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ANNEX 1 : TERMS OF REFERENCE

Annex 1A	:	National Steering Committee
Annex 1B	:	Technical Advisory Committee
Annex 1C	:	National Project Director
Annex 1D	:	Chief Technical Advisor
Annex 1E	:	Program Advisory Group (s)
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Annex 1G	:	Program Manager (s)
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ANNEX 2 : WORKPLAN OF COMPONENT ACTIVITIES

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ACRONYMS

ADB	Asian Development Bank
ASEAN	Association of South East Asia Nations
CETDEM	Center for Environment, Technology & Development Malaysia
CO ₂	Carbon Dioxide
CEO	Chief Executive Officer
CTA	Chief Technical Adviser
DANCED	Danish Cooperation for the Environment and Development
DEGS	Department of Electricity and Gas Supply
EASA	Electrical Apparatus Services Association
EE	Energy Efficiency
EPU	Economic Planning Unit
ESCO	Energy Service Company
ESITF	Electricity Supply Industry Trust Fund
FMM	Federation of Malaysian Manufacturers
FRIM	Forest Research Institute of Malaysia
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHG	Greenhouse Gas
GoM	Government of Malaysia
IEEIP	Industrial Energy Efficiency Improvement Project
IPP	Independent Power Producer
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
MECM	Ministry of Energy, Communications and Multimedia
MIDA	Malaysia Industrial Development Authority
MITI	Ministry of International Trade and Industry
MJ	Megajoule
MPI	Ministry of Primary Industries
MOSTE	Ministry of Science, Technology and Environment
NEDO	New Energy and Industrial Technology Development Organization (Japan)
NGO	Non Government Organization
NPD	National Project Director
NSC	National Steering Committee
PAG	Program Advisory Group
PORIM	Palm Oil Research Institute of Malaysia
PTM	Pusat Tenaga Malaysia (Malaysia Energy Centre)
RM	Ringgit Malaysia
SIRIM	SIRIM BHD
TAC	Technical Advisory Committee
TNB	Tenaga Nasional Berhad
TOR	Terms of Reference
TPR	Tripartite Review
UNDP	United Nations Development Programme.
USD	United States Dollar
UTM	Universiti Teknologi Malaysia

SECTION A: BACKGROUND AND SETTING

A.1. Background

The Malaysia Industrial Energy Efficiency Improvement Project (IEEIP) has been developed in the programming context of removing barriers to energy conservation and energy efficiency in the Malaysian Industrial Sector, i.e., GEF Operational Program No. 5.

Malaysia is one of the member states of the Association of South East Asia Nations (ASEAN) which is endowed with abundant natural resources. It is a country, which until the first half of 1997 experienced a remarkable economic growth through the last decade, particularly in the industrial sector. The country's annual GDP growth rates have been one of the world's highest, and in 1997, GDP per capita reached USD 3,191 (USD 1 = RM 3.8). The World Bank classifies Malaysia as an upper middle income country.

The country's economic growth is expected to be lower for the next few years, as compared to the previous few years which averaged at 8% annually. This is due to the current economic conditions in the country that led to the devaluation of the Malaysian Ringgit by as much as 47% in July 1997.

A.2. Energy Consumption in Malaysia

Energy has been a key input in the development and growth of Malaysia's economy. Malaysia is a net exporter of oil and natural gas; has significant hydropower resources; recently started to exploit its limited coal resources; and also possesses significant potential in renewable energy resources.

The final consumption of commercial energy in the country has been growing at an average annual rate of 8.6% during the period 1991-1995 and is expected to continue at the average annual rate of 4.0% during the period 1996-2000. Total commercial energy consumption is expected to reach 1,279 PJ in the year 2000. The country's energy intensity increased from 6.97 MJ/RM (26.49 MJ/US\$) of GDP in 1990 to 7.74 MJ/RM (29.41 MJ/US\$) of GDP in 1996. This trend is expected to continue to increase during the Seventh Plan period resulting in an energy intensity of 8.49 MJ/RM (32.25 MJ/US\$) of GDP by 2000. Malaysia's energy consumption per unit of GDP is high in comparison to most developed countries and several advanced developing countries.

Industrial Sector Energy Consumption

The country's industry sector contributes about a third of the overall gross domestic product (GDP). Its contribution to the GDP grew from 13% in 1970 to 27% in 1990. The industrial sector is expected to continue growing, albeit at a lower average annual rate as compared to the 10.7% that the country's Seventh Plan (1996-2000) had projected. The continued development and growth of Malaysia's industrial sector is an important objective of the "Seventh Malaysia Plan" and its targets for 2020.

In 1995, the industrial sector accounted for 33.1% of GDP and it was expected to grow to 37.5% by 2000. During the same time period, the sector consumed 35.7% of total commercial energy and is expected to consume 38.2% by the year 2000. However, revised estimates of economic growth rates projects the sector to account for about a third of GDP by the year 2000, the same as in 1995. Present plans to continue infrastructure and industrial projects, plus the projected growth rate in the sector still reflects the growing importance of the industrial sector in Malaysia's economy. These estimates do not include "non-conventional" energy resources used by some of the industrial establishments.

The energy consumption in the industrial sector is only rivaled by that in the transport sector, which accounted for 39.1% of the overall energy utilization in 1995 and is expected to account for 38.3% in 2000. When conventional and non-conventional energy resources are combined, the industrial sector represents the largest sectoral consumer of energy in Malaysia. However, considering the present economic conditions, it may be possible that there will be a reduction in energy consumption not because of energy efficiency improvements but because of lower production volumes and perhaps energy supply and/or use curtailments. The Government's present policies favor the use of fossil fuels and electricity by the industrial sector, and this makes the country's industrial sector a primary source of greenhouse gas (GHG) emissions.

The final consumption of commercial energy in the Malaysian industrial sector grew at an average annual rate of 6.0% during the period 1991-1995. Assuming a business-as-usual scenario, the total commercial energy consumption is expected to reach 488.7 PJ in the year 2000. High-efficiency energy utilization techniques have not penetrated the Malaysian industrial market except for a few large steel and cement plants.

The majority of industrial production comes from medium and small-scale units. Commensurate with the projected economic growth, the energy consumption and the energy intensity of the industrial sector are expected to continue to increase during the Seventh Plan period. The country's energy intensity is projected to increase from 5.14 MJ/RM (19.53 MJ/US\$) of GDP in 1996 to 5.70 MJ/RM (21.66 MJ/US\$) of GDP in 2000. The trend in the annual average industrial sector energy intensity indicates an enormous opportunity for energy utilization efficiency improvements. Being the largest energy-consuming sector in the country, the potentials for energy savings, and at the same time GHG emissions reduction are high.

A.3. Existing Programs and Energy Sector Strategy

The IEEIP's activities concerning the improvement of energy efficiency in the Malaysian industrial sector would definitely be in line with other measures/programs undertaken by the GoM in the pursuit of national energy objectives, namely:

- Deregulation of the power generation sector and encouragement of competition with the privatization of the electric utilities.
- National Energy Efficiency Program (1991) - This includes energy conservation awareness programs, energy audits in buildings as well as studies on fiscal incentives, transfer of technology, legislation, etc..
- Requirement of Environmental Impact Assessment Study for all new energy projects.
- Issuance of the Electricity Supply Act 1990 (Electricity Regulations 1994).
- Occupational Safety and Health Act 1994.

The project will also build on the significant volume of existing studies that have been undertaken in identifying EE&EC opportunities in Malaysian industries. Specifically, the project can utilize the Asian Development Bank technical assistance study (ADB/TA No. 1574-MAL) "A Report on Energy Efficiency in Malaysian Industries - Economic Analysis and Recommendations for an Institutional Framework" and the detailed multi-volume "Study on Energy Policy Analysis and Planning to the Year 2020." There are also other documents produced from other previous and ongoing energy studies carried out by foreign institutions (e.g., JETRO, JICA, DANCED) in cooperation with local government and private organizations (e.g., SIRIM, FRIM, MITI) that can be utilized in defining the relevant components of an EE&EC barrier removal project.

Malaysia's energy sector strategy lies upon the macro-economic framework stipulated in the National Development Policy which emphasizes the overriding goal of rapid industrialization to achieve developed country status by the year 2020. This goal is embodied in the concept "Vision 2020."

Malaysia's energy policy as stated in the National Energy Policy focuses on:

- Energy Supply: Assurance of adequate energy supply through the reduction of the dependence on oil, and through the development and utilization of alternative sources of energy.
- Energy Utilization: Promotion and encouragement of the efficient use of energy and the elimination of wasteful and non-productive patterns of energy consumption.
- Environmental Conservation: Minimization of environmental degradation in realizing the supply and utilization objectives.

The implementation of the ongoing energy efficiency program is primarily guided by the utilization objective of the National Energy Policy. In consonance with the utilization objective, a national energy efficiency strategy is currently being considered for implementation. The objective is not to constrain the consumption of energy, but to promote efficient use of energy resources.

Considering the present economic conditions, energy efficiency and energy conservation (EE&EC) will surely be a prominent feature in the Malaysian industrial sector in the near as well as the long-term. As per its plans in the 80s, the government is expected to continue the propagation of energy conservation among energy consumers and enhance these endeavors in the future. In spite of the availability and current surplus of domestic energy resources, the GoM is preparing to issue some basic energy efficiency regulations under the authority of the 1990 Electricity Supply Act to support EE&EC efforts.

The latest effort by the GoM to meet the objective of improving energy efficiency in the country has been the establishment of the Pusat Tenaga Malaysia or PTM (Malaysia Energy Center). PTM is a non-profit company, administered by the Ministry of Energy, Communication and Multimedia (MECM) to catalyze the implementation of EE&EC measures throughout the country. The primary objective of PTM is to work with the GoM, private sector, NGOs and academe to help build capacity, institute policies and practices and identify opportunities for adoption of energy efficiency measures in Malaysia.

A.4. Previous and Ongoing Assistance

There are various assistance programs that have been provided by international organizations to stimulate EE&EC activities in Malaysia. A common aspect of these international supported EE&EC programs is close cooperation with local counterparts such as MECM, TNB and DEGS. The scope of assistance includes funding, technical consultation and technology transfer. Among the EE&EC programs that have been implemented with international assistance are the following:

- ADB/TA No. 1774-MAL: Malaysian Industry Energy Conservation Study, 1993
- The California Energy Commission – TNB: TNB Demand Side Management Project, 1994.
- JETRO – MECM: Survey on Energy Conservation for Malaysian Food Processing Industries, 1996.
- JETRO – MECM: Survey on Energy Conservation for Malaysian Textile Industries, 1997.
- JETRO – PTM/MECM: Survey on Energy Conservation for Malaysian Ceramic Industries, 1998.

- JICA – DEGS/MECM: Energy Audits for Commercial & Industrial Sectors, 1998.
- NEDO – MECM/PTM: Feasibility Study for Energy Conservation Model Projects, 1998.
- EC-ASEAN Cogen Program – SIRIM Bhd.: Implementation of Full Scale Co-generation Demonstration Projects in Malaysia, 1998.
- Common Fund for Committee – FRIM: Wood Waste Utilization for Energy Generation in Malaysia, 1998.

The GoM has also taken steps to provide financial assistance to EE&EC efforts through the creation of ESITF in which major independent power producers (IPPs) and TNB generators in Malaysia and TNB Generation contribute 1% of their audited revenues to the fund annually. Among the EE&EC projects that have been financed either partly or totally by the fund are the following:

Project	Contractor	Status
Energy Efficiency and Demand Side Management Project	Tenaga Nasional Berhad	Contract signed and ongoing. Sep. 1998 – Jun 1999
Energy Efficiency & Cogeneration Program for Malaysian Forest and Pulp & Paper Industries	ECO Energy Sdn. Bhd.	Contract signed and ongoing. Sep. 1998 – Jun 1999
Energy Optimization Scheme in University Malaya	Techno Economists Sdn. Bhd.	Contract signed and ongoing. Jan. 1998 – Jan 1999

Besides the above support from international organizations, UNDP-GEF is currently funding a project through its Enabling Activity, entitled “Enhancement of Technical Capacity to Develop National Response Strategies to Climate Change”. This is a capacity building project to enhance human resource and technical capability of Malaysia to fulfill its obligation under Articles 4 and 12 of the Framework Convention on Climate Change. The project is designed to enable the Government of Malaysia to meet its reporting requirements under the Convention which are to: (i) prepare a national GHG inventory of sources and sinks; (ii) identify, examine and prioritize GHG mitigation options; to (iii) review and update the assessment of vulnerability to climate change and assess adaptation needs; and (iv) enable the Government of Malaysia to prepare its first National Communications to the Conference of Parties (COP).

UNDP also, supported a project entitled “Energy Policy and Planning to the Year 2020”. This project provided the Government with a reference framework for decision making on strategic energy sector issues to support the development emanating from the programme Vision 2020.

SECTION B: PROJECT JUSTIFICATION

B.1. Problems to be Addressed: The Present Situation

To date, efforts to conserve energy and utilize energy efficiently in industries have been hampered by several barriers, which are economic/financial, information, regulatory and technical in nature. The main barriers to the implementation of energy efficiency and energy conservation (EE&EC) projects in industries include:

- Limited knowledge/awareness about EE&EC techniques/technologies in industries and the lifecycle economic benefits there of. Producers remain extremely sensitive to the relatively high first cost to be paid for energy efficient equipment.
- Lack/limited access to information on EE&EC techniques/technologies. Lack of information on sectoral energy benchmarks.
- Industries are unwilling to incur what are perceived as “high cost-high risk” transactions involved in implementing EE&EC projects.
- Industries generally focus on investments on production-related improvements and not efficiency.
- Lack of financiers ready to finance EE&EC investments in industries.
- Limited/not stringent regulations on energy efficiency standards and implementation.
- Few/limited EE&EC technology demonstration projects or programs implemented by industries or the government.
- Weak local energy support services. Lack of trained industry and financial sector personnel on energy management.

The result of all of the above barriers is a standstill in improving the energy efficiency in the Malaysian industrial sector, and the core problem of inefficient and wasteful use of energy in industrial facilities. The waste of energy which results in higher energy consumption and demand and more rapid depletion of the country’s non-renewable energy resources, contributes to the increase of GHG emissions from Malaysian industries.

Part of the solution to the above problems is for the country to embark on an aggressive program to improve the efficiency with which its industry sector uses energy. This is the focus of the proposed UNDP-GEF Malaysia IEEIP. Substantial opportunities exist throughout the country’s industrial sector to improve energy efficiency, in part, because of a long history of both public ownership of large portions of the industrial economy and past subsidies of energy prices.

B.2. Expected End of Project Situation

At the conclusion of this project, Malaysia will have a strong institutional and technical foundation for continued efforts to capture the energy efficiency potentials within the industry sector and achieve the concomitant GHG emission reductions. The end of project situation is a collective achievement of desirable outcomes that include:

- Information on EE&EC technologies are documented, easily accessed, and are disseminated.
- Regular campaign programs on the rational use of energy are provided to industries by the government /other autonomous bodies.
- Sectoral energy benchmarks are set and published.
- Industries become interested in investing in the implementation of EE&EC projects and practices that are economically and financially viable.
- Industry personnel are adequately trained on energy management.
- Financial incentives to industries to conserve energy are provided.
- Financiers provide financing for EE&EC projects to interested industries.
- Energy efficient equipment becomes affordable to industries.
- Stringent regulations on energy efficiency are enforced by the government.
- Local energy support services are promoted, strengthened and utilized.
- Significant EE&EC technology demonstration programs are implemented by the government or relevant agencies in collaboration with the private sector and financial institutions.

B.3. Target Beneficiaries

The target beneficiaries of the projects can be divided into two groups. The first group comprises those that directly benefit from participating in the Activities of the components listed. The second group comprises future beneficiaries arising out of successful replication of the programs carried out.

Beneficiaries of the project:

The following comprise organisations and industries that will directly benefit from the energy efficiency project:

1. Malaysia Energy Centre (PTM) by involvement of its staff in the project. PTM will also have to recruit more staff and the project will thus result in increasing its capacity and strengthening the capability of its staff.
2. Participating research organisations such as SIRIM, FIRIM, PORIM and Universities by involvement of their staff in the project activities which will result in increasing their research and academic capabilities and hence contribute to institutional strengthening. SIRIM will benefit by having equipment test facilities and Universities will also benefit by inclusion of experiences into their course curriculum.
3. Government organisations such as MECM, DEGS, MOSTE, EPU, and MIDA where officers from these agencies will have to participate in coordination meetings and discussions and will gain sufficient knowledge to be able to formulate the necessary policy papers for efficiency regulations, energy pricing etc.
4. The industries and related industry organisations where energy audit activities are carried out to establish the level of energy efficiency of the respective industry. These industries will benefit by the on-the-job training of their staff and increase of awareness of energy efficiency. The associations will benefit by having available a trained energy audit team for the particular sector.
5. The industries selected for energy demonstration projects. These industries will benefit by being able to implement proven energy efficient technologies at subsidised costs and expert advice from the project consultants.
6. The manufacturers of energy efficient equipment. The incremental R&D costs for improvement in energy efficiency of the equipment will be borne by the project and this will encourage these manufacturers to produce more energy efficient equipment at competitive costs.
7. The Energy Service Companies (ESCOs)¹. The project has opportunities for the involvement of ESCOs in the various activities as consultants and contractors. The project will also develop further opportunities and scope for the services of ESCOs in the country by publicising their roles to the industrial and financial sectors.
8. The Federation of Malaysian Manufacturers (FMM). The project will complement the role of FMM in promotion of energy efficiency. Most of the dissemination activities will be coordinated through FMM and this will enhance its role as a focal point for manufacturing industries.
9. Financial institutions will be able to appreciate and participate in energy efficiency projects.

¹ In developed countries where the ESCO industry thriving, the term ESCO generally refers to an entity, which provide financing to energy efficiency/engineering projects. In Malaysia, ESCOs are companies that provide energy management services to industrial and commercial establishments. These services include, among others, energy audits, energy project design and implementation energy studies/researchers. Such companies may only be providing professional services and get paid for services rendered. They may also be companies that finance part or the entire cost of the energy efficiency/engineering projects of their clients, based on a mutually agreed scheme such as performance contracting, shared saving, etc.

Future Beneficiaries of the project:

1. PTM will have a definite role to play in implementing and coordinating energy efficiency activities for industry. It would have built up sufficient capacity and capability to assist the government in their efforts to implement energy efficiency.
2. SIRIM will have available testing facilities to evaluate the energy performance of industrial equipment and this will ensure that standards are met. FIRIM and PORIM would have resources to undertake future research activities in the area of energy efficiency. Universities will play a greater role in the teaching of energy efficiency principles in their undergraduate courses and also conduct courses for energy managers/personnel from industry apart from increased energy R&D.
3. The government would have established energy efficiency standards and regulations and will be able to extend the life of their available fossil fuels.
4. The industrial sector will benefit by replication of energy audit activities and energy technology demonstration projects. This will also cover sectors of the industry not included in the project. Industries will also be able to gauge their performance with other industries in the same sector using similar processes.
5. Equipment manufacturers will produce more cost-competitive energy efficient equipment not only for use locally but also for import.
6. The electricity utility TNB will benefit in that it will not have to cater for increased peak demand. This will delay their construction of additional power plants.
7. The global environment will benefit from reduced emission of GHG resulting from the successful implementation of this project.
8. By improving efficiency of Malaysian industries this project will contribute to competitiveness of the Malaysian economy, which should lead to increase in peoples incomes

B.4. Project Strategy and Institutional Arrangement

Project Strategy

The overall project strategy is to establish an institutional focus, responsibility and capacity within the Malaysian government to identify barriers to improving efficiency and assist in removing them. Simultaneously, capacity will be established to provide energy efficiency services to all sectors of the national economy, but in particular to the industrial sector, so that as barriers are removed, the capability is there to capture efficiency opportunities. The strategy is to locate this institutional focus within the Malaysia Energy Center (PTM), and to sufficiently involve other stakeholders such that the energy efficiency improvement project spreads throughout the public and private sectors. A comprehensive strategy will be used for program design and implementation where multiple intervention techniques are implemented in a carefully orchestrated sequence focused on a single program on industrial energy efficiency improvement for maximum impact. These include information campaigns, demonstration programs, as well as the provision of engineering services, financial incentives, and training courses.

Specifically, the overall strategy will be to create an institutional focus and capability to improve the efficiency of energy use in the industrial sector through the implementation of two distinct groups of programs:

- Energy Technology Application Programs; and,
- Energy Efficiency Support Programs.

The former consists of programs that will qualify and quantify the energy utilization performance of the industry sector, enhance the level of awareness and knowledge about energy efficient practices and measures in industries, and show case proven and applicable energy saving technologies. The latter is comprised of programs that are designed to guide, motivate and support industries in their energy efficiency improvement efforts.

The proposed programs are to be carried out through the newly established PTM under the MECM. Over time, the strategy will be to develop a broad range of mutually reinforcing capabilities within the PTM, including end use research, policy analysis, training and information development and dissemination. Initially, however, the focus will be on developing the capability to provide energy efficiency services to industrial energy end-users, and to design and implement large-scale energy efficiency programs.

The PTM is established as a financially and administratively distinct unit under the MECM. This will enable all or part of the PTM to be removed from the auspices of the MECM at some point in the future and incorporated separately as either a stand alone public or private company. Thus, the strategy will be indirectly to use the IEEIP project to establish the PTM's energy efficiency capability and to sustain this by a combination of both public and private funds after the termination of the UNDP/GEF funds.

A general program strategy will be to target "cross-cutting technologies" such as boilers, steam and process heating systems, electric motors, heat transfer equipment, fans, compressors, etc., addressing a common energy efficiency opportunity in a standardized, repeating fashion so that economies of scale and high levels of participation are achieved. This programmatic approach has been successfully used in other large-scale programs in developing countries and is capable of realizing large energy savings at low cost.

Staffing strategy for the PTM will follow the comprehensive approach, i.e., there will need to be a diversity of staff capabilities to be able to handle each of the different functional capabilities required. The general functional capabilities required include engineering, training, information, analysis, and finance. These functions will then be combined into carefully orchestrated and sequenced programs using where possible, the PTM resources to achieve the maximum synergy during program implementation. Seconded government employees who will contribute their managerial and technical skills and know-how in the implementation of the various programs of the IEEIP will supplement the PTM staff.

Implementation Arrangements

To ensure the success of the UNDP-GEF project, it is important that the institutional arrangements for project implementation are well defined and compatible with the project's overall objective and workable within the context of the newly formed PTM. The project implementation organizational chart is as shown in Figure 1.

Overall responsibility for project implementation will lie with the MECM. The Deputy Secretary General of MECM will have specific responsibility for overseeing the current UNDP/GEF project. Coordination among government agencies will be achieved through a National Steering Committee (NSC) which will be chaired by the Economic Planning Unit (EPU), with the Deputy Secretary-General of MECM as alternate chair. The implementing agency will be Pusat Tenaga Malaysia (Malaysia Energy Centre) and the Chief Executive Officer (CEO) of PTM will serve as the National Project Director (NPD). The NPD will carry out the directions of the NSC and will also be responsible for the monitoring and adherence of the work plan, which forms the basis for project execution. The

INSERT FIGURE 1: UNDP-GEF PROJECT IMPLEMENTATION ORGANAZATION CHART
(SAVED AS SEC B-P10.PPT)

MECM has already appointed a full time person to this position, and his roles and responsibilities as NPD are presented in Annex 1. The TOR for the NPD is detailed in Annex 3C.

The project will be nationally executed with UNDP assisting PTM to make all direct payments. However, the implementing agency (one of assigned counterpart from TPM) will still maintain an accounting and financial transaction of the project. Details of the accounting and financial procedures are attached as Annex to the project document. UNDP Kuala Lumpur office will assist to facilitate the said work.

The Government will provide the Resident Representative with certified periodic financial statements, and with an annual audit of the financial statements relating to the status of UNDP (including GEF) funds according to the procedures set out in Section 30503 of the UNDP Policies and Procedures Manual and Section 10404 of the UNDP Financial Manual. The audit will be conducted by the legally recognised auditor of the Government, according to the GoM auditing procedures, or by a commercial auditor engaged by the Government.

Prior to completion of UNDP/GEF assistance to the project, the GoM and the UNDP/GEF shall consult as to the disposition of all project equipment provided from the UNDP/GEF funds. Title to such equipment shall normally be transferred to the Government or to any entity nominated by the Government, when it is required for continued operation of the project or for activities following directly therefrom. In the case of this project, the title of the equipment will be passed on to PTM at the end of the project. The UNDP, however, at its discretion may retain title to all or part of such equipment.

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National Steering Committee

The NSC will provide necessary guidance and oversight to the project implementation, and will invite members and experts for specific meetings, as needed. Meeting once in three months, the NSC will serve to coordinate activities with other government agencies and relevant. Issues that the NSC expected to deal with include:

- Application of the energy efficiency financing mechanism
- Development and implementation of equipment efficiency standards
- Coordination of various aspects of project activities
- Discussion of policy recommendations
- Coordination of all planning, implementation, monitoring and evaluation activities of the project

The NSC will function not only to coordinate the program implementations, but will also act as a discussion forum for proposed activities, policies and initiatives. The NSC can also serve, to coordinate the activities of the demonstration and support programs so that they adequately incorporate energy efficiency potential and corresponding funding. The membership of the NSC would include representatives from the Government agencies (EPU, MECM, DEGS, MoSTE, MIDA, MPI, FRIM), implementing agency (PTM), industry association (FMM), private sector organizations (TNB, SIRIM Bhd, IPPs), NGO (CETDEM) and UNDP (refer to acronyms page for full description of abbreviations). A reasonably broad membership in the NSC will help accelerate the development of awareness of energy efficiency and create a stronger base for launching the Malaysia IEEIP.

Pusat Tenaga Malaysia (Malaysia Energy Center)

The Malaysian government has set up this independent unit under the MECM with broad responsibility for energy efficiency and planning services. The PTM's CEO reports to the Board of Directors of PTM, has day-to-day responsibility and authority for the activities of the Center, including the implementation of the Malaysia IEEIP.

The CEO, who is also the National Project Director (NPD), will manage overall project progress and assist MECM and UNDP Resident Representative in overseeing the entire project. The detail TOR for the NPD is detailed in Annex 3C.

The rationale behind PTM's establishment is to fulfill the need for a national energy research center that will coordinate various activities, specifically energy planning and R&D undertaken in the energy sector.

Functions

- The PTM has a comprehensive set of functional capabilities that can provide a complete array of services both internally to the MECM and government planners in terms of policy, research and planning, but also externally in terms of consumer information, training, and energy efficiency services and programs. As an independent unit under MECM, PTM not only has its own legal entity and authority in purchasing the services under the project (equipment, sub-contacts, hiring staff), but also the capacity in doing so. A functional organization chart is given in Figure 2.

In the pursuit of its objectives, PTM is expected to function as:

Agent for public and private energy sectors

- Guardian/repository of a national energy database
- "Think-tank" on energy issues through consultancy services
- Promoter of the national energy efficiency program
- Coordinator and lead manager in energy research, development and demonstration projects for early commercialization

Organization

For the purpose of project implementation, the Center is organized into 4 units: Energy Data Services, Energy Efficiency Services, Energy Technology R&D Services, Administration and Finance. Overall management and direction would be the responsibility of the CEO who will have day-to-day responsibility for the UNDP-GEF funded Malaysia IEEIP.

Staffing

The staff positions are currently being filled and the full staff complement will be available by the time the IEEIP implementation starts by the second quarter of 1999. The availability of qualified staff to fill these positions is a prerequisite for this project. Seconded government employees who can contribute their managerial and technical expertise to the IEEIP will supplement the PTM staff.

INSERT FIGURE 2: PUSAT TENAGA MALAYSIA -ORGANIZATIONAL CHART (SAVED AS SEC B-P12.PPT)

Technical Advisory Committee

In order to improve the design and implementation of the various programs, the PTM will establish a Technical Advisory Committee (TAC) that will be chaired by the NPD with the Chief Technical Adviser (CTA) as the alternate chair. The TAC will be providing guidance/advice to the PTM staff in the implementation of each project component. The NPD will carry out coordination of the project with MECM, PTM, and participating agencies and institutions, and will report to the NPD. The CTA will provide guidance to the project team for execution and adhering to the planned milestones. The CTA will also coordinate and supervise the work carried out by consultants/contractors who will be involved in the project. The TAC will be composed of local energy experts whose combined expertise and experiences cover all the technical and implementation aspects of the project components.

Amongst others, the TAC will assume the responsibility in carrying out all functions of approvals and award of contracts, sub-contracts, equipment, appointment of CTA, and other services to be procured under the project. The CTA and NPD is responsible in drawing-up list of suppliers, prepare tendering procedures, evaluate the bids, and with the TAC's approval in finalizing issuance of contracts, procurement of equipment and etc. For the equipment listed in Annex 4, locally available equipment will be procured on an open national competitive bidding. For equipment not available domestically, the GOM must apply an open international bidding procedure. The equipment will be used exclusively for the purpose of the project. Similar competitive bidding procedures will be followed for the award of subcontracts. The TORs for the TAC and the CTA are detailed in Annexes 3B and 3D, respectively

Program Advisory Groups

In order to improve the design and effectiveness of the various programs, the PTM will establish ad hoc advisory groups within the TAC for programs as they are implemented. The advisory groups will be comprised of members of the TAC who are key stakeholders affected by each program. The following program advisory groups are envisioned during the entire duration of the IEEIP:

- Energy Technology Programs
 - Energy Rating Programs Advisory Group (*Component Nos. 1 & 3*)
 - Energy Efficiency Promotion Programs Advisory Group (*Component Nos. 2 & 4*)
- Energy Efficiency Support Programs
 - Energy Technology Promotion Programs Advisory Group (*Component Nos. 6 & 7*)
 - Energy Services Support Programs Advisory Group (*Component Nos. 5 & 8*)

Technical Advisors

A program manager who is a staff of the PTM will manage each program. The program manager will be advised/guided by a technical advisor to be appointed by the TAC. The Job Descriptions (JDs) of each type of technical advisor are in Annex 1. The Technical Advisor will be responsible for program implementation, in coordination with the PTM project engineers. The technical advisors report to the CTA.

B.5. Reasons for Assistance

Need for Assistance

Concerns about the present economic conditions in the country have spurred many industrial establishments to seriously consider cutting down on operating cost items, particularly energy. Most of these establishments are also concerned about the forthcoming AFTA (2002-2003), and are now gearing up for improving competitiveness by employing new technologies that will not only improve quality but also energy use efficiency. In the short term, the present anxiety regarding the economy is considered by most industries as a motivation for them to become more efficient to sustain and/or improve their cash flows.

However (as detailed earlier) there are a number of barriers which hinder the wider adoption of efficient energy technologies and practices by Malaysian industries. The creation of the PTM is meant to help remove such barriers, but its current programmes and its capacity to promote Energy Efficiency are not yet adequate. Support is needed to train and assist industrial plant managers to prepare EE&EC projects and, when necessary, to secure the external private sector financing needed to implement such projects. Technical assistance to backstop PTM will be needed to enhance its planned activities.

Furthermore, it also is one of the strategies identified by the UNFCCC to stabilize atmospheric GHG concentrations at levels that would prevent dangerous anthropogenic interference with global climate. Malaysia is committed to identifying and implementing ways to achieve this objective, and assistance is needed to do this.

If assistance is not provided, the potentials for energy savings and consequently the reduction in energy use-related GHG emissions, are much less likely to be fully realized; and barriers which currently exist, will be reinforced and harder to break down in the future.

Need for UNDP-GEF Assistance

As detailed above there is a need to strengthen the capacity of the GoM to implement and sustain long-term energy efficiency efforts that both improve Malaysia's economic and industrial efficiency, and which have a well-documented positive impact on the global as well as the local environment.

UNDP-GEF assistance is needed because national capacity and experience is not yet sufficient to overcome these barriers, and because the multilateral, neutral, non-commercial nature of UNDP-GEF assistance permits a project implementation strategy that is both nationally driven and which can draw on the best international expertise available. UNDP-GEF has experience with similar programmes in other countries and the project conforms with Operational Program number 5 "*Removing Barriers to Energy Efficiency and Energy Conservation*" of the GEF Operational Strategy. Furthermore, energy efficiency projects have been identified as one of the priority areas under the Country Cooperation Framework (CCF) which serves as the Memorandum of Agreement between the Government of Malaysia and the UNDP governing their joint development activities over the period 1997-2001.

The GEF contribution to the project of USD\$7.3 million will enhance national energy efficiency efforts by providing new ideas, new processes and new technologies for industrial energy efficiency. It will permit capacities to be built and awareness to be raised to the extent that barriers to efficient energy use in industry will be broken. This should facilitate the implementation of follow-up "win-win" projects to which the GoM is already committed. Lastly, the project will also provide a policy

action framework for meeting climate change mitigation objectives within the existing system in a cost-effective way.

This project is a national priority because it will create greater energy efficiency and facilitate measurable reductions in GHG emissions. It is also a national priority within the context of the national environmental strategy, and national energy policy. The project itself is expected to lead to investments in energy efficiency practices/technologies in Malaysian industries.

B.6. Coordination Arrangements

Coordination has been structured into this UNDP-GEF project at multiple levels to ensure that all stakeholders are involved and exposed to the project's efforts, and to multiply the effectiveness of the program expenditures. Arrangements for coordination include:

Inter-ministerial Coordination – The National Steering Committee (NSC) will be formed including representatives of the MoSTE, MIDA, EPU, other relevant ministries, the UNDP mission and other stakeholders. The Committee will be chaired by the EPU and the Deputy Secretary-General of the MECM will be the alternate chair. For further details see Figure 1. Any policy issues/recommendations or other actions requiring higher authority can be taken by the EPU/MECM.

Intra-ministerial Coordination - To assist the NSC coordinate tasks of the project within the MECM on a day-to-day level is the CEO of the PTM, who serves as the National Project Director. The NPD will monitor progress, help resolve issues and problems, and provide upward and downward reporting for all components of the overall project.

Pusat Tenaga Malaysia (Malaysia Energy Center) - Overall coordination of PTM activities will be the responsibility of its CEO. However, because of the multiplicity of programs and the need to involve all key stakeholders in each program, the proposed UNDP-GEF project is designed to have an ad hoc technical advisory committee to coordinate and monitor each program so that it fits well within other existing activities.

SECTION C: DEVELOPMENT OBJECTIVE

The development objective of this project is to improve energy efficiency in Malaysia's industrial sector, through removing barriers to efficient industrial energy use, and through creating a sustainable institutional capacity to provide energy efficiency sources, and a conducive policy, planning and research framework.

The Malaysian government has committed to a national program of improving energy efficiency in its industrial sector. This commitment results from the country's need to reduce the rate of consumption of precious nonrenewable energy sources, to sustain economic growth and to reduce the environmental impacts resulting from energy production and use, including the production of greenhouse gas emissions. This commitment is expressed in the creation of the PTM and the staff and facilities necessary to support this effort. It is also reflected in the commitment of funds by the government for this effort, which will result in a significant improvement in the energy efficiency in its industrial sector.

The above government commitments form the foundation for important efforts to improve efficiency but are not sufficient to achieve major efficiency gains due to the barriers discussed in Section B. The project will permit the development objectives to be met by contributing to:

- The implementation of appropriate measures such as demonstrating the effectiveness of energy saving technologies and the provision of financial incentives for the manufacture of energy efficient industrial equipment.
- Provision of highly skilled energy audit and engineering services, project financing, and training and information to plant managers and operators.
- Implementation of energy efficiency programs and other large-scale efficiency programs by strengthening the institutional capacity for energy program design and implementation, monitoring and evaluation.
- Capacity building of existing organizations to provide energy management advisory services, energy engineering and design.
- To sustainable follow-up programs that will be implemented at the end of the project that will build on the achievements and experience gained, and where necessary improve the program activities and deliverables.

SECTION D: IMMEDIATE OBJECTIVES, OUTPUTS AND ACTIVITIES

Immediate Objectives

The project's immediate objectives are embodied in the various project components:

1. Energy Use Benchmarking Program
2. Energy Auditing Program
3. Energy Rating Program
4. Energy Efficiency Promotion Program
5. ESCO Support Program
6. Energy Technology Demonstration Program
7. Local Energy Efficient Equipment Manufacturing Support Program
8. Financial Institutional Participation Program

Improvement Targets

With implementation of the IEEIP through demonstration schemes, equipment improvement projects and increased awareness on EE&EC technologies, the energy consumption in the industrial sector during the year 2004 would be 10% lower when compared to the energy consumption based on a "business as usual" scenario. The industrial sector energy intensity is also expected to be reduced by 10% by 2004. Based on 1995 levels, and calculations performed in 1996, the proposed project could directly and indirectly help reduce GHG emissions from the industry sector by 10% by the year 2004.

1. Industries become aware of the actual and rational energy utilization performance, as well as the EE&EC measures that can be applied to improve energy utilization efficiency through the establishment of energy use norms for industrial sub-sectors and processes.

2. Industries comply with regulations designed to encourage the use of energy efficient equipment and practices.
3. Awareness about, and attitude towards, energy efficiency and environmental improvement by industries widespread.
4. Industries are using and benefiting from local energy support services (ESCOs) in the implementation of their EE&EC projects.
5. Industries are implementing proven and cost-effective EE&EC technology projects.
6. Industries utilize locally manufactured equipment with comparable efficiencies to imported quality industrial equipment.

Component No. 1: Energy-use Benchmarking Program

This component will address the lack of “benchmark” information regarding the energy performance in the various processes of the industrial sub-sectors of the country.

Benchmarks are usually used for industrial processes. They are useful in assessing the energy performance of an industry as compared to other establishments in the same industry. The computation of energy benchmarks for various industry sub-sectors for major industrial processes will reveal a range of figures and from this a “norm” can be established. An industrial establishment which has an energy-use figure higher than the “norm” has potential for energy saving. The appropriate energy use benchmarks will be determined based on the information that will be derived from energy consumption reports that will be submitted by the industrial establishments. Hence, it will be necessary to get the industrial firm’s cooperation and commitment to support this particular activity. It is very essential that all the relevant information for establishing the energy use “norms” or “benchmarks” be obtained from them. It may also be necessary for the PTM to devote some time to visit and assist the industrial firms in filling up the required reports forms, and determining/measuring energy usage, in order to get their cooperation and more importantly, the correct information. Experience in other countries indicates that it is necessary to explain the clearly to the industrial firms the purpose of the reporting requirement and its benefits particularly to them, and to provide them feedback for them to continuously support the program.

The information that will be gathered from the local industrial establishments will be supplemented by information that will be gathered from literature surveys. Information regarding the energy utilization performances (i.e., specific energy consumption and energy intensities) of industrial processes and operations in other countries (e.g., ASEAN member states) that are similar to that in Malaysian Industries.

It should be emphasized that the energy use benchmarks that will be established must be realistic, achievable and applicable. These should be applicable in the sense that all factors that are applicable to the Malaysian Industrial setting are considered in coming up with the benchmark figure.

Although the IEEIP will focus on 8 pre-selected industry sub-sectors, the program will cover all industry sub-sectors. The program will also disseminate the established benchmarks to all industrial firms to assist them in assessing and help them in establishing their targets and plans in implementing their respective EE&EC activities. The information will be provided through the publication of monthly bulletins, dissemination activities and also by setting up a database. The database that will be developed will support mainly the storage and processing of all information that will be collected from industry report submission, as well as data from energy audits. It will provide the information regarding energy use benchmarks, the energy use profiles, and energy saving potentials in various industrial firms in cooperation with the relevant government agencies and industry associations.

The established benchmarks will have to be updated regularly so as to reflect the current situation. Changes and new realities in the national, regional and global economic and environment scenes, as well as technological and structural changes will be considered in the updating of the benchmarks. The benchmarks are in essence the success indicators of the EE&EC activities in the industrial sector. The regular monitoring of industrial energy utilization performance through the report submission and energy auditing activities of PTM and the ESCOs. Aside from regular literature reviews, will ensure that the benchmarking program will be sustained. The benchmarks for this project will be established based upon international best practices.

Immediate Objective

To establish and develop energy-use benchmarks for various industry sub-sectors (based on industrial processes, operations and energy systems) that can be used by industries as guides in their EE&EC efforts.

Success Criteria

By the end of this program, PTM will have achieved the following results:

- Set-up a data collection system for energy benchmarking.
- Established industrial energy-use benchmarks.
- Installed an industrial energy-use database.
- Established a system of disseminating end-use benchmark information to industries.

Output 1.1. Data Collection System for Energy Benchmark Setting

The PTM will develop a reporting format that will be used to collect data on energy consumption and production figures from the various industrial firms in the country. The data that will be collected will be the bases for computing the energy-use benchmarks.

Activity 1.1.1 Collection of available energy-use benchmark data from overseas industry organizations and/or research institutions where such data is available.

The PTM will conduct a literature review of various industrial processes and operations in other countries within ASEAN, and in other developed countries.

Activity 1.1.2 Design of an energy reporting form that will be used by industrial firms in reporting regularly their energy consumption data to the PTM.

An energy reporting form will be designed by the PTM to gather the relevant data that will be used for computing industry energy-use benchmarks. The report format will include among others energy supply and use data and production data.

Activity 1.1.3 Get endorsement from the government (MECM and MIDA) and business community (e.g., industry associations and FMM) on the energy reporting requirement of industrial firms.

The MECM's endorsement (and that of MIDA and the industry associations FMM) of the energy reporting form is very essential in the energy reporting activity of the industries. Meetings with the relevant parties will be conducted to get the commitments of business community in supporting the nationwide industrial energy reporting activity. It must be emphasized that confidentiality of the data provided by industries will be assured.

Output 1.2 Energy Consumption Benchmarks for Malaysian Industries

The energy-use benchmarks will be established for all industry sectors specifically cement, ceramic, food, glass, iron & steel, pulp & paper, rubber and wood.

Activity 1.2.1 Coordinate the distribution of the energy reporting forms with FMM/MIDA

The PTM, with the endorsement of the FMM/ MIDA/Industry Associations, will mail the energy reporting forms (with guidelines) to various industrial firms.

Activity 1.2.2 Conduct visits to industrial firms.

The visits will be selective. These would be to those firms that are:

1. Requesting assistance in filling up the report forms.
2. Big firms that have various operations and processes
3. Presently complying with certain corporate energy use benchmarks

Other visits will also be made to industries but are mainly for the purpose of collecting the report forms, thereby ensuring that response is obtained from majority of industries. These visits are best done with different groups covering selected areas.

Activity 1.2.3 Establishment of Industrial Energy-Use Benchmarks

Data obtained from the report forms submitted by the various industrial firms will be used to come up with the existing energy use benchmarks. The end-use benchmarks will be established for each industry sub-sector, and if possible, for each sub-sectoral groups.

Output 1.3 Industry Energy-Use Database

The data from the reports and the computed values of energy use intensities will be encoded into a computerized database. This will also facilitate more systematic processing and handling of data.

Activity 1.3.1 Develop, install and operate a database on energy-use from information gathered.

The IEEIP consultants will design the database, specifying the various data input requirements, modules and deliverables. The consultants will develop the required software and install the whole system. The PTM staff will be trained on-the-job by the consultants on how to operate and maintain the database.

Subsequent data inputs to the database will include the results from energy audits done by the PTM or by other groups under the project (Component No. 2). The database will be updated regularly based on the next batch of energy consumption reports that will be submitted by the industrial firms. The information in the database will also be used in other energy efficiency activities and services of PTM, the ESCOs and other relevant institutions.

Output 1.4 Dissemination of Industry Energy-Use Benchmarks

The established benchmarks, aside from other relevant information will be disseminated to industries to assist them in their EE&EC activities. The information will be provided to industries through the information dissemination activities of the PTM, MIDA and the industry associations. Since energy-use monitoring and reporting will be a continuous baseline activity, there will be enough data to update “benchmarks” regularly.

Activity 1.4.1 Conduct of a seminar-workshop to disseminate the initial findings of the energy- use benchmarking program.

The findings of the survey will be compiled and documented and discussed in a seminar-workshop that will be organized and conducted by the PTM. Recommendations as to the energy use reporting format and the regular reporting requirement for industries 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.

Activity 1.4.2 Provide information to industries on energy-use benchmarks through publications of FMM, MIDA, NPC, and industry associations.

The PTM will make use of regular newsletters of industry associations to their members in passing information on the energy-use benchmarks. The information that will be provided to an industry association will be in the form of a summary report highlighting the benchmarks for various operations and processes involved in the particular industry.

These reports will serve as feedback to the industrial firms that complied with the energy reporting requirement. The reports will be prepared and submitted after each period of report submissions to the PTM.

Component No. 2: Energy Audit Program

This program addresses the barrier concerning the lack of awareness/knowledge about, and the poor attitude towards, energy efficiency in the country’s industrial sector. The energy audit program will also address the lack of trained local energy audit professionals that industries can utilize to assist them in their energy efficiency efforts. It will also supplement the proposed energy monitoring and reporting system (Component No. 1) by evaluating the reasons why the energy performances of specific industrial establishments and of each sub-sector are such. PTM intends to

work very closely with ESCOs/consultants and industry associations to ensure sustainability of this program.

Energy auditing is a proven effective energy management tool, and has been practiced by energy professionals in Malaysia since the 80s. However, the energy audit services provide by energy consulting firms vary in depth and quality. A preliminary energy audit to one consultant could be regarded only as a simple energy survey by another. A detailed energy audit work done by one consultant may be regarded only as preliminary energy audit by another. The fact is there are no standard energy audit procedures that are to be followed. Hence, in order to implement an effective energy audit program, it is imperative to review and evaluate the present energy audit practices and needs in the Malaysian industrial sector.

Aside from the absence of the standard energy auditing procedures, many industries are not aware of the benefits that they can get (or what they really should get) from doing an energy audit. Those who are aware of the practice, either doing this by themselves or simply don't make it a priority, or other technical/financial reasons. These are definitely barriers to implementation of EE7EC efforts in the industrial sector. It is therefore imperative to identify and address accordingly the major barriers to the wide-spread utilization of the energy auditing as an energy management tool in the industry sector. Moreover, an assessment of the current practice of energy auditing in industries should be made. This will definitely provide useful inputs in the development of standardized energy audit procedures and energy audit tools.

Since PTM will be the focal point of EE&EC in the country, as part of the capacity building activities of the IEEIP, it will be necessary to upgrade the energy auditing skills of PTM technical staff. The general training strategy will be to use a "train-the-trainers" approach. This will entail the IEEIP consultant to initially train the PTM staff or consulting engineers in all the relevant aspects of energy auditing. These trained staff will then assist the IEEIP consultants in subsequent training courses, taking increasing responsibility with each successive course. By the end of a training course sequence, the PTM staff trainee(s) should be able to conduct the course themselves. This will help provide sustainability to the training and also create another source of revenue for the PTM.

The present energy audit capability of PTM and of the various ESCOs in Malaysia are limited to general energy processes and operations (e.g., boilers and steam systems, refrigeration and air conditioning, electrical systems and lighting systems, fuel and combustion systems). They are not familiar and knowledgeable in energy audits of specific industrial processes, operations and equipment (e.g., distillation, evaporation, filtration, chemical reactors, heat integration, etc.) To upgrade the energy audit capability and capacity in the country, expertise should be built in these specialized energy consuming processes, operations and systems. This would be more effective and easily accomplished by providing the necessary energy audit training to those who are involved in these processes, operations and systems – the technical staff from the relevant industry sub-sectors.

Hence, in line with the development objective of capacity and the aim of spreading the utilization of the energy auditing as an energy management tool in industries, the different industry sectors, the energy audit program will establish and train sectoral energy audit teams. The cooperation of the relevant industry associations will be indispensable in this activity. Sectoral energy audit programs for each sectoral energy audit team will be developed, and energy audits will be conducted in the pre-selected 8 industry sub-sectors. Energy audit instruments will be specified and procured for use of each sectoral energy audit team and the PTM energy audit team.

To further widen the knowledge and practice of energy auditing in the industrial sector, the same activities will be carried out in other industry sub-sectors. These additional sub-sectors will be identified and energy audit plans will be developed for them. The development of sub-sectoral energy audit capability will help provide sustainability to the capacity building objective of the program and will also create another source of revenue for the industry associations.

Energy auditing identifies energy saving opportunities. It also identify “energy efficiency features” that will help achieve energy savings. As part of the energy audit program, PTM will also be trained to assess the, and recommend, energy efficient features of new industrial facility constructions. One sure way of achieving energy efficiency in the operations of the industrial facility, is to make the energy efficient right from the start, i.e., at the design and construction stage. A mechanism for incorporating the assessment of energy efficiency features in the processing applications for new industrial facility constructions should be implemented in Malaysia. The program will be develop such mechanism which can be implemented on a voluntary and pilot scale basis. After a specified period, the mechanism will be evaluated as to its effectiveness and applicability.

Immediate Objectives

In its desire to improve the energy utilization efficiency in industries, either as part of quality improvement or as a cost reduction activity, the IEEIP will implement this program that aims to promote the practice of energy auditing in Malaysian industries. This program shall be carried out to achieve the following objectives:

1. Promotion of energy auditing as an effective tool for industrial energy management.
2. Establishment of Sectoral Energy Audit Teams; and,
3. Conduct of a continuing Energy Audit Program for industries

The program has an ultimate aim of achieving wide spread use and practice of energy auditing in Malaysian industries as part of their energy management efforts. Indirectly, such practice will lead to better management of energy resources and will contribute to the improvement of the overall industrial energy utilization efficiency with a corresponding reduction in GHG emissions.

The energy auditing program will cover the entire Malaysian industrial sector. In conjunction with Project Component No. 4 (Energy Efficiency Promotion Program), an industry sector-wide promotion program on the effective use of energy auditing as an energy management tool will be organized. The following outputs and the corresponding activities that will be carried out to realize the outputs are described below.

Success Criteria

By the end of this program, the PTM will have achieved the following results:

- Upgraded the energy auditing skills of PTM technical staff.
- Assessed the present energy audit practices and needs in the Malaysian industrial sector.
- Identified and addressed the present magnitude of barriers to the implementation of energy efficiency and the practice of energy auditing in industries.
- Developed standardized energy audit procedures and energy audit tools.
- Established and trained sectoral energy audit teams.
- Developed sectoral energy audit programs for each sectoral energy audit team.

- Specified and procured the energy audit instruments that are used in the program.
- Conducted energy audits each pre-selected industry sub-sector.
- Evaluated the results and impacts of the program.
- Developed sustainable follow-up energy audit programs for each industry association.
- Developed an energy audit plan for other industry sub-sectors.
- Developed an “energy efficiency features” assessment mechanism for processing applications for new industrial facility constructions.

Output 2.1. Energy Audit Skills Upgrading for PTM

This desired outcome is to equip the PTM energy engineers the appropriate skills and techniques in designing energy audit programs and conducting energy audits.

Activity 2.1.1 Conduct of information-based training course for PTM energy engineers.

The PTM energy engineers will be trained by IEEIP consultants on the concepts of energy management and energy audit fundamentals and procedures.

Activity 2.1.2 Conduct of practical training course on energy audit techniques for PTM energy engineers.

The PTM energy engineers will be trained by IEEIP consultants on energy audit techniques which will include, among others engineering evaluations and calculations, energy accounting and targeting, use of audit instruments, conducting interviews, data gathering and processing.

Activity 2.1.3 Purchase of energy audit materials and subscriptions to energy engineering publications.

The PTM energy engineers, with the assistance of IEEIP consultants will identify specific engineering tools and reference materials to supplement their information intake.

Output 2.2. Review of Energy Audit Practices and Needs

The Energy Audit Program aims to find ways of improving the current awareness of the industry sector, and its general attitude towards, energy auditing. The aim here is to establish the current level of awareness and knowledge, applications, and practices concerning energy audits in Malaysian industrial firms. Information from the survey will establish the industry sector’s regard to energy auditing and the quality of energy audits done in and for industries. Moreover, this specific program output will also include relevant recommendations that can make the energy audits offered to industries more useful and effective, and recommendations that will help encourage industries to use energy auditing as a tool for improving their energy utilization efficiency and ultimately their cash flows.

Activity 2.2.1 Conduct of a survey within the Malaysian industrial sector

This survey will be carried out under the auspices of the PTM, and it will cover all sub-sectors of the Malaysian industrial sector. The PTM will direct the design of the survey questionnaire.

Activity 2.2.2 Evaluation of survey returns.

The survey results will be verified, processed and evaluated. Conclusions and recommendations for improving awareness about, and attitude towards, energy auditing, as well as present in-house auditing capabilities and practices will be made.

Activity 2.2.3 Documentation of survey findings, evaluation results, conclusions and recommendations.

Output 2.3. Seminar-Workshops on Energy Efficiency and Energy Audit Techniques

As part of the campaign efforts to encourage the practice of energy efficiency and energy auditing, a seminar-workshop on energy audit techniques will be provided under the program for Malaysian industries. The seminar-workshop will serve as a forum for the discussion of current issues concerning the practice of energy efficiency and energy auditing in industrial establishments. The seminar portion of this activity will be an informative training course on energy management principles and general energy audit procedures. Discussions on the results of the survey of audit experiences, practices and needs will also be included. The workshop portion will tackle the current energy efficiency and energy audit issues in industries (e.g., techniques, barriers/constraints, and costs), with the aim of coming up with relevant policy recommendations to the PTM concerning the practice of energy management and energy audits in industries.

Activity 2.3.1 Marketing and organization of the seminar-workshops

The PTM, with the cooperation of the industry associations, will promote the energy efficiency and energy audit seminar-workshops. This will also include the scheduling of each seminar-workshop for each of the identified industry sub-sector under the IEEIP.

Activity 2.3.2 Conduct of the energy conservation and energy audit seminar workshops

Each workshop will identify present problems and barriers concerning the implementation of energy efficiency and energy auditing in each sub-sector, and come up with recommendations for eliminating the problems and at least mitigating the barriers.

Activity 2.3.3 Documentation of the sub-sectoral workshop findings and recommendations

Output 2.4 Standardized Energy Auditing Procedures and Auditing Tools

One of the findings regarding energy audits that have been conducted in Malaysia is the lack of a standard auditing procedure that energy consulting firms has to follow. Each consulting firm has its own concept of energy audits, particularly as to the scope/coverage, duration, procedures used, and the contents of the audit reports. This is one particular concern that industries have raised concerning the quality of audit services that they get from energy consultants. To address this

matter, the program will come up with a standard general energy audit procedure that will have to be followed by energy consulting firms providing energy audit services to industries.

Activity 2.4.1 Definition of the various aspects for all types of energy audits.

The IEEIP consultants will come up with specifications for each type of energy audit that can be provided by energy consultants (energy surveys, preliminary audits, detailed audits) particularly as to the objective, scope, duration, frequency, audit team composition, preparations required, audit kit, audit report contents, types of recommendations, and application of recommendations.

Activity 2.4.2 Development of standard energy audit tools.

Based on findings from available energy audit reports from the MECM, other government agencies involved in energy auditing, local ESCOs, the academe, the PTM and the IEEIP consultants will come up with standardized auditing tools (e.g., checklists, calculation sheets and audit forms) that can be recommended for energy auditing purposes.

Activity 2.4.3 Conduct of consultative meeting on the standard audit procedures and audit tools

The PTM will organize and conduct a meeting with all the relevant parties involved in energy auditing business to deliberate on the recommended standards. Being the target users of such standards they are expected to comment and express their views and suggestions. At the end of the meeting, a consensus among the meeting attendees as to an industry acceptable standard will have been achieved.

Activity 2.4.4 Publication and dissemination of the standard audit procedures and audit tools

Considering all relevant inputs during the consultative meeting (Activity 2.4.3), the PTM will publish and disseminate the standard audit procedures and audit tools.

Output 2.5 Establishment of Sectoral Energy Audit Teams

This desired outcome is in line with the objective of ensuring that energy auditing will be practiced by industrial firms, at least in the pre-selected sub-sectors for the IEEIP, namely: cement, ceramic, food, glass, iron/steel, pulp/paper, rubber and wood sub-sectors. In cooperation with the relevant industry association of each sub-sector, PTM will train a cadre of technical people to become energy auditors in each industry sub-sector. The trainees will come from the companies that make up the sub-sector. They will be trained in all aspects of energy management and energy auditing (fundamentals, techniques, engineering evaluations and calculations, use of audit instruments, etc.).

Activity 2.5.1 Marketing the idea of setting up sectoral energy audit teams.

Meetings with the different business associations in the pre-selected industry sub-sectors will be arranged and conducted by the PTM to discuss the proposed idea. With the assistance of IEEIP experts, the PTM will present to

these associations the need to support, and the benefits of, this program. The commitment of each member company of the industry associations to support the proposed idea is very essential for this program.

Activity 2.5.2 **Setting-up of Sectoral Energy Audit Teams**

The PTM will enter into Memorandum of Agreement (MOA) with each industry sub-sector business association concerning the setting up the audit team. It will also assist in the selection and appointment of nominated persons to the sectoral audit teams. Industry personnel who have attended the seminar-workshops on Energy Audit Techniques (Activity 2.3.3) are ideal candidates to the sectoral audit teams.

Activity 2.5.3 **Training of Sectoral Energy Audit Teams**

Each sectoral audit team will be trained on the auditing techniques that are specific to the industry operations and processes within their sub-sector. The IEEIP will provide technical consultants who will train the audit team members specifically on the energy audit of facilities, operations, processes and equipment that are common in their respective sub-sector.

Output 2.6 **Development of Sectoral Energy Audit Programs**

Each sectoral energy audit team will formulate their respective energy audit programs. It is very important to take note of some delicate and critical issues that industrial firms are very much concerned about (e.g., data to be shared and facilities to be inspected). All companies in each sub-sector will be audited. However, not all companies will be audited at the same time or within a year. The selection of companies that will be prioritized for energy auditing will be based on their energy utilization performances.

Activity 2.6.1 **Coming up with collective energy audit agreement/understanding among industry association members.**

The PTM and the industry association will organize and conduct a meeting for each industry sub-sector, to be attended by representatives (preferably management) of the member companies of the industry sub-sector association, to discuss and agree on the critical issues that will have to be considered in the planned energy audits. Each meeting should result in a collective agreement among the member companies as to, for example: (1) coverage of the audits; (2) facilities that can be inspected; (3) data that can be shared to auditors; (4) the need for a neutral party to be involved in the audits; (5) confidential matters; (6) others. A memorandum of understanding will be drawn between the industry association (representing the sectoral audit team) and the member companies to this effect.

Activity 2.6.2 **Scheduling of energy audit activities.**

The prioritization of companies to be audited by the sectoral audit teams will be based on the company energy utilization performance, and extent of energy saving potentials. Moreover, the same criteria will be used in deciding what

type of energy audit (preliminary or detailed) will be carried out in each company. In this regard, the audit team will review the energy consumption reports submitted to the PTM by their member companies.

Activity 2.6.3 Setting up of individual energy audit program for each member company

The sectoral audit teams will develop the audit programs for each company they plan to audit for each year. It should be emphasized that the audit programs have to be developed in consultation with the management and technical and/or production personnel of each company. It should be noted that top management's support to the auditing exercise is very essential. The audit team has to identify its focal point in the company, somebody who can champion the energy auditing activity, and is fully supported by top management.

Activity 2.6.4 Submission of annual energy audit programs to PTM

The industry associations will document the annual energy audit programs that will be carried out by their respective energy audit teams.

Output 2.7 Procurement of Energy Audit Instruments

Each sectoral energy audit team will be provided by the IEEIP a set of energy audit instruments. A set of basic energy audit instruments will be lent for each sectoral team. Specific instruments that may be required for auditing specific operations/processes/equipment will be purchased by the IEEIP and will be available for use by each team on a need basis. The training on the use of energy audit instruments that the audit team members got during their initial training will be supplemented by the additional practical training on the use of the instruments that will be purchased.

Activity 2.7.1 Identification of basic and special energy audit instruments.

Basic energy audit instruments as stated in Annex 4 would be purchased and lent to each sectoral energy audit team. Each team will have to identify and specify the special instruments that they will require for their audit activities.

Activity 2.7.2 Preparation and tendering of bids for the supply of instruments

The PTM, with the advise of IEEIP consultants, will prepare the bid documents for the supply of energy audit instruments, including the specification of criteria for bidding eligibility and for choosing the best bid (based on applicable GoM and UNDP requirements). It will also tender the supply bids.

Activity 2.7.3 Evaluation of bids, selection of qualified bidders, negotiation with qualified bidders and final selection of supplier.

Following its criteria, the PTM will evaluate all bids and select qualified bidders. It will also negotiate the final price for the supply with the winning bidder. After the agreeing with the final price offer, the PTM will inform the UNDP about the details and requirements about the energy audit instruments procurement. UNDP will be responsible for the procurement.

Activity 2.7.4 Training of PTM and sectoral energy auditors on the use of the instruments

A training course on the use of the purchased energy audit instruments will be organized and conducted by the PTM for its energy engineers and the members of the sectoral energy audit teams. The instruction manuals of each instrument will be provided to each sectoral energy audit team.

Output 2.8 Conduct of Energy Audits

With the guidance of PTM and technical assistance from the IEEIP, the sectoral audit teams will conduct energy audits in selected establishments within their respective sub-sectors, according to the annual energy audit program. They will carry out all aspects of the auditing program the conduct of the audits, to the evaluation of audit findings, drawing of conclusions and recommendations, up to the preparation of energy audit reports.

It is assumed that the energy consumption reports that industrial firms will submit to the PTM (Component No.1: Energy Use Benchmarking) will already contain sufficient data about the energy supply and consumption profiles of the companies. In that case, energy surveys will no longer be necessary and only preliminary and detailed energy audits will be conducted by the sectoral energy audit teams.

Activity 2.8.1 Conduct of preliminary energy audits

Each team will conduct preliminary energy audits in 6 companies within their sub-sector. Each audit will be completed within 2 months. Energy audit reports will be prepared and submitted by the audit teams to the PTM after each audit engagement.

Activity 2.8.2 Conduct of detailed energy audits

Each team will conduct detailed energy audits in at least 1 company, where it has performed a preliminary energy audit. The detailed energy audit job is expected to be completed within 3 months. The company(ies) that will be audited in detail will be those with big energy saving potentials as determined in the preliminary energy audits. Energy audit reports will be prepared and submitted by the audit teams to the PTM after each audit engagement.

Output 2.9. Program Evaluation

It should be emphasized that the energy audits that will be provided to the companies under the Energy Audit Program are free of charge. Midway of the second year of the program, a post energy audit survey among the program beneficiaries will be conducted.

Activity 2.9.1 Conduct of post energy audit survey

A survey among the recipients of energy audits under the program will be conducted by the PTM. The companies will be surveyed either with use of questionnaires, which will be sent to them or they have to reply back to PTM, or be through phone interviews.

Activity 2.9.2 Evaluation of survey results

The survey returns and the information that will be gathered from the phone interviews will be evaluated in order to determine, among others, the actual results/impacts to each company of the application of the audit recommendations, the reasons behind the implementation, and non-implementation of audit recommendations, and the companies comments about, and suggestions to improve, the program.

The results of the survey evaluation, including the relevant recommendations for further improving the program will be documented.

Output 2.10 Sustainable Energy Audit Follow-up Program

A self-sustainable scheme will be developed to ensure the continuance of the energy audit program after the IEEIP.

Activity 2.10.1 Development of an energy audit business within industry associations.

The PTM will assist the different industry associations, in collaboration with local ESCOs, in developing the energy audit program as a profit-making activity. The energy audit services will be catered to the industry association member companies and to non-member companies as well. The member companies may avail of discounted rates. The affiliated ESCOs are expected to carry out the design and engineering of energy saving schemes/projects that are recommended for implementation in the energy audits.

Output 2.11 Energy Audit Program for Other Industry Sub-Sectors

The other industry sub-sectors will also benefit from the energy audit program, albeit at a later stage since prioritization has been given to the 8 pre-selected energy-intensive industry groups. Similar to the priority sub-sectors, the desired outcome is in line with the objective of ensuring that industrial firms will practice energy auditing. The PTM will train a cadre of technical people to become energy auditors in the other industry sub-sectors, and they will also be trained in all aspects of energy management and energy auditing. It is believed that the success that will be achieved with the priority sub-sectors will facilitate easy acceptance of this idea by the industry associations in the other sub-sectors.

Activity 2.11.1 Marketing the idea of setting up sectoral energy audit teams.

The same approach as in Activity 2.5.1 will be used.

Activity 2.11.2 Setting-up of Sectoral Energy Audit Teams

The same approach as in Activity 2.5.2 will be applied. The ideal candidates to the sectoral teams are also those who have attended the seminar-workshops on Energy Audit Techniques (Activity 2.3.3).

Activity 2.11.3 Training of Sectoral Energy Audit Teams

The same approach as in Activity 2.5.3 will be used. Energy auditors from related industry sub-sectors would be asked to lecture in the training course.

Activity 2.11.4 Development of sectoral energy audit programs

The same activities as those that will be carried out to realize Output 2.6 will be carried out in order for the new sectoral energy audit teams to formulate their respective energy audit programs. With the help of the PTM, the members of each industry association will have to come up with collective energy audit agreement/understanding. A memorandum of understanding will be drawn between the industry association (representing the sectoral audit team) and the member companies to this effect. Each sectoral audit team will schedule their energy audit activities and set up of individual energy audit program for each member company. The annual energy audit programs of each team will be submitted to PTM.

Output 2.12 Energy Efficiency Features Assessment of New Industrial Facilities

Another way of contributing to the improvement of industrial energy efficiency is by making planned industrial facilities energy efficient. Right from the design phase, energy efficient features can already be incorporated for new industrial facility construction. This particular aspect of facility construction can also be looked into during the usual processing of facility construction applications.

Under this project component, a mechanism that involves the analysis and provision of advice concerning new industrial facilities construction will be developed. Given the long life time of some industrial facilities and the fact that it is always more cost effective to make such facilities more energy efficient to start with, rather than retrofitting them once built, the mechanism will encourage adoption of energy efficiency measures.

Activity 2.12.1 Design a suitable system of evaluation and provision of advice concerning energy efficient features of new industrial facility constructions.

The IEEIP consultants will develop a mechanism whereby new facility construction applications will be reviewed as to their energy efficiency features. Any design aspects that are found to be energy inefficient or wasteful will be determined and alternative energy efficient features will be recommended. Suggested inputs to possible government regulations or ordinances to this effect will be provided by the IEEIP.

The IEEIP consultants will also train the PTM energy engineers on how to evaluate the energy efficiency aspects of industrial facility designs, and also on

the alternative designs that can be recommended in order to effect immediate or long term energy savings.

Activity 2.12.2 Coordinate with relevant government agencies the inclusion of the review of energy efficiency features in new industrial facility construction applications.

The PTM will meet, and propose to, relevant government agencies (e.g., local authorities of town or city where the facility will be constructed) the importance of considering the energy efficiency aspects of new constructions. Presentations concerning energy efficiency in engineering and construction designs will be made to the relevant government agencies, the engineering and architectural industry, and the construction industry. If required, the PTM will assist in supporting the passing of resolutions to effect the proposed mechanism.

Activity 2.12.3 Implement the proposed mechanics for evaluating the energy efficiency features of new industrial facility constructions

The relevant government agency will provide copies of the proposed design plans of new industrial facility constructions. The IEEIP consultants, with the assistance of PTM staff, will evaluate the energy efficiency aspects of the design. Comments and recommendations will then be submitted to the relevant government agency. The PTM will later check if the suggested features have been incorporated in the revised design plans.

Activity 2.12.4 Evaluation of the proposed mechanism

A seminar-workshop will be organized and conducted by the PTM to primarily discuss the impacts of the proposed mechanism. The PTM, IEEIP consultants, relevant government agencies, engineering and architectural design firms, and the construction firms will attend the meeting. The seminar portion will include some presentations on energy efficient designs, incorporation of energy saving features in the design, and findings from the design reviews made by the PTM. The workshop portion will review and discuss the impacts of the proposed mechanism. Basically, the success of the proposed mechanism will be reflected on whether applicants considered PTM's proposed energy saving features in their design plans. Concerns of engineering and architectural design firms, and construction firms, and more importantly the industrial businessmen will be discussed at length. This is to decide whether to extend the period of voluntary compliance to the proposed requirement or making it a mandatory requirement by the end of the project period.

Activity 2.12.5 Documentation of the seminar-workshop findings and recommendations

The PTM will document the seminar-workshop findings and recommendations and submit the workshop resolution concerning the future of the proposed mechanism to the relevant government agencies.

Component No. 3: Energy Rating Program

Minimum energy efficiency standards have been shown to be the one of the cost-effective action that can be taken by governments to improve overall energy efficiency. Efficiency ratings take time to develop and their development must closely involve the affected manufacturers and other stakeholders so as to achieve a high degree of consensus. Efficiency ratings that are not consensus based will be difficult to enforce and even in the most advanced countries, a heavy investment in enforcement generally cannot overcome widespread lack of compliance.

Malaysia could benefit greatly by implementing minimum efficiency ratings for key energy consuming equipment used in industries. As many of these equipment or their components are imported, Malaysia may wish to work in concert with the countries where the equipment originated so that together they have greater influence with equipment manufacturers, which generally tend to be large multinational corporations.

This program addresses the barrier concerning the lack of information on the energy use performance of equipment and machinery used, and the absence of energy ratings for industrial equipment sold and used in the country. The program will involve the setting up of an industrial equipment testing facility and establish comparative ratings, nameplate characteristics, as well as the assembling, organization and dissemination of such information to increase awareness and encourage the use of energy efficient equipment in industry.

The overriding principle here is that a consumer who is adequately educated about energy consumption is a better consumer. If the aim is to promote EE&EC in industries, one of the most effective strategies is to educate the energy users in industry and make available energy ratings for industrial equipment.

Hence this program will involve activities that will inform industries about energy efficient equipment/machinery particularly their availability, cost, technical specifications, economics and energy performance. Available information on applicable energy rating programs and case studies of energy ratings will also be provided to industries.

A critical functions of the PTM here is the development of policy recommendations to support the energy rating program. There would be some barriers to this (e.g., cooperation of equipment manufacturers/suppliers/dealers) and the policy support would be one way of overcoming these barriers. The policy development function will require the ability to analyze, among others, the economic and environmental costs and benefits to the country which would result from the program. This may require engineering analysis, financial analysis, economic and legal analysis, computer modeling and other reasonably complex techniques to determine the precise impact on the country. Experiences in other countries regarding the implementation of similar programs will be useful.

The PTM would have the lead responsibility for this output but would work in close cooperation with other relevant government agencies such as SIRIM, MIDA, MITI, and other relevant agencies. An energy rating committee would be established, which comprised of appropriate government representatives, as well as representatives of the manufacturers and affected consumers.

Immediate Objectives

To provide information on energy-efficient equipment and energy rating programs to increase awareness and encourage the use of energy efficient equipment in industry and set up an industrial equipment testing facility to label equipment.

Success Criteria

By the end of this program, the PTM and MECM will have achieved the following results:

- Made available to industry information on energy efficient equipment and energy rating programs.
- Conducted policy support studies in support of energy rating programs.
- Developed an implementation plan for a comparative energy rating program.
- Implemented the first phase of a comparative energy rating program.
- Prepared and proposed specifications for an equipment energy performance testing facility
- Designed and constructed an equipment testing facility or accredited testing facilities.

Output 3.1 Information on Energy Efficient Equipment and Energy Rating Programs Available to Industries.

Limited knowledge/awareness about the availability and cost-effectiveness of energy efficient equipment is the main reason for industries not using them. They are taken off by the relatively high first cost of such equipment. Adequate publicity and justification will overcome this situation.

Activity 3.1.1 Identify energy efficient equipment available in Malaysia

A market survey will be conducted under the auspices of the PTM to ascertain the availability and the market size of energy efficient equipment, whether manufactured locally or imported. The assistance of MIDA and FMM in the identification of relevant equipment suppliers and manufacturers in the country will be sought.

The survey will cover the range of efficiencies of the industrial equipment found in the Malaysian market. The survey should determine the range of efficiencies in each size class of the equipment and present the information so that estimations can be made of the number of sales of each size that would be affected by minimum efficiency standards, as well as the energy and power savings that would result.

Activity 3.1.2 Obtain technical specifications, energy performance and cost from suppliers of the energy efficient equipment.

Based on information from the survey, the PTM will contact suppliers and manufacturers of energy efficient equipment to inquire about details on required tests for each of these equipment (e.g., standards used, test facilities used, etc.).

Activity 3.1.3 Identify sources of information on energy rating programmes from countries which have successfully implemented them.

The PTM will contact relevant institutions abroad that have and are currently implementing energy rating programs for equipment. Arrangements for possible exchange of information will be made with these institutions.

Also from these institutions, the PTM would research for information about energy efficient equipment/machineries particularly their availability, cost, technical specifications, economics, and energy performance. Available

information on applicable energy rating programs and case studies of energy rating will also be collected.

Activity 3.1.4 Dissemination of collected information on energy efficient equipment and energy rating programs.

Information about energy efficient equipment/machineries particularly their availability, cost, technical specifications, economics, and energy performance, as well as available information on applicable energy rating programs and case studies of energy rating will be provided to industries.

The project will also purchase applicable test codes and standards that can be shared to industries. These may include codes prepared by ASME, ARI, NEMA and EASA.

Moreover, information gathered from the surveys and inquiries to institutions will be disseminated to industries and related institutions (e.g., SIRIM) through publications of FMM, MIDA, NPC, and industry organizations. As mentioned before, this is a cost-effective way to disseminate information to industry.

Output 3.2 Policy Paper to Support Energy Rating Programs

With the technical assistance provided to the IEEIP consultants, policy support studies and the definition of institutional arrangements for industrial equipment energy rating will be carried out under the program.

Activity 3.2.1 Revalidate technical and economic feasibility of energy rating program

The IEEIP consultants will carry out a study to verify the magnitude of benefits that can be derived from the implementation of an industrial equipment energy rating program for Malaysia. With the assistance of the PTM staff, the IEEIP expert will consult with industrial equipment suppliers regarding the prospects of energy labeling.

Activity 3.2.2 Carry out policy studies about energy labeling.

From the results of the study, relevant policy measures/instruments will be recommended, including the corresponding institutional arrangements. These may include mandatory testing, restriction of the import of energy inefficient equipment and the provision of fiscal incentives (e.g., duty tax exemptions, tax rebates) for energy efficient equipment.

Output 3.3 Plans for Implementing a Comparative Energy Rating Program

A comparative energy rating program will be designed by the PTM. This will mainly involve the development of standards of performance and energy rating criteria. The program will be promoted to equipment suppliers, manufacturers, and buyers/users.

Activity 3.3.1 Prepare standards of performance for equipment

The IEEIP consultants will develop standards for industrial equipment used in Malaysia, based existing standards currently being used in countries which have an energy rating program in place. Minimum standards of performance for equipment will be established. Identify the industrial equipment for which minimum efficiency standards and labeling requirements will be developed. It is suggested that equipment which are typically used in industries be the first set of equipment to consider in the program.

Activity 3.3.2 Develop comparative energy rating criteria.

The IEEIP consultants will develop a performance rating criteria for industrial equipment used in the country. This maybe similar to the star rating system used in other countries. For example the one that satisfies the minimum requirement is rated as one star and the one that is most energy efficient is rated as five stars.

The comparative energy rating activities, which rely on standards based on energy performance levels and criteria that are currently in use in other countries, will be the first phase of the energy rating program. The second phase of the program will involve the comparison of performance based on performance levels as determined in an established testing facility or accredited testing facilities in the country.

Activity 3.3.3 Organize an energy labeling promotion program

The use of energy labels, which indicate the star rating of equipment, will be promoted to equipment suppliers, manufacturers and users. This will most likely be done through a conference on industrial equipment energy ratings. The energy labels will be designed in such a way that they will be easy to understand and accepted by the equipment buyers. The input from consumer associations will also be considered, although they may be more concerned about the quality and performance of appliances.

Activity 3.3.4 Set up an energy rating committee

With the results of the promotions, the PTM will recommend the appropriate strategy to implement the program. The government will endorse the program, employing the recommended strategy, by establishing an energy standard and labeling committee. The committee will be composed of government representatives from the MECM, MIDA, and other relevant Ministries, manufacturers and consumer representatives. It will deal with both setting a minimum efficiency standard as well as developing a label that conveys energy efficiency and cost of use information to the buying public. An international IEEIP expert in energy efficiency standards will assist it in the equipment selected.

Activity 3.3.5 Develop energy labels for industrial equipment

The PTM will work with the committee in a consensus process to set a minimum efficiency standard for each size class of equipment. Once the standard is set, it should be codified in government regulations.

Draft labels will be prepared for the equipment. These should be easy to understand and clearly conveys information regarding efficiency and cost of use information. The label should display information, which shows how the particular equipment ranks relative to others of its class in terms of efficiency and cost.

Activity 3.3.6 Evaluate the draft energy labels

The PTM will conduct focus groups to test the label design. The label designs will be modified based on focus group inputs.

Output 3.4 Comparative Energy Rating Program Implementation

The first phase of the energy rating program is implemented while testing facilities that will later support the energy standards and labeling program are being designed and constructed.

Activity 3.4.1 Implement the energy rating program

SIRIM, in coordination with the PTM will implement the proposed energy rating program. A grace period, say one year (or up until the testing facilities are operational), might be considered to allow manufacturers time to work off existing inventory which is below the standard and adjust their manufacturing and marketing to the higher efficiency models. Enforcement and consumer information programs should be implemented in conjunction with the implementation of the energy rating program.

Activity 3.4.2 Regularly assess the program implementation

The PTM will assess the enforcement requirements for the energy rating program. The PTM and SIRIM will make recommendations for increased staffing or other resources to bring enforcement capability up to the required level. Also, an assessment of the need for a consumer information program to educate industries both of the new standards as well as how to read and use the new labels will be conducted.

Output 3.5 Specifications for an Equipment Testing Facility

To support the proposed energy rating program, an equipment testing facility will be specified to carry out the required equipment performance testing. The IEEIP consultants will identify all the necessary infrastructure for such facility.

Activity 3.5.1 Study the set-up of testing laboratories in countries like Thailand, the Philippines, Australia, and the USA.

This will involve review of reports about the existing testing laboratories (e.g., capacity, services provided, test units installed, research activities, staffing,

etc.). It will also involved study visits to some of these test facilities to observe the activities being carried out and to learn from the people who actually operate such facilities.

Activity 3.5.2 Review testing facilities available in industries and to what standards they conform to.

One particular concern to be addressed is whether the testing facilities should be centralized (e.g., in one government institution) or decentralized (e.g., in various established equipment manufacturing test facilities). The IEEIP consultants will visit some industries that operate their own testing facilities based on standards of countries where their equipment is imported.

Activity 3.5.3 Specify necessary equipment and facilities to upgrade existing test facilities

Based on the design of the energy rating program, the IEEIP consultants will specify test equipment, procedures, references, and auxiliary units that will be required for a particular equipment. Depending on the recommendations whether the testing facilities will be centralized or decentralized, the IEEIP consultants will also specify other necessary requirements like the area/space/building where the testing units will be installed, the utilities, and the staff requirements (including specification of qualifications). In case of a decentralized system, it may be necessary to upgrade the existing facilities to include latest technology and measuring methods.

Output 3.6 Design and Construction of Testing Facilities

Depending on the recommendations concerning the testing facilities, the IEEIP will finance (through government and private sector funds) the construction or upgrading of equipment testing facilities. In case of a centralized facility, this will be within the site of SIRIM, which is the existing body responsible for standardization and testing.

Activity 3.6.1 Identify construction requirements

Based on the recommendations of the IEEIP consultants, the required items for the construction of the testing facility will be established by SIRIM personnel, in the case of a centralized facility, and by the industry staff, in the case of decentralized facility.

Activity 3.6.2 Design and construction of the test facility or test facilities

Using the available funds, which the MECM will provide under the project, the proposed test facility or test facilities will be designed and constructed as per design.

Activity 3.6.3 Procurement of test equipment

The test equipment that will be installed in the facility/facilities will be procured using the available funds, which the MECM will provide under the project. The specifications of test equipment and auxiliaries provided by the IEEIP consultants will be strictly followed.

Activity 3.6.4 Installation and commissioning of test modules

The test equipment and auxiliaries will be installed according to design plans. By the end of the IEEIP, the test facility/facilities will have been installed and commissioned.

With the test facility/facilities installed, the second phase of the proposed energy rating program will commence.

Component No. 4: Energy Efficiency Promotion Program

This program will address the information barriers that hinder the implementation of EE&EC efforts in industries. It will address the concerns regarding the limited forum for local exchange of information and technical assistance on EE&EC techniques and technology applications, as well as the weak local energy support services in the country. The program will build on the regular information dissemination activities of the PTM. The activities include the coordination, monitoring and review of the activities of the energy research institutions in the country, consolidation/review of available information on EE&EC technology applications and the provision of extension work for industry regarding energy efficient practices and techniques.

The information that are very necessary to disseminate actually need to be researched, consolidated and reproduced in a way that will be understood by the industrial firms for them to utilize in their EE&EC activities. The information barrier actually involve also the lack of knowledge where to get and access the information in a user friendly form. Hence, it is very necessary for PTM to implement activities that will review the information materials that can be obtained from relevant institutions in the country abroad (e.g., universities, research institutions, technology developers and suppliers in the country. These should be reviewed, summarized, catalogued, printed and/or placed in a database which can be accessible to the industrial firms or the industry associations.

Many industries are not aware of proven and applicable energy saving technologies. Part of the energy efficiency promotion effort should be the documentation and dissemination of relevant energy project profiles and case studies on EE&EC technology applications in the country and in other developing countries, and even in the developed world. A compendium of EE&EC techniques and technology applications and a computerized database of EE&EC technology applications will be useful for the industrial firms in their EE&EC efforts.

There have been complaints from industries about the quality for energy management services (e.g., energy audit) that the existing ESCOs are providing. There are also concerns about the presence of ESCOs that are not really qualified to provide such kind of special services. As part of the energy efficiency promotion activity, industrial firms should be informed about the qualified ESCOs in the business. To do this, qualified ESCOs have to be accredited by the MECM. An accreditation program for local ESCOs and energy specialist should be developed and implemented. In coordination with relevant government institutions, an appropriate accreditation scheme will be developed including testing programs and the definition of the institutional mechanism for the accreditation program. The scheme could be later expanded to facilitate the integration of the energy specialists accreditation program to existing related accreditation schemes in the country, in other ASEAN countries and in the developed countries.

In conjunction with the accreditation program, the energy efficiency promotion efforts can be further enhanced through the establishment of a local professional organization of energy specialists,

consultants and technology developers and providers. Such organization can also carry out the accreditation program and coordinate government-led energy efficiency promotion activities with private sector groups and in the regulation of the ESCO industry. This activity will also compliment component No. 5, which aims to support to local energy specialists and energy service companies (ESCOs).

Immediate Objectives

To disseminate information on energy efficient practices in industries, EE&EC technology applications and establish an association of accredited energy specialists, consultants and technology developers and providers.

Success Criteria

At the end of the program, the PTM will have achieved the following results:

- Enhanced information dissemination activities of MECM and PTM.
- Developed energy technology information services.
- Established a professional organization of local energy specialists, consultants and technology developers and providers.
- Developed an accreditation scheme for energy specialists and ESCOs.

Output 4.1 Brochures and Regular Newsletters/Bulletins on EE&EC Technology Studies and Applications.

Available literature and information from government and private institutions in the country and abroad will be regularly gathered and compiled. These will be regularly reviewed, summarized, published and disseminated as part of the PTM's energy efficiency promotion efforts.

Activity 4.1.1 Develop a mechanism for information gathering.

The PTM will develop a mechanism for regularly collecting information from government organizations and agencies involved in energy, energy research institutions, universities, FMM, ESCOs etc. on on-going activities and from selected industries on EE&EC projects and technology applications.

Activity 4.1.2 Publish a quarterly energy technology newsletter.

The PTM, with the guidance of an IEEIP consultant (Technical Publishing Expert) will design, develop, and regularly publish a quarterly newsletter to disseminate information of energy technology research activities and applications. The newsletter will also publicize the EE&EC activities carried out by industry. The actual design and publication of the newsletter will be sub-contracted to a qualified/credible technical publishing company.

This will become a regular activity of PTM and a mailing list of the organizations and industries will be set up for this purpose with regular updates made.

Output 4.2 Energy Technology Information Services

This program will involve the documentation of relevant energy project profiles and case studies on EE&EC technology applications in developed and developing countries, and in ASEAN.

Activity 4.2.1 Obtain information from national, regional and foreign sources

The PTM will source out from various national, ASEAN and international agencies, information and write-ups on energy projects and case studies related to EE&EC technology applications. In order to ensure the availability of technical articles to publish, the PTM will sub-contract a foreign technical information provider. Moreover, the PTM will also subscribe to relevant technology information database systems, energy engineering publications, and will affiliate with international energy engineering organizations.

Activity 4.2.2 Documentation of case studies and profiles of projects involving the application of energy saving technologies

The PTM summarize articles collected and will prepare articles/write-ups of successful case studies and a compendium of EE&EC techniques and technology applications. These will be adequately filled up with illustrations and photographs.

Activity 4.2.3 Creation of an internet website for the PTM that will include up to date information on EE&EC techniques and technology applications.

The PTM will sub-contract the development of a website that will make available information database on EE&EC technology application projects implemented locally, in ASEAN and in developed countries.

Output 4.3 An Association of Energy Services Professionals and Industry.

The program will establish a local professional organization of energy specialists, consultants and technology developers and providers, similar to the objective of supporting local energy specialists and energy service companies (ESCOs).

Activity 4.3.1 Identification of potential officers and members of the planned professional organization

The PTM will come up with a master list of all persons involved in the energy field as researchers, officials, support staff, energy managers, maintenance staff, consultants, academics etc. and also a list of all companies providing energy related services.

Activity 4.3.2 Establishment of the energy professionals organization

With the advice of the IEEIP consultant, the PTM and key energy professionals in the country will establish an association with individual and corporate membership. The appropriate status of the organization and where it should be placed will be determined. There may be problems to have it established as a

registered society. It is best to be maintained as a working group under an established energy organization.

Activity 4.3.3 Identify and establish the activities of the organization.

With the guidance of the PTM, the organization will come up with its work plan that may include activities that can supplement that of the PTM such as technical visits, talks and technical meetings.

Output 4.4 Accreditation Scheme for ESCOs and Energy Professionals

Another major deliverable of this program is the creation of an accreditation program for local ESCOs and energy specialists. In coordination with relevant government institutions, an appropriate accreditation scheme will be developed including testing programs and the definition of the institutional mechanisms for the accreditation program. Moreover, a scheme will be developed to integrate the energy specialist accreditation program to existing accreditation schemes in the country, in other ASEAN countries and in the developed countries.

Activity 4.4.1 Develop specific qualifications for energy management advisory services and energy engineering services in the country.

The PTM and the energy professionals' organization will develop a list of qualifications and experience needed for energy managers and basic pre-requisites for an ESCO. The specific job descriptions for energy managers will be defined. As for ESCOs, the qualifications of the key personnel will be identified.

Activity 4.4.2 Establish accreditation scheme for energy professionals

Using the established professional accreditation systems in the country and the accreditation schemes in ASEAN countries and in the developed countries, the PTM will establish one for local energy managers. The scheme will consider the energy management and energy technology knowledge and years of experience in the industry of the prospective candidates.

Activity 4.4.3 Institutionalization of the accreditation scheme

The PTM, with the guidance of the IEEIP consultant will determine the appropriate institutional arrangement for the implementation of the proposed accreditation scheme. This will most likely be a government agency so that the integrity of the scheme will be maintained.

Activity 4.4.4 Establish international recognition of Malaysian energy professionals

The PTM will develop and propose a scheme for mutual recognition of accredited energy professionals within ASEAN and other developed countries. This will be advantageous as to the career development of local energy professionals.

COMPONENT NO. 5: ENERGY SERVICE COMPANIES (ESCOs) SUPPORT PROGRAM

The rapid growth of the industrial sector is straining the capacity of the sector to focus on multiple objectives. As a result, the opportunity exists for Energy Service Companies (ESCOs) to assist the industrial sector in achieving energy efficiency objectives without compromising on industrial productivity and growth. However, to date, the model of industrial ESCOs has not been widely practiced in Malaysia. Presently, local energy support services in the country are weak, with few local full time professional energy auditors. Therefore, this component is targeted at stimulating the establishment of credible and proactive ESCOs in the country.

As pointed out earlier, unlike in countries where the ESCO business thriving, most of the ESCOs in Malaysia are actually engineering companies, which provide energy management and energy engineering services to industrial and commercial establishments. Those which also provide financing for energy projects are companies which also sell the hardware that forms part of the offered energy solution. Besides other factors, due to the absence of institutional and legal framework for ESCO activities in the country, the ESCO business is not thriving. Moreover, industries do not really understand the concept of the ESCO business, and ESCOs are finding it hard to promote themselves.

One important factor that hampers the ESCO business is the lack of financing that will be used to implement energy efficiency projects in industries. Financiers are not aware and do not know the ESCO concept. Some of the local engineering firms that venture in the energy management business are also in need of advice in making bankable project proposals, business plans, and in securing financing arrangements for their clients. Moreover, the local ESCOs need advice in identifying the feasible products and services that they can offer and evaluating the risks associated with performance contracting that they may venture to undertake with prospective clients in the industrial sector.

Immediate Objectives

This program will be implemented to enable the PTM to determine the optimal structure for an ESCO industry in Malaysia. It is expected to provide valuable inputs to PTM and the MECM in coming up with developmental options for ESCOs and performance contracting in industries. It will be carried out to achieve the following objectives:

- To develop a suitable institutional and legal framework for ESCO activities in the country
- To develop institutional arrangements that will promote ESCOs to the industrial sector
- To assist the local ESCOs in making bankable project proposals, business plans, and in securing financing arrangements for their clients.
- To advice ESCOs in defining the feasible products and services that they can offer and evaluating the risks associated with performance contracting.

Success Criteria

By the end of this program, the PTM will have achieved the following results:

- Surveyed and evaluated the capacity of known, existing ESCOs in Malaysia with a specific emphasis on their capability to assist industries
- Conducted a national workshop to promote the concept and benefits of ESCOs for potential recipients and providers of this service

- Conducted a cooperative workshop to develop the institutional and legal framework for the delivery and cost recovery of ESCO services
- Monitored and evaluated the activities of selected ESCOs with the Malaysian industrial sector
- Provided training to local engineering firms and consultants in integrating energy efficiency in their designs
- Developed energy engineering design tools for ESCOs
- Developed a model marketing strategy for ESCOs, in coordination with industry groups and the GoM

Output 5.1 A survey and evaluation of the capacity of known, existing ESCOs in Malaysia with a specific emphasis on their capability to assist industries.

Activity 5.1.1 Review of ESCO experiences in other countries

The PTM will review the experiences of ESCOs in other countries in order to identify the essential elements of operating a successful ESCO. The survey will also include an evaluation of the market potential of various energy efficiency products and services that could be provided by local ESCOs.

Activity 5.1.2 Survey and evaluation of local ESCOs capabilities

A detailed survey, to be done either through mail or personal interview, will be carried out on the existing ESCOs in Malaysia under the auspices of PTM. Based on the results of the survey, a comprehensive evaluation of the capacity of ESCOs in Malaysia will be carried out. This evaluation will cover details such as the local ESCOs' technical and financial capabilities, logistics, areas of specialization and services provided, as well as an assessment of their strengths and weaknesses. Based on the evaluation, prospective ESCOs with sufficient capability to assist industries will be considered for participation in the other components of the IEEIP and a recommendation will be made, if necessary, for a comprehensive training program for ESCOs with regard to the ESCO development.

Output 5.2 Establish links between ESCOs and industrial firms

A national workshop to promote the concept and benefits of ESCOs for potential recipients and providers of energy performance services is envisioned to facilitate linkages between ESCOs and target clients in industries

Activity 5.2.1 Define target client groups

The PTM will carry out a study to identify the target client groups that local ESCOs can approach and offer their services. This will be done by obtaining a list of promising target customer groups and a generic financial profile for each potential client, as well as an estimate of the potential client's ability to pay for energy services. Interviews will also be conducted with industry facility owners. These interviews will somehow gauge the extent of willingness of potential customers to invest time and money for energy efficiency services. Based on the study results, recommendations will be made to ESCOs as to what services they should focus on.

Activity 5.2.2 Conduct a national workshop for ESCOs and target customer groups to promote the concept and benefits of ESCOs

The PTM will organize and conduct a national workshop to discuss potentials and concerns regarding cooperative efforts between industrial firms and ESCOs in achieving energy efficiency. The workshop will be supplemented by presentations and talks about the concepts and benefits of ESCOs, as well as experiences in such kind of cooperation in other countries.

Activity 5.2.3 Develop and publish an ESCO directory

The PTM will develop a directory of local ESCOs, detailing, among others the technical and financial capabilities, and the energy products and services that each one of them provide. This is envisioned to help create awareness within the industry sector of the availability of energy services provided by ESCOs. The directory will be published and disseminated by the PTM to industry associations.

Output 5.3 Established Legal framework for the ESCO industry in Malaysia

Intensive consultation with the ESCOs, financing institutions and the industries will be needed in establishing the institutional and legal framework of the ESCO industry.

Activity 5.3.1 Evaluate risks and mitigation measures concerning the ESCO business
PTM will consult ESCOs and their financing partners regarding perceived and real risks that has to be considered for the industry to flourish in the country. Suggestions on how to mitigate, if not eliminate, these risks will be solicited from both parties. The PTM, with the advice of the IEEIP consultants will analyze the potential risks based on the consultations with the relevant parties, as well as those put forward by these parties. Mitigating measures and possible incentives will be determined.

Activity 5.3.2 Develop legal framework for the ESCO industry

The PTM and IEEIP consultants will develop a standard pro-forma of contract agreements for the delivery and cost recovery of ESCOs services. This will be carried out in consultation with relevant government agencies. The main bases of such standard contract will be the findings and recommendations from Activity 5.3.1. The standard contract may also be patterned to those used in other countries where the ESCO business is presently thriving.

Output 5.4 Monitoring and evaluation of local ESCO industry performance

Activity 5.4.1 Monitor ESCO activities

The PTM will organize and conduct a consultative meeting with local ESCOs to get their support, and to come up with a suitable and effective arrangement for the PTM to monitor the ESCOs activities and document noteworthy projects that they have implemented highlighting, among others, the business methodologies/approaches that were applied.

In this regard, PTM will require the ESCOs to submit reports. The PTM will develop the report forms that the ESCOs will use for their reporting activity. Assistance will also be provided, if requested by any ESCO, in filling up the report forms.

Activity 5.4.2 ESCOs submit reports

The ESCOs will submit their reports to the PTM on a regular basis. The PTM will make sure that ESCOs comply with the reporting requirement.

Activity 5.4.3 Evaluation of reports submitted by the ESCOs

Reports submitted by the ESCOs will be evaluated by the PTM. Particular emphasis will be given to the results (in terms of energy savings, economics, impacts, problems encountered, etc.) of the energy efficiency projects implemented by the ESCOs.

The PTM will provide feedback to each ESCO. The feedback may include for example, recommendations on how the ESCOs can mitigate technical problems they encounter, or that can improve on their services. The feedback could also include information on potential market leads, and sources of technical information.

Output 5.5 Training of local engineering firms and consultants in integrating energy efficiency in their designs

Activity 5.5.1 Conduct of training and workshop sessions on energy-integrated designs

The PTM will organize and conduct supervised training and workshop sessions with local engineering firms and consultants on integrating energy efficiency in their designs. These educational activities are aimed at providing supplementary technical information and know-how to local ESCOs, which they used in their business. These will also somehow encourage existing engineering firms to consider providing ESCO services to their clients.

Output 5.6 Energy engineering design tools for ESCOs

This deliverable is meant for local ESCOs who could use these tools in their trade, and is part of the general objective of supporting and promoting the ESCO industry in Malaysia.

Activity 5.6.1 Development of energy engineering design tools for ESCOs

Based on information obtained in Activities 5.1.2 and 5.4.2, the IEEIP consultants will evaluate the various tools that ESCOs currently use and deduce the possible energy engineering design tools that they may use, considering the services that they are presently providing and planning to provide in the future. The IEEIP consultants will develop these design tools. These tools can come in the form of user-friendly guidebooks, manuals, and calculation sheets and computation software. This activity will support Activity 2.4.2 of Component No. 2, which involves the development of standard energy audit tools.

Activity 5.6.2 Testing and evaluation of tools

The IEEIP consultants will present the design tools to the ESCOs in a workshop, which will include comprehensive training on the usage of tools both for the ESCOs and the PTM energy engineers. The design tools will be provided to the ESCOs for them to test and evaluate. After a period of 3 months, the ESCOs will submit in a small report their comments on the use of the tools and their recommendations for possible improvements. The IEEIP consultants based on their evaluation of the comments and recommendations will make the revisions/modifications.

Output 5.7 Marketing Strategy for ESCOs

In coordination with industry groups and the GoM, a marketing strategy for ESCOs will be developed by the IEEIP. The program will assist the ESCOs in developing their business plans, and at the same time also develop a model business plan for ESCOs.

Activity 5.7.1 Development of a model ESCO business plan

The IEEIP consultants will develop a model business plan for ESCOs based on the results of the preceding activities of this program and the recommendation of one specific institutional structure. The business plan (business and financial), will be worked out prudently and to a reasonable degree of detail, and it will have the character of a typical outline format.

Activity 5.7.2 Provision of assistance to ESCOs in the design of business plans

The PTM through the IEEIP consultants will provide assistance in the form of technical advice, on a request basis, to ESCOs in the design of their detailed business plans. More or less, the plan that will be recommended will be based on the model business plan and will include details regarding strategic objectives, market objectives, market entry strategies, market forecasts, cash flow projections etc.

Activity 5.7.3 Conduct of interactive workshops for PTM and ESCO staff on the business planning process

To supplement the assistance provided in Activity 5.7.2, the PTM will organize and conduct a business planning workshops for its staff and that of the ESCOs. This workshop will be designed to train the staff of existing and prospective ESCOs in the development of a viable business plan for a typical ESCO. The application of the model business plan prepared in Activity 5.7.1 will be discussed.

Activity 5.7.4 Recommend appropriate funding mechanisms

The PTM will evaluate different funding options that ESCOs can offer to prospective clients in the industrial sector. A compendium of all possible funding sources available will be prepared detailing the associated requirements and mechanics. The compendium will include information about financing

sources like the Energy Supply Industry Trust Fund and commercial banks, leasing arrangements, vendor financing, and financing by multilateral development banks.

Recommendations regarding the approach for acquiring funding for performance contracting projects will also be provided in the compendium. The compendium is also expected to create the necessary links between ESCOs, industrial firms, and financing institutions.

Component No. 6: Energy Technology Demonstration Program

This project component will address the barrier concerning the lack of knowledge on EE&EC techniques and technologies, and the limited energy demonstration programs of the government. The program will also build on the proposed activities of the PTM regarding the promotion of EE&EC technologies in the Malaysian industrial sector.

A rapidly industrializing economy like Malaysia is definitely cognizant of the advantages of the implementation of energy efficient technologies. Unfortunately, such technologies come with a very high price tag. Industries, especially at present have to carefully evaluate first whether to invest in such technologies. The fact that energy is still relatively cheap and readily available in the country, many industrial firms simply do not care whether their facilities/equipment are energy efficient as long as these can still turn out products. There are also some industrial firms that do not know what sort of measures and/or technologies they can consider to improve, not only productivity but also their energy utilization performance.

One way of convincing the management of industrial firms to consider the application of energy efficient technologies in their company operations is to show them an example of actual applications, preferably under the same conditions their company operates. Not only the actual physical working hardware must be shown them but also the evidences that such application contributes to the improvement of the company's cash flow.

Energy efficiency enjoys the advantage of a much shorter lead time than most options for increasing energy supply. Through the adoption of energy efficient technologies, industries can realize significant improvements in their cash flows. However, the potential savings are almost always not achieved due to a number of factors such as lack of awareness about these technologies, skepticism, competition for scarce capital, etc. The UNDP-GEF project addresses such constraints by supporting energy investments through demonstration of energy efficient technologies.

The major activities in this program will be similar to full project implementations, starting from the conceptual design, to feasibility study, engineering design, installation, operation, monitoring and evaluation. Appropriate EE&EC technologies will be selected for the sectors that will be considered in the program. These sectors are also those considered in Project Component No. 2, namely: cement, ceramics, food, glass, iron/steel, pulp/paper, rubber, and wood. Based on the information obtained from various industry representatives regarding energy technology applications in the major industrial sectors in the country, the following energy efficiency technologies are examples of possible energy saving projects that may be considered for the energy demonstration program:

Cement Sector: High Insulating Bricks in Rotary Kiln Burning Zone; and/or Rotary Kiln Combustion Control and Management System

Ceramic Sector:	Ceramic Recuperator in Sanitary Ware Muffle Kiln
Food Sector:	Compact Immersion Tube Juice Pasteurization; and/or Mechanical Vapor Recompression Evaporator; and/or Energy Efficient Food Blanching through Steam Recirculation
Glass Sector:	Electric Heating of Glass Furnace Forehearth; and/or External Sprayed-applied Insulating Fibers for Furnace Regenerator
Iron & Steel Sector:	Use of Low Excess Air Recuperative Burners; and/or Improved Ladle Drying and Preheating in Small Foundries
Pulp & Paper Sector:	Radio Frequency Drying Improved Paper Drying System
Rubber Sector:	Drying Air Recirculation; and/or Insulation Jackets for Rubber Injection Press Mold
Wood Sector:	Flash Steam and Condensate Recovery; and/or Automatic Solid Fuel Feeding and Combustion System Wood Dust Burning System

Considering the above sample demonstration projects, the magnitude of the ultimate markets and the “win-win” nature of these initiatives is summarized in Annex 5.

Immediate Objectives

1. Demonstrate the applicability and the feasibility (technical and economic) of proven energy efficiency technologies.
2. Documentation and dissemination of information on the application and benefits of energy efficiency technologies in local industrial settings.
3. Provision of technical and financial assistance to industrial energy users.

The program has an ultimate aim of having the demonstrated energy efficiency technologies replicated in other industrial facilities in the country. This multiplier effect is expected to contribute to the improvement of the overall industrial energy utilization efficiency with a corresponding reduction in GHG emissions.

Success Criteria

By the end of this program, the PTM will have achieved the following results:

- Identified potential energy saving technologies that can be applied in Malaysia industries.
- Conducted seminar-workshop on energy saving technologies application and demonstration.
- Developed selection criteria for host demonstration companies.
- Selected suitable companies that will host the demonstration schemes.
- Established baseline data for each demonstration site.
- Developed installation and implementation designs/plans for the demonstration schemes.
- Arranged the financial assistance for each demonstration scheme and assisted in the procurement of required hardware.
- Have the required hardware for each demonstration scheme installed, tested and accepted, and commissioned.
- Monitored and evaluated the energy performance of each demonstration scheme.
- Surveyed and evaluated the overall performance of the energy technology demonstration program.

- Developed a sustainable follow-up program for financially supporting the energy efficiency efforts of industrial firms.

Output 6.1 Catalogue of Energy Saving Technologies for Demonstration Program

This a primary requirement for the program, inasmuch as appropriate technologies that are of interest to most industries have to be identified in order to ensure a wide coverage of the impacts and benefits of the demonstration program.

Activity 6.1.1 Survey of energy saving technology applications and needs

A survey within the Malaysian industrial sector will be conducted by the PTM. This will be a combination of the use of survey questionnaires and actual visits to various industrial firms to primarily, determine the level of awareness and knowledge, and application of energy saving technologies in the Malaysian industry sector. The visits will also serve as marketing for the financial assistance that will be provided in the Energy Technology Demonstration Program.

Activity 6.1.2 Assessment of potential energy saving technologies

This activity will involve the assessment of existing, planned and proposed technology applications in the various industries based on energy consumption reports and energy audit reports that will be gathered by the PTM and MECM during the visits. The energy saving technologies that were previously proposed for the program will also be included in the assessments. Furthermore, potential energy conservation or energy efficiency improvement projects involving technology applications that can be implemented as a demonstration scheme in some of the companies surveyed will be identified.

Activity 6.1.3 Evaluation and documentation of survey results

This activity will primarily involve the evaluation and documentation of the responses to the survey. Survey findings concerning the energy technology applications that are of interest to most industries will be documented. A survey report will be prepared and submitted to the PTM. Finally, the PTM, with the assistance of the IEEIP consultants will come up with a list of appropriate technologies whose application and energy saving and/or energy efficiency features will be demonstrated under the program.

Output 6.2 Seminar-Workshop on Energy Technology Demonstration

This will involve the conduct of a seminar-workshop for management and technical personnel of industrial firms. The seminar portion will consist of lectures on, and case studies of, energy technology applications, either as part of a demonstration program or a distinct company effort. The seminar is also intended to promote the proposed energy technology demonstration program, and update the skills of the technical people who are involved in plant energy management. Discussions on the proposed implementation mechanics of the program, the results of the survey of energy saving technology applications and needs will also be included. The workshop portion, which will

also be attended by the management personnel will involve discussions on energy technology application and needs issues in industries (e.g., techniques, barriers or constraints, costs), and recommendations regarding technologies to be demonstrated under the program

Activity 6.2.1 Marketing of the energy saving technology demonstration program and the seminar-workshop

The PTM, with the cooperation of the industry associations, will organize the seminar-workshop on energy saving technologies, and at the same time introduce the proposed demonstration programs to the industrial firms.

Activity 6.2.2 Conduct of the energy saving technology seminar-workshop

The workshop will identify present techniques, costs, problems and barriers concerning the implementation of energy saving technologies, and come up with recommendations for eliminating the problems and at least mitigating the barriers. More importantly, views and suggestions from the participants regarding the implementation mechanics of the energy saving technology demonstrations will be deliberated on.

Activity 6.2.3 Documentation of the seminar-workshop findings and recommendations

Output 6.3 Baseline Data Establishment

Baseline data are necessary for the evaluation of the success/failure of a demonstration scheme since these will be the bases for comparing actual results obtained. The PTM and the host demonstration companies should agree on the baseline data before the demonstration scheme is implemented.

Activity 6.3.1 Establish list of parameters for monitoring energy utilization performance

The IEEIP consultants will establish a list of components and operating parameters that should be monitored to help track the performance of each specific demonstration scheme. The consultants will determine the measurement points and instruments needed to provide the necessary information to establish the energy use performance. The condition and accuracy levels of existing monitoring instruments will be ascertained and corrective measures recommended. Without the accuracy of the measurements and confidence in the data, determining the actual performance cannot be done effectively.

Activity 6.3.2 Conduct of energy audits in demonstration sites

The PTM will come up with energy audit programs for each host company. The audits will cover the specific area/facility where the project will be implemented including other areas that will be directly affected. The audit will primarily establish the present operating conditions in the specific facility/area and also quantify the present values of operating parameters that relate directly and indirectly to energy utilization. These are the parameters that are identified in Activity 6.5.1.

Activity 6.3.3 Agreement on baseline performance data

The PTM audit team will present the audit findings and baseline performance data that were found out, to the relevant company personnel (preferably management and technical). Discussions as to the acceptability of the baseline data will be made. Should there be some conflicts, if PTM finds it rational to further verify the audit results, more measurements will be made until a consensus as to the correct baseline data is ascertained. A Memorandum of Understanding will be drawn to define the agreed baseline data, which will be considered as an integral part of the contract agreement between the PTM and the host company.

Output 6.4 Demonstration Project Designs

This is one of the major deliverables of the program. The host companies will be responsible for the design of their own project. They can either do the design by themselves or hire an engineering or energy consulting firm to do the design for them. In either case, the IEEIP will provide assistance in the review of the proposed designs.

Activity 6.4.1 Coordination with host companies

The PTM will visit all the proposed sites where the demonstration schemes will be implemented. Discussions between the PTM, IEEIP consultants and the host company regarding the project design and planning will be made and documented.

Activity 6.4.2 Provision of assistance in the design of demonstration projects

This activity will be carried out in host demonstration companies, on a request basis. The IEEIP can provide technical assistance to these companies and their designers/consultants on:

- basic engineering design
- comprehensive techno-economic feasibility analyses
- detailed engineering design
- preparation of budget plan and implementation plan

Activity 6.4.3 Review of detailed engineering designs, budget and implementation plan

The PTM, with the assistance of the IEEIP consultants will review and approve the proposed designs and plans, in addition to the other required approvals from relevant government agencies. One particular item that will be looked into is the provision of at least the minimum allowable monitoring and measurement facilities for purposes of performance data gathering and evaluation.

Output 6.5 Funding Arrangements and Hardware Procurement

This major program deliverable will be in line with the funding activities in Component No. 8. In general, the main requirement to go on with the activities to realize this output is the endorsement of

the project design, budget and implementation plans by the PTM. Hardware in this case refers to the physical items that will be needed in the projects and may consist of equipment with its appurtenances or a system of equipment and controls and accessories.

The host companies will be responsible for the procurement of the hardware that will be used in their own project. Again, they can either do this by themselves or if they hired an engineering or energy consulting firm to do the project design, they can also contract them to do the procurement arrangements (following also the guidelines related to the financing agreement with the IEEIP). In either case, the IEEIP will monitor the procurement arrangements and if requested will also provide assistance in the procurement process.

Activity 6.5.1 Monitoring of procurement arrangements by host companies

The host companies will submit their procurement plan to the PTM. The PTM will ascertain whether compliance to guidelines related to the financing agreement is met.

Activity 6.5.2 Provision of assistance in the hardware procurement

This activity will be carried out in host demonstration companies, on a request basis. The IEEIP can provide technical advice to these companies and their contractors on:

- names of potential suppliers
- preparation and floating of bids for hardware supply
- procurement and delivery of hardware

Activity 6.5.3 Inspection of delivered hardware

The PTM, with the assistance of the IEEIP consultants will verify whether the hardware that were purchased for the demonstration project complies with the required specifications. All other items specified in the purchase agreements will be verified, before acceptance of the deliveries is made. One particular item that will be looked into is the cost of the actual purchase.

Output 6.6 Hardware Installation, Testing and Commissioning

This is another major deliverable of the energy audit program. The PTM will monitor the progress of the each demonstration project implementation.

The host companies will be responsible for the installation, commissioning and final acceptance of the installed hardware that will be used in their own project. Again, they can either do this by themselves or they sub-contract this job (perhaps including all other jobs on a turnkey basis). In either case, the IEEIP will monitor the progress of installation, performance testing, and commissioning of the installed hardware, and if requested will also provide assistance in the performance testing.

Activity 6.6.1

Monitoring of hardware installation in each host company

The host companies will submit progress reports about the installation progress to the PTM.

Activity 6.6.2

Provision of assistance to host companies

This activity will be carried out in host demonstration companies, on a request basis. The IEEIP can provide technical advice to these companies and their contractors mainly on the performance testing of the installed hardware.

Activity 6.6.3

Inspection of installed hardware

The PTM, with the assistance of the IEEIP consultants will assist the host companies in verifying whether the hardware installation complies with the specifications in the installation plans. Particular items that will be looked into are the achievement of guaranteed performance and the submission of as-built installation drawings by the contractors.

Output 6.7 Performance Monitoring and Evaluation of the Demonstration Projects

To realize this output, several activities involving the monitoring of the energy performance of the demonstration schemes and the evaluation of the impacts will be carried out. The results of the demonstration schemes will be documented.

Activity 6.7.1

Conduct of regular energy performance testing

The PTM will come up with a monitoring program detailing the schedules of performance testing for each host demonstration company. The testing will be carried out in the same areas/facilities that were covered in the audits performed in Activity 6.5.2. The PTM, in coordination with the company staff, will conduct the testing/audit to establish actual operating conditions and measuring the present values of operating parameters that were identified in Activity 6.5.1, i.e., the baseline data parameters.

The monitoring of energy performance will be carried out by the host company and the PTM until the time the investment cost of the project is recovered.

Activity 6.7.2

Evaluation of actual energy savings

Based on the audit/test data that will be obtained from the regular performance testing, the actual energy savings and other benefits from the project will be quantified. The economics (based on agreed parameters, e.g., IRR or payback period) will be evaluated.

Activity 6.7.3

Documentation of each demonstration scheme

The PTM will monitor the progress of each demonstration project. Status reports will be compiled and published each year presenting the project

profiles (e.g., name of project, technology demonstrated, investment cost, financing provided, savings and other benefits already achieved, expected payback time, etc.). The annual report compilation will be disseminated to the industries. At the end of each project (i.e., when payback period is achieved) a detailed project profile (including illustrations) will be published and disseminated to industrial firms.

Output 6.8 Demonstration Program Evaluation

It should be emphasized that the energy saving technology demonstration schemes that will be implemented under the Energy Technology Demonstration Program are financed partly by the IEEIP (50%). Towards the end of the IEEIP, a survey among the program beneficiaries will be conducted.

Activity 6.8.1 Conduct of survey

A survey among the recipients of financing assistance under the program will be conducted by the PTM. The companies will be visited and interviewed by the PTM staff. The survey is meant, among others, to learn from the host companies themselves, the actual tangible and intangible benefits and the difficulties/problems they faced in hosting the demonstration schemes. Other comments and suggestions for the improvement of the program will be solicited from the respondents.

Activity 6.8.2 Evaluation and documentation of survey results

The information that will be gathered from the survey interviews will be evaluated to know, among others, the general and specific opinions/impressions of the host companies about the program. Based on the information concerning actual benefits and the difficulties/problems they faced in hosting the demonstration schemes, recommendations on whether to continue or stop the program, or on how to improve the mechanics of the program will be formulated. The results of the survey evaluation, including the relevant recommendations for further improving the program will be documented.

Activity 6.8.3 Conduct Workshop on Energy Technology Demonstration

This will involve the conduct of a workshop to discuss the results of the demonstration programs. Each host company will present the demonstration schemes they have implemented highlighting the technology involved, the scheme, the investment requirements, results, energy savings achieved, actual project economics, estimated GHG emission reductions, and their recommendations for the energy technology demonstration program. The workshop will assess the overall performance of the program and will come up with recommendations to the MECM concerning the relevance of such kind of programs to support the government's efforts to improve the energy efficiency levels in the Malaysian industrial sector. The proceedings of the workshop will be documented and published for dissemination.

Component No.7: Local Energy Efficient Equipment Manufacturing Support Program

This program will address the barriers concerning expensive energy efficient equipment and the lack of locally available and manufactured energy efficient equipment sold to, and used in, Malaysian industries.

According to industrial firms, most of locally manufactured industrial equipment in Malaysia are relatively inefficient compared to those imported from other countries. However, many firms are using them even though these are inefficient because the imported variety is expensive. The inherent inefficiency of locally manufactured industrial equipment results in more energy being utilized by industries, not to mention breakdowns, which also results in poor productivity. In order to determine the extent of improvement that can be realistically achieved, it is imperative to assess the :

- Equipment manufacturing capabilities of local equipment manufacturers;
- The manufacturing processes involved; and
- Typical energy performance of selected locally produced industrial equipment.

In so doing, it will be possible to identify potential improvements and new designs for locally manufactured industrial equipment. It is believed that the local industrial equipment manufacturers will be more than willing to improve the efficiency and quality of their products. However, if there is no demand for improved local product quality, there will be no incentives for them to improve their designs. After all, they can still sell their products.

In order for local equipment manufacturers to be motivated to improve their designs and manufacturing techniques, they should be adequately trained on high efficiency designs and production technologies. Besides classroom trainings, they should also be provided with technical assistance in the actual retrofitting of their manufacturing system. Moreover, some of financial incentives have to be provided in order to encourage them to go on with the improvement of their equipment design and manufacturing process.

The program will focus on local industrial equipment manufacturers and will be implemented in conjunction with the technical assistance provided under the energy rating program (Component No. 3). It is designed to offer incentives to selected local industrial equipment manufacturers. Presently, there are local manufacturing capabilities in the production of industrial equipment. Based on the opinions/suggestions of industry representatives, the following locally manufactured industrial equipment can be considered for the program: (1) boilers; (2) electric motors; (3) heat exchangers; (4) pumps; and, (5) fans/ blowers. Other possible industrial equipment that can be considered are transformers and industrial ovens. The assistance that will be provided by the program is to offset the expected incremental costs that will be incurred by local manufacturers in developing and introducing new energy efficient products.

Immediate Objective

To initiate design and manufacturing improvement projects of local industrial equipment manufacturers as a means of promoting and accelerating the production and utilization of energy efficient equipment in industries.

The program has an ultimate aim of having the energy efficiency improvements replicated by other local industrial equipment manufacturers. This multiplier effect is expected to contribute to the improvement of the overall industrial energy utilization efficiency with a corresponding reduction in GHG emissions.

Success Criteria

By the end of this program, the PTM will have achieved the following results:

- Assessed the equipment manufacturing capabilities of local manufacturers.
- Evaluated the typical energy performance of selected locally produced industrial equipment.
- Identified potential improvements and new designs for locally manufactured industrial equipment.
- Trained local industrial equipment manufacturers on high efficiency designs and production technologies.
- Provided technical assistance to local equipment manufacturers.
- Provided funds to eligible equipment design and manufacturing improvement projects of selected local industrial equipment manufacturers.
- Evaluated the results and impacts of the funded equipment design and manufacturing improvement projects.

Output 7.1 Assessment of Local Equipment Manufacturing Capabilities.

In order for the program to focus on the groups that would create significant impacts on energy Utilization and GHG emission reductions, the program will establish first the current manufacturing capabilities and practices of industrial equipment manufacturers in Malaysia.

Activity 7.1.1 Conduct of a market survey.

The PTM, with the assistance of MIDA , and the relevant industry associations will organized a market survey among the local industrial equipment manufacturers. The survey will be conducted under the auspices of the PTM. Its objectives is to determine, among others, the locally manufactured industrial equipment, production volumes, market, sales, and performance of the locally produced equipment. Other important information that will be asked in the survey are the following:

Activity 7.1.2 Evaluation of the survey results

The information that will be gathered from the survey will be evaluated by the PTM. The Evaluation will assess, among, others, following:

- Local equipment manufacturing industry's regard to, and attitude towards, energy efficiency and productivity in their designs and production processes.
- Possible design improvements that can be done to local equipment design and/or manufacturing according to the manufacturers themselves.
- Possible policy instruments to be put in place, in order to promote and encourage the production of the energy efficient equipment which can be utilized by local industries, and also exported to other countries.
- Potential problems in the adoption of energy efficient designs.

Activity 7.1.3 Selection of industrial equipment to be covered under the program

Although some industrial equipment were already propose earlier, the information gathered in the survey will be used to make the final selection of locally manufactured industrial equipment that will be considered in the program. Among the possible criteria will be the energy performance and the volume of sales of the equipment, which somehow directly relates to the amount of energy that will be utilized to operate them annually.

The PTM will also select the local manufacturer's of the identified equipment who have agreed to be visited by the IEEIP consultants for purpose of evaluating their products and their manufacturing process. Other manufacturers of these equipment may also be visited.

Output 7.2 **Evaluation of Typical Energy Performance of Selected Locally Produced Industrial Equipment**

This deliverable is important in determining specific improvements that can be recommended for local industrial equipment design and/or manufacturing

Activity 7.2.1 Conduct visit to the production facilities of local manufacturers

The IEEIP consultant and PTM staff will conduct visit to the production plants of the local equipment manufacturers identified in Activity 7.1.3 to determine the types of equipment and machineries used in production, the production process, production lines, product testing facilities and capabilities, and the manufactured products.

Activity 7.2.2 Evaluation of the energy performance of locally manufactured industrial equipment.

Using the information gathered from the market survey and the technical data provided by the local manufacturers, and their findings during the plants visit (Activity 7.1.3), the IEEIP consultants will evaluate the performance and quality of the industrial equipment in produced and the manufacturing processes in Malaysia.

Activity 7.2.3 Conduct literature review about energy performance of industrial equipment in other countries.

The IEEIP consultant through the literature review, consideration of appropriate levels of costs and using their own experience, will be establish a list of performance data from various countries for industrial equipment that are also locally manufactured in Malaysia.

Output 7.3 **Potential Improvements and New Designs for Locally manufactured Industrial Equipment**

The IEEIP consultants will identify possible improvements that can be incorporated in the design of local industrial equipment, as well as in the manufacturing process.

Activity 7.3.1

Comparison of locally manufactured equipment and manufacturing processes with that of other countries.

The IEEIP consultant will make a comparative analysis of the quality and performance of industrial equipment and of the manufacturing processes in Malaysia and in other countries. This is to determine the potential areas of improvement in the equipment design and the manufacturing processes.

Moreover, based on their observations on the manufacturing processes and the actual productions, the IEEIP consultant will analyze and identify the possible improvements that can be recommended.

Output 7.4 Local Industrial Equipment Manufacturers Trained on High Efficiency Designs and Production technologies.

The PTM will organize a series of training courses for local industrial equipment manufacturers to improve their knowledge and supplement their know-how on high efficiency and energy efficient equipment designs and production technologies. They will be trained in the principals of high efficiency equipment design, including modifications to existing and planned designs to increase the energy utilization efficiency. PTM staff will also be joining the training courses.

Activity 7.4.1

Conduct of a technology seminar exhibition

A 3-day technology seminar and a week-long workshop will be organized and conducted by the PTM to introduce local equipment manufacturers to energy efficient technologies. The seminar will be supplemented by an intensive equipment design workshop.

Activity 7.4.2

Conduct of a training course on computerized design modeling

The PTM will organize and conduct an intensive energy efficient equipment design modeling training course for local manufacturers in the use of the computer model/design tools in efficient equipment design.

Activity 7.4.3

Conduct a planning dialogue with local equipment manufacturers

The PTM will organize and conduct a planning workshop with local equipment manufacturers to review future needs for high efficiency industrial equipment, particularly in view of energy labeling objectives of the MECM. This is mainly to ensure that the demand for high efficiency equipment will exist in the local market. Furthermore, the PTM will presents its program of providing technical assistance to local manufacturers, on a request basis.

Output 7.5 Technical Assistance to Local Equipment manufacturers

The IEEIP will provide technical advice to local equipment in various aspects of the business. The PTM energy engineers will participate in the activities that will be carried out to realize this output, as part of their on-the-job training.

Activity 7.5.1 Provision of assistance for business plan preparations and financing proposals

The IEEIP consultants will provide local equipment manufacturers assistance in developing bankable business and financing proposals to upgrade designs and production technology at individual factories.

Activity 7.5.2 Provision of technical assistance for product-design improvements.

The IEEIP consultants will provide advisory services to local equipment manufacturers in planning and implementing modifications in the design of their manufactured products.

Activity 7.5.3 Provision of technical assistance for factory production line conversion.

The IEEIP consultants will provide advisory services to local equipment manufacturers in planning, designing and implementing conversion of their production lines, including procurement of equipment.

Output 7.6 Selection and Funding of Eligible Equipment Design and Manufacturing Improvement Projects of Local Industrial Equipment Manufacturers

After evaluating the financing applications of local equipment manufacturers, arrangements for the provision of funds are made.

Activity 7.6.1 Discussions and contract signing with eligible applicants

A contract agreement will be signed between PTM and the companies that are eligible for financing assistance. A final list of host companies for the equipment design improvement projects will be prepared, detailing the proposed improvements including investment requirements, estimated energy savings, estimated payback period, and estimated GHG emission reductions.

Activity 7.6.2 Provision of funds to eligible applicants

PTM will apply whatever fund payment scheme will be recommended in Activity 8 in the disbursement of the requested funds

Output 7.7 Evaluation of the Improvement Projects

To realize this output, several activities involving the monitoring of the progress and results of the improvement projects and the evaluation of the impacts will be carried out. The results of the improvement projects will be documented. Monitoring will be mainly through the progress reports that the participating local manufacturers will regularly submit to the PTM.

Activity 7.7.1 Evaluation of design and/or manufacturing improvement results

The manufacturers under the supervision of the PTM will carry out tests. The PTM, with the guidance of the IEEIP consultants will also carry out the same test to verify the magnitude of efficiency improvements that resulted from the new design applications. The economic benefits for the manufacturer that will result from the improvements will be quantified. The overall economics (based on agreed parameters, e.g., IRR or payback period) will be evaluated.

Activity 7.7.2 Documentation of reach improvement project

Progress reports from the participating manufacturers will be compiled and published each year presenting the project profiles. (e.g., improvements in the design and/or manufacturing process, investment cost, financing provided, savings and other benefits already achieved, expected payback time, etc.). The annual report compilation will be disseminated to the local equipment manufacturing industries. At the end of each project (i.e., when payback period is achieved) a detailed project profile (including illustrations) will be published and disseminated

Component No. 8: Financial Institutional Participation Program

This program is to assist in the implementation of Component Nos. 6 and 7 in the financing aspects of the activities that will be implemented in these programs. Industries generally focus on investments on production-related improvements and not energy-efficiency improvements. Furthermore, there is a lack of financiers willing to finance EE&EC efforts in industrial processes.

The lack of financing/banking institutions in the country who are willing to fund EE7EC projects stem from their lack of awareness about the potential benefits of such ventures. In general, the awareness of energy-efficiency project among financiers in the country is low and many are not interested in financing low-cost energy investments. Those who has been approached in the past by potential borrowers (ESCOs and industrial firms) were not convinced enough that the proposed projects will be bankable/feasible. They view EE7EC projects ask risky ventures. These highlight also the reality that some ESCOs and industrial firms lack the capability of preparing and presenting bankable EE7EC project proposals.

The financing/banking institutions in the country should be made aware of the viability of funding EE7EC efforts. The GoM, through PTM should educate these institutions and encourage them to help in the effort to improve the energy utilization efficiency in industries by assisting industrial firms (and ESCOs) in financing EE&EC projects. They can also assist by providing advice on the favorable options that industries can consider in applying for financing. On the other hand, GoM should also provide incentives to the financing/banking institutions (e.g., loan guarantees) in order to encourage them to “buy in” and support the GoM’s EE7EC efforts. The financing/banking institutions can also be asked to serve as fund managers of any EE&EC and EE7EC-related funds of the GoM or of other regional/international lending institutions (e.g., JICA, NEDO, DANCED).

This particular component of the IEEIP is basically intended to set up a mechanism for lending the available loans under this program. Moreover, it will train financiers how to assess the techno-economic viability of energy efficiency demonstration projects.

Immediate Objectives

1. To promote and accelerate the production and utilization of energy efficient industrial equipment through:
 - Dissemination of information and techniques on energy efficient equipment designs and production
 - Technical and financial assistance to local industrial equipment manufacturers
 - Development of local expertise on energy efficiency technologies
2. To set up financing arrangements for the provision of loans to eligible companies/ equipment manufacturers that can:
 - Host energy efficient technology demonstration programs and design applications (Component 6)
 - Produce energy-efficient industrial equipment amongst local markets for the technology demonstration activity (Component 7)

The program has an ultimate aim of having the energy efficiency improvements replicated by other local industrial equipment manufacturers. This multiplier effect is expected to contribute to the improvement of the overall industrial energy utilization efficiency with a corresponding reduction in GHG emissions.

Success Criteria

By the end of this program, the PTM will have achieved the following:

- Trained local banking and financial institutions on financing EE&EC projects in industries.
- Assessed the capabilities of the local equipment manufacturers in Malaysia.
- Evaluated the typical energy performance of some locally produced industrial equipment.
- Identified potential improvements and new designs for locally produced industrial equipment.
- Trained local industrial equipment manufacturers on high efficiency designs and production technologies.
- Provided technical assistance to local industrial equipment manufacturers.
- Developed criteria for selecting companies for energy technology demonstration scheme financing assistance.
- Identified eligible companies for the energy technology demonstration program.
- Developed criteria for selecting companies for industrial equipment manufacturing improvement financing assistance.
- Identified eligible companies for the industrial equipment manufacturing improvement program.
- Evaluated both project financing assistance programs of the IEEIP.
- Developed a sustainable energy technology support program.

Output 8.1 Local Banking and Financial Institutions Trained on Financing and Evaluating EE&EC Projects in Industries

As part of the campaign efforts to encourage financiers to provide credit to industrial firms for the latter's EE&EC activities, a seminar-workshop on the evaluation of the technical and economic/financial feasibility of EE&EC projects will be provided under the program for local bankers and financial

institutions. The seminar-workshop will also serve as a forum for the discussion of the issues concerning the external funding of EE&EC activities in industrial establishments.

Activity 8.1.1 Conduct of a seminar-workshop on EE&EC project financing

The PTM will organize a seminar-workshop for local banking and financial institutions on financing EE&EC projects of industrial firms. The seminar portion will include presentations and talks on the prospects of financing EE&EC projects, and how to evaluate the technical and financial viability of such projects. Presentations on case studies of external financing (i.e., through banks, ESCOs) of EE&EC projects will also be included. The workshop portion will also be attended by prospective clients, and will discuss all concerns that both the industries and financiers have about the financing of EE&EC efforts.

Activity 8.1.2 Marketing the idea of financing EE&EC projects in industries.

Meetings between local bankers and financing institutions and the different business associations in the pre-selected industry sub-sectors (and also the ESCOs) will be arranged and conducted by the PTM to discuss the proposed idea. The PTM will present to these groups the need to support, and the benefits of, this idea. These meetings will serve as a forum between the 2 groups in continuously working closely in realizing the implementation and benefits of EE&EC projects to both parties, the country, and the global environment.

The local bankers and financing institutions will also be requested to participate in the development of the most realistic and applicable financing mechanism for the IEEIP's two zero interest loan programs (Component Nos. 6 & 7). Those who offer their assistance will be requested to participate in the techno-economic evaluation of applications for the 0% interest loans to finance demonstration schemes and equipment improvement design projects. They will also be trained on the monitoring of energy performance of EE&EC projects and the evaluation of energy and energy cost realized.

Output 8.2 Assessment of Local Equipment Manufacturing Capabilities

In order for the program to focus on the groups that would create significant impacts on energy utilization and GHG emission reductions, the program will establish first the current manufacturing capabilities and practices of industrial equipment manufacturers in Malaysia.

Activity 8.2.1 Conduct of a market survey

The PTM, with the assistance of MIDA, and the relevant industry associations will organize a market survey among the local industrial equipment manufacturers. The survey will be conducted under the auspices of the PTM. Its objective is to determine, among others, the locally manufactured industrial equipment, production volumes, market, sales, and performance of the locally produced equipment. Other important information that will be asked in the survey are the following:

Activity 8.2.2 Evaluation of the survey results

The information that will be gathered from the survey will be evaluated by the PTM. The evaluation will assess, among others, the following:

- Local equipment manufacturing industry's regard to, and attitude towards, energy efficiency and productivity in their designs and production processes.
- Possible design improvements that can be done to local equipment design and/or manufacturing according to the manufacturers themselves.
- Possible policy instruments to be put in place, in order to promote and encourage the production of energy efficient equipment which can be utilized by local industries, and also exported to other countries.
- Potential problems in the adoption of energy efficient designs.

Activity 8.2.3 Selection of industrial equipment to be covered under the program

Although some industrial equipment were already proposed earlier, the information gathered in the survey will be used to make the final selection of locally manufactured industrial equipment that will be considered in the program. Among the possible criteria will be the energy performance and the volume of sales of the equipment, which somehow directly relates to the amount of energy that will be utilized to operate them annually.

The PTM will also select the local manufacturer's of the identified equipment who have agreed to be visited by the IEEIP consultants for purposes of evaluating their products and their manufacturing process. Other manufacturers of these equipment may also be visited.

Output 8.3 Evaluation of Typical Energy Performance of Selected Locally Produced Industrial Equipment

This deliverable is important in determining specific improvements that can be recommended for local industrial equipment design and/or manufacturing.

Activity 8.3.1 Conduct visits to the production facilities of local manufacturers

The IEEIP consultant and PTM staff will conduct visits to the production plants of the local equipment manufacturers identified in Activity 7.1.3. to determine the types of equipment and machineries used in production, the production process, production lines, product testing facilities and capabilities, and the manufactured products.

Activity 8.3.2 Evaluation of the energy performance of locally manufactured industrial equipment

Using the information gathered from the market survey and the technical data provided by the local manufacturers, and their findings during the plant visits (Activity 7.1.3), the IEEIP consultants will evaluate the performance and quality of the industrial equipment produced and the manufacturing processes in Malaysia.

Activity 8.3.3 Conduct literature review about energy performance of industrial equipment in other countries

The IEEIP consultant through a literature review, consideration of appropriate levels of costs and using their own experience, will establish a list of performance data from various countries for industrial equipment that are also locally manufactured in Malaysia.

Output 8.4 Potential Improvements and New Designs for Locally Manufactured Industrial Equipment

The IEEIP consultants will identify possible improvements that can be incorporated in the design of local industrial equipment, as well as in the manufacturing process.

Activity 8.4.1 Comparison of locally manufactured equipment and manufacturing processes with that of other countries

The IEEIP consultant will make a comparative analysis of the quality and performance of industrial equipment and of the manufacturing processes in Malaysia and in other countries. This is to determine the potential areas of improvement in the equipment design and the manufacturing processes.

Moreover, based on their observations on the manufacturing processes and the actual productions, the IEEIP consultant will analyze and identify the possible improvements that can be recommended.

Output 8.5. Local Industrial Equipment Manufacturers Trained on High Efficiency Designs and Production Technologies

The PTM will organize a series of training courses for local industrial equipment manufacturers to improve their knowledge and supplement their know-how on high efficiency and energy efficient equipment designs and production technologies. They will be trained in the principles of high efficiency equipment design, including modifications to existing and planned designs to increase the energy utilization efficiency. PTM staff will also be joining the training courses.

Activity 8.5.1 Conduct of a technology seminar and exhibition

A 3-day technology seminar and a week-long workshop will be organized and conducted by the PTM to introduce local equipment manufacturers to energy efficient design principles and showcase currently available energy efficient technologies. The seminar will be supplemented by an intensive equipment design workshop.

Activity 8.5.2 Conduct of a training course on computerized design modeling

The PTM will organize and conduct an intensive energy efficient equipment design modeling training course for local manufacturers in the use of computer models/design tools in efficient equipment design.

Activity 8.5.3 Conduct of a planning dialogue with local equipment manufacturers

The PTM will organize and conduct a planning workshop with local equipment manufacturers to review future needs for high efficiency industrial equipment, particularly in view of energy labeling objectives of the MECM. This is mainly to ensure that the demand for high efficiency equipment will exist in the local market. Furthermore, the PTM will present its program of providing technical assistance to local manufacturers, on a request basis.

Output 8.6 Technical Assistance to Local Equipment Manufacturers

The IEEIP will provide technical advice to local equipment in various aspects of their business. The PTM energy engineers will participate in the activities that will be carried out to realize this output, as part of their on-the-job training.

Activity 8.6.1 Provision of assistance for business plan preparations and financing proposals

The IEEIP consultants will provide local equipment manufacturers assistance in developing bankable business and financing proposals to upgrade designs and production technologies. Technical assistance will be provided in upgrading designs and production technology at individual factories.

Activity 8.6.2 Provision of technical assistance for product design improvements

The IEEIP consultants will provide advisory services to local equipment manufacturers in planning and implementing modifications in the design of their manufactured products.

Activity 8.6.3 Provision of technical assistance for factory production line conversion

The IEEIP consultants will provide advisory services to local equipment manufacturers in planning, designing and implementing conversion of their production lines, including procurement of equipment.

Output 8.7 Selection Criteria for Host Demonstration Sites of Component No. 6

In order to ensure the realization of the objectives of the demonstration program, and in view of the limited financing assistance for the demonstration program, certain criteria will be established to select the most appropriate candidates. Local banking and financial institutions will participate in this activity, mainly in managing the funds and in providing advice based on local financing practices.

Activity 8.7.1 Selection of banks that will manage the funds

Local banking and financial institutions will be offered the opportunity to manage the project funds (i.e., funds for the demonstration schemes), on condition that they will, in the future, finance other industrial EE&EC projects,

by themselves. The banks will be required also to provide relevant advice based on local financing practices.

Activity 8.7.2 Development of selection criteria for host demonstration sites

This activity will involve the design and development of a set of selection criteria and procedures that will be used in the identification and selection of suitable demonstration sites. The selection criteria shall consider, among others, the financial performance of the firm, the energy saving potentials and the corresponding potential GHG emissions reduction. In essence, the financial assistance that will be provided to the eligible companies will be without restrictions on the scale of their operations provided that they agree to certain requirements such as:

- Provide free, open access to the demonstration site for PTM representatives and other interested parties
- Provide project design and engineering information and performance data on the results of the demonstration project
- Allow PTM, industry associations and relevant government agencies to disseminate the project information freely (but limited to the project only) to interested parties.

The participating banking and financing institutions (identified in Activity 8.1.2) will provide relevant advice based on their experience and local financing practices, e.g., typical selection criteria, financial background investigations, interest settings, loan repayment mechanism.

Output 8.8 Final List of Host Demonstration Companies

Companies who will be interested in the availing of the financial assistance that goes with the responsibility of hosting the demonstration programs will be required to submit their applications. A suitable application form will be designed for this purpose stating among others the project that they intend to implement as a demonstration scheme, project description, investment required, savings, economics, and magnitude of GHG emissions reduction. Using the set criteria, the applicants will be evaluated and rated. The number of companies that will be chosen will be limited to that to which the budget for the program can allow.

Activity 8.8.1 Design of Application Forms for the demonstration project financial assistance

The IEEIP consultants, with the advice of local banking and financial institutions, will design and develop the necessary application forms that will be used by interested companies for applying for financial assistance in implementing their project involving demonstrable energy saving technology. The application forms will be disseminated to industry associations or directly to interested companies. The PTM will assist the companies, if required, in filling up the application forms.

Activity 8.8.2 Evaluation of applications for financial assistance

Using the selection criteria, the PTM, with the guidance of the IEEIP consultants will evaluate the application forms submitted by industrial firms. The PTM will also determine, based on its evaluation the appropriate amount of funds (50% of investment cost) that will be awarded (as loan @ 0% interest) to the eligible applicants.

Activity 8.8.3 Conduct of background investigation of applicants who qualified for the financial assistance

The participating banking and financial institutions will provide information about the financial standing of the applicants that qualified, based on the set criteria, for the energy saving technology demonstration scheme financing assistance.

Activity 8.8.4 Discussions and contract signing with eligible applicants

A contract agreement will be signed between PTM and the companies that are eligible for financing assistance and who will implement their projects involving the application of energy saving technologies as a demonstration scheme. A final list of host companies for the demonstration projects will be prepared, detailing the project and energy saving technology that will be demonstrated, including investment requirements, financing provided, estimated energy savings, estimated payback period, and estimated GHG emission reductions.

Output 8.9 Selection Criteria for the Local Manufacturers Support Program

Local industrial equipment manufacturers will be offered incentives in order to offset their expected incremental costs for improving equipment design, thereby reducing risks to them of developing and introducing new energy efficient products. In order to ensure the realization of the objectives of the local industrial equipment manufacturers support program, and in view of the limited financing assistance for the program, certain criteria will be established to select the most appropriate candidates.

Activity 8.9.1 Selection of banks that will manage the funds

Local banking and financial institutions will be offered the opportunity to manage the project funds (i.e., funds for the improved equipment design projects), on condition that they will, in the future, finance similar or other industrial EE&EC projects, by themselves. The banks selected for managing the demonstration project funds may also be appointed as the fund managers.

Activity 8.9.2 Development of selection criteria for financing

This activity will involve the design and development of a set of selection criteria and procedures that will be used in the identification and selection of suitable manufacturers to support. The selection criteria shall consider, among others, the financial performance of the manufacturer, the energy saving potentials, the efficiency gains and the corresponding GHG emissions

reductions attributable to the measures implemented and market penetration of the resultant high efficiency models.

As in Component No. 6, the participating banking and financing institutions (identified in Activity 8.1.2) will provide relevant advice based on their experience and local financing practices, e.g., typical selection criteria, financial background investigations, interest settings, loan repayment mechanism.

Output 8.10 Final List of Eligible Local Industrial Equipment Manufacturers

Manufacturers who will be interested in the availing of the financial assistance will be required to submit their applications. A suitable application form will be designed for this purpose stating among others the design and/or manufacturing improvements that they intend to implement, investment required, expected benefits, economics, and magnitude of GHG emissions reduction resulting from the use of improved equipment designs. Using the set criteria, the applicants will be evaluated and rated. The number of companies that will be chosen will be limited to that to which the budget for the program can allow.

Activity 8.10.1 Design of Application Forms for the program financial assistance

The IEEIP consultants will design and develop the necessary application forms that will be used by interested companies for applying for financial assistance in implementing improvements in the design and/or manufacturing or their products. The application forms will be disseminated to the relevant industry associations or directly to interested companies. The PTM will assist the manufacturers, if required, in filling up the application forms.

Activity 8.10.2 Evaluation of applications for financial assistance

Manufacturers will submit closed competitive bids for funding of their projected incremental cost to develop, produce and market energy efficient equipment. Using the selection criteria, the PTM, with the guidance of the IEEIP consultants will evaluate the application forms submitted by the local manufacturers. The PTM will also determine, based on its evaluation the appropriate amount of funds that will be awarded (as loan @ 0% interest) to the eligible applicants.

Activity 8.10.3 Conduct of background investigation of applicants who qualified for the financial assistance

The participating banking and financial institutions will provide information about the financial standing of the applicants that qualified, based on the set criteria, for the local energy-efficient industrial equipment manufacturing financing assistance.

Output 8.11 Financing Assistance Program Evaluation

Towards the end of the IEEIP, a survey among the program beneficiaries of both 0% interest loan assistance programs of the IEEIP (Component Nos. 6 & 7) will be conducted.

Activity 8.11.1

Conduct of survey

A survey among the recipients of both financing assistance programs will be conducted by the PTM. The companies will be visited and interviewed by the PTM staff. The survey is meant, among others, to learn from the host companies themselves, the actual financial/economic benefits of the demonstration schemes or the equipment design and manufacturing improvement projects. Other comments and suggestions for the financing of such kind of projects will be solicited from the respondents.

Activity 8.11.2

Evaluation and documentation of survey results

The information that will be gathered from the survey interviews will be evaluated to know, among others, the general and specific opinions/impressions of the host companies about the financing schemes applied in the programs. Based on the information gathered, recommendations on whether to continue or stop the program, or on how to improve the financing mechanics of the programs will be formulated. The results of the survey evaluations, including the relevant recommendations for further improving the financing programs will be documented.

Output 8.12 Sustainable Energy Technology Support Program

GEF funds that were loaned to the host demonstration companies and local industrial equipment manufacturers (@ 0% interest) have to be repaid by them at the time when the investment cost of the demonstration projects, or the incremental costs for the improved product designs and manufacturing, has been recouped. The funds can then be loaned again to another batch of companies who are interested in employing energy saving technologies in their operations/facilities, but this time with interest. This kind of a self-sustainable scheme will be developed to ensure the continuance of the energy technology support program after the IEEIP.

Activity 8.12.1

Development of a revolving fund using the GEF seed money for the demonstration schemes and industrial equipment improvement program.

Towards the end of the IEEIP, the PTM and the participating banking and financial institutions will study and develop a revolving fund that will provide soft loans to assist eligible industrial firms finance their EE&EC efforts. This can be carried out using the same implementation mechanics applied in the demonstration schemes or the industrial equipment design improvement program, or can be done through the different industry associations, the banks and financing companies, or in collaboration with local ESCOs.

SECTION E: INPUTS

E.1. Government of Malaysia Inputs

The inputs from the GoM account for about half of the total project cost. These include both cash and in-kind contributions coming from various government agencies that will be actively involved in the implementation of the IEEIP

Cash

The GoM will put into the project cash contributions amounting to US\$ 6,302,000. This amount will come from a significant portion of the PTM's yearly budget (US\$ 3,072,000), the committed amount from the Energy Efficiency Program of the DEGS (US\$ 1,064,000), and the share from the wood and biomass energy conversion projects of FRIM and SIRIM (US\$ 2,166,000). The cash coming from FRIM and SIRIM forms part of the financing for the energy technology demonstration schemes (Component No. 6), and the energy audit activities that will be carried out in Component Nos. 2 & 6.

Table E-1.1 shows the breakdown of expenses by project component, which will be paid for using the GoM cash funds.

In-Kind

The Government will assign or transfer to the project experienced and qualified staff as part of in-kind contribution, including the use of facilities. Personnel in-kind contribution includes the time spent by professional and administrative support staff who will participate in the project implementations. Facilities in-kind project may include the use of existing laboratories and computer hardware and the provision of office space for international and national consultants who will work on the project. The in-kind contributions which amount to US\$ 1,627,600 will come mainly from the DEGS, EPU, FRIM, PTM, MECM, MIDA/MITI, PORIM, SIRIM, TNB, UTM.

Table E-1.1					
Project Budget Paid for by GoM Cash Funds (US Dollars)					
Professional Staff	Admin Staff & Costs	Equipment Purch./Rent	Travel Costs	Sundries	Total Cost
Component No. 1					
288,000	120,000	530,000	50,000	40,000	1,028,000
Component No. 2					
504,000	273,000	580,000	130,000	40,000	1,527,000
Component No. 3					
432,000	216,000	30,000	40,000	40,000	758,000

Component No. 4					
144,000	144,000	30,000	40,000	40,000	398,000
Component No. 5					
0	168,000	110,000	50,000	35,000	363,000
Component No. 6					
378,000	210,000	330,000	70,000	35,000	1,023,000
Component No. 7					
180,000	90,000	730,000	25,000	30,000	1,055,000
Component No. 8					
90,000	0	30,000	0	30,000	150,000
TOTAL					6,302,000

Table E-1.2 shows the distribution of the total in-kind contributions from the GoM among the various components of the IEEIP.

Table E-1.2	
Distribution of GoM In-Kind Contributions	
Component	In-kind Contribution
1. Energy Use Benchmarking	US\$ 159,400
2. Energy Auditing	US\$ 509,600
3. Energy Rating	US\$ 147,000
4. Energy Efficiency Promotion	US\$ 164,500
5. ESCO Support	US\$ 77,000
6. Energy Technology Demonstration	US\$ 335,000
7. Local Energy Efficient Equipment Manufacturing Support	US\$ 114,600
8. Financial Institution Participation	US\$ 120,000
TOTAL	US\$ 1,627,600

E.2. Private Sector Inputs

Private sector inputs to the project will mainly come from the Energy Supply Industry Trust Fund (ESITF) which amounts to about US\$ 5,260,000. It is also expected that some in-kind contribution will come from the private sector. This will mostly be in terms of hours spent by industry personnel and professionals in the implementation of specific program activities (e.g., time of industry personnel who will be named as members of sectoral energy audit teams). The exact magnitude of the in-kind contribution will only be ascertained during the program implementations.

Cash

The following is the distribution of the private sector cash inputs to the IEEIP:

Table E-2 Distribution of Private Sector Cash Contributions	
Expense Item	Cash Contribution
Component No. 3 - Testing Laboratory Facilities	US\$ 3,000,000
Component No. 6 - Energy Technology Demonstration Scheme Equipment	US\$ 2,260,000
TOTAL	US\$ 5,260,000

E.3. UNDP Inputs (Components 2 & 4)

UNDP is providing a total of US\$ 225,000 in direct funding for Component No. 2 and US\$ 75,000 for Component No. 4. Personnel costs including travel total US\$ 39,600. The various expenses listed below total approximately \$300,000 and include equipment and other miscellaneous costs.

Personnel

Table E-3.1: Personnel Expenses		
Personnel	Total Work Months	Total Remuneration, US\$
Industrial Process Energy Audit Specialist	3	39,600

Subcontracts

Table E-3.2: Subcontract Expenses		
Particular	Total Work Months	Total Remuneration, US\$
Printing of Quarterly Energy Technology Newsletter	42	70,000

Equipment, Training and Other Expenses

The following equipment, training and other expenses will be paid for by UNDP funds on Component Nos. 2 and 4.

Item	Total Cost (\$)
Energy Audit Equipment	152,900
Engineering Software and Updates	4,200
Energy Engineering Journals Subscription	4,800
Energy Engineering Books	16,000
Advanced Energy Audit Seminar-Workshop	7,500
Sundries	5,000
Total	US\$190,400

E.4. GEF Inputs (All Components)

GEF will provide a total of US\$7,300,600 for the entire IEEIP (inclusive of review and evaluation costs and UNDP commissions). Of this total, US\$ 1,791,600 will be allocated to the engagement of international consultants (inclusive of professional fee, travel, DSAs). The budget allocation for engagement of local consultants amounts to US\$ 1,037,300. Total sub-contracts amounts to US\$ 2,854,000. Bulk of the sub-contract budget is for the conduct of the demonstration schemes and equipment improvement projects that will be financed under the IEEIP. Local travel expenses paid for by the GEF budget amounts to US\$ 60,000. The training budget (fellowships and group training) amounts to US\$ 244,000, while a total of US\$ 162,000 will be allocated for workshops and conferences. Bulk of the US\$ 502,000 budget for equipment procurement will be for the purchase of energy audit instruments (about 80%). A total of US\$ 117,100 is allocated for reporting costs. Other costs related to the conduct of tripartite meetings, GEF monitoring and review, UNDP commission and sundries) make up the balance of US\$ 532,600.

Personnel

Personnel	Component	Total Work Months	Remuneration, US\$
International Consultants			
Energy Analysis Expert (1)	1	1	10,560
Energy Database Design Expert (2)		2	42,240
Ind'l. Process Energy Audit Specialist (10)	2	78	823,680
Energy Efficient Design Specialist (1)		1	10,560
Process Design Specialist (1)		1	10,560
Process Control Specialist (1)		1	10,560
Heat Transfer Specialist (1)		1	10,560
Engineering Design Specialist (1)		1	10,560
Energy Engineering Specialist (1)		1	10,560
Energy Policy Expert (1)	3	1	21,120
Equipment Standards Specialist (1)		2	21,120
Energy Labeling Specialist (1)		2	21,120

Instrumentation Specialist (1)		2	21,120
Instrument Calibration Specialist (1)		2	21,120
Metrologist (1)		2	21,120
Testing Laboratory Consultant (1)		2	21,120
Energy Technology Specialist (1)	4	1	10,560
Energy Certification Specialist (1)		1.5	15,840
Technical Publication Specialist (1)		1	10,560
ESCO Business Plan Specialist (1)	5	3.5	36,960
Energy Technology Specialist (1)		3	31,680
Energy Technology Specialist (1)	6	6	63,360
Energy Engineering Specialist (1)		3	31,680
Project Engineering Specialist (1)		6	63,360
Energy Efficiency Design Expert (2)	7	8	46,080
Equipment Design Expert (2)		8	46,080
TOTAL (38)		143.0	1,433,280
National Professionals			
Chief Technical Adviser (1)	All	48	316,800
Program Technical Adviser (7)	All except 8	87	478,500
Energy Benchmarking Specialist (1)	1	2	11,000
Sectoral Benchmarking Specialist (8)		4	22,000
Energy Audit Specialist (1)	2	2	11,000
Equipment Test Laboratory Designer (1)	3	4	22,000
Energy Auditor (1)	7	12	66,000
Financial Analyst (1)	8	9	49,500
Legal Adviser (1)		2	11,000
Cost Engineer (1)		9	49,500
TOTAL (23)		179.0	1,037,300
TOTAL PERSONNEL		322	2,470,580

Subcontracts

Table E-4.2: Subcontract Expenses			
Particulars	Component	Total Work Months	Remuneration, US\$
International Sub-Contracts			
Supply of Technology Information Materials for Publication in Energy Technology Newsletter	4	14 Qtrs.	7,000
TOTAL		14 Qtrs.	7,000
Local Sub-Contracts			
Industrial Energy Use Survey	1	1	7,500
Energy Audit Practices Survey	2	1	7,500
Marketing of Energy Rating Program	3	6	45,000
Production of Quarterly Energy Technology Newsletter	4	14 Qtrs.	105,000
Creation of Malaysia IEEIP Website		1	5,000
Energy Technology Applications Survey	6	4	10,000

Cement Sector Energy Technology Demonstration Projects		24	328,000
Ceramic Sector Energy Technology Demonstration Projects		12	66,800
Glass Sector Energy Technology Demonstration Projects		24	114,000
Food Processing Sector Energy Technology Demonstration Projects		36	299,300
Iron & Steel Sector Energy Technology Demonstration Projects		24	198,300
Pulp & Paper Sector Energy Technology Demonstration Projects		24	894,200
Rubber Sector Energy Technology Demonstration Projects		24	99,400
Equip. A Improvement Design Projects	7	24	157,000
Equip. B Improvement Design Projects		24	137,000
Equip. C Improvement Design Projects		12	37,000
Equip. D Improvement Design Projects		12	62,000
Equip. E Improvement Design Projects		24	207,000
Local Industrial Equipment Survey	8	2	15,000
Financing Assistance Fund Management		36	52,000
TOTAL			2,847,000
TOTAL SUB-CONTRACTS			2,854,000

Equipment, Training, and Other Expenses

The following equipment, training, and other expenses for the different components will be paid for by GEF funds:

Local Travel	Group Training & Study Tour	Training & Workshop	Equipment	Printing	Total Cost
Component No. 1					
	24,000	6,000	12,000	8,000	50,000
Component No. 2					
20,000	81,000	79,500	400,000	35,500	616,000
Component No. 3					
5,000	24,000	9,500	10,000	14,000	62,500
Component No. 4					
		4,000	24,000	5,000	33,000
Component No. 5					

	22,000	17,500		12,600	52,100
Component No. 6					
20,000	68,000	11,500	25,000	25,000	149,500
Component No. 7					
	25,000	34,000	31,000	15,000	120,000
Component No. 8					
15,000				2,000	2,000
TOTAL					1,085,100
Allocated Expenses					
GEF/RBAP Review Cost					67,300
Mid-Term Monitoring and Evaluation Cost					37,400
Mandatory Evaluation Cost					56,100
Mission Cost for International Experts					400,000
UNDP Local Travel Cost					15,000
UNDP Fee (3% Direct Cost)					64,800
Sundries					15,800
TOTAL					810,618
OVERALL COST					1,895,718

The detailed breakdown of the GEF budget and the distribution of GEF funds by project components are shown in Annex 1A-1 and Annex 1A-2, respectively.

E.5. Project Management and Support Services (All components)

Management

A full time **National Project Director** will manage the day to day implementation of the project. The NPD's remuneration is covered by the PTM, and is part of the IEEIP baseline budget. A Chief Technical Advisor will be appointed to oversee both the technical and operational aspects of all program implementations. The CTA will work full time on the project, and his/her total will be paid for under the GEF budget.

Support

All cost related to the provision of support services to the project will be covered by the GoM as part of baseline project cost. These services will include the time spent by the PTM staff and the in-kind contribution (e.g., professional and administrative staff time, use of equipment, etc.) by other government agencies in supporting the activities in all programs under the IEEIP.

SECTION F: PROJECT REVIEW, REPORTING, AND EVALUATION

Project Monitoring

Ongoing project monitoring will be provided in accordance with UNDP established procedures and will be provided on an ongoing basis by the UNDP Country Office with support from UNDP/RBAP/GEF.

Tripartite Reviews

The project will be subject to review by representatives of the implementing agency (PTM), GoM, and the UNDP/GEF HQ at least once every year. The first tripartite (TPR) meeting will take place within twelve months following project start-up. During these review meetings, the project performance will be measured against established work plans, expenditures will be reviewed and the overall technical performance will be discussed.

Mid-term Review

One detailed mid-term evaluation will be held at the middle of the third year of project implementation depending on outcome and recommendation of the first and second tripartite meetings. The review process will be undertaken through a two week mission to Malaysia where the UNDP/GEF will be represented in addition to international experts who will look into the technical aspects of the project implementation.

During this mid-term review a thorough evaluation of the performance and the implementation of the project in accordance with identified targets of emissions reduction and project outputs. Moreover, an analysis of the degree to which the project objectives are achieved using the success criteria identified in the project document will be undertaken. The terms of reference and timing of the review will be decided after consultation between the parties concerned. An evaluation report will be prepared.

Reporting

The National Project Director will prepare and submit to the UNDP Country Office for examination three months prior to each TPR meeting, a Project Performance Evaluation Report (PPER). Additional Annual Project Reports (APRs) is also requested to be submitted every year during life of the project. All reports will be produced in the English language.

The TAC will submit monthly and quarterly accomplishment reports to the PSC. The monthly reports shall be concise describing activities undertaken, issues confronting the PTM and the progress of work with respect to work accomplished and budgets expended. These reports shall be available for the TPRs and mid-term evaluation.

A project terminal report will be prepared for consideration at the terminal tripartite review (TPR) meeting. It shall be prepared in draft sufficiently in advance (one month prior to the meeting) to allow review by Government and UNDP, during the project.

SECTION G: RISKS

Energy efficiency projects face a number of risks. In general, such projects, which are more in line with demand side effort face more risks and are less easily implemented than supply side projects. This is because supply side projects usually are carried out within a single organizational entity such as the state electric utility, whereas demand side projects usually require the voluntary action of many end users to achieve their results. Where voluntary actions are not possible, regulatory actions may be required, which are often difficult to implement.

This UNDP-GEF project mainly faces energy demand side risks and has to contend with several issues. Some of the most critical risks are:

The need for more rational energy pricing - Current national energy pricing policy that is not conducive to the productive use of energy to energy efficiency needs of the economy. If this pricing is made less conducive, there is a risk incentives for industrial energy efficiency will be less. However, the DEGS (under the MECM) has indicated that this policy is under review especially as it relates to inhibiting energy efficiency in the industrial sector.

The necessity for the creation and enforcement of energy use regulations - Another issue is the issuance of regulations that are necessary to sustain the efforts that will be initiated and implemented by the IEEIP. Specifically, this refers to regulations that will require industrial establishments to carry out mandatory energy audits and regularly submit to the MECM periodic energy consumption reports. There is also the need for government to enforce energy labels in the near future and for the industrial equipment manufacturers and distributors to cooperate in complying with such labels.

The indispensability of full government support - This project will not achieve the results predicted unless the GoM, and specifically the MECM, fully support both the goals of the project as well as the day-to-day implementation and administration of the project. However, the risk of lack of government support appears very low at this time given the strong support the project development has received to date from the MECM and particularly the Secretary General. In addition, all of the government officials contacted during the development of this project document expressed strong support for the goals of the project and offered their full cooperation. To ensure full support from the government, the project design incorporates the creation of a National Steering Committee (NSC) with representation from the affected ministries and other relevant parties on the committee. Reducing the risk of lack of support has also been engineered into the design of each program within the overall project, by including key stakeholders at each level in the program design and implementation, thus hopefully engendering their full support.

The need for improved coordination - The lack of overall coordination could result in key stakeholders not being informed of program plans and later slowing progress; mis-timing of critical events that need to be properly orchestrated such as the high level launch of the Malaysia IEEIP, and many other possibilities. This issue has been addressed both by the creation of the NSC, as mentioned above, but also by the establishment of a National Project Director. This person will be responsible for monitoring the progress of all project components (programs) to assure their coordination, and feeding information up to the Secretary General and NSC for action.

Programme implementation Risks

The project risks are perhaps numerous, but these risks have been experienced by many energy efficiency efforts around the world and thus are known, can be anticipated and dealt with. The most critical of these risks in this project are:

Insufficient access to industrial firms and data - This is a very valid concern, which relates to energy use and production information in industrial facilities. If this data is not available to the PTM, they will be unable to provide detailed advice and feasibility studies to improve plant efficiency. This risk has been mitigated through the design of the educational and information dissemination programs in Component No. 4. Reluctance to provide information may be further mitigated by MECM, with the planned regulatory measures that will be enforced concerning the need for regular energy audits.

Paucity of qualified local engineers - The recently established PTM alone will be insufficient to meet the major challenges for implementing effective energy efficiency in the Malaysian industrial sector. The project anticipates the PTM contracting out to local engineers to implement many of the efficiency services because of insufficient number of qualified engineers to supply all the positions envisioned in the project plan. This risk has been mitigated, first, by checking that, in fact, skilled consulting engineers are available locally. A limited number of qualified independent engineers exist at least in Kuala Lumpur. Second, the local engineers will be invited to participate in the various training programs so that they can gain the necessary skills needed to provide the services. Third, engineers from each industry sub-sector will be seconded to be trained in energy audits and the specialized services to be offered by the PTM. When these engineers return to their plants, they will also be important assets in assisting their plant improve its own energy utilization performance.

Lack of attractive financing - The ability to finance the follow-up activities after the GEF assistance is critical to achieving continuously the project's energy savings and emissions reduction goals. The risk of lack of financing has been addressed directly by the project by providing financial assistance to host demonstration companies and local equipment manufacturers for projects certified as technically and economically feasible by the PTM. There is however some additional risk that although the financing is available after the GEF assistance, the terms may not be sufficiently attractive to get the industries to borrow to finance their efficiency projects. This risk can be mitigated by only bringing to financing those projects with a short payback period, say, under two years (i.e., a 50% simple return on investment).

Reluctance to adopt energy efficiency policies - The adoption of energy efficiency policies for the industry sector will involve change, even if the result is positive for all concerned, and many industrial companies are reluctant to change their ways of doing things. For example, even though industrial firms could save much money and energy by adopting life cycle costing techniques in their procurements, companies in many parts of the world have been slow to change their procurement policies to this new method. Similarly, many companies have been slow to adopt energy efficiency as part of their basic specifications in procurement. These are relatively simple measures. The adoption of energy efficiency standards for equipment will meet even more resistance. These risks have been anticipated by designing within the PTM the policy analysis capability to quantify the benefits to the country resulting from these measures in order to obtain support for their implementation at the highest levels necessary. In addition, the energy efficiency promotion program is designed to get the industrial sector's, and to some extent, the public's support for the efficiency programs and services and thereby reduce political resistance to the adoption of energy efficiency programs. Nonetheless, this risk cannot be reduced to zero, and the government may wish to promulgate those policies, which have the greatest acceptance by industry before tackling the more difficult ones.

Implementation delays – Previous experience in project implementations indicate the need to anticipate carefully potential delays that can adversely affect the implementation of the project, and in so doing come up with appropriate mitigating measures to avoid unnecessary problems and respites. Examples of these are delays in hiring the key personnel (e.g., CTA) who will work on the project, poor coordination resulting to slow progress, and poorly scheduled critical events. These procedural risks have been

addressed both by the creation of the NSC and the appointment of an NPD. In fact, these are among the pre-requisites of the project as mentioned in Section H. Since the availability of the CTA is very critical in the smooth running of the project, the PTM would have to scout for the appropriate candidates for the position, months ahead of the target project kick-off.

SECTION H: PRIOR OBLIGATIONS AND PRE-REQUISITES

The prior obligations of the Government of Malaysia to the project are as follows:

- Agreement to create a Malaysia Energy Center (PTM) and to provide office space, furniture and professional staff for the PTM, including a full-time qualified Chief Executive Officer (CEO).
- Agreement that the PTM will be an independent unit under the Ministry of Energy, Communications and Multimedia (MECM), with a CEO reporting directly to the Secretary General of the MECM.
- Agreement to commit a part of the Energy Supply Industry Trust Fund to the project, throughout the entire project duration.
- Agreement that other government agencies will contribute funds (cash or in-kind) to the project throughout the entire project duration.

The project document will be signed by the UNDP, and the UNDP assistance to the project will be provided only if the prior obligations stipulated above have been met to UNDP's satisfaction.

Prerequisites of the project are listed as follows:

- Availability of the space, furniture and staff for the PTM, and designation of a CEO
- Commitment of other government agencies to support the program.

The project document will be signed by the UNDP, and the UNDP assistance to the project will be provided, subject to the UNDP receiving satisfaction that the pre-requisites listed above have been fulfilled or are likely to be fulfilled. When anticipated fulfillment of one or more pre-requisites fails to materialize, the UNDP may at its own discretion, either suspend or terminate its assistance.

SECTION I: LEGAL CONTEXT

This project document shall be the instrument envisaged in the Supplemental Provisions to the Project Document, attached hereto. The host country implementing agency shall for the purpose of the Supplemental Provisions to the Project Document, refer to the Government co-operating agency described in the Supplemental Provisions.

All activities stipulated in the Project Document shall be implemented accordingly. However, should there be a need to make changes/modifications to any of the agreed activities, all signatories of the Project Document must concur, before such changes are made.

The following amendments may be made to the original Project Document, even if they are signed only by the UNDP Resident Representative, provided the latter is assured that all other signatories of the Project Document have no objections to the amendments:

- Revisions in, or additions to, any of the Annexes of the Project Document.
- Revisions which do not result in a major changes in the project's immediate objectives or outputs, and which are attributable to a reordering of the activities or inputs in order to improve the realization of the objectives or the outputs.
- Necessary yearly revisions are made to reorganize the provision of already scheduled inputs, to reflect an increase in the cost of expert services or other services due to inflation.

The government executing agent designated on the cover page to this project document has been duly delegated by the government coordinating authority to carry out this project and accordingly will follow the NEX accounting, financial reporting and auditing procedures set forth in the following documents as may be amended by UNDP from time to time.

The Accounting and financial reporting procedures set out in UNDP Programme and Project Manual (PPM), Section 30503, sub-section 6.

The UNDP Audit Requirements set out in PPM Section 30503, sub-section 7.0 and,

The UNDP Government Execution Manual (GEM)

The above documents are an integral part of this project document although incorporated herein only be reference. They have already been provided to the government and said Government executing agent.

Auditors to the project will be officially designated. Such auditors, and/or other officially appointed auditors shall undertake periodic management and financial audits of the project in accordance with UNDP auditing procedures for nationally executed projects, pursuant to the Government's overall national execution responsibilities under the Project Document and as set out in the documents listed above.

In addition, all accounts maintained by the government for UNDP resources may be audited by the UNDP internal Auditors and/or the United Nations Board of Auditors or by public accountants designated by the United Nations Board of Auditors.