indicators	GEF Fund (USD)	Performance Budget	
		$ 4.699.420	Total Expenses	%
Project Strategy	**Objectively Verifiable Indicators**	**$2.187.721**	**$1.445.910**	**66%**
National Project Team mobilisation & inception report	Stakeholders workshop, preparation of inception report and updating project planning matrix, for submission to NSC	$37.235		
	Establishment and mobilisation of national project team	$1.462.086	$1.006.172	69%
	Mobilisation of international consultants	$688.400	$439.738	64%
	Establishment of NSC (meets every 6 months) and PRC (meets every 3 months)	$0		
Project Strategy	**Objectively Verifiable Indicators**			
1. Project Goal				
1. The annual growth rate of GHG emissions from fossil fuel fired power generators is reduced via the widespread implementation of BIPV application to replace part of the current fossil fuel use in Malaysia, and via the cost reduction of the BIPV technology.	GHG emissions from fossil fuel-based power generation in the country is reduced by 65,100 tons CO_2 over the lifetime of the installed PV capacity by the year 2010, relative to the baseline in year 2005.			
	GHG emissions avoided from forecast replications beyond the MBIPV project are about 868,000 tons CO_2 over the lifetime of the total installed PV capacity in the year 2020.			
Project Strategy	**Objectively Verifiable Indicators**			
2. Project Purpose				
2. The overall capacity (technical, policy, planning, institutional, fiscal, financial) both in government and the private sectors, to develop, design and make use of the BIPV energy potential and to develop local industry is significantly improved.	Increased installed BIPV capacity by about 330% and a unit cost reduction of 20% by the year 2010.			
	A National BIPV program is integrated in the 10th Malaysian Plan enabling about 30% annual growth in installed BIPV capacity from the end of the project to Year 2020, leading to a further 30% BIPV unit cost reduction within the 10 year period.			

3.1. Project Outputs			Performance Budget	
Component 1: BIPV Information Services, Awareness and Capacity Building Programs	Relevant GoM agencies processing applications for BIPV project implementation by 2008.	**C1 sub-total**	**Comp 1 Total Expenses**	**%**
	Building owners and developers consider the incorporation of BIPV systems in their planned building projects starting 2007.	**$493.295**	**$281.826**	**57%**
	Malaysian PV Industry Association established as an umbrella organization and leader of BIPV quality program by 2007. (watchdog services)			
	At least 3 BIPV projects implemented annually by trained PV service providers, engineers and BIPV designers by 2008.			
1.1. Integrated information and awareness building program on BIPV	Creation and operation of a BIPV cell in the resource center at PTM by Q4 2006, where a staff is able to become a BIPV spokesperson.	$294.100	$177.935	61%
	BIPV website developed and operational by Q4 2006, to achieve 120 average no. of hits per annum. A mechanism for increasing public awareness and generating interest by providing relevant and comprehensive information on BIPV to interested parties.			
	Mechanics for the information exchange and promotion activities set-up by Q4 2006, where BIPV information and facts are readily available. The various channels for information dissemination are to reach target audience more effectively.			
	Rollout of the national BIPV campaign targeting the public. 2006 - 1 seminar (Q1), developer's launching (Q2), SURIA 1000 cum website launching program (Q4). 2007 - developer's launching, PTM new building launching, International tri-conference, 2008 - 1 seminar & 1 roadshow, 2009- 2 seminars 2010 - 1 seminar. Press luncheon will occur at least once a year. The events are to give a more direct and personal approach to educate, draw interest and commitment in targetted segments.			
1.2. National BIPV database	Creation of a publicly accessible BIPV database and link to website and fully operational by Q4 2006 with average of 50 hit counts accessing the database annually. Database is to become a knowledge base, it will address information suitable for both technical and non-technical audience.			
1.3. BIPV training courses	In-house training course for support staff (PTM) completed by Q3 2006 with at least 1 staff member fully trained.	$65.171		
	Design and preparation of training materials completed by Q4 2006. Facilities for training are ready. Train the trainers are ready to be conducted.		$64.475	99%
	1 train-the trainer course in 2006, 2 training courses on BIPV for service providers, architects and engineering consultants in 2007 and 2008 each. 80% of participants who passed the exam able to provide quality services. The result of the training is to create market confidence in the quality of service provided by the PV service providers.			
1.4. Malaysian PV Industry Association	Representation from PV industry meet twice a year starting from Q1 2006, with at least 10 representations for the first meeting. The establishment of MPIA is to be an extension arm for the MBIPV in terms of driving the PV market and being an advocate to the government.	$13.492	$12.679	94%
1.5. Quality control programs for local industry	Malaysian PV Industry Association implementing BIPV user watchdog scheme by Q3 2007 with at least 1 consultant appointed. In doing so, the PV industry is self-regulated with interest of PV service providers and public protected.	$11.974		0%
	Malaysian PV Industry Association approves (in long-term – accredits) local service providers who completed and passed the required training course. Implementation of one-stop concept for BIPV service providers by Q4 2007. Four applications for 1-stop service received by Q4 2007. At least eight local PV industries (engineering firms and service providers) are registered as one-stop service provider by end of the project. This will reduce barriers as public do not have to be hassled by co-ordinating the different parties involved in the entire PV installation process.			
	Annual award ceremony for BIPV installations starting from 2009 with at least one winner. The award will give recognition to the PV service providers who have made the initiative and effort to achieve the standards and provide incentives to other pv service providers to attain the same achievements. In turn, the publicity the event generates will create greater public awareness, interest and confidence in the PV technology.			
1.6. Capacity building and awareness programs for policy makers and financial sector	Ten government officials and decision makers from the finance sector completed in total 5 visits to local BIPV demonstration projects and 3 study tours to countries with outstanding BIPV installations by end of the project. The tour is to promote awareness of BIPV to decision makers and financial sector so that they are well informed and this in turn, translated into favourable decision making.	$58.558	$8.819	15%
1.7. International BIPV event for decision makers	An international BIPV event is hosted in Malaysia every 2 years starting from 2007 with at least 50 participants. The event is to promote Malaysia in the international profile on the use of renewable energy source as a viable energy mix.	$11.842	$0	0%
1.8. Disseminate information and lessons learn to regional ASEAN countries	BIPV incorporated into ASEAN plan of action via RE-SSN with Malaysia as the focal country. Malaysia reports progress during annual RE-SSN meeting for dissemination of information starting Q3 2007. The report is to assist other ASEAN countries with experiences and lessons learnt from the MBIPV project which in turn aims to reduce barriers and time delivery in countries interested in using BIPV.	$7.895	$0	0%
1.9. Impact assessment of BIPV technology development	Initial survey conducted by Q4 2006 and final survey by Q2 2010. Survey results identify minimum 20% BIPV cost reduction and assess BIPV replicability beyond project scope. The initial survey is create a baseline in which the final survey will benchmarked against.	$30.263	$17.919	59%

Project Strategy	Objectively Verifiable Indicators		Performance Budget	
Component 2: BIPV Market Enhancement and Infrastructure Development Program	Developed BIPV standards and guidelines by 2010. The quality of BIPV system installations are standardised.	**C2 sub-total**	**Comp 2 Total Expenses**	**%**
	100 kWp BIPV showcases and 400kWp BIPV demonstration projects implemented and monitored for performance starting 2007 and 2008 respectively. This would enhance the awareness among the public and catalyse building industry to incorporate BiPV in future building constructions.	**$1.405.247**	**$892.279**	**63%**
	At least 15 prospective clients apply for BIPV projects (under Suria 1000 program) each year starting 2007. This could spin off to more market requirement for BIPV systems.			
	Information on BIPV showcases and demonstration projects disseminated through seminars and the national BIPV campaign starting 2008.			
2.1. Standards and guidelines development	Department Standard Malaysia (DSM) publishes PV code of practice by Q4 2005. Code of practice is integrated in training courseware and utilised by service providers.	$0		
	Standard on building practice (PV code of practice) is to be revised by Q3 2010 and utilised by the building industry.			
2.2. Review and final design of the planned BIPV showcases	Completion of guidelines and tender documents or approved design for the following BIPV applications:	$0		
	Office building: PTM ZEO: 40 kWp by Q4 2005			
	Government building: MEWC LEO: 4kWp by Q3 2006			
	Commercial/ Public building: To be confirmed: 20kWp by Q2 2007			
	Residential property: To be confirmed: 36 kWp by Q1 2007			
2.3. Hardware installation and operation of the BIPV showcases	Showcases are to be completed as follows:	$763.158	$645.277	85%
	Office building: PTM ZEO: 40 kWp by Q2 2007			
	Government building: MEWC LEO: 4kWp by Q3 2007			
	Commercial/ Public building: To be confirmed: 20kWp by Q4 2008			
	Residential property: To be confirmed: 36 kWp by Q3 2008			
2.4. Evaluation of demonstration sites	Guideline development for demo project application by Q2 2006. Proposed demo sites and newly identified sites are evaluated by Q3 2008. Projects are approved for implementation with total capacity of 400 kWp by Q3 2010.	$0		
2.5. Design and evaluation of technical and commercial viability for the demonstration projects	Evaluation report and detail engineering designs completed by Q4 2008 leading to confirmation of BiPV installations by the building developers.	$0		
2.6. BIPV demonstration implementation and operation at government and private buildings	Construction of all demonstration projects (400kWp) completed by Q2 2010 where BIPV systems are commissioned and operational. Enhance understanding among building industry on BiPV design and installation methods.	$521.053	$196.385	38%
2.7. Review and promotion of national PV program "Suria 1000"	Revised bidding concept for the national programme and approval by Q3 2006.	$84.211	$50.617	60%
	Extensive marketing campaign to launch the programme targeting the public sector is carried out by Q4 2006.			
2.8. Implementation and operation of "Suria 1000"	Award of successful bidders starting Q1 2007. Two sessions of award are planned annually until 2010.	$0		
	First equipment and delivery contract signed by Q4 2007.			
	End of the programme with 1MWp installed by Q4 2011.			
2.9. Monitoring and evaluation of BIPV projects	Establishment of PV monitoring centre by Q3 2006. Guideline for system moniitoring developed by Q2 2007.	$0		
	Monitoring exercise of the system for all completed BIPV projects starting Q3 2007.			
	Annual evaluation report for the demo projects highlighting the operating and economic performance starting Q4 2007. Report is utilised for further system improvement and capacity development.			
2.10. Dissemination and promotion of demonstration program results	The results of evaluated BiPV installations are disseminated through info service (PTM) starting Q1 2008, generating visitation from interested stakeholders and public.	$34.211	$0	0%
	A national workshop presenting the results of the demo program and Suria 1000 is held in Q2 2010 with at least 50 participants.			
2.11. Sustainable follow-up program design	Based on the activities and outcomes from C3, a follow up programme is designed for the 10th Malaysia Plan by Q2 2010 and submitted to EPU.	$2.615	$0	0%

Project Strategy	Objectively Verifiable Indicators		Performance Budget	
Component 3: BIPV Policies and Financing Mechanisms Program	BIPV policy and institutional framework supported with financing mechanism for a sustainable follow-up program integrated in the 10th Malaysian Plan by 2009, and implemented by 2010.	**C3 sub-total**	**Comp 3 Total Expenses**	**%**
	About 30% annual increase in BIPV applications spurred by policy implementation supported with appropriate financing mechanism starting from Yr5 until end of 10th Malaysian Plan.	**$131.579**	**$56.416**	**43%**
3.1. Techno-economic analysis for grid-connected BIPV	Completion and submission of assessment report highlighting cost benefits of BIPV, peak tariff and technical issues to NSC by Q3 2006. Report becomes reference for other project activities			
3.2. Design and implementation of government incentives to utility and manufacturing industry	Recommendations of incentives for the grid-connection of BIPV and the power production by Q1 2007, incentives for local manufacturing by Q2 2007 andeEndorsed by NSC by Q2 2007 for submission to MEWC.			
3.3. Analysis on existing and new financial mechanism and fiscal incentives	Assessment report on exisiting fiscal incentives and financing mechanism support for BIPV submitted to NSC by Q1 2007 for submission to MEWC to adopt.			
	Assessment report and recommendations for suitable fiscal incentives and financing mechanisms for BIPV submitted to NSC by Q3 2007 for submission to MEWC to adopt.			
3.4. Implementation of a fiscal and financial framework for a sustainable follow-up program	An appropriate framework for BIPV, encompassing fiscal aspects and financial mechanism, including favorable power tariff and industry support policy is formulated and submitted to NSC by Q4 2008 for aproval by MEWC.			
	Government endorsement of favorable financing schemes and power tariff policy for BIPV by Q3 2010, based on MEWC approval indicated above.			
3.5. Study on past experience and impact on international regulatory schemes	Findings of different regulatory schemes worldwide regarding BIPV and recommendations completed and submitted to NSC by Q2 2007. Findings report becomes reference for other activities.			
3.6. Review and integration of BIPV in existing regulatory schemes	Evaluation report of the SREP, solar roadmap and other existing regulatory schemes to determine contextual relevance to BIPV completed and submitted to NSC by Q4 206.			
	Adoption of BIPV in the SREP by Q2 2007.			
	Relevant recommendations on policy improvements or for new regulatory provisions submitted to MECM by Q2 2008.			
3.7. Implementation of an institutional and policy framework for a sustainable follow-up program	An appropriate institutional and policy framework for a sustainable follow-up BIPV program is formulated and submitted to MECM by Q1 2009.			
	A clear GoM policy on the promotion, development and utilization of BIPV is endorsed in the 10th Malaysian Plan by Q1 2011 (This is beyond te project period to suit 10 MP schedule).			
3.8. Policy and financial framework implementation, monitoring and impact assessment	An annual assessment of the policy implementation supported with an appropriate financing mechanism starting in year 2010 until end of 10th Malaysian Plan.	$131.579	$56.416	43%
	Annual policy impact assessment completed and reviewed by MEWC for further action by 2010.			
3.9. Government liaison and dissemination of results	Dissemination of earlier impact assessment results through third party seminars and workshops,and a final seminar targeting the policy sector with all relevant stakeholders and the utility presenting the policy framework and the financial schemes by Q3 2010, with minimum 50 participants.			

Project Strategy	Objectively Verifiable Indicators		Performance Budget	
Component 4: BIPV Industry Development and R&D Enhancement Program	At least 2 business partnerships and technology transfer for harnessing enhanced R&D activities for two locally manufactured BIPV products established and implemented by 2010.	**C4 sub-total**	**Comp 4 Total Expenses**	**%**
	Developed business models for at least 5 local BIPV entities successfully implemented by 2010	**$481.579**	**$178.311**	**37%**
	Established BIPV testing facility providing quality control with possible upgrade towards certification center by 2010			
4.1. R&D activities enhancement on cost reduction of local BIPV products and system optimization for local condition	Research Project from university and industry to design and develop local BIPV Inverter starting Q1 2006. Pre-commercialize product (inverter) is completed by Q4 2009 and commercialization by Q4 2010.	$52.632	$5.158	10%
	Research project from university and industry to design and develop local BIPV mounting mechanism starting Q1 2006. Pre-commercialize product (mounting structure) is completed by Q4 2009 and commercialization by Q4 2010.			
4.2. International collaboration and transfer technology program	International collaboration program and Transfer Technology Scheme between international and local partners established by Q4 2010. At least one (1) colloborative project/program materialised by Q4 2007and additional one (1) colloborative program materialised by Q4 2009.	$36.316	$26.745	74%
4.3. Upgrading local industry capabilities	Market research of capabilities of local industry and manufacturers completed by Q2 2007. Industry Business Development Model are developed based on the finding from market research by Q4 2007. Report becomes reference for further industry development activities	$255.789	$144.637	57%
	Three (3) business opportunity meetings for the local industry with international partners held once a year starting in 2008. At least 2 matchmakings generated.			
	Industry business development models are implemented by local industry by Q4 2010. At least 3 companies (service / manufacturing) implement and follow through the business development model.			
	Industry Growth and Development Program are implemented for local industry player. At least 2 industry training and development program conducted every year starting from 2008 (up to Q4 2010)			
	One commercial (BIPV mounting structure) and one commercial (BIPV Inverter) product are available and applied in local market by Q4 2010.			
4.4. Testing facility, with potential to upgrade as certification institute	A testing facility for R&D activities on local manufactured products, as well as for quality control of imported PV components is established by Q4 2010. Product are tested by the facilities.	$136.842	$1.771	1%
	Collaboration with international certification bodies is established by Q1 2010. Testing facilities are upgraded to international standard.			
		GEF Fund (USD)	**Grand Total Expenses**	**%**
		$ 4.699.420	**$ 2.854.741**	**61%**

Overall spending level of the GEF budget component as of 30 September 2008 is at about 60 % with:

- Component 1 at 57 %
- Component 2 at 63 %
- Component 3 at 43 %
- Component 4 at 37 %

The utilization of the GEF funding component is found to be balanced and to reflect the actual project progress, which as mentioned before in general terms is ahead of both targets and time shedules.

Component 2, which has implemented more capacity (kW) than expected, has benefitted from accelerated price reductions.

Component 3 exhibit a bit of underspending compared to the project as such, and this can be explained with the national BIPV enabling framework still very much being a political level issue.

Component 4 also exhibits underspending, and this can be explained by a low take up of R&D activities by local industry due to uncertainties as to the local market for BIPV – again as a consequence of the missing enabling framework.

The Evaluator is of the opinion, that the underspending will remedy itself in the second half of the MBIPV project period in line with progress in establishing the envisaged national enabling framework for BIPV.

Consequently the Evaluator has no recommendations as to GEF budget component utilisation. However, as mentioned in the Executive Summary it is recommended, that the MBIPV team closely follow the eventual impact of the global crisis on e.g. defaulting of provided Suria awards and loss of response in future Suria calls. Should such impacts be found to be significant, a project extension or an extension combined with a budget revision should be considered.

3.3 Implementation: assessment of the project's impacts

Half way in the MBIPV project the Evaluator finds the project impact can be summarized as:

- **Political level – enabling framework**
  At the time of the mid term review mission it was evident from the press and indications from the MEWC, that the energy sector as such was an issue being much discussed, and that RE and energy conservation would see a more prominent role in the future. Strategies and possible instruments, e.g. feed in tariffs, were often mentioned, and the MBIPV was referred to very positively both as an active project and as a souce of information.
- **Key stakeholders and actors**
  Representatives met from e.g. the Energy Commission, the TNB, MIDA, academia, industry and developers all expressed respect for and satisfaction with the MBIPV project and its progress, and with the information and support received from the MBIPV team.
- **End users**
  End users met, e.g. from the educational system and private households, expressed great satisfaction with their BIPV systems and in particular with the support provided by the MBIPV team.
- **Implementation**
  As previously mentioned the MBIPV project is found to be ahead both as to targets and time schedules.
- **Regional dissemination**
  The regional dissemination in the ASEAN framework (NRE-SSN) is found to be weak and not to have the impact expected and possible.

3.4 Implementation: assessement of risk management

It is the opinion of the Evaluator, that the project risk management both in the overall project implementation and on the component level is well handled by the MBIPV team and that assumptions and identified risks are recognized and discussed freely, e.g. at the monthly project meetings, leading to a quick identification of viable mitigating measures.

However, the extent to which the NSC (with annual meetings) and the PRC (with quarterly meetings) are actively engaged in project risk management is not clear to the Evaluator.

3.5 Project relevance, design and country drivenness

3.5.1 Relevance

Generally, Malaysia has to face, and is indeed facing the challenges of future development in a global environment where the spur to growth fuelled by hydrocarbons will be proportionally weaker than in the past. Spiralling oil prices, environmental degradation and climate change have made the need for sustainable use of energy more evident. RE technologies including PV and BIPV are high on the international climate and energy agenda.

Thus, the project is relevant to the development objectives of Malaysia. Renewable energy at the national level was first stated in the Eighth Malaysia Plan (2001-2005), and in the Third Outline Perspective Plan 2001-2010. Renewable energy is again explicitly addressed in the (current) Ninth Malaysia Plan (2006-2010). Photovoltaic (PV) technology is one the fastest growing renewable energy technologies on the world market with a recognized huge potential given the expected cost reductions are met. Many countries and regions have introduced enabling frameworks for PV in anticipation of its growing competitiveness and importance as an environmental benign source of electricity, and as previously indicated Malaysia appears presently to be considering its options, priorities, strategies and instruments as to energy and RE. The MBIPV is expected to provide significant input to the 10th Malaysia Plan this way giving the MBIPV project additional relevance.

3.5.2 Project conceptualisation

As such, the project document provides a clear, logical structure in four Components. The outputs of each Component are clearly specified and would if achieved meet the objectives of each Component. The original list of targets and activities has changed over time[4], but this may be expected of a project responding to the fast development of a globaly very dynamic sector such as PVs. The four Components themselves are found supplementing each other and interlinked with clear interfaces.

At the mid term of the MBIPV the Evaluator finds no major flaws in the project concept and design.

The project addresses the barriers mentioned in section 2.1. However, it seems that the lack of a conducive policy and planning framework in Malaysia for the promotion and implementation of RE and PV including BIPV is another main barrier (together with the existence of subsidised energy prices), maybe a barrier somewhat out of scope of the MBIPV project. However, ongoing political activities in Malaysia appears to start addressing this overall barrier with the MBIPV providing not insignificant input.

[4] Project Indicators with Annual Target Values last updated in August 2007

3.6 Assessment of the implementation approach in achieving outcomes and outputs

3.6.1 Progress towards results; adaptive management

Project management

The project management structure is explained in Section 2.2. Overall direction of the MBIPV rests with a National Steering Committee (NSC) chaired by the MEWC. The NSC mets annually. A Project Review Committee (PRC) chaired by the Energy Commission meets quarterly to provide guidance to the MBIPV. Attendance in both Committees appears to be good and the minutes of meeting are satisfactorily. The National Project Director (NPL) is the head of the PTM. Day-to-day project management is the responsibility of a full-time project manager, the National Project Leader (NPL). A Component Manager or Leader manages each Component.

The Evaluator has found the MBIPV internal management quite effective ensuring a smooth and continuous project operation. Internal management meetings are carried out monthly.

The contribution of the external management structure to the effectiveness of the MBIPV is not clear to the evaluator.

Delays in project implementation

The MBIPV project is at mid term ahead of time schedules.

Adaptive management

Adaptive management has been practiced. Changes to the project team and activities are implemented from time to time, and are by the Evaluator found timely and appropriate in execution.

Long-term consultancy

The MBIPV project is found to have experienced three not completely satisfactory mid-long term consultancy contracts:

- On inverter R&D with the University of Malaysia, where the Evaluator finds the lack of industry involvement a major flaw. Public-private partnerships in such R&D efforts have prooved to be mutually beneficial;
- On the training of Approved Service Providers, where the contract fell through, and the MBIPV team had to restart actions in their own regi;
- On a technical-economic analysis of grid connected BIPV, where the the contract fell through, and the MBIPV team had to restart actions in their own regi.

The long term contract with the international consultant is found to operate excellently and as expected.

3.6.2 Financial planning and delivery of counterpart inputs

The resources under the project as foreseen in the Project Brief come from cash contributions from GEF, the Government and private/international sources as well as in-kind contributions as listed below:

GEF (cash)	US$ 4,699,420	19%
Co-financing:		
▪ MECM (cash)	US$ 1,014,871	4%
▪ EC (cash)	US$ 4,250,000	17%
▪ MESITA (cash)	US$ 918,947	4%
▪ Agencies of Gov. of Malaysia (cash)	US$ 2,652,632	11%
▪ Private and international sectors (cash)	US$ 3,863,160	15%
▪ Gov. of Malaysia (in-kind)	US$ 3,707,236	15%
▪ Private and international sectors (in-kind)	US$ 3,852,894	15%
Total Full Project Cost	US$ 24,959,160	100%

The funding contribution from MESITA appears to have been lost and the project budget revised accrodingly.

The Evaluator has not been made aware of any other problems as to delivery of counterpart input.

3.6.3 Stakeholder involvement and partnership strategy

In general, one can say that the project forms a good example of government agencies, institutes and private sector organisations working hand-in-hand.

Contacts with local key stakeholders, such as the MEWC, The PTM, the energy commission, the TNB, MIDA, academia (UiTM, UM), IKRAM, industry (members of MPIA), developers and end users have all indicated satisfactory involvement of stakeholders.

3.6.4 Logical framework and monitoring

A logical framework (of outcomes, outputs, indicators and verifiers) is provided in the GEF Project Brief. A set of indicators for the project's achievements following the Project Brief is given in the 'annual implementation review' reports (APR-PIRs) of which the Evaluator has had acces to two. The indicators were reviewed and slightly revised in 2007 defining the annual targets for each. The indicators used in this Evaluation Report are taken from both the Project Brief and the last APR-PIR (2007).

A brief overview of the Evaluators characterization of the project outputs is listed in annex C in terms of Higly Satisfactory (HS), Satisfactory (S), Marginally Satisfactory (MS) and Unsatisfactory (U).

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

The following summarises the findings of the evaluation. Each of the points discussed below has been dealt with in more detail in the previous chapters.

4.1.1 Project design and project implementation

Project conceptualisation

The Project Brief describes a coherent set of objectives and outputs. Indeed, at the time of writing of the project document (2004), awareness and capacity in industry and consultancy business regarding PV and BIPV in Malaysia was low, and the project rightly addresses this important barrier. The very fast and dynamic development of the global PV sector and the increased global and Malaysian focus on climate issues including PV has enhanced the importance of the MBIPV project in the view of the Evaluator.

Effectiveness of implementation

As stated previously the MBIPV project is well ahead of targets and time schedules, as also indicated by the APR-PIR's submitted.

4.1.2 Impacts, sustainability and replicability

The project, in the view of the Evaluator, has made important and real contributions to removing barriers, in particular awareness creation and capacity building in important areas such as benchmarking, best practices and demonstration of BIPV implementation processes and technology including monitoring. Potentially it has generated powerful insights into the technical and economic potential for BIPV and highlighted – at mid term at least partially - the means available to government to realise that potential.

While these achievements are real, their longer-term sustainability is in doubt without continuous government support and the establishment of a suitable enabling framework. Most of the MBIPV activities will need to be continued as part of PTM regular programme. However, continuation will depend strongly on the financial support of the Government to sustain these efforts.

In addition, another main barrier to improved BIPV and PV in general use in Malaysia remains the highly subsidised energy prices. There is little that the MBIPV project can do directly to remove that barrier except for providing relevant policy recommendations.

4.2 Recommendations

The Evaluator has the following recommendations as result of the mid term review.

1. An increasing risk of awards defaulting or loss of interest in future calls has been found due to the global economic crisis leading to considerations of an extension of the MBIPV. The MBIPV is *recommended* closely to monitor this risk and to take appropriate actions e.g. a project extension , a budget revision of a combination of both.
2. The MBIPV is *recommended to* strengthen its flow of information towards other ongoing RE and energy conservation activities in Malaysia in order to facilitate common understanding and coordination among stakeholders.
3. The MBIPV is *recommended* to better structure and strengthen the regional (ASEAN) dissemination via the NRE-SSN; Malaysia has the opportunity to take a leading role.
4. Interviews with major stakeholders exhibit a rather fragmented situation with regard to creating a decent Malaysian enabling framework (FIT, capital incentives, etc.). It is consequently *recommended* to establish a National PV Working Group with representatives from all major stakeholders, and initially with a 6-months brief from the MEWC to streamline the existing institutional set-up around BIPV implementation, to compile a national PV Strategy and to propose - and eventually later to regulate/adapt - the instruments needed to implement the strategy. If successful such a national PV WG could later be the nucleus of a RE WG or an RE & Energy Conservation WG. (RE & energy conservation measures often goes hand in hand and synergies are obvious).
5. At the end of the MBIPV project a vacuum will be created in the field of GCPV in Malaysia, if nothing is done, and industry and the public will most likely experience a collapse of the now emerging GCPV sector. To avoid this it is *recommended* to start a process leading to a smooth transition of the MBIPV activities and results to the PTM, PTM seen as a natural national anchoring of GCPV and MBIPV facilitating functions in the future. Whether this new PTM entity can/shall manage financial incentives or head externally funded projects has to be determined. The basic role of PTM may have to be redefined in this context. A prerequisite in this context will be to allocate sufficient resources including human resources to the PTM. In parallel the PV Monitoring Center at the UiMT should receive official recognition to enable the centre to continue monitoring (permanent staff) - local data crucial for future policies and strategies - and at the same time be a PV conduit to the educational system.
6. And as a very general observation: all energy matters could preferably be handled by a single ministry.

4.3 Lessons learnt

One lesson learned is that care must be taken not to focus on a single RE technology or applications such as BIPV and GCPV. RE and for that matter energy conservation present a palet of options to addressed in a coordinated manner, and as such policy planners should look into the bigger perspective when creating a future enabling frame work for BIPV.

Despite low local energy cost and initial low awareness the MBIPV has managed to deploy more GCPV installations than expected and to create more interest/demand, than can be fulfilled within the frame work of the program, this way exhibiting real impact. While such enthousiastic participation is laudable in an initial phase, PV and BIPV promotion and implementation need to be an integral part in the Government's long-term public climate and energy policy.

ANNEX A: TERMS OF REFERENCE OF THE EVALUATION

Building Integrated Photovoltaic (BIPV) Project
Mid-Term Evaluation 2008

UNDP Malaysia seeks a qualified International project evaluator (consultant), for a full-time two-week period and will be stationed at UNDP Office Kuala Lumpur and Pusat Tenaga Malaysia in Bangi, Selangor.

1. INTRODUCTION

The Building Integrated Photovoltaic Technology Application (BIPV) Project is intended to induce long-term cost reduction of non-emitting GHG technology (i.e. the photovoltaic or PV) via integration of the PV technology within building designs and envelopes. It is aimed at creating a sustainable BIPV market in Malaysia that will generate widespread BIPV applications. Over the lifetime of the expected installed BIPV capacity from the project, the energy generated will avoid 65,100 tons of CO_2 emissions from the country's power sector in addition to contributing towards national energy policy objectives.

The principal objective of this project is to reduce the long-term cost of BIPV technology within the Malaysian market (GEF Operational No 7), which will subsequently lead to sustainable and widespread BIPV technology applications that will avoid greenhouse gas (GHG) emissions from the country's electricity sector. The project aims to catalyze BIPV technology acceptance among the public, policy makers, financiers and building industry, which will lead towards a sustainable BIPV market beyond the completion of the project. The project will specifically focus on the market development for BIPV technology, and building the national capacities on three major areas: (a) policy and education; (b) technical skill and market implementation; (c) technology development support.

Activities in the BIPV project are as below:
Component 1: BIPV information services, awareness and capacity building programs
Component 2: BIPV market enhancement and infrastructure development
Component 3: BIPV policies and financing mechanisms programs
Component 4: BIPV Industry Development and R&D enhancement program

2. OBJECTIVE OF THE EVALUATION

The purpose of the Mid-Term Evaluation is to **review, rate the performance** of the project from the start of the project implementation up to the present and **recommend possible** corrective actions if any. The review will include evaluating the

a) Progress in project implementation, measured against planned outputs set forth in the Project Document/Inception Report with latest revision in accordance with rational budget allocation, and

b) An assessment of the overall impact of the project to the country.

c) and identify corrective measures, lessons learned and best practices which could be applied to future activities and other on-going/new projects.

3. ACTIVITIES

The scope of work for the consultancy will include, but not necessarily be limited to, the following activities:

a) Assessment of progress in project implementation

The evaluation will focus on such aspects as appropriateness and relevance of work plan, compliance with the work plan along side with budget allocation; timeliness of disbursements; procurement, quantity and quality of goods and services created; coordination among different project stakeholders. Any issue that has impeded or advanced the implementation of the project or any of its components, including actions taken and resolutions made should be highlighted. Activities to be continued by the executing agency shall also be recommended. The template below shall assist the consultant in reviewing the progress.

Review of Activities			
Activities	Planned	Actual	Action

Assessment of Budget Utilization			
Activities	As per ProDoc	Actual Expenditures	% of Project Budget

The following assessments shall be carried out:

- Capacity of risk management in overall project implementation and per component level i.e., whether the assumptions and risks are well recognized and mitigating measures are considered throughout implementation.
- Project design, i.e., whether the project design allowed for flexibility in responding to internal and external changes in the project environment.
- Implementation difficulties, i.e., whether difficulties and barriers, which were not expected at the start of the project, are identified and the approaches for the solutions are considered and implemented effectively.
- Project resources, i.e., whether the project components and activities were logically designed as to content and time frame commensurate with the human and financial resources that were made available.

b) Assessment of project outputs

For both the component and overall project levels, assess:

- Whether the project is implemented in the right direction to achieve the outcomes (i.e., based on the agreed work plan / annual target).
- The significance of the outcomes so far achieved for the country/region.
- Whether the project outputs are produced effectively, efficiently, and in a timely manner according to the time schedule.
- The quality and credibility of the outputs, as stipulated in the Project Document.

- The project's contributions to the targeted beneficiaries and their effectiveness.
- How effective and efficient the project funds are utilized, and how the expenditures are monitored.
- The credibility of the data used in the project and reliance of the numerical outputs.
- The monitoring and evaluation of the project consultants' work.
- The quality of the internal monitoring system results.

Outputs of the BIPV are as below:

Overall Project Goals and Objectives

a) The amount of annual GHG emissions avoided from fossil fuel-based power generation – in tons CO_2 of the cumulative installed PV capacity

b) Project Purpose: The overall capacity (technical, policy, planning, institutional, fiscal, financial) both in government and the private sectors, to develop, design and make use of the BIPV energy potential and to develop local industry is significantly improved.

c) % of increased installed BIPV capacity against baseline (inclusive of awarded Suria)

d) % of BIPV unit cost reduction against baseline

e) No. of National BIPV program integrated into the 10th Malaysian Plan

Objective 1: BIPV Information Services, Awareness and Capacity Building Programs

1.1. Integrated information and awareness building program on BIPV
1.2. National BIPV database
1.3. BIPV training courses
1.4. Malaysian PV Industry Association
1.5. Quality control programs for local industry
1.6. Capacity building and awareness programs for policy makers and financial sector
1.7. International BIPV event for decision makers
1.8. Disseminate information and lessons learn to regional ASEAN countries
1.9. Impact assessment of BIPV technology development

Objective 2: BIPV Market Enhancement and Infrastructure Development Program

2.1. Standards and guidelines development
2.2. Review and final design of the planned BIPV showcases
2.3. Hardware installation and operation of the BIPV showcases
2.4. Evaluation of demonstration sites
2.5. Design and evaluation of technical and commercial viability for the demonstration projects
2.6. BIPV demonstration implementation and operation at government and private buildings
2.7. Review and promotion of national PV program "Suria 1000"
2.8. Implementation and operation of "Suria 1000"
2.9. Monitoring and evaluation of BIPV projects
2.10. Dissemination and promotion of demonstration program results
2.11. Sustainable follow-up program design

Objective 3: BIPV Policies and Financing Mechanisms Program

3.1. Techno-economic analysis for grid-connected BIPV
3.2. Design and implementation of government incentives to utility and manufacturing industry

3.3. Analysis on existing and new financial mechanism and fiscal incentives
3.4. Implementation of a fiscal and financial framework for a sustainable follow-up program
3.5. Study on past experience and impact on international regulatory schemes
3.6. Review and integration of BIPV in existing regulatory schemes
3.7. Implementation of an institutional and policy framework for a sustainable follow-up program
3.8. Policy and financial framework implementation, monitoring and impact assessment
3.9. Government liaison and dissemination of results

Objective 4: BIPV Industry Development and Technology Localization Program
4.1. Activities on cost reduction of local BIPV products and system optimization for local condition
4.2. International collaboration and transfer technology program
4.3. Upgrading local industry capabilities
4.4. Establishment of BIPV Quality Control Centre

For each output, compare and apply the following rating system concerning outputs, which reflects the degree to which an output's targets have been met:

- **highly satisfactory** (HS), i.e., output/indicator fully on track (progressing fully as planned or beyond plan);
- **satisfactory** (S), i.e., output/indicator mostly on track (progressing mostly as planned);
- **marginally satisfactory** (MS), i.e., output/indicator partially on track (progressing behind schedule); and,
- **unsatisfactory** (U), i.e., output/indicator substantially off track (progressing substantially off-schedule).

The rating system serves as a proxy assessment of how successful the Project has been in achieving its outputs. The four ratings are meant to reflect the degree of achievement of outputs by comparing with the baseline (i.e., the non-existence of the output) with the target (i.e. the production of the output).

c) Assessment of project impact

- Capacity Development - The effects of the project activities on strengthening the capacities of the Pusat Tenaga Malaysia (PTM), MEWC and other related stakeholders and the PV industries.
- Sustainability - Efforts undertaken to ensure that the results of successful projects are sustained beyond the period of GEF financing will be evaluated, as well as the project's existing mechanisms. It is imperative to confirm whether the policy recommended by the projects are well embedded in the current national policies or future policies.
- Leverage - The project's effectiveness in leveraging local or other international resources / funds that would influence larger projects or broader policies to support its goal will be assessed.
- Awareness Raising - The Project's contribution to raise awareness about the use of PV and renewable energy as a whole, should be examined, as well as the project's contribution to promote policy or advocacy activities and collaboration among stakeholders.
- Lessons Learned and Best Practices - Both good and bad experiences and lessons learned from the implementation of the project thus far will be identified and evaluated. There shall be a document the integration and application of experience from the various

components of the project (holistic approach).

- Operational recommendations- Recommendations will be developed to help the executing agency and project partners improve its operational and support activities in implementing such projects. The recommendations would aim to:

I. Help executing agency and partners improve the project implementation and to address operational lapses and gaps;

II. Strengthen the work of the project management team and Project Steering/Advisory Committee/s and how the activities shall sustain under the government's initiatives;

III. Enable UNDP /GEF to provide effective support in future ;

IV. Improve ways to draw, share and document lessons learned and best practices experience to the various stakeholders; and

V. Provide effective operational guidance for effective implementation of the remaining part of the project and onwards for future project prospect/s.

4. EXPECTED OUTPUTS AND REPORTING REQUIREMENTS

The evaluation report shall highlight important observations, analysis of information and key conclusions including its recommendation/s. As a guideline, the format of the report shall consist as below:

1. Title Page
2. List of acronyms and abbreviations
3. Table of contents, including list of annexes
4. Executive Summary (max 3 pages)
5. Introduction, Scope, and Purpose of the evaluation
6. Methodology including description of the work conducted and Key questions
7. Findings and Observation (at component level, at project level, project targets, capacity building)
8. Recommendations for the remaining part of the project including lessons, generalizations, alternatives for sustainability of the activities
9. Budget Utilization (% against actual, component level and project level)
10. Conclusion (max 3 pages)
11. Annexes

The draft Evaluation Report that will be produced under this assignment must be available on or before **31 Oct 2008**. The report shall be in Word and Adobe Acrobat format and must have no restriction in access. The Consultant is free to use what he/she thinks is the most appropriate structure of the Evaluation Report.

5. METHODOLOGY

The evaluators will review relevant project documents and reports related and conduct focused individual/group discussions on topics and issues that relate to the implementation and impact of the project. The evaluators are expected to become well versed as to the objectives, historical developments, institutional and management mechanisms and project activities. More specifically, the evaluation will be based on the following sources of information:

I. **Review of documents** related to the project such as project document, quarterly and annual progress reports, other activity/component specific reports and evaluation. as

described.

II. **Structured interview** with knowledgeable parties, i.e., NPD, Project Staff members, Sub-Contractors, International/National Consultants, UNDP, members of the National Steering/Advisory Committee/s, Project Beneficiaries or grantees, etc.

III. **Site visits** to specific projects, if feasible. The site visits should be discussed with the NPL and the UNDP Country Office.

Key documents to be reviewed are as below:

- GEF-approved BIPV Project Brief;
- UNDP/GEF BIPV Project Document;
- Inception Report
- All output reports and documents produced under BIPV
- Minutes of Project Steering Committee Meetings and National Steering Committee meetings.
- Amendments to the inception report (if any)
- Latest Project Implementation Report PIR (2007)
- Latest NEX audit reports or any other audit reports
- Past consultancies' assignments and summary of the results
- Quarterly reports
- Pictures of equipment, installations and sites if any
- Newspaper/publication articles

The evaluation team shall meet and interview the following:

- National Project Director
- National Project Leader
- Finance Officer
- Component Managers (all)
- Relevant officers from the executing agency, (Ministry of Energy Water and Communication (MEWC))
- Economic Planning Unit (EPU) officers
- Representative from Energy Commission
- Representative from industrial association (MPIA)
- Representative from the academia
- Selected members of the NSC meeting
- Consultants
- Participating industries
- Installed PV facilities
- Equipment suppliers
- Other project partners

The evaluator will conduct an opening meeting with the NPD and relevant executing agency staff to be followed by an "exit" interview with UNDP CO to discuss the findings of the assessment prior to the submission of the final report.

6. EXPERTISE REQUIRED

The evaluation shall be carried out by an **International Consultant**. A local consultant may be engaged if necessary. The consultant(s) shall have the necessary expertise in but not limited to

- Project evaluations especially in UN/UNDP projects
- Familiar with project management framework
- Have involved in PV industries or similar GEF OP7 projects
- Have sound knowledge in policy and project financing
- Where necessary, the local consultant shall assist the international consultant in providing information on country specific issues such as local laws, institutional arrangements and communications.
- Have tertiary education in engineering, science, business, economics or any development qualification. Post-graduate or with relevant professional qualification is preferred.
- More than 10 years of working experience in the areas addressed with a good knowledge of the state-of-the-art approaches and international best practices;
- Prior evaluation experience of similar projects in UNDP programme countries and familiarity with the specific **UNDP GEF monitoring and evaluation** requirements;
- Fluency in English

7. COMMISIONING PROCESS AND COMMUNICATION

The commissioning tasks shall be conducted according to standard UNDP GEF Monitoring and Evaluation policies with the advice from UNDP/GEF Regional Centre Bangkok as per following guidelines:

- Full compliance to the terms of reference (TOR) above in consultation with key partners and stakeholders.
- Selection of the evaluator(s) on a competitive basis and through a transparent process in line with UNDP's procurement procedure;
- Brief the evaluator(s) on the expectations for the evaluation and on the code of conduct ;
- Review the first draft of the evaluation report and give relevant stakeholders a chance to provide feed back on factual errors or omissions;
- Disseminate the main evaluation findings, conclusions and recommendations to audiences internal and external to UNDP

More info at
http://www.gefweb.org/MonitoringandEvaluation/MEAbout/meabout.html
http://www.undp.org/gef/undp-gef_monitoring_evaluation/undp-gef_monitoring_evaluation.html
http://www.mbipv.net.my/

Kindly send application and forward any communication to:
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ANNEX B: LIST OF PEOPLE MET

Mrs, Loo Took Gee, deputy permanent secretary, MEWC
Mrs. Badriyah Malek; under secretary (sustainable energy development), MEWC
Mr. Ahmad Ismail, CEO (acting), PTM
Mr. Azman Abidin, deputy director (policy & research), PTM
Mr. Ho Yeh Weng (William), director (ICT&electrical), MIDA
Mrs. Diana Mohd. Zain, deputy director, (ICT&electrical), MIDA
Mr. Francis Xavier Jacob, director (gas safety and supply), Energy Commission
Mr. Wan S. N. Wan Abdul Malik, assistant director (economic regulation & industry), E.C.
Ms. Ruzaida binti Daud, head RE, (economic regulation & industry), E.C.
Staff at the Sekolah Menengah Kebangsaan (4,4 kW)
Mr. Tengku A. T. Kasim; senior manager (small power resources), TNB
Mr. Sansubari Che Mud, manager (RE/REPPA negotiation), TNB
Private house with 10,4 kW (bungalow Saujana Impian)?
Mr. Hooi Ming Cheong, manager, Putra Perdana Development.
Mr. H. J. Len, general manager, My Trends (approved service provider)
Mr. Lincoln C.T. Lee, executive director, Smart & Cool Homes (approved service provider)
Dr. Suleiman Shaari, head, Photovoltaic Monitoring Centre, UiTM
Dr. Ahmad Maliki Omar, deputy head, Photovoltaic Monitoring Centre, UiTM

Mr. Ahmad Hadri Haris, Nat. Project Leader, MBIPV
Mr. Mohd Hafiz Mohd Suib, Financial Officer, MBIPV
Ms. Chen Wei Nee, technical advisor (communication), MBIPV
Mr. Vincent Tan Hong Chuan, technical advisor (market), MBIPV
Mr. G. Lalchand, technical advisor (policy), MBIPV
Mr. Daniel Ruoss, technical advisor (technology), MBIPV

ANNEX C: CHARACTERIZATION OF THE PROJECT OUTPUTS

MBIPV Outputs	Rating
Overall Project Goals and Objectives	S
a) The amount of annual GHG emissions avoided from fossil fuel-based power generation – in tons CO2 of the cumulative installed PV capacity	S
b) Project Purpose: The overall capacity (technical, policy, planning,institutional, fiscal, financial) both in government and the private sectors, to develop, design and make use of the BIPV energy potential and to develop local industry is significantly improved.	S
c) % of increased installed BIPV capacity against baseline (inclusive of awarded Suria)	HS
d) % of BIPV unit cost reduction against baseline	HS
e) No. of National BIPV programs integrated into the 10th Malaysian Plan	-
Objective 1: BIPV Information Services, Awareness and Capacity Building Programs	S
1.1. Integrated information and awareness building program on BIPV	S
1.2. National BIPV database	HS
1.3. BIPV training courses	S
1.4. Malaysian PV Industry Association	S
1.5. Quality control programs for local industry	S
1.6. Capacity building and awareness programs for policy makers and financial sector	S
1.7. International BIPV event for decision makers	-
1.8. Disseminate information and lessons learn to regional ASEAN countries	S
1.9. Impact assessment of BIPV technology development	S
Objective 2: BIPV Market Enhancement and Infrastructure Development Program	S
2.1. Standards and guidelines development	
2.2. Review and final design of the planned BIPV showcases	S
2.3. Hardware installation and operation of the BIPV showcases	S
2.4. Evaluation of demonstration sites	HS
2.5. Design and evaluation of technical and commercial viability for the demonstration projects	S
2.6. BIPV demonstration implementation and operation at government and private buildings	S
2.7. Review and promotion of national PV program "Suria 1000"	S
2.8. Implementation and operation of "Suria 1000"	S
2.9. Monitoring and evaluation of BIPV projects	S
2.10. Dissemination and promotion of demonstration program results	S
2.11. Sustainable follow-up program design	-
Objective 3: BIPV Policies and Financing Mechanisms Program	S
3.1. Techno-economic analysis for grid-connected BIPV	MS
3.2. Design and implementation of government incentives to utility and manufacturing industry	S
3.3. Analysis on existing and new financial mechanism and fiscal incentives	S
3.4. Implementation of a fiscal & financial framework for sustainable follow-up program	S
3.5. Study on past experience and impact on international regulatory schemes	HS
3.6. Review and integration of BIPV in existing regulatory schemes	S
3.7. Implementation of an institutional and policy framework for a sustainable follow-up program	S[5]
3.8. Policy and financial framework implementation, monitoring and impact assessment	-[6]

[5] All preparations done – awaits decision on national enabling framework and funding

[6] Is presently not seen as bringing any added value; evt. change of activity to be decided later

3.9. Government liaison and dissemination of results	
<u>Objective 4: BIPV Industry Development and Technology Localization Program</u> 4.1. Activities on cost reduction of local BIPV products and system optimization for local condition 4.2. International collaboration and transfer technology program 4.3. Upgrading local industry capabilities 4.4. Establishment of BIPV Quality Control Centre 4.5. Revising of building codes	S MS[7] HS S[8] S -

[7] No GEF funding invloved

[8] Higly satisfactory preparationsm but so far little/no take up due lack of enabling framework