

United Nations Development Programme  
Country: Malaysia  
PROJECT DOCUMENT<sup>1</sup>



**Project Title:** Building Sector Energy Efficiency Project (BSEEP)

**UNDAF Outcome(s):**

**UNDP Strategic Plan Environment and Sustainable Development Primary Outcome:**

**UNDP Strategic Plan Secondary Outcome:**

**Expected CP Outcome(s):**

*(Those linked to the project and extracted from the country programme document)*

**Expected CPAP Output (s)**

*Those that will result from the project and extracted from the CPAP)*

Outcome 3: Improved sustainable Stewardship through sustainable energy development and environmental management.

**Executing Entity/Implementing Partner: Public Works Department ,Malaysia**

**Implementing Entity/Responsible Partners: Public Works Department, Malaysia**

**Brief Description**

BSEEP has for its goal the reduction in the annual growth rate of GHG emissions from the Malaysia buildings sector. The project objective is the improvement of the energy utilization efficiency in Malaysian buildings, particularly those in the commercial and government sectors, by promoting the energy conserving design of new buildings and by improving the energy utilization efficiency in the operation of existing buildings. The realization of this objective will be facilitated through the removal of barriers to the uptake of building energy efficiency technologies, systems, and practices. The project is in line with the GEF's climate change strategic program on Promoting Energy Efficiency in Residential and Commercial Buildings (SP-1). It is comprised of activities aimed at improving energy efficiency and promoting the widespread adoption of energy efficient building technologies and practices in the Malaysian buildings sector.

|                         |                  |                            |               |
|-------------------------|------------------|----------------------------|---------------|
| Programme Period:       | <u>2011-2015</u> | Total resources required   | 29,635,882.00 |
| ATLAS Award ID:         | <u>00058231</u>  | Total allocated resources: | 29,635,882.00 |
| Project ID:             | <u>00072266</u>  | Regular                    | _____         |
| PIMS #                  | <u>3108</u>      | Others:                    |               |
| Start date:             | <u>Jan 2011</u>  | GEF                        | 5,000,000     |
| End Date                | <u>Dec 2015</u>  | Government (cash)          | 15,947,222    |
| Management Arrangements | <u>NEX</u>       | Government (In-kind)       | 3,458,104     |
| PAC Meeting Date        | _____            | Private Sector (cash)      | 4,930,556     |
|                         |                  | Private Sector (in-kind)   | 300,000       |

Agreed by (Government):

\_\_\_\_\_  
Date/Month/Year

Agreed by (Executing Entity/Implementing Partner):

\_\_\_\_\_  
Date/Month/Year

Agreed by (UNDP):

\_\_\_\_\_  
Date/Month/Year

<sup>1</sup> For UNDP supported GEF funded projects as this includes GEF-specific requirements

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## List of Acronyms

| Acronym         | Meaning   |
|-----------------|---|
| ACEM            | Association of Consulting Engineers Malaysia  |
| APR/PIR         | Annual Project Reports / Project Implementation Review                                |
| ASEAN           | Association of South East Asian Nations   |
| ATLAS           | UNDP Financial system   |
| AWP             | Annual Work Plan  |
| BAU             | Business as usual   |
| BEI             | Building Energy Index = Specific Energy Consumption (SEC)                             |
| BERM            | Building Energy Reporting & Monitoring  |
| BSEEP           | Building Sector Energy Efficiency Project   |
| CBEED           | Central Building Energy Efficiency Database   |
| CDR             | Combine Delivery Report – UNDP Financial Reporting system                             |
| CER             | Certified Emission Reduction  |
| CETREE          | Centre For Education, Training And Research In Renewable Energy And Energy Efficiency |
| CIDB            | Construction Industry Development Board   |
| CO <sub>2</sub> | Carbon Dioxide  |
| CPAP            | Country Programme Action Plan   |
| DSM             | Demand Side Management  |
| EAEF            | EU-ASEAN Energy Facility  |
| EE              | Energy Efficiency / Energy Efficient  |
| EIB             | Energy Information Bureau   |
| EPU             | Economic Planning Unit  |
| ESCO            | Energy Service Company  |
| FEMP            | Federal Energy Management Programme   |
| GBI             | Green Building Index  |
| GEF             | Global Environmental Fund   |
| GEO             | Green Energy Office (previously Zero Energy Office)                                   |
| GHG             | Greenhouse Gas(es)  |
| GoM             | Government of Malaysia  |
| GWh             | Gigawatt hour   |
| HVAC            | Heating, Ventilation and Air Conditioning   |
| IEM             | Institute Engineers Malaysia  |
| IRP             | Integrated Resource Planning  |
| ISM             | Institution of Surveyors Malaysia   |
| JKR (= PWD)     | Jabatan Kerja Raya (Public Works Department)  |
| Ktoe            | kilotons of oil equivalents   |
| Kton            | Kilo tone   |
| KWh             | kilowatt hour   |
| LEED            | Leadership in Energy and Environmental Design   |
| LEO             | Low Energy Office   |

| <b>Acronym</b> | <b>Meaning</b>  |
|----------------|---|
| LFA            | Logical Framework Analysis  |
| MAESCO         | Malaysian Association of ESCOs  |
| MBIPV          | Malaysian Building Integrated Photovoltaic (project)  |
| MEERB          | Malaysian Energy Efficiency Rating for Buildings  |
| MEGTW          | Ministry of Energy, Green Technology and Water (previously Ministry of Energy, Water and Communications - MEWC) |
| MESITA         | Malaysia Electricity Supply Industry Trust Account  |
| MFBEMP         | Malaysian Federal Building Energy Management Programme  |
| MHLG           | Ministry of Housing and Local Government  |
| MIEEIP         | Malaysian Industrial Energy Efficiency Improvement Project  |
| MMT            | Million Metric Tons   |
| MITI           | Ministry of International Trade and Industry  |
| MNRE           | Ministry of Natural Resources and Environment   |
| MOF            | Ministry of Finance   |
| MoH            | Ministry of Health  |
| MOSTI          | Ministry of Science, Technology and Innovations   |
| MS 1525        | Malaysian Standard 1525   |
| MWh            | Megawatt hour   |
| NAFAM          | National Asset and Facilities Management (Association)  |
| NPD            | National Project Director   |
| NPM            | National Project Manager  |
| PAM            | Pertubuhan Arkitek Malaysia (Malaysia Architect Association)  |
| PC             | Project Coordinator   |
| PMO            | Prime Minister's Office   |
| PMT            | Project Management Team   |
| PPM            | Project Planning Matrix   |
| PRC            | Project Review Committees   |
| PTM            | Pusat Tenaga Malaysia (Malaysia Energy Centre)  |
| PV             | Photovoltaic  |
| QPR            | Quarterly Progress Reporting  |
| R&D            | Research and Development  |
| REHDA          | Housing Developers Association  |
| SEC            | Specific Energy Consumption (kWh/m <sup>2</sup> in buildings)   |
| SIRIM          | Standards Industrial Research Institute Malaysia  |
| ST             | Suruhanjaya Tenaga (Malaysian Energy Commission)  |
| TNB            | Tenaga Nasional Berhad – National Utility   |
| TWC            | Technical Working Committees  |
| UBBL           | Uniform Building By-Laws  |
| UNDP           | United Nations Development Programme  |
| UNDP-RCU       | UNDP Regional Coordination Unit (Asia-Pacific)  |
| UNFCCC         | United Nations Frameworks Convention on Climate Change  |
| UTM            | Malaysian University of Technology  |

## SECTION 1: ELABORATION OF THE NARRATIVE

### PART I: Situation Analysis

#### *Context and Global Significance*

1. Between now and 2030, global primary energy consumption is expected to rise by 1.6% per annum or 45% in total in the next 21 years. In Malaysia, electricity demand is forecasted to reach 18,947 MW in 2020 and 23,092 MW in 2030. This is an increase of almost 35% from the 14,007 MW in 2008.
2. Overall electricity demand in Malaysia is forecast to grow consistently between 7 to 8 percent per year<sup>2</sup> until 2020. Since electricity supply in Malaysia is carried out by three main utilities whose grids are not fully integrated there will be regional differences. The bulk of generation and consumption is, in peninsular Malaysia, which is also where the vast majority of buildings are located. Most electricity is generated using natural gas, but the share of coal fired power plants is increasing. It may therefore be expected that the grid emission factor which is presently at 0.684 ton CO<sub>2</sub>/MWh (built margin)<sup>3</sup>.
3. The buildings sector in Malaysia consists predominantly<sup>4</sup> of commercial, government, and residential buildings (high-rise, as well as terraced and single dwellings). In 2008, the estimated electricity use in the buildings sector amounted to about 7,750 GWh.
4. The present growth in annual energy consumption in buildings is expected to continue to contribute significantly to the country's GHG emissions unless efforts are done to improve energy efficiency. The growth in energy consumption experienced is brought about both by an increase in new building constructions (about 6 % per year<sup>5</sup>), inefficient energy utilization and continuously increasing stock of electrical appliances in new and existing buildings.
5. The CO<sub>2</sub> emissions from the building sector (mainly from electricity utilization) in 2008 are about 5,301 ktons<sup>6</sup>. Considering that the growth in electricity consumption in buildings is higher than in other sectors, and the fact that the potential for improvements are substantial in this sector, there are strong reasons to address the situation comprehensively through a project that will facilitate the widespread application of EE technologies and practices in this sector.
6. In 2008, the service sector building stock amounted to about 37.806 million m<sup>2</sup> floor area<sup>7</sup>. According to the PTM Building Benchmarking exercise carried out in 2008, about 11% of the buildings in the sector can be considered as EE buildings<sup>8</sup>.

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<sup>2</sup> "National Energy Balance 2008 – Ministry of Energy, Green Technology and Water"

<sup>3</sup> Recommended figure by PTM (2009)

<sup>4</sup> Industrial facilities obviously also have buildings, but energy use in industry is dominated by processing and building energy use is therefore a minor constituent

<sup>5</sup> IRP, LEAP: Reference Scenario Assumptions and Results, Malaysian – Danish Environmental Cooperation Programme - Renewable Energy and Energy Efficiency Component, Revised May 2005.

<sup>6</sup> Emission equivalents from electricity consumption using a grid emission factor of 0.684 ton CO<sub>2</sub>/MWh.

<sup>7</sup> This covers office buildings, educational facilities and hotels in both private and public sector. The information on floor space in service sector derives from the forecast presented in the IRP reference scenario, and has been adjusted to exclude shop lots and other negligible sectors. This does not include residential floor space, except those in high rise residential buildings.

<sup>8</sup> These are buildings with building energy index (BEI) of 136 kWh/m<sup>2</sup>/yr or lower.

7. Generally speaking, there is a very large untapped potential for improving the energy performance of buildings in Malaysia. This is true both for existing and new buildings. A few demonstration projects in Malaysia have shown aspects of this, in particular Securities Commission Building, MEGTW's new Low Energy Office (LEO) building in Putrajaya and PTM's Green Energy Office (GEO) Building in Bangi. These projects have demonstrated that BEI can be brought down dramatically with relatively little additional cost. Aspects demonstrated so far have focused on lighting systems and day lighting, efficient space organization, and use of low energy office equipment. So far, although the demonstration projects have been successful, these experiences have not been widely applied in new building projects. Furthermore, many important aspects have not been addressed so strongly in terms of demonstration, namely heating, ventilation and air conditioning (HVAC) and optimization of the building envelope as well as through comprehensive Energy Management augmented by further automation.
8. The previous demonstration projects have all been new construction, and in that regard, there is still a strong need to demonstrate that existing buildings can be cost effectively retrofitted. Furthermore the two demonstration projects mentioned above have both been for offices, and therefore, although successful in their own right, does not have very much impact on decisions for other kinds of buildings such as hospitals and health facilities, retail outlets and shopping malls, educational facilities, hotels and resorts and residential dwellings.
9. It is estimated that it is feasible to improve the average BEI of buildings from 205 to 187 kWh/m<sup>2</sup>/year through simple interventions in design of new buildings and the incorporation of EE systems in existing buildings with little or very limited additional cost compared to business-as-usual type construction/renovation projects. This is roughly about 10% improvement in overall BEI. Under a business-as-usual scenario, even new buildings have BEIs (about the same as the current average BEI of 205 kWh/m<sup>2</sup>/yr) both due to: (1) more installed equipment; and, (2) more compact space utilization (increased number of people per m<sup>2</sup>). The relatively lower BEIs can be found in existing buildings that have lower occupancy density (typical in older buildings), as well as lower equipment power densities. Furthermore it was found that many older buildings had insufficient HVAC capacity to provide adequate and comfortable indoor environmental conditions that would today be considered necessary.
10. Much higher improvements are possible (as shown by the previous demonstration projects), but would then require a more concerted and dedicated effort which may not be reasonable to assume will be possible to achieve across the board. The LEO building for instance can be seen as a proof that drastic reductions in BEI are possible with measures that can be characterized as Good Practice. It is however worth to note that without a very significant effort on post commissioning, then the BEI of the LEO building would probably be significantly higher. This puts an emphasis on the necessity of doing follow-up energy management practices and where possible the commissioning of manual or automatic energy management, control and monitoring systems. A study by the JKR/IEN on possible improvements by upgrading GoM buildings in Putrajaya showed that for the Prime Minister's Office about 40% savings could be achieved, and a similar study of a JKR office building in Jalan Duta indicated some 38% savings could be achieved with energy efficiency investments of favorable economic feasibility. Based on the results of the employment of no-cost measures in JKR's Blok F building and in the Prime Minister's Office in Putrajaya revealed that the order-of-magnitude energy savings are about 10-15 %<sup>9</sup>.

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<sup>9</sup>CK Tang and PE Kristensen, IEN, Personal communication, Dec 2008

11. Although there are only limited data available on current building stock, the best available is from the IRP reference scenario study<sup>10</sup>. Additionally there are some data available on building stock from the MBIPV market survey<sup>11</sup>. Forecasting the building stock for the baseline scenario has followed the approach in the IRP reference scenario for the service sector. A similar approach based on population growth and the data on existing stock of residential buildings from the market survey carried out under the UNDP-GEF Malaysia Building Integrated PV (MBIPV) project can be used for residential buildings. For the residential sector only number of units, not the floor area has been estimated. In order to be conservative it has been assumed that the relative proportions of different housing types remain the same over the projection period. In reality continued economic growth and technological development will likely tend to bring a shift towards larger units which apart from being larger also have more installed equipment (higher electricity consumption per m<sup>2</sup>). In relation to estimating the energy savings and related CO<sub>2</sub> emission reductions from the project, it is worth noting that all savings for the residential sector will be indirect. Although establishing a building energy code for residential buildings it is likely that such will not be made mandatory until after the end of the project.
12. A reasonable assessment is that it will be possible to reduce the average BEI in the buildings sector by 10% by introducing mandatory building regulations (MS 1525:2007) and systematic Energy Management. A further revision of MS 1525 as proposed in the project should together with systematic Energy Management activities be able to achieve a lower BEI in new buildings. In existing buildings it has been estimated that about 20% reduction in energy consumption should be possible on average through systematic Energy Management activities. That would bring down the BEI of existing buildings (before 2007) in which such activities are undertaken to around 135-140 kWh/m<sup>2</sup>/year.
13. Table 1 below summarizes the issues/concerns identified during the project development stage, and the corresponding project activities in which these will be individually and/or collectively addressed.
14. The identified issues/concerns were discussed, verified and confirmed during a Logical Framework Analysis (LFA) Workshop that was conducted in August 2008 with the project stakeholders. The project framework design was developed during that workshop. The project activities to address these issues/concerns were also reviewed and confirmed. The agreed project planning matrix (PPM) is shown in Section II, Part II.

#### *Institutional, Sectoral and Policy Context*

15. The proposed project is expected to make great contribution to the objectives of the 9th Malaysia Plan and the Prime Minister's Directive 2005 of reducing 10% energy consumption in government buildings. In that regard, the project is contributing to the national priority on the promotion of energy efficiency and facilitation of measurable reductions in GHG emissions. It is also in line with the national environmental strategy as stipulated.
16. The proposed project itself is expected to lead to investments in energy efficiency practices/technologies in Malaysian building sectors. The results of the ongoing discussions

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<sup>10</sup> IPR, LEAP: Reference Scenario Assumptions and Results, Malaysian – Danish Environmental Cooperation Programme - Renewable Energy and Energy Efficiency Component, Revised May 2005.

<sup>11</sup> Market Status Report on BIPV in Malaysia, PTM, January 2007

on the adoption of the voluntary standard on EE buildings MS 1525 “Code of Practice on Energy Efficiency and use of Renewable Energy for Non-residential buildings” are hoped to be incorporated into a mandatory UBBL. With the amendments of the UBBL, new specifications on sustainable construction materials will also be further emphasized for full-scale adoption.

**Table 1: Summary of Issues & Concerns Regarding the Application of EE Technologies in the Buildings Sector in Malaysia**

| Issue/Concern  | Activities Addressing Barrier |
|--|-------------------------------|
| <b>Policy/Regulatory</b>   |                               |
| There is no strong integrated energy policy or strategy by GOM to guide activities and investments. Statements on EE in 9 <sup>th</sup> Malaysia Plan are general and without distinct targets.  | Activity 1.1                  |
| The current voluntary code of practice for EE building design, MS 1525:2007, has not yet been made mandatory through incorporation in the Unified Building Bylaws (UBBL) despite various efforts to this end over the last 5 years   | Activity 3.2.1                |
| There are no regulations or mandatory legislation in place that support Energy Efficiency in the building sector   | Activity 3.2.2                |
| Subsidized energy prices skew the market, and furthermore it is not clear that electricity tariffs give enough incentive for spontaneous EE project development and implementation.  | Activity 3.3.3                |
| There is no clear system to monitor, gather, analyze and disseminate information on developments and progress on energy efficiency. This hampers not only awareness in general but also the development of effective policies and targets, as well as making it neigh impossible to assess whether or not existing initiatives are successful or not and thus whether or not to continue funding, strengthen it, or redirect it to other, more effective, measures | Activity 3.3.5                |
| <b>Institutional</b>   |                               |
| The EE section of Energy Commission (ST) is essentially non-operational at present. Regulations and other supportive measures promoting energy efficiency and energy management are not developed and implemented  | Activity 1.1                  |
| Research and educational institutions dealing with EE in buildings are few and generally under-resourced   | Activity 1.1                  |
| Energy Efficiency is dealt with by numerous ministries, departments, authorities (e.g. MEGTW, PWD, Min. Housing, Min Health, Min. Defense, ST, local authorities etc.) and institutions (e.g. Universities, CETREE, PTM, etc.) with little coordination of efforts. This is linked to the fact that there is no strong overarching energy efficiency policy or strategy by GOM   | Activity 1.2                  |
| <b>Technical</b>   |                               |
| Although advanced building materials are generally available they are often imported which adds to their cost as well as to the time to acquire them. There is limited demand for these materials in the local market and the local manufacturers have not found it sufficiently attractive to start local production.   | Activity 4.3.1, 4.3.2 & 5.2.1 |
| The technical capacity of local professionals to carry out energy efficiency projects is limited in the sense that there are very few professionals in the market with the necessary skills and knowledge. As with many market-driven issues the lack of a strong demand and stable market for EE building services has the effect of limiting the available expertise to a niche.   | Activity 4.3.3                |



| Issue/Concern   | Activities Addressing Barrier |
|---|-------------------------------|
| <b>Information and Awareness</b>  |                               |
| There is a general lack of awareness of the importance of EE in buildings, as well as of the opportunities for implementing EE in buildings, amongst decision makers in the building sector.  | Activity 4.1.1                |
| There have been few, if any, efforts to raise and maintain awareness on EE in buildings. Some general efforts have been made mainly on energy management (e.g. by ST and CETREE), but there has been a distinct lack of a sustained targeted effort towards decision makers, professionals and financing institutions   | Activity 4.2.1                |
| There is no easily accessible information on building EE – comprehensive real life case studies; technology demonstrations and information; index of professional services and suppliers; financing information/opportunities; information offices with professional experts to guide and support e.g. building owners or developers; No easily available regular and sufficiently detailed up-to-date statistics and energy performance information for buildings for comparison and benchmarking  | Activity 4.1.2                |
| There are few real life building projects that demonstrate how to go about making a building energy efficient in a cost effective manner (both new builds and retrofit projects). The few examples that exist are all prestigious office building projects, which makes it harder for the general building developer/client to relate to them and see that such technologies, methods and results are also implementable in more commonplace projects and does not come at an unaffordable additional cost.   | Activity 5.1                  |
| <b>Market</b>   |                               |
| ESCOs have difficulties in generating sufficient commercial volume for their activities. Basically most ESCOs operating in Malaysia are very small. Because of their smallness ESCOS do not have sufficient resources to make financially and technically attractive offers to potential clients (i.e. where the ESCO provides financing, technical expertise and project implementation). Since energy efficiency is not generally seen as a priority the market for ESCOs remain small and financing institutions reluctant to provide stable financing (RE market: there is limited awareness of the importance of, and possibilities for EE in buildings; electricity prices remain relatively low hence energy costs are a small share of Total costs; there is no legal/regulatory imperative etc). This has led to a vicious circle where it is difficult for the ESCOs to attract technical expertise and funding, which in turn makes it even more difficult for them to make attractive offers, which again undermine their business. | Activity 3.3 & 3.4            |
| Although advanced building materials are generally available they are often imported which adds to their cost as well as to the time to acquire them. The main barrier seems to be that because there is such a limited demand for these materials in the local market the local manufacturers have not found it sufficiently attractive to start local production. This is another example of a vicious circle that needs to be broken in order to promote EE in buildings locally   | Activity 3.5                  |
| The technical capacity of professionals to carry out energy efficiency projects is limited in the sense that there are very few professionals in the market with the necessary skills and knowledge. Those that are available are capable enough but occupy a niche segment of the construction industry. As with many market-driven issues the lack of a strong demand and stable market for EE building services has the effect of limiting the available expertise to a niche. To break this niche status the market needs to be developed   | Activity 3.6 & 3.7            |

17. Several fiscal incentives for energy conservation for companies, such as investment tax allowance on capital expenditure and sales tax and import duty exemptions, are hoped to be enhanced and adjusted according to the new requirements on EE buildings.
18. The project will also complement and continue efforts done on past projects such the 2002 Energy Audit in Government Building (EAGB) and 2006 Energy Commission - Danish International Development Assistance Demand Side Management project (DANIDA DSM).
19. The proposed project is in line with the 2008-2012 UNDP Programme Action Plan (CPAP) Outcome 3: Improved sustainable Stewardship through sustainable energy development and environmental management.

*Stakeholders and Related Activities on Energy Efficiency in Malaysia*

20. The proposed project is designed to build on previous, ongoing and planned activities in the country in the area of energy efficiency, in general, and building energy efficiency, in particular, as well as on the outputs and lessons learned from the implementation of previous and ongoing EE activities in the ASEAN region.
21. The proposed project will complement ongoing governmental efforts. Elements of earlier projects will also form the foundation for the BSEEP. These projects include the UNDP-GEF funded project Malaysia Industrial Energy Efficiency Improvement Project (MIEEIP)<sup>12</sup>; the DANIDA-funded DSM Energy Commission's project; the EU-ASEAN Building Benchmarking Programme; and Malaysian Electricity Supply Industry Trust Account (MESITA) funded Energy Audit in Government's Building (EAGB) project. Other projects have been the construction of MEGTW Low Energy Office building in Putrajaya with support from DANIDA, and the construction of PTM's Geo Energy Office Building with support from the EU ASEAN energy facility.
22. The project will also to the extent relevant build on the achievements of the on-going MBIPV project, which has successfully demonstrated the design and implementation of grid-connected building integrated PV systems in more than 20 mixed residential and office buildings (amounted to nearly 1000kWp, as at April 2009). Lessons from that project especially in negotiating partnerships and coordinating and managing multi-stakeholders, particularly in the private sector, and the way forward in demonstrating the application of low GHG emitting energy technologies in buildings will benefit the implementation of the BSEEP which will be partly simultaneous with the MBIPV project.
23. The project proponents will coordinate the capacity development activities of the project with the relevant government agencies that are involved in policy design and implementation related to building constructions. Construction Industry Development Board (CIDB) will also be encouraged to participate in construction research while the local universities will similarly be encouraged to intensify their R&D utilizing local and sustainable construction materials. The impending phase-out of HCFCs and its impact on e.g. cooling equipment will be followed closely and taken into consideration by the project team.

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<sup>12</sup> The MIEEIP was completed in December 2007. While its focus is on industrial energy efficiency, the systems that have been promoted and instituted by the project can also be utilized and possibly improved (taking into consideration experiences and lessons gained) under the proposed project. This includes, among others, the energy benchmarking system, and the information sharing network on energy efficiency technologies.

24. Table 2 below summarizes the main previous, ongoing and planned building EE technology application projects in the country.

**Table 2: Summary of Previous, Ongoing and Planned Building EE Technology Projects in Malaysia**

| Project Name                             | Bldg EE Technology Applied/Demonstrated  | Investment Cost, USD | Expected Energy Savings |                      | Date Commissioned or Completed |
|--|--|----------------------|-------------------------|----------------------|--------------------------------|
|  |  |                      | Energy, ktoe/yr         | Cost, USD            |                                |
| <b>Capacity Building</b>                 |  |                      |                         |                      |                                |
| UNDP/GEF MIEEP                           | Energy benchmarking system, information sharing network on energy efficiency technologies  | 22.22 M              | 61.7                    | 120 M (over 5 years) | 2007 (completion)              |
| IRP (DANIDA)                             | Revision of MS 1525, Establishment of an Energy Information Bureau at PTM  | 4.98 M               | N.A.                    | N.A.                 | 2007 (completion)              |
| DSM project in ST (DANIDA)               | Energy Management, initial steps towards building Energy Benchmarking  | 1.52 M               | N.A.                    | N.A.                 | 2004 (completion)              |
| <b>Demonstration Projects</b>            |  |                      |                         |                      |                                |
| MEGTW LEO Building, Putrajaya            | Building envelope, space organization, low energy office equipment, day lighting, motion sensors   | 15,000,000           | 0.44                    | 750,000              | 2005 (commissioned)            |
| PTM GEO building                         | Building envelope, day lighting and lighting automation, BIPV, low E office equipment, demand controlled HVAC and Fabric Energy Storage technology, Renewable energy systems | 6,500,000            | 0.11                    | 650,000              | 2008 (commissioned)            |
| ST Low Energy Office Building, Putrajaya | Building envelope, lighting and HVAC technologies  | 42,000,000           | 1.06                    | 2,100,000            | Ongoing (start 2007)           |

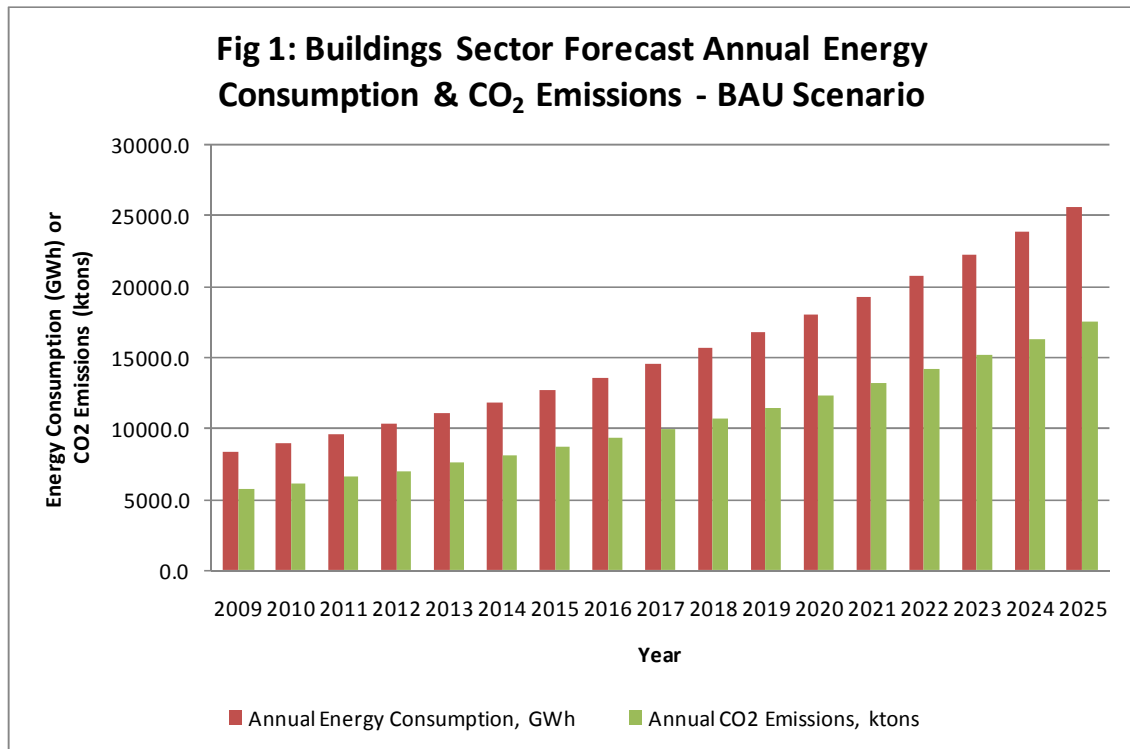
Baseline Scenario

25. The Baseline Scenario is a continuation of the present business as usual situation, which follows from existing government policy, activities, legislation and institutions/mandates. Based on studies carried out during the project development stage, the baseline, or business-as-usual (BAU), scenario will most likely be characterized by the following:

- Continued weak EE policy by the Government of Malaysia (Malaysia Plan9 to be followed by MP10 in 2011)
- No, or possibly weakly formulated, mandatory energy requirements in Building regulations. So far all efforts to incorporate MS1525 in UBBL have stalled. This is despite numerous dedicated efforts and project support (e.g. IRP project supported by DANIDA that ended in 2007).

- Continued difficulty to access financing for building EE projects since the necessary understanding in the private and banking sectors as regards buildings' EE opportunities, risks, and technologies remain limited. Furthermore the financial crisis that ensued end of 2008 will further frustrate possibilities to get financing for Energy Efficiency in buildings (as well as in general).
  - ESCOs will remain small and relatively ineffective- largely due to difficulties in obtaining base capital and financing. A key ingredient in ESCO operations is the ability to offer a complete package, including financing. Therefore as long as there is reluctance from the financial sector towards energy efficiency investments in buildings, the existing ESCOs will find it difficult to make attractive offers to clients. Their services are therefore likely to remain limited to energy audits and other non-investment related activities
  - Demonstration showcases will remain few and far between, and effective dissemination of the results to relevant target groups remain ineffective
  - Energy subsidies continue to skew the market and thus undermine EE efforts in buildings (and elsewhere)
  - Information on Building Energy Efficiency – e.g. energy performance, technologies, and suppliers/experts – remains scattered and hard to find. This will continue to hamper the market access and effectiveness
  - Accessibility of local expertise, materials and equipment for EE buildings, and financial backers/support remain limited due to lack of market pressures to improve EE in buildings (lack of strong and sustained government policy, lack of information/showcases, lack of effective funding/incentives, lack of effective implementers (including ESCOs), lack of legislative pressure in the form of mandatory MS 1525 and similar, lack of energy pricing that promote EE)
  - EE in buildings will remain scattered on many institutions with weak coordination between them. This is partly due to lack of a strong coordinating EE policy and legislation
  - Research and development on building EE will remain low priority and thus effectively under resourced
  - Energy management efforts in buildings will remain low priority to building owners
26. Under a business-as-usual scenario, the new buildings that will be built in Malaysia will be more or less having BEIs similar to the current building energy performance, i.e., 205 kWh/m<sup>2</sup>/yr. There will also be fewer buildings that can be considered EE buildings (BEI = 136 kWh/m<sup>2</sup>/yr) and the percentage of such type of buildings in the country's building stock in the next 10-15 years will remain at the current level (11%). The estimated energy consumption of the sector in 2009 (based on trend analysis of historical energy consumption data) is about 8,315 GWh, and this is forecast to increase to 11,824 GWh by end of the BSEEP in 2014. The CO<sub>2</sub> emissions from the buildings sector due to energy utilization are expected to be about 5,688 ktons in 2009 and 8,088 ktons by end-of-project. Fig 1 shows the business-as-usual forecast energy consumption and CO<sub>2</sub> emissions in the country's buildings sector.
27. Without BSEEP, the prospects for radically improving the energy performance of the building sector will thus be bleak. Improvements in building energy performance will only come slowly in pace with phasing out of obsolete technologies, rather than being at the forefront of technology development. This is largely a consequence of the fact that without awareness/knowledge of the cost implications of building low EE buildings, without access to reliable financing to build better, without mandatory requirements, and without supportive

networks of information, research, incentives and expertise there is little pressure on the market to move faster than a least-building-construction-cost philosophy would demand. Until Malaysia has to comply with mandatory reductions in GHG emissions there will be little effective pressure from this.



**PART II: STRATEGY (additional details contained in Section IV)**

*Project Rationale and Policy Conformity*

- 28. The proposed GEF-supported alternative to the baseline scenario is intended to reduce greenhouse gas emissions in the Malaysian building sector by reducing the growth rate of emissions from the building sector.
- 29. The proposed BSEEP aims to improve energy utilization efficiency in new and existing buildings as well as to support and strengthen implementation of more widespread practicing of energy efficiency and conservation activities in buildings in Malaysia.
- 30. The proposed BSEEP will achieve the objective set out in the GEF Strategic Program No. 1, which is on Promoting Energy Efficiency in Residential and Commercial Buildings (SP-1).

Alternative Scenario

- 31. Under the alternative scenario, a number of activities will be implemented to improve energy efficiency in the Malaysian buildings sector through various means, including awareness raising and provision of information, strengthening of policies and regulatory regimes, erection of a number of building demonstration projects and dissemination of the results and

technologies used, strengthening of financial support mechanisms and capacity in financial institutions to engage in building EE projects, development of a building rating system and also a monitoring system for EE in the building sector, and strengthening of capacity amongst professionals to implement energy efficiency projects in buildings.

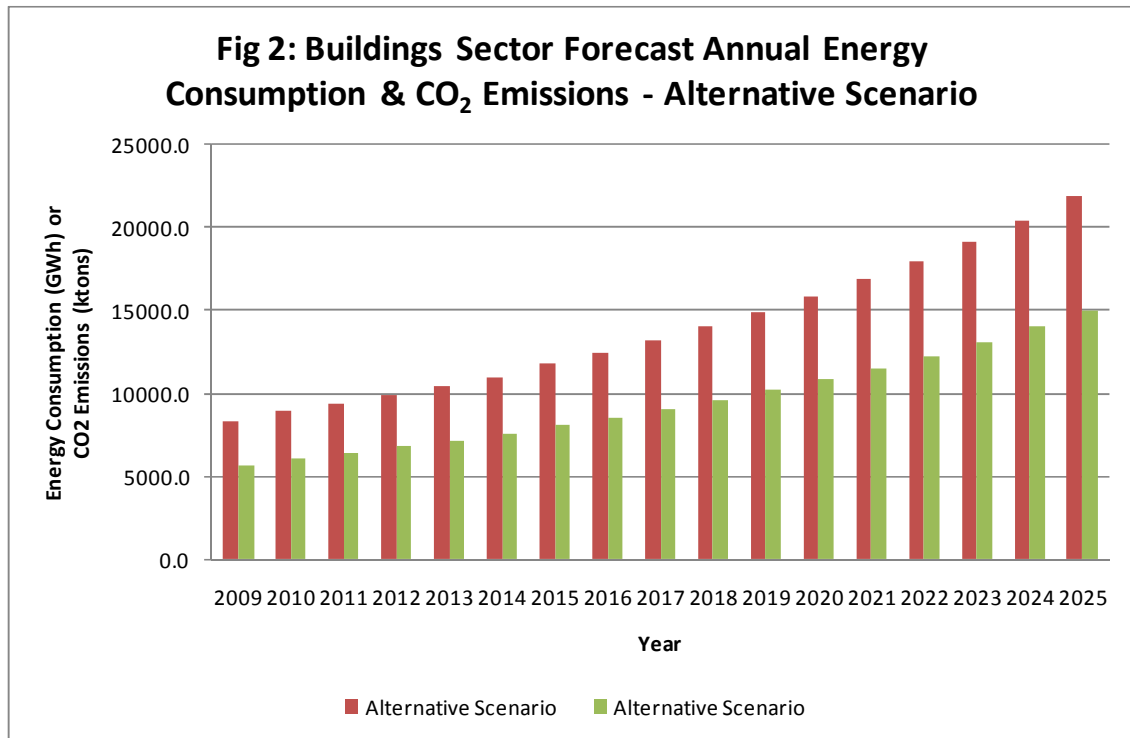
32. To achieve the alternative scenario, the proposed BSEEP will involve key stakeholders in pivotal roles in relation to the project implementation. The key drivers for the project are JKR, MEGTW, and PTM, with ST, MHLG, and SIRIM in important supplementary roles. These key drivers will also be supported and assisted by a large variety of other stakeholders from both public and private sectors such as universities, CIDB, Malaysian Sustainable Buildings Council, professional bodies, financial institutions, the Malaysian Green Council and the academia.

33. The realization of the Alternative Scenario is manifested by and large by the following:

- Strengthened government building energy policy making capacity and policies on EE in buildings through the development of an EE strategy and supportive legislation (incl. incorporation of MS 1525 in mandatory building regulations (UBBL))
- Heightened awareness and strengthened capacity within financial institutions on EE in buildings through among others a number of seminars and conferences; training courses, a design competition and targeted media campaigns.
- Completion of a number of building demonstration projects to showcase energy efficient building technologies in new and existing buildings over a range of building types. The demonstration projects will comprise both new construction and retrofitting of existing buildings, and will span over a number of different building uses from residential units to offices and educational facilities.
- MS 1525:2007 incorporated into UBBL and thus made mandatory, as well as being updated to reflect developments in technology since last revision
- Incentives for promotion of EE in buildings have been improved and thereby provide a larger amount of support to building EE projects. It is the plan to analyze and propose improvements to existing incentives schemes as well as to push for additional incentives and financing (e.g. establishment of a revolving fund or similar – to be analyzed and proposed).
- An established and implemented building energy rating system.
- A monitoring system for building energy efficiency has been developed and implemented. It is envisaged that the monitoring system will be based on the building rating system.
- Information on good practices, technologies, suppliers and experts is made available through an open database information system, guidelines, and other materials and kept regularly up to date. Information will also be disseminated through seminars, conferences and other professional gatherings, as well as through training courses, guidelines, supporting software building energy design tools and so on.

34. In the Alternative scenario, while most of the new buildings that will be built in Malaysia will still have BEIs similar to the current building energy performance ( $BEI = 205 \text{ kWh/m}^2/\text{yr}$ ), the percentage of new EE buildings ( $BEI = 136 \text{ kWh/m}^2/\text{yr}$ ) will increase from the current 11% to 30% by end-of-project. This is possible because there will also be existing buildings that will be retrofitted (some of the existing buildings will also be employing energy management systems and practices) so that their BEIs improve to the EE building category level. The estimated energy consumption of the sector by end-of-project in 2014 (based on

trend analysis of historical energy consumption data) is about 10,974 GWh. This is 7.2% lower than what is expected under a business-as-usual scenario. The CO<sub>2</sub> emissions from the buildings sector due to energy utilization are expected to be about 7,507 ktons by end-of-project (i.e., 7.2% lower than what can be expected under a business-as-usual scenario). Fig. 2 shows the alternative scenario forecast energy consumption and CO<sub>2</sub> emissions from the country's buildings sector.



35. Table 3 below summarizes the characteristics of the Baseline and Alternative Scenarios and the impact in terms of electricity savings (GWh/year) and CO<sub>2</sub> reductions (MMT CO<sub>2</sub> per year, and cumulative).
36. The BSEEP is expected to facilitate through the barrier removal activities the realization of the forecast energy savings and CO<sub>2</sub> emission reductions from the Malaysian buildings sector. Fig 3 shows the forecast number of EE buildings (BEI = 136 kWh/m<sup>2</sup>/yr or lower) that will directly and indirectly result from the BSEEP activities. Fig. 4 shows the forecast annual energy savings and CO<sub>2</sub> emission reductions from the buildings sector.

*Project Goal, Objective, Outcomes and Outputs/Activities*

37. This proposed project has for its goal the reduction of GHG emissions from the Malaysian buildings sector. The project objective is the improvement of the energy utilization efficiency in Malaysian buildings, particularly those in the commercial and government sectors, by promoting the energy conserving design of new buildings and by improving the energy utilization efficiency in the operation of existing buildings. The realization of this objective will be facilitated through the removal of barriers to the uptake of building energy efficiency technologies, systems, and practices.

38. Specifically, the proposed project will reduce carbon emissions by an estimated 581.1 ktons CO<sub>2</sub> per year (or cumulative total of about 1,421.3 ktons CO<sub>2</sub>) by end of the project. This represents about 4% reduction in CO<sub>2</sub> emissions compared to the magnitude of CO<sub>2</sub> emissions under a business-as-usual scenario<sup>13</sup>. Five years after the project end, CO<sub>2</sub> emissions are forecast to be about 7.2% lower in annual emissions if there will be no BSEEP.
39. The objective of the project is the improved energy utilization efficiency in the Malaysian buildings sector, the success of which can be manifested by EE being more widely practiced and implemented in the building sector; and, more EE buildings being constructed.

**Table 3: Summary of Expected Results of Baseline and Alternative Scenarios<sup>14</sup>**

| Indicator  | Project Start <sup>15</sup> | Project End <sup>16</sup> | 5 Years after EOP | 10 Years after EOP |
|--|-----------------------------|---------------------------|-------------------|--------------------|
| Baseline Electricity Consumption (GWh/yr)                    | 8,315.4                     | 11,824.0                  | 16,812.9          | 23,906.8           |
| Alternative Electricity Consumption (GWh/yr).                | -                           | 10,974.4                  | 14,905.4          | 20,471.1           |
| Electricity Savings (GWh/yr)                                 | 0                           | 849.6                     | 1,907.5           | 3,435.7            |
| Savings compared to Baseline (% lower than baseline)         | 0                           | 7.2                       | 11.3              | 14.4               |
| CO <sub>2</sub> Reductions (MMT/year)                        | 0                           | 0.581                     | 1.305             | 2.350              |
| CO <sub>2</sub> Emission Avoided (% lower than baseline)     | 0                           | 7.2                       | 11.3              | 14.4               |
| Cumulative CO <sub>2</sub> Savings <sup>26</sup> (Total MMT) | 0                           | 1.421                     | 6.204             | 15.816             |

### **BSEEP Activities**

40. Based on the logical framework analysis that was carried out during the project development, the expected outcomes of the project are the following:
- Outcome 1: Clear and effective system of monitoring and improving the energy performance of the building sector
  - Outcome 2: Implementation of, and compliance to, favorable policies that encourage the application of EE technologies in the country's buildings sector
  - Outcome 3: Availability of financial and institutional support for initiatives on EE building technology applications
  - Outcome 4: Enhanced awareness of the government, public and the buildings sector on EE building technology applications
  - Outcome 5: Improved confidence in the feasibility, performance, energy, environmental and economic benefits of EE building technology applications leading to the replication of the EE technology application demonstrations.

<sup>13</sup> The estimated CO<sub>2</sub> emissions in the buildings sector in 2009 is about 5,688 ktons. By end-of-project, if BSEEP is not implemented, this would have increased to 35,301 ktons.

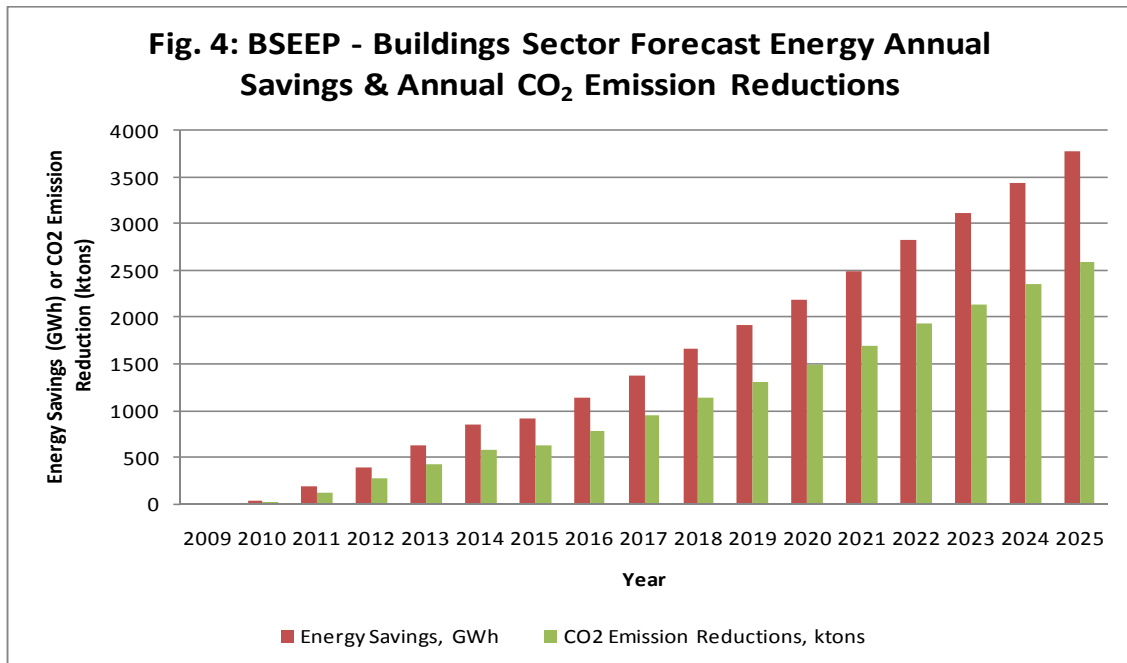
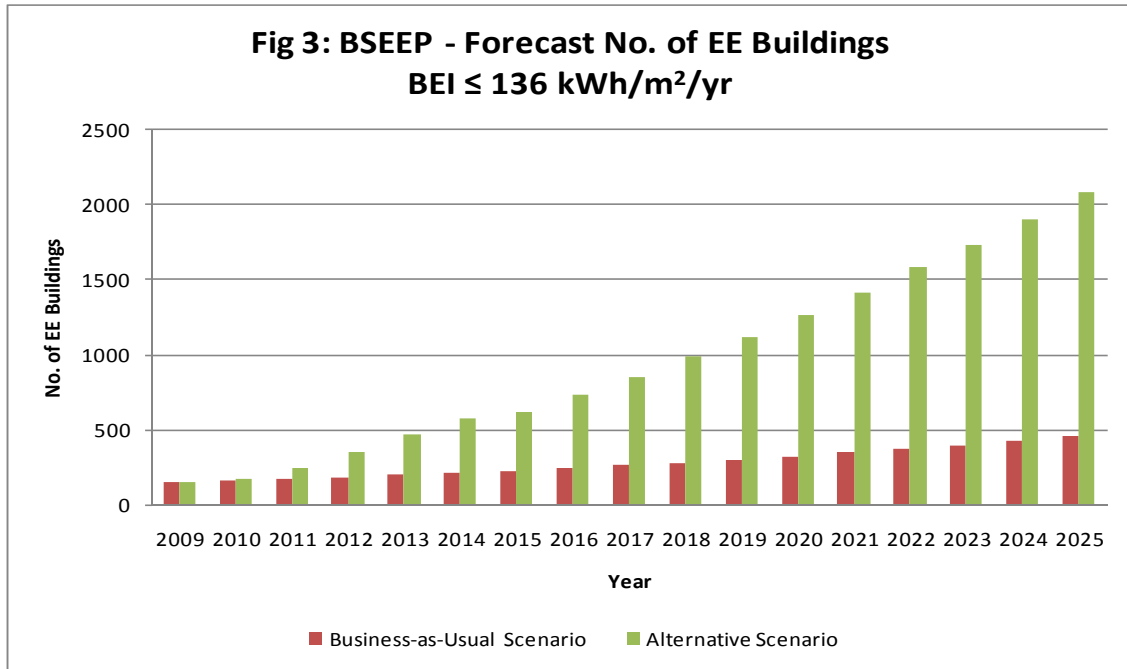
<sup>14</sup>The figures in the table are rounded off. The estimates are very conservative and include both direct and indirect energy savings and emission reductions.

<sup>15</sup> Project start is 2010. The estimated figures under this column are as of end 2009.

<sup>16</sup> Project end is early 2015. The estimated figures under this column are as of end 2014.



These will all collectively lead to EE being more widely practiced and implemented in the Malaysian building sector, and that more EE buildings constructed in Malaysia.



41. The abovementioned outcomes will be realized through the delivery of the following outputs that would result from the activities that will be carried out under the proposed project:

- GOM agencies/departments that employ and implements energy management systems in their buildings and facilities
  - Improved Malaysian EE Building policies, Act/legislation, regulations and action plan
  - EE Buildings code of practice approved and enforced by relevant legislation & regulations
  - Utility regulations that promote and support EE technology applications in buildings
  - More available, extensive and accessible financing for EE building projects
  - Tools for enhancing the skills and experience of local building practitioners in the design of energy efficiency projects in buildings
  - Market oriented EE programs in the buildings sector at the national and local levels
  - Government agencies and private sector entities capable of designing and implementing EE building projects
  - Completed demonstrations projects showcasing successful applications of building EE technologies, techniques and practices.
  - More knowledgeable and technically capable and competent building practitioners in the GOM and private sector
42. The proposed project is grouped into five (5) components each consisting of a number of complementary activities designed to remove barriers to the widespread applications of EE technologies in the buildings sector in Malaysia.
- Component 1: Institutional Capacity Development
  - Component 2: Policy Development and Regulatory Frameworks
  - Component 3: EE Financing Capacity Improvements
  - Component 4: Information and Awareness Enhancement
  - Component 5: Building EE Demonstrations
43. The following paragraphs describe the various major activities and sub-activities under each project component.

#### **COMPONENT 1: Institutional Capacity Development**

44. This component will address the identified barriers concerning widespread implementation of energy management activities in the government sector. It is well recognized that there are potentially large energy savings to be reaped by systematic and continuous activities to manage energy consumption in individual organizations. Despite this, it has proved deceptively difficult to make headway and convince management to allocate manpower and resources to such activities which are generally of secondary importance to the core business of the organization. This has also been the case in many developed countries that today operate highly successful government energy management programs.
45. The expected outcome from this component is a clear and effective system of monitoring and improving the energy performance of the building sector. The activities that will be carried out under this component will all contribute to the delivery of a single tangible output - GOM agencies/departments that employ and implements energy management systems in their buildings and facilities.
46. The component aims at emulating the successful approach taken in other countries and the establishment of a dedicated Malaysian Federal Buildings Energy Management Programme (MFBEMP) to support, and promote energy management activities in the public sector.

47. The activities comprise of the setting up of the MFBEMP organizationally and provide assistance in terms of promotional materials and facilitating tools for energy managers, as well as a framework within which to share and exchange information and experiences. Experiences from other countries has shown that to sustain a strong and active energy management programme it is necessary to have an organizational anchoring point and backbone to ensure continuity and resources for the effort. Also included is the development of a comprehensive energy management guideline for GOM and disseminate its use to potential energy managers, as well as key decision makers in government in order to break the ice and secure the all important backing of top management.

**Output 1.1: GOM agencies/departments that employ and implements energy management systems in their buildings and facilities**

48. This output is expected to be realized from the implementation of several activities that are designed to promote and implement energy management activities in government agencies and organizations.

**Activity 1.1: Assessment of Capacity Needs of GOM Institutions in the area of Building Energy Management**

49. This involves the evaluation of the current level of awareness about, and understanding of, energy management among the people working in the government agencies/institutions. It will involve the conduct of an assessment of the gaps and needs of these government units regarding the practice and application of energy management, in general, and building energy management, in particular. The assessment will enable the programming of appropriate capacity development interventions for GOM agencies at the federal, state and local levels. Promotion of the energy management practice and, as well as the planning for the design of the capacity development program will also be undertaken prior to its implementation.

- Activity 1.1.1: Promotion of Building Energy Management in Government Agencies and Institutions – This will involve the holding of meetings, a series of workshops and agency-wide promotional campaign to inform and introduce the concept of , and the plans for the introduction of energy efficiency in their premises and facilities. A monitoring system as well as feedback mechanisms will be set to gauge agency-wide performance on energy management.
- Activity 1.1.2: Assessment of Level of Awareness on Energy Management – A survey will be conducted to determine the level of awareness on, and understanding about, EM and . The results of the survey will be used as basis for the design of a government-wide EM/ awareness raising program. The survey will be done a year before end-of-project to determine how well the program has impacted on the energy utilization performance in GOM agencies, as well as in the operation of GOM-owned buildings.
- Activity 1.1.3: Design and Conduct of Capacity Development Program on EM in GOM Based on the results of the survey in Activity 1.1.2, a continuing education program on EM/ for different levels of personnel in government agencies, particularly for those operating and maintaining building facilities, will be developed. The program will form part of any personnel self-development programs instituted in GOM agencies/institutions (federal, state and local). Lessons identified from the evaluation of the similar training

events under the BSEEP will also be considered in identifying new strategies to ensure effective implementation of the capacity development program.

*GEF support is needed for the technical assistance in the capacity needs assessment and in the design of the capacity development program.*

**Activity 1.2: Development of the Malaysian Federal Building Energy Management Program (MFBEMP)**

50. This activity will involve the design, development and implementation of a government-wide building energy management programme.

- Activity 1.2.1: Review of Government Energy Management Programs - A study will be conducted to review and evaluate similar schemes in other countries and come up with a scheme that is adapted to the conditions and needs of Malaysia. Data and information will be gathered on experiences on government building EM program implementation in other countries (e.g., ASEAN countries). An analysis of building EM program development and implementation in these countries will also be conducted.
- Activity 1.2.2: Framework Design of the MFBEMP - A working group will be organized to discuss and define the program objectives, targets, beneficiaries, operating procedures, organizational set-up and governance, and funding requirements. In addition to the results of previous surveys on the capacity development needs in the area of EM, consultations with the heads of government agencies, as well as administrators of government-owned buildings will be conducted in order to come up with the most workable strategy of ensuring active participation of the various government agencies but also of their personnel. Short term concerns such as the program budget allocations, promotional activities and launching of the program will be addressed.
- Activity 1.2.3: Design of the MFBEMP – Based on the defined framework of the program, the first work plan of the program will be designed. The relevant activities that will be carried out under the program will be formulated, budgeted and responsibilities for implementation designated.
- Activity 1.2.4: Establishment of the Entity for Administering the MFBEMP - Initially the BSEEP project staff and ad-hoc experts will form the core of the operational entity but will gradually hand over the responsibilities to the MFBEMP agency. Part of their job is to determine the suitable entity in the country that will manage and run the MFBEMP. A dedicated agency will need to be appointed and the selection will be based on a set of criteria determined by the project stakeholders, as to their suitability to manage and institutionalize the program.
- Activity 1.2.5: Approval of the MFBEMP – This will involve the implementation of actions to promote, advocate, and where necessary petition the approval of the MFBEMP as an official GOM program that is in line with the country’s energy objectives. A government circular instructing the full participation in the program by all GOM agencies/institutions will help move and ensure its successful implementation. Linkage to the overarching national Climate Change objectives will also be made.

*GEF support is needed for the technical assistance in the assessment of energy management programs, as well as in the design of the MFBEMP.*

**Activity 1.3: Preparation of Specific Energy Management (EM) Guidelines for Government Institutions**

51. A guidebook (or Standards Operating Procedures) specifically for government agencies will be prepared to assist in the identification and formulation of annual work plans, and also for implementation of specific actions to improve the energy efficiency in government facilities.

- Activity 1.3.1: Review of Government Operations – This will entail the evaluation of various energy consuming operations (e.g., purchase of equipment and services, production and consumption of energy, etc.) and procedures to determine energy saving opportunities. Energy audits of representative government buildings/facilities will be conducted to establish the baseline energy utilization performance. Moreover, the audits will determine and assess any wasteful as well as energy conserving practices, operations and procedures. The present operations and procedures will be analyzed, vis-à-vis proposed MFBEMP objectives and activities. An assessment of potential improvements/modifications to allow compliance or complementation with the MFBEMP will also be carried out.
- Activity 1.3.2: Formulation of Specific EM Guidelines – Based on the energy audit findings and the assessment of potential energy efficiency improvements, specific guidelines for each type of government buildings will be prepared. Such guidelines are meant to assist the relevant government agencies/institutions to comply with the requirements and objectives of the MFBEMP. A monitoring scheme will be included in the guidelines in order for the government agencies to monitor on their own their progress in implementing the MFBEMP. At the same time, a nationwide monitoring scheme will also be devised specifically to monitor the extent and impacts of the application of the EM guidelines.
- Activity 1.3.3: Promotion of the Application of the EM Guidelines – Seminar/Workshops will be conducted at the national and state levels for the promotion, and for introducing the application, of the EM Guidelines. This activity will include the design and conduct of seminar-workshops on the application of the EM Guidelines vis-à-vis the MFBEMP implementation.

*GEF support is required for technical assistance in the assessment of the energy consuming operations in government buildings, the design of the EM guidelines, and in the conduct of the seminar-workshop for the promotion of the guidelines.*

**Activity 1.4: Monitoring and Evaluation of the MFBEMP Impacts**

52. A nationwide monitoring scheme for gauging how the MFBEMP is implemented and the program performance will be developed. Included in that scheme is the monitoring of how the EM guidelines are applied and the resulting impacts. Initially, a baseline survey will be carried out amongst the GOM agencies/institutions organizations to ascertain uptake of, investments on, and savings/benefits from Energy Management, in general, and Building Energy Management, in particular. A market research sub-contractor will be engaged to prepare and mock test the survey design, then carry out the survey. The survey results will be

used as part of the inputs to the design of the MFBEMP, particularly in the design of the program's M&E component.

*GEF support is required for technical assistance to carry out the survey and analyze the results.*

**Activity 1.5: Building Energy Reporting and Monitoring (BERM) Program**<sup>17</sup>

53. The BERM program focuses mainly on the MFBEMP and its result will be fed into CBEED (Activity 4.1.2) and synthesis result of BERM will be also a useful input to design and development of the MEERB in Activity 4.2.3. This will involve the monitoring of the energy utilization performance of the Malaysian buildings sector. The program will be carried out in two phases. Phase 1 will only cover government-owned buildings. This will be carried out as part of the MFBEMP. Building owners/administrators will be required to submit periodic reports (e.g., quarterly) of, among others, their energy consumption and level of activities for a specific period<sup>18</sup>. The periodic reports will be submitted to the MFBEMP agency, which will monitor and evaluate the energy performance of each participating building. That database will include, among others, a special module for the energy consumption data of each participating buildings. The relevant staff members of the MFBEMP agency and the engineering/utilities departments of the buildings will be trained to carry out the energy consumption monitoring (in some cases systematic calculation or estimation). The training will also include energy consumption reporting and ways and means to improve the energy utilization efficiency in building operations.

54. Phase 2 will include buildings in the private sector. The same approach used in Phase 1 will be applied. This time around, the information that will be gathered from the energy reports coming from both the public and private sector buildings will be used as bases for the building rating scheme under the MEERB. The BERM program will be designed to become a regular activity of the MFBEMP agency. The program will track the achievement of the target indicators to determine project impacts.

- Activity 1.5.1: Design of Data Collection System – JKR will develop an energy reporting template that will be used to collect data on energy consumption and production figures from the various government buildings in the country. The data that will be collected will be the bases for determining the energy performance of the participating buildings. As part of the process, a literature review of various buildings (designs and operations) in other countries (e.g., ASEAN countries) will be carried out. The MEGTW's endorsement of the energy reporting template is very essential in the energy reporting activity of the private buildings. Consultations with the relevant parties

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<sup>17</sup> Presently, there is no system to monitor, gather, analyze and disseminate information on developments and progress on energy efficiency in Malaysia. This hampers not only awareness in general but also the development of effective policies and targets, as well as making it neigh impossible to assess whether or not existing initiatives are successful or not and thus whether or not to continue funding, strengthen it, or redirect it to other, more effective, measures. The monitoring system that is to be developed will address these concerns as well as others brought forth by relevant key stakeholders such as Ministry of Energy, Green Technology and Water (MEGTW), ST, JKR and others. The system will initially be developed for the building sector, but must be made flexible and versatile so as subsequently to be extendable to all sectors relevant to energy efficiency and conservation.

<sup>18</sup> The unit of measure for the level of activity shall be agreed by the stakeholder. For example: Hotels – kWh/guest-day; Hospitals – kWh/patient-day; Schools – kWh/student-day; and, Office – kWh/m<sup>2</sup>, noting the average occupancy rate.

will be conducted to get the commitments of business community in supporting the nationwide buildings energy reporting and monitoring program. It must be emphasized that confidentiality of the data provided by building owners/administrators will be assured.

- Activity 1.5.2: Energy Use Benchmarks for Malaysian Buildings – This will involve the evaluation of the energy performance of the various buildings that are participating in the BERM. JKR, with the endorsement of the Malaysian Sustainable Buildings Council, will submit (or mail) the energy reporting forms (with guidelines) to the participating buildings. The MSBC will then reconcile and strengthen the CBEED, MFBEMP and BERM. The BSEEP personnel will conduct visits to selected buildings particularly those that are:
  - Requesting assistance in filling up the report forms;
  - Big buildings that have various operations and processes (e.g., hotels, hospitals); and
  - Presently complying with certain corporate energy use benchmarks

If necessary, visits will also be made to other buildings but mainly for the purpose of collecting the completed report forms. This is to ensure that responses are obtained from majority of the participating buildings. These visits are best done with different groups covering selected areas. Data from the reports will be used to come up with the energy use benchmarks. Energy-use benchmarks will be established for each building type.

- Activity 1.5.3: Data Banking of Building Energy-Use Information – This will involve the processing of all pertinent data from the energy reports from the participating buildings for encoding into a specific module in the CBEED. Said module will be designed by BSEEP consultants specifying the various data input requirements, sub-modules and deliverables. The MFBEMP agency personnel that will work on the database will be trained on-the-job by the consultants on how to operate and maintain it. Subsequent data inputs to the database will include the results from the demonstration projects. The database will be updated regularly based on the next batch of energy consumption reports that will be submitted by the monitored buildings. The information in the database will also be used in other energy efficiency activities and services of JKR, the ESCOs and other relevant institutions. The project, together with JKR will submit a necessary plan to the Government to finance the system after BSEEP is ended.
- Activity 1.5.4: Dissemination of Building Energy-Use Benchmarks - The established benchmarks, aside from other relevant information will be disseminated to the monitored buildings and the building practitioners to assist them in their EE&C activities. Since energy-use monitoring and reporting will be a continuous activity, there will be enough data to update “benchmarks” regularly. A seminar-workshop will be conducted to disseminate the initial findings of the energy- use benchmarking program. The findings will be compiled and documented and discussed during the seminar-workshop. Recommendations as to the energy use reporting format and the regular reporting requirement for buildings will be put forth and discussed. The range of energy-use benchmarks will be highlighted and some comparison will be made to figures available from sources in other ASEAN and developed countries. Moreover, the energy use performance analysis report for a building will be provided to the building owner/administrator. Such report will serve as feedback to the industrial building owners

that complied with the energy reporting requirement. The reports will be prepared and submitted after each period of report submissions to the MFBEMP agency.

*GEF support is required for the necessary TA in the design of the program and initial logistical support for the program design such as the surveys and site visits.*

## **COMPONENT 2: Policy Development & Regulatory Frameworks**

55. This component will address the current lack of strong policies, concise action plans, legislation and regulations for promoting and enforcing EE in the building sector. The expected outcome from the deliverables of the activities that comprise this component is the implementation of, and compliance to, favorable policies that encourage the application of EE technologies in the country's buildings sector.
56. The project activities will support MEGTW in developing an EE action plan and to draft or review the EE Act. Furthermore proposed activities will support and enhance MEGTW and ST in revising regulatory controls and set up a monitoring system for the energy sector. Such a monitoring system will have important implications for future developments in the energy sector in that not only does the monitoring system give the decision makers a tool for following and evaluating specific interventions, but more importantly it will allow monitoring and evaluation of the overall policy goals. This provides the means by which such policies can be developed and revised with much higher confidence than currently, and will supply strong arguments for further policy and regulatory measures by providing concrete proof of their benefits. The monitoring system will by virtue of its nature also be a treasure trove of detailed energy sector information that will feed into not only new policy development but also DSM programme, scholarly research and commercial activities.
57. On a more technical level the component will support the updating of MS 1525 as well as the development of a code of practice for residential buildings. The project's focus is on commercial buildings but developing a residential code is a windfall opportunity too good to miss, and which can have very significant impacts on energy consumption in Malaysia in the long term. That is an opportunity that may not come again for many years to come.

### **Output 2.1: Improved Malaysia EE Building policies, legislation/regulations & action plan**

58. This output is expected to be realized from the implementation of several activities that facilitate the development of a national EE policy and action plan for buildings and the incorporation of such policies in the 11th Malaysia Plan, contributing towards the enactment of a Malaysian EE Act.

#### **Activity 2.1.1: Conduct of Building EE Policy Studies**

59. This activity involves the provision of technical advice in the review of existing EE-related policies and regulations in Malaysia as applied to building construction and operations. Similar policies found in other countries, like those in ASEAN, that are aimed at promoting EE in buildings will also be reviewed. It will also involve the evaluation of possible policy support activities and strategies that can be considered for building developers, managers and owners/investors. Specific policy studies will be carried out based on the suggestions of the project stakeholders as well as the recommendations from the policy reviews.



- Activity 2.1.1.1: EE Building Options – This will involve a comprehensive study of the current performance of all building types and designs in Malaysia. As part of the study, several options addressing the energy saving opportunities for each type and design of buildings, will be identified and evaluated. The study will elucidate macroeconomic costs and benefits of different measures and approaches as well as linkages to climate change initiatives. Legal context, an extended stakeholder analysis to pinpoint roles and responsibilities will also be necessary. The study will also provide recommendations on an appropriate scope and effective measures for the action plan in order to promote EE in the buildings sector in the long term.
- Activity 2.1.1.2: EE Building Incentives Scheme - New and innovative policy and market mechanisms for the application of EE features in the design, construction and operation of new buildings shall be analyzed. Costs and benefits analyses shall also be developed to provide clear economic justifications for the same. Also, fiscal/financial incentives for building developers and owners of new buildings and retrofitted existing buildings to incorporate EE features will also be studied, whenever applicable.
- Activity 2.1.1.3: EE Building Blueprints – This is a comprehensive investigation of the feasibility of implementing and enforcing a policy and regulatory framework for requiring new building constructions to incorporate energy efficiency features in their designs. The regulations shall be enforced in phases, with the pilot phase involving the demonstration of the regulatory framework, the next phase involving the provision of incentives for building designs with EE features and verifiable EE savings generated through the EE features; and lastly a phase that involves the mandatory enforcement of the requirements for EE building blueprints (i.e., designs).

**Activity 2.1.2: Formal & Informal Discussions with Policymakers**

60. This involves the organization and conduct of a series of formal and informal meetings with policy makers in order to familiarize them with the project and (where necessary) with energy efficiency issues, consult on project issues, obtain necessary approvals, and gain support for policy initiatives.

*GEF support is needed both for the cost of the formal and informal meetings, including technical assistance for any studies that will be conducted to back up policymakers in supporting the proposed policies.*

**Output 2.2: Approved and Enforced EE Buildings Code of Practice**

61. This output is expected to be realized from the implementation of several activities that assist in further revising the existing buildings Code of Practice, have it approved and enforced by relevant legislation and regulations. Appropriate recommendations will be prioritized according to readiness for implementation of action that needs to be taken to address the current barriers in the inclusion of MS 1525 into the Unified Building By-Laws (UBBL).

**Activity 2.2.1: Review of Existing Buildings Code of Practice**

62. Based on available information in the CBEED and the published guidelines, this activity is mainly involving the review of the UBBL and the MS 1525, with the aim of enhancing the

chances of officially incorporating the latter to the former thereby facilitating the promotion and enforcement of EE policies in the design, construction and operation of buildings.

- Activity 2.2.1.1: Review of the MS 1525 - This activity will involve the review and updating of the existing MS 1525 to incorporate any necessary adjustments in the provisions, develop the relevant implementation procedures; and building the capacity of government building inspectors on application and monitoring of EE technology systems. Where relevant, design and compliance guidelines for the various energy systems in buildings (building envelope, lighting, air conditioning, etc.), will be recalculated and updated taking into consideration the presently available and applicable building EE technologies. The new guidelines and procedures will be disseminated to the building inspectors of the local governments, and training on the implementation of the guidelines will also be provided. Building permit requirements and building inspector's checklists will be reviewed and will be revised accordingly to include specifications from the updated lighting system guidelines.
- Activity 2.2.1.2: Conduct of Stakeholders Consultation Meetings - The results of the policy studies and the MS 1525 review will be presented to the different stakeholders for their comments and additional inputs. For each deliverable (e.g., inception report, draft report, final report, etc.) the stakeholders will be consulted to solicit their inputs and comments<sup>19</sup>. The project will not accept the results of the policy studies and the MS 1525 review unless it has gone through the required consultative process. The project would like to make sure that the policy recommendations provided by the study would gain wider acceptance, particularly by the private sector.

*GEF support is needed both for the technical assistance required in the review of MS 1525 and also to cover cost of the consultation meetings.*

#### **Activity 2.2.2: Formulation, Approval and Enforcement of a Policy on EE Building Design**

63. This activity involves a series of stakeholders' consultations on the application of MS 1525:2007 in the energy efficient design, operation and maintenance of buildings. It is aimed at ensuring that all new building projects, starting with the JKR projects, are in line with the principles of energy efficient design and follows MS 1525:2007 (or better). These discussions will be with the JKR for the design issues concerning of government buildings, and with the Ministry of Housing and Local Government (MHLG) as the custodian of the UBBL which will affect both government and private sector buildings. The following sub-activities will be carried out:

- Activity 2.2.2.1: Conduct of Stakeholders Consultation Meeting - Regular consultation meetings will be conducted with the various stakeholders in the buildings sector to solicit their comments on the adoption and implementation of MS 1525:2007 as part and parcel of the Unified Building By-Laws (UBBL). Among the agenda for discussion include the review of the specific provisions of MS 1525:2007, including the preparation of its

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<sup>19</sup> It is recommended that the experts and organizations involved in the revision leading to MS 1525:2007 are again invited to participate so as to take maximal advantage of the expertise and knowledge already established. The work would be organized in a way similar to the last revision. SIRIM should ultimately publish the revised standard. Representatives from the agencies/authorities responsible for administering the Unified Building By-Laws (i.e., under MHLG) will be included since they could have important inputs in terms of how to best organize and adjust the code to facilitate administration and enforcement.

implementing rules and regulations. Other potential support programs and incentives to accelerate the growth of EE technology applications in the buildings sector will also be taken up during these meetings.

- Activity 2.2.2.2. MS 1525 Regulatory Frameworks Recommendations and Endorsement - After series of consultation meetings, proposed policies and regulatory frameworks in support of MS 1525 will be drafted. The proposed policies will be based on the results and recommendations of the policy studies that will be conducted under Activity 2.1.1. The formulated policies will be presented to the stakeholders and the Project Steering Committee. Once favorably endorsed, the document will be submitted to the MHLG.
- Activity 2.2.2.3: Assisting the MHLG in Facilitating MH1525 Enforcement – This entails the provision of capacity building for the MHLG in the enforcement of the MS 1525 as part of the UBBL. A training program for the MHLG personnel who are responsible for the enforcement of the UBBL will be designed and implemented. This will include training on the evaluation of the EE features of building designs that are applied for building permits and approvals. An evaluation will be carried out to ascertain the level of technical and institutional capacity built within the MHLG a year after the training program completion

*GEF support is required for the technical assistance needed in preparing the policy and implementing rules and regulations and for taking them through the decision making structures of the GOM.*

#### **Activity 2.2.3: Capacity Building on the Application of Building Energy Codes**

64. This activity involves the capacity building of building practitioners in Malaysia in utilizing and complying with the building energy codes.

- Activity 2.2.3.1: Survey of the Local Building Service Industry - A survey will be conducted to assess and evaluate the capacity of the building industry (i.e., building practitioners, building owners/administrators, and service providers) to comply with the requirements of the building energy codes, and to also to provide feed-back for further development of it in the future.
- Activity 2.2.3.2: Technical Capacity Development on Building Energy Codes - This activity will involve the conduct of comprehensive training courses on building energy codes for building practitioners such as architects, engineers, building administrators, etc. This capacity development activity will form part of a certification program for building practitioners. This certification program and the associated capacity development program are expected to continue even after the BSEEP. It will also involve capacity building for the JKR to enable it to become a service provider to the industry.
- Activity 2.2.3.3: Assessment of Capabilities of Existing Building Service Providers - This activity will involve the evaluation of the capabilities of the local architectural, engineering and building development firms in performing technical and maintenance services to building owners for compliance to building energy codes. It will also involve the evaluation of the feasibility of, and requirements for enhancing the building services industry, as well as the development of an industry for the local manufacture of EE building materials and associated equipment that are building EE code-compliant.

- Activity 2.2.3.4: Training Course on the Design, Feasibility Evaluation, Construction, Operation and Maintenance of EE Buildings – This capacity building activity will involve the provision of comprehensive training courses on the design, construction, economic feasibility evaluation, operation and maintenance of EE buildings for local engineering firms and equipment manufacturers, repair and maintenance service providers. The training courses form part of the required capacity building for JKR to enable it to become an EE building service provider to the buildings sector.

*GEF support is needed both for the technical assistance required for the assessments and design of the training courses and also to cover for the initial costs for conduct of the training courses.*

**Activity 2.2.4: Development of an EE & RE Code of Practice in Residential Buildings**

65. This activity involves the development of a code of practice for the application EE features, as well as EE and RE systems in domestic buildings. The building industry's support will be sought to evaluate the present operating performance of representative samples of existing EE and RE systems installed in residential buildings. The industry's participation is very vital from the outset in order to gain their acceptance of standards in later activities. This activity will result in the delivery of useful inputs in the design of new residential buildings or expansions/retrofits.

- Activity 2.2.4.1: Assessment of Best Practices on EE Residential Building Design and Operation - A methodology for the assessment of the different residential building designs in Malaysia and in other countries (e.g., ASEAN and other tropical countries) including systems and equipment that are used will be prepared. This includes procedures for drawing out samples of buildings and their energy systems, the parameters in assessing system performance, the procedures for the conduct of performance evaluation and testing as well as the identification of various testing equipment (including equipment and test service providers) needed for the assessment. Upon the approval of the said methodology, the procurement of testing equipment as well as the conduct of actual performance assessment shall follow. Based on the results of the said assessment, best practices on EE building and building energy system design and installation shall be identified and compiled according to criteria set for cost, system performance and/or quality.
- Activity 2.2.4.2: Assessment and Setting of Domestic Building EE Codes - This activity will continue on the technologies identified in Activity 2.2.4.1. Standards and best practices on the performance, design, construction and installation of energy systems will be researched in-country and internationally. A comparative analysis will be conducted between existing domestic building design and their energy systems and existing building energy performance standards available. The analysis will also include cost factors. Based on the analyses, a set of recommended designs and standards for domestic buildings will be prepared including the corresponding testing and evaluation scheme for the measurement of the same.
- Activity 2.2.4.3: Establishment of Domestic Building Energy Codes and Standards - Meetings and consultations with concerned stakeholders particularly the building practitioners, building service providers, building materials suppliers, and building

owners will be carried out for the setting up of the energy performance standards, best practices and the recommended testing procedures. Registration of said design standards and practices with concerned government institutions particularly the JKR (Government Buildings) and the MHLG (Private Buildings) will be pursued. Once approved, a promotional program for the adoption and widespread use of the prescribed standards and best practices will be developed and implemented. The dissemination of the standards and best practices will be carried out under the promotional programs that will be carried out under the BSEEP.

*GEF support is needed both for the technical assistance required for the assessment and setting up of the recommended domestic building EE codes and also to cover for the costs for the consultations and promotion of the codes.*

**Output 2.3: Utility regulations that promote/support EE technology applications in buildings**

66. This output is expected to be realized from the implementation of several activities that facilitate the development of favorable utility regulations that promote and support EE technology applications in buildings.

**Activity 2.3.1: Assessment of Utility Regulations Promoting and Supporting EE Building Technology Applications**

67. This activity will involve the review of policies and regulations supported by public utilities in other countries that are supportive of the implementation of EE initiatives in the design, construction, retrofit and operation of buildings. Applicable incentive schemes for such projects in buildings sectors will be researched in-country and internationally. An analysis will be conducted to compare various incentive schemes (including the policies/regulations that supported them) as to their applicability and viability in the Malaysian context. The cost requirements and cost implications of each scheme will be analyzed considering the factors that either made them successful or a not too successful.

*GEF support is needed both for the technical assistance in the assessment of utility regulations promoting EE building technology applications.*

**Activity 2.3.2: Design of EE System Incentives in Buildings**

68. This activity will involve assisting the ST and TNB in coming up with applicable incentive schemes for supporting EE initiatives in buildings. Technical assistance will be provided in evaluating the design and implementation of the selected incentive options.

*GEF support is needed both for the required technical assistance in the evaluation of incentive options.*

**Activity 2.3.3: Review of Utility Tariffs Focusing on EE in the Buildings Sector**

69. The review will focus on identifying problems and opportunities for EE in buildings given the existing tariffs for electricity, gas and other relevant energy carriers.

- Activity 2.3.3.1: Electricity Pricing Study - An electricity tariff pricing study for electricity used in buildings, as well as electricity generated in buildings for sale to the grid will be made. Various options for financial incentives to encourage EE projects in buildings, as well as power generation using RE (e.g., solar), including capacity and energy payment and investment incentives shall be investigated and evaluated. The study will also provide specific recommendations on the levels of each incentive measure. Successful experiences in other countries such as investment tax incentives, property tax reductions, accelerated depreciation, and feed-in tariffs will be studied to determine their applicability and suitability in the local electricity market. If available, previous electricity pricing studies in the country will also be used in the pricing study. The intention is to provide the key government agencies, particularly the ST, greater appreciation of the pricing issues on decentralized power generation.
- Activity 2.3.3.2: Public Survey on Fuel Price Perception – This activity entails the conduct of a special survey of building owners/developers and building practitioners as to, among others, what they think as the reasonable or optimum price for typical fuels used in buildings.
- Activity 2.3.3.3: Study on Gas Fuels Pricing for Buildings - A related fuel supply and distribution policy for MCT should be based on sound policy on the national development of new gas distribution infrastructures that ensures sustainable access to affordable gas for effective building cogeneration technology application. Appropriate grid pricing for cogenerated electricity sales should be develop in order to encourage EE projects in buildings such as cogeneration
- Activity 2.3.3.4: Monitoring of Prices of Energy Carriers Used in Buildings – Regular monitoring of the prices of energy carriers used in buildings will be carried out under this activity. The economics of many EE and RE (if feasible) application projects in buildings will be evaluated to determine the fuel price impacts.

*GEF support is needed both for the required technical assistance in the studies that will be carried out, as well as, to pay for the cost of surveys to be conducted.*

**Activity 2.3.4: Discussions on Energy Pricing for Buildings**

70. This activity will involve the conduct of a series of consultation meetings lead by MEGTW with TNB, MoF, EPU and MITI/MIDA and other stakeholders regarding the need for balanced subsidized energy for both buildings and industries. This is to address the importance of broad and regular consultations on the issue of tariffs which is very complex.

*GEF support is needed for the technical assistance to support proposed tariff structures and to cover the consultation meeting costs.*

**Activity 2.3.5: Web-based Monitoring of Incentives Scheme Implementation**

71. This will involve the design, development, operation and maintenance of a web-based online application and monitoring service for whatever fiscal/financial incentive mechanism will be proposed and implemented under the BSEEP. The development of the on-line service shall be coordinated with the review and analysis in Activity 2.3.2 and linked to the CBEED.

*GEF support is needed for the technical assistance for the design of the web-based monitoring system.*

### **COMPONENT 3: EE Financing Capacity Improvements**

72. This component will address the lack of and poor accessibility of financing for investments in energy efficiency in buildings. It addresses the need to provide technical and financial assistance packages to EE building project developers. It will include technical assistance in facilitating the design, establishment and implementation of appropriate mechanisms for financing EE projects, in general, and EE building technology application initiatives, in particular. The expected outcome from this project component is the availability of financial and institutional support for initiatives on EE building technology applications.
73. One concern that has been raised is the relative inefficiency of existing tax incentives to increase investments in EE in buildings. Therefore the project will investigate and find solutions to improve the functioning of these existing mechanisms. The project will also engage in the pivotal task to develop and propose how a comprehensive energy efficiency promotion fund can be established by government to not only significantly increase the amount of funding available for EE investments but also offer more attractive conditions and better access to funds for interested building owners that today face great difficulties in getting access to financing from commercial banks.
74. The activities will also comprise training and opportunities for financial institutions and ESCOs to meet and develop ways to strengthen cooperation by exchange of ideas, develop new approaches and tools and generally build confidence between them.

#### **Output 3: Enhanced availability and accessibility of financing for EE building projects**

75. This output is expected to be realized from the implementation of several activities that facilitate more available, extensive and accessible financing for EE building projects.

##### **Activity 3.1: Streamlining Processes for Financing Applications**

76. Existing tax incentives to promote energy efficiency are perceived as slow, cumbersome and ineffective by the majority of the stakeholders consulted during the project design. To address this concern, this activity will focus on assisting the MEGTW in streamlining the procedures for applying for and getting financial incentives for building EE activities. Together with MEGTW and other pertinent stakeholders, a review and analysis of the existing procedures will be carried out to come up with pertinent recommendations on how to make better and more effective use of the already existing incentive mechanisms for promotion of EE.

*GEF support is needed both for the technical assistance required for the streamlining of financing assistance procedures.*

##### **Activity 3.2: Capacity Building on EE Building Technologies for the Banking/Financial Sector**

77. This will involve the conduct of training workshops on evaluating the financial viability of EE building and EE building technology application projects. The workshops will also serve as campaigns addressed towards enhancing the banking/financial sector's interest in providing financing to prospective EE building project developers/owners. This will also

involve securing support from banks and financing institutions in the financing scheme that the project will help develop.

*GEF support is needed both for the technical assistance in the training courses and to cover for the initial training costs.*

**Activity 3.3: Development of an Action Plan for EE Building Project Financing**

78. A study compiling details of all EE building demonstration sites, potential entrepreneurs, market conditions for EE building technologies and possible financing modalities will be conducted. Based on the study, an action plan will be prepared outlining the essential steps and actions to be taken to facilitate the provision of financing of energy efficiency initiatives. The study will also come up with recommendations towards reaching agreements on mobilizing local and international financial institutions and local industry resources through co-financing counterpart to the proposed. Financing will be carried out by engaging key parties (e.g., foreign EE equipment suppliers and local ESCO), businesses and end-users to implement EE building and EE building technology projects.

*GEF support is needed both for the technical assistance required for the studies and in the action planning activity.*

**Activity 3.4: Design of Financing Schemes for EE Building Project Financing**

79. This is targeted to assist potential: (1) EE building project developers/owners; and, (2) Local suppliers and/or manufacturers in locally producing EE building materials and products. A working group will be formed comprising of financing institutions (e.g. Association of Banks in Malaysia) and local ESCOs to carry out the review of the performance of the existing credit schemes in Malaysia to determine the most appropriate baseline scheme (or a combination of schemes) for the envisioned EE building financing, as well as the latest international literature and experience on similar financial mechanisms for building improvements and/or building construction investments. They will also assess how much financing is currently being extended to EE building projects by private financing institutions<sup>20</sup>. The working group will also evaluate the viability of financing EE building projects, as well as the assessment of potential financing schemes. A report detailing the terms and conditions of each viable schemes will be prepared. Technical assistance will be provided in the design of appropriate financing schemes for such projects, based on government grants, and loans from financial intermediaries. The identification and assessment of sources of finance, tariff structures and fiscal aspects will also be covered. This activity will also involve the development of selection criteria for the financing schemes and the selection of eligible borrowers.

*GEF support is needed both for the technical assistance required in the assessment of financing schemes and in the design of the recommended financing scheme for EE building projects.*

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<sup>20</sup> For this purpose, surveys will be carried out at the start and towards the end of the project. These surveys are essential in providing evidence for the actual amount of funding going into EE building projects. Presently no such detailed documentation exists although everyone agrees that the amount of funding today is low, and insufficient. The surveys will enable the project to gauge its success in improving the funding situation for EE in buildings.



**Activity 3.5: Promotion of EE Building Projects to Local ‘ESCOs’**

80. This activity will entail the promotion of EE building project as viable ventures for ESCOs operating in Malaysia. This is targeted to local building services equipment (e.g., air conditioning) suppliers that are currently engaged in ESCO-type and/or EPC-type building system projects. It will facilitate information sharing and confidence building activities between ESCOs and financial institutions through the conduct a series of seminars/workshops for financial institutes & ESCOs. At least four seminars are envisioned.

*GEF support is needed both for the technical assistance for assisting ESCOs in venturing into EE building projects.*

**Activity 3.6: Capacity Building on EE Building Project Financing**

81. This will involve the conduct of a series of seminar-workshops for the buildings sector on potential financing options, including a special course on CDM and ESCOs, for supporting their EE building and EE building technology projects. Also covered under this activity is the provision of technical assistance to prospective EE building project developers/owners in accessing and partnering with ESCOs (local and/or foreign).

*GEF support is needed for the technical assistance in partnering with ESCOs and also to cover for the costs of the seminar-workshops.*

**Activity 3.7: Business Development Matching and Strategic Partnership Establishment**

82. This activity will involve mobilizing local and international financial institutions and local building industry resources to promote the commercialization of EE building technology application. A designated EE Building Market Services Group (MSG), possibly under JKR, shall be organized in the first year of the project with the main function of identifying business opportunities through providing technical support to EE building project financing. As a means of capacity building in this respect, the MSG will be involved in the business planning and financial advice to the EE Building Demonstration Projects in order to ensure that these demonstration projects will be implemented as planned according to the purposes of the demonstration activity. Working through existing public and private sector partners, the MSG will work directly with private companies and FIs, responding to their individual needs to structure investments, develop products, build their capacity to deliver EE building and EE building technology application project financing, and market their projects and financing products. Within the five year project, the MSG will be evaluated for its capacity to engage key parties (e.g., foreign EE building equipment suppliers and local ESCO), businesses and end-users to implement EE building technology application projects in the long run.

*GEF support is needed for the technical assistance in setting-up and capacitating the MSG, and to cover its initial operational costs.*

**COMPONENT 4: Information and Awareness Enhancement**

83. This component will address the identified barriers concerning lack of pertinent information, awareness, and capacity to design and implement Energy Efficient buildings. It will also provide tools and incentives for evaluating and comparing building performance and

improving the building designs developed. The expected outcome is heightened awareness and enhanced motivation and capability to design and implement EE buildings.

84. The activities described in the following comprise development, elaboration, processing and publishing of information materials, databases, guidelines and tools to assist building practitioners in making their designs more energy efficient. An online database containing important data, good practice examples and guidance for professionals will assist designers by improving accessibility to information that they need. The information will also be disseminated through seminars and workshops and journal articles, and compiled into training courses for professionals. In a nutshell these include:

- a) A draft EE policy for JKR will be prepared so as to ensure that the information is translated into concrete action, and take steps towards making the currently voluntary code of practice for EE in buildings a de-facto mandatory standard.
- b) Development of a building energy rating system (MEERB – Malaysian Energy Efficiency Rating for buildings and the Green Building Index (GBI)) will greatly facilitate benchmarking and performance monitoring of buildings and will also help establishing the broader context for setting performance targets and measuring ones success in achieving energy management goals.
- c) To ensure sustainability of the BSEEP’s information and awareness enhancement activities, the project will establish a national Central Building Energy Efficiency Database (CBEED) or it can also utilize the existing facilities such as Energy Information Bureau at PTM and preliminary database on government building by JKR. At the same time, in order to make this possible, such facility will be strengthened and its reach enhanced by initiating the establishment of several regional energy information offices throughout Malaysia, and targeted awareness campaigns to the general public and professionals alike will build further support and pressure on politicians and legislators to promote energy efficiency.
- d) Finally the component will support excellence in energy efficient buildings by offering awards for good and innovative design solutions.

85. These activities form an important part of the concerted effort towards ensuring that more energy efficient buildings are erected in Malaysia. The component also underpins the other components in important ways. By strengthening access to information, ability to compare, set targets and make the right choices, as well as capacity to pursue and awareness in general the foundation for developing more powerful policies and regulations is put in place; developing better understanding and partnerships between developers and financiers; moving decision makers towards more readily venturing into investments into EE in buildings, and so forth. Overall, an enhanced awareness of the government, public and the buildings sector on EE building technology applications is the expected outcome from this project component.

#### **Output 4.1: Tools for enhancing the skills and experience of local building practitioners in the design of energy efficiency projects in buildings**

86. This output is expected to be realized from the implementation of several activities that facilitates the implementation of new energy efficiency projects in buildings designed based on EE skills and experience gained. These activities are as follows:

#### **Activity 4.1.1: Detailed Study on the Current Building Designs and EE Building Applications**

87. This activity entails the gathering and a literature review of available information on the current trends and practices in building design in Malaysia, as well as on the typical EE features that are incorporated in the design of new buildings and applied in the retrofit of existing buildings. Information on EE building design and practices that were successfully applied in other countries with the same climate as Malaysia will also be gathered. Based on the information gathered, a detailed picture of current building design practices in Malaysia, as well as the current best practices globally and regionally for the kind of environment that exist in Malaysia. The best practices in other countries especially in Europe and in the United States will also be evaluated as to their feasible application in the Malaysian context. The information on the typical problems/constraints in the implementation of EE technologies and practices will also be assessed as well as the feasibility of the opportunities that were gathered from the literature review. The study will also pinpoint knowledge gaps and needs amongst practitioners within different fields and decision-making levels<sup>21</sup> in Malaysia. Moreover, the results of this study are important for the implementation of the other activities of the project, and will provide guidance and priorities for the development of design tools, and training activities and materials that will be used for the capacity development of the local building practitioners.

*GEF support is required for the technical assistance in conduct of the detailed study.*

#### **Activity 4.1.2: Establishment of a Centralized Building Energy Efficiency Database System (CBEED)**

88. This activity addresses the barrier concerning the difficulty in getting hold of comprehensive, and up-to-date and quality information. It will involve the design and development of an institutional mechanism for the establishment of a centralized building energy database system. The database will include information on EE building designs and design practices, EE building technologies and technology applications in Malaysia and in other tropical countries as well as linkages with other buildings databases in the country (e.g., registry of building, building projects, etc.)<sup>22</sup>. The profiles and results of the EE technology application demonstrations that will be carried out under the project will form part of this database. The database will be housed in, and operated and maintained by an institution which will be decided later.

- Activity 4.1.2.1: Selection of the Database Administrator – An evaluation of the potential institutions that will manage the operation and upkeep of the centralized database will be conducted. A listing of all key institutions that will provide building sector-related information (referred to as database keepers) will be prepared and validated. These institutions will provide inputs for the updating and maintenance of the database system. The system will be a mechanism to consolidate all existing building sector-related database that will be made accessible to various building practitioners. An arrangement between the JKR and the identified database keepers will be established to

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<sup>21</sup> This means technically, managerially, investment-related, policy-related etc.

<sup>22</sup> This database will cover (but not necessarily limited to) information on: (a) Energy consumption patterns in different types of buildings and locations in Malaysia; (b) Documentation and details on relevant case studies from existing EE projects; (c) Suppliers and technologies for building EE available in Malaysia and abroad; and, (d) Building materials and components performance data.

enable such integration of databases. The scope of the integrated database system will depend on what can be realistically done within the 5-year timeframe of the project.

- Activity 4.1.2.2: Collaboration on Database Upkeep - Meetings and consultations with identified institutions will be carried out to evaluate their existing databases and specialization in information service, and to facilitate the discussions on the proposed integration of existing buildings sector-related databases and information. Communications with international/regional organizations, particularly those in the ASEAN region will also be carried out to discuss collaboration on database and information linkage. An agreement will be established among these institutions to implement the centralized building energy database. Under the said agreement, a committee will be formed in which the participating agencies will be designated as database keepers, with the project team as the focal point. Specifically, the agreement will bind the different database-keepers by defining the possible arrangements for the communal use of database among database-keepers, data access by the building practitioners on the integrated database via the project team, as well as the promotion for the effective use of the database system. A plan and strategy for the development of the centralized buildings energy database. Since access through the internet is the most practical approach, the database-keepers will be assisted to upgrade their database to web-ready formats. Arrangements will also be made with interested international/regional institutions for the possible exchange of database and information related to EE building technologies and practices.
- Activity 4.1.2.3: Capacity Development on the Operation & Maintenance of the Centralized Building Energy Database: A program will be developed and immediately implemented to strengthen the capability of the CBEED agency in the operation & maintenance of the database. This activity will also involve capacity building of the database-keepers in aspects of information technology, database management and information service.
- Activity 4.1.2.4: Establishment of Satellite CBEED – This is meant to extend the reach and effectiveness of the CBEED Administrator by establishing satellite offices throughout Malaysia. This is done through the following sub activities: (a) Development of a clear concept of EE information offices (EIO) as extension of CBEED; (b) Establishment of the EIOs in various locations around Malaysia; and, (c) Linking up CBEED to the Malaysian Sustainable Building Council which needs to be set up to ensure EE & sustainability, carries through after BSEEP. The satellite agencies will also serve as training hubs and awareness campaign focal points. For the government sector, this can be implemented by establishing the system through the available JKR Asset and Management Group located at each state.

*GEF support is needed for the technical assistance required in setting up the database; gathering/producing additional information as necessary, in the capacity building for the database keepers, and in the establishment of satellite information centers.*

**Activity 4.1.3: Establishment of a Comprehensive Guidebook on EE Building Design**

89. Based on the study done in Activity 4.1.1, the guidebook will be prepared (both in English and Melayu versions) and this is targeted for building designers, architects, engineers and building developers. The updating of MS 1525 is uncertain and unlikely will be completed in

2009. JKR is taking the initiative to update the important components in MS 1525 in order to achieve (i) BEI 100 – 130 kWh/m<sup>2</sup>/year for government office buildings and (ii) BEI 150 – 160 kWh/m<sup>2</sup>/year for government buildings operating 24 hours, e.g., Hospitals. This update will be completed by 2009 and the document will be identified as JKR document. In addition, JKR is doing the ground work for the preparation of the guideline on residential buildings (government quarters). This can be further developed into a guideline under this project. With the updating of the important components in MS 1525 by JKR, the guidebook on its proper application in the design and operation of buildings will be developed and published for dissemination. The DANIDA-funded publication Design Strategies for EE in New Buildings (non-Domestic) and other available studies will also be used as reference. The guidebook will be important both as a teaching/training aid and as a detailed, practical up to date reference for designers on all aspects of designing and constructing an energy efficient building whether it is a new building or an existing one that needs upgrading. It will be periodically updated whenever new provisions or updates on the MS 1525 are made. Moreover, it will also incorporate new strategies that were developed and implemented under the BSEEP, including the formulated building EE policies that will be approved and enforced as facilitated by the project.

*GEF support is required for the technical assistance needed in preparing the guidebook.*

**Activity 4.1.4: Development of a Peer-Reviewed, User-Friendly Building Performance Prediction Software Tool**

90. This will involve the evaluation of commercially available software packages, and possibly those that are currently being used by building practitioners, in Malaysia. Such packages enable detailed evaluation of design issues and decisions throughout the building design process. Those that are currently in use by Malaysian building practitioners are mainly building energy performance software for analyzing performance of different EE options (Energy 10); and for building energy performance simulation (i.e., Ecotech, Integrated Environment Solutions). Currently JKR is using a rudimentary prediction software tool, developed in our projects, in evaluating the BEI of new building. This project can further develop and enhance the software tool and tailor-made for Malaysia. The software will be disseminated to building professionals for their comments and feedbacks.
91. Part of this activity is the updating of the building performance prediction tool based on feedbacks from users. A survey of the potential improvements that can be done, as well as perhaps rectifications and updating that should be done will be carried out. Based on the survey results, the tool will be updated/revised and finalized.
92. The finalized tool will be submitted to JKR and building professional bodies for their approval/endorsement. The promotion of the tailor-made building performance prediction software tool and provision of training on its application to JKR and to the local building practitioners in the private sector are part of this major activity. This will then be reproduced and disseminated to building professionals (including JKR personnel) by end of project. Linkage to the CBEED will also be established.

*GEF support is required for the technical assistance needed in preparing, documenting, validating and getting the necessary endorsements for the software tool, as well as in its improvement and updating.*

**Output 4.2: Implemented market oriented EE programs in the buildings sector both at the national and local levels**

93. This output is expected to be realized from the implementation of several activities that facilitate and improve the participation of the various stakeholders in the buildings sector in market oriented EE programs at national and local levels; and to also enhance the level of awareness on, and attitude towards, EE in the buildings sector.

**Activity 4.2.1: Design of the Malaysian Energy Efficiency Rating for Buildings (MEERB)**

94. The MEERB scheme for buildings will be designed based on the intended objectives, including the rating criteria and methods, organizational set-up and governance, funding requirements in the long-term, promotion and information activities. The initiative on Green Building Index (GBI) undertaken by Pertubuhan Arkitek Malaysia (PAM) and Association of Consulting Engineers Malaysia (ACEM) will be fully explored and linked to the MEERB. A study of similar rating schemes that are implemented in other countries to adapt them to the conditions and needs of Malaysia. This scheme will make use of the information that will be generated from the Building Energy Reporting & Monitoring (BERM) program (refer to Activity 1.5).

- Activity 4.2.1.1. Review of Available Information on Buildings Energy Performance Rating – The project will consolidate and review available information regarding building EE performance rating schemes that are currently ongoing and/or were implemented in other countries. This is to learn about the mechanics, results and impacts of the scheme, as well as lessons learned and best practices from those ongoing or implemented rating programs. Moreover, this is also for the purpose of assessing existing practices and methods (both local and international) in conducting such rating schemes. Focus is given on the process of verification and evaluation of energy efficiency (EE) activities of the participating buildings. From the review, the proposal for the MEERB scheme will be developed.
- Activity 4.2.1.2. Design and Development of the MEERB Scheme – Based on the comprehensive review of similar schemes in other countries, the design of an appropriate building energy performance rating scheme for Malaysia (i.e., MEERB) will be developed. The rating scheme will, among others, look in to the specific energy consumption (kWh/m<sup>2</sup>/year); EE design features; energy management program (EMP) employed; and annual energy savings. Higher rating points would be given to those buildings which have shown success and have given encouragement on the conduct and implementation of EE initiatives. It is envisioned that this rating scheme will help promote the replication of such initiatives by other building owners/developers in the country. Among others, weight will be given to the magnitude of improvements in the specific energy consumption of the buildings based on the EE initiatives that were carried out. The rating scheme will be patterned after applicable and similar schemes implemented in the country (if any), as well as in other countries.
- Activity 4.2.1.3. Testing of the MEERB Scheme - The project team will contact select building administrators/owners to introduce the MEERB scheme and test it, depending on various type categories and sizes. The views of the building administrators/owners will be taken into consideration before the scheme is fully implemented. A testing program will be conducted to ensure that the implementation of the rating scheme is

acceptable to all actors/players in the buildings industry, and to get their “buy-in” and participation.

*GEF support is required for the technical assistance needed for the design and development of the MEERB scheme, and for the initial testing of the scheme.*

**Activity 4.2.2: Development of the Institutional Mechanism for the MEERB Scheme**

95. With the developed rating scheme, the procedures/guidelines and rules that will be used in its implementation will be prepared. Also, the entity that will be responsible for the implementation of the rating scheme will be established.

- Activity 4.2.2.1: Setting up of the Operational Entity for the MEERB – This will involve the identification of potential institutions and the selection of the suitable institution that will be responsible for the promotion and operation of the MEERB scheme. Initially the project staff and ad-hoc experts will form the core of the operational entity but will gradually hand over the responsibilities to the permanent entity that will be established. One possibility would be to coordinate with and engage the soon to-be-established Malaysian Sustainable Buildings Council (MSBC) or any other similar organization for this.
- Activity 4.2.2.2: Development of the Mechanics and Implementing Rules for the MEERB Scheme – The official procedures and implementation rules for the rating scheme will be prepared based on the MEERB design. The project team will then coordinate the implementation of the scheme with the relevant government agencies and private sector organizations. Issues on the level playing field between the government and the private sectors buildings will be also addressed.
- Activity 4.2.2.3: Promotion and Implementation of the MEERB in the Malaysian Buildings Sector – A series of workshop will be conducted mainly to introduce and promote the rating scheme that will be implemented. The requirements that the participating buildings will have to comply with and the benefits that they can gain will be presented and discussed.

*GEF support is required for the technical assistance needed as well as in the procurement of the necessary database equipment for the operational entity. Staffing of the operational entity is in the medium term expected from local stakeholders.*

**Activity 4.2.3: Implementation, Monitoring and Evaluation of the MEERB Scheme**

96. This is intended both for information development and as a promotional activity to encourage the JKR and the building practitioners to improve the energy utilization performance (i.e., kWh/m<sup>2</sup>/yr). As part of the promotional campaign, this activity is intended to encourage healthy competition between buildings to improve energy performance. JKR has started live monitoring of electricity consumption for a number of government buildings by collaborating with the Danish Energy Savings Trust. The response to the live monitoring, from the building custodians, has been very encouraging. This preliminary effort needs to be further developed in this project. Using the information gathered from the BERM program, the energy utilization performance of participating buildings in both public and private sectors are

evaluated, rated and ranked. The project team, in cooperation with local governments, the JKR and the Malaysian buildings industry will carry out this as an annual activity.

- Activity 4.2.3.1: Development of Measurement and Verification Scheme – A study will be conducted to come up with a verification scheme for evaluating the EE features and activities of participating buildings. Evaluation parameters and indicators for different building types will be identified and defined. A standard measurement and verification scheme will be developed based on the set evaluation parameters and indicators. A guideline for the conduct of measurement and verification activity for each type of building will be developed. Institutions and agencies that can do the verifications will also be identified and consulted for the design and conduct of the rating scheme.
- Activity 4.2.3.2: MEERB Program Development – This will entail the development of a program for the implementation of the MEERB scheme. This includes the guidelines for the conduct of verification and measurement as well as the procedure for the rating schemes. Among others, the program will provide an outline of activities for the issuance of the rating certificates to both building owner and developer/designer. The institutional mechanisms for the implementation of the program will also be formulated. The institutional framework for the program will delineate the roles and responsibilities of key government agencies and private sector entities such as JKR, MEGTW, MHLG, MSBC, etc. such as in the aspects of promotion and identification of candidate buildings, conduct of verification and measurement, issuance of certificates, etc. A scheme that will integrate the rating scheme to other business accreditation programs in the country will be developed. Consultations with the building sector stakeholders will be conducted to present the proposed program and to gather necessary comments and suggestions prior to its implementation.
- Activity 4.2.3.4: MEERB Program Implementation – The project team will need to identify a dedicated agency which will be responsible for the implementation, monitoring and evaluation of the proposed rating scheme. With the guidance provided by relevant government and private sector entities, the MEERB agency will implement the rating scheme with the full support of the local buildings industry while JKR will be utilized to promote the rating program and to receive nominations for candidate buildings. The program will be carried out annually and the top ranked buildings will be given necessary recognition or awards (such as the National Building EE Award).

*GEF support is needed for the technical assistance needed to assist with different aspects of operating the MEERB particularly during the initial stages.*

#### **Activity 4.2.4: EE Buildings Advocacy and Promotion**

97. This activity aims to formulate and implement a public awareness program to support a public awareness campaign program on EE Buildings. It is designed to develop strong consciousness of the government and the people on the benefits and advantages of EE building technologies. It involves conduct of various promotional and information dissemination activities that will enhance the appreciation of the various players/actors in the Malaysian buildings sector on the application of EE technologies and practices. Although the project will cover commercial and residential buildings, for maximum benefit, it is envisaged that schools and universities will participate in its activities.



98. A series of information and education campaign activities will be carried out in line with the EE objectives of the GOM. Government decision-makers will be encouraged to formulate policies and laws that will promote the EE buildings, and arouse the interests of the building sector (public and private) in investing in EE building projects.

- Activity 4.2.4.1: Assessment of Potential Coverage for the EE Buildings Outreach and Promotion Program – This will involve the design and development of an outreach and promotion program using appropriate communication mechanisms (e.g., mass media, conferences and site visits) for the buildings sector. The targets may include, among others: (1) New building constructions; (2) Building practitioners; (3) Policy decision-makers in key government and legislative positions such as the MEGTW, MHLG, JKR, ST, etc. The scope and limitations of the EE Building Promotion Program that will be conducted under the project will be defined. The program will also cover the additional promotional support needed by the other activities of the Project such as the establishment of the CBEED and the MEERB scheme.
- Activity 4.2.4.2: Program Design and Development – This will entail the design of a program for EE buildings outreach and promotion taking into consideration the different characteristics of the various building types in Malaysia. Each activity under the program will be defined by identifying the target audience, its size, the mechanism to be employed, responsible institution/s, and the other modalities of the activity. School public awareness campaign will be also introduced and heavily promoted. A corresponding monitoring and evaluation system to measure success of each activity will be developed. A work plan of activities will be developed for the 5-year implementation of the program with corresponding budgetary requirements. The design of the program will also provide recommendations towards its sustainability after the completion of the BSEEP.
- Activity 4.2.4.3: Program Implementation - The designed outreach and promotion program will be implemented in coordination with groups, agencies and institutions with existing networks such as the JKR, PTM, ST and MHLG. Participation of the local government units, NGOs/CBOs, building practitioners, etc. will be sought in the implementation of the same.
- Activity 4.2.4.4: Monitoring and Evaluation of the awareness programme- Each program activity will be fully monitored and reviewed to provide guidance in the overall implementation of the program, using the M&E system that is developed in Activity 2.4.2. Where and when necessary, program redirection will be made.

*GEF support is needed both for the technical assistance required for the program design and development and also to cover for the initial costs for printing, publishing, advertisement etc.*

#### **Output 4.3: Government agencies and private sector entities capable of designing and implementing EE building projects**

99. This output is expected to be realized from the implementation of several capacity building activities that will help enhance the capacity to design and implement EE building projects in the government and private sectors. The activities that will be carried out to deliver this output are also intended to enhance capacity in the national and local governments in the

control/regulation of the incorporation of EE features in the design of new buildings and retrofit of existing buildings.

**Activity 4.3.1: EE Buildings Training Needs Assessment and Planning**

100. This involves the conduct of a training needs assessment of the different stakeholders in the buildings sector. Such assessment will enable the prioritization of the different types of training, seminars, workshops and/or conferences that will comprise a training program that will be developed to address the capacity building on EE technologies, techniques and practices of each group of stakeholders. Planning activities for the design of the training program will also be undertaken prior to its implementation, and this would include activities such as the identification of necessary resource speakers, preparation of training materials, as well as the logistics for each training activity to be carried out under the program.

- Activity 4.3.1.1: Scoping Study of the Training Program – A scoping study will be carried out to develop an inventory of training institutions, resource speakers and experts that will be involved in the conduct of the training courses. Also, target agencies, institutions and other buildings sector stakeholders, which will be prioritized for capacity building will be identified. Thus, the task will lead to a comprehensive inventory of training institutions and EE building experts (trainers) as well as the target groups that will be trained under this component.
- Activity 4.3.1.2: Validation of Training Needs for the Buildings Sector - Based on the results of the scoping study, the identified training activities will be validated vis-à-vis the actual needs of the target institutions and participants.
- Activity 4.3.1.3: Development of the Overall Training Program - Based on the results of the validation work, a complete 5-year work plan of training activities will be prepared. The work plan will include details on the resources required, training institutions and potential resource speakers which will conduct and design the training, target participants, travel programs, teacher training requirements, etc. Budgeting for each training course will also be prepared and submitted to JKR for consideration and approval. Meetings and consultations with concerned agencies and entities will be made to gather suggestions on the same.

*GEF support is needed both for the technical assistance required for the assessments and in the design of the training program.*

**Activity 4.3.2: Design of the Training Courses and Materials**

101. This involves the actual design of training activities that will be carried out under the training program. The design will be consistent with the training courses defined in the approved 5-year work plan developed in Activity 4.3.1.3. Where necessary, changes in the approved work plan such as the modalities of training participants, scheduling and the selection of venues may be permitted to make the implementation of the trainings more realistic and doable. Thus, the training design will involve the validation of the course outline for each training course, development of training modules and other educational materials, target clients per training course, management of training logistics, activity

scheduling, and the development of a unified M&E system for the trainings. Informational materials are consolidated into a database for conduct of future trainings.

- Activity 4.3.2.1: Design of Training Courses - A design of course syllabus for each training will be prepared specifying the actual target participants, the actual resource speaker/s, and the teaching strategies to be adopted for each course, training duration, logistics needed (e.g., venues, travel arrangements for participants), among others.
- Activity 4.3.2.2: Design and Preparation of Training Materials - Based on the training program design, training materials will be developed and reproduced. These will be prepared at least one month prior to the actual conduct of training course. Preparation will involve presentation and pre-testing in a controlled training group possibly of teacher trainees, who will also be required to prepare to adequate use/deliver the training materials. Moreover, monitoring and evaluation sheets will be prepared as integral part of the training materials.
- Activity 4.3.2.3: Training Program Logistics Organization - All arrangements for the logistics of the training activities will be organized and coordinated at least one month in advance of the event. Strong coordination by the PMO with the relevant stakeholders will be ensured.
- Activity 4.3.2.3: Conduct of Training Program - The training courses will be conducted as per the work plan. Any uncontrolled deviation in the plan must not greatly affect the prescribed objectives and schedule of the training courses.
- Activity 4.3.2.4: Certification and Quality Assurance Mechanism - In ensuring that participants understand and successfully developed the necessary skills, it is expected formal tests (examination papers) and informal tests (peer-review, supervisor's recommendation) are periodically conducted and participants are finally competent in implementing such activities. The training courses will be tailored to suit various levels of expertise from beginner, novice, standard, trainer and master trainer. A certification body, recognized by an international body, will need to be established with support from various professional bodies.
- Activity 4.3.2.5: Training Program Monitoring and Evaluation - Using the M&E scheme developed for the training program, each training event will be evaluated from both perspectives of the participants and the teachers/resource speakers. A report incorporating all training materials and curriculum as well as the evaluation for each training activity will be prepared. The documentation of each training event is consolidated to form part of the training database, which will be included in the CBEED.

*GEF support is needed both for the technical assistance required for the design and development of the training courses & materials, as well as to cover for the initial costs for the implementation of the training program, and M&E.*

#### **Activity 4.3.3: Sustainable Training Program Design**

102. This activity involves the development of a sustainable follow-up program on capacity development for the buildings sector in Malaysia. Focus is given on the institutionalization of the training activities in various academic and training institutions. In this regard, a

sustainable follow-up program will be developed to ensure the continuing capacity development in the buildings sector after the BSEEP implementation. Institutional framework, funding requirements and financing support for the program will also be identified.

- Activity 4.3.3.1: Evaluation of the Training Program - This will include analysis and assessment of the whole training program based on the results of evaluation of each training course conducted in Activity 4.3.2. The results of the assessment and the corresponding recommendations will be presented to all training stakeholders for their review and approval. Evaluation of the readiness of the identified training institutions to implement EE buildings training curriculums will also be carried out. A survey amongst the trainees from GOM and private sector practitioners and decision makers on their involvement in EE activities and practices will also be carried out as part of the evaluation.
- Activity 4.3.3.2: Sustainable Training Program Design - Based on the training program evaluation, a 5-year sustainable follow-up program for capacity development in the Malaysian buildings sector will be developed. Focus of the program is the institutionalization of EE building training courses in various academic and training institutions. Lessons identified from the evaluation of the training events under the BSEEP will be the bases for identifying new strategies to ensure effective implementation of trainings and to expand training services to cater to additional clients.
- Activity 4.3.3.3: Institutional Arrangements for Capacity Development – This will involve the development of a suitable framework for the implementation of the follow-up program. It involves the delineation of roles and responsibilities of different agencies and institutions such as JKR. Corresponding work plan of activities, financial requirements and fund sourcing activities for the follow-up program will also be developed.

*GEF support is required both for the technical assistance needed in the evaluation of the training program and in the design of the sustainable follow-up program.*

#### **COMPONENT 5: Building EE Demonstrations**

103. This component will address the lack of demonstration of various key aspects of energy efficiency in buildings. It will at the same time provide unparalleled opportunities for both government and private sector practitioners for gaining practical experiences with implementing EE building projects. Overall, an improved confidence in the feasibility, performance, energy, environmental and economic benefits of EE building technology applications, leading to replication of the demonstrations, is the expected outcome of this project component.
104. The activities under this component will therefore both provide crucial evidence and documentation, and contribute powerfully to the building of capacity in building EE design and implementation.

**Output 5.1: Completed demonstration projects showcasing successful applications of building EE technologies, techniques and practices.**

105. This output is expected to be realized from the implementation of activities that facilitate and improve the level of knowledge, skills and competency of local building practitioners both in the government and private sectors by providing good, effective and visible real-life demonstrations of the principles and technologies advocated to make buildings more energy efficient, as well as through direct involvement of a large number of designers, engineers, managers etc. in the actual building processes.

**Activity 5.1.1: Demonstration of EE Building and EE Building Technology Applications**

106. This activity will focus on the demonstration of the application of EE building designs and construction as well as in the application of EE technologies in buildings. By supporting the erection of real-life energy efficient demonstration buildings that will become examples to follow and aspire to, the project will achieve not only visibility and attention to the issues but also produce proofs that EE technologies can be integrated in real buildings, for real people in real locations. The importance of this can hardly be overestimated and therefore component five of the project is one of the more important in generating forcefulness behind the push for energy efficient buildings. Among the demonstrations that may be featured under this activity are:

- Demonstration of the application of building EE technologies. For example JKR has devised a method of measuring infiltration of outside air into a building. The equipment used is simple and the infiltration measurements give an indication of the air tightness of the building. This method needs to be further developed to be used as a tool in deciding the rectification works to improve air tightness.
  - Demonstration of applications (e.g., on line energy consumption monitoring)
  - Demonstration of building retrofits for enhancing EE performance. JKR has already started by selecting a few buildings as pilot projects on improving energy efficiency using good housekeeping practices and implementing low cost measures.
  - Demonstration of the application of building EE codes/standards
  - Demonstration of design, engineering, financing, operation & maintenance of EE buildings
- Activity 5.1.1.1: Promotion of EE Building Technology Application Demonstration Projects – This activity will involve the conduct of a seminar-workshop to promote the demonstration projects, for purposes of identifying the building owners/developers who are interested in hosting the demonstrations. A set of criteria will be developed and used in selecting the potential demonstration project hosts.
- Activity 5.1.1.2: Conduct of Detailed Feasibility Studies of Selected Demonstration Sites – The pre-feasibility analyses that were conducted during the project preparation phase will be reviewed to determine and verify project implementation requirements. Further feasibility assessments will be carried out by the demonstration hosts. This will involve carrying forward the existing EE building feasibility studies for the demonstration projects to detailed technical design and engineering, cost calculation, design of ownership and management models, cost-benefit analysis, design of operation and maintenance concept, and assessment of financing aspects.
- Activity 5.1.1.3: Specific Demonstration Project Implementation Requirements – This will involve the performance of activities to meet certain requirements required to facilitate the smooth and effective implementation of the demonstration projects. Among

these are: (1) Verification and confirmation of the availability of building permits and other requirements; (2) Availability of materials needed and manpower for the construction of the buildings; and, (3) Financing assistance mechanism for the financing of some of the demo projects. In addition, technical assistance will be provided in the setting up of administration, as well as operation and maintenance systems at the demonstration sites (designation of administrator, operators; establishing of guidelines and procedures, etc.).

- Activity 5.1.1.4: Establishment of Baseline Data for the Demonstration Project Sites – This activity will involve the gathering of baseline data for each demonstration projects. For the EE building demo projects, these includes, among others, the building design specifications, and design energy consumption. For the EE building technology application demonstrations, these will include the provision of the actual building specifications, operating performance (level of activity, energy consumption, etc.). The operating performance targets for each demonstration project will also be established. This activity could be carried out in conjunction with the review/conduct of the feasibility analyses.

Please refer to Annex 2 for the list of demonstration projects that were identified during the project preparation stage. The selected demonstrations are based on the preliminary set of selection criteria that was used for choosing the EE technologies/techniques that are of interest to the building developers and owners.

- Activity 5.1.1.5: Finalized Design of Demonstration Projects – This activity will involve the provision of technical assistance in the preparation basic engineering designs of the EE building construction demo projects, or EE building technology application projects, particularly to sites where no previous designs have been proposed. It will also involve provision of technical advice in the comprehensive technical and economic feasibility evaluations, as well as in the detailed engineering designs.
- Activity 5.1.1.6: Technical Assistance for the Financing of Demonstration Projects – The provision of assistance in the processing of applications for the financing of the operation and maintenance of each demonstration site will form bulk of the work under this activity. Host building developers/owners that are availing of the financing from banks/financial institutions will be assisted (if needed) in securing their financing.

*GEF support is needed for the technical assistance required for the feasibility studies, establishment of baseline data, and final design of the demonstration projects*

#### **Activity 5.1.2: Demonstration Project Implementation**

107. Under this major activity, the identified and designed demonstration projects will be implemented. Starting from the commissioning, the host and BSEEP personnel will monitor the operation of each demo project.

- Activity 5.1.2.1: Installation and Operation of each Demonstration Project - The main tasks under this major activity for each demonstration project will be similar to that in full project implementations, starting from the conceptual design, to feasibility study, engineering design, installation, operation, monitoring and evaluation. Technical assistance will also be provided in the installation and commissioning works. Each demo

project will be regularly monitored by the host and the BSEEP project personnel using a common M&E system that will be designed and employed for this purpose.

- Activity 5.1.2.2 EE Building Technology Demonstration Results Documentation - This activity involves the preparation of the project profiles (as case studies) of the building EE technology demonstrations that will be carried out under the project in Component. An inventory of the demonstration project results will be made. The inventory will also include similar and other building EE technology application projects that were implemented in other countries. Each project report will be summarized into project profiles (or case studies) following an agreed presentation format. These project profiles will be inputted into a centralized building energy database. The project profiles will be stored in a specific module of the database.
- Activity 5.1.2.3: EE Building Technology Demonstration Results Dissemination - A workshop will be organized and conducted to discuss the results of the demonstration projects. The demonstration hosts (i.e., building owners/managers) will present the demonstration project they have implemented highlighting the building EE technology involved, the scheme, the investment involved, results, energy savings achieved, actual project economics, estimated GHG emission reductions, and their respective recommendations for the building EE technology demonstration under the BSEEP. The workshop will assess the overall performance of the demonstration program and will come up with recommendations to the National Steering Committee concerning the relevance of such kind of programs to support the government's efforts to improve the energy efficiency in the buildings sector in Malaysia.

The workshop proceedings will be documented and published for dissemination. This activity seeks to influence both practitioners and decision makers and will also provide important opportunities for networking, for high level discussions, exposure to regional and possibly overseas expertise etc. The events will also provide opportunities for presenting work in progress – both that of the project team and of the participants. Also covered in this activity is the publication of the detailed information on the results and evaluation of the building EE technology application demonstrations. The results of the other activities in the project (not least the foregoing ones) in professional magazines and journals, a significantly wider audience can be reached than through workshops and seminars. Albeit interactivity is more limited it is possible to disseminate more detailed and in-depth information than is usually possible at e.g. workshops.

*GEF support is required for the technical assistance needed in the installation and operation of the demonstration projects (if required by the demonstration hosts) and in the preparation of the project profiles (case studies). Moreover, GEF support is required for the conduct of the workshop and in the publication and dissemination of the workshop proceedings.*

## **Output 5.2: More knowledgeable, technically capable and competent building practitioners in the GOM and the private sector**

### **Activity 5.2.1: Follow-up Capacity Building for the Local Building Industry**

108. This activity will involve the conduct of capacity development actions to further enhance the capacity of building practitioners in the application of EE building designs and EE

building technologies. As part of the promotion of the widespread adoption of EE in the buildings sector and a continuing capacity building for the Public Works Department (JKR), technical assistance will be provided to the building service industry and to interested building developers/owners in the design and engineering of new EE buildings or retrofit of existing buildings to make them more energy efficient. Together with project experts and the JKR technical personnel who were trained under the project, this service will be provided to owners and proponents of building projects (new or retrofit) that incorporate energy efficiency features or replicate the EE technologies and techniques that will be showcased in the building EE demonstrations. This will address the current very limited expertise and experience with design and construction of energy efficient buildings in Malaysia.

- Activity 5.2.1.1: Assessment of the Viability of Local Manufacturing of EE Building Materials and Associated Equipment and/or Components - This activity will involve the evaluation of the feasibility of, and requirements for developing an industry/business for the local manufacture of EE building materials and associated equipment and components. Assessment reports highlighting findings and recommendations for the local building materials industry for the manufacture of such materials for domestic use (and possibly for the export market) will be prepared and submitted to the MITI.
- Activity 5.2.1.2: EE in the Malaysian Buildings Sector Technology Education Program – This will involve the design and conduct of a training course on EE in the buildings sector for JKR/MEGTW personnel, comprehensive training course on EE building materials applications and production technology for local engineering firms. The relevant training materials will be designed based on the identified needs of the local building materials and equipment manufacturers. These training courses are expected to be continuously conducted by the JKR or any appointed institutions after the completion of the BSEEP.
- Activity 5.2.1.3: Development of Building Sector EE Projects and Plans – This activity will involve the provision of technical assistance to the JKR and the building practitioners in efforts towards widespread adoption of EE in the Malaysian buildings sector beyond the BSEEP. Project proposals will be prepared for new projects covering project set-up, cost-benefit analysis (e.g., energy saving potentials and GHG emissions reduction) and financial plan. These proposals will be presented to the GOM and interested local and/or foreign investors. The TA on project proposal preparation and evaluation also forms part of the JKR's and the building service industry's technical capacity building to enable them to become credible service provider to the sector. As part of the promotion of the widespread adoption of EE in the buildings sector and a continuing capacity building for the Public Works Department (JKR), technical assistance will be provided to the building service industry and to interested building developers/owners in the design and engineering of new EE buildings or retrofit of existing buildings to make them more energy efficient. Together with project experts and the JKR technical personnel who were trained under the project, this service will be provided to owners and proponents of building projects (new or retrofit) that incorporate energy efficiency features or replicate the EE technologies and techniques that were showcased in the building EE demonstrations. Based on JKR's planned building development and construction projects (new and refurbishments/retrofit), the number building projects that can be assisted during the BSEEP implementation period is about 30, bulk of which would be building retrofits (23 projects).



*GEF support is required for the technical assistance needed in the assessment of the viability of local EE building materials & equipment manufacturing, in the EE technology training course design and implementation, preparation of EE building construction and EE building technology application project proposals & plans, and in the provision of TA in the design/engineering of new and retrofit building projects.*

### **Project Indicators, Risks and Assumptions**

109. The project success indicators are shown in the Project Planning Matrix (PPM) in Section II, Part II. The target values for these indicators based on the PPM, which will be monitored during the course of the BSEEP implementation, are summarized in Section IV.
110. While all possible efforts have been made to ensure the effective design and implementation of the project activities in the project design phase, there are inevitably some unavoidable residual risks that will have to be carefully monitored and managed during the project to ensure its success. The different risks that were identified during the project formulation and the recommended mitigation measures are described in Section IV.
111. The success of the project relies on the continued political commitment and stable economic growth in Malaysia. Whereas the second is heavily influenced by global and regional developments that are outside the influence of the project, the first can be mitigated to a certain extent by the project itself. This is done by making an effort to involve and commit GOM and its institutions in the activities. GOM will be directly involved through JKR, MEGTW, ST and other government institutions, and the project will endeavor to get the backing from high level political players by involving them in public events, executive level briefings and listen to their advice on how best to proceed with the more politically sensitive activities in the project.

### ***Expected Global, National and Local Benefits***

#### *Global Benefits*

112. The project is forecast to facilitate and influence actions that will result in the reduction of GHG emissions from the country's buildings sector by end-of-project by about 4% as compared to a the GHG emissions in a business-as-usual scenario. The average increase in GHG emission reductions during the course of the project is about 3.8%. After the project, the GHG emission reduction will grown annually by an average of about 11.1%.

| <b>Energy Savings, GWh</b>   |          | <b>Ave. Rate of Increase</b> |
|--|----------|------------------------------|
| • 2010-2014 (Project)  | 2,078.0  | 3.8%                         |
| • 2015-2025 (Post-Project)   | 17,608.7 | 11.1%                        |
| <b>CO<sub>2</sub> Emission Reductions, ktons</b>   |          | <b>Ave. Rate of Increase</b> |
| • 2010-2014 (Project)  | 1,421.3  | 3.8%                         |
| • 2015-2025 (Post-Project)   | 12,044.4 | 11.1%                        |
| <b>% Energy Savings by EOP (Cumulative BAU Energy Consumption by EOP = 51,609.8 GWh)</b>                             |          | 4.0%                         |
| <b>% CO<sub>2</sub> Emission Reductions by EOP (Cumulative BAU CO<sub>2</sub> Emissions by EOP = 35,301.1 ktons)</b> |          | 4.0%                         |

### *National Benefits*

113. Among the key national benefits that the project will bring about are:
- Significant savings in electricity in buildings sector, and corresponding CO<sub>2</sub> emissions reduction, in the long term.
  - Significant capacity has been built, incl. professionals are enabled to design EE buildings on a large scale
  - The access to financing for EE in buildings has improved, incl. the establishment of an EE&EC fund
  - Showcase buildings have proven EE design concepts,
  - Legislative and regulatory frameworks have been improved to promote EE in buildings,
  - Significant awareness has been generated amongst professionals, decision makers, and the general public,
  - Energy rating of buildings and energy management in buildings have attained a firm footing,
  - Monitoring of EE in buildings sector enables better evaluation and development of new policies and strategies by government
  - A number of design tools have been developed, incl. a guidebook and a software tool
  - Access to pertinent and comprehensive information has been organized (through databases etc.)
  - A large number of demonstration buildings have been constructed

### ***Country Ownership: Country Eligibility and Country Drivenness***

114. Malaysia has signed onto the UNFCCC on June 9, 1993, and ratified one year later on July 13, 1994. It has completed and submitted its First National Communications under the framework of the UNFCCC, which highlighted that EE, in general, and ES&L, in particular and among the measures each country are considering for the reduction of GHG emissions. It is now preparing its Second National Communications to the UNFCCC.
115. Jabatan Kerja Raya (JKR) or Public Works Department, an agency under the Ministry of Works is involved in the planning, design, construction and maintenance of public buildings in Malaysia. It is the designated executing agency for this GEF-funded project.
116. Numerous stakeholders' consultations activities, aside from the LFA workshop, were conducted to discuss the issues and concerns (i.e. barriers) regarding the application of building EE technologies. The LFA workshop came up with the activities that are proposed to be carried out under the BSEEP, including the project implementation and management arrangements.
117. BSEEP includes ongoing and planned EE technology application projects of selected project partners, namely JKR, MEGTW, ST and PTM. Other stakeholders comprise SIRIM, Malaysian Sustainable Buildings Council, CIDB, Professional organizations, developers and entrepreneurs, academicians, MAESCO, financing institutions etc. Some of these are among the demonstration activities of the project (these buildings would be constructed in any event, but not likely as energy efficient buildings), and others relate to development of national EE action plan, legislation and financing schemes for the building sector. These are

parallel activities that, as per agreement with the project proponents/owners, will be subsumed in the BSEEP.

118. It should be noted that the demonstration projects are funded separately and are among the co-financed activities of BSEEP. As part of the project (and indicated in the PPM), their results are reported as among the outputs of BSEEP. Where necessary, GEF resources will be used for technical assistance in the implementation of some of these parallel activities. The matching of these parallel activities and BSEEP's technical assistance is very important in achieving the reduction of the identified barriers to building EE technology applications in the Malaysian buildings sector.

#### *Sustainability*

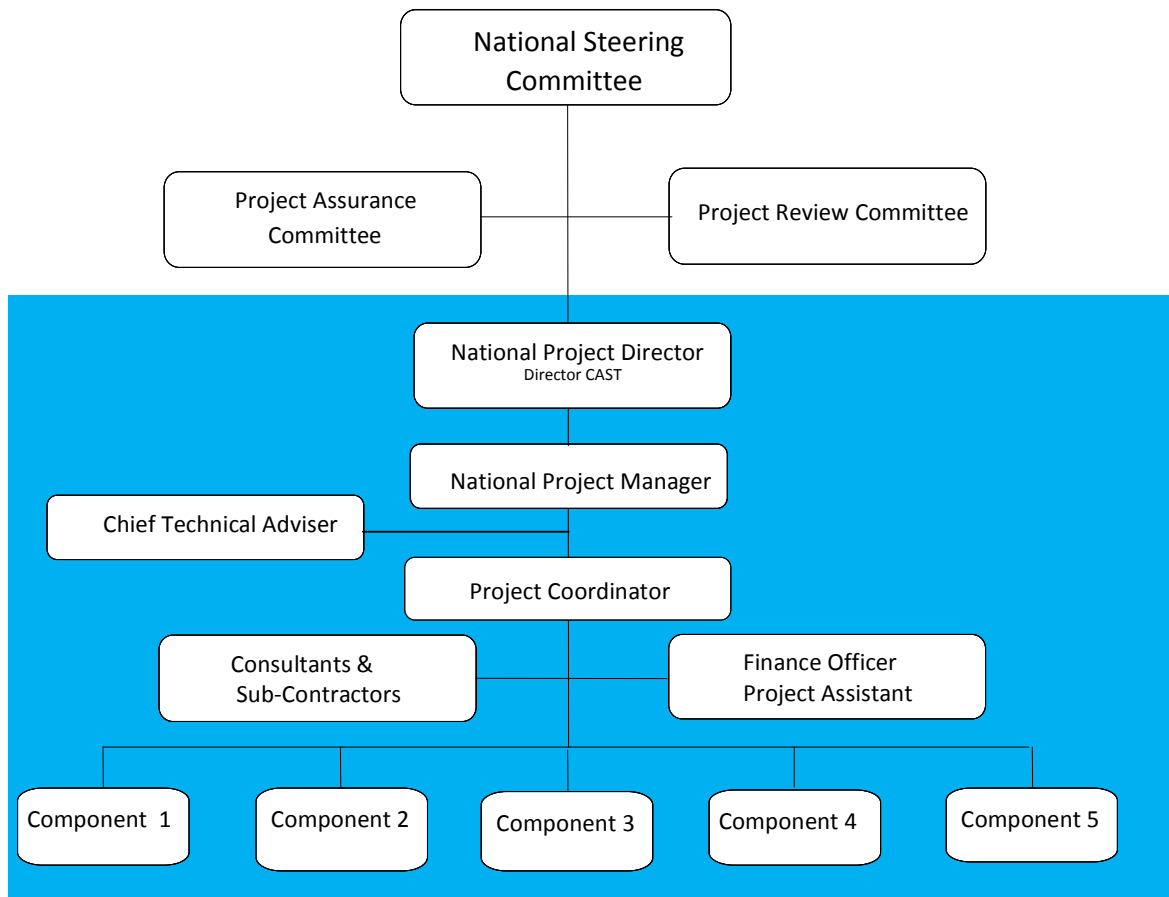
119. Sustainability is an integral element of the BSEEP activities and is ensured through the outputs of most of the project components. The sustainability of the institutional elements of the project will be ensured through the adoption of collaborative approaches and strategies that seek to foster and reinforce the long-term sustainability of existing institutional and coordination structures that have been established and are operational at both the federal and state levels with regards to projects dealing with energy efficiency.
120. Sustainability of the project is ensured through the outputs of the different project components, e.g., endorsed policy and financial frameworks, technical guidelines on building EE technology installation, operation and maintenance, and educated consumers and policy/decision makers, increased know-how and upgraded capacity of service providers.
121. In the final year of the project, a follow-up national program will be designed considering the different achievements and lessons learned. The follow-up program, with a long-term target that is to be achieved in the subsequent Malaysia development plans, will create a significant impact to the energy performance of the Malaysian buildings sector. Projects outputs will be inputs to the Government's 10th Malaysia Plan and 11th Malaysia Plan.

#### *Replicability*

122. BSEEP is designed to have a balanced mix of capacity building and enabling environment activities tailor-made to Malaysia's specific conditions, markets and regulatory environment. Such balanced mix of activities is expected to promote the application of building EE technologies. Replication is an integral component of the project design as the expected energy savings from the application of EE technologies in Malaysian buildings (and the corresponding GHG emissions reduction from the reduced electricity demand) rely on the replication of the relevant BSEEP activities. This is an important part of the project strategy and is a reason for the emphasis put on information and capacity building related activities.
123. Replicability of the proposed project components will be ensured through the documentation of the package of activities/inputs that went into each EE projects that are in one way or another, directly or indirectly influenced by BSEEP.

### PART III: Management Arrangements

124. Given the past experience with UNDP-supported project, UNDP seeks to implement an innovative management approach based on a partnership where accountability and responsibility for managing and achieving project outputs are equally shared among the BSEEP partners.
125. The proposed organizational structure of the project is shown in Fig. 5:



**Fig. 5: BSEEP Project Organizational Structure**

### Project Implementation Arrangements

126. BSEEP will be Nationally-Executed (NEX) by the Malaysian Government and JKR is the appointed executing agency. A National Steering Committee (NSC) will be established and will comprise of the representatives of the UNDP-GEF Regional Coordination Unit (RCU) for Asia-Pacific, UNDP-Malaysia, JKR, MEGTW, MHLG, MNRE and other national stakeholders. The NSC will play the role of an advisory committee and providing an overall direction to the project team. The Chairperson of the NSC will be the Director-General of the Public Works Department (JKR). The NSC will be established with the key responsibilities as follow: (a). Reviewing of annual progress reports for necessary guidance;

- (b) Reviewing and approving the annual work plans and budgets; (c) Providing guidance on the effectiveness of BSEEP implementation, and its linkages to corporate UNDP policy decisions, and other UNDP initiatives; and, (d) Monitoring and evaluating the implementation of BSEEP towards the intended outputs, after two years of project execution. As a minimum, the PSC will meet at least once a year, allowing for the stakeholders to review the progress with the project implementation and to agree on a coordinated annual project implementation strategy and plan.
127. As UNDP's Implementing Partner for this project, Malaysia's JKR will appoint a National Project Director (NPD) to be in charge of overall responsibilities, including planning, coordination, administration and financial management of the project with support by UNDP-Malaysia. The NPD will be responsible for the achievement of the project objectives, for all projects' reporting, including the submission of Annual Work Plans (AWP) and financial reports. He/She will ensure the delivery of the project outputs and the judicious use of the project resources. This will ensure that expected outputs are delivered using the most efficient and cost-effective implementation strategies and procedures. The NPD will be also a member of the NSC. As the project's Implementing Partner, the JKR and other key stakeholder will coordinate in providing in-kind contribution to implement the BSEEP.
128. The Project Management Team (PMT) will be established and will be responsible for coordinating and implementing the project activities and will be headed a government-appointed National Project Director (NPD) which is also serves as the Secretary of the PSC. It will be headed by the GEF-funded full-time National Project Manager (NPM). The NPM will primarily be responsible for the day-to-day management of the project operations covering the administrative, financial and operational aspects of the project implementation. The NPM will be supported by a Project Coordinator (PC) who will coordinate the capacity development, enabling environment, and technical assistance activities that will be carried out in all of the project components.
129. A Financial Officer and a Project Assistant will be employed to ensure efficient disbursement of project funds and administration. Each component will be led by a local Component Managers who will ensure component activities run as stipulated in the project document.
130. Working in conjunction with the various project partners, UNDP-Malaysia will be responsible for monitoring and evaluation (M&E), including organizing project reviews, approving annual implementation work plans and budget revisions, monitoring progress and provide linkages to the other sub-regional, Asia-Pacific regional and global initiatives. All M&E functions will be carried out in line with standard UNDP and UNDP-GEF procedures. UNDP Malaysia will also provide country office support for all the activities of the project as agreed with the implementation partner of Malaysia. Among the activities will include organizing project reviews, approving annual implementation work plans and budget revisions, monitoring progress, identifying problems, suggesting actions to improve project performance, facilitating timely delivery of project inputs, and provide linkages to the other sub-regional, Asia-Pacific regional and global initiatives.
131. A Project Assurance Committee is an independent oversight committee and will be established with the main responsibility of monitoring the project implementation process and achievements. It will also be called upon periodically to contribute inputs on the

relevance of BSEEP activities to the on-going and planned national level energy efficiency and related initiatives and provide necessary recommendations to the NSC.

132. A Project Review Committee (PRC) will comprise of a single or several technical committee meetings based on the selected field areas. The members will include national government professionals, specialized departments and other relevant national stakeholders from the private sector and civil society will, to the extent possible, manage, coordinate and implement the BSEEP activities. The Deputy Director General will be the chair of the PRC. However, he/she can designate an expert on EE technology applications (particularly in buildings) to chair the PRC meetings.

### **BSEEP Implementation**

133. The proposed BSEEP will be implemented for a period of Five Years. Considering the duration of the process of obtaining GEF funding, it is anticipated that the project will kick-off by the 2<sup>nd</sup> Qtr 2010 and end by 3<sup>rd</sup> Qtr 2015
134. To accord proper acknowledgment to GEF for providing funding, a GEF logo will appear on all relevant publications and documents produced by the project, including among others, project hardware purchased with GEF funds. Any citation from any of the BSEEP publications and documents will also accord proper acknowledgment to GEF. The UNDP logo should be more prominent and separated from the GEF logo if possible, as UN visibility is important for security purposes.

### **PART IV: Monitoring and Evaluation Plan and Budget**

135. The project will be monitored through the following M& E activities. The M& E budget is provided in the Table 15.
136. A Project Inception Workshop will be held within the first 2 months of project start with those with assigned roles in the project organization structure, UNDP country office and where appropriate/feasible regional technical policy and programme advisors as well as other stakeholders. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan.
137. The Inception Workshop should address a number of key issues including:
  - Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of UNDP CO and RCU staff vis-à-vis the project team. Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.
  - Based on the project results framework and the relevant GEF Tracking Tool if appropriate, finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
  - Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.

- Discuss financial reporting procedures and obligations, and arrangements for annual audit.
  - Plan and schedule Project Board meetings. Roles and responsibilities of all project organization structures should be clarified and meetings planned. The first Project Board meeting should be held within the first 12 months following the inception workshop.
138. An Inception Report is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided during the meeting.
139. Quarterly reporting will be made at the end of each quarter. Progress made shall be monitored in the UNDP Enhanced Results Based Management Platform. Based on the initial risk analysis submitted, the risk log shall be regularly updated in ATLAS. Risks become critical when the impact and probability are high. Note that for UNDP GEF projects, all financial risks associated with financial instruments such as revolving funds, microfinance schemes, or capitalization of ESCOs are automatically classified as critical on the basis of their innovative nature (high impact and uncertainty due to no previous experience justifies classification as critical). Based on the information recorded in ATLAS, a Project Progress Reports (PPR) can be generated in the Executive Snapshot. Other ATLAS logs can be used to monitor issues, lessons learned etc... The use of these functions is a key indicator in the UNDP Executive Balanced Scorecard.
140. Annual Reporting will be made available end of June every year. The Annual Project Review/Project Implementation Reports (APR/PIR) is prepared to monitor progress made since project start and in particular for the previous reporting period (30 June to 1 July). It shall be prepared by the Project Manager and shared with the NSC as specified period by GEF. The Annual Progress Report shall highlight risks and challenges, the summary of results achieved, and lessons learnt of the project for that reporting year. The APR/PIR combines both UNDP and GEF reporting requirements. The APR/PIR includes, but is not limited to, reporting on the following:
- Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative)
  - Project outputs delivered per project outcome (annual).
  - Lesson learned/good practice.
  - AWP and other expenditure reports
  - Risk and adaptive management
  - ATLAS QPR
  - Portfolio level indicators (i.e. GEF focal area tracking tools) are used by most focal areas on an annual basis as well.
141. UNDP CO and the UNDP-GEF RCU will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the Project Board may also join these visits. A Field Visit Report/BTOR will be prepared by the CO and UNDP-GEF RCU and will be circulated no less than one month after the visit to the project team and Project Board members.
142. The project will undergo an independent Mid-Term Evaluation at the mid-point of project implementation (June 2013). The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will

highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF. The management response and the evaluation will be uploaded to UNDP corporate systems, in particular the UNDP Evaluation Office Evaluation Resource Center (ERC). The relevant GEF Focal Area Tracking Tools will also be completed and utilized during the mid-term evaluation cycle.

143. An independent Final Evaluation (or Terminal Evaluation) will take place three (3) months prior to the final Project Board (or NSC) meeting and will be undertaken in accordance with UNDP and GEF guidance. The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF. The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response which should be uploaded to PIMS and to the UNDP Evaluation Office Evaluation Resource Center (ERC). Similarly, the relevant GEF Focal Area Tracking Tools will also be completed during the final evaluation.
144. During the last three months, the project team will prepare the Project Terminal Report. This comprehensive report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, problems met and areas where results may not have been achieved. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's results.
145. Results from the project will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects. Finally, there shall be a two-way flow of information between this project and other projects of a similar focus.

### **Financial Monitoring and Quality Assurance**

146. The Combined Delivery Report (CDR) is the report that reflects the Total expenditures and actual obligations (recorded in ATLAS) of a Project during a period. This report is prepared by UNDP using ATLAS and shared with the implementing partner on a quarterly basis and at the end of each year. The Implementing Partner is required to verify each transaction made and sign the quarterly issued CDR report. Statements of cash position as well as assets and equipments should also be submitted together with the CDR on a yearly basis.
147. Audit is an integral part of sound financial and administrative management, and of the UNDP accountability framework. The project will be audited at least once in its lifetime



and in accordance with the threshold established for the annual expenditures by the Office of Audit and Investigations (OAI). The audit provides UNDP with assurance that resources are used to achieve the results described and that UNDP resources are adequately safeguarded. The selection of an Audit Firm shall be through a competitive Request for Proposals, in consultation with the Implementing Partner and EPU or if possible shall be performed by the National Audit Authority. UNDP procedures must be followed as per the specific Terms of Reference for Audits of NEX/NIM Projects. The audit is expected to provide assurance related to the following broad areas:

- Project progress and rate of delivery (PP)
- Financial management (FM)
- Procurement of goods and /or services (PR)
- Human resource selection and administration (HR)
- Management and use of equipment and inventory (EQ)
- Record-keeping systems and controls (R)
- Management structure (MS)
- Auditors' comments on the implementation status of prior year audit

#### **PART VI: Legal Context**

148. The project document shall be the instrument envisaged in the Supplemental Provisions to the Project Document, attached hereto.
149. The term "Government Co-Operating Agency" mentioned in the Supplemental Provision shall mean the executing agency/implementing partner to the project as stated in the cover page of this document.
150. Consistent with the above Supplemental Provisions, the responsibility for the safety and security of the executing agency/ implementing partner and its personnel and property, and of UNDP's property in the executing agency's custody, rests with the executing agency/implementing partner.
151. The executing agency/ implementing partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via <http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm>.

## SECTION II: STRATEGIC RESULTS FRAMEWORK AND GEF INCREMENTAL

### PART I: Incremental Cost Analysis

#### *Broad Development Goals*

1. The buildings sector in Malaysia is one of the fast growing sectors of the country. In 2008, the estimated electricity use in the buildings sector amounted to about 7,750 GWh. The present growth in annual energy consumption in buildings is expected to continue to contribute significantly to the country's GHG emissions unless efforts are done to improve energy efficiency. The growth in energy consumption experienced is brought about both by an increase in new building constructions (about 6 % per year), inefficient energy utilization and continuously increasing stock of electrical appliances in new and existing buildings.
2. The average building energy index of buildings in Malaysia is about 205 kWh/m<sup>2</sup>/yr; public buildings at 225 kWh/m<sup>2</sup>/yr and private buildings at 185 kWh/m<sup>2</sup>/yr. A building is considered an energy efficient building (i.e., EE Building) if has a BEI of 136 kWh/m<sup>2</sup>/yr or lower. Currently, only 11% of the building stock is considered EE buildings.
3. The CO<sub>2</sub> emissions from the building sector (mainly from electricity utilization) in 2008 are about 5,301 ktons. Considering that the growth in electricity consumption in buildings is higher than in other sectors, and the fact that the potential for improvements are substantial in this sector, there are strong reasons to address the situation comprehensively through a project that will facilitate the widespread application of EE technologies and practices in this sector.
4. The goal of this proposed project is the reduction of GHG emissions from the Malaysian buildings sector. The project objective is the improvement of the energy utilization efficiency in Malaysian buildings, particularly those in the commercial and government sectors, by promoting the energy conserving design of new buildings and by improving the energy utilization efficiency in the operation of existing buildings. The realization of this objective will be facilitated through the removal of barriers to the uptake of building energy efficiency technologies, systems, and practices.

#### *Global Environmental Objective*

5. The proposed project will facilitate the realization of energy savings in the buildings sector, which translates to reduction of CO<sub>2</sub> emissions (from fossil fuels used in power generation. The potential CO<sub>2</sub> emission reductions during the course of the 5 year project implementation are expected to accumulate to around 1,421.3 ktons CO<sub>2</sub>. This represents about 4% reduction in CO<sub>2</sub> emissions compared to the magnitude of CO<sub>2</sub> emissions under a business-as-usual scenario. Five years after the project end, CO<sub>2</sub> emissions are forecast to be around 7.2% lower in annual emissions should there will be no project.

#### *Baseline Activities*

6. Recognizing the need to address the inefficiencies in the buildings sector, a number of EE initiatives have been planned by some government agencies (e.g., JKR) and private sector entities. Unfortunately, these efforts are by and large stand-alone individual efforts. There are no coordination among the project owners and proponents to at least explore and take

advantage of potential synergies in order to deliver more impacts to the buildings sector. The following are what can be expected under a business-as-usual scenario:

- a) The formation of Malaysian Sustainable Buildings Council
- b) In 2007/2008 there has been a weak, but strengthening trend towards having prestigious corporate headquarters designed to fulfill a “gold” rating by applying the US founded LEED standard<sup>23</sup> This trend is assumed to continue in the baseline, meaning that a number of large – especially multinational, or internationally oriented – organizations take steps to incorporate EE in their buildings.
- c) EE technology will gradually become more available and less costly as regional and global developments naturally trickle down to the Malaysian market, and some – mainly export oriented – Malaysian manufacturers will increase their turnover and activities due to global demand for EE products
- d) As market demand for energy efficient building design inspired by global and regional trends<sup>24</sup>, and energy management is pushed by increasing energy costs, available expertise locally will gradually be enhanced in an ad hoc fashion.
- e) Institutions like PTM and JKR will continue their work within EE in buildings, but rely heavily on project financing which make a concerted and continuous effort difficult to maintain
- f) Government policies and legislation is likely to develop slowly towards more explicit support and demands for EE, not least since national oil and gas supplies begin to dwindle
- g) Financial institutions will likely get increasingly favorably inclined towards EE as global trends trickle down to the Malaysian market. This will without the project be a slowly developing and not particularly systematic process.
- h) The incentive offered through CERs via the Clean Development Mechanism may possibly also to some extent help improve financing perspectives in the long term.

#### *GEF Alternative*

7. Under the alternative scenario, a number of activities will be implemented to improve energy efficiency in the Malaysian buildings sector through various means, including awareness raising and provision of information, strengthening of policies and regulatory regimes, erection of a number of building demonstration projects and dissemination of the results and technologies used, strengthening of financial support mechanisms and capacity in financial institutions to engage in building EE projects, development of a building rating system and also a monitoring system for EE in the building sector, and strengthening of capacity amongst professionals to implement energy efficiency projects in buildings.
8. In line with the GEF’s Climate Change Strategic Program 1, the proposed project will facilitate the realization of the Alternative Scenario, which will be manifested by and large by the following outcomes:
  - Clear and effective system of monitoring and improving the energy performance of the building sector

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<sup>23</sup> Examples that are **under development** include Sime Darby world HQ (KL), Public Mutual Bank(KL) HQ, TNB new HQ (KL), Sarawak Energy HQ (Kuching), Shell HQ (KL), and others

<sup>24</sup>Thailand and Singapore for example have mandatory building energy regulations; Indonesia is increasingly focusing on Energy Efficiency and Renewable Energy for buildings, etc. China is increasingly pushing for EE due to its rapidly rising energy costs caused by rapid economic growth and other factors. Globally climate change and rising energy costs push strongly for EE and RE

- Implementation of, and compliance to, favorable policies that encourage the application of EE technologies in the country's buildings sector
  - Availability of financial and institutional support for initiatives on EE building technology applications
  - Enhanced awareness of the government, public and the buildings sector on EE building technology applications
  - Improved confidence in the feasibility, performance, energy, environmental and economic benefits of EE building technology applications leading to the replication of the EE technology application demonstrations
9. The project is expected to facilitate and influence actions that will result in the reduction of GHG emissions from the country's buildings sector by end-of-project by about 4% as compared to a the GHG emissions in a business-as-usual scenario. The average increase in GHG emission reductions during the course of the project is about 3.8%. After the project, the GHG emission reduction will grown annually by an average of about 11.1%.
- Cumulative energy savings by EOP = 2,078 GWh<sup>25</sup>
  - Cumulative CO<sub>2</sub> emission reductions by EOP = 1,421 ktons<sup>26</sup>
  - % of building stock that are EE buildings by EOP = 30%
10. BSEEP is comprised of 5 major components consisting of complementary activities designed to remove barriers to achieve the abovementioned outcomes and contribute to the achievement of the project objective. The project components are as follows:
11. **Component 1: Institutional Capacity Development** – This component is focused on the strengthening of the institutional framework to promote Energy Management in buildings. The activities under this component will collectively cost around **US\$ 1,079,030** to implement. Implementing the incremental activities will cost **US\$ 462,000**, which will be financed by the GEF.
12. **Component 2: Policy Development and Regulatory Frameworks** – This component is intended to address the need to strengthen the policy, legislative and regulatory foundations of the push for EE in buildings in Malaysia. The activities under this component collectively cost about **US\$ 1,026,760** to implement. The cost of the incremental activities is **US\$ 592,000** and this will be financed by the GEF.
13. **Component 3: EE Financing Capacity Improvements** – This component is comprised of activities that are aimed at strengthening the local capacity to provide funding for EE building projects, as well as streamlining and establishment of delivery mechanisms. The activities under this component will collectively cost around **US\$ 1,050,580** to implement. The GEF will finance the cost of incremental activities which comes up to **US\$ 502,000**.
14. **Component 4: Information and Awareness Enhancement** – This component entails development of design tools, improvements to organization, scope and accessibility of pertinent information, enhancement of awareness and incentives to motivate designers. The activities under this component will collectively cost about **US\$ 1,972,840** to implement. Incremental activities will cost **US\$ 1,242,000** and will be financed by the GEF.

<sup>25</sup> Compared to BAU, this represents a 4% energy savings. Average annual increase in energy savings is 3.8%

<sup>26</sup> Compared to BAU, this represents a 4% CO<sub>2</sub> emission reduction (@ 0.684 ton CO<sub>2</sub>/MWh). Average annual increase in CO<sub>2</sub> emission reduction is 3.8%

15. **Component 5: Building EE Demonstrations** – This component focuses on the construction of a number of demonstration buildings to showcase and provide evidence on performance of properly designed energy efficient buildings in Malaysia. The implementation of the activities under this component will collectively cost about **US\$ 23,495,582**. Incremental activities under this component cost **US\$ 1,735,000** to implement and will be financed by the GEF.

*Incremental Cost Matrix and Project Indicative Budget*

16. The proposed budget for each project component is shown in Table 4 below. In total, the requested grant from GEF is US\$ 5,000,000.

**Table 4: Summary Cost of Each Project Component (US\$)**

| Project Component                        | Incremental (GEF) | Baseline (Co-Financing) | TOTAL      |
|--|-------------------|-------------------------|------------|
| 1. Institutional Capacity Development    | 462,000           | 617,030                 | 1,079,030  |
| 2. Policy Development and Regulatory     | 592,000           | 434,760                 | 1,026,760  |
| 3. EE Financing Capacity Improvements    | 502,000           | 548,580                 | 1,050,580  |
| 4. Information and Awareness Enhancement | 1,242,000         | 730,840                 | 1,972,840  |
| 5. Building EE Demonstrations            | 1,735,000         | 21,760,582              | 23,495,582 |
| Project Management                       | 467,000           | 544,090                 | 1,011,090  |
| <b>Total</b>                             | 5,000,000         | <b>24,635,882</b>       | 29,635,882 |

17. Table 5 shows the project cost sharing between the GEF, Government of Malaysia, and the private sector.

**Table 5: Project Cost Sharing Matrix (US\$)**

| PROJECT COMPONENTS                              | GEF       | National Gov't    | Private Sector   | Total      |
|---|-----------|-------------------|------------------|------------|
| 1. Institutional Capacity Development           | 462,000   | 617,030           | 0                | 1,079,030  |
| 2. Policy Development and Regulatory Frameworks | 592,000   | 434,760           | 0                | 1,026,760  |
| 3. EE Financing Capacity Improvements           | 502,000   | 548,580           | 0                | 1,050,580  |
| 4. Information and Awareness Enhancement        | 1,242,000 | 730,840           | 0                | 1,972,840  |
| 5. Building EE Demonstrations                   | 1,735,000 | 16,530,026        | 5,230,556        | 23,495,582 |
| Project Management                              | 467,000   | 544,090           | 0                | 1,011,090  |
| <b>TOTAL</b>                                    | 5,000,000 | <b>19,405,326</b> | <b>5,230,556</b> | 29,635,882 |

18. The summary of confirmed co-financing is shown in Table 6.

**Table 6: Summary of Project Co-Financing**

| <b>Contributor</b>            | <b>Classification</b> | <b>Type</b> | <b>Amount (US\$)</b> | <b>Status</b> |
|-------------------------------|-----------------------|-------------|----------------------|---------------|
| Public Works Department (JKR) | Gov't Agency          | Cash        | 15,947,222           | Confirmed     |
| Public Works Department (JKR) | Gov't Agency          | In-kind     | 3,458,104            | Confirmed     |
| Putra Perdana                 | Private Sector        | Cash        | 1,666,667            | Confirmed     |
| Putra Perdana                 | Private Sector        | In-kind     | 100,000              | Confirmed     |
| Sime Darby                    | Private Sector        | Cash        | 3,263,889            | Confirmed     |
| Sime Darby                    | Private Sector        | In-kind     | 200,000              | Confirmed     |
| <b>Total</b>                  |                       |             | <b>24,635,882</b>    |               |

NOTE: 1 USD = 3.6 MYR

19. Table 7 shows the incremental cost matrix. The baseline and alternative courses of actions are presented together with the required costs for implementing them.

**Table 7: Incremental Cost Matrix**

| Component  | Baseline  | Alternative   | Increment  |
|--|---|---|--|
| <b>Global Environmental Benefits</b>                   |   | <ul style="list-style-type: none"> <li>• Reduced CO<sub>2</sub> emissions from the Malaysian buildings sector</li> <li>• Reduced CO<sub>2</sub> emissions in Malaysia in the long term</li> </ul>   | <p>Enable changing the direction development would take in the baseline towards increased capacity to improve EE in the buildings sector.</p>  |
| <b>Domestic Benefits</b>                               | <p>The energy intensity of buildings gradually stabilizes and a kind of status quo will be maintained. In the long term building energy efficiency will improve slowly as technology developments and design strategies abroad filters through to the Malaysian market.</p> | <ul style="list-style-type: none"> <li>• Significant savings in electricity in buildings sector, and corresponding CO<sub>2</sub> emissions reduction, in the long term</li> <li>• Significant capacity built, incl. professionals are enabled to design EE buildings on a large scale</li> <li>• The access to financing for EE in buildings improved, incl. the establishment of an EE&amp;EC fund</li> <li>• Showcase buildings with proven EE design concepts</li> <li>• Legislative and regulatory frameworks improved to promote EE in buildings</li> <li>• Generate significant awareness amongst professionals, decision makers, and the general public</li> <li>• Promotion of the practice of energy rating of buildings and energy management in buildings</li> <li>• Monitoring of EE in buildings sector enables better evaluation and development of new policies and strategies by govt</li> <li>• A number of design tools developed, incl. a guidebook and a software tool</li> <li>• Access to pertinent and comprehensive information organized (through databases etc.)</li> <li>• Demonstration buildings constructed</li> </ul> | <p>Generate awareness; develop design tools, establish a building energy rating system; establish a federal energy management program, build capacity amongst professionals; develop financing mechanisms; strengthen policy, legislation and regulatory frameworks; update MS1525, etc.; EE-monitoring system for buildings sector put in place, delivers showcases (demonstration buildings)</p> |
| <b>Component 1: Institutional Capacity Development</b> | <p><b>Business as Usual</b></p> <ul style="list-style-type: none"> <li>• No strong coordinated Energy Management effort</li> <li>• Each agency will implement energy management according to its own definition</li> <li>• Lack of coordinated policies</li> </ul>          | <p><b>Proposed Situation</b></p> <ul style="list-style-type: none"> <li>• Energy Management in Buildings is significantly strengthened in Malaysia emulating the successful approach taken in other countries and the establishment of a dedicated Malaysian Federal Buildings Energy Management Programme (MFBEMP).</li> <li>• Operational BERM program that will monitor and evaluate the energy performance of buildings in the</li> </ul>   | <p><b>Additional Features</b></p> <ul style="list-style-type: none"> <li>• Malaysian Federal Energy Management Programme (MFBEMP) established</li> <li>• BERM program</li> <li>• MEERB established</li> </ul>  |

| Component  | Baseline   | Alternative  | Increment  |
|--|--|--|--|
|  | and implementation   | buildings sector <ul style="list-style-type: none"> <li>The development of a comprehensive energy management guideline for GOM and disseminate its use to potential energy managers, as well as key decision makers in government in order to break the ice and secure the all important backing of top management.</li> </ul>   |  |
|  | <b>Domestic Benefits</b><br>None   | <b>Domestic Benefits</b> <ul style="list-style-type: none"> <li>Increased ability of public and private practitioners in developing more EE buildings.</li> <li>Greater domestic market for EE products,</li> <li>Organized and streamlined government's building guidelines</li> </ul>  | <b>Domestic Benefits</b> <ul style="list-style-type: none"> <li>Malaysian government buildings acts as example to building sectors</li> <li>Accurate and systematic data collection leads to greater building monitoring products.</li> </ul>  |
|  | <b>Global Benefits</b><br>none   | <b>Global Benefits</b><br>Demand for EM solutions strengthened; National building EE programme will be streamlined with other international EE programs.   | <b>Global Benefits</b><br>Demand for EM solutions strengthened. National building EE programme will be streamlined with other international EE programs  |
| <b>COST</b>  | <b>USD 617,030</b>   | <b>USD 1,079,030</b>   | <b>USD 462,000</b>   |
| <b>Component 2:<br/>Policy Development and Regulatory Frameworks</b> | <b>Business as Usual</b> <ul style="list-style-type: none"> <li>Slowly developing EE policies and legislation</li> <li>Development in EE in buildings characterized by lowest common denominator and dependent on global and regional developments</li> <li>R&amp;D not stimulated by challenging demands and allocation of resources</li> </ul> | <b>Proposed Situation</b> <ul style="list-style-type: none"> <li>Proactive EE policies drive development forward, and results in reduced energy intensity in buildings</li> <li>CO<sub>2</sub> emissions reductions</li> <li>Stronger R&amp;D environment encouraged by policy targets, regulatory requirements and allocation of resources from government</li> </ul> | <b>Additional Features</b> <ul style="list-style-type: none"> <li>Action plan for EE in buildings sector</li> <li>Introduced MS 1525 as mandatory requirement</li> <li>Update of MS 1525</li> <li>Code of practice for residential buildings, monitoring system for EE in buildings sector in place</li> <li>EE Act drafted and implemented</li> </ul> |
|  | <b>Domestic Benefits</b><br>None   | <b>Domestic Benefits</b><br>Ability of private sector to adopt EE programme increased.   | <b>Domestic Benefits</b><br>Ability of private sectors to adopt EE programme increased.  |
|  | <b>Global Benefits</b><br>None   | <b>Global Benefits</b><br>Greater market transparency for investors.   | <b>Global Benefits</b><br>Greater market transparency for investors  |



| Component   | Baseline  | Alternative  | Increment   |
|---|---|--|---|
| <b>COST</b>   | <b>USD 434,760</b>  | <b>USD 1,026,760</b>   | <b>USD592,000</b>   |
| <b>Component 3: EE Financing Capacity Improvements</b>    | <b>Business as Usual</b> <ul style="list-style-type: none"> <li>Stimulus for EE weak (inefficient incentives)</li> <li>Difficult to find and get financing for EE projects in buildings</li> <li>ESCOs continue to have difficulties</li> </ul>   | <b>Proposed Situation</b> <ul style="list-style-type: none"> <li>Incentives for investments in EE work better and provide stimulus to the market players to invest in EE</li> <li>A fund for support to EE projects and investments is established and enables greater amounts of funding to be channeled towards EE in buildings, and conditions for the financing is better than current strictly commercial terms</li> <li>ESCOs have easier access to funding through better understanding and cooperation between the financial sector and the energy services sector.</li> </ul> | <b>Additional Features</b> <ul style="list-style-type: none"> <li>Existing incentives have been streamlined, online applications and monitoring made possible</li> <li>EE fund designed and approved</li> <li>ESCOs and financial sector players have been given better understanding of each other's situation, needs and limitations</li> <li>Capacity has been built in financial sector to deal more effectively and factually with EE financing.</li> </ul>                        |
|   | <b>Domestic Benefits</b><br>None  | <b>Domestic Benefits</b> <ul style="list-style-type: none"> <li>Ability of private sector to adopt EE programme increased.</li> <li>Availability of financing for EE projects in the buildings sector</li> </ul>   | <b>Domestic Benefits</b> <ul style="list-style-type: none"> <li>Ability of private sector to adopt EE programme increased.</li> <li>Availability of financing for EE projects in the buildings sector</li> </ul>  |
|   | <b>Global Benefits</b><br>None  | <b>Global Benefits</b> <ul style="list-style-type: none"> <li>More investment in EE drives down energy usage and thus CO<sub>2</sub> emissions;</li> <li>More investment provides more opportunities for global players in the EE market</li> </ul>  | <b>Global Benefits</b> <ul style="list-style-type: none"> <li>More investment in EE drives down energy usage and thus CO<sub>2</sub> emissions;</li> <li>More investment provides more opportunities for global players in the EE market</li> </ul>   |
| <b>COST</b>   | <b>USD 548,580</b>  | <b>USD 1,050,580</b>   | <b>USD 502,000</b>  |
| <b>Component 4: Information and Awareness Enhancement</b> | <b>Business as Usual</b> <ul style="list-style-type: none"> <li>Lack of, and difficult to find information;</li> <li>No user-friendly design tools adapted to Malaysian context</li> <li>Awareness on EE in buildings is low</li> <li>Few professionals with EE design expertise</li> <li>No way to determine and compare energy</li> </ul> | <b>Proposed Situation</b> <ul style="list-style-type: none"> <li>Enhanced and accessible information on good practices in online database</li> <li>Pertinent information disseminated; guidebook and endorsed user-friendly software tool adapted to Malaysian context</li> <li>JKR policy to adopt MS 1525 or better</li> <li>Awareness campaigns and competitions</li> <li>Malaysian Energy Efficiency Rating system for buildings in place</li> <li>BERM program</li> <li>Operational entity for MEER established</li> </ul>  | <b>Additional Features</b> <ul style="list-style-type: none"> <li>Accessible detailed information on good practices in online database</li> <li>Pertinent information disseminated; guidebook and endorsed user-friendly software tool adapted to Malaysian context</li> <li>Training courses on BEMs</li> <li>JKR policy to adopt MS 1525 or better</li> <li>Awareness campaigns and competitions</li> <li>Malaysian Energy Efficiency Rating system for buildings in place</li> </ul> |

| Component                                      | Baseline  | Alternative  | Increment   |
|--|---|--|---|
|  | <p>performance of buildings</p> <ul style="list-style-type: none"> <li>Few incentives for professionals to make an extra effort to design energy efficiently and come up with innovative solutions.</li> <li>Information on building is uncoordinated.</li> </ul> | <ul style="list-style-type: none"> <li>Capacity has been built amongst professionals in govt. and private sector</li> </ul>  | <ul style="list-style-type: none"> <li>BERM program</li> <li>Capacity has been built amongst professionals in government and private sector</li> </ul>  |
|  | <p><b>Domestic Benefits</b><br/>Building costs lower to some extent than in alternative scenario – at least in the short term</p>   | <p><b>Domestic Benefits</b></p> <ul style="list-style-type: none"> <li>Increased awareness and ability of local building practitioners to respond to EE</li> <li>Trained building practitioners can lead to minimum technical risk in EE</li> <li>Lower costs of managing building</li> <li>MEERB will reduce transaction and maintenance cost due to informed building performance.</li> </ul>  | <p><b>Domestic Benefits</b></p> <ul style="list-style-type: none"> <li>Systematic training modules for EE training courses</li> <li>Reduced cost of building operation and maintenance due to increased expertise</li> <li>MEERB will reduce transaction and maintenance cost due to informed building performance.</li> </ul>  |
|  | <p><b>Global Benefits</b><br/>Demand for EE products and services will be slow and unattractive</p>   | <p><b>Global Benefits</b></p> <ul style="list-style-type: none"> <li>Demand for EE products and services strengthened</li> <li>Easily available information on EE systems and equipment create opportunities for CO<sub>2</sub> emission reductions</li> </ul>   | <p><b>Global Benefits</b><br/>Demand for EE products and services strengthened</p>  |
| <b>COST</b>                                    | <b>USD 730,840</b>  | <b>USD 1,972,840</b>   | <b>1,242,000</b>  |
| <b>Component 5: Building EE Demonstrations</b> | <p><b>Business as Usual</b><br/>Planned building projects designed and built based on conventional design, which are not energy efficient and would have BEIs that are more or less 200 kWh/m<sup>2</sup>/yr.</p>   | <p><b>Proposed Situation</b><br/>10 demonstration projects showcasing EE design of new as well as exiting buildings of different types provide good leadership and examples for others to follow. In addition 30 buildings (new and refurbishment/retrofit) from JKR's planned building development and construction projects assisted to be designed as EE buildings. These also provide hard evidence on benefits of EE building design.</p> | <p><b>Additional Features</b></p> <ul style="list-style-type: none"> <li>10 demonstration buildings; capacity built in building sector through direct involvement in design, construction, commissioning and monitoring of EE building projects</li> <li>Additional hard evidence is furnished on the benefits to be reaped from EE design of new buildings and retrofits</li> <li>30 additional building projects assisted for EE building design and construction.</li> </ul> |
|  | <p><b>Domestic Benefits</b><br/>None</p>  | <p><b>Domestic Benefits</b><br/>Demonstration projects serve as the showcase building for domestic building industry.</p>  | <p><b>Domestic Benefits</b><br/>Demonstration projects serve as the showcase building for domestic building</p>   |

| <b>Component</b>          | <b>Baseline</b>                | <b>Alternative</b>   | <b>Increment</b>   |
|---------------------------|--------------------------------|--|--|
|                           |                                |  | industry.  |
|                           | <b>Global Benefits</b><br>None | <b>Global Benefits</b> <ul style="list-style-type: none"> <li>• Easier for international contractors/designers to get assignments in Malaysia and vice-versa;</li> <li>• CO<sub>2</sub> emissions reductions from the demonstration buildings</li> <li>• CO<sub>2</sub> emission reductions from replication projects</li> </ul> | <b>Global Benefits</b> <ul style="list-style-type: none"> <li>• Easier for international contractors/designers to get assignments in Malaysia and vice-versa;</li> <li>• CO<sub>2</sub> emissions reductions from the demonstration buildings</li> </ul> |
| <b>COST</b>               | <b>USD 21,760,582</b>          | <b>USD 23,495,582</b>  | <b>USD 1,735,000</b>   |
| <b>Project Management</b> | <b>USD 544,090.00</b>          | <b>USD 1,011,090</b>   | <b>USD 467,000</b>   |
| <b>TOTAL COST</b>         | <b>USD 24,635,882</b>          | <b>USD 29,635,882</b>  | <b>USD 5,000,000</b>   |

**PART II: Logical Framework Analysis (Project Planning Matrix)**

**Table 8: Project Planning Matrix (PPM)**

| Strategy   | Success Indicator   | Baseline | Target  | Means of Verification   | Assumptions  |
|--|---|----------|---------|---|--|
| <b>GOAL:</b> Reduced intensity of GHG emissions from the buildings sector  | • Cumulative CO <sub>2</sub> emission reduction from the buildings sector by end-of-project (EOP, Year 2014), kton CO <sub>2</sub> eq | 0        | 1,421.3 | <ul style="list-style-type: none"> <li>• CBEED</li> <li>• BERM Program data</li> <li>• MEERB</li> <li>• PTM building-sector energy database</li> </ul>  | <ul style="list-style-type: none"> <li>• GOM commitment to EE remains firm</li> <li>• Current economic growth at least remains constant</li> </ul> |
|  | • % reduction in GHG emissions from the buildings sector by EOP   | 0        | 7.2     |   |  |
|  | • Average emission reduction in the buildings sector by EOP, kg/m <sup>2</sup>  | 0        | 5.3     |   |  |
| <b>OBJECTIVE:</b><br>Improved energy utilization efficiency in the buildings sector                                      | • Cumulative energy savings from the buildings sector by EOP, GWh   | 0        | 2,078   | <ul style="list-style-type: none"> <li>• CBEED</li> <li>• BERM Program data</li> <li>• MEERB</li> <li>• PTM building-sector energy database</li> <li>• Annual reports from client departments, JKR, and other building project developers.</li> </ul> | <ul style="list-style-type: none"> <li>• GOM commitment to EE remains firm</li> <li>• Current economic growth at least remains constant</li> </ul> |
|  | • Average BEI in the Malaysian buildings sector by EOP, kWh/m <sup>2</sup> -yr  | 205      | 187.3   |   |  |
|  | • % Energy savings reduction by EOP   | 0        | 7.2     |   |  |
|  | No. buildings with EMS and/or EMP in place by EOP   | 160      | 576     |   |  |
|  | % improvement of BEI in the buildings sector by EOP   | 0        | 8.6     |   |  |
|  | No. of new EE buildings by EOP (Basis: End 2009)  | 0        | 39      |   |  |
|  | % of new buildings that are considered EE buildings at EOP (Basis: End 2009)  | 0        | 30      |   |  |
| <b>COMPONENT 1: Institutional Capacity Development</b>   |   |          |         |   |  |
| <b>Outcome 1: Clear and effective system of monitoring and improving the energy performance of the buildings sector.</b> |   |          |         |   |  |
| <b>Output 1: GOM agencies/departments that employ and implements energy management systems</b>                           |   |          |         |   |  |
| <b>Activity 1.1:</b><br><u>Capacity Needs Assessment in the GOM Institutions on Building Energy Management</u>           | • No. of training programs on building energy management in Government Agencies/Institutions conducted each year starting Year 2010   | 0        | 4       | <ul style="list-style-type: none"> <li>• Documentation on the training programs</li> <li>• Evaluation reports on training programs</li> <li>• BERM Reports</li> </ul>   | GOM institutions interested in learning EC&EE, particularly BEM.   |
|  | • No. of government agencies/institutions that are aware of, and the benefits of, building energy                                     | 10       | 150     |   |  |

| Strategy   | Success Indicator  | Baseline | Target        | Means of Verification   | Assumptions   |
|--|--|----------|---------------|---|---|
|  | management (BEM) in their day-to-day operations by EOP   |          |               | • Project Reports   |   |
|  | • No. of government agencies/institutions that have employed BEM programs by EOP                                     | 10       | 150           |   |   |
| <b>Activity 1.2:</b><br><u>Development of a Malaysian Federal Building Energy Management Program (MFBEMP)</u>        | • An established and fully operational Malaysian Federal Buildings Energy Management Programme (MFBEMP) by Year 2012 | 0        | 1             | Documentation of the approved MFBEMP  | Continuous support of GOM institutions on MFBEMP even after the BSEEP                                 |
|  | • Average annual total budget for the MFBEMP by EOP, RM Million  | 0        | 40            | MBEMP annual reports and plans  |   |
| <b>Activity 1.3:</b><br><u>Preparation of Specific Energy Management (EM) Guidelines for Government Institutions</u> | • Completed and approved guidebook on Energy Management Guidelines for Government Institutions by Year 2012          | 0        | 1             | • Published guidebook<br>• MBEMP reports<br>• BERM Reports<br>• Project Reports     |   |
|  | • No. of government building managers each year that are satisfied in using the EM guidelines starting Year 2013     | 0        | 10            |   |   |
|  | • No. of government buildings with BEM programs designed based on the EM guidelines by EOP                           | 0        | 160           |   |   |
| <b>Activity 1.4:</b><br><u>Monitoring and Evaluation of the MFBEMP Impacts</u>                                       | • Average level of investment/budget each year on energy efficiency per building starting Year 2011, RM              | 0        | 20,000        | • MBEMP reports<br>• BERM Reports<br>• CBEEED                                       | Continuous support of GOM institutions on MFBEMP even after the BSEEP                                 |
|  | • Average energy savings per building generated from EE projects and BEM activities starting Year 2011, RM           | 0        | 100,000       |   |   |
| <b>Activity 1.5:</b><br><u>Building Energy Reporting and Monitoring (BERM) Program</u>                               | • No. of buildings actively participating in the BERM Program each year starting Year 2012                           | 0        | 350           | • Documentation on the approved BERM program<br>• BERM Reports<br>• Project Reports | Building owners see the benefits of the BERM program and continuously support it even after the BSEEP |
|  | • % of reporting buildings each year that are satisfied with the BERM program starting Year 2012                     | 0        | 70 (at least) |   |   |
|  | • No. of reporting buildings that have met and/or exceeded the set BEI (for specific building types) by EOP          | 0        | 20            |   |   |
|  | • % Improvement in the BEI (i.e., reduction) per building category by EOP  |          |               |   |   |

| Strategy   | Success Indicator   | Baseline | Target        | Means of Verification  | Assumptions  |
|--|---|----------|---------------|--|--|
|  | <ul style="list-style-type: none"> <li>▪ Office buildings</li> <li>▪ Hotel buildings</li> <li>▪ Hospital buildings</li> <li>▪ Retail buildings</li> </ul> | 0        | 10            |  |  |
|  |   | 0        | 10            |  |  |
|  |   | 0        | 10            |  |  |
|  |   | 0        | 10            |  |  |
| <b>COMPONENT 2: Policy Development &amp; Regulatory Frameworks</b>   |   |          |               |  |  |
| <b>Outcome 2: Implementation of, and compliance to, favorable policies that encourage the application of EE technologies and practices in the country's buildings sector</b> |   |          |               |  |  |
| <b>Output 2.1: Improved Malaysian EE Building policies, legislation, regulations and action plan</b>   |   |          |               |  |  |
| <b>Activity 2.1.1: <u>Conduct of Building EE Policy Studies</u></b>  | • No. of policy studies conducted by EOP  | 0        | 10            | Documentation of completed policy studies  | <ul style="list-style-type: none"> <li>• GOM commitment to EE remains firm</li> <li>• Current economic growth at least remains constant</li> </ul> |
|  | • No. of recommended policies from completed policy studies that are implemented and enforced by local governments, JKR and MHLG by EOP                   | 0        | 5             | <ul style="list-style-type: none"> <li>• Documentation of approved policies</li> <li>• Implementing rules &amp; regulations on policies</li> </ul> |  |
| <b>Activity 2.1.2: <u>Formal &amp; informal discussions with policymakers</u></b>  | • No. of policy making agencies endorsing the proposed policies by EOP  | 0        | 10 (at least) | • Documentation of approved policies   |  |
|  | • No. of approved policies on building EE technology applications by EOP  | 0        | 2             | • Implementing rules & regulations on policies   |  |
| <b>Output 2.2: Approved and Enforced EE Buildings Code of Practice</b>   |   |          |               |  |  |
| <b>Activity 2.2.1: <u>Review of Existing Buildings Code of Practice</u></b>  | • No. of existing articles and provisions in the MS 1525 that were reviewed, adjusted/modified or upgraded to facilitate incorporation in the UBBL by EOP | 0        | 10            | MS 1525 Review Reports   | MHLG supports the incorporation of EE aspects in the UBBL  |
| <b>Activity 2.2.2: <u>Formulation, Approval and Enforcement of a Policy on EE Building Design</u></b>  | • No. of upgraded provisions in the MS 1525 completed and approved/endorsed for incorporation in the UBBL by the MHLG by EOP                              | 0        | 10            | Documentation of the approved version of MS 1525 in SIRIM and MHLG   |  |
|  | • No. of MHLG personnel trained on the enforcement of MS 1525 as part of the UBBL by EOP  | 0        | 150           | Training course report and training evaluation report  |  |
| <b>Activity 2.2.3: <u>Capacity Building on the Application of Building Energy</u></b>  | • No. of training courses conducted on building energy codes for building practitioners by EOP  | 0        | 20            | Documentation on the training courses; training reports  | Building practitioners are interested in the training courses  |
|  | • No. of training courses conducted on the design, construction, economic feasibility   | 0        | 20            | Documentation on the training courses; training reports  |  |

| Strategy  | Success Indicator  | Baseline | Target | Means of Verification  | Assumptions  |
|---|--|----------|--------|--|--|
| <u>Codes</u>  | evaluation, operation and maintenance of EE buildings <sup>27</sup> by EOP   |          |        |  |  |
|   | • No. of technically capable building practitioners and building service providers by EOP  | 0        | 700    | List of certified building practitioners and service providers in CBEEED |  |
|   | • No. of local engineering and engineering consulting firms that are providing EE building system services by EOP  | 0        | 20     | List of certified firms providing building EE system services in CBEEED  |  |
| <b>Activity 2.2.4:</b><br><u>Development of an EE Code of Practice in Residential Buildings</u>                             | • A completed government-endorsed EE Code of Practice in Residential Buildings officially launched by Year 2012  | 0        | 1      | Published EE Code of Practice in Residential Buildings at MHLG           | MHLG supports the enforcement of the EE Code of Practice for Residential Buildings |
|   | • No. of residential building projects that are compliant to the provisions of the EE Code of Practice by EOP  |          |        | Approved building permits in MHLG  |  |
|   | ▪ New residential buildings  | 0        | 5      |  |  |
|   | ▪ Retrofitted residential buildings  | 0        | 10     |  |  |
| <b>Output 2.3: Utility regulations that promote/support EE technology applications in buildings</b>                         |  |          |        |  |  |
| <b>Activity 2.3.1:</b><br><u>Assessment of Utility Regulations Promoting/Supporting EE Building Technology Applications</u> | • Completed assessment report on applicable policies and regulations that are supportive of the implementation of EE initiatives in the design, construction, retrofit and operation of buildings by Year 2011 | 0        | 1      | • Assessment Report in MEGTW, ST and TNB<br>• Project Reports            |  |
| <b>Activity 2.3.2:</b><br><u>Design of EE System Incentives in Buildings</u>  | • No of approved incentives for EE buildings by EOP  | 0        | 5      | Documentation on the approved incentives                                 | • GOM commitment to EE remains firm<br>• Current economic growth remains constant  |
|   | • No. of buildings that benefited from the incentive given by EOP  | 0        | 200    | • List of buildings that availed of the incentives<br>• Project Reports  |  |
| <b>Activity 2.3.3:</b><br><u>Review of Utility Tariffs Focusing on</u>  | • Satisfactorily completed and acceptable report on the Electricity Pricing Study that is intended for policy decision making regarding pricing  | 0        | 1      | Documentation of completed electricity pricing study                     | ST & TNB supports study and make use of it for policymaking                        |

<sup>27</sup> For local engineering firms and equipment manufacturers, repair and maintenance service providers

| Strategy   | Success Indicator   | Baseline | Target         | Means of Verification  | Assumptions   |
|--|---|----------|----------------|--|---|
| <u>EE in the Buildings Sector</u>  | issues on decentralized power generation by Year 2012   |          |                |  |   |
|  | • Satisfactorily completed and acceptable report on the survey and recommendations on Fuel Price Perception by Year 2012    | 0        | 1              | Documentation of fuel price perception study   | PETRONAS supports both study; uses these for policymaking |
|  | • Satisfactorily completed and acceptable report on the Study on Gas Fuels Pricing for Buildings by Year 2012               | 0        | 1              | Documentation of the gas price study   |   |
| <b>Activity 2.3.4:</b><br><u>Discussions on Energy Pricing for Buildings</u>   | • No. of tariff adjustments made by public utilities that are supportive of EE buildings incentive schemes by EOP           | 0        | 2              | Documentation on the approved tariff adjustments from ST/TNB and PETRONAS  |   |
| <b>Activity 2.3.5:</b> <u>Web-based Monitoring of Incentives Scheme Implementation</u>                                       | • An operational web-based online fiscal/financial incentive mechanism monitoring service by Year 2011                      | 0        | 1              | <ul style="list-style-type: none"> <li>Operational website</li> <li>Survey of and documented feedback from website users</li> <li>Project Reports</li> </ul>   |   |
|  | • % of clients each year that are satisfied with the monitoring service starting Year 2011                                  | 0        | 70% (at least) |  |   |
| <b>COMPONENT 3: EE Financing Capacity Improvements</b>   |   |          |                |  |   |
| <b>Outcome 3: Availability of financial and Institutional support for initiatives on EE Building technology applications</b> |   |          |                |  |   |
| <b>Output 3: Enhanced availability and accessibility of financing for EE building projects</b>                               |   |          |                |  |   |
| <b>Activity 3.1:</b><br><u>Streamlining Processes for Financing Applications</u>   | • Approved streamlined procedures for applying for and getting financial incentives for building EE activities by Year 2012 | 0        | 1              | <ul style="list-style-type: none"> <li>Documented streamlined procedures for each participating banks/FIs</li> <li>Project Reports</li> </ul>  | Banks/FIs are willing to finance building EE projects     |
|  | • % of clients each year that were satisfied with the streamlined procedures starting Year 2012                             | 0        | 70% (at least) |  |   |
| <b>Activity 3.2:</b><br><u>Capacity Building on EE Building Technologies for the Banking/Financial Sector</u>                | • No. of training courses on EE building technologies for the banking/financial institutions designed and conducted by EOP  | 0        | 10             | <ul style="list-style-type: none"> <li>Documentation of training courses</li> <li>Training course evaluation reports</li> <li>Project Reports</li> <li>BERM Reports</li> <li>CBEED</li> <li>Building construction reports</li> </ul> | Banks/FIs are interested in EE training courses           |
|  | • Percentage of targeted banking/financial institutions that are committed to support EE building projects by EOP           | 0        | 50% (at least) |  |   |
|  | • Total No. of EE building projects that are financed by local banks/financial institutions by EOP                          | 0        | 100            |  |   |



| Strategy   | Success Indicator  | Baseline | Target         | Means of Verification   | Assumptions  |
|--|--|----------|----------------|---|--|
|  | <ul style="list-style-type: none"> <li>Total volume of financing provided by local banks/financial institutions for EE building projects by EOP</li> </ul>   | 0        | RM500 million  | <ul style="list-style-type: none"> <li>Bank financing reports</li> </ul>  |  |
| <b>Activity 3.3:</b><br><u>Development of an Action Plan for EE Building Project Financing</u> | <ul style="list-style-type: none"> <li>Completed and approved action plan for the facilitation of the provision of financing of energy efficiency initiatives by Year 2012</li> </ul>  | 0        | 1              | <ul style="list-style-type: none"> <li>Documentation of action plan</li> <li>Signed agreements between financing institutions and Malaysian building sector entities</li> </ul> | Growth in the Malaysian buildings sector is such that local and international financing entities becomes interested in venturing on EE building projects |
|  | <ul style="list-style-type: none"> <li>No. of agreements signed on mobilizing local and international financial institutions and resources from the local building sector for implementing EE building and EE building technology projects by EOP</li> </ul> | 0        | 10             |   |  |
| <b>Activity 3.4:</b> <u>Design of Financing Schemes for EE Building Project Financing</u>      | <ul style="list-style-type: none"> <li>No. of applicable project financing schemes on building EE identified and designed by Year 2012</li> </ul>  | 0        | 3              | Documentation of the designed financing scheme, including implementation mechanisms, and rules & regulations  | Banks/FIs are willing to finance building EE projects  |
| <b>Activity 3.5:</b><br><u>Promotion of EE Building Projects to Local 'ESCOs'</u>              | <ul style="list-style-type: none"> <li>No. of seminar-workshops on EE building project ventures for local ESCOs conducted by Year 2011</li> </ul>  | 0        | 20             | Documentation of workshop proceedings   |  |
|  | <ul style="list-style-type: none"> <li>Percentage (%) of targeted ESCOs that committed to support EE building projects by EOP</li> </ul>   | 0        | 70% (at least) | <ul style="list-style-type: none"> <li>MAESCO Reports</li> <li>Individual ESCO Reports</li> </ul>   | ESCOs are willing to venture on EE building projects   |
|  | <ul style="list-style-type: none"> <li>Total No. of EE building projects which utilize ESCOs by EOP</li> </ul>   | 0        | 100            |   | Building developers and owners are willing to work with ESCOs  |
|  | <ul style="list-style-type: none"> <li>Total volume of financing provided to the local ESCOs for EE building projects by EOP</li> </ul>  | 0        | RM500 million  | <ul style="list-style-type: none"> <li>Bank/FI financing reports</li> <li>MAESCO Reports</li> <li>Individual ESCO Reports</li> </ul>  |  |
| <b>Activity 3.6:</b><br><u>Capacity Building on EE Building Project Financing</u>              | <ul style="list-style-type: none"> <li>No. of seminar-workshops conducted for the buildings sector on potential financing options for supporting their EE building and EE building technology projects by Year 2011</li> </ul>                               | 0        | 10             | Documentation of workshop proceedings   |  |
| <b>Activity 3.7:</b><br><u>Business Development Matching and</u>                               | <ul style="list-style-type: none"> <li>An operational EE Building Market Services Group (MSG) with a clear mandate of identifying business opportunities through providing technical support to EE building</li> </ul>                                       | 0        | 1              | <ul style="list-style-type: none"> <li>Documentation of the establishment of the MSG</li> <li>Charter of the MSG</li> </ul>   | Building developers are interested in "clearinghouse" or "one-stop-shop" type  |

| Strategy  | Success Indicator  | Baseline | Target         | Means of Verification  | Assumptions   |
|---|--|----------|----------------|--|---|
| <u>Strategic Partnership Establishment</u>  | project financing by Year 2012   |          |                |  | of assistance for their EE projects                       |
|   | <ul style="list-style-type: none"> <li>No. of EE building project developers/owners, banks and financial institutions assisted by the MSG building their capacity to deliver EE building and EE building technology application project financing, and market their projects and financing products by EOP.</li> </ul> | 0        | 10             | Documentation of each EE building project assisted by the MSG  |   |
|   | <ul style="list-style-type: none"> <li>% of MSG clients that were satisfied with the services provided by the MSG by EOP</li> </ul>  | 0        | 70% (at least) | MSG Performance Survey Results   |   |
| <b>COMPONENT 4: Information and Awareness Enhancement</b>   |  |          |                |  |   |
| <b>Outcome: Enhanced awareness of the government, public and the building sector on EE building technology applications</b>                               |  |          |                |  |   |
| <b>Output 4.1: Tools for enhancing the skills and experience of local building practitioners in the design of energy efficiency projects in buildings</b> |  |          |                |  |   |
| <b>Activity 4.1.1:</b><br><u>Detailed Study on the Current Building Designs and EE Building Applications</u>  | <ul style="list-style-type: none"> <li>Completed study on best practices in the application of EE technologies and techniques in the design, construction and operation of buildings by Year 2011</li> </ul>   | 0        | 1              | Report on the best practices study   |   |
| <b>Activity 4.1.2:</b><br><u>Establishment of a Centralized Building Energy Efficiency Database System (CBEED)</u>  | <ul style="list-style-type: none"> <li>A fully established and operational Centralized Building Energy Efficiency Database System (CBEED) by Year 2011</li> </ul>  | 0        | 1              | <ul style="list-style-type: none"> <li>CBEED installed in JKR</li> <li>CBEED Reports</li> </ul>                                | Buildings sector agrees to JKR administering CBEED        |
|   | <ul style="list-style-type: none"> <li>No. of database-keepers (national and international) linked and/or contributing to the CBEED by EOP</li> </ul>  | 0        | 10             | <ul style="list-style-type: none"> <li>CBEED installed in JKR</li> <li>Communications with partner database-keepers</li> </ul> | Regular exchanges with partner database-keepers and CBEED |
|   | <ul style="list-style-type: none"> <li>No. of EE information offices (EIOs) operating each year starting Year 2011</li> </ul>  | 0        | 10             | EIO Reports  | Initial EIOs are JKR State Offices                        |
|   | <ul style="list-style-type: none"> <li>% of overall EIO customers each year that are satisfied with the EIO services starting Year 2011</li> </ul>   | 0        | 70% (at least) | EIO Reports  |   |
| <b>Activity 4.1.3:</b><br><u>Establishment of a Comprehensive Guidebook on EE</u>   | <ul style="list-style-type: none"> <li>Government (JKR) - endorsed Guidebook on EE Building Design officially launched by Year 2012</li> </ul>   | 0        | 1              | Published Guidebook on EE Building Design  |   |
|   | <ul style="list-style-type: none"> <li>% of building practitioners each year that are</li> </ul>   | 0        | 70% (at        | <ul style="list-style-type: none"> <li>Project Reports</li> </ul>  | BERM and MFBEMP   |

| Strategy   | Success Indicator  | Baseline | Target         | Means of Verification  | Assumptions  |
|--|--|----------|----------------|--|--|
| <u>Building Design</u>   | satisfied in using the guidebook starting Year 2012  |          | least)         | <ul style="list-style-type: none"> <li>• BERM &amp; MFBEMP Reports</li> <li>• Building Sector Survey Reports</li> </ul>  | programs will continue even after BSEEP  |
|  | • No. of building projects that were designed (of at least 70%) based on the guidebook by EOP  |          |                |  |  |
|  | • New Buildings  | 0        | 39             |  |  |
|  | • Retrofitted Buildings  | 0        | 326            |  |  |
| <b>Activity 4.1.4:</b><br><u>Development of a Peer-Reviewed, User-Friendly Building Performance Prediction Software Tool</u> | • Government-endorsed Building Performance Prediction Software Tool officially launched by Year 2011   | 0        | 1              | Building Performance Prediction Software Tool in JKR   |  |
|  | • % of building practitioners each year that are satisfied in using the building performance prediction software tool starting Year 2012   | 0        | 70% (at least) | <ul style="list-style-type: none"> <li>• Project Reports</li> <li>• BERM &amp; MFBEMP Reports</li> <li>• Building Sector Survey Reports</li> </ul>             | BERM and MFBEMP programs will continue even after BSEEP                        |
|  | • No. of building projects that were designed using the building performance prediction software tool by EOP   |          |                |  |  |
|  | • New Buildings  | 0        | 20             |  |  |
|  | • Retrofitted Buildings  | 0        | 50             |  |  |
| <b>Output 4.2: Implemented market oriented EE programs in the buildings sector both at the national and local levels</b>     |  |          |                |  |  |
| <b>Activity 4.2.1:</b><br><u>Design of the Malaysian Energy Efficiency Rating for Buildings (MEERB)</u>                      | • Government-endorsed MEERB officially launched by Year 2011   | 0        | 1              | Documentation of the official launch of MEERB  | Continuous GOM support of EE initiatives, particularly in the buildings sector |
|  | • An established and operational a government-endorsed Sustainable Buildings Council (MSBC) with clear mandate to work on the administration and implementation of the MEERB scheme by Year 2012 | 0        | 1              | <ul style="list-style-type: none"> <li>• Documentation of the establishment of the MSBC</li> <li>• Charter of MSBC</li> <li>• Business Plan of MSBC</li> </ul> |  |
| <b>Activity 4.2.2:</b><br><u>Development of the Institutional Mechanism for the MEERB Scheme</u>                             | • Approved implementing rules and regulations on the MEERB implementation by Year 2012   | 0        | 1              | • Documentation of the MEERB implementing rules and regulations  |  |
| <b>Activity 4.2.3:</b><br><u>Implementation, Monitoring and Evaluation of the MEERB Scheme</u>                               | • No. of buildings actively participating in the MEERB each year starting Year 2012  | 0        | 50             | <ul style="list-style-type: none"> <li>• MEERB Reports</li> <li>• Project Reports</li> </ul>   |  |
|  | • No. of qualified awardees each year for the National Building EE Awards starting Year 2012   | 0        | 10             | • Documentation of the National Building EE Awards   | Buildings sector fully supports the awards.                                    |

| Strategy  | Success Indicator   | Baseline | Target | Means of Verification  | Assumptions  |
|---|---|----------|--------|--|--|
| <b>Activity 4.2.4:</b> <u>EE Buildings Advocacy and Promotion</u>   | <ul style="list-style-type: none"> <li>No. of promotional campaigns conducted each year to promote EE in buildings and EE building design starting Year 2010</li> </ul>   | 0        | 12     | <ul style="list-style-type: none"> <li>Documentation of completed promotional campaigns</li> </ul> |  |
| <b>Output 4.3: Government agencies and private sector entities capable of designing and implementing EE building projects</b>                             |   |          |        |  |  |
| <b>Activity 4.3.1:</b> <u>EE Buildings Training Needs Assessment and Planning</u>   | <ul style="list-style-type: none"> <li>No. of subjects/concepts on energy efficient design, construction, operation and maintenance of buildings identified for inclusion in training courses by Year 2010</li> </ul>                 | 0        | 20     | Training needs assessment report   |  |
| <b>Activity 4.3.2:</b> <u>Design and Implementation of EE Building Training Courses</u>   | <ul style="list-style-type: none"> <li>No. of sets of training materials developed and disseminated by EOP</li> </ul>   | 0        | 20     | <ul style="list-style-type: none"> <li>Published and web-based training materials</li> </ul>       |  |
|   | <ul style="list-style-type: none"> <li>No. of training courses conducted each year starting Year 2010</li> </ul>  | 0        | 4      | <ul style="list-style-type: none"> <li>Documentation of the training courses</li> </ul>            |  |
|   | <ul style="list-style-type: none"> <li>Overall no. of trained personnel each year starting Year 2010</li> </ul>   | 0        | 120    | <ul style="list-style-type: none"> <li>Training course evaluation reports</li> </ul>               |  |
|   | <ul style="list-style-type: none"> <li>% of overall no. of trainees that are gainfully employing learned skills on EE building design / construction/operation &amp; maintenance of new and/or retrofitted building by EOP</li> </ul> | 0        | 70     | Post training course evaluation reports  | <ul style="list-style-type: none"> <li>GOM commitment to EE remains firm</li> <li>Favorable economic growth</li> </ul> |
|   | <ul style="list-style-type: none"> <li>No. of certified EE building practitioners by EOP</li> </ul>   | 0        | 700    | List of certified EE building practitioners with JKR   | This is in cooperation with MSBC   |
| <b>Activity 4.3.3:</b> <u>Sustainable Training Program Design</u>   | <ul style="list-style-type: none"> <li>A completed, ready-for-implementation and funded sustainable follow-up EE building training program approved by the National Steering Committee by Year 2013</li> </ul>                        | 0        | 1      | NSC-approved Follow-up EE Building Training Program  | GOM will support this program after BSEEP  |
| <b>COMPONENT 5: Building EE Demonstrations</b>  |   |          |        |  |  |
| <b>Outcome 5: Improved confidence in the feasibility, performance, energy, environmental and economic benefits of EE building technology applications</b> |   |          |        |  |  |
| <b>Output 5.1: Completed demonstration projects showcasing successful applications of building EE technologies, techniques and practices.</b>             |   |          |        |  |  |
| <b>Activity 5.1.1:</b> <u>Demonstration of EE Building and EE Building Technology Applications</u>  | <ul style="list-style-type: none"> <li>A set of criteria ready to be used for selecting demonstration projects by Year 2010</li> </ul>  | 0        | 1      | Documentation of the set of criteria   |  |
|   | <ul style="list-style-type: none"> <li>No. of detailed technical and financial feasibility studies done for demonstration site selection by Year 2011</li> </ul>  | 0        | 30     | Documentation of the techno-economic feasibility studies   |  |
|   | <ul style="list-style-type: none"> <li>No. of finalized and approved demonstration project designs (engineering &amp; construction) by Year 2011</li> </ul>   | 0        | 10     | Documentation of approved demonstration project designs  |  |

| Strategy  | Success Indicator   | Baseline | Target | Means of Verification   | Assumptions  |
|---|---|----------|--------|---|--|
|   | <ul style="list-style-type: none"> <li>No. of financed demonstration projects confirmed and approved for implementation each year starting Year 2011</li> </ul>   | 0        | 10     | Financing report for each demonstration project   |  |
| <b>Activity 5.1.2:</b><br><u>Demonstration Project Implementation</u>   | <ul style="list-style-type: none"> <li>No. of demo projects implemented each year starting Year 2011</li> </ul>   | 0        | 3      | Documentation of each demonstration project   |  |
|   | <ul style="list-style-type: none"> <li>No of dissemination exercises conducted each year starting Year 2011</li> </ul>  | 0        | 4      | Report on each annual demo project results dissemination activity   |  |
| <b>Output 5.2: More knowledgeable, technically capable and competent building practitioners in the GOM and the private sector</b> |   |          |        |   |  |
| <b>Activity 5.2.1:</b><br><u>Follow-up Capacity Building for the Local Building Industry</u>                                      | <ul style="list-style-type: none"> <li>Completed assessment report on the viability of a local industry for the manufacture of EE building materials and EE building equipment/components by Year 2013</li> </ul> | 0        | 1      | Assessment Report submitted to FMM  | Local industries are interested learning how to, and in investing in the, manufacture of EE building materials and EE building equipment and/or components |
|   | <ul style="list-style-type: none"> <li>No. of training courses designed and conducted for local building materials producers/suppliers on EE building materials applications by EOP</li> </ul>                    | 0        | 8      | <ul style="list-style-type: none"> <li>Documentation of training courses</li> <li>Training evaluation reports</li> <li>Project Reports</li> </ul>         |  |
|   | <ul style="list-style-type: none"> <li>No. of training courses designed and conducted for local engineering firms on EE building materials production and applications by EOP</li> </ul>                          | 0        | 8      |   |  |
|   | <ul style="list-style-type: none"> <li>No. of new EE building projects designed based on, or influenced by, the results of the demonstration projects by EOP</li> </ul>   | 0        | 40     | <ul style="list-style-type: none"> <li>Documentation of proposed replication projects</li> <li>Documentation of completed replication projects</li> </ul> |  |

**SECTION III: TOTAL BUDGET AND WORK PLAN (TBWP)**

|  |  |                |          |
|--|--|----------------|----------|
| <b>Award ID:</b>                               | 00058231   | Project ID(s): | 00072266 |
| <b>Award Title:</b>                            | Malaysia: PIMS 3108 CC FP: Building Sector Energy Efficiency Project (BSEEP) |                |          |
| <b>Business Unit:</b>                          | MYS10  |                |          |
| <b>Project Title:</b>                          | Malaysia: PIMS 3108 CC FP: Building Sector Energy Efficiency Project (BSEEP) |                |          |
| <b>PIMS no.</b>                                | 3108   |                |          |
| <b>Implementing Partner (Executing Agency)</b> | Jabatan Kerja Raya (Public Works Department - PWD)                           |                |          |

| GEF Outcome/Atlas Activity   | Responsible Party | Fund ID | Donor Name | Atlas Budgetary Account Code | Atlas Budget Description           | Amount Year 1 (USD) | Amount Year 2 (USD) | Amount Year 3 (USD) | Amount Year 4 (USD) | Amount Year 5 (USD) | Total (USD) |
|--|-------------------|---------|------------|------------------------------|------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|-------------|
| <b>OUTCOME 1: Institutional Capacity Development</b>   |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |             |
| <b>Output 1: GOM agencies/departments that employ and implements energy management systems</b>             |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |             |
| Activity 1.1: <u>Capacity Needs Assessment in the GOM Institutions on Building Energy Management</u>       | PWD               | 62000   | GEF        | 71300                        | Local Consultant                   | 42,400              | 42,400              | 42,400              | 42,400              | 42,400              | 212,000     |
|  |                   |         |            | 71600                        | Travel                             | 5,000               | 5,000               | 5,000               | 5,000               | 25,000              |             |
|  |                   |         |            | 72200                        | Equipment                          | 3,000               | 0                   | 0                   | 0                   | 3,000               |             |
|  |                   |         |            | 75700                        | Training, Workshops and Conference | 3,000               | 3,000               | 3,000               | 3,000               | 15,000              |             |
|  |                   |         |            | 74500                        | Miscellaneous                      | 2,000               | 2,000               | 2,000               | 0                   | 6,000               |             |
| Activity 1.2: <u>Development of a Malaysian Federal Building Energy Management Program (MFBEMP)</u>        | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 0                   | 28,000              | 0                   | 0                   | 0                   | 28,000      |
|  |                   |         |            | 71300                        | Local Consultant                   | 0                   | 10,000              | 0                   | 0                   | 0                   | 10,000      |
|  |                   |         |            | 71600                        | Travel                             | 0                   | 14,000              | 5,000               | 0                   | 19,000              |             |
|  |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 5,000               | 5,000               | 0                   | 10,000              |             |
|  |                   |         |            | 74500                        | Miscellaneous                      | 0                   | 2,000               | 2,000               | 0                   | 4,000               |             |
| Activity 1.3: <u>Preparation of Specific Energy Management (EM) Guidelines for Government Institutions</u> | PWD               | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 10,000              | 0                   | 0                   | 0                   | 10,000      |
|  |                   |         |            | 71600                        | Travel                             | 0                   | 3,000               | 0                   | 0                   | 0                   | 3,000       |
|  |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 5,000               | 0                   | 0                   | 5,000               |             |
|  |                   |         |            | 74500                        | Miscellaneous                      | 0                   | 2,000               | 0                   | 0                   | 2,000               |             |
| Activity 1.4: <u>Monitoring and Evaluation of the</u>  | PWD               | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 0                   | 10,000              | 0                   | 10,000              | 20,000      |
|  |                   |         |            | 71600                        | Travel                             | 0                   | 0                   | 3,000               | 0                   | 3,000               | 6,000       |
|  |                   |         |            | 75700                        | Training, Workshops                | 0                   | 0                   | 5,000               | 0                   | 5,000               |             |

| GEF Outcome/Atlas Activity   | Responsible Party | Fund ID | Donor Name | Atlas Budgetary Account Code | Atlas Budget Description           | Amount Year 1 (USD) | Amount Year 2 (USD) | Amount Year 3 (USD) | Amount Year 4 (USD) | Amount Year 5 (USD) | Total (USD)    |
|--|-------------------|---------|------------|------------------------------|------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------|
| <u>MFBEMP Impacts</u>  |                   |         |            |                              | and Conference                     |                     |                     |                     |                     |                     |                |
|  |                   |         |            | 74500                        | Miscellaneous                      | 0                   | 0                   | 2,000               | 0                   | 0                   | 2,000          |
| Activity 1.5: <u>Building Energy Reporting and Monitoring (BERM) Program</u>                         | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 0                   | 0                   | 28,000              | 0                   | 0                   | 28,000         |
|  |                   |         |            | 71300                        | Local Consultant                   | 0                   | 0                   | 20,000              | 0                   | 0                   | 20,000         |
|  |                   |         |            | 71600                        | Travel                             | 0                   | 0                   | 12,500              | 0                   | 0                   | 12,500         |
|  |                   |         |            | 72200                        | Equipment                          | 0                   | 0                   | 7,000               | 0                   | 0                   | 7,000          |
|  |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 0                   | 9,500               | 0                   | 0                   | 9,500          |
| <b>TOTAL OUTCOME 1</b>   |                   |         |            |                              |                                    |                     |                     |                     |                     |                     | <b>462,000</b> |
| <b>OUTCOME 2: Policy Development &amp; Regulatory Frameworks</b>                                     |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                |
| <b>Output 2.1: Improved Malaysian EE Building policies, legislation, regulations and action plan</b> |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                |
| Activity 2.1.1: <u>Conduct of Building EE Policy Studies</u>   | MEGTW             | 62000   | GEF        | 71200                        | International Consultant           | 42,000              | 0                   | 0                   | 0                   | 0                   | 42,000         |
|  |                   |         |            | 71300                        | Local Consultant                   | 44,400              | 44,400              | 44,400              | 44,400              | 44,400              | 222,000        |
|  |                   |         |            | 71600                        | Travel                             | 23,000              | 2,500               | 2,500               | 2,500               | 2,500               | 33,000         |
|  |                   |         |            | 72200                        | Equipment                          | 3,000               | 0                   | 0                   | 0                   | 0                   | 3,000          |
|  |                   |         |            | 75700                        | Training, Workshops and Conference | 3,000               | 3,000               | 3,000               | 3,000               | 3,000               | 15,000         |
|  |                   |         |            | 74500                        | Miscellaneous                      | 0                   | 2,000               | 2,000               | 0                   | 0                   | 4,000          |
| Activity 2.1.2: <u>Formal &amp; informal discussions with policymakers</u>                           | MEGTW             | 62000   | GEF        | 71300                        | Local Consultant                   | 10,000              | 0                   | 0                   | 0                   | 0                   | 10,000         |
|  |                   |         |            | 71600                        | Travel                             | 2,000               | 0                   | 0                   | 0                   | 0                   | 2,000          |
| <b>Sub Total</b>   |                   |         |            |                              |                                    |                     |                     |                     |                     |                     | <b>331,000</b> |
| <b>Output 2.2: Approved and Enforced EE Buildings Code of Practice</b>                               |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                |
| Activity 2.2.1: <u>Review of Existing Buildings Code of Practice</u>                                 | PWD               | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 10,000              | 0                   | 0                   | 0                   | 10,000         |
|  |                   |         |            | 71600                        | Travel                             | 0                   | 2,000               | 0                   | 0                   | 0                   | 2,000          |
|  |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 3,000               | 0                   | 0                   | 0                   | 3,000          |
| Activity 2.2.2: <u>Formulation, Approval and Enforcement of a</u>                                    | PWD               | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 10,000              | 10,000              | 0                   | 0                   | 20,000         |
|  |                   |         |            | 71600                        | Travel                             | 0                   | 2,000               | 2,000               | 0                   | 0                   | 4,000          |
|  |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 3,000               | 3,000               | 0                   | 0                   | 6,000          |

| GEF Outcome/Atlas Activity  | Responsible Party | Fund ID | Donor Name | Atlas Budgetary Account Code | Atlas Budget Description           | Amount Year 1 (USD) | Amount Year 2 (USD) | Amount Year 3 (USD) | Amount Year 4 (USD) | Amount Year 5 (USD) | Total (USD)    |
|---|-------------------|---------|------------|------------------------------|------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------|
| <u>Policy on EE Building Design</u>   |                   |         |            | 74500                        | Miscellaneous                      | 0                   | 2,000               | 2,000               | 2,000               | 2,000               | 8,000          |
| <u>Activity 2.2.3: Capacity Building on the Application of Building Energy Codes</u>                              | PWD               | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 0                   | 10,000              | 10,000              | 0                   | 20,000         |
|   |                   |         |            | 71600                        | Travel                             | 0                   | 0                   | 3,000               | 3,000               | 0                   | 6,000          |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 0                   | 5,000               | 5,000               | 5,000               | 15,000         |
|   |                   |         |            | 74500                        | Miscellaneous                      | 0                   | 0                   | 2,000               | 2,000               | 3,000               | 7,000          |
| <u>Activity 2.2.4: Development of an EE Code of Practice in Residential Buildings</u>                             | PWD               | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 0                   | 0                   | 20,000              | 0                   | 20,000         |
|   |                   |         |            | 71600                        | Travel                             | 0                   | 0                   | 0                   | 3,000               | 0                   | 3,000          |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 0                   | 0                   | 3,000               | 0                   | 3,000          |
|   |                   |         |            | 74500                        | Miscellaneous                      | 0                   | 0                   | 0                   | 2,000               | 0                   | 2,000          |
| <b>Sub Total</b>  |                   |         |            |                              |                                    |                     |                     |                     |                     |                     | <b>129,000</b> |
| <b>Output 2.3: Utility regulations that promote/support EE technology applications in buildings</b>               |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                |
| <u>Activity 2.3.1: Assessment of Utility Regulations Promoting/Supporting EE Building Technology Applications</u> | EC                | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 0                   | 10,000              | 0                   | 0                   | 10,000         |
|   |                   |         |            | 71600                        | Travel                             | 0                   | 0                   | 2,000               | 0                   | 0                   | 2,000          |
| <u>Activity 2.3.2: Design of EE System Initiatives in Buildings</u>   | EC                | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 0                   | 10,000              | 0                   | 0                   | 10,000         |
|   |                   |         |            | 71600                        | Travel                             | 0                   | 0                   | 2,000               | 0                   | 0                   | 2,000          |
| <u>Activity 2.3.3: Review of Utility Tariffs Focusing on EE in the Buildings Sector</u>                           | EC                | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 0                   | 0                   | 10,000              | 10,000              | 20,000         |
|   |                   |         |            | 71600                        | Travel                             | 0                   | 0                   | 0                   | 2,000               | 2,000               | 4,000          |
| <u>Activity 2.3.4: Discussions on Energy Pricing for Buildings</u>  | EC                | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 0                   | 0                   | 10,000              | 10,000              | 20,000         |
|   |                   |         |            | 71600                        | Travel                             | 0                   | 0                   | 0                   | 2,000               | 2,000               | 4,000          |
| <u>Activity 2.3.5: Web-</u>   | EC                | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 0                   | 0                   | 20,000              | 0                   | 20,000         |



| GEF Outcome/Atlas Activity  | Responsible Party | Fund ID | Donor Name | Atlas Budgetary Account Code | Atlas Budget Description           | Amount Year 1 (USD) | Amount Year 2 (USD) | Amount Year 3 (USD) | Amount Year 4 (USD) | Amount Year 5 (USD) | Total (USD)    |
|---|-------------------|---------|------------|------------------------------|------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------|
| <u>based Monitoring of Incentives Scheme Implementation</u>   |                   |         |            | 71600                        | Travel                             | 0                   | 0                   | 0                   | 2,000               | 0                   | 2,000          |
|   |                   |         |            | 72200                        | Equipment                          | 0                   | 0                   | 0                   | 30,000              | 0                   | 30,000         |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 0                   | 0                   | 5,000               | 0                   | 5,000          |
|   |                   |         |            | 74500                        | Miscellaneous                      | 0                   | 0                   | 0                   | 3,000               | 0                   | 3,000          |
| <b>Sub Total</b>  |                   |         |            |                              |                                    |                     |                     |                     |                     |                     | <b>132,000</b> |
| <b>TOTAL OUTCOME 2</b>  |                   |         |            |                              |                                    |                     |                     |                     |                     |                     | <b>592,000</b> |
| <b>OUTCOME 3: EE Financing Capacity Improvements</b>  |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                |
| <b>Output 3: Enhanced availability and accessibility of financing for EE building projects</b>      |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                |
| <u>Activity 3.1: Streamlining Processes for Financing Applications</u>                              | PWD               | 62000   | GEF        | 71300                        | Local Consultant                   | 42,400              | 42,400              | 42,400              | 42,400              | 42,400              | 212,000        |
|   |                   |         |            | 71600                        | Travel                             | 3,000               | 3,000               | 3,000               | 3,000               | 3,000               | 15,000         |
|   |                   |         |            | 72200                        | Equipment                          | 3,000               | 0                   | 0                   | 0                   | 0                   | 3,000          |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 3,000               | 3,000               | 3,000               | 3,000               | 3,000               | 15,000         |
|   |                   |         |            | 74500                        | Miscellaneous                      | 3,000               | 3,000               | 3,000               | 3,000               | 3,000               | 15,000         |
| <u>Activity 3.2: Capacity Building on EE Building Technologies for the Banking/Financial Sector</u> | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 0                   | 28,000              | 0                   | 0                   | 0                   | 28,000         |
|   |                   |         |            | 71300                        | Local Consultant                   | 0                   | 10,000              | 10,000              | 0                   | 0                   | 20,000         |
|   |                   |         |            | 71600                        | Travel                             | 0                   | 12,000              | 2,000               | 2,000               | 0                   | 16,000         |
|   |                   |         |            | 72200                        | Equipment                          | 0                   | 0                   | 0                   | 0                   | 0                   | 0              |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 5,000               | 5,000               | 5,000               | 5,000               | 20,000         |
| 74500   | Miscellaneous     | 0       | 5,000      | 0                            | 0                                  | 0                   | 5,000               |                     |                     |                     |                |
| <u>Activity 3.3: Development of an Action Plan for EE Building Project Financing</u>                | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 0                   | 28,000              | 0                   | 0                   | 0                   | 28,000         |
|   |                   |         |            | 71300                        | Local Consultant                   | 0                   | 10,000              | 10,000              | 0                   | 0                   | 20,000         |
|   |                   |         |            | 71600                        | Travel                             | 0                   | 12,500              | 0                   | 0                   | 0                   | 12,500         |
|   |                   |         |            | 72200                        | Equipment                          | 0                   | 0                   | 0                   | 0                   | 0                   | 0              |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 5,000               | 0                   | 0                   | 0                   | 5,000          |
| 74500   | Miscellaneous     | 0       | 0          | 0                            | 0                                  | 0                   | 0                   |                     |                     |                     |                |
| <u>Activity 3.4: Design of Financing Schemes for EE</u>   | PWD               | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 0                   | 0                   | 10,000              | 0                   | 10,000         |

| GEF Outcome/Atlas Activity  | Responsible Party | Fund ID | Donor Name | Atlas Budgetary Account Code | Atlas Budget Description           | Amount Year 1 (USD) | Amount Year 2 (USD) | Amount Year 3 (USD) | Amount Year 4 (USD) | Amount Year 5 (USD) | Total (USD)    |
|---|-------------------|---------|------------|------------------------------|------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------|
| <u>Building Project Financing</u>   |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                |
| Activity 3.5: <u>Promotion of EE Building Projects to Local 'ESCOs'</u>   | PWD               | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 0                   | 0                   | 10,000              | 0                   | 10,000         |
|   |                   |         |            | 71600                        | Travel                             | 0                   | 0                   | 0                   | 2,000               | 0                   | 2,000          |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 0                   | 0                   | 5,000               | 0                   | 5,000          |
| Activity 3.6: <u>Capacity Building on EE Building Project Financing</u>   | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 0                   | 0                   | 0                   | 28,000              | 0                   | 28,000         |
|   |                   |         |            | 71600                        | Travel                             | 0                   | 0                   | 0                   | 12,500              | 0                   | 12,500         |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 0                   | 0                   | 5,000               | 0                   | 5,000          |
| Activity 3.7: <u>Business Development Matching and Strategic Partnership Establishment</u>  | PWD               | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 0                   | 0                   | 0                   | 10,000              | 10,000         |
|   |                   |         |            | 71600                        | Travel                             | 0                   | 0                   | 0                   | 0                   | 5,000               | 5,000          |
| <b>TOTAL OUTCOME 3</b>  |                   |         |            |                              |                                    |                     |                     |                     |                     |                     | <b>502,000</b> |
| <b>OUTCOME 4: Information and Awareness Enhancement</b>   |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                |
| <b>Output 4.1: Tools for enhancing the skills and experience of local building practitioners in the design of energy efficiency projects in buildings</b> |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                |
| Activity 4.1.1: <u>Detailed Study on the Current Building Designs and EE Building Applications</u>  | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 14,000              | 14,000              | 0                   | 14,000              | 14,000              | 56,000         |
|   |                   |         |            | 71300                        | Local Consultant                   | 52,400              | 52,400              | 52,400              | 52,400              | 52,400              | 262,000        |
|   |                   |         |            | 71600                        | Travel                             | 10,000              | 10,000              | 5,000               | 10,000              | 10,000              | 45,000         |
|   |                   |         |            | 72200                        | Equipment                          | 3,000               | 0                   | 0                   | 0                   | 0                   | 3,000          |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 3,000               | 3,000               | 3,000               | 3,000               | 3,000               | 15,000         |
|   |                   |         |            | 74500                        | Miscellaneous                      | 2,000               | 2,000               | 2,000               | 2,000               | 0                   | 8,000          |
| Activity 4.1.2: <u>Establishment of a Centralized Building Energy Efficiency Database</u>   | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 14,000              | 0                   | 0                   | 0                   | 0                   | 14,000         |
|   |                   |         |            | 71300                        | Local Consultant                   | 20,000              | 20,000              | 10,000              | 10,000              | 10,000              | 70,000         |
|   |                   |         |            | 71600                        | Travel                             | 17,000              | 3,000               | 3,000               | 3,000               | 3,000               | 29,000         |
|   |                   |         |            | 72200                        | Equipment                          | 30,000              | 0                   | 10,000              | 0                   | 0                   | 40,000         |

| GEF Outcome/Atlas Activity   | Responsible Party | Fund ID | Donor Name | Atlas Budgetary Account Code | Atlas Budget Description           | Amount Year 1 (USD) | Amount Year 2 (USD) | Amount Year 3 (USD) | Amount Year 4 (USD) | Amount Year 5 (USD) | Total (USD)    |
|--|-------------------|---------|------------|------------------------------|------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------|
| <u>System (CBEED)</u>  |                   |         |            | 75700                        | Training, Workshops and Conference | 5,000               | 5,000               | 5,000               | 5,000               | 5,000               | 25,000         |
|  |                   |         |            | 74500                        | Miscellaneous                      | 2,000               | 2,000               | 2,000               | 2,000               | 2,000               | 10,000         |
| Activity 4.1.3: <u>Establishment of a Comprehensive Guidebook on EE Building Design</u>                                  | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 14,000              | 0                   | 0                   | 0                   | 0                   | 14,000         |
|  |                   |         |            | 71300                        | Local Consultant                   | 10,000              | 10,000              | 0                   | 0                   | 0                   | 20,000         |
|  |                   |         |            | 71600                        | Travel                             | 11,000              | 0                   | 0                   | 0                   | 0                   | 11,000         |
|  |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 13,000              | 0                   | 0                   | 0                   | 13,000         |
|  |                   |         |            | 74500                        | Miscellaneous                      | 0                   | 7,000               | 0                   | 0                   | 0                   | 7,000          |
| Activity 4.1.4: <u>Development of a Peer-Reviewed, User-Friendly Building Performance Prediction Software Tool</u>       | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 0                   | 14,000              | 0                   | 0                   | 0                   | 14,000         |
|  |                   |         |            | 71300                        | Local Consultant                   | 0                   | 30,000              | 0                   | 0                   | 0                   | 30,000         |
|  |                   |         |            | 71600                        | Travel                             | 0                   | 15,500              | 0                   | 0                   | 0                   | 15,500         |
|  |                   |         |            | 72200                        | Equipment                          | 0                   | 20,000              | 0                   | 0                   | 0                   | 20,000         |
|  |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 8,000               | 0                   | 0                   | 0                   | 8,000          |
| <b>Sub Total</b>   |                   |         |            |                              |                                    |                     |                     |                     |                     |                     | <b>729,500</b> |
| <b>Output 4.2: Implemented market oriented EE programs in the buildings sector both at the national and local levels</b> |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                |
| Activity 4.2.1: <u>Design of the Malaysian Energy Efficiency Rating for Buildings (MEERB)</u>                            | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 14,000              | 0                   | 0                   | 0                   | 0                   | 14,000         |
|  |                   |         |            | 71300                        | Local Consultant                   | 10,000              | 10,000              | 0                   | 0                   | 0                   | 20,000         |
|  |                   |         |            | 71600                        | Travel                             | 16,000              | 5,000               | 0                   | 0                   | 0                   | 21,000         |
| Activity 4.2.2: <u>Development of the Institutional Mechanism for the MEERB Scheme</u>                                   | PWD               | 62000   | GEF        | 71300                        | Local Consultant                   | 10,000              | 10,000              | 0                   | 0                   | 0                   | 20,000         |
|  |                   |         |            | 71600                        | Travel                             | 2,000               | 2,000               | 0                   | 0                   | 0                   | 4,000          |
|  |                   |         |            | 74500                        | Miscellaneous                      | 3,000               | 0                   | 0                   | 0                   | 0                   | 3,000          |
| Activity 4.2.3: <u>Implementation, Monitoring and Evaluation of the</u>  | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 0                   | 14,000              | 0                   | 0                   | 0                   | 14,000         |
|  |                   |         |            | 71300                        | Local Consultant                   | 0                   | 10,000              | 0                   | 0                   | 0                   | 10,000         |
|  |                   |         |            | 71600                        | Travel                             | 0                   | 14,000              | 0                   | 0                   | 0                   | 14,000         |

| GEF Outcome/Atlas Activity  | Responsible Party | Fund ID | Donor Name | Atlas Budgetary Account Code | Atlas Budget Description           | Amount Year 1 (USD) | Amount Year 2 (USD) | Amount Year 3 (USD) | Amount Year 4 (USD) | Amount Year 5 (USD) | Total (USD)      |
|---|-------------------|---------|------------|------------------------------|------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------|
| <u>MEERB Scheme</u>   |                   |         |            | 72200                        | Equipment                          | 0                   | 15,000              | 0                   | 0                   | 0                   | 15,000           |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 15,000              | 0                   | 0                   | 0                   | 15,000           |
|   |                   |         |            | 74500                        | Miscellaneous                      | 0                   | 10,000              | 0                   | 0                   | 0                   | 10,000           |
| <u>Activity 4.2.4: EE Buildings Advocacy and Promotion</u>  | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 14,000              | 0                   | 0                   | 0                   | 0                   | 14,000           |
|   |                   |         |            | 71300                        | Local Consultant                   | 10,000              | 10,000              | 10,000              | 10,000              | 10,000              | 50,000           |
|   |                   |         |            | 71600                        | Travel                             | 10,000              | 10,000              | 10,000              | 10,000              | 10,000              | 50,000           |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 25,000              | 10,000              | 10,000              | 10,000              | 10,000              | 65,000           |
|   |                   |         |            | 74500                        | Miscellaneous                      | 3,000               | 3,000               | 3,000               | 3,000               | 3,000               | 15,000           |
| <b>Sub Total</b>  |                   |         |            |                              |                                    |                     |                     |                     |                     |                     | <b>354,000</b>   |
| <b>Output 4.3: Government agencies and private sector entities capable of designing and implementing EE building projects</b>                 |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                  |
| <u>Activity 4.3.1: EE Buildings Training Needs Assessment and Planning</u>  | PWD               | 62000   | GEF        | 71300                        | Local Consultant                   | 20,000              | 0                   | 0                   | 0                   | 0                   | 20,000           |
|   |                   |         |            | 71600                        | Travel                             | 5,000               | 0                   | 0                   | 0                   | 0                   | 5,000            |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 5,000               | 0                   | 0                   | 0                   | 0                   | 5,000            |
| <u>Activity 4.3.2: Design of the Training Courses and Materials</u>   | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 14,000              | 0                   | 0                   | 0                   | 0                   | 14,000           |
|   |                   |         |            | 71300                        | Local Consultant                   | 10,000              | 0                   | 10,000              | 0                   | 0                   | 20,000           |
|   |                   |         |            | 71600                        | Travel                             | 16,000              | 0                   | 3,000               | 0                   | 0                   | 19,000           |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 5,000               | 5,000               | 5,000               | 5,000               | 5,000               | 25,000           |
|   |                   |         |            | 74500                        | Miscellaneous                      | 10,000              | 0                   | 10,000              | 0                   | 0                   | 20,000           |
| <u>Activity 4.3.3: Sustainable Training Program Design</u>  | PWD               | 62000   | GEF        | 71300                        | Local Consultant                   | 0                   | 0                   | 10,000              | 0                   | 10,000              | 20,000           |
|   |                   |         |            | 71600                        | Travel                             | 0                   | 0                   | 2,000               | 0                   | 2,000               | 4,000            |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 0                   | 0                   | 6,500               | 0                   | 0                   | 6,500            |
| <b>Sub Total</b>  |                   |         |            |                              |                                    |                     |                     |                     |                     |                     | <b>158,500</b>   |
| <b>TOTAL OUTCOME 4</b>  |                   |         |            |                              |                                    |                     |                     |                     |                     |                     | <b>1,242,000</b> |
| <b>OUTCOME 5: Building EE Demonstrations</b>  |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                  |
| <b>Output 5.1: Completed demonstration projects showcasing successful applications of building EE technologies, techniques and practices.</b> |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                  |
| <u>Activity 5.1.1: Demonstration of</u>   | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 42,000              | 42,000              | 42,000              | 42,000              | 42,000              | 210,000          |

| GEF Outcome/Atlas Activity  | Responsible Party | Fund ID | Donor Name | Atlas Budgetary Account Code | Atlas Budget Description           | Amount Year 1 (USD) | Amount Year 2 (USD) | Amount Year 3 (USD) | Amount Year 4 (USD) | Amount Year 5 (USD) | Total (USD)      |
|---|-------------------|---------|------------|------------------------------|------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------|
| <u>EE Building and EE Building Technology Applications</u>  |                   |         |            | 71300                        | Local Consultant                   | 70,400              | 70,400              | 70,400              | 70,400              | 70,400              | 352,000          |
|   |                   |         |            | 71600                        | Travel                             | 18,000              | 18,000              | 18,000              | 18,000              | 18,000              | 90,000           |
|   |                   |         |            | 72200                        | Equipment                          | 10,000              | 0                   | 0                   | 0                   | 0                   | 10,000           |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 12,500              | 12,500              | 12,500              | 12,500              | 12,500              | 62,500           |
|   |                   |         |            | 74500                        | Miscellaneous                      | 3,000               | 3,000               | 3,000               | 3,000               | 3,000               | 15,000           |
| <u>Activity 5.1.2: Demonstration Project Implementation</u>   | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 14,000              | 14,000              | 14,000              | 14,000              | 14,000              | 70,000           |
|   |                   |         |            | 71300                        | Local Consultant                   | 86,000              | 86,000              | 86,000              | 86,000              | 86,000              | 430,000          |
|   |                   |         |            | 71600                        | Travel                             | 12,500              | 12,500              | 12,500              | 12,500              | 12,500              | 62,500           |
|   |                   |         |            | 72200                        | Equipment                          | 3,000               | 3,000               | 3,000               | 3,000               | 3,000               | 15,000           |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 18,000              | 18,000              | 18,000              | 18,000              | 18,000              | 90,000           |
|   |                   |         |            | 74500                        | Miscellaneous                      | 5,000               | 5,000               | 5,000               | 5,000               | 5,000               | 25,000           |
| <b>Sub Total</b>  |                   |         |            |                              |                                    |                     |                     |                     |                     |                     | <b>1,435,000</b> |
| <b>Output 5.2: More knowledgeable, technically capable and competent building practitioners in the GOM and the private sector</b> |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                  |
| <u>Activity 5.2.1: Follow-up Capacity Building for the Local Building Industry</u>  | PWD               | 62000   | GEF        | 71200                        | International Consultant           | 14,000              | 14,000              | 14,000              | 14,000              | 14,000              | 70,000           |
|   |                   |         |            | 71300                        | Local Consultant                   | 10,000              | 10,000              | 10,000              | 10,000              | 10,000              | 50,000           |
|   |                   |         |            | 71600                        | Travel                             | 12,500              | 12,500              | 12,500              | 12,500              | 12,500              | 62,500           |
|   |                   |         |            | 72200                        | Equipment                          | 50,000              | 7,500               | 7,500               | 7,500               | 2,500               | 75,000           |
|   |                   |         |            | 75700                        | Training, Workshops and Conference | 12,500              | 5,000               | 5,000               | 5,000               | 5,000               | 32,500           |
|   |                   |         |            | 74500                        | Miscellaneous                      | 2,000               | 2,000               | 2,000               | 2,000               | 2,000               | 10,000           |
| <b>Sub Total</b>  |                   |         |            |                              |                                    |                     |                     |                     |                     |                     | <b>300,000</b>   |
| <b>TOTAL OUTCOME 5</b>  |                   |         |            |                              |                                    |                     |                     |                     |                     |                     | <b>1,735,000</b> |
| <b>Project Management</b>   |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                  |
| <b>Monitoring &amp; Evaluation Costs</b>  |                   |         |            |                              |                                    |                     |                     |                     |                     |                     |                  |
| Financial Audit   | UNDP              | 62000   | GEF        | 74100                        | Audit firm                         | 3,000               | 3,000               | 3,000               | 3,000               | 3,000               | 15,000           |
| Mid-Term Review   | UNDP              | 62000   | GEF        | 71200                        | International consultants          | 0                   | 0                   | 14,000              | 0                   | 0                   | 14,000           |
|   |                   |         |            | 71600                        | Travel                             | 0                   | 0                   | 8,000               | 0                   | 0                   | 8,000            |
| Final Evaluation  | UNDP              | 62000   | GEF        | 71200                        | International consultants          | 0                   | 0                   | 0                   | 0                   | 14,000              | 14,000           |

| GEF Outcome/Atlas Activity                          | Responsible Party | Fund ID | Donor Name | Atlas Budgetary Account Code | Atlas Budget Description                          | Amount Year 1 (USD) | Amount Year 2 (USD) | Amount Year 3 (USD) | Amount Year 4 (USD) | Amount Year 5 (USD) | Total (USD)      |
|---|-------------------|---------|------------|------------------------------|---|---------------------|---------------------|---------------------|---------------------|---------------------|------------------|
|   |                   |         |            | 71600                        | Travel  | 0                   | 0                   | 0                   | 0                   | 8,000               | 8,000            |
| <b>Total M&amp;E Budget</b>                         |                   |         |            |                              |   |                     |                     |                     |                     |                     | <b>59,000</b>    |
| <b>Project Management Costs</b>                     |                   |         |            |                              |   |                     |                     |                     |                     |                     |                  |
| Project Management Activities                       | PWD               | 62000   | GEF        | 71300                        | Local Consultants                                 | 48,000              | 48,000              | 48,000              | 48,000              | 48,000              | 240,000          |
|   |                   |         |            | 71400                        | Service contract - Individual                     | 28,800              | 28,800              | 28,800              | 28,800              | 28,800              | 144,000          |
|   |                   |         |            | 71600                        | Travel  | 0                   | 0                   | 0                   | 0                   | 0                   | 0                |
|   |                   |         |            | 72200                        | Equipment   | 5,000               | 0                   | 0                   | 0                   | 0                   | 5,000            |
|   |                   |         |            | 75700                        | Inception Workshop, PSC Meetings, Review Meetings | 5,000               | 0                   | 5,000               | 0                   | 5,000               | 15,000           |
|   |                   |         |            | 74500                        | Miscellaneous                                     | 2,000               | 0                   | 2,000               | 0                   | 0                   | 4,000            |
| <b>Total Project Management Costs</b>               |                   |         |            |                              |   |                     |                     |                     |                     |                     | <b>408,000</b>   |
| <b>PROJECT MANAGEMENT TOTAL (including M&amp;E)</b> |                   |         |            |                              |   |                     |                     |                     |                     |                     | <b>467,000</b>   |
| <b>GRAND TOTAL</b>                                  |                   |         |            |                              |   |                     |                     |                     |                     |                     | <b>5,000,000</b> |

#### Summary of Funds

| Source of Funds | Amount           |                  |                  |                  |                   | Total             |
|-----------------|------------------|------------------|------------------|------------------|-------------------|-------------------|
|                 | Year 1           | Year 2           | Year 3           | Year 4           | Year 5            |                   |
| GEF             | 1,133,800        | 1,169,300        | 968,800          | 919,800          | 808,300           | 5,000,000         |
| Government      | 652,693          | 678,550          | 3,884,600        | 5,496,009        | 8,693,473         | 19,405,326        |
| Private Sector  | 30,000           | 30,000           | 1,046,111        | 1,569,167        | 2,555,278         | 5,230,556         |
| <b>TOTAL</b>    | <b>1,816,493</b> | <b>1,877,850</b> | <b>5,899,511</b> | <b>7,984,976</b> | <b>12,057,051</b> | <b>29,635,882</b> |

**SECTION IV: ADDITIONAL INFORMATION**

**PART I: Other Agreements (See attached)**

- A. GEF Operational Focal Point Letter of Endorsement
- B. Co-Financing Letters

Attached separately

## PART II: Stakeholder Involvement Plan

The following are the stakeholders of the BSEEP and their expected roles in the project:

**Table 10: Role of Stakeholders**

| Institution                                  | Role in BSEEP   |
|--|---|
| <b>Central Government Agencies</b>           |   |
| PMO  | <ul style="list-style-type: none"> <li>Advise on national policies and strategies for sustainable development</li> <li>Demonstration host and demonstration project co-financer</li> </ul>  |
| EPU  | <ul style="list-style-type: none"> <li>Signatory of the UNDP-GEF project agreement on behalf of the government of Malaysia</li> <li>Member of National Steering Committee</li> </ul>  |
| MoF  | <ul style="list-style-type: none"> <li>Advise on policy for Energy Efficiency and Energy Management procurement.</li> </ul>   |
| <b>Ministries and Sectoral Policy Makers</b> |   |
| MEGTW  | <ul style="list-style-type: none"> <li>Advise on Energy Efficiency policy and strategies as applied to the buildings sector</li> <li>Member of National Steering Committee and Review Committee</li> </ul>  |
| MNRE   | <ul style="list-style-type: none"> <li>Member of National Steering Committee and Review Committee</li> <li>Demonstration host and demonstration project co-financer</li> </ul>  |
| ST   | <ul style="list-style-type: none"> <li>Member of National Steering Committee and Review Committee</li> </ul>  |
| PTM  | <ul style="list-style-type: none"> <li>Member of Review Committee</li> </ul>  |
| SIRIM  | <ul style="list-style-type: none"> <li>Advise on, and updating of, the MS 1525</li> </ul>   |
| MOSTI  | <ul style="list-style-type: none"> <li>Member of the National Steering Committee</li> </ul>   |
| Dept. of Statistics                          | <ul style="list-style-type: none"> <li>Lead coordinator for the CBEED</li> </ul>  |
| <b>Building Policy Implementers</b>          |   |
| JKRHQ  | <ul style="list-style-type: none"> <li>Executing Agency for BSEEP and Designated Implementing Partner of UNDP</li> <li>Advise on energy policy for JKR and advisory services to JKR States on the practice of Energy Efficiency</li> <li>Supervise the BSEEP Project Management Team</li> <li>Provision of project office space and logistics to project management team</li> <li>Member of National Steering Committee and Review Committee</li> <li>Demonstration host and demonstration project co-financer; as well as designer of JKR-funded demonstration projects included in BSEEP</li> </ul> |
| JKR States                                   | <ul style="list-style-type: none"> <li>Provision of assistance on the BERM, MEERB, and MFBEMP implementation, as well as other BSEEP activities</li> <li>Construction management of JKR-funded demonstration projects included in BSEEP.</li> </ul>   |
| MHLG   | <ul style="list-style-type: none"> <li>Facilitation of discussions on the incorporation of MS 1525 into UBBL and for securing Cabinet approval;</li> <li>Facilitation of the implementation of MS 1525 with State/Local Authorities</li> <li>Provide continuous training on Energy Efficiency for staff at National, State and District levels.</li> <li>Member of National Steering Committee and Review Committee</li> </ul>  |
| NAFAM  | <ul style="list-style-type: none"> <li>Member of National Steering Committee</li> </ul>   |
| <b>Professional Institutions/Entities</b>    |   |
| PAM  | <ul style="list-style-type: none"> <li>Member of National Steering Committee and Review Committee</li> </ul>  |
| ACEM/ IEM                                    | <ul style="list-style-type: none"> <li>Member of National Steering Committee and Review Committee</li> </ul>  |
| LJUBM  | <ul style="list-style-type: none"> <li>Member of National Steering Committee and Review Committee</li> </ul>  |
| <b>Private Sector Entities</b>               |   |
| TNB  | <ul style="list-style-type: none"> <li>Member of Review Committee</li> </ul>  |



| Institution           | Role in BSEEP  |
|-----------------------|--|
|                       | <ul style="list-style-type: none"> <li>• Assist in the discussions concerning proposed tariffs for electricity used in buildings</li> <li>• Contributor to the CBEED</li> </ul>                    |
| MAESCO                | <ul style="list-style-type: none"> <li>• Member of National Steering Committee</li> </ul>  |
| Association of Banks  | <ul style="list-style-type: none"> <li>• Member of National Steering Committee</li> </ul>  |
| REHDA                 | <ul style="list-style-type: none"> <li>• Member of National Steering Committee</li> </ul>  |
| Putrajaya Perdana Bhd | <ul style="list-style-type: none"> <li>• Demonstration host and demonstration project co-financer</li> </ul>   |
| Sime Darby            | <ul style="list-style-type: none"> <li>• Demonstration host and demonstration project co-financer</li> </ul>   |
| <b>Others</b>         |  |
| UTM                   | <ul style="list-style-type: none"> <li>• Demonstration host and demonstration project co-financer</li> </ul>   |
| MITI                  | <ul style="list-style-type: none"> <li>• Demonstration host and demonstration project co-financer</li> </ul>   |
| MoH                   | <ul style="list-style-type: none"> <li>• Demonstration host and demonstration project co-financer</li> </ul>   |
| UNDP                  | <ul style="list-style-type: none"> <li>• Implementing agency for the BSEEP on behalf of the GEF</li> <li>• Guide, monitor and evaluate the management and implementation of the project</li> </ul> |

## PART III: CO<sub>2</sub> EMISSIONS REDUCTION ESTIMATES

### Summary

The BSEEP is intended to remove barriers to the widespread application of energy efficiency technologies, techniques and practices in the Malaysia buildings sector. The anticipated energy savings from the implementation of energy efficiency initiatives that will be facilitated and influenced by the interventions that will be carried out in the project; and the construction of new buildings based on energy conserving design and operations will bring about CO<sub>2</sub> emission reductions from the reduced utilization of electricity in these buildings. The implementation of the BSEEP will lead to a potential CO<sub>2</sub> emissions reduction of about 1,421.3 ktons by end of project. The long-term CO<sub>2</sub> emissions reductions will be much greater reaching to about 15.816 million tons of CO<sub>2</sub> in 2024.

### Direct CO<sub>2</sub> Emission Reductions

The BSEEP includes the implementation of activities intended to promote the widespread applications of EE brick making and EE building technologies in the buildings sector of Malaysia. However, not all of the potential savings can be attributed to the implementation of the BSEEP. Some of will be directly attributed to the project, while the rest would be indirectly realized as influenced by the interventions and enabling environments that will be established and facilitated by the project. Most of the direct emission reductions will come from the various EE building demonstrations that will be carried out under the project.

### Assumptions<sup>28</sup>

The major assumptions used in the estimation of CO<sub>2</sub> emissions reductions are as follows:

1. Growth rate in buildings sector (in terms of m<sup>2</sup> floor area) are 5.7% (2003-2006) and 6.4% (2007 onwards) - Based on Ninth Malaysia Plan
2. Building Energy Indices (BEIs): Average all buildings = 205 kWh/m<sup>2</sup>/yr; Public = 225 kWh/m<sup>2</sup>/yr; Private = 185 kWh/m<sup>2</sup>/yr; EE Building = 136 kWh/m<sup>2</sup>/yr
3. Average floor area of buildings = 30,000 m<sup>2</sup>
4. %of building stock that are EE buildings = 11% (2003-2009); %of building stock that are EE buildings by 2015 (after BSEEP) = 30%
5. % of building stock that are EE buildings: 2010 = 12%; 2011 = 16%; 2012 = 21%; 2013 = 26%; 2014 = 30%.
6. % of building stock that are EE buildings (annual percentage point increase): 2016-2018 = 3%; 2019-2022 = 2%; 2023-2025 = 1%
7. Grid CO<sub>2</sub> emission reduction factor = 0.684 ton/MWh
8. Lifetime of EE building = 50 years
9. Lifetime of retrofitted building (to become EE) = 30 years
10. Influence period = 10 years after end of BSEEP
11. At least 30 EE building projects replicating the demos assisted by the BSEEP

Based on the design of the demonstration projects, it is estimated that these will collectively generate annual energy savings of about 22.8 GWh, and an annual CO<sub>2</sub> emission reductions of about 15.6 ktons. The total lifetime CO<sub>2</sub> emission reductions from these demonstrations is 628.5 ktons (new EE buildings = 400.3 ktons; and retrofitted buildings = 228.2 ktons).

<sup>28</sup> The calculation of direct and indirect GHG emission reductions follows the methodology issued by GEF in "Manual for Calculating GHG benefits of GEF projects" in 2008.  
[www.gefweb.org/Operational\\_Policies/Operational\\_Strategy/documents/CC\\_DRAFT-GEFCO2Manual.doc](http://www.gefweb.org/Operational_Policies/Operational_Strategy/documents/CC_DRAFT-GEFCO2Manual.doc)

**Table 11: Direct Energy Savings and CO<sub>2</sub> Emission Reductions during the Lifetime of Demo Projects<sup>29</sup>**

| Year | Annual Energy Savings (GWh) | Cumulative Energy Savings (GWh) | Annual CO <sub>2</sub> Emission Reductions (ktons) | Cumulative CO <sub>2</sub> Emission Reductions (ktons) |
|------|-----------------------------|---------------------------------|--|--|
| 2015 | 22.826                      | 22.826                          | 15.613   | 15.613   |
| 2044 | 22.826                      | 684.780                         | 15.613   | 468.39   |
| 2064 | 11.706                      | 918.900                         | 8.007  | 628.53   |

### Direct Post Project CO<sub>2</sub> Emission Reductions

The project activities include providing assistance to prospective EE building developers and owners in various aspects of EE building project development and implementation. Such assistance could be on the conduct of feasibility analyses; or building design, engineering, and construction. It is estimated that a number of new EE building projects (7 buildings) and building retrofit projects (23 buildings) replicating the demonstrations planned for implementation during the 5 years after the BSEEP completion will be assisted by the project. Such number of projects would potentially account for at least 1% of the overall potential savings in the buildings sector. This translates to a cumulative energy savings of about 769.1 GWh during the period 2015-2029, and to about 526.1 ktons CO<sub>2</sub> emission reductions for the same period<sup>30</sup>.

### Indirect CO<sub>2</sub> Reductions

BSEEP creates the enabling environment that will facilitate the widespread application of energy efficiency technologies, techniques and practices in the buildings sector of Malaysia. The primary targets of the project are the commercial buildings including high-rise residential buildings. Capacity development activities that will be conducted under the project are expected to influence the relevant stakeholder entities in the promotion, support, design and installation, financing, operation and maintenance of EE building (new and retrofits) projects.

The project will also involve interventions that will bring about the necessary institutional, regulatory and financial policies and mechanisms that would enhance the promotion of the applicable and feasible building energy management systems, including energy efficient building services systems, and encourage the target groups in taking on such technologies, techniques and practices.

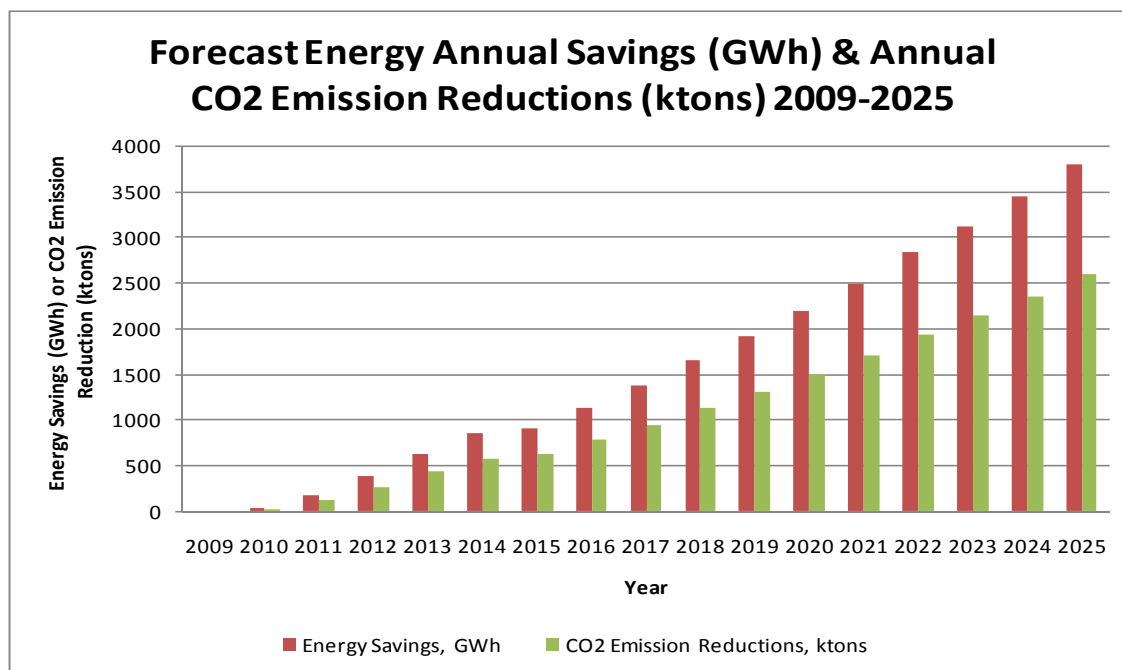
The transformation of the buildings sector from relatively high overall average BEI of 205 kWh/m<sup>2</sup>/yr to a benchmark BEI<sup>31</sup> level of 116 kWh/m<sup>2</sup>/yr that is influenced and induced by the enabling environment established, and demonstrations shown, under the BSEEP is expected to bring about the cumulative CO<sub>2</sub> emission avoidance of about 14.394 million tons (2015-2024).

<sup>29</sup> Direct energy savings from the EE buildings projects are the cumulative energy savings over the building's lifetime (new EE buildings = 50 years; Retrofitted buildings = 30 years).

<sup>30</sup> The direct post project CO<sub>2</sub> emission reductions are based on a 10 year period after the project (2015-2024; 2020-2029)

<sup>31</sup> The current Malaysian standard MS1525 refers a building with maximum building energy index (BEI) of 136 kWh/m<sup>2</sup>/year as an EE building. The average SEC of Malaysian buildings (commercial, public and high-rise residential) is 205 kWh/m<sup>2</sup>/yr. Average SECs of public and private buildings are 225 and 185, respectively. Based on the PTM Benchmarking Study in 2006, the realistic benchmark BEI is 116 kWh/m<sup>2</sup>/yr. This BEI benchmark is forecast to be achieved by most Malaysian buildings by end of the 11th Malaysia Plan in 2020.

Considering the significant barrier removal work and the creation of the appropriate enabling environment that will be done under the BSEEP, it is deemed that the GEF influence in achieving the abovementioned CO<sub>2</sub> emission reductions (14.394 million tons) during the influence period, which in this case is 10 years after the BSEEP (i.e., 2015-2024), is considered quite high, relative to the cumulative CO<sub>2</sub> emission reductions by end-of-project (i.e., 2014) at 1.421 million tons.



In that regard, most of the indirect CO<sub>2</sub> reduction can be attributed partly to the interventions that will be carried out during the BSEEP implementation period such as the establishment and enforcement of EE building policies and financing mechanisms, market enhancement, and the successful demonstration programs.

Assuming an influence period of 10 years, the indirect CO<sub>2</sub> emission reductions based on a “Bottom-up” approach, is about 1.886 million tons @ RF = 3 (due to market transformation and demonstrations). Based on a “Top-down” approach, the potential CO<sub>2</sub> emission reductions during the period 2015-2029 (i.e., 14.394 million tons) is multiplied by the appropriate GEF Causality Factor (CF). In this case, the CF used was 0.4 (modest, but substantial), resulting in 5.758 million tons. Hence the range of indirect CO<sub>2</sub> emission reductions is 1.886 to 5.758 million tons.

### Total CO<sub>2</sub> Emissions Reduction

**Table 12: Total CO<sub>2</sub> Emissions Reduction Attributed to BSEEP**

| Particulars              | Quantity (M tons) | Remarks  |
|--------------------------|-------------------|--|
| Direct CO <sub>2</sub>   | 0.629             | Cumulative lifetime CO <sub>2</sub> emission reductions from the demonstration projects (2010-2014)                    |
| Direct Post Project      | 0.526             | Replication projects (7 new; 23 retrofits) assisted by the BSEEP and implemented during the period 2015-2019           |
| Indirect CO <sub>2</sub> | 1.886 – 5.758     | Range of possible combined indirect savings from EE building projects during the BSEEP’s influence period (2015-2024). |

**Part IV: Project Risks and Assumptions**

While all efforts are made to ensure the effective design and implementation of the project activities, there are some risks that have to be addressed to ensure success of the project. The Project Planning Matrix (Sec II, Part II) shows a detailed overview of the project’s risk and assumptions. The principal risks, which can potentially hinder the successful project implementation and/or reduce project effectiveness, relate to:

To address these risks, the project has to establish effective means to monitor and to the extent possible mitigate these risks. Mitigation measures include active and continuous involvement in project activities and decisions of the groups of people that might pose a risk to the project implementation and sustainability. Generally speaking the project will try to establish win-win situations so that all parties can unite behind the results of the project activities.

The greatest risk to the success of the project is continued political commitment and continued stable economic growth in Malaysia. Whereas the second is heavily influenced by global and regional developments that are outside the influence of the project, the first can be mitigated to a certain extent by the project itself. This is done by making an effort to involve and commit GOM and its institutions in the activities. GOM will be directly involved through JKR, MEGTW, ST and other government institutions, and the project will endeavor to get the backing from high level political players by involving them in public events, give high level briefings and listen to their advice on how best to proceed with the more politically sensitive activities in the project (such as those under outputs 5-8).

**Table 13: Summary of Risk Mitigation measures for the BSEEP**

| Risk  | Level of Risk | Mitigating Actions   |
|---|---------------|--|
| Political support for EE                                  | Low           | <ul style="list-style-type: none"> <li>• Among others involvement of govt. decision makers in project implementation and information activities targeting political decision makers</li> </ul>   |
| Unstable economic growth in Malaysia                      | Medium        | <ul style="list-style-type: none"> <li>• None realistically possible through project</li> </ul>  |
| Inaccuracy of data submitted in CBEED and MEERB programme | Low           | <ul style="list-style-type: none"> <li>• Ensure data is properly vetted by approved personnel.</li> <li>• Caution on normalization and consistency with other buildings</li> <li>• Training will be always conducted for the relevant personnel</li> </ul> |
| Low commitment from state                                 | Low           | <ul style="list-style-type: none"> <li>• State and local authority will be consistently updated on</li> </ul>  |

| Risk  | Level of Risk | Mitigating Actions   |
|---|---------------|--|
| and local authorities   |               | project progress   |
| Lack of support from building sector professionals  | Low           | <ul style="list-style-type: none"> <li>• Involve the professionals in all stages of the project so that the outcomes are in agreement with the consensus amongst such groups</li> </ul>  |
| Poor performance of demonstrated technologies, non-achievement of projected energy savings and increased investment or maintenance costs for energy efficient technologies. | Low           | <ul style="list-style-type: none"> <li>• Proper selection of the EE technologies that will be demonstrated</li> <li>• Activities for the removal of barriers to the effective implementation of demonstrations will be carried out</li> <li>• Use of proven off-the-shelves equipment that can easily fit various performance level requested by the owners.</li> <li>• Adequate capacity building for building practitioners in the feasibility study of EE technology applications, selection, deployment and operation of EE technology application projects</li> </ul> |
| <b>OVERALL</b>  | <b>Low</b>    |  |

At the inception stage of BSEEP the project risks and assumptions will be reviewed, and where necessary additional project risks will be identified. In addition, also as part of the project inception activities, a detailed risk management strategy for project implementation will be prepared.

**Audit Clause:**

Audits will be conducted following UNDP Financial Regulations and Rules and related audit policies.

## Part V: Monitoring & Evaluation Plan and Budget

The following summarizes the annual targets for high-level success indicators that will be monitored to gauge the effectiveness and impacts of the BSEEP. More detailed indicators for each project activity are shown in the Project Planning Matrix (Part II)

**Table 14: Annual Targets for Project Outcomes**

| Strategy  | Success Indicator   | Baseline | Annual Targets |        |        |        |        |
|---|---|----------|----------------|--------|--------|--------|--------|
|   |   |          | Year 1         | Year 2 | Year 3 | Year 4 | Year 5 |
| <b>GOAL:</b> Reduced annual growth rate of GHG emissions from the buildings sector        | • Cumulative CO2 emission reduction from the buildings sector by end-of-project (EOP, Year 2014), kton CO2eq                            | 0        | 23             | 147    | 413    | 840    | 1,421  |
|   | • % reduction in GHG emissions from the buildings sector by EOP   | 0        | 0.4            | 1.9    | 3.8    | 5.7    | 7.2    |
|   | • Average emission reduction in the buildings sector by EOP, kg/m <sup>2</sup>  | 0        | 0.53           | 2.65   | 5.30   | 7.95   | 10.08  |
| <b>OBJECTIVE:</b> Improved energy utilization efficiency in the buildings sector          | • Cumulative energy savings from the buildings sector by EOP, GWh   | 0        | 34             | 215    | 603    | 1228   | 2,078  |
|   | • Average BEI in the Malaysian buildings sector by EOP, kWh/m <sup>2</sup> -yr  | 205      | 202.7          | 199.2  | 194.9  | 190.6  | 187.3  |
|   | • % Energy savings reduction by EOP   | 0        | 0.4            | 1.9    | 3.8    | 5.7    | 7.2    |
|   | • Cumulative No. of new buildings with EMS and/or EMP in place by EOP   | 160      | 200            | 275    | 350    | 475    | 576    |
|   | • % improvement of BEI in the buildings sector by EOP   | 0        | 1.1            | 2.9    | 5.2    | 7.5    | 9.5    |
|   | • Cumulative No. of new EE buildings by EOP (Basis: End 2009)   | 0        | 12             | 17     | 24     | 32     | 39     |
|   | • % of new buildings that are considered EE buildings at EOP (Basis: End 2009)  | 11       | 12             | 16     | 21     | 26     | 30     |
| <b>COMPONENT 1: Institutional Capacity Development</b>                                    |   |          |                |        |        |        |        |
| <b>Activity 1.1:</b> Capacity Needs Assessment in the GOM Institutions on Building Energy | • No. of training programs on building energy management in Government Agencies and Institutions conducted each year starting Year 2010 | 0        | 4              | 4      | 4      | 4      | 4      |
|   | • Cumulative no. of government  | 10       | 25             | 50     | 100    | 125    | 150    |

| Strategy   | Success Indicator   | Baseline | Annual Targets |         |         |         |               |
|--|---|----------|----------------|---------|---------|---------|---------------|
|  |   |          | Year 1         | Year 2  | Year 3  | Year 4  | Year 5        |
| <u>Management</u>  | agencies/institutions that are aware of, and the benefits of, building energy management (BEM) in their day-to-day operations by EOP  |          |                |         |         |         |               |
|  | <ul style="list-style-type: none"> <li>Cumulative no. of government agencies/institutions that have employed BEM programs by EOP</li> </ul>                                 | 10       | 25             | 50      | 100     | 125     | 150           |
| <b>Activity 1.2:</b><br><u>Development of a Malaysian Federal Building Energy Management Program (MFBEMP)</u>        | <ul style="list-style-type: none"> <li>An established and fully operational Malaysian Federal Buildings Energy Management Programme (MFBEMP) by Year 2012</li> </ul>        | 0        |                |         | 1       |         |               |
|  | <ul style="list-style-type: none"> <li>Cumulative average annual total budget for the MFBEMP by EOP, RM Million</li> </ul>  | 0        | 0              | 10      | 20      | 30      | 40            |
| <b>Activity 1.3:</b><br><u>Preparation of Specific Energy Management (EM) Guidelines for Government Institutions</u> | <ul style="list-style-type: none"> <li>Completed and approved guidebook on Energy Management Guidelines for Government Institutions by Year 2012</li> </ul>                 | 0        |                |         | 1       |         | Revised       |
|  | <ul style="list-style-type: none"> <li>Cumulative no. of government building managers each year that are satisfied in using the EM guidelines starting Year 2013</li> </ul> | 0        |                |         |         | 10      | 50            |
|  | <ul style="list-style-type: none"> <li>Cumulative no. of government buildings with BEM programs designed based on the EM guidelines by EOP</li> </ul>                       | 0        | 20             | 40      | 80      | 120     | 160           |
| <b>Activity 1.4:</b><br><u>Monitoring and Evaluation of the MFBEMP Impacts</u>                                       | <ul style="list-style-type: none"> <li>Average level of investment/budget each year on energy efficiency per building starting Year 2011, RM</li> </ul>                     | 0        |                | 20,000  | 20,000  | 20,000  | 20,000        |
|  | <ul style="list-style-type: none"> <li>Average annual energy savings per building generated from EE projects and BEM activities starting Year 2011, RM</li> </ul>           | 0        |                | 100,000 | 100,000 | 100,000 | 100,000       |
| <b>Activity 1.5:</b><br><u>Building Energy Reporting and Monitoring (BERM) Program</u>                               | <ul style="list-style-type: none"> <li>Cumulative no. of buildings actively participating in the BERM Program each year starting Year 2012</li> </ul>                       | 0        |                |         | 250     | 300     | 350           |
|  | <ul style="list-style-type: none"> <li>% of reporting buildings each year that are satisfied with the BERM program starting Year 2012</li> </ul>                            | 0        |                |         | 70      | 70      | 70 (at least) |
|  | <ul style="list-style-type: none"> <li>Cumulative no. of reporting buildings that have met and/or exceeded the set BEI (for specific building types) by EOP</li> </ul>      | 0        |                |         | 10      | 15      | 20            |



| Strategy  | Success Indicator  | Baseline | Annual Targets |        |        |        |               |
|---|--|----------|----------------|--------|--------|--------|---------------|
|   |  |          | Year 1         | Year 2 | Year 3 | Year 4 | Year 5        |
|   | <ul style="list-style-type: none"> <li>• % Improvement in the BEI (i.e., reduction) per building category by EOP</li> </ul>  |          |                |        |        |        |               |
|   | <ul style="list-style-type: none"> <li>▪ Office buildings</li> </ul>   | 0        | 1              | 3      | 5      | 8      | 10            |
|   | <ul style="list-style-type: none"> <li>▪ Hotel buildings</li> </ul>  | 0        | 1              | 3      | 5      | 8      | 10            |
|   | <ul style="list-style-type: none"> <li>▪ Hospital buildings</li> </ul>   | 0        | 1              | 3      | 5      | 8      | 10            |
|   | <ul style="list-style-type: none"> <li>▪ Retail buildings</li> </ul>   | 0        | 1              | 3      | 5      | 8      | 10            |
| <b>COMPONENT 2: Policy Development &amp; Regulatory Frameworks</b>                                    |  |          |                |        |        |        |               |
| <b>Activity 2.1.1:</b> <u>Conduct of Building EE Policy Studies</u>                                   | <ul style="list-style-type: none"> <li>• Cumulative no. of policy studies conducted by EOP</li> </ul>  | 0        | 2              | 4      | 6      | 8      | 10            |
|   | <ul style="list-style-type: none"> <li>• Cumulative no. of recommended policies from completed policy studies that are implemented and enforced by local governments, JKR and MHLG by EOP</li> </ul>                   | 0        |                | 1      | 2      | 4      | 5             |
| <b>Activity 2.1.2:</b> <u>Formal &amp; informal discussions with policymakers</u>                     | <ul style="list-style-type: none"> <li>• Cumulative no. of policy making agencies endorsing the proposed policies by EOP</li> </ul>  | 0        |                |        | 3      | 7      | 10 (at least) |
|   | <ul style="list-style-type: none"> <li>• Cumulative no. of approved policies on building EE technology applications by EOP</li> </ul>  | 0        |                |        |        | 1      | 2             |
| <b>Activity 2.2.1:</b> <u>Review of Existing Buildings Code of Practice</u>                           | <ul style="list-style-type: none"> <li>• Cumulative no. of existing articles and provisions in the MS 1525 that were reviewed, adjusted/modified or upgraded to facilitate incorporation in the UBBL by EOP</li> </ul> | 0        |                | 1      | 4      | 7      | 10            |
| <b>Activity 2.2.2:</b> <u>Formulation, Approval and Enforcement of a Policy on EE Building Design</u> | <ul style="list-style-type: none"> <li>• Cumulative no. of upgraded provisions in the MS 1525 completed and approved/endorsed for incorporation in the UBBL by the MHLG by EOP</li> </ul>                              | 0        |                |        | 5      | 7      | 10            |
|   | <ul style="list-style-type: none"> <li>• Cumulative no. of MHLG personnel trained on the enforcement of MS 1525 as part of the UBBL by EOP</li> </ul>  | 0        |                |        | 50     | 100    | 150           |
| <b>Activity 2.2.3:</b> <u>Capacity Building on the Application of Building Energy Codes</u>           | <ul style="list-style-type: none"> <li>• Cumulative no. of training courses conducted on building energy codes for building practitioners by EOP</li> </ul>  | 0        | 4              | 8      | 12     | 16     | 20            |
|   | <ul style="list-style-type: none"> <li>• Cumulative no. of training courses conducted on the design, construction, economic</li> </ul>   | 0        | 4              | 8      | 12     | 16     | 20            |

| Strategy  | Success Indicator  | Baseline | Annual Targets |        |        |        |         |
|---|--|----------|----------------|--------|--------|--------|---------|
|   |  |          | Year 1         | Year 2 | Year 3 | Year 4 | Year 5  |
|   | feasibility evaluation, operation and maintenance of EE buildings <sup>32</sup> by EOP   |          |                |        |        |        |         |
|   | <ul style="list-style-type: none"> <li>Cumulative no. of technically capable building practitioners and building service providers by EOP</li> </ul>   | 0        |                | 100    | 300    | 500    | 700     |
|   | <ul style="list-style-type: none"> <li>Cumulative no. of local engineering and engineering consulting firms that are providing EE building system services by EOP</li> </ul>   | 0        |                | 2      | 10     | 15     | 20      |
| <b>Activity 2.2.4:</b><br><u>Development of an EE Code of Practice in Residential Buildings</u>                             | <ul style="list-style-type: none"> <li>A completed government-endorsed EE Code of Practice in Residential Buildings officially launched by Year 2012</li> </ul>  | 0        |                |        | 1      |        | Revised |
|   | <ul style="list-style-type: none"> <li>Cumulative no. of residential building projects that are compliant to the provisions of the EE Code of Practice by EOP</li> </ul>   |          |                |        |        |        |         |
|   | <ul style="list-style-type: none"> <li>New residential buildings</li> </ul>  | 0        |                |        | 1      | 3      | 5       |
|   | <ul style="list-style-type: none"> <li>Retrofitted residential buildings</li> </ul>  | 0        |                |        | 2      | 5      | 10      |
| <b>Activity 2.3.1:</b><br><u>Assessment of Utility Regulations Promoting/Supporting EE Building Technology Applications</u> | <ul style="list-style-type: none"> <li>Completed assessment report on applicable policies and regulations that are supportive of the implementation of EE initiatives in the design, construction, retrofit and operation of buildings by Year 2011</li> </ul> | 0        |                | 1      |        |        |         |
| <b>Activity 2.3.2:</b><br><u>Design of EE System Incentives in Buildings</u>  | <ul style="list-style-type: none"> <li>Cumulative no of approved incentives for EE buildings by EOP</li> </ul>   | 0        |                | 1      |        | 3      | 5       |
|   | <ul style="list-style-type: none"> <li>Cumulative no. of buildings that benefited from the incentive given by EOP</li> </ul>   | 0        |                | 50     | 100    | 150    | 200     |
| <b>Activity 2.3.3:</b><br><u>Review of Utility Tariffs Focusing on EE in the Buildings Sector</u>                           | <ul style="list-style-type: none"> <li>Satisfactorily completed and acceptable report on the Electricity Pricing Study that is intended for policy decision making regarding pricing issues on decentralized power generation by Year 2012</li> </ul>          | 0        |                |        | 1      |        |         |

<sup>32</sup> For local engineering firms and equipment manufacturers, repair and maintenance service providers

| Strategy  | Success Indicator   | Baseline | Annual Targets |        |        |        |               |
|---|---|----------|----------------|--------|--------|--------|---------------|
|   |   |          | Year 1         | Year 2 | Year 3 | Year 4 | Year 5        |
|   | <ul style="list-style-type: none"> <li>Satisfactorily completed and acceptable report on the survey and recommendations on Fuel Price Perception by Year 2012</li> </ul>              | 0        |                |        | 1      |        |               |
|   | <ul style="list-style-type: none"> <li>Satisfactorily completed and acceptable report on the Study on Gas Fuels Pricing for Buildings by Year 2012</li> </ul>                         | 0        |                |        | 1      |        |               |
| <b>Activity 2.3.4:</b><br><u>Discussions on Energy Pricing for Buildings</u>                                  | <ul style="list-style-type: none"> <li>Cumulative no. of tariff adjustments made by public utilities that are supportive of EE buildings incentive schemes by EOP</li> </ul>          | 0        |                |        | 1      |        | 2             |
| <b>Activity 2.3.5:</b> <u>Web-based Monitoring of Incentives Scheme Implementation</u>                        | <ul style="list-style-type: none"> <li>An operational web-based online fiscal/financial incentive mechanism monitoring service by Year 2011</li> </ul>                                | 0        |                | 1      |        |        |               |
|   | <ul style="list-style-type: none"> <li>% of clients each year that are satisfied with the monitoring service starting Year 2011</li> </ul>  | 0        |                | 70     | 70     | 70     | 70 (at least) |
| <b>COMPONENT 3: EE Financing Capacity Improvements</b>  |   |          |                |        |        |        |               |
| <b>Activity 3.1:</b><br><u>Streamlining Processes for Financing Applications</u>                              | <ul style="list-style-type: none"> <li>Approved streamlined procedures for applying for and getting financial incentives for building EE activities by Year 2012</li> </ul>           | 0        |                |        | 1      |        |               |
|   | <ul style="list-style-type: none"> <li>% of clients each year that were satisfied with the streamlined procedures starting Year 2012</li> </ul>                                       | 0        |                | 70     | 70     | 70     | 70 (at least) |
| <b>Activity 3.2:</b><br><u>Capacity Building on EE Building Technologies for the Banking/Financial Sector</u> | <ul style="list-style-type: none"> <li>Cumulative no. of training courses on EE building technologies for the banking/financial institutions designed and conducted by EOP</li> </ul> | 0        |                | 2      | 6      | 10     | 10            |
|   | <ul style="list-style-type: none"> <li>Percentage of targeted banking/financial institutions that are committed to support EE building projects by EOP</li> </ul>                     | 0        |                |        | 25     | 40     | 50 (at least) |
|   | <ul style="list-style-type: none"> <li>Cumulative no. of EE building projects that are financed by local banks/financial institutions by EOP</li> </ul>                               | 0        |                |        | 20     | 60     | 100           |
|   | <ul style="list-style-type: none"> <li>Cumulative volume of financing provided by local banks/financial institutions for EE building projects by EOP, RM million</li> </ul>           | 0        |                |        | 300    | 400    | 500           |
| <b>Activity 3.3:</b><br><u>Development of an</u>  | <ul style="list-style-type: none"> <li>Completed and approved action plan for the facilitation of the provision of financing of</li> </ul>  | 0        |                |        | 1      |        |               |

| Strategy   | Success Indicator   | Baseline | Annual Targets |        |        |             |               |
|--|---|----------|----------------|--------|--------|-------------|---------------|
|  |   |          | Year 1         | Year 2 | Year 3 | Year 4      | Year 5        |
| <u>Action Plan for EE Building Project Financing</u>                                       | energy efficiency initiatives by Year 2012  |          |                |        |        |             |               |
|  | <ul style="list-style-type: none"> <li>Cumulative no. of agreements signed on mobilizing local and international financial institutions and resources from the local building sector for implementing EE building and EE building technology projects by EOP</li> </ul> | 0        |                |        | 2      | 6           | 10            |
| <u>Activity 3.4: Design of Financing Schemes for EE Building Project Financing</u>         | <ul style="list-style-type: none"> <li>No. of applicable project financing schemes on building EE identified and designed by Year 2012</li> </ul>   | 0        |                |        | 3      |             |               |
| <u>Activity 3.5: Promotion of EE Building Projects to Local 'ESCOs'</u>                    | <ul style="list-style-type: none"> <li>Cumulative no. of seminar-workshops on EE building project ventures for local ESCOs conducted by Year 2011</li> </ul>  | 0        | 10             | 20     |        |             |               |
|  | <ul style="list-style-type: none"> <li>Percentage (%) of targeted ESCOs that committed to support EE building projects by EOP</li> </ul>  | 0        |                |        |        |             | 70 (at least) |
|  | <ul style="list-style-type: none"> <li>Cumulative no. of EE building projects which utilize ESCOs by EOP</li> </ul>   | 0        |                |        | 10     | 50          | 100           |
|  | <ul style="list-style-type: none"> <li>Cumulative volume of financing to local ESCOs for EE building projects by EOP, RM million</li> </ul>   | 0        |                |        | 100    | 300         | 500           |
| <u>Activity 3.6: Capacity Building on EE Building Project Financing</u>                    | <ul style="list-style-type: none"> <li>Cumulative no. of seminar-workshops conducted for the buildings sector on potential financing options for supporting their EE building and EE building technology projects by Year 2011</li> </ul>                               | 0        | 5              | 10     |        |             |               |
| <u>Activity 3.7: Business Development Matching and Strategic Partnership Establishment</u> | <ul style="list-style-type: none"> <li>An operational EE Building Market Services Group (MSG) with a clear mandate of identifying business opportunities through providing technical support to EE building project financing by Year 2012</li> </ul>                   | 0        |                |        | 1      | Operational | Operational   |
|  | <ul style="list-style-type: none"> <li>Cumulative no. of EE building project developers/owners, banks and financial institutions assisted by the MSG by EOP.</li> </ul>   | 0        |                |        | 3      | 7           | 10            |

| Strategy   | Success Indicator  | Baseline | Annual Targets |        |             |             |               |
|--|--|----------|----------------|--------|-------------|-------------|---------------|
|  |  |          | Year 1         | Year 2 | Year 3      | Year 4      | Year 5        |
|  | <ul style="list-style-type: none"> <li>% of MSG clients that were satisfied with the services provided by the MSG by EOP</li> </ul>  | 0        |                |        | 70          | 70          | 70 (at least) |
| <b>COMPONENT 4: Information and Awareness Enhancement</b>  |  |          |                |        |             |             |               |
| <b>Activity 4.1.1:</b><br><u>Detailed Study on the Current Building Designs and EE Building Applications</u>       | <ul style="list-style-type: none"> <li>Completed study on best practices in the application of EE technologies and techniques in the design, construction and operation of buildings by Year 2011</li> </ul> | 0        |                | 1      |             |             |               |
| <b>Activity 4.1.2:</b><br><u>Establishment of a Centralized Building Energy Efficiency Database System (CBEED)</u> | <ul style="list-style-type: none"> <li>A fully established and operational Centralized Building Energy Efficiency Database System (CBEED) by Year 2011</li> </ul>  | 0        |                | 1      | Operational | Operational | Operational   |
|  | <ul style="list-style-type: none"> <li>Cumulative no. of database-keepers (national and international) linked and/or contributing to the CBEED by EOP</li> </ul>   | 0        |                | 2      | 5           | 7           | 10            |
|  | <ul style="list-style-type: none"> <li>Cumulative no. of EE information offices (EIOs) operating each year starting Year 2011</li> </ul>   | 0        |                | 2      | 5           | 8           | 10            |
|  | <ul style="list-style-type: none"> <li>% of overall EIO customers each year that are satisfied with the EIO services starting Year 2011</li> </ul>   | 0        |                | 70     | 70          | 70          | 70 (at least) |
| <b>Activity 4.1.3:</b><br><u>Establishment of a Comprehensive Guidebook on EE Building Design</u>                  | <ul style="list-style-type: none"> <li>Government (JKR) - endorsed Guidebook on EE Building Design officially launched by Year 2012</li> </ul>   | 0        |                |        | 1           |             | Revised       |
|  | <ul style="list-style-type: none"> <li>% of building practitioners each year that are satisfied in using the guidebook starting Year 2012</li> </ul>   | 0        |                |        | 70          | 70          | 70 (at least) |
|  | <ul style="list-style-type: none"> <li>Cumulative no. of building projects that were designed (at least 70%) based on the guidebook by EOP</li> </ul>  |          |                |        |             |             |               |
|  | <ul style="list-style-type: none"> <li>New Buildings</li> </ul>  | 0        |                |        | 5           | 25          | 39            |
|  | <ul style="list-style-type: none"> <li>Retrofitted Buildings</li> </ul>  | 0        |                |        | 100         | 250         | 326           |
| <b>Activity 4.1.4:</b><br><u>Development of a Peer-Reviewed,</u>   | <ul style="list-style-type: none"> <li>Government-endorsed Building Performance Prediction Software Tool officially launched by Year 2011</li> </ul>   | 0        |                | 1      | Operational | Revised     | Operational   |

| Strategy  | Success Indicator  | Baseline | Annual Targets |        |               |             |               |
|---|--|----------|----------------|--------|---------------|-------------|---------------|
|   |  |          | Year 1         | Year 2 | Year 3        | Year 4      | Year 5        |
| <u>User-Friendly Building Performance Prediction Software Tool</u>                                      | • % of building practitioners each year that are satisfied in using the building performance prediction software tool starting Year 2012   | 0        |                |        | 70            | 70          | 70 (at least) |
|   | • Cumulative no. of building projects that were designed using the building performance prediction software tool by EOP  |          |                |        |               |             |               |
|   | ▪ New Buildings  | 0        |                |        | 5             | 10          | 20            |
|   | ▪ Retrofitted Buildings  | 0        |                |        | 15            | 30          | 50            |
| <b>Activity 4.2.1:</b><br><u>Design of the Malaysian Energy Efficiency Rating for Buildings (MEERB)</u> | • Government-endorsed MEERB officially launched by Year 2011   | 0        |                | 1      | Operational   | Operational | Operational   |
|   | • An established and operational a government-endorsed Sustainable Buildings Council (MSBC) with clear mandate to work on the administration and implementation of the MEERB scheme by Year 2012 | 0        |                |        | 1             | Operational | Operational   |
| <b>Activity 4.2.2:</b><br><u>Development of the Institutional Mechanism for the MEERB Scheme</u>        | • Approved implementing rules and regulations on the MEERB implementation by Year 2012   | 0        |                |        | 1             |             |               |
| <b>Activity 4.2.3:</b><br><u>Implementation, Monitoring and Evaluation of the MEERB Scheme</u>          | • Cumulative no. of buildings actively participating in the MEERB each year starting Year 2012   | 0        |                |        | 50 (at least) | 75          | 100           |
|   | • No. of qualified awardees each year for the National Building EE Awards starting Year 2012   | 0        |                |        | 10            | 10          | 10            |
| <b>Activity 4.2.4:</b> <u>EE Buildings Advocacy and Promotion</u>                                       | • Cumulative no. of promotional campaigns conducted each year to promote EE in buildings and EE building design starting Year 2010   | 0        | 2              | 4      | 2             | 2           | 2             |
| <b>Activity 4.3.1:</b> <u>EE Buildings Training Needs Assessment and Planning</u>                       | • Cumulative no. of subjects/concepts on energy efficient design, construction, operation and maintenance of buildings identified for inclusion in training courses by Year 2010                 | 0        | 2              | 5      | 10            | 15          | 20            |
| <b>Activity 4.3.2:</b><br><u>Design and Implementation of EE Building</u>                               | • Cumulative no. of sets of training materials developed and disseminated by EOP   | 0        | 2              | 5      | 10            | 15          | 20            |
|   | • No. of training courses conducted each year starting Year 2010   | 0        | 4              | 4      | 4             | 4           | 4             |

| Strategy  | Success Indicator   | Baseline | Annual Targets |        |        |        |        |
|---|---|----------|----------------|--------|--------|--------|--------|
|   |   |          | Year 1         | Year 2 | Year 3 | Year 4 | Year 5 |
| <u>Training Courses</u>   | • No. of trained personnel each year starting Year 2010   | 0        | 120            | 120    | 120    | 120    | 120    |
|   | • % of overall no. of trainees that are gainfully employing learned skills on EE building design / construction/operation & maintenance of new and/or retrofitted building by EOP | 0        | 70             | 70     | 70     | 70     | 70     |
|   | • Cumulative no. of certified EE building practitioners by EOP  | 0        | 50             | 150    | 300    | 500    | 700    |
| <b>Activity 4.3.3:</b><br><u>Sustainable Training Program Design</u>                                  | • A completed, ready-for-implementation and funded sustainable follow-up EE building training program approved by the National Steering Committee by Year 2013                    | 0        |                |        |        | 1      |        |
| <b>COMPONENT 5: Building EE Demonstrations</b>  |   |          |                |        |        |        |        |
| <b>Activity 5.1.1:</b><br><u>Demonstration of EE Building and EE Building Technology Applications</u> | • A set of criteria ready to be used for selecting demonstration projects by Year 2010  | 0        | 1              |        |        |        |        |
|   | • Cumulative no. of detailed technical and financial feasibility studies done for demonstration site selection by Year 2011   | 0        | 15             | 30     |        |        |        |
|   | • Cumulative no. of finalized and approved demonstration project designs (engineering & construction) by Year 2011  | 0        | 3              | 10     |        |        |        |
|   | • Cumulative no. of financed demonstration projects confirmed and approved for implementation each year starting Year 2011  | 0        |                | 2      | 7      | 10     |        |
| <b>Activity 5.1.2:</b><br><u>Demonstration Project Implementation</u>                                 | • Cumulative no. of demo projects implemented each year starting Year 2011  | 0        |                | 3      | 7      | 10     |        |
|   | • No of dissemination exercises conducted each year starting Year 2011  | 0        |                | 1      | 1      | 1      | 1      |
| <b>Activity 5.2.1:</b><br><u>Follow-up Capacity Building for the Local Building Industry</u>          | • Completed assessment report on the viability of a local industry for the manufacture of EE building materials and EE building equipment/components by Year 2013                 | 0        |                |        |        | 1      |        |
|   | • Cumulative no. of training courses designed and conducted for local building materials producers/suppliers on EE building materials applications by EOP                         | 0        |                |        |        | 4      | 8      |

| Strategy | Success Indicator   | Baseline | Annual Targets |        |        |        |        |
|----------|---|----------|----------------|--------|--------|--------|--------|
|          |   |          | Year 1         | Year 2 | Year 3 | Year 4 | Year 5 |
|          | <ul style="list-style-type: none"> <li>Cumulative no. of training courses designed and conducted for local engineering firms on EE building materials production and applications by EOP</li> </ul> | 0        |                |        |        | 4      | 8      |
|          | <ul style="list-style-type: none"> <li>Cumulative no. of new EE building projects designed based on, or influenced by, the results of the demonstration projects by EOP</li> </ul>                  | 0        |                |        | 5      | 20     | 40     |

At the inception stage of BSEEP, the annual targets will be reviewed, and where necessary revised.



## Monitoring & Evaluation Budget

The following table summarizes the budget for the various monitoring & evaluation (M&E) activities that will be carried out to manage and gauge the effectiveness of the BSEEP implementation. The table also shows the parties responsible for each M&E activity and the time frame for each activity.

**Table 15: M&E Budget for BSEEP Project**

| Type of M&E Activity  | Responsible Parties   | Budget US\$ <sup>33</sup>    | Time Frame  |
|---|---|------------------------------|---|
| Inception Workshop (IW)   | <ul style="list-style-type: none"> <li>▪ Project Team</li> <li>▪ UNDP-Malaysia</li> </ul>   | Part of PM Budget            | Within first 3 months of project start up                             |
| Inception Report (IR)   | <ul style="list-style-type: none"> <li>▪ UNDP-GEF RCU</li> <li>▪ JKR</li> <li>▪ Stakeholders</li> </ul>   |                              | a) Draft IR available before IW<br>b) Final IR available following IW |
| Measurement of Means of Verification for Project Progress and Performance | <ul style="list-style-type: none"> <li>▪ Oversight by UNDP-GEF Technical Advisor and PM</li> <li>▪ Measurements by JKR field officers</li> </ul>  | Part of the Component Budget | Start, mid and end of project   |
| Annual Project Review and Project Implementation Review                   | <ul style="list-style-type: none"> <li>▪ Project Team</li> <li>▪ UNDP Malaysia</li> <li>▪ UNDP-GEF</li> <li>▪ JKR</li> <li>▪ Economic Planning Unit (EPU)</li> </ul>  | Part of PM Budget            | Annually  |
| Tri-Partite Review (TPR) and MPR report                                   | <ul style="list-style-type: none"> <li>▪ Economic Planning Unit (EPU)</li> <li>▪ UNDP Malaysia</li> <li>▪ Project team</li> <li>▪ UNDP-GEF RCU</li> </ul>   | Part of PM Budget            | Every year, upon receipt of APR                                       |
| PSC Meetings  | <ul style="list-style-type: none"> <li>▪ Project Manager</li> <li>▪ UNDP Malaysia</li> </ul>  | Part of PM Budget            | 6 monthly and subsequently at least once a year                       |
| Periodic status reports   | <ul style="list-style-type: none"> <li>▪ Project team</li> </ul>  | Part of PM Budget            | To be determined by Project team and UNDP Malaysia                    |
| Technical reports   | <ul style="list-style-type: none"> <li>▪ Project team</li> <li>▪ Hired consultants as needed</li> </ul>   | Part of Component Budget     | To be determined by Project Team and UNDP Malaysia                    |
| Mid-term External Evaluation  | <ul style="list-style-type: none"> <li>▪ Project team</li> <li>▪ UNDP- Malaysia</li> <li>▪ UNDP-GEF RCU</li> <li>▪ External Consultants (i.e. evaluation team international and local consultants)</li> </ul> | 22,000                       | At the mid-point of project implementation.                           |
| Final External Evaluation   | <ul style="list-style-type: none"> <li>▪ Project team</li> <li>▪ UNDP Malaysia</li> <li>▪ UNDP-GEF RCU</li> <li>▪ External Consultants</li> </ul>   | 22,000                       | At the end of project implementation                                  |
| Terminal Report   | <ul style="list-style-type: none"> <li>▪ Project team</li> <li>▪ UNDP Malaysia</li> <li>▪ External Consultant</li> </ul>  | Part of PM Budget            | At least one month before the end of the project                      |

<sup>33</sup> Most of the listed M&E activities listed in the table are among the project management activities. Hence the budgets for such activities are included in the PM budget.

| Type of M&E Activity  | Responsible Parties  | Budget US\$ <sup>33</sup>       | Time Frame |
|---|--|---------------------------------|------------|
| Lessons Learned Report  | <ul style="list-style-type: none"> <li>▪ Project team</li> <li>▪ UNDP Malaysia</li> <li>▪ UNDP-GEF RCU</li> </ul>  | Part of Component Budget        | Annually   |
| Audit Interim / NEX Audit (as per OAI requirements)   | <ul style="list-style-type: none"> <li>▪ UNDP Malaysia</li> <li>▪ Project team</li> <li>▪ National Audit Department</li> <li>▪ Private sector auditors (if necessary)</li> </ul> | 15,000 (total for 5 years)      | Annually   |
| Visits to field sites (UNDP staff travel costs to be charged to IA fees)                                    | <ul style="list-style-type: none"> <li>▪ UNDP Malaysia</li> <li>▪ UNDP-GEF RCU (as appropriate)</li> <li>▪ Government representatives</li> </ul>                                 | Part of PM Budget <sup>34</sup> | Annually   |
| <b>TOTAL INDICATIVE COST</b><br><i>Excluding project team staff time and UNDP staff and travel expenses</i> |  | <b>59,000</b>                   |            |

<sup>34</sup> This is part of the PM travel budget

## **Annex 1: Terms of References (of Key Project Management Posts)**

### **TERMS OF REFERENCE**

Title: National Steering Committee (NSC)  
Duty Station: Malaysia

#### **Requirement**

The National Steering Committee (NSC) will monitor the conduct of the project and provide guidance and direction to the project team at the strategic level. The National Steering Committee will be established with the following composition and will meet at least twice a year and as and when the need arises.

The Director General of the JKR will chair the Committee. The National Project Director will serve as the Secretary to the Committee, and the National Project Manager will provide support to the Secretary. The secretariat services will be provided by the CAST of JKR.

#### **Duties and Responsibilities**

NSC shall be responsible for the following functions:

- Provide policy guidance on matters pertaining to the implementation of the project;
- Monitor and evaluate the implementation of the project towards the fulfillment of the objectives stated in the project document;
- Review, approve and endorse proposed work plan and budget;
- Initiate remedial actions to overcome all constraints in progress of the project;
- Review and approve relevant changes to the project design;
- Coordinate the roles of the various organizations involved in the execution of the project and ensure harmony with related activities;
- Advice on the long term sustainability strategy of the project;
- Reviewing the project activities, and their adherence to the work plan set forth in the project document and approve any modifications/revisions as may be necessary;
- Reviewing and approving on each year's proposed work plan and budget;
- Approving major project deliverables;
- Making decisions on the issues brought to its notice by UNDP and other cooperating institutions, and advise regarding efficient and timely execution of the project;
- Reviewing issues raised and agreeing to action plans for their resolutions; and,
- Appointing sub-committees to carry out specific tasks

#### **Membership**

The Committee will comprise main stakeholders as follows:

- Director General of the Jabatan Kerja Raya (as the Chair)
- Deputy Director General of JKR (also as the Chair of the Project Review Committee )
- Ministry of Energy, Green Technology and Water (MEGTW)
- Pusat Tenaga Malaysia (PTM)
- Economic Planning Unit (EPU) of the Prime Minister's Department;
- Ministry of Natural Resources and Environment (GEF National Operational Focal Point);
- Ministry of Housing and Local Government (MHLG);

- Ministry of Finance (MoF);
- Malaysia Industrial Development Authority (MIDA)
- Tenaga Nasional Berhad (TNB)
- SIRIM Berhad;
- Professional institutions (e.g. PAM, ACEM, IEM)
- UNDP - Malaysia

## **TERMS OF REFERENCE**

Title: Project Review Committee (PRC)  
Duty Station: Malaysia

The Project Review Committee (PRC) will assist the NSC in monitoring the conduct of the project and providing technical guidance on the implementation of the project.

### **Duties and Responsibilities**

The Committee will meet quarterly and shall be responsible for:

- Advising NSC on all status and deliverables of the project;
- Ensuring system of purchase, financial concurrence, etc. for the project, purchase, procurement, award of work, which should be on completion basis and in line with GoM/UNDP guidelines;
- Reviewing annual work plan and budget of the project as prepared by the National Project Team for the timely submission to the National Steering Committee;
- Monitoring and evaluating the implementation and success indicators of the project activities and outcomes according to work plan;
- Providing technical advice and specific recommendations if necessary to improve project impact and implementation to the project team.

### **Membership**

The Committee will be chaired by the Deputy Director General of JKR, who also have the option to appoint an EE expert to chair the PRC meetings. The PRC shall comprise of the following:

- JKR CAST (National Project Director)
- National Project Manager
- Component Managers
- UNDP
- PTM
- MEGTW
- Ministries responsible in hosting the Demonstration sites
- Professional Bodies (PAM, ACEM and IEM)

## **TERMS OF REFERENCE**

Title: National Project Director (NPD)  
Duty Station: Malaysia

The National Project Director is appointed by the NSC to oversee the project implementation and progress. The person will be a government's representative and is holding a senior position in the government's hierarchy.

### **Duties and Responsibilities**

The National Project Director shall be tasked for:

- Ensuring that the project document and project revisions requiring Government's approval are processed through the Government co-ordinating authority , in accordance with established procedures;
- Mobilizing national institutional mechanisms for smooth progress of project;
- Providing formal project/deliverable sign-off and acceptance upon verification by the Commandant of MPTC;
- Reviewing and recommending for endorsement project deliverables and reports
- Providing direction and guidance on project-related issues;
- Providing advice and guidance to the project team.
- Reporting to the National Steering Committee the progress of the project and seek approval for any modifications/revisions to the project document as recommended by the PRC;
- Ensuring conformity of the project activities and objectives to the project document;
- Providing overall guidance to the NPM for managing the project finances in line with GoM/UNDP guidelines and approve expenditure as provided for in the project budget;
- Providing overall guidance to the NPM on the project execution and convey GoM's official position as may be requested during the project implementation;
- Approving annual project reports and other relevant reports and knowledge products for submission to NSC and UNDP;
- Approving payments according to the agreed deliverables
- Being responsible for the preparation and submission of the Annual Progress Report (based on AWP); Project Implementation Report (PIR), Quarterly Operational Reports for submission to the Executing Agency and UNDP.

## **TERMS OF REFERENCE**

Title: National Project Manager (NPM)  
Duty Station: Malaysia

The Project Manager will be primarily focused on the day to day operation of the project including administrative, financial and operational aspects of the project. The project manager's role is to manage and coordinate the implementation of various project activities in ensuring quality and timeliness of activities and delivery of outputs. He/She will be based at the JKR.

### **Duties and Responsibilities**

The National Project Manager (NPM) shall report directly to the National Project Director (NPD) and shall be responsible for:

- Managing and coordinating the implementation of project activities to ensure the maintenance of quality and timeliness, and delivery of outputs
- Liaising and working closely with the project partners and beneficiaries
- Reporting regularly to the NSC and PRC on the project's progress
- Maintaining close contact with designated focal points from UNDP and other stakeholders, indicating any estimated changes to the work plan, and proposing a budget revision when appropriate
- Ensuring that the requisite allocations are available in accordance with the agreed budget and established schedules of payment, if any, in consultation with JKR and UNDP
- Working closely with key stakeholders in the drafting and preparation of relevant Terms of Reference for local consultants.
- Monitoring the project budgets, funds and resources.
- Preparing progress and financial reports of the project when required.
- Maintaining an up-to-date accounting system to ensure accuracy and reliability of financial reporting
- Being actively involved in the preparation of relevant knowledge products (including publications and reports)
- Performing the function of ATLAS External User, creating requisitions and vouchers, and other relevant ATLAS processes
- Coordinating the management and implementation of activities of the project as set out in the project document and recommending any such modifications/revisions as may be necessary to the NSC through the NPD;
- Delivery of the Project Inception Reports and the results as per the agreed results framework and contained in the Project Document and/or Project Brief;
- Preparing the annual work plan (AWP) and budget of the project and its timely submission to the NPD;
- Chairing the monthly progress meetings with the program managers; and,
- Submitting regular progress reports to the local implementing agency, MEWC and UNDP;
- Reporting to the Project Review Committee the status and progress of the project and seek appropriate recommendation if required:
  - Collating deliverables from all components and being responsible for the write up of progress reports;
  - Reviewing and editing technical reports in cooperation with the National Project Director;

- Assisting the National Project Director in the preparation of the Annual Progress Report (in line with the Annual Work Plan); Project Implementation Report, Quarterly Operational Reports for submission to the Executing Agency and UNDP;
- Facilitating the work of the National Steering Committee and Project Review Committee by presenting to the Committees regular progress reports and results of project development.

### **Requirement**

- Advanced Degree in Mechanical/Electrical/Civil Engineering or Architecture or any other science-based background
- Possess a professional qualification or a member of an acknowledged professional organization or society.
- At least 5 years extensive working experience in the field of energy efficiency and possesses a strong knowledge of the local BSEEP industry and scenario.
- Extensive experience in project management with adequate exposure to financial management.
- Have a good command of the English and Bahasa Malaysia languages.

### **Duration**

The National Project Manager will be appointed under UNDP service contract for the duration one year in the first instance with the possibility of renewal.



## **TERMS OF REFERENCE**

Title: Project Coordinator (PC)  
Duty Station: Malaysia

The primary role of the Project Coordinator is to manage and coordinate the implementation of various capacity development, enabling environment and technical assistance activities that will be carried out under each project component. He/She will assist the NPM in ensuring quality and timeliness of activities and delivery of outputs. He/She will be based at the JKR.

### **Duties and Responsibilities**

The Project Coordinator (PC) shall report directly to the National Project Manager (NPM) and shall be responsible for:

- Managing and coordinating the implementation of all project activities to ensure the maintenance of quality and timeliness, and delivery of outputs
- Liaising and working closely with the project partners and beneficiaries
- Assist the NPM in reporting regularly to the NSC and PRC on the project's progress
- Liaising with designated focal points from UNDP and other stakeholders, indicating any estimated changes to the work plan, and proposing a budget revision when appropriate
- Ensuring that the requisite allocations are available in accordance with the agreed budget and established schedules of payment, if any, in consultation with JKR and UNDP
- Working closely with key stakeholders in the drafting and preparation of relevant Terms of Reference for local consultants.
- Monitoring the project implementation performance, particularly on the delivery of outputs.
- Preparing progress and financial reports of the project when required.
- Make use of the project's accounting system to ensure accuracy and reliability of financial reporting
- Active involvement in the preparation of relevant knowledge products (including publications and reports)
- Provision of the necessary inputs for the application of the ATLAS External User system, assisting in creating requisitions and vouchers, and other relevant ATLAS processes
- Coordinating the management and implementation of activities of the project as set out in the project document and recommending any such modifications/revisions as may be necessary to the NSC through the NPD;
- Coordination of the delivery of the Project Inception Reports and the results as per the agreed results framework and contained in the Project Document;
- Provision of inputs in the preparation of the annual work plan (AWP) and budget of the project and its timely submission to the NPD;
- Provision of inputs and assistance in the preparation of regular progress reports to the local implementing agency, MEWC and UNDP; and,
- Assisting the NPM in reporting to the Project Review Committee the status and progress of the project and seek appropriate recommendation if required.

### **Requirement**

- Advanced Degree in Mechanical/Electrical/Civil Engineering or Architecture or any other science-based background
- Possess a professional qualification or a member of an acknowledged professional organization or society.

- At least 5 years extensive working experience in the field of energy efficiency and possesses a strong knowledge of the local BSEEP industry and scenario.
- Extensive experience in project management with adequate exposure to financial management.
- Have a good command of the English and Bahasa Malaysia languages.

**Duration**

The Program Coordinator will be appointed under UNDP service contract for the duration of one year in the first instance with the possibility of renewal.

## **TERMS OF REFERENCE**

Title: Project Assistant  
Duty Station: Malaysia

### **Duties and Responsibilities**

The Project Administration Officer shall report directly to the National Project Manager and shall be responsible for:

- Providing administrative and logistic support to the project team;
- Executing secretarial tasks and related activities;
- Managing schedules and project implementation within specified project constraints;
- Undertaking secretariat services to specific project activities;
- Providing limited backup support to the team

### **Requirement**

- Minimum qualification is a tertiary education in secretarial science degree/diploma or related professional qualifications
- At least 3 years experience project assistant
- Have a good command of the English and Bahasa Melayu languages.
- Experiences in project management and the energy sector are preferred.

### **Duration**

The Project Assistant will be appointed under the UNDP service contract for the duration of one year in the first instance with the possibility of renewal.

## **TERMS OF REFERENCE**

Title: Financial Officer (FO)  
Duty Station: Malaysia

### **Duties and Responsibilities**

The Financial Officer shall report directly to the National Project Manager and shall be responsible for:

- Providing financial and limited backup support to the project team;
- Executing financial and budgetary tasks and related activities;
- Managing project funds and co-financing sources, budget expenditures and accounts;
- Maintaining up to date accounts and facilitating financial audit process;
- Preparing tender documents and undertaking procurement process.
- Assisting in the Annual NEX/NIM Audit as per UNDP's requirement
- Ensuring all transactions are done according to the standard UNDP or government's procedure.

### **Requirement**

- A minimum qualification of a tertiary education in accountancy or finance degree or related professional qualifications
- At least 3 years experience, in project management and accounting
- Have a good command of the English and Bahasa Malaysia languages
- Exposure to financial management activities is an advantage.

### **Duration**

The Financial Officer will be appointed under the UNDP service contract for the duration of one year in the first instance with the possibility of renewal.

## Annex 2: List of Demonstration Schemes

| No. | Demonstration Project   | Building Type                 | Tentative Energy Efficiency Technology /Technique to be Demonstrated  | Estimated Annual Energy Savings kWh |
|-----|---|-------------------------------|---|-------------------------------------|
| 1   | Design and Construction of Nurses College at Parit Jaya                           | Institutional                 | Application of insulated facades and roof, window shading and ID design for maximum daylight use and maximum visual comfort, use of VRV split A/C systems, airtight building, high efficiency lighting system controlled according to occupancy and daylight availability.  | 711,750                             |
| 2   | Design and Construction of Government Health Clinic & Quarters at Nilai, Seremban | Institutional/<br>Residential | Strategic layout of A/C zones and naturally ventilated zones for reduced A/C load and reduced risk of humidity and mold growth, insulated facades and roof, façade, shading and ID design for maximum daylight use and maximum visual comfort, high performance glazing, use of VRV split A/C systems, airtight building with CO <sub>2</sub> control of ventilation air inlet, high efficiency lighting system controlled according to occupancy and daylight availability, individual fluorescent desk lamps.   | 209,625                             |
| 3   | Design of New UTM Building, Jl. Semarak   | Institutional/<br>Office      | Building orientation, insulated facades and roof, façade, shading and ID design for maximum daylight use and maximum visual comfort, low E glazing, design of staircases for reduced use of lifts, high performance chiller, low pressure ventilation system and AHU's with VAV, high efficiency pumps, motors and AHU fans, airtight building with CO <sub>2</sub> control of ventilation air inlet, high efficiency lighting system controlled according to occupancy and daylight availability, individual fluorescent desk lamps.   | 1,935,000                           |
| 4   | Retrofit of JKR Blok F Building   | Office                        | Installation of a high efficiency lighting system controlled according to occupancy and daylight availability, installation of a new internal shading system for improved daylight availability and improved visual comfort, personal fluorescent desk lamps, weather stripping of windows and doors for reduced infiltration of outside air, improved fans and fan motors, high EE pumps, implementation of awareness program to improve energy performance.   | 1,520,000                           |
| 5   | Retrofit of Prime Minister's Office   | Office                        | Optimization of the Building and Energy Management System for optimal energy performance and user comfort, adjustment and optimization of the performance of the AHUs with fans and motors, rewiring of wiring of the lighting system in offices towards the facade so that daylight controls can be installed, installation of motion controls of lighting in chosen areas of the building, use of fluorescent task lights in offices towards the façade to reduce the use of general office lighting, implementation of an awareness program to improve energy performance, | 4,800,000                           |
| 6   | Retrofit of Ministry of Natural Resources and Environment's Building              | Office                        | Optimization of the Building and Energy Management System for optimal energy performance and user comfort, adjustment and optimization of the performance of the AHUs with fans and motors, rewiring of wiring of the lighting system in offices towards the façade so that daylight controls can be installed, installation of motion controls of lighting in chosen areas of the building, use of fluorescent task lights in offices towards the façade to reduce the use of general office lighting, implementation of an awareness program to improve energy performance. | 4,800,000                           |

| No.   | Demonstration Project   | Building Type | Tentative Energy Efficiency Technology /Technique to be Demonstrated  | Estimated Annual Energy Savings kWh |
|---|---|---------------|---|-------------------------------------|
| 7   | Design and Construction of New Building of Ministry of Trade and Industry | Office        | Building orientation, use of vegetation , use of water body, energy efficient transport/lift system, insulated facades and roof, façade, shading and ID design for maximum daylight use and maximum visual comfort, high performance glazing, high performance chiller, low pressure ventilation system and AHU's with VAV, high efficiency pumps, motors and AHU fans, high performance lifts with electricity regeneration, airtight building with CO <sub>2</sub> control of ventilation air inlet, high efficiency lighting system controlled according to occupancy and daylight availability.<br>Image/impact of Malaysia's seriousness on sustainability to potential foreign investors. | 3,800,000                           |
| 8   | Design and Construction of Housing Estate, Klang Valley                   | Residential   | Building orientation, shading of walls via window overhang and other measures, use of improved glazing with less heat transmission, use of vegetation around the building, use of water bodies, insulated walls and highly insulated roofs, use of VRV split A/C systems, implementation of an airtight building envelope, design of windows and ventilation openings for optimal natural ventilation when the climate allows for this, use of efficient lighting systems, installation of energy efficient fridges and energy efficient washing machines, installation of solar water heaters.   | 550,000                             |
| 9   | Design and Construction of New Office Building of Putra Perdana           | Office        | Building orientation, insulated facades and roof, façade, shading and ID design for maximum daylight use and maximum visual comfort, high performance glazing, design of staircases for reduced use of lifts, high performance chiller, low pressure ventilation system and AHU's with VAV, high efficiency pumps, motors and AHU fans, airtight building with CO <sub>2</sub> control of ventilation air inlet, high efficiency lighting system controlled according to occupancy and daylight availability, individual LED desk lamps.  | 2,250,000                           |
| 10  | Design and Construction of New Office Building of Sime Darby              | Office        | Building orientation, insulated facades and roof, façade, shading and ID design for maximum daylight use and maximum visual comfort, high performance glazing, high performance chiller, low pressure ventilation system and AHU's with VAV, high efficiency pumps, motors and AHU fans, high performance lifts with electricity regeneration, airtight building with CO <sub>2</sub> control of ventilation air inlet, high efficiency lighting system controlled according to occupancy and daylight availability.  | 2,250,000                           |
| <b>TOTAL (kWh savings)</b>  |   |               |   | <b>22,826,375</b>                   |
| <b>TOTAL CO<sub>2</sub> (ton CO<sub>2</sub>eq)</b>  |   |               |   | <b>15, 613</b>                      |
| NOTES: Electricity price = 0.4 MYR/kWh (USD 0.11/kWh); CO <sub>2</sub> Factor = 0.684 ton/MWh |   |               |   |                                     |

**Annex 3:**

## Malaysia: Building Sector Energy Efficiency Project (BSEEP) Comparison of Projected Building Stock (Baseline and Alternative Scenarios)

| YEAR | BASELINE SCENARIO (Business-as-Usual)                 |   |  |   | ALTERNATIVE SCENARIO (BSEEP) |  |   |  |   |  |   |
|------|---|---|--|---|------------------------------|--|---|--|---|--|---|
|      | Total Floor Area <sup>35</sup> (1000 m <sup>2</sup> ) | Total Number of Buildings <sup>36</sup> | Incremental No. of New Buildings <sup>37</sup> | Total No. of EE Buildings <sup>38</sup> | % EE Buildings <sup>39</sup> | Incremental No. of EE Buildings (New & Retrofit) <sup>40</sup> | Incremental No. of EE Buildings (New) <sup>41</sup> | Incremental No. of EE Buildings (Retrofit) <sup>42</sup> | Total No. of EE Buildings <sup>43</sup> | Ave. BEI of Non-EE Buildings <sup>44</sup> | Overall Building Sector BEI <sup>45</sup> |
| 2008 | 37805.5   | 1260                                    | 86   | 139                                     | 11                           | 0  | 0   | 0  | 139                                     | 213.5                                      | 205.0                                     |
| 2009 | 40563.1   | 1352                                    | 92   | 149                                     | 11                           | 0  | 0   | 0  | 149                                     | 213.5                                      | 205.0                                     |
| 2010 | 43521.8   | 1451                                    | 99   | 160                                     | 12                           | 15   | 12  | 3  | 175                                     | 211.8                                      | 202.7                                     |
| 2011 | 46696.3   | 1557                                    | 106  | 171                                     | 16                           | 78   | 17  | 61   | 249                                     | 211.2                                      | 199.2                                     |
| 2012 | 50102.3   | 1670                                    | 114  | 184                                     | 21                           | 167  | 24  | 143  | 351                                     | 210.5                                      | 194.9                                     |
| 2013 | 53756.8   | 1792                                    | 122  | 197                                     | 26                           | 269  | 32  | 237  | 466                                     | 209.8                                      | 190.6                                     |
| 2014 | 57677.9   | 1923                                    | 131  | 211                                     | 30                           | 365  | 39  | 326  | 577                                     | 209.3                                      | 187.3                                     |
| 2015 | 61885.0   | 2063                                    | 140  | 227                                     | 30                           | 392  | 42  | 350  | 619                                     | 209.3                                      | 187.3                                     |

NOTES: Project period is 2010-2014

<sup>35</sup> Entries are annual cumulative values based on projection of building sector floor area from 2005.

<sup>36</sup> Assumption: 1 building has a total floor area of 30,000 m<sup>2</sup>

<sup>37</sup> This is the difference in the total floor area in the current year and the previous year, i.e., the increase in floor area is mainly due to new buildings constructed.

<sup>38</sup> This is 11% of the total building stock (in terms of floor area). EE buildings have BEI ≤ 136 kWh/m<sup>2</sup>/yr. The average BEI of all non-EE buildings is 213.5 kWh/m<sup>2</sup>/yr

<sup>39</sup> The assumed annual increase in the percentage of EE buildings in the buildings sector is based on the potential improvements in the sector as found out from the IRP, LEAP: Reference Scenario Assumptions and Results, Malaysian – Danish Environmental Cooperation Programme - Renewable Energy and Energy Efficiency Component, Revised May 2005, as well as in the PTM Building Benchmarking exercise in 2008.

<sup>40</sup> Total number of EE buildings in ALTERNATIVE Scenario less Total number of EE buildings in BASELINE Scenario

<sup>41</sup> This is % of buildings in the ALTERNATIVE Scenario that are EE buildings multiplied by the incremental number of new buildings.

<sup>42</sup> In the ALTERNATIVE Scenario, this is the difference between the incremental number of EE buildings and the incremental number of new EE buildings.

<sup>43</sup> This is the sum of the number of EE buildings in the BASELINE Scenario and the incremental number of EE buildings (new & retrofitted) in the alternative scenario

<sup>44</sup> Total annual energy usage of all non-EE buildings divided by the total floor area of all non-EE buildings

<sup>45</sup> Prorated BEI based on the % of EE buildings and % of non-EE buildings.