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PREPARATION PHASE

# PROJECT DOCUMENT

FOR

PROGRAMME AREA 2:  
“TECHNICAL STANDARDS FOR RURAL  
ELECTRIFICATION/ELECTRICITY NETWORKS”



Updated, 20 June 2005

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## PROJECT DOCUMENT FOR PROGRAMME AREA 2

“Technical Standards for Rural Electrification/Electricity Networks”

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## ACRONYMS

DoI	Department of Industry, Within MOI
EVN	Electricity of Vietnam
GWh	GigaWatt-hour = 1,000,000 kWh
hh	Household
IA	Implementing Agency
KW	kilowatt
kWh	kilowatt-hour
LV	Low voltage, mainly 0.4 kV
MOI	Ministry of Industry
MV	Medium voltage, usually 6 –35 kV
MW	Megawatt = 1,000 kW
MWh	Megawatt hour = 1,000 kWh
PMB	Programme Management Board
PMT	Pole mounted transformer
PMU	Programme Management Unit
PPC	Provincial Peoples Committee
Sida	Swedish International Development Agency
VSRE	Vietnam-Sweden Rural Energy Programme

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## 1 BACKGROUND

The 5. July 2004, Ministry of Industry, Vietnam and Sida signed the Contract “Carl Bro International” and “entec” as Programme Consultant to the Vietnam – Sweden Rural Energy Programme 2003 – 2008. The services delivered by the consultant are divided into two phases:

- 1) A one year Preparation Phase and
- 2) An Implementation Phase.

The Preparation Phase is to specify the activities and the expected outcome beyond the description in the Project Document for the Programme Consultant. The programme is implemented in the Ministry of Industry, Vietnam, and the two provinces: Ha Giang and Quang Nam.

The role of the consultants, “Carl Bro”, “entec” and the Vietnamese consultants are strictly advisory and supportive. The responsibility for the project preparation and implementation rests with MOI and the Implementing Agents (IA).

The Programme includes 6 Programme areas and four of these are included in the contract.

This document deals with Area 2 Technical Standards for Rural Electrification/Electricity Networks.

Based on these ToRs, and the Contract Document attached to the Contract, this Detailed Project Document for Area 2 is prepared.

### 1.1 General about country and sector policy

#### 1.1.1 Geography

Vietnam is located in South-eastern Asia bordering China, Laos and Cambodia as well as the Gulf of Thailand, Gulf of Tonkin and South China Sea. The country has a total area of 329,560 sq km and a population of 82,700,000 (July 2004 est.). The terrain is low flat delta in south and north, central highlands and hilly, mountainous in far north and northwest with the highest point Fan Si Pan 3,144 m. The country is extended 1,650 km from north to south but only 50 km across at its narrowest point.

#### 1.1.2 Natural resources

The country has natural resources like phosphates, coal, manganese, bauxite, chromate, offshore oil and gas deposits, forests and hydropower.

### 1.1.3 History and Administration

France occupied Vietnam by 1884. Independence was declared after World War 2 (2<sup>nd</sup> September 1945) and the official name is Socialist Republic of Vietnam. Chief of State is President Tran Duc Luong and Head of Government Prime Minister Phan Van Khai. The country is divided in 58 provinces and 3 municipalities and the capital is Hanoi.

### 1.1.4 Economy

Vietnam can be described as a poor, densely populated country that's in the process of recovering from many years of warfare. Substantial progress was achieved from 1986 to 1996 with growth rates at an average around 9% per year. Growth then fell somewhat in 1998 and 1999 and again raising in the following years to 6 to 7 % in 2002 even against the background of global recession. The estimated purchasing power parity (2003) is USD 2,500 GDP-per capita. The GDP is divided by sector in Agriculture 24 %, industry 37 % and services 39 % (2001 est.). The labour force by occupation is agriculture 63 %, industry and services 37 % (2000 est.), the unemployment rate is 25 % (1995 est.)

### 1.1.5 Electricity industry

Ministry of Industry (MOI), Electricity of Vietnam (EVN) is the responsible entity for the electricity industry in the country. Within EVN there are 6 Power Companies (PC), out of which PC 1 in the North, PC 2 in the South and PC 3 in the Central, are the Power companies involved in rural electrification.

The total generation (2003) was 32 billion kWh, of which 40.5 % were fossil fuel and 59.5 % hydro. The total losses were about 12 % and the consumption thus around 28 billion kWh.

The transmission system comprises the following facilities (2002):

<u>Voltage</u>	<u>Line length, km</u>	<u>Transformer capacity, MVA</u>
500	1 531	4 231
220	3 839	8 474
110	7 703	11 004

The distribution system comprises today many voltages 0.4, 6, 10, 15, 22 and 35 kV. In the future the distribution will generally only comprise 0.4 and 22 kV. The total length of the distribution lines is 140,646 km and the installed transformer capacity is 19,499 MVA (2001).

The electricity consumption was in year 2000 22,397 GWh with a maximum demand of 4,890 MW, giving a specific consumption of 341 kWh/capita. The structure of electricity consumption by sectors (%) was

Industry	40.6
Agriculture	1.9
Service	8.5
Household	49.0

### 1.1.6 Rural Electrification

In Vietnam approximately 16 million households (hh) are living in the rural part of the country. 25 % of these hh or 4 million hh have still no access to power. The Vietnamese Government is carrying out an ambitious rural electrification plan to connect 95 % of these households to the national grid by 2005. The remaining 5 % or 200 000 hh in over 400 remote or mountainous villages will be supplied with electricity through off-grid systems base on least cost options such as small hydro, diesel systems, solar photovoltaic systems and similar.

The Ha Giang province is a mountainous poor region with plenty of hydropower resources is situated in the north of the country and has totally 117 945 hh. Hereof 69 768 hh are connected to the electricity grid and 11 061 hh are connected to isolated electricity systems, powered mainly by hydro power plants. The remaining 37 116 hh, constituting 31 % of the hh have still no access to power. Many of those are situated far from the grid and most of thee will for a long period rely upon connection to isolated electricity nets.

The Quang Nam province in the middle of the country not far from Da Nang has 314 826 hh. 287 745 hh are connected to the electricity grid and 600 hh are connected to an isolated grid in Tan Hiep island in Hoi An town. 26 481 hh, constituting 8.4 % of the hh have still no access to power.

About 1,000 projects have been completed in Vietnam with financing from the World Bank. Another 1,000 projects have been completed with local Vietnamese financing and additionally some more with bilateral financing. For the projects financed by the World Bank loans, a temporary standard was defined and applied. This standard has also been used for other projects. The experience is that the installations have become quite expensive and EVN and MOI are considering alternative standards to be used for rural electrification projects. Cost reduction could be achieved by choosing less expensive material and design for conventional supply but also non-conventional designs could be considered.

## 1.2 Problem analysis

### 1.2.1 History

The distribution system in Vietnam has been extended during a long period of time and under influence of a number of standards copied from different countries. In the North, the standards were Russian influenced, in the South American influenced while in the middle of the country the French dominated.

During the past 15 years many foreign donors have financed rural electrification and to some extent imposed their national standards into the projects.

### 1.2.2 Problems

- All the existing medium voltages 6-10-15-22-35
- All different standards according to which Rural Electrification Projects have been designed and erected
- Electricity companies still rely on standards, 20 years old
- Operational difficulties with the various voltages
- Maintenance problems with all the various standards
- Difficulties to stock spare parts for all the various standards
- Difficulties to plan extension of networks, considering different standards in the existing network
- Comparatively high costs for the distribution facilities installed
- The pole-mounted transformers used also for rural electrification are much too complicated and substantial savings could be achieved by adopting a more simple but although reliable design.

### 1.2.3 Analysis

The total investments in the distribution networks are very large and a conversion of all existing systems to a uniform voltage level and common standard will therefore require further investments and several years, not to say decades, to complete. It is, however, of utmost importance that a decision to strive towards this goal is taken in the very near future. All new distribution projects and rehabilitation of existing networks should therefore be designed and erected according to a new standard to be applied all over the country, independent of financing actors, consulting firms and contractors opinion and practise. The basis for the work with the new standards should be the existing temporary EVN standard and the work already performed within MOI-EVN to achieve a new distribution standard.

As an example, the pole-mounted transformer design could be another designed otherwise with the same reliability less costly by:

1. Abolish the insulated platform
2. Remove the isolator at the top of the PMT
3. Do not include the cabinet for the LV protection, meters are not necessary and the fuses could be mounted on an iron-bar
4. The c/c between the two poles could be reduced, thereby reducing the dimensions of crossbars implying lower costs

## 1.3 Identification of target groups

### 1.3.1 *MOI*

The most essential target group is the Ministry of Industry. The Ministry implements new policies, new projects, and are engaging new consultants and contractors. Under MOI there are also the Programme Management Board (PMB) for implementation of rural energy projects guided by a Steering Committee. In the provinces Project Management Units (PMU) are established and these are referring to the PMB in MOI.

### 1.3.2 *EVN*

EVN has the legal status as a state corporation and is among others also undertaking the role of extending the electric network to non-electrified communes and is therefore a very important target group for implementation of new technical standards.

Under EVN the various Power Companies play a significant role in rural electrification and their experience (good and bad) of the present standards is very substantial to pick up when defining new standards.

### 1.3.3 *Department of Industry (Dol)*

At provincial level the Dol is among others responsible for regulation of energy production, distribution and consumption, power development planning, provincial policy development and is therefore an important target group.

### 1.3.4 *Provincial Peoples Committees (PPCs)*

The PPCs will be the implementing agencies for the new projects for remote electrification in the provinces and as such very well aware of local conditions, which may have an effect in selecting the appropriate standard.

### 1.3.5 *The World Bank and other financing bodies*

As the World Bank is planning to start a substantial rural electrification project in the near future and have a long experience of rural electrification in Vietnam, their participation is essential. The same is valid for other donors to rural electrification projects.

### 1.3.6 *International and local consulting firms*

The consulting firms are those, who have designed the standards used in various countries for rural electrification project although the clients in respectively country are those who have decided to accept the design of a project.

### **1.3.7 International and local contractors**

The Contractors are those, who have actually erected the rural electrification facilities and to some extent prepared the detailed design. The Contractors therefore together represent an in deep knowledge of the rural distribution networks and their technical specifications.

### **1.3.8 Local manufacturing companies**

Much of the material used for distribution nets are available from the domestic producers. It is therefore important, when defining material for a new standard, that the new standards do not discriminate domestic producers. Further, the manufacturers need due warning to change and upgrade their products in order to compete also in quality with international manufacturers.

### **1.3.9 The electricity consumers**

The new standard will also include the service connections to be fixed to the consumer's premises. The consumer's interests in this respect and also in other matters will be taken into consideration, when the new standards are compiled.

## **1.4 Policies/guidelines relevant to the project**

### **1.4.1 Vietnam Government policy**

The ten-year socio-economic development strategy 2001-2010 by the Government of Vietnam envisions an improvement of standard of living through a wide range of policy measures, among them the energy sector.

### **1.4.2 Vietnam Rural Energy Study**

This study, completed in May 2000, has identified potentials and barriers for rural electrification in Vietnam.

### **1.4.3 Decree No 45/2001/ND-CP and Decree No 40/2003-QD-TTg**

These decrees are providing guidelines of the organisation of the electricity industry.

### **1.4.4 Policy on Rural Electrification, Socialist Republic of Vietnam**

This document presents a broad view of the principles of rural electrification policies on which all projects should be based.

### **1.4.5 Vietnam-Sweden Poverty Alleviation Programme or "Chia Se"**

As this programme supports among other thing also projects in the Ha Giang province, possible mutual benefits with the current activities in the province will be will be considered.

### 1.5 Documentation available

Vietnam Government Decree No 22/1999/QD-TTg  
Vietnam Government Decree No 45/2001/ND-CP  
Vietnam Rural Energy Study Final Report, May 2000, Volume 1-4  
ESMAP Options for renewable energy in Vietnam, July 2000  
Renewable Energy in Vietnam, March 2001  
Renewable Energy Master Plan, Summary, March 2002  
Renewable Energy Action plan  
Distribution standard adopted for the World Bank financed project Rural Energy 1, 09/2000  
Old standard documents from 1984, used in Ha Giang Province

## 2 THE PROJECT

### 2.1 Overall objectives

The overall objective of the programme is that the rural population of Vietnam has increased access to options for rural energy services that are reliable, affordable, appropriate, and sustainable.

### 2.2 Project objectives

The objective of Programme Area 2 is to develop a proposal for appropriate sector technical standards and enforcement mechanisms for safe and reliable rural electricity service delivery in order to achieve a strengthened capacity to implement policies related to increasing safe, appropriate and cost effective rural electricity access, based on a new national technical standard for rural grid connected and off-grid electrical distribution systems, and related enforcement mechanisms.

### 2.3 Expected results

The expected result will be:

- A proposal for a revised national standard for rural grid connected and off-grid electrical distribution systems including guidelines for its application.
- Increased capacity within government to apply tools and methods in developing sector technical standards.
- A plan of action for implementation of appropriate sector technical standard to be applicable in different kinds of rural electrification networks.
- An implementation plan for appropriate enforcement and incentives mechanisms for application of sector technical standards for rural electrification.
- Increased understanding within MOI on stakeholders views of sector technical standards and amongst constructors of rural electrification network about the proposed technical standards.

### 2.4 Activities

According to the Terms of Reference for the Programme Consultant to the Vietnam-Sweden Rural Energy Programme 2003-2008 (Appendix C to the Contract), the Preparation Phase should include a review of experience from use of existing standards for rural electricity networks. According to Appendix C, "The review should be completed through

participatory workshops for identification of strong points and weaknesses of the existing standards.”

During preparation of this Project Document a number of important stakeholders were travelling abroad and therefore not able to participate in a workshop(s). It was therefore not considered meaningful to hold workshop(s). Instead meetings were held with MOI with participation of delegates from Department of Science and technology and other stakeholders as well (EVN and Vietnamese consultants). The present standards were also discussed in detail with the Power Company in Ha Giang, providing valuable input for the work.

Instead of the workshop during the Preparation Phase it is proposed to hold the Workshop as a two-day Kick-off meeting, which will be the first activity of the Implementation Phase, and serve as a workshop for the work ahead. With all stakeholders present during the first session and a later follow-up meeting between MOI and the Area 2 Team of Consultant's, the identification of strong points and weaknesses of the existing standards should be thoroughly examined.

#### **2.4.1 Realization of a Start-up Workshop**

A start-up workshop for around 25 Vietnamese experts will be arranged. The workshop will be arranged in Hanoi.

The workshop will be a two-day Kick-off meeting for this area work including the following main items:

1. Objectives of this area program
2. Ways to create cost reduction for rural electrification projects
3. Present standard documents to review
4. Identification of weaknesses in the present standards
5. Identification of strong points in the present standard
6. The general structure of a new standard based on conventional supply to rural areas
7. Domestic material available
8. Non-conventional distribution standard
9. Future work to accomplish the goal; a new distribution standard for rural electrification projects, grid-connected or off-grid solutions
10. Documentation of the standards
11. Approval as national standard
12. Application guidelines
13. Identification of required modifications in current training program
14. Detailed timetable for the work
15. Content of training programme

#### **2.4.2 Review of existing standards and practice for rural electrification**

The existing documentation of present standards and practices will be analysed. Additional study tours within Vietnam to inspect already implemented rural electrification will be conducted. Advantages and disadvantages with present practice will be identified

#### **2.4.3 Proposal for revised technical standards**

A proposal for revised technical standards for rural electrification networks aiming at reducing the cost for construction of rural networks will be established. The proposed new technical standards will be presented and discussed at a number of workshops in Hanoi. The standard will be based on the IEC standard. The standard will be suitable as a national standard and will include material and equipment for distribution lines MV and LV, transformer substations, metering and protection in grid-connected as well as off-grid networks.

The new standard proposal will mainly focus on less expensive solutions in material and erection based on grid-connected supply to the rural areas but also solutions suitable for off-grid systems. The off-grid solutions should be possible later to be adapted to grid supply. The standard for rural electrification should include both three-phase and single-phase solutions with all the flexibility to later on extend the supply to three-phase applications as required by future developments in the rural areas.

During the start-up workshop of the Implementation phase a review of existing standards for alternative distribution options will also be carried out.

During the preparation of the draft proposal for a new standard, a number of workshops will be hold in order to find out the best options for the new standard. The idea is to hold one workshop in Hanoi and one in Ho Chi Minh City and one in Da Nang. Participants will be part of the Consultant's team, the PMU's, representatives of MOI, EVN and local Power Companies.

The proposal for technical standards for rural areas will be structured into the following main chapters:

1. General Standards for electrical installations in Vietnam
2. General data for electricity installations in Vietnam, like altitude, temperatures, winds, etc.
3. The various standards for material to comply with, like IEC, BS, DIN, ASTM etc.

- 
4. Special requirements for installations in off-grid networks. For example requirements for small solar plants with only low voltage connection and a small number of consumers on each plant.
  5. General requirements for electrical installations like earthing requirements, distance to houses and roads for distribution lines, clearance to roads, other overhead lines etc
  6. General requirements for material like safety factors to be applied, surface protection, factory tests etc.
  7. MV lines
    - Poles
    - Conductors
    - Insulators
    - Hardware
    - Connectors and clamps
    - Stays
    - Load break switches
    - Auto reclosers
    - Grounding
    - Erection, including requirements for survey work and documentation of lines erected, like profiles, earth resistance measurements, commissioning tests etc.
  8. LV lines
    - Poles
    - Conductors
    - Insulators
    - Hardware
    - Clamps
    - Stays
    - Grounding
    - Erection including requirements for survey work, documentation of network erected, like maps, earth resistance measurements, commissioning tests

#### 9. PMT

- Poles
- Transformers
- Lightning arresters
- Medium voltage fuses
- Low voltage fuses
- Grounding equipment
- Hardware
- Erection including commissioning tests

#### 10. Service connections

- Meters
- Fuses or other short circuit protection
- Service connection wires
- Erection

#### 11. Optic Fibre

- Type of cable
- Accessories
- Erection including commissioning tests

#### **2.4.4 Documentation of new standard**

A complete documentation for the new standard will be prepared. The standard will be documented in printable form so that copies easily can be produced and attached to tender invitations. The standard will also be described in electronic form suitable for work with CAD computer programs. In addition to the technical specifications for the material also standard design drawings for transformer substations, metering installations, poles etc. will be produced and documented.

The drawings will include assembly drawings for the various type of poles, for MV as well as LV and also for PMT:s, Load break switches, Auto reclosers and service connection, in addition to drawings on details and description or reference to catalogue information of minor things like bolts, nuts and washers.

The standard will be prepared in the English as well as in the Vietnamese language.

#### **2.4.5 Formulation of a national Vietnamese Standard**

In order to get the new standards, assistance to MOI will be provided in their consultations with stakeholders such as network owners, local manufacturers and training institutes. This work will start only after MOI

has finally approved the proposal for new standards for rural electrification projects.

#### **2.4.6 Preparation and Performance of a Capacity Building Training Programme including a plan of action for implementation of Sector Technical Standards**

The result of this activity is one of the main outputs of Area 2 and will in practice be carried out successively in several steps during all stages of the Area programme.

For the Capacity Building Training Programme, the following main components/activities are identified to be performed, beside the considerable on-job training component, which will be provided continuously in all phases of the area schedule:

- Review of the existing competence within relevant MoI departments & institutions and as well within regional IAs on rural electrical distribution technical standards and on application of standards in implementation for rural electrification.
- Preparation of general training programme components on rural electrification network standards including network components and functions and their application in rural electrification projects.
- Preparation of training programme components on revision and development of rural electrification network standards.
- Arrangement of a Stakeholder Preparatory Workshop in Hanoi with contribution of the PMU of MoI, concerning prerequisites, conditions, possibilities, advantages, revenue options, technical and institutional alternatives, etc. on rural electrification. The workshop will tentatively be performed in one day within the first year of the project schedule with at least 10 participants. If found appropriate it may be performed in cooperation with other Area Teams, PMUs and extended to a two-day event.
- Preparation of a Plan of Action for Implementation of Sector Technical Standards. The plan will cover implementation of the new technical standards for rural electrical distribution networks, developed under this programme. Hence, the plan will include activities, methods and routines for application of the new standards in the planning, design and implementation of new and upgrading of existing rural electrical distribution networks. Alternative solutions for grid-connected and off-grid networks should be regarded. The plan should further include application of the new standards for both central and regional actors.
- Preparation and performance of workshops for presentation and training in application of the new National standards and the Plan of Action for implementation/application of the standards. The workshops/training should be directed to both the PMB of MoI and to IAs at the two involved regions. It is foreseen to hold one workshop in Hanoi and one in each of the two involved regions. The

workshops will tentatively be two-day events.

- Preparation and performance of a workshop for presentation and training in application of the Guidelines for Existing Network Owners. The workshop is foreseen to be a one-day workshop in Hanoi, with a presentation of the guidelines followed by a case study session, presentation and evaluation.

#### **2.4.7 Preparation of guidelines for existing network owners**

Formulation of proposed guidelines for owners of existing networks for introduction of the new national standard will be prepared. Special consideration will be given to networks where the new standard will mean that special adjustments in technical design must be made, for example voltage conversions or changing from single phase to 3 phase or vice versa.

#### **2.4.8 Identification of required modifications in current training programs**

Possible required modifications in the existing training programs for construction and operational staff for electrical networks will be identified.

### **2.5 Use of resources**

The total amount of resources for this area is:

International experts 111 days in Vietnam and 90 hours at home office

Local experts 504 days

Secretarial and 88 days

interpreting  
services.

Eight international flights Sweden-Vietnam.

The number of international flights has been extended with two trips, see section 4.3 below.

The resources are distributed as follows:

### 2.5.1 Consultants resources during the Implementation phase

#### International experts

1. The **Area leader, Mr Nils Nilsson**  
4 visits to Vietnam.  
Totally 58 working days in Vietnam (increased with 5 days compared to the Contract) and additionally 48 hours at home office.  
The Area leader will be in charge of the proposal for the whole work within Area 2. At the initial workshop, he will propose working tasks for all members of the team. He will further at that meeting propose working methods in detail and time limits for the various tasks. Later on he will check material worked out by other members of the team and correct them, where need be. He will propose layout of documents and drawings for MOI to approve. When the Area leader is not in Vietnam, he will monitor the work in Vietnam with assistance from the Team leader and also the local Area leader. Workshops will be proposed by the Area leader and he will be active in preparation of the new technical standards.
2. The **VSRE Team leader**  
10 working days in Vietnam.  
His main duties will be communication with the Area Leader, the local Area leader and a general control that the work is performed according to Terms of Reference and according to the Project Document. He will also support the team with practical arrangements as example with travelling and arrangement of workshops.
3. One **Expert in capacity building, standards and training, Mr Gunnar Toräng**  
3 visits to Vietnam  
38 working days in Vietnam and additionally 34 hours at home office.  
The main duties of this international expert will be arrangement of all training for this area, starting with the initial workshop, continuing with preparation and performance of a Capacity Building Training Programme including a plan of action for implementation of Sector technical Standards as described in clause 2.4.6 above. This work will also including training of Vietnamese consultants and contractors as well as representatives of local power Companies in the application of the new standard.

4. One **Economist, Mr Niels Juhl Thomsen**  
5 working days and additionally 8 hours at home office. The duties of this expert will be comparison of prices for different material and work methods, which may have an influence in the choice of alternative for the new standard.

#### Local experts

1. The **Area leader, Mr Nguyen Manh Hien**  
170 days with the project.  
The local Area leader will be deputy to the Area leader and work with the same duties as the Area leader and he will be working close to full time with his tasks from July 2005 to May 2006. With his long experience of electrification issues in Vietnam together with EVN, local power companies and other actors, he will be able to confront these actors with ideas to new standards and this way receive feed-back on the work. He will be responsible for all documentation in the Vietnamese language. He will further coordinate the work of the other local experts and check the quality of their work and correct where need might be.
2. The **Standards and technical trainer expert, Mr Tran Vinh Tinh**  
49 days in the project (increased with 28 days compared to the Contract)  
He will participate in the preparation of general technical requirement for electrical installation in Vietnam. He will further participate in training in implementation of the new standards in the first place in Quang Nam province.
3. The **Rural energy standards expert, Mr Cao Chan**  
40 days in the project  
He will participate in the preparation of the general technical requirement for electrical installations in Vietnam and in the preparation of the new standards.  
He will also participate in the introduction of the new standards to Power Companies, Consultants, and Constructors.
4. The **Capacity building expert, Mr Dang Quoc Thong**  
40 days in the project.  
He will work together with Mr Gunnar Toräng with basically the same working tasks. He will also participate in the preparation of the new standards and formulation of training sessions and work-shop in implementing the new standards.
5. The **Standards and Technical trainer expert, Mr Nguyen Boi Khue**  
100 days in the project.  
He will participate in the preparation of the new standards. He will also participate in formulation of the training sessions and work-shops in implementing the new standard

He will participate in load forecasting and maximum demand calculation for new customers and also participate in training work in the workshops

He will participate in the introduction and training of the new standards to Power Companies, Consultants, and Contractors and estimate to what extent the customers of energy will be affected by new technical standards and if that seems to be the case, try to minimize that affect. In this respect also check what the customers as a target group can contribute with in formulation of the new standards.

6. The **Project secretary/Interpreter**

88 days in the project.

She will be responsible for all secretarial services required by the team and she will also be responsible for interpreting and translation of document, done either by her or by hired competence

7. The **Reference Committee**

105 days in the project.

The Project team will report on the progress of the work to the Reference Committee. The idea with the Reference Committee is that the team working with the new standards will get feedback from the Committee on presented views and proposals. The meeting with the Reference Committee is proposed to take place once a month from January 2005 to June 2005 and thereafter every second month up to the end of the Area 2.

**2.5.2 Resources from the client**

During the preparation phase, valuable inputs to the area have been received from discussions with officials from MOI, EVN, provincial authorities and power companies.

It would be desirable to continue a dialogue with the experts participating in the initial workshop.

In addition to the inputs from the above mentioned experts a continuing dialogue with the Reference Committee, other experts within MOI and EVN as well as with experts from provincial authorities and power companies is expected to contribute substantially to the creation of a new standard for rural electrification networks.

### 3 CONDITIONS AND ASSUMPTIONS RELATED TO PROJECT IMPLEMENTATION

Results of the project implementation depend largely on the conditions and factors affecting the process of project implementation. Especially, in Vietnam, a country in the process of economical transition, there are several constraints; the Technical Standards for MV and LV is not adequate and completed, lack of infrastructure, the awareness of people on the implementation of standards and regulations in many sectors is limited. Only with the assessment of all the above-mentioned situations, a feasible, effective project implementation plan could be worked out.

#### 3.1 External/Internal factors affecting the implementation

Today, the Vietnam electricity system at least in part of the country has been designed and constructed, managed and operated on the basis of standards issued in 1984. These standards were compiled on those used by the former Soviet Union. At present, with the scientific, technical and economical progress made, many of its provisions do not appear to be suitable any more.

During a long period, because of limitation of investment capital, the Vietnam rural electricity distribution system has been developed, designed and constructed by various consultants and contracting companies, using different capital sources. The involved building capabilities were quite different resulting in a low and not consistent quality, especially valid for the local low voltage net connecting to the transformer substation.

At the end of 2001, the National electricity grid covered 491 (97.6 %) out of the total 503 districts in the whole country, (the remaining 12 districts, among them 9 island districts, 2 inland districts, and Lai Chau the provincial town, were supplied with electricity generated locally). 7 584 communes (84.9 %) of the total 8 939 communes have been supplied with electricity. 9.91 million rural households have been supplied with electricity, which represent 77.4% of the total number of rural households.

The organizational patterns of rural electricity nets are quite diversified. Implementing the EVN instruction of cancellation the wholesale to rural communities has improved and upgraded the electricity networks in many localities. Therefore, the quality of electricity in these localities has been improved a lot, at the same time the electricity price has become reasonable to the users. However, due to lack of investment capital, the said instruction still has not been implemented in many localities. Now, Vietnam is embarking on the implementation of the road map of shaping and developing an electricity market. It is obvious that quite some time is required to build up a unified, effective rural electricity management model.

During the process of implementation phase I of the project “Vietnam Rural Energy”, MOI has organized and issued the “Technical Regulation for Rural Electricity Networks” (9/2000) to be applied to the project. The regulation has concretized the technical standards specifically applicable to rural electricity networks. However, due to limitation of time during the compilation of the work, some provisions in the regulation still need to be further discussed and clarified, thus facilitating its uniform implementation.

Vietnam is being in the process of regional and global integration in terms of economy, science and technology. At present, there are several standards, which originate from many countries, applied for the whole electricity system in general, and for rural electricity networks in particular. Vietnam could consult these standards in order to compile a new standard of its own, suitable for its natural, economical conditions, which at the same time should create favourable conditions for the process of integration.

### 3.2 Assessment of risks

The compiling and publication of a new standard for rural electricity network requires a serious and cautious implementation, especially in the Vietnam current situation. Because the standards will directly have an impact on the process of implementation of the project “Vietnam Rural Energy” in particular, and the process of development and improvement of the rural electricity network in general. The standards to be published will largely affect the technical requirements, the safety and economic features of the electricity networks. While there today does not exist a complete standard, the impact of the different natural characteristics of various regions, the capable level and responsibility of the implementation of existing standards in some areas are not taken so seriously, and the economic difficulties would be big challenges for the process of project implementation.

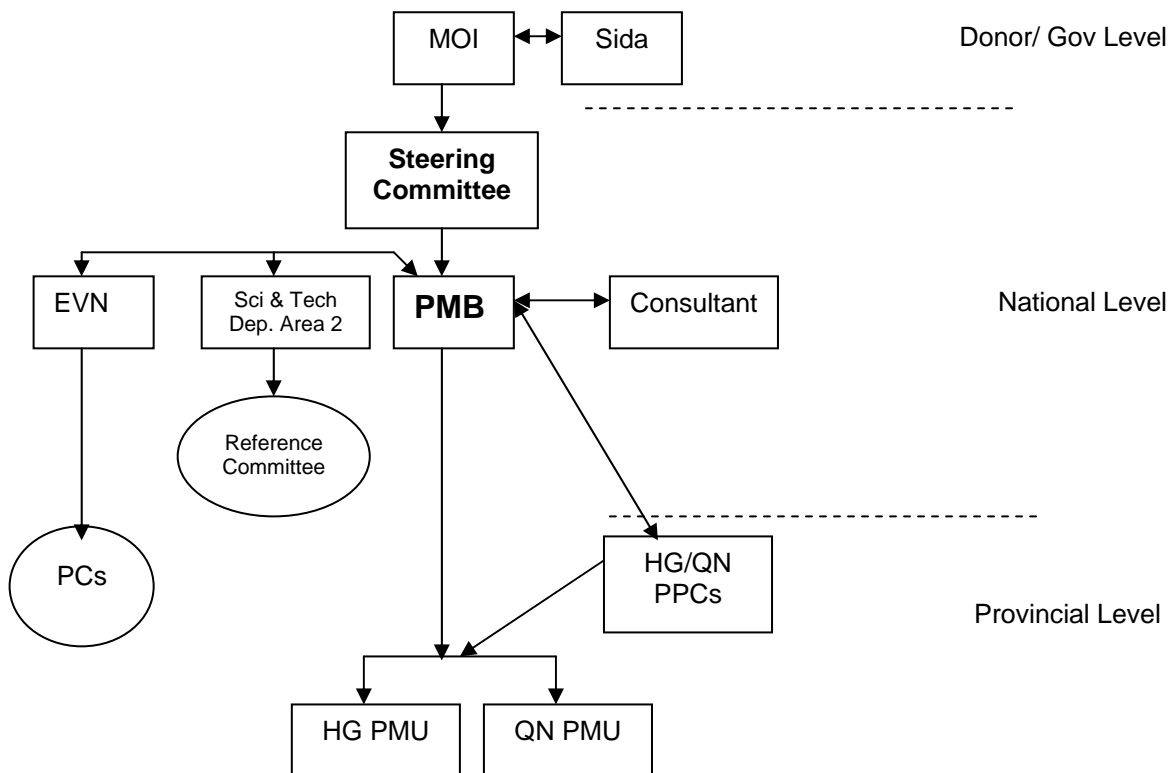
## 4 PROJECT IMPLEMENTATION

The works with a new standard for rural electrification network should be used for the forthcoming project Rural Energy II..

### 4.1 Organisation and implementation of organisation

The detailed organisation of the implementation work will be laid down after the first kick-off meeting in Hanoi, which is the start of the training program. Below is a general outline of the intended organisation of the Area 2.

#### Organization for AREA 2



The international and local experts will work in close cooperation with each other and form working groups of local experts assigned for various tasks of the work.

The Science and Technology Department within MOI has been working on improvement of existing standards and holds an impressive knowledge and experience in standards design. In addition to that experts on rural electrification projects from Power companies will take part in the work and the workshops.

The composition of the Consultant's team with international as well as local experts with very long experience of rural electrification projects in various parts of the world will guarantee sufficient technical competence. Within the team are also experts on capacity building, which will strengthen the team's capacity to communicate the proposed new standards to the stakeholders.

It is therefore expected that the described organisation will be fully capable of fulfilling the goals set out for Area 2 within the time frame given in the time schedules.

## 4.2 Time schedule

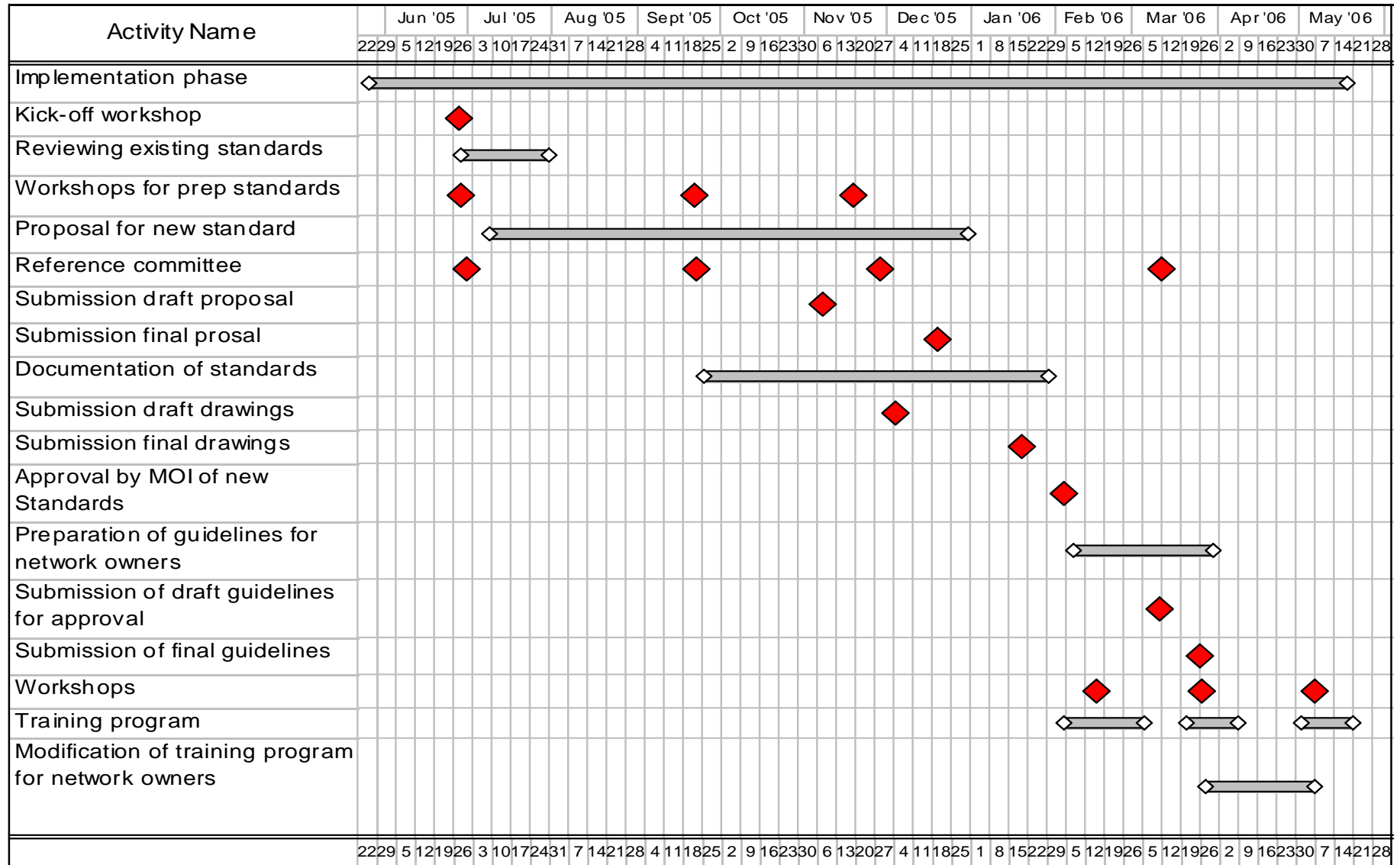
During discussions with the representative from the World Bank responsible for work with Distribution Standards within the Bank, the opinion was raised, that the draft proposal for a new standard should be available in July 2005.

The present time schedule is prepared with the ambition to fulfil these requirements.

Two schedules are shown below, the first one is displaying the time frame for the various activities and the other time schedule is showing the use of the resources.

In preparation of a time schedule for the implementation phase it became obvious that more visits by international experts were required in order to accomplish the goals set out within the limited time frame, within which the area is supposed to be completed. Instead of three visits by the area leader, four visits are proposed and for the capacity building, training and standards expert three visits instead of two visits are proposed. The budget allocated for international flights within area 2 will be kept although the number of trips is increased. By this proposal an international expert will be engaged in the implementation in Vietnam more or less every month at least partly after the option has been approved for implementation.

Time Schedule Activities

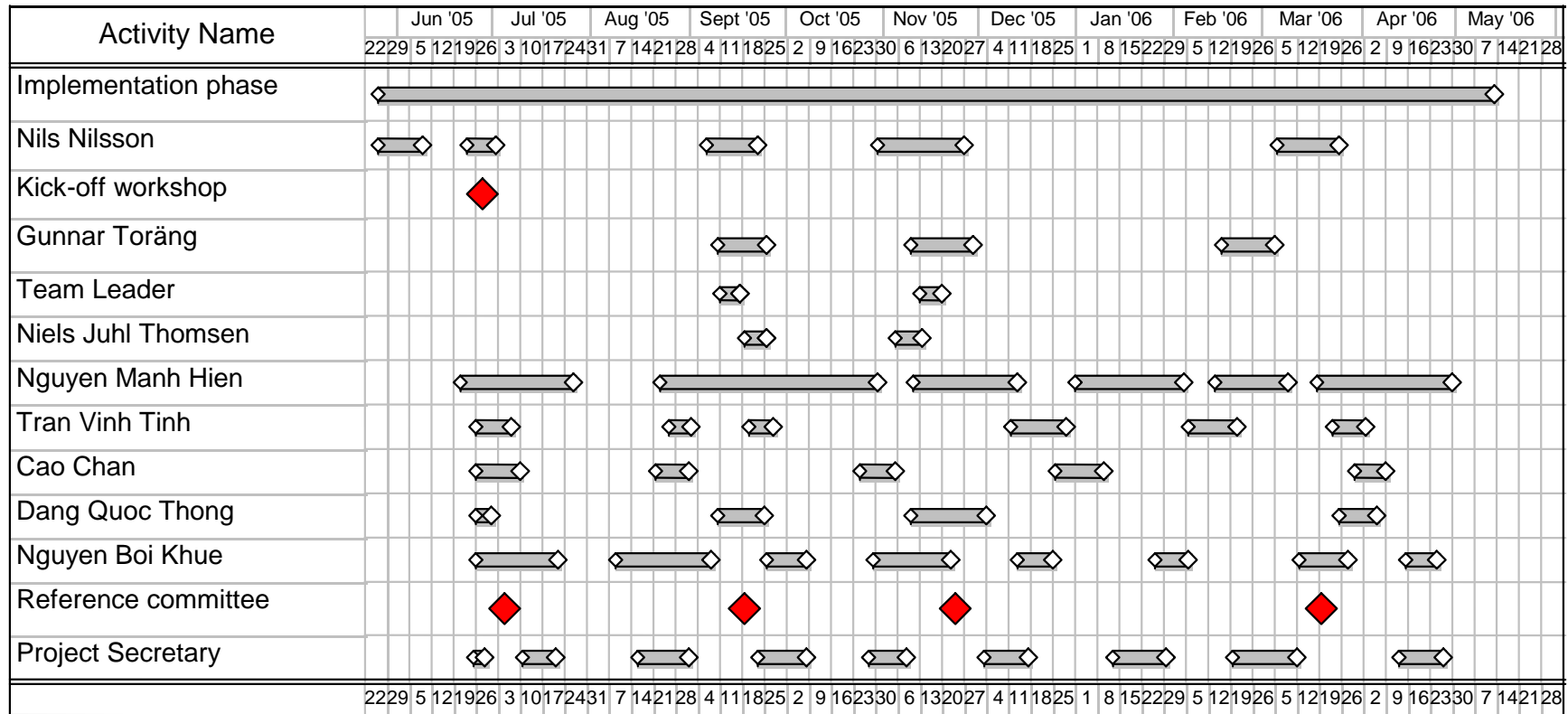


Legend:

Event: Activity:

\* On MOI approval only

Time Scedule  
Resources



### 4.3 Budget and financing

The budget for the implementation phase will be according to the budget in the Contract. As pointed out above in clause 4.3 eight international air travels Sweden/Hanoi and return are foreseen instead of the six flights proposed in the Contract. The total amount allocated for international air services in the Contract for Option 3, Area 2 will however not be exceeded. At this stage it is not foreseen that any contingencies will be required for the implementation of this area.

All cost for the Consultant will be financed from Sida according to the Contract. MOI and the Provincial Authorities will cover the costs for all fees for their participation by themselves.

### 4.4 Specific issues related to the project

Vietnam is a poor country being in the process of economic transition. Over the recent past years, its economic growth rate has been rather high and stable. That is why the electricity growth rate has been quite high too (in average, 15%/year, during the period of 1996-2001). However, due to the limitation of investment capital, and partly lack of concerns on the development planning work, the Vietnam electricity system still has many disadvantages. It has not fitted into an integrated structure, the electricity quality is low, and electricity losses are high. The equipment in use have diversified origin, are of low quality, resulting in low reliability of the electricity supply.

The rural electricity networks have been constructed during various periods, by various capital sources, and its quality is generally low. Vietnam is trying to attain the target of 90% rural households to be supplied with electricity by 2010 and 100% to be supplied with electricity by 2020. However, due to the low income of the rural people, their electricity demand is not high; electricity mostly serves the lighting requirements.

The Vietnam electricity system has been built based on the standards issued in 1984. Therefore, many of its provisions have become obsolete. Besides, due to the constraint of knowledgeable management, technical standards have not been seriously implemented during the whole process of design, construction, operation and maintenance of the electricity distribution network.

At present, Vietnam does not have an officially promulgated technical standard for rural electricity networks. This situation has caused a lot of difficulties to the design work, the erection and operation of the electricity network, thus resulting in electricity network with a bad economic and technical performance, as well as a low safety level.

The requirement of compilation and publication of a complete new standard for rural electrification in Vietnam has become urgent.

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Therefore, the process of project implementation would attract serious concerns from MOI, EVN and other related authorities.

## 5 ECONOMICALLY SOUND AND SUSTAINABLE DEVELOPMENT

### 5.1 Policy and legislation to support implementation

To facilitate the effective implement of the project, it is necessary to have the support and assurance of the Government and MOI in terms of legal documents and policy. An advantage is that the electricity law is being under consideration for approval by the Vietnam National Assembly.

The Government, MOI, EVN and local leaders should have ready policies, supporting consultants, contractors and management of local power companies in there strive to adopt the new standards in the implementation of new rural electrification projects.

### 5.2 Choice of technology in relation to prevailing conditions

The project implementation consists of the following steps:

1. Setting and approving the objectives, plans, content, time schedule for implementation, and method for evaluation of results of the implementation,
2. Collection of documents, information relating to the project,
3. Survey, collection of expert opinions on the existing standards,
4. Compiling technical standards for rural electricity networks,
5. Organization of workshops soliciting contributions from related authorities and experts,
6. Revision after inputs from the workshops and publication of a final version
7. Submitting this final version to MOI for approval and thereafter distribute a temporary version.
8. Training, organization of training courses,

The following tasks will not be part of Area 2 but will be conducted under Area 4

9. Pilot area application in the selected areas (Ha Giang, Quang Nam),
10. Organization of evaluation and opinion collection,

### 5.3 Management and institutional capacity building

The rural electricity networks are rather scattered, diversified in terms of feeding sources, voltages and loads; topographic conditions are rather complicated. The knowledge on management level is still limited. That is why, in order to enhance the effectiveness of the project implementation, it is necessary to pay heed to the management and institutional capacity building and strengthening; to improve and issue required legal documents, related to the planning and developing of rural electricity

networks; to organize training courses and disseminate the required knowledge, related to technical standards for the rural electricity network.

#### **5.4 Environmental considerations**

The environmental considerations and impact assessments have great influence on the selected technical standards as well as on the development plans of rural power sources and electrical networks, especially on the selection and construction of renewable energy sources. Moreover, only with the adequate and serious concerns about the mutual impact with the environment, the project could achieve sustainability and effectiveness.

#### **5.5 Socio-cultural aspects & gender equality**

The parts of Vietnam, which have no access to power are the immense rural areas that still are very little developed, where many minority groups are living, with various habits and different living patterns. The process of rural electrification should also pay attention to the socio-economic cultural features of each region in order to assure that the rural electrification program can be a real driving force for the economic, cultural and social development and for the gender equality in these regions.

#### **5.6 Financial and economic sustainability**

Investment capital for the rural electrification is a serious problem for many countries, especially for developing ones, and Vietnam is not an exception. If all electrification projects should be financed through the government budget, one cannot expect a desirable development. Due to a limited budget, the government has many sectors in need of important and urgent investments. The socialization of the investment capital for the rural electrification, under the administration and supervision by the competent authorities, would be a good solution. In order to optimize the input of investments it is important that a technical standard is developed with that in mind.

Organization of rural electrification projects in a technical optimal manner, with supporting financing from foreign sources (grants or soft loans) will substantially contribute to a sustainable development, avoiding unwanted environmental disturbances by local generation facilities using e. g. diesel.

## 6 FOLLOW-UP AND EVALUATION

The objectives of the Vietnam-Sweden Rural Energy Project are to establish a sound, sustainable and effective rural energy development model including the capability of planning, designing and construction of rural energy development projects; institution for rational, effective and environmental friendly development, management, operation and effective use of the rural energy distributed.

The evaluation of results to be attained during the process of project implementation in two pilot projects Ha Giang and Quang Nam, would give practical experiences, for further implementation in the country. It is required to duplicate the models and bring about their effectiveness in order to improve the effectiveness of the rural electrification program. Therefore the project follow-up would have a great significance, assuring the project would not fall into oblivion.

### 6.1 Time schedule for follow-up

Area 2, (Technical standards for Rural Electrification/Electricity Networks), with its specific features, should be early implemented in order to furnish a draft proposal by July 2005 in order to be utilised for the project Energy 2.

After completion of the Technical Standards, it is desirable to monitor the practical implementation of the new standards in the pilot areas as well as in other areas identifying shortcomings needed to be over-come and adjusted in order to fit the practical situation of the Vietnam rural areas:

- Organization of surveys in the areas where the pilot project models are implemented,
- Organization of workshops soliciting opinions from concerned authorities and experts.

### 6.2 Indicators for follow-up

The project objective requirements to be attained are to compile a technical standard for the rural electrification, matching with the natural, economic, social and cultural conditions of Vietnam, at the same time it should respect International and regional conventions, thus facilitating the process of integration.

### 6.3 Division of roles and responsibilities for follow-up

MOI issues regulations and policies facilitating the implementation of the issued standards.

Consultants, EVN and Ha Giang, Quang Nam Power companies have responsibilities on carrying out surveys and revision of the process of implementation of the technical standards.

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MOI and EVN facilitate the duplication of the Technical Standards to be applied through out the country.

#### 6.4 Indicators for fulfilment of objectives

The technical standards for rural electrification should be clear, easy to understand, and implement, covering all aspects relating to planning, design, management, operation and using electric power in rural areas. The electricity networks, which have been constructed, based on these standards should assure the safety for human and equipment, should have a reasonable reliability and an economic advantage, should be environmentally friendly and should match with socio-cultural features of Vietnam and respect international conventions.

Moreover, the technical standards should be accepted and committed for implementation by MOI, EVN, power companies, concerned authorities and electricity users.

#### 6.5 Time schedule for evaluation

The evaluation of attained objectives could be divided into 3 phases, during the project:

1. Completion of the draft standard document by July 2005,
2. Revision of draft standards, completed late 2005,
3. Publication of the official standard documents. Division of roles and responsibilities for evaluation

The evaluation of attained objectives during each phase is under the competence of DoI, consultants, and experts. But, the decisive and final evaluation should be put under the responsibility of the Appraisal Council set up by MOI.

## 6.6 LFA-matrix

### Logical Framework: Technical standards for Rural Electrification/Electricity Networks

	Intervention Logic	Objective verifiable and measurable indicators	Sources of verification
Overall Objectives	Government institutions responsible for rural electrification and renewable energy have strengthened capacity to implement policies related to increasing safe and appropriate rural electricity access.	Proposed standards to be applied in rural electrification schemes	Official standard
Project purpose	A proposal for appropriate sector technical standards and enforcement mechanisms for safe and reliable electricity service delivery is developed	Proposal for technical standard is available Proposal for enforcement mechanisms is available	Assessment of proposed technical standards and enforcement mechanisms
Outputs	Government has increased capacity to apply tools and methods in developing sector technical standards  A proposal for sector technical standards to be applicable in different kinds of rural electrification networks is available  A proposal for appropriate enforcement and incentive mechanisms for application of sector technical standards for rural electrification is available  MOI has increased understanding on stakeholders' views of sector technical standards and about the proposed sector technical standards.	Application of tools and methods in technical standard development process  Proposed sector technical standards  Proposed enforcement mechanism  Increased dialogue and understanding of the situation among stakeholders	Assessment of institutional and human capacity to apply tools and methods  Assessment of proposed technical standards  Assessment of proposed enforcement mechanisms  Interviews

<p>Activities</p>	<ol style="list-style-type: none"> <li>1. Start-up Workshop/Kick –of meeting</li> <li>2. Review of existing standards and practices             <ul style="list-style-type: none"> <li>• Analysis of standards and practices.</li> <li>• Inspecting implemented rural electrification</li> <li>• Advantages and disadvantages of present practice</li> </ul> </li> <li>3. Preparation of a proposal for revised technical standards             <ul style="list-style-type: none"> <li>• General Standards</li> <li>• General data.</li> <li>• The standards for material to comply with.</li> <li>• Special requirements</li> <li>• General requirements for electrical installations</li> <li>• General requirements</li> <li>• General requirements for</li> <li>• MV lines</li> <li>• LV lines</li> <li>• PMT</li> <li>• Service connections</li> <li>• Optic Fibre</li> </ul> </li> <li>4. Documentation of new standards             <ul style="list-style-type: none"> <li>• Review of the existing competence</li> <li>• Preparation of general training programme</li> <li>• Preparation of training programme components</li> <li>• Arrangement of a Stakeholder Preparatory Workshop</li> <li>• Preparation of a Plan of Action for Implementation</li> <li>• Preparation and performance of workshops</li> <li>• Presentation and training in application</li> <li>• Training in application for Existing Network</li> </ul> </li> <li>5. Formulation of a national Vietnamese standard</li> <li>6. Capacity Building Training Programme including a plan of action for implementation of Sector Technical Standards             <ul style="list-style-type: none"> <li>• Review of the existing competence</li> <li>• Preparation of general training programme</li> <li>• Preparation of training programme components</li> <li>• Arrangement of a Stakeholder Preparatory Workshop</li> <li>• Plan of Action for Implementation</li> <li>• Workshops for presentation</li> <li>• application of the new National standards</li> <li>• Guidelines for Existing Network Owners</li> </ul> </li> <li>7. Preparation of guidelines for existing network owners</li> <li>8. Identifications of required modifications in current training programmes</li> </ol>		<p>Progress reports            Reports            Minutes of meeting            Timesheets            Plan of operations            List of participants            Questioners</p>
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