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## **Emerging Lessons in Private Provision of Rural Infrastructure Services**

### **Final Report - Guatemala**

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**Submitted to PPIAF and the World Bank  
by:**

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## Abbreviations

AMM	Administrator of the Wholesale Market
CODERURAL	Rural electrification coordinator, an administrative unit under the General Energy Administration of MEM
CNEE	Comision Nacional de Energia Electrica (National Commission of Electric Energy)
CT	Technical Committee
DEOCSA	Distribuidora Eléctrica de Occidente, S.A. (distribution company, to the west of Guatemala)
DEORSA	Distribuidora Eléctrica de Oriente, S.A (distribution company to the east of Guatemala)
DISCO's	Distribution Companies.
EEGSA	The Metropolitan distribution company, which was privatised in 1998
FONAPAZ	National Peace Fund
GERO	Gerencia de Electrificación Rural y Obras (INDE's Rural Electrification Office)
HT	High tension
ID	Independent Supervisors
INDE	Instituto Nacional de Electrificación (National Institute for Electrification)
LGE	Ley General de Electricidad (General Electricity Law), 1996
LT	Low tension
MEM	Ministry of Energy and Mines
MIGA	Multilateral Investment Guarantee Agency (World Bank)
MT	Medium tension
NRECA	National Rural Electric Cooperatives Association (US)
NTDOID	Technical standards for distribution networks
PER	Plan de Electrificación Rural (rural electrification plan)
POA	Annual Operative Plan of FONAPAZ
SBP	Strategic Business Plan (as part of PER)
Ufacex	Unión Fenosa Desarrollo y Acción Exterior, S.A. (Spanish electricity utility)
UGP	Unit of Administration Program
VAD	Distribution Value Added

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# 1 Introduction

## 1.1 The Study

This Report has been prepared as part of the project on *Emerging Lessons in Private Provision of Rural Infrastructure Services* funded by the **Public-Private Infrastructure Advisory Facility** and administered by the *World Bank*. It focuses on Case Study I (Guatemala - Electricity) and in particular on schemes to supply electricity to rural areas served by two privately owned electricity distribution utilities DEOCSA and DEORSA and the “Plan de Electrificación Rural” (PER) in Guatemala.

The purpose<sup>1</sup> of the Case Study is to examine:

- ❑ the incentives facing private infrastructure service providers, including commercial, legal, and regulatory environment in which the business is conducted,
- ❑ the underlying costs and profit drivers of the business, and
- ❑ the value-added generated by the service provider.

The Report has been prepared following desk research, a field trip and analysis.

## 1.2 Key Features of the Scheme in Guatemala

The key characteristics of the current Guatemalan rural electrification scheme are as follows:

- ❑ Electricity distribution to rural areas outside Guatemala City has been awarded under two non-exclusive concession contracts to a private company (Union Fenosa).
- ❑ The two rural distribution companies owned by Union Fenosa - Distribuidora Eléctrica de Occidente, S.A. (DEOCSA) to the west (Occidental) and Distribuidora Eléctrica de Oriente, S.A (DEORSA) to the east (Oriental). These two companies, together with EEGSA that serves Guatemala City, serve approximately 90% of Guatemala’s 1.4 million electricity consumers.
- ❑ DEOCSA/DEORSA were contracted to connect an additional 280,000 rural households over a five year period between May 1999 and 2004 for a fixed price of US\$650/customer that is paid as a grant from the US\$333 million expected to be available from PER.

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<sup>1</sup> From the Terms of Reference to the Study.

- ❑ The 280,000 extra consumers under PER lie beyond 200 metres of the existing electricity network. Within the 200 metre zone, DEOCSA/DEORSA have an obligation to connect new consumers on request but may demand a connection fee<sup>2</sup> and recover costs through tariffs.
- ❑ The PER scheme was a major feature of the privatisation package for the two rural distribution companies.
- ❑ The bidding for the concessions and the concession contracts were designed to give performance based incentives to the winners to achieve the targeted connections and extension of electrification.
- ❑ There are two uniform tariffs, one each for DEOCSA and DEORSA so that there is no difference in prices charged to rural consumers or to semi-urban consumers. The US\$650 grant per connection is not included in the regulatory asset base and does not earn a rate of return.
- ❑ 105,000 connections had been made at the end of January 2002 from a scheduled total of 280,000. The distribution companies had met their targets in 1999 and 2000 but did fall behind in 2001 such that 85% of the planned connections had been made by the end of that year. Transmission investments are further behind schedule largely as the result of problems obtaining and negotiating way-leaves. US\$100 million of the funds have been disbursed at the end of 2001 from the total of US\$333 million.

### 1.3 Layout of the Report

The Report follows the structure suggested in the Terms of Reference, namely:

- ❑ Introduction (including statement of why the particular case study is of interest)
- ❑ Case Study Overview -- Overall Business and Sector Context
- ❑ Description of Service Provider's Business and of the Market
- ❑ Legal and Regulatory Review
- ❑ Role of the Public Sector (esp. consideration of subsidy or investment role)
- ❑ Performance Assessment
- ❑ Economic and Financial Analysis (including cost and profit drivers), and Operational and Managerial Assessment

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<sup>2</sup> See Section 4.6 below.

- ❑ Public policy implications
- ❑ Informational and statistical Annexes

We excluded one section listed in the Terms of Reference called *Status report and prospects for growth* as this is already covered under *Performance Assessment*. The main issues raised by the case study are described in Section 8 (*Public Policy Implications*).

## **2 Overview of the Business and Sector Context**

### **2.1 Introduction**

This section provides background information on Guatemala and rural electrification in the country.

### **2.2 Background to the country**

Guatemala has a population of 11.4 million and a land area of 109,000 km<sup>2</sup>. The most densely populated area is the metropolitan area around Guatemala City but outside Guatemala City the population is relatively well dispersed around the country.

Those living in rural areas represent 60% of the total population. Agriculture represents 23% of the US\$ 18 billion GDP of Guatemala. Per capita income is US\$ 1,600 but wealth tends to be unevenly distributed and is concentrated in a small, wealthy percentage of the population. The growth rate of GDP has been low over the past two years.

### **2.3 The electricity sector**

#### **2.3.1 General electricity market**

In 2001, electricity generated in Guatemala was 5,825 GWh and energy sold to the distributors was 5,293 GWh. The system-wide peak demand was 1,074 MW. The source of energy generated was 43% from hydropower plants and 57% from thermal plants.

#### **2.3.2 Institutional and legal framework**

Guatemala has introduced a number of major reforms in the electricity sector since 1996; these are summarized below:

- ❑ The General Law of Electricity (see Annex 0) was approved in November 13, 1996. This law enforced the separation of generation, transmission and distribution. It also created the wholesale electric market. The regulatory body - National Commission of Electric Energy (CNEE) - and the Administrator of the Wholesale Market (AMM) were created under this law.
- ❑ In accordance with the General Law of Electricity, the government approved a regulatory decree concerning rural electricity distribution in May 2, 1997 (see Annex A2) which specified the obligations of DEOCSA

- and DEORSA in relation to connections, standards of performance and the PER scheme.
- ❑ EEGSA (the Metropolitan distribution company) was privatised in 1998.
- ❑ Instituto Nacional de Electrificación (“INDE”) was the vertically integrated electricity utility that pre-dated the General Law of Electricity and remained the owner of the assets held by DEOCSA and DEORSA under concession agreements. It retains responsibility for transmission and currently owns generation assets. INDE signed the contract for privatisation of the two rural electricity distribution companies with Union Fenosa in September 1998. 80% of the shares in both companies were sold while the remaining 20% is held by INDE. Subsequently, in the year 2000, a further 5% of the shares were privatised.
- ❑ The PER scheme was specified as part of the privatisation agreement with Union Fenosa.
- ❑ INDE, DEOCSA and DEORSA, and the Banco Agrícola Mercantil de Guatemala signed a contract for the creation of the “Fideicomiso” Trust Fund in May 1999. The objective of this is to provide finance for the rural electrification under the PER programme.

## 2.4 Rural electrification context

Development of electric infrastructure oriented towards supply to the non-electrified areas, is one of the priority areas of the government of the Guatemala and of the municipalities. Reforms in the electricity sector have gone hand-in-hand with continued implementation of the government’s electrification policy and the country has been successful in increasing access to electricity to low-income households, most of them living in small rural communities, distributed across the whole country.

After the Peace Accords were signed in 1996 and became effective, the financial resources allocated to rural electrification tripled in Guatemala. In addition, the source of financing changed. Until 1996, about two thirds of the investment in rural electrification came from the state-owned operator INDE. This contribution was reduced dramatically but it has been more than offset by an almost 400% increase in investments from social funds. Between 1996 and 1999 social funds represented an important source of financing for rural electrification investments and development of other infrastructure services. In 1999, PER was launched together with a special fund - the Fideicomiso. Since then, PER has been the main programme for the development of rural electrification in Guatemala and other social funds only participate occasionally in rural electrification projects, such as one on-going scheme located on the Guatemala-Mexico border.

Electrification in Guatemala, as indicated by the electrification index<sup>3</sup>, is shown in Table 1.

Table 1 Electrification index						
1995	1996	1997	1998	1999	2000	2001
52%	53%	56%	60%	64%	70%	78%

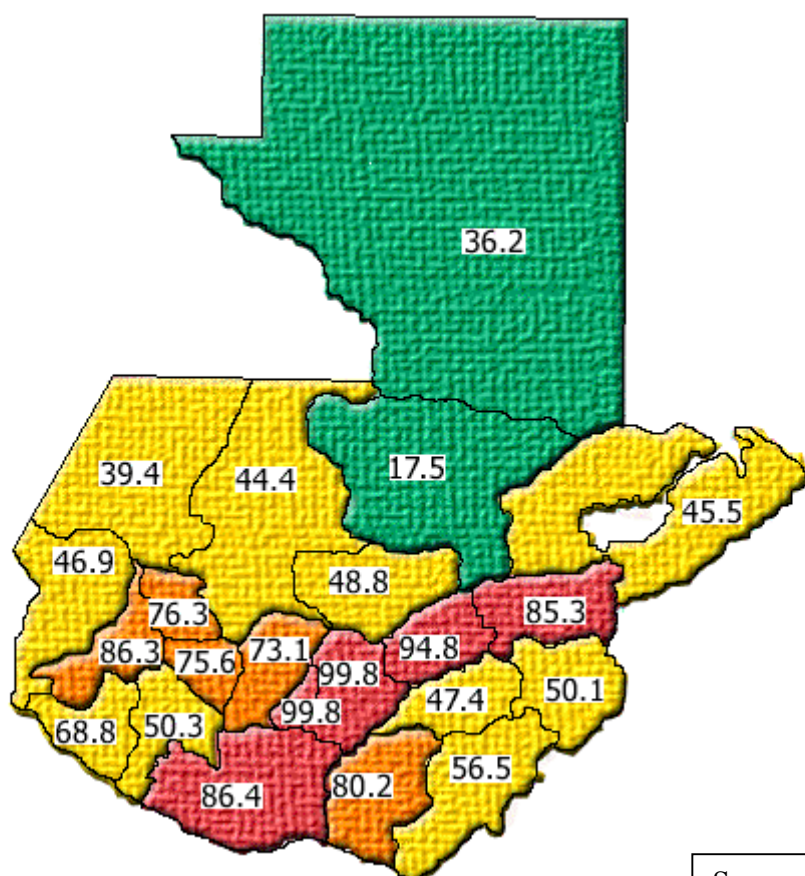
Figure 1 shows the percentage of households with electricity in different parts of the country. In the metropolitan area served by EEGSA this percentage is high, ranging from 85% to nearly 100%. In other areas, particularly the Peten region to the north, it is very low.

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<sup>3</sup> Share of households with electricity.

Figure 1 Electrification % in Guatemala's regions

Households Electrified (%) Year 2000



Source MEM

Outside of Guatemala City and the area served by EEGSA, approximately 20GWh, or 2% of electricity, is sold to consumers in off-grid electricity networks.



### 3 Service Provider's Business and Structure of the Market

#### 3.1 Introduction

This Section describes the business activities of the two rural electricity distribution companies - DEOCSA and DEORSA - and the PER scheme. Further descriptions of public bodies involved in the rural electricity sector are provided in Section 5.

#### 3.2 The PER scheme

PER was structured as an integral component of the privatisation of the electricity distribution assets of INDE, which were split into two distribution companies DEOCSA and DEORSA. In September 1998, 80% of the shares of the DISCOs were sold to Unión Fenosa Desarrollo y Acción Exterior, S.A. ("Ufacex", Spain). Table 2 provides some basic data on DEORSA and DEOCSA prior to privatisation.

**Table 2 Basic data on DEORSA and DEOCSA**

Com- pany	No. of customers (1997)	No. of communities serviced (1997)	Revenues (1996) US\$000	Revenues (1997) US\$000	Percentage change	Consump- tion (1997) GWh
DEORSA	228,000	1,029	19,841	24,487	23.4%	325.7
DEOCSA	407,000	1,740	21,149	26,407	24.9%	354.6
TOTAL	635,000	2,769	40,990	50,894	24.2%	680.3

As part of the privatisation process, the winning bidder was required to assume the ongoing distribution operations and to undertake the investments detailed under the PER (see Annex A4) and those investments to be undertaken by the sponsor under its Strategic Business Plan ("SBP" or the "Plan"), the latter complementing the investments programmed under the PER.

PER is intended to modernize the electricity sector in Guatemala and expand coverage to a large number of rural communities. It was conceived by the Government of Guatemala through INDE and designed to be undertaken by private investors. PER aims at expanding services to 75% of rural areas and incorporating over 280,000 new customers in 2,633 communities by the year 2004 and costing US\$333 million. The successful completion of PER will make electricity available to 90% of the country's population from 78% at present and from 63% when PER

started. It is estimated that there will be another 3,000 communities remaining un-electrified when the initial PER programme is completed in 2004.

The number of communities scheduled to be connected in the electrification plan are shown in Table 3.

**Table 3 Communities scheduled to be connected - by zone**

Zone	Number of communities
Altiplano Occidental	522
Costa Sur Occidental	242
Quiche	708
Petén	156
Bajo Norte	221
Franja Transversal del Norte	168
Zona Atlántica	109
Zona Oriental	513

DEOCSA/DEORSA were contracted to connect an additional 280,000 rural households over a five year period between 1999 and 2004 for a fixed price of US\$650/customer that is paid as a grant from the US\$333 million expected to be available from PER. Additionally, DEOCSA/DEORSA were required to undertake specified investments in transmission for a fixed price agreed at the time of privatisation.

PER funds are used to finance distribution connections and transmission investments undertaken by DEOCSA/DEORSA. The funds cannot, however, be used to finance investments other than by DEOCSA/DEORSA.

DEOCSA and DEORSA have exclusivity within a zone of 200 metres from the existing network. Beyond the 200 metre zone anyone has the right to build networks to supply consumers but DEOCSA and DEORSA have an obligation to supply all consumers (see Annex A6 for a definition of a house) within the 200 metre zone. They also have an obligation to connect and supply any consumer or other network on request that are constructed up to the border of the 200 metre zone.

DEOCSA and DEORSA buy electricity from INDE<sup>4</sup> under contracts signed in 1999 and valid until 2003. The distribution companies sell the electricity to their consumers and have no power generation of their own.

<sup>4</sup> They do not have direct contracts with generators or MEM and do not distinguish the source of generation. INDE sells at a 'blended' price and DEOCSA/DEORSA pass this cost on in full to their customers. Approximately 80% of electricity produced by INDE is from hydropower.

Union Fenosa has a concession to manage and operate the existing distribution assets for a period of 50 years. The assets are returned to INDE in good condition at the end of that period. New assets constructed under the PER programme or by DEOCSA/DEORSA as part of its electrification programme are treated in a similar way. However, INDE, communities and other organisations may also construct distribution networks and hand them over to DEOCSA/DEORSA for operation. It is unclear whether DEOCSA/DEORSA has obligations to maintain these assets in good repair and to reinforce them when necessary or whether this is the responsibility of the original developer. This is a potential problem with the scheme and may need clarification in the near future.

Ownership, management and operation of the transmission network is the responsibility of INDE's subsidiary Transmission Company. The law and regulations do not define the voltage level that distinguishes a transmission asset from a distribution asset. The Ministry's (MEM) Reference Plan states that 69kV lines and substations are always transmission assets. 11kV assets may be treated as either transmission assets or distribution assets.

Transmission projects that are undertaken by DEOCSA/DEORSA are handed over to INDE once completed, and INDE subsequently operates and maintains these assets. The distribution companies are paid a fixed price from PER funds for constructing each of the transmission lines and substations; the individual projects are listed in the Rural Electrification Plan (Annex A4) that forms part of the agreement between INDE and Union Fenosa. The price that the companies receive for each project is similarly stated in the Plan.

### 3.3 Funding sources

Table 4 contains a summary of distribution investments scheduled in the PER. Table 5 summarises the investments planned for transmission.

**Table 4 Rural Electrification Plan - Distribution**

Region	New customers	People benefitting	Communities	Investment cost (US\$ mn)
East distribution	123,315	690,564	1,161	75.55
West distribution	157,324	881,014	1,472	107.04
Total	280,639	1,571,578	2,633	182.59

**Table 5 Rural Electrification Plan - Transmission**

Type of investment	Size	Cost (US\$ million)
<i>East</i>		
16 substations	507MVA	39.0
Transmission lines	780kms	66.0
<i>West</i>		
12 substations	168MVA	18.0
Transmission lines	500kms	28.41
Total		151.41

The funds for the PER are provided as follows: a) Ufacex provides part of the financing through the re-investment of the revenues from the sale of the shares of the DISCOs (US\$101 million), and (b) the Government of Guatemala finances the balance (US\$229 million). The sources of funds are shown in more detail in Table 6.

**Table 6 Source of funds for PER**

Source	Amount (US\$ million)
Sale of 80% of the shares of the Discos (in May 1999)	101.0
Treasury bond (January 2000)	51.0
Sale of 5% of the shares of the Discos (November 2000)	6.3
Interest on the fund	10.9
Total	169.2

Further contributions to the funds are expected as shown in Table 7.

Table 7 Future sources of funds for PER

Source	Expected amount (US\$ million)
Loan from BCIE (under negotiation)	52.0
Loan from IDB (under negotiation)	90.0
Future interest on the fund	7.0
Sales to employees	2.8
Sale of remainder of the shares	12.0
Total	163.8

The Multilateral Investment Guarantee Agency (MIGA) gave a guarantee to Union Fenosa covering its US\$37 million equity investment and US\$71 million shareholder loan to DEOCSA and DEORSA. The guarantee was for 90% of these amounts, lasted for a period of 15 years and covered risks of transfer restriction, expropriation, war and civil disturbance, breach of contract.

### 3.4 Implementation arrangements for the PER scheme

A fiduciary fund<sup>5</sup> - "*Fideicomiso*" *Trust Fund* - was created for the transparent administration of the financial resources required to develop the PER and other mechanisms were introduced for the supervision of execution and certification of works.

The Fideicomiso trust fund is supervised by a *Technical Committee* and administered by Banco Agrícola Mercantil de Guatemala.

The implementation process is described in the Trust Fund Contract (Annex A3) signed by INDE, DEOCSA and DEORSA, and the Banco Agrícola Mercantil de Guatemala.

The communities to be electrified are detailed in the plan (see Annex A4) but changes are often necessary and these changes need to be authorised by the *Technical Committee (CT)*. The CT comprises technical people who represent:

- ☐ The Direction Committee of INDE
- ☐ The Ministry (MEM)
- ☐ DEOCSA/DEORSA.

<sup>5</sup> Escrow account.

CT may also decide on penalties to apply to DEOCSA/DEORSA if the plan is behind schedule<sup>6</sup>. The role of the CT is described in the Fideicomiso contract (Annex A3) and also in the progress report on PER in Annex A6.

**GERO (INDE's Rural Electrification Office)** and the DISCOS meet regularly on a weekly basis to discuss progress and to coordinate activities. Changes to the list of communities are also agreed. These changes can be proposed either by MEM, INDE or DEOCSA/DEORSA. All the proposed communities must apply to CODERURAL (MEM) for a socio-economic evaluation in order to qualify for inclusion in PER. Communities nominated by INDE and MEM have normally been positively evaluated by CODERURAL. It is not clear whether communities proposed by the DISCOS have necessarily undergone a socio-economic evaluation.

Annex A5 contains an example evaluation report undertaken by CODERURAL as part of the socio-economic evaluation. It consists of a summary of economic activities, a check that the community is not electrified and that a network extension is not already under construction. This is not a socio-economic evaluation in the normal sense of the term; in general communities are approved on the basis that they lack electricity supply and are more than 200 metres from an existing network.

Every two months, the *Independent Supervisors* (IDs) contracted by CT visit and certify the construction works and connections, based on information supplied by DISCOS. Annex A9 proves an example of the documentation that DISCOS send and the certification performed by ID. This certification is sent to GERO, which can perform either office checks or further field checks. The certification is then submitted to CT and CT approves the certification and approves payment by the Trust Funds bank to the DISCOS.

### 3.5 Implementation of PER by DEOCSA/DEORSA

The two companies employ 18 contractors allocated to different zones to work on rural electrification projects; four of these are Spanish. The contractors have one-year contracts of approximately US\$1 million each. The DISCOS provide the materials and the construction companies provide labour, machinery and logistics (and some materials). The DISCO's regional engineers supervise the works.

### 3.6 Consumer numbers of DEOCSA, DEORSA

Figure 2 shows the territory allocated to DEOCSA, DEORSA and EEGSA under concession arrangements.

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<sup>6</sup> Though it is disputed whether penalties may be applied for delays in the connection of the 280,000 consumers.

Figure 2 Concession territories of DEOCSA, DEORSA &amp; EEGSA

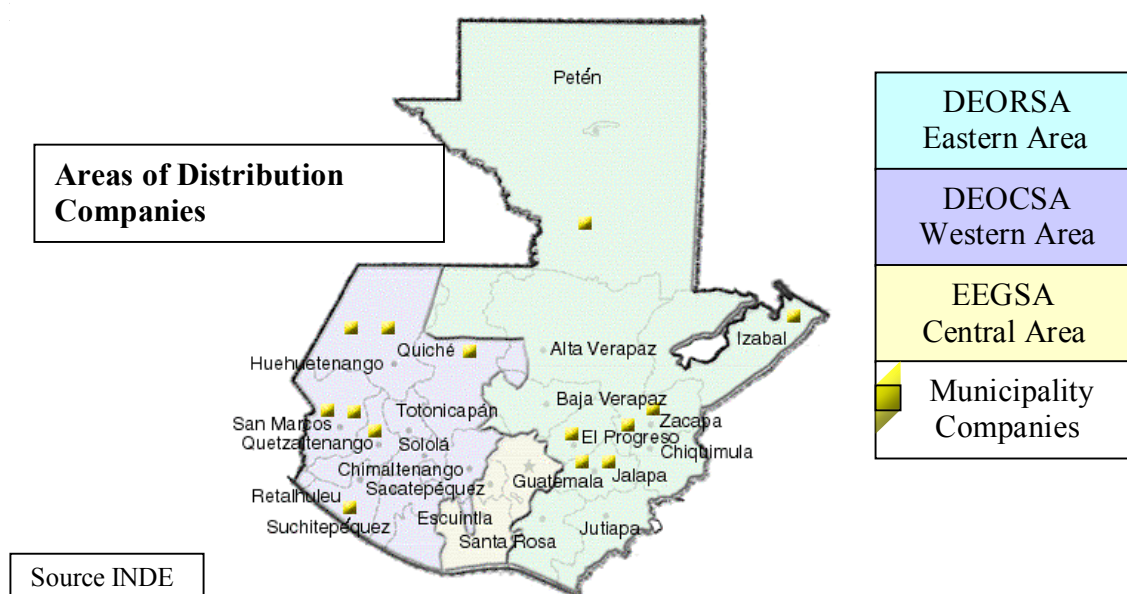
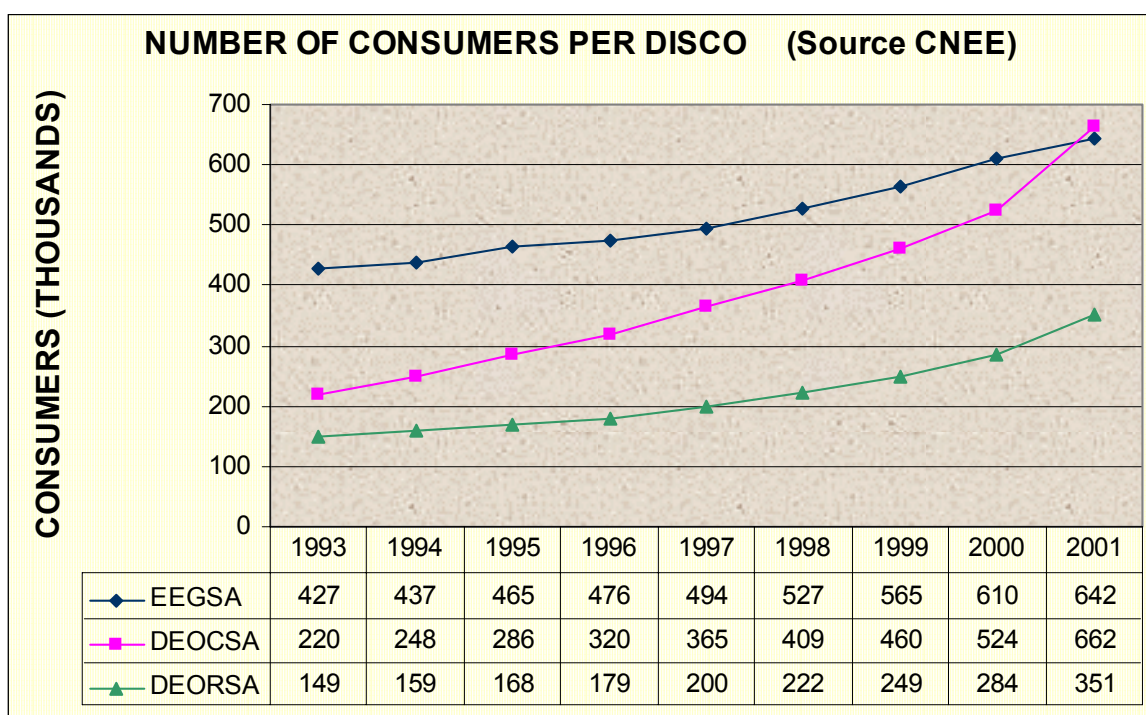


Figure 3 shows the growth in the number of consumers since 1993. EEGSA had the highest number of consumers until the year 2001 when it was overtaken by DEOCSA at 662,000. DEOCSA has the fastest growth rate in the number of consumer and has averaged nearly 15% per year but 26% of that growth was in the year 2001.

Figure 3 Growth of consumer numbers



The overall total number of consumers by customer category are shown in Table 8 for the year 1999.



**Table 8 Number of consumers by tariff category - DEOCSA and DEORSA**

Tariff Category	1999
<i>Residential</i>	
<b>Low tension total</b>	<b>707,797</b>
<b>Low tension social</b>	569,422
Low tension normal	138,374
<i>Non-residential</i>	
<b>Low tension government</b>	1
<b>Low tension commercial</b>	1,044
<b>Low tension industry</b>	118
<b>Medium tension government</b>	0
<b>Medium tension commercial</b>	205
<b>Medium tension industry</b>	22
<b>Total</b>	<b>709,187</b>
<b>Big Consumers</b>	120
<b>Public Lighting</b>	283
<b>Total</b>	<b>709,590</b>

Source: Union Fenosa.

The number of connections and electrification ratio by Department are provided in Table 9.

**Table 9 Electrification rate by department (1991-2000)**

Department	Consumer numbers (year 2000)	Electrification Coverage (%)	Growth 1991-2000 (%)
Guatemala	514,463	94.8	6.3
Sololá	48,914	93.9	51.1
Sacatepéquez	42,640	91.3	18.0
Quetzaltenango	101,762	91.2	42.2
Totonicapán	57,882	90.8	44.5
Santa Rosa	54,986	90.5	45.9
Chimaltenango	66,987	89.7	44.6
El Progreso	24,507	86.5	34.3
Zacapa	33,853	85.9	32.7
Retalhuleu	36,411	83.3	56.8
Escuintla	73,853	79.5	33.8
Suchitepéquez	50,035	70.8	33.4
San Marcos	94,488	66.4	46.5
Jutiapa	48,838	65.8	27.1
Izabal	36,776	62.0	34.9
Baja Verapaz	23,655	61.3	38.6
Huehuetenango	88,501	60.9	45.6
Jalapa	25,534	59.1	28.6
Chiquimula	31,937	58.4	20.4
Quiché	60,656	54.8	40.9
Petén	25,108	47.3	30.6
Alta Verapaz	33,337	29.3	18.5
<b>Total Year 2000</b>	<b>1,575,123</b>	<b>76.4</b>	<b>32.0</b>

Source: Union Fenosa



Residential consumers represent over 99% of the customers of the two utilities' customers. The next largest group are the 1,000 commercial customers who represent only 0.1% of the total.

### 3.7 Sales by DEOCSA and DEORSA

Demographic data on the areas supplied by DEOCSA and DEORSA are contained in Annex A13.1. Data is not available on the per-capita income levels in these areas. The average GDP per capita for Guatemala as a whole is US\$1,600 but this is highly unevenly distributed.

The annual sales by DEOCSA and DEORSA over the period 1999 to 2001 are shown in Table 10 but data on sales by customer category are surprisingly difficult to obtain from Union Fenosa and vary significantly from one source to another. The data in Table 10 and subsequent comments drawn from this Table should therefore be used cautiously.

**Table 10 Total sales (GWh) by DEOCSA & DEORSA**

Tariff Category	1999 E	2000 E	2001 P
<i>Residential</i>			
<b>Low tension total</b>	575.3	651.3	576.4
<b>Low tension social</b>	462.8	523.9	463.7
Low tension normal	112.5	127.3	112.7
<i>Non-residential</i>			
<b>Low tension government</b>	0.8	0.9	24.0
<b>Low tension commercial</b>	67.6	76.5	61.8
<b>Low tension industry</b>	11.5	13.0	86.6
<b>Medium tension government</b>	0.0	0.0	0.0
<b>Medium tension commercial</b>	20.1	22.8	58.7
<b>Medium tension industry</b>	3.2	3.6	59.8
<b>Total low &amp; high tension</b>	<b>678.6</b>	<b>768.1</b>	<b>867.3</b>
<b>Big Consumers</b>	100.6	113.9	125.8
<b>Public Lighting</b>	48.5	54.9	37.2
<b>Overall total</b>	<b>827.6</b>	<b>936.9</b>	<b>1.030.3</b>

Source: Union Fenosa

The average monthly consumption for different consumer groups for DEOCSA is shown in Table 11. This is based on data from Table 8 and Table 10.

**Table 11 Monthly consumption for DEOCSA & DEORSA by customer type (1999)**

Customer type	kWh/month
Residential	68
Industry plus large consumers	31,816
Commercial	4,989
Public lighting & government	11,444

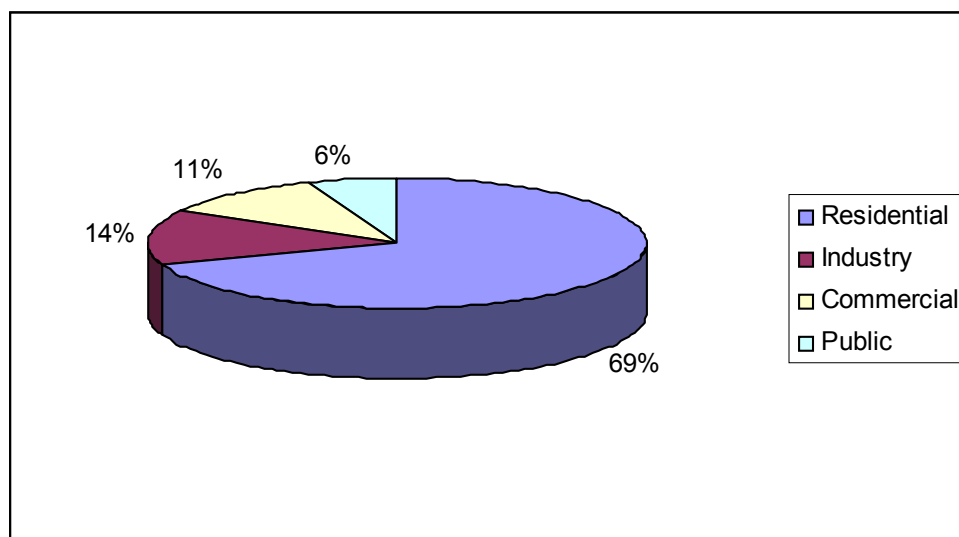
The average monthly electricity consumption<sup>7</sup> for DEOCSA in the year 2000 was 78kWh while for DEORSA it was 122 kWh.

The average monthly consumption for residential consumers in the two service areas is 68 kWh per month. The statistics suggest, however, that for consumers on the social tariff the monthly consumption is virtually identical to the consumption of consumers not on the social tariff. This leads to some concern about the validity of the data contained in Table 10.

DEOCSA/DEORSA suggested that a typical pattern of consumption for a new PER consumer is approximately 20kWh/month during the first year rising to 30kWh-40kWh per month after a year or two.

The share of the residential sector in overall kWh sales for DEOCSA and DEORSA is shown in Figure 4. The residential sector accounts for 69% of electricity sales while industrial consumes 14% of electricity and the commercial sector accounts for 11% each. Industrial consumers in particular tend to be relatively large, as shown in Table 11 with an average consumption of 32,000 kWh per month; commercial consumers are also relatively large and take nearly 5,000 kWh per customer per month.

<sup>7</sup> Source: DEOCSA & DEORSA annual reports.

**Figure 4 Sectoral share in electricity sales - DEOCSA & DEORSA (2000)**

### 3.8 Other distributors

Guatemala's largest distribution company - EEGSA - is located in the Guatemala City metropolitan area. It has approximately 47.1% of sales in the country.

There are 18 municipal distribution schemes that supply approximately 4.8% of Guatemala's total electricity sales. They receive external support for investments in electrification from the government, donors or they negotiate with INDE for assistance.

The municipal companies supply some thousands of consumers. They buy energy from INDE at prices subsidized by the social tariff and add a small margin to prices charged to their customers. They do not have funds to finance investments and rely on support from government or donors.

PER does not provide funds to organisations other than DEOCSA/DEORSA.

### 3.9 Issues

The PER scheme provides an important example of private sector concession in which a fixed payment per connection is made to DEOCSA and DEORSA. However, it raises some important issues that are discussed below.

By focusing the subsidy on DEOCSA/DEORSA does this undermine initiatives by other private sector organisations and local communities? Some micro-finance organisations that were previously involved in financing the sector have been edged-out by PER. The team also heard during a visit to a rural area that at least one local community is delaying self-help options in favour of waiting for PER

financing. This visit also revealed some dissatisfaction that a geographical lottery could make the difference between obtaining a very low-cost connection via PER or paying high prices if a community is not included in the PER programme or lies within the 200 metre zone. Local municipalities are also discriminated against in relation to subsidies for rural electrification - though there are some questions about the efficiency of municipal supply schemes<sup>8</sup>.

Does the scheme restrict competition? Would competition among organisations to access the funds help drive down the costs of connections? The team heard that the cost of rural electrification during the mid-1990s, before the arrival of the PER programme, was higher than under the PER programme and this suggests, as a minimum, that the costs have fallen since then. But it was difficult to find firm evidence that other providers could offer lower prices for connection. The price of US\$650/connection was reportedly selected on the basis of information on connection costs in neighbouring countries.

A related question arises: does the concentration of the funding on the two (effectively only one, Union Fenosa) organisations allow economies of scale in contracting and procurement of materials? The team was told that this is the case compared with the situation before PER when INDE was responsible for rural electrification and when the connections were contracted piecemeal to a range of different contractors. There is, however, no firm data on the cost of connections during the period before the PER scheme started though the team was told that the costs varied widely and was generally higher.

Although there is no direct evidence that the price of US\$650/connection is wrong, nevertheless it would be relatively easy to test this with a competitive tender for the next tranche of connections when the original 280,000 households/2,633 communities are connected under the current PER programme. A further 3,000 communities are expected to remain un-electrified in 2004. DEOCSA and DEORSA could tender for this in competition with other parties but the two companies should take over the operation of the networks when they are energised. Experience in Guatemala suggests that small-scale tendering by INDE was inefficient but large scale schemes are more cost effective but only a competitive tender will demonstrate whether US\$650 is too low or too high.

It would also be sensible to allow tendering to supply isolated networks including the construction and operation of those networks.

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<sup>8</sup> It is beyond the scope of this study to consider whether municipal electricity schemes are efficient at delivery of electricity.

## 4 Legal and Regulatory Review

### 4.1 Introduction

The following sub-sections describe the legal and regulatory framework and issues relating to this framework and its impact on rural electricity supply.

### 4.2 National Commission of Energy (CNEE)

(COMISIÓN NACIONAL DE ENERGÍA ELÉCTRICA)

This commission was created by the LGE and has the following functions<sup>9</sup>:

- ☐ To ensure that agents fully comply with the LGE and related regulations (“Reglamentos”), and to apply penalties where necessary.
- ☐ To monitor the fulfilment of obligations of the concessionaires and licensees, to protect consumer’s rights and avoid behaviour that is contrary to free competition or abuses of dominant positions or is discriminatory.
- ☐ To define transmission and distribution activities that require regulation, as given in the LGE, and the regulatory methodology to be followed.
- ☐ To arbitrate in disputes that arise between agents in the electric sector.
- ☐ To issue and monitor technical standards consistent with internationally accepted practices.
- ☐ To issue regulations intended to ensure open access and use of transmission lines and distribution networks, as defined in the LGE and related regulations.
- ☐ To monitor the execution of the PER, checking the fulfilment of obligations of the distribution companies and protection of the users’ rights. In particular CNEE monitors the obligations of the distribution companies to operate and maintain the networks and connections of rural consumers.
- ☐ To calculate tariffs and regulate their implementation. This includes both the social tariff and the non-social tariff.

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<sup>9</sup> This description is paraphrased from LGE.

Specifically in relation to rural electrification, CNEE is responsible for technical standards, performance standards and service obligations, the tariffs and the implementation of the social tariff. These are discussed below.

### 4.3 Tariffs and PER

Annex A11 describes the tariff methodology implemented through CNEE. The pricing of end-user tariffs is based on full pass-through of the wholesale price plus transmission charges and a price cap on the distribution margin. The price cap is set for a period of five years and is currently between UScents 4.2/kWh and UScents 4.5/kWh; it differs slightly depending on the customer group and distribution company.

The three electricity distribution companies - EEGSA, DEOCSA and DEORSA - have slightly different tariffs but within each of these companies the tariffs are uniform. EEGSA's tariffs shown in Annex A11 are slightly higher than those of DEOCSA and DEORSA.

The allowed distribution margin is reviewed periodically but in calculating the margin, CNEE and the distribution companies do not include the PER assets in the asset base and do not include depreciation on these assets as an operating expense.

### 4.4 The social tariff

In addition to the standard tariff, Government introduced (in 1998) a subsidised social tariff for all residential consumers whose monthly consumption is less than 300 kWh. This represents most residential consumers in Guatemala and almost 80% of rural consumers (see Table 8, Section 3.6). On average, DEOCSA/DEORSA sell approximately 55% of electricity at the social tariff and 45% at the regular tariff. The average price that DEOCSA/DEORSA pay to INDE is approximately US\$ 0.05 per kWh but this price is an average between generation prices of US\$ 0.026 at the social tariff and US\$ 0.074 for the regular tariff. DEOCSA and DEORSA pay slightly different prices to INDE for generation at the social rate and at the normal rate.

Energy that is sold by DEOCSA/DEORSA at the social tariff (plus the transmission charge and distribution mark-up) to residential consumers is bought from INDE at the generation social tariff. The DISCOs are not affected financially<sup>10</sup> by this subsidy.

The expansion of the number of rural electricity consumers in Guatemala resulting from the PER scheme will increase the share of consumption at the social tariff. It is therefore questionable whether a subsidy applied to households with consumption of up to 300 kWh per month is sustainable. When the social tariff is eliminated or reduced, the tariff to many rural households will increase - unless a proper lifeline tariff is introduced targeted at households with monthly consumption of, say, less

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<sup>10</sup> Either positively or negatively.

than 50kWh. Many of DEOCSA/DEORSA's customers will fall into this consumption band.

## 4.5 Fixed & variable charges

The average price authorised by CNEE for DEOCSA/DEORSA for residential consumers (the Social Tariff, applicable to Rural consumers), is Q 0.61 (US\$ 0.078) per kWh but the DISCOs bill this in the following way:

Fixed charge	Q 6.8 (US\$ 0.87)
Variable charge (energy)	Q 0.58 (US\$ 0.074) per kWh
Customer deposit (once only)	Q 60 (US\$ 7.70)

The consumption of DEOCSA/DEORSA's customers average approximately 20 kWh per month during the first year and 30 kWh to 40 kWh/month thereafter.

The fixed charge (Q 6.8/month) is designed to cover the distribution companies' fixed costs of metering, billing, revenue collection, etc; all costs that do not depend on kWh consumption.

A consumer who uses only 20 kWh per month will pay Q18.4/month but, according to DEOCSA/DEORSA, this does not cover its fixed costs of supplying consumers. At 40 kWh per month, a typical consumer will pay Q30/month. Union Fenosa believes that the tariff should be re-balanced with a higher fixed charge and lower variable charge. This has been rejected by CNEE for the time being though it will be reviewed at the next 5-yearly tariff revision.

## 4.6 Connection charges

When connections are financed under the PER programme, DEOCSA and DEORSA cannot charge consumers a connection fee but within the 200 metre zone or for non-PER connections the companies are entitled to demand a payment that will be refunded after five years. DEOCSA and DEORSA aim to charge from US\$300 to US\$3,000 but this is usually beyond the reach of most rural communities. The amount that they can charge is capped by CNEE.

The connection charge is returned to customers after a period of up to five years. The return of the deposit is mandatory but the timing is at the discretion of the distribution companies. The connection charge may be returned as shares or bonds in the distribution company or in any other way that guarantees that the money will be repaid with interest equal to a minimum of 5% per annum. The form in which the money is returned must be agreed between the distribution companies and the consumer.



The system of refundable connection charges, backed by guarantees, offers the possibilities for banks to provide loans to communities to undertake connections and, indirectly, finance DEOCSA and DEORSA. Indications during the field visits suggested that communities regarded the connection charge as an insurmountable hurdle. There was no evidence that banks or communities were aware of the opportunities for loans to finance connections. However, it is not immediately obvious why it should be more efficient for communities rather than DEOCSA/DEORSA to seek financing from banks to pay for connections.

## 4.7 Regulation of technical standards

CNEE has authority to impose penalties for non-compliance with technical standards but, according to Union Fenosa, has never done so.

NTDOID is the document issued by CNEE that determine minimum standards for construction, maintenance and operation of electrical installations. In the view of the consultant and in relation to rural electrification, these standards do not restrict the selection of suitable options by DEOCSA/DEORSA and certainly do not impose expensive solutions.

The standards are summarised in Annex A12.

In general, Union Fenosa has adopted its own standards for the rural electrification design and these standards are well above those contained in NTDOID. We would make the following comments on the actual standards adopted by Union Fenosa in comparison with the minimum design standards contained in NTDOID:

**Poles.** The design of poles has the biggest impact on the cost of rural electrification. Union Fenosa's own design standards in general prefer the use of cement poles and only recommend wood poles as an alternative for particular applications. Union Fenosa has adopted this standard in Guatemala.

According to INDE, the supply of wood poles in Guatemala would be adequate to meet the annual demand and they noted that the cost is lower than that of cement poles. Wood poles are the standard adopted by NRECA<sup>11</sup>; wood poles would comply with the NTDOID standards and would be perfectly acceptable in Guatemala.

It is not entirely clear why Union Fenosa should adopt more expensive design standards than the regulations require. Payment under the PER scheme is a fixed price per connection and is independent of the design (providing it complies with the standards). One explanation might be that it is a standard adopted by Union Fenosa worldwide and the company would not wish to be seen to be adopting a lower standard in Guatemala than, for example, it adopts in Spain. Another explanation could be that the electrification programme is so rapid that for a five-year period there would be problems in obtaining an adequate supply of poles;

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<sup>11</sup> National Rural Electric Cooperative Association of EEUU.



when the connection rate becomes less rapid then the company may switch to wood pole design.

**Conductors.** Union Fenosa standards identify only 50mm<sup>2</sup> and 100 mm<sup>2</sup> for medium tension conductors. Frequently, for small loads and secondary circuits, 25mm<sup>2</sup> or 35 mm<sup>2</sup> would be sufficient. Again, Union Fenosa could make cost savings by using smaller conductors. Its decision to continue to use the larger conductors may be related to economies of scale in procurement of standard conductor sizes.

**Winds.** NTDOID allows for wind speed tolerance of 80 or 100 km/h for line design tolerance. Union Fenosa applies a higher design level of 120 km/h. The lower wind speed tolerance in the NTDOID would permit longer spans, less poles and lower costs. Union Fenosa may have chosen the higher design standard for long-term cost saving.

**Transformers.** Union Fenosa's standard transformer sizes are 10, 25, 50 and 75 kVA. For small and isolated loads they might adopt smaller sizes such as 3 kVA and/or 5 kVA. The decision may again relate to economies of scale in procurement.

## 4.8 Regulation of service obligations

CNEE is responsible for ensuring that the DISCOs comply with their obligations with respect to issues such as the connection of consumers within the 200m of the network, the refundable connection charges levied on these consumers and supply reliability. During the field visit some concern was expressed by communities about the level of connection charges requested by the distribution companies for non-PER connections and whether CNEE is monitoring this effectively. However, by itself, this is not evidence that the charges are too high or that CNEE is not monitoring them.

## 4.9 Issues

### 4.9.1 Incentives to connect consumers

The regulatory system has little impact on incentives of DEOCSA and DEORSA to connect consumers under the PER programme; this incentive arises principally from the US\$650/connection that is paid by Fideicomiso. Some concern has been expressed by MEM that DEOCSA/DEORSA will tend to connect the lowest cost communities at the beginning of the PER programme and that cost of connections may rise above US\$650/connection toward the end of the programme. This would mean that the two companies would then be more reluctant to connect new consumers and the pace of electrification might slow. It is not clear that this will be a problem but, to counter the threat, MEM has suggested imposing a penalty if the electrification programme is delayed. This was not, however, foreseen in the original contract and has been rejected by Union Fenosa.

The regulatory system is more important in relation to the connection by the distribution companies of non-PER households within the 200 metre zone. The

companies earn profits from these customers from the distribution margin contained within the tariff and an important question is whether this margin gives them an incentive to connect these consumers or whether they are reluctant to connect non-PER consumers.

Between the end of 1999 and the end of the year 2001, the two distribution companies have added approximately 300,000 new customers (see Figure 3 in Section 3.6) of whom most (99%) will typically be residential. These connections include 105,000 certified under the PER programme (or 130,000 including those completed but not yet certified and those rejected by CT; see and Table 12 in Section 6.2). There have therefore been approximately 195,000 non-PER consumers connected over the period. Information is not available on how many of these consumers were connected as part of DEOCSA/DEORSA's normal operations and within the 200 metre zona franja and how many were connected with support from INDE or by the communities themselves<sup>12</sup>. Assuming they were mostly connected by DEOCSA/DEORSA and within the zona franja then it suggests that there is no strong bias against connecting non-PER households.

#### **4.9.2 Technical standards**

The technical standards set by CNEE allow the possibility of low-cost distribution technology that is suitable for rural areas. Nevertheless, the distribution companies have adopted standards that are more expensive than are strictly required. There do not appear to be any regulatory issues with regard to technical standards.

#### **4.9.3 Conclusions on the regulatory framework**

The conclusion from this review is that the general regulatory framework has been designed to be consistent with the PER scheme and, based on the evidence available, appears to provide appropriate incentives to the companies to connect and supply consumers within the 200 metre zone. The PER scheme provides incentives to connect rural consumers outside this zone. However, when the PER programme is completed in the year 2004, it is unlikely that the DEOCSA and DEORSA will be willing to continue the electrification programme to the more remote and costly areas of Guatemala.

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<sup>12</sup> Some of the 'connections' were simply the regularisation of connections that had been made by various means at various times but not recorded, until now, in the list of customers.

## 5 Role of the Public Sector

The most important institutions involved in the development and implementation of PER and rural electrification are described below.

### 5.1 Ministry of Energy & Mines (MEM)

(MINISTERIO DE ENERGÍA Y MINAS)

MEM is responsible for policy making in the energy sector in Guatemala. Within MEM, the General Board of Energy (Dirección General de Energía (DGE)) has the responsibility for the electricity sector. Its role includes development and oversight of the sector policies relating to the use of renewable sources of energy, regulation of non-military use of nuclear energy and research. DGE is also responsible for developing and amending laws and regulations relating to the electricity sector. At present the General Electricity Law “Ley General de Electricidad (LGE, November 13, 1996) and associated regulations “Reglamento” (May 02, 1997) and later amendments are the key regulatory standards for the sector (described in Section 2.3.2). DGE is also involved in developing policies for tariff setting though CNEE is responsible for regulating tariffs.

MEM is responsible for preparing General Plans for the electricity sector. Annex A4 shows the plans concerning rural electrification.

Within DGE, a department entitled Rural Electrification Coordinator (**CODERURAL**) is responsible for rural electrification issues.

The main responsibilities of CODERURAL are:

- ☐ the construction and maintenance of a database of communities to electrify, and
- ☐ preparing socio-economic evaluations, when required, for inclusion in the PER.

The socioeconomic evaluation (see Annex A5) consists of the following checks:

- ☐ That the community is located in a rural area of Guatemala.
- ☐ That the locality is located outside of the 200 metre zone for the existing network<sup>13</sup>.
- ☐ That other bodies are not contributing to the electrification and that the community is not paying cash to DEOCSA/DEORSA for electrification.

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<sup>13</sup> Within 200m, DEOCSA and DEORSA have an obligation to supply consumers.

- ☐ That construction is not already taking place and that a network had not already been built before the contract for the Trust Fund was signed on 04/05/1999.
- ☐ That the users are not located in private properties, living as colonists and/or formed communities inside the property.

Where the community lies partly within the 200 metre zona franja and partly outside, CODERURAL may approve it as a PER scheme provided that it is mostly outside the zona franja.

The evaluation performed by CODERURAL is not a socio-economic study in the accepted sense of the term but is a check that the scheme satisfies certain rules. CODERURAL also collects information about population, economic activity, etc, relating to the community<sup>14</sup>.

## 5.2 National Institute for Electrification (INDE)

(INSTITUTO NACIONAL DE ELECTRIFICACIÓN)

### 5.2.1 General responsibilities

INDE was formerly the vertically integrated power company and still retains generation and transmission but has divested the majority of its distribution activities to the three distribution companies (EEGSA, DEOCSA and DEORSA). Within INDE, the Directorate of Works and Rural Electrification (Gerencia de Electrificación Rural y Obras (GERO)) has some responsibilities in relation to monitoring the activities of DEOCSA and DEORSA and the PER programme. INDE performs the following functions:

- ☐ Supervision of the certification of connections that take place under the PER programme.
- ☐ Definition of connections inside and outside the "200 metre zone".
- ☐ Auditing of technical and non-technical issues relating to the execution of works.
- ☐ Preparation of plans for rural electrification, in conjunction with MEM.
- ☐ Preparation of projects for privatisation of rural electrification.
- ☐ Technical design and budgets of rural electrification projects (eg under the PER programme).
- ☐ Supervision of the execution of works.
- ☐ Research on sources of financing for rural electrification.
- ☐ Support to municipalities and other institutions.

<sup>14</sup> Note that CODERURAL has 20 employees to carry out these duties.

- ❑ Supply of materials to communities.

INDE existed before 1996 when the General Law on Electricity was approved and historically has been very closely related to rural electrification. Within the new institutional environment its functions are now significantly changed; formerly it was mainly responsible for the execution of projects (this is now under responsibility of the distribution companies). At present, INDE is in charge of planning, monitoring and control and provision of financing for rural electrification.

### 5.2.2 Certification

One of INDE's responsibilities is the certification of investments made under the PER programme. Its obligations are specified in the Trust Fund contract. INDE's certification role and the role of the Independent Supervisors is described in Section 3.4.

### 5.2.3 Direct electrification activities and off-grid electricity

INDE also undertakes other rural electrification projects outside the PER and independently of DEOCSA/DEORSA; the latter take over the operation of the networks when they are completed. For non-PER electrification schemes there is no single method but a common method is for INDE to provide the material and for the local community to provide the labour and to hire contractors where these are required. In some cases, the municipalities may also provide some support by providing necessary construction equipment.

For projects in isolated areas, INDE also operates the network. In the year 2000 approximately 20 GWh was supplied by INDE to consumers in off-grid electricity networks; this is a little over 2% of the electricity sold by DEOCSA and DEORSA. DEOCSA and DEORSA are not responsible for developing or operating any off-grid networks.

An important role of INDE is the regular weekly meetings with DEOCSA/DEORSA to discuss and agree the communities to be scheduled for electrification. Although a detailed plan was agreed when the contract with Union Fenosa was originally signed in 1999, the plan was not reliable: some of the communities have already been electrified, some were partially electrified and some cannot be found. INDE or DEOCSA/DEORSA will propose schemes to replace the communities that are listed in the plan but that no longer qualify for PER support.

## 5.3 Communities, Municipalities and NGOs

There are 18 municipal distribution schemes that supply approximately 4.8% of Guatemala's total electricity sales. They receive external support for investments in electrification from Government or donors or they may negotiate with INDE for assistance; however INDE's resources for investment are limited and donors have been discouraged from channelling resources to rural electrification since the creation of PER. They rarely have funds of their own to finance investments. PER does not provide funds to organisations other than DEOCSA/DEORSA.

The municipalities buy energy from INDE at prices subsidised by the social tariff and add a small margin to prices charged to their customers.

Municipality schemes are normally operated as a department within the municipal administration.

The team visited one such scheme in the Municipality of Guastatoya that has 5,077 consumers and employs a staff of 26. They buy monthly from INDE approximately 770 MWh of electricity that meets 85% of their consumption while a local hydropower plant makes up the balance. The average supply cost is US\$ 0.044 per kWh and the average end-use tariff is US\$0.063 per kWh (below CNEE tariff limits) but they estimate that the tariff should be around US\$0.11 per kWh to cover costs<sup>15</sup>. The municipality makes up the difference between the revenues and the costs. There are ten communities in the area covered by the municipality that do not have electricity; but the municipality does not have the resources to extend the network to these communities.

In relation to the PER programme, the municipalities and NGO's are in close and active relationship with INDE during the stages of planning of rural electrification projects. These bodies represent the interests of involved communities.

## 5.4 Role of financing institutions

To-date, PER has been financed largely from funds derived from the privatisation of the distribution utilities. Other electrification also takes place using INDE's own funds but these are very limited. In the past, social funds such as FONAPAZ and FESC, were active in providing financing for rural electrification programmes. These organisations support a range of social projects such as housing, education and water with funds provided by government or donors. Since privatisation and the creation of PER the government has discouraged investment in rural electrification by these institutions.

The financing institutions are as follows:

- ❑ Development Councils. These are presidential offices that coordinate with the departmental Governors about the use of national government funds by each department in different sectors.
- ❑ FONAPAZ (Peace National Fund). This organization was established in 1991 as a Trust Fund, and undertakes infrastructure projects in groups of communities. The funds are provided from a share of VAT revenues, the government or donors. Annex A10 shows the procedures for applying for funds from FONAPAZ.
- ❑ FIS (Social Investment Funds). These organizations participate in infrastructure projects for communities, and the government or donors

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<sup>15</sup> They do not charge for electricity used for water pumping and this may account for some of the losses.



provide the funds. They undertook rural electrification projects in only five communities.

- ❑ FODIGUA. This organization provides infrastructure to Indian communities, in the same way as the above organizations.

## 5.5 Issues

As mentioned in Section 3, Union Fenosa was required as part of the privatisation agreement to undertake the investments detailed in a Plan. This plan was prepared under contract to INDE prior to privatisation and contained detailed lists of communities to be connected together with larger scale investments in transmission and distribution. The plan is summarised in Annex A4 but the full plan is much more detailed.

During implementation it was quickly discovered that the electrification plan was inaccurate or out-of-date: communities might already have been electrified or partly electrified or were within the zona franja (200 metres) and some communities could not be located. Between 800 and 1100 of communities out of the 2,633 identified in the Plan are thought to have fallen into one of these categories. Consequently, a process of substitution of new communities for those in the original Plan takes place.

**GERO** and the DISCOS normally meet on a weekly basis to discuss progress and to agree on changes to the list. These changes can be proposed either by MEM, INDE or DEOCSA/DEORSA. In principle, all the proposed communities must apply to CODERURAL (MEM) for a socio-economic evaluation in order to qualify for inclusion in PER. Communities nominated by INDE and MEM have normally been positively evaluated by CODERURAL. But communities proposed by the DISCOS may be agreed by INDE without having undergone a socio-economic evaluation.

A question arises as to whether the Plan (list) and the socio-economic evaluation adds any value to the electrification programme. For example, could DEOCSA/DEORSA be left to choose the communities to be electrified without the intervention of GERO and CODERURAL? The certification process clearly needs to take place but are the other procedures worthwhile?

If left to themselves, DEOCSA and DEORSA would choose to electrify the areas with the lowest costs and highest density of households. But there is no evidence to suggest that the communities proposed by INDE are in the more remote areas or in low density areas that would not be attractive to the distribution companies without the subsidy; and the CODERURAL evaluation considers only very simple criterion, such as whether the community is within the zona franja. The current arrangement, with the list and the socio-economic evaluation, provides an opportunity for politicisation of the process of selecting communities for electrification but without offering any benefits of targeting the subsidy where it is most needed.

This leads to a second question: should the subsidy be targeted at the higher cost rural areas which would not otherwise be connected by DEOCSA/DEORSA? This is discussed in Section 8.

## 6 Performance Assessment

### 6.1 Introduction

The following Section assesses the performance of the PER scheme to-date covering:

- ☐ actual achievements of PER,
- ☐ the implementation arrangements,
- ☐ DEOCSA/DEORSA

### 6.2 Performance against target

#### 6.2.1 Electrification

The two distribution companies DEORSA and DEOCSA are contractually responsible for executing the investments nominated in the electrification plan. Between May 1999 and the end of the January 2002, 105,000 connections have been made in 963 communities and certified under the PER programme compared with an overall connection target of 280,000 by the year 2004. As shown in Table 12, the programme was generally on-target in 1999 and 2000. In 2001 21,267 connections were certified and another 13,000 had been made but not yet certified. There were also a further 12,000 connections that had been made but are subject to dispute over whether they qualify for PER payment (see Section 6.3.4). Overall, the two companies had achieved 85% of the connections that were scheduled in the plan<sup>16</sup>.

**Table 12 PER connections to-date versus target**

Year	Planned	Certified connections
1999	32,819	32,819
2000	54,501	51,351
2001	51,556	21,267
2002	51,530	
2003	45,112	
2004	45,111	
TOTAL	280,629	105,437

<sup>16</sup> If the disputed 12,000 connections are included then the achievement was 94% of the target.



However DEOCSA/DEORSA expect costs to increase for future projects and it is possible that the rate of new connections could slow, though there is no evidence to suggest that this is happening.

The number of communities electrified and the number of connections in each of the departments are shown in Table 13. There is information on the connections by zone that were programmed in the original PER Plan (Table 3) but no information on the progress on connection by individual department.

**Table 13 Communities connected under the PER programme at January 2002**

DEPARTMENT	COMMUNITIES	CONNECTIONS
ALTA VERAPAZ	110	11,031
BAJA VERAPAZ	48	4,568
CHIMALTENANGO	32	3,400
CHIQUMULA	60	4,576
ELPROGRESO	3	138
EL QUICHE	108	10,229
ESCUINTLA	16	2,536
HUEHUETENANGO	117	15,779
IZABAL	33	3,920
JALAPA	46	4,937
JUTIAPA	72	6,955
PETEN	16	1,195
QUETZALTENANGO	39	4,273
RETALHULEU	9	1,793
SAN MARCOS	128	15,167
SANTA ROSA	40	3,640
SOLOLA	12	951
SUCHITEPEQUEZ	23	3,327
TOTONICAPAN	32	5,336
ZACAPA	19	1,581
TOTALS	963	105,332

Source: INDE Progress Report, reproduced in Annex A6.

### 6.2.2 Transmission

Progress on transmission and substation investments compared with the timetable agreed at the inception of PER are described in Annex A8.1 and A8.2. In general, these are reported to be behind schedule, largely due to problems obtaining wayleaves and negotiations for compensation are said to be very slow. This does not impact on connections at the distribution level except in areas with weak or non-existent transmission grids.

### 6.2.3 Disbursement

Since the programme became active in 1999 and until the end of January 2002, over US\$100 million (30%) has been disbursed as shown in Table 14 out of a total of US\$333 million.

**Table 14 Disbursement of PER funds**

	Amount of certified works (US\$ million)
Distribution	61.99
Transmission	40.21
Total	102.20

A progress report on the performance of PER prepared by INDE is provided in Annex A6. Further information on the progress of the programme is contained in Annex A8.

## 6.3 Implementation arrangements

### 6.3.1 Modifications to the original plan

The original PER electrification plan (that formed part of the contract between DEOCSA/DEORSA and the Fideicomiso) was prepared by an external consultant company contracted by INDE. The work was based on INDE plans and field work developed in the non-electrified communities. This first plan contained details of transmission lines and substations to be built and a detailed list of communities to electrify.

From that first version of the plan, the transmission work remains unchanged but the list of communities was modified several times. Of communities included in the first plan, 30% have been found to be already electrified or are under construction. Those communities were replaced by others following Trust Fund Contract rules.

### 6.3.2 Socio-economic evaluations

The socio-economic evaluations conducted by CODERURAL are, effectively, a verification that the communities are beyond 200 metre from an existing network. Subsequently, the independent supervisors verify that the connections have been completed. Both bodies therefore appear to serve a useful function in relation to verifying that the 200 metre criterion is met before construction (CODERURAL) and that the work has been completed (Independent Supervisors).

CODERURAL is also nominally responsible for the central coordination for all issues and planning of Rural Electrification. They are constructing a database of communities inside and outside PER but, to-date, their main role is limited to undertaking the socio-economic evaluations for PER. MEM does not yet have plans to continue the PER when the current funds are exhausted.

### 6.3.3 Speed of certification procedures

There are currently 13,000 connections that have been made and awaiting certification; this is equivalent to between 2 and 3 months of scheduled connections. This appears to be reasonable delay.

### 6.3.4 Contractual issues

Although 105,000 connections were certified, 130,000 have actually been undertaken including 12,000 that were rejected because they did not comply with the PER criteria that they should be beyond 200 metres of the existing network. This has given rise to a dispute concerning the contract between Union Fenosa and INDE.

According to the DISCOS, the contract does not distinguish between connections that meet the CODERURAL criterion (ie., beyond 200 metres from an existing network) and those that do not; the DISCOS therefore submit all connections to the Fideicomiso for financing from PER.

The law does, however, make this distinction between eligibility of PER payments for connections outside the 200 metre zone. The dispute will be settled by arbitration.

## 6.4 Comparison of PER with previous arrangements

Prior to the establishment of PER, social funds in Guatemala undertook specific projects to develop infrastructure, including rural electrification. From the Peace Accords in 1996 until 1999 they played a significant role in rural electrification but the coordination by INDE was poor. Many of the projects started by INDE were not completed and it is estimated that INDE still needs more than US\$10 million to complete these projects. Construction costs during this period were also said to be high in some cases though evidence on this was not available to the team.

## 6.5 Issues and conclusions on performance

The implementation arrangements for the PER scheme and an assessment of how well this is working is described in Section 5 and again in Section 6.3. The review suggests that some of the implementation arrangements, such as CODERURAL and some of the functions of GERO, may be superfluous but they do not impede the electrification programme. The certification arrangements may also contain some redundancy but the time taken to certify connections does not seem excessive.

The review of the legal and regulatory system (Section 4) similarly suggests that there are no problems with the regulatory framework that discourage investment by DEOCSA/DEORSA or hinder the electrification programme.

The need to find substitute communities for those in the original PER list could potentially have delayed the programme but there is reportedly good cooperation between INDE and the two distribution companies, regular meetings between them

and a good degree of flexibility in selecting communities to substitute. Even the CODERURAL socio-economic evaluation does not appear to act as a serious barrier to the selection of communities. The need for substitution of communities was not cited as a reason for a delay in implementing the new connections.

Despite the lack of obvious problems with the implementation arrangements or incentives, the distribution connections did fall behind schedule in the year 2001. No explanation for this has been provided; nor is it yet clear whether this was a temporary problem and whether it will continue to be a problem in the current year (2002).

The more serious delays occurred in relation to the transmission investments which are now estimated to be only 60% completed compared to the target. The delays are caused by problems obtaining wayleaves. This is a general problem faced by any utility, whether private or state owned and whether in rural or urban areas. The solution is a regulatory one (strengthen statutory powers to obtain land for transmission lines and substations) but it does not provide any useful lessons for private sector participation in rural infrastructure.

## 7 Economic and Financial Analysis

### 7.1 Introduction

This Section considers:

- ❑ the financial performance of the two DISCOs,
- ❑ the contract price paid to the DISCOs for connections, and
- ❑ the incentives.

### 7.2 DEOCSA/DEORSA's financial performance

Annual Reports for the two companies both show profits of over 10% (return on net assets) although decreasing in the second half of the year.

The PER scheme gives the companies profits both in transmission/distribution activities and in connections.

For the construction of substations, the DISCOS expect to earn a rate of return of over 20% based on INDE contract prices and present construction contracts. The construction of some transmission lines are facing delays caused by wayleave disputes and this has resulted in the investment programme being behind schedule. The main issue to be resolved relates to the cost of compensation and who must bear this cost. To-date this has had no direct impact on profitability.

### 7.3 Fee for connections

The fee for the construction of distribution networks to connect new consumers is paid to DISCOS at a fixed rate of US\$650 per connection. Union Fenosa informed the team that over the past two years, the share of profits in this connection fee averaged 7% and the companies expect to maintain this figure in the future<sup>17</sup>. As the remaining works involve zones with lower population density and that are a greater distance from the existing networks, it is likely that construction costs per connected consumer will increase. In order to keep present levels of profits, construction costs would need to be reduced.

There differing views on the actual cost of connecting consumers under the PER programme but no hard evidence.

Before the PER scheme was established, when INDE was responsible for rural electrification, the cost of connections varied considerably but INDE informed the

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<sup>17</sup> Although this may be unlikely if construction costs increase

team that the cost was higher than \$650. The team was told that the cost has fallen partly because Union Fenosa procured materials and equipment in bulk and contracted a small number of contractors to undertake the work.

It is likely that DEOCSA/DEORSA will have begun the electrification of the areas where the costs of connection are lowest and below the connection fee of US\$650. As the electrification programme continues, the companies will encounter the more expensive areas and they may lack incentives to connect these areas. The contract with DEOCSA/DEORSA allows the Technical Committee to impose penalties if the companies fall behind with the network investments but it does not include provisions for penalties for failing to meet the schedule for connecting consumers. In anticipation of a possible reluctance of the DISCOs to complete the electrification programme, MEM and INDE have been examining the possibility of imposing penalties on the DISCOs if they fail to meet the schedule.

## 7.4 Costs of administering the PER scheme

To select the Bank to administer the Trust Fund, INDE called for bids from Guatemalan banks and the contract was awarded to “Banco Agrícola Mercantil de Guatemala” associated with the New York Bank. These banks requested no charges for administering the fund.

Members of the CT collect US\$250 for each official meeting they attend.

The environmental impact studies are paid by the Trust Fund.

INDE is responsible for coordinating CT, DISCOS and MEM and the independent supervisor and undertakes all associated administration tasks. These activities are wholly financed by INDE. GERO has a budget of US\$2.5 million per year but some responsibilities for rural electrification by INDE fall outside of GERO. The US\$2.5 million includes small investments in material and equipment for rural electrification. INDE's assessment of the cost of supervising the PER scheme is shown in Table 15.

**Table 15 Expenditures by INDE on PER supervision**

Period	Amount in Quetzales (thousands)	Amount in US\$ (thousands)
1999 (August 13 - Dec. 31)	1,408	180
2000	4,906	629
2001	6,144	788

Source: GERO, INDE

Annually, INDE calls for tenders for independent supervisors. At present, two companies are contracted. Their payments are made from the Trust Fund at a total cost of Q 1 million (US\$133,000) per year.

The budget for CODERURAL is U\$S 260,000 per year.

## 7.5 Incentives

It is believed that DEOCSA/DEORSA earn a healthy profit from the US\$650 fee for connecting new rural consumers. It is less clear whether they earn a reasonable profit from selling electricity to these consumers. The companies have indicated that they would like to increase the fixed charge (see Section 4.3) because the variable charge does not cover their fixed costs.

## 8 Public Policy Implications

### 8.1 Introduction

The PER scheme is simple, efficient, with few administrative hurdles and more-or-less on-track to meet the target of electrifying 90% of the population.

The purpose of this Review is to identify both positive and negative lessons that can be learnt from the PER scheme and that could be used when designing similar schemes in other countries. The following Section describes some of the key policy issues that arise from the Guatemala case study. At this stage they raise a number of questions for which the answers, based on the limited experience of Guatemala, are incomplete.

### 8.2 Key positive features of the scheme

The PER scheme provides an excellent example of a system to encourage private sector provision of rural infrastructure through a simple lump-sum payment of US\$650 per connection for households that are beyond 200 metres from existing networks. Once connected, the private utility takes responsibility for supply and covers its operating costs and earns profits through the normal tariff.

The scheme has a few administrative hurdles, such as an independent certification that the connections fall within the 200 metre zone, but generally the scheme operates with little bureaucracy.

The scheme leads to very few distortions of incentives though, inevitably, there are some inequities.

### 8.3 Allocation of PER funds

Currently, PER money is only available for DEOCSA/DEORSA (Union Fenosa). Some micro-finance organisations that were previously involved in financing the sector have been edged out by PER. The issues are:

- ☐ By focusing the subsidy on DEOCSA/DEORSA does this undermine initiatives by the private sector and local communities?
- ☐ Does this restrict competition? For example, does it limit any benchmarking of connection costs? Would competition among organisations to access the funds help drive down the costs of connections?
- ☐ Should the US\$650/connection be made available to other bodies, such as other private distribution companies, local communities, Municipal distributors or contractors?



- ❑ Do these other organisations (municipalities, etc) have the competence to implement electrification schemes? Would administration and supervision costs be too high if the grant were made available to them?
- ❑ Does the concentration of the funding on the two (one) organisation allow economies of scale in contracting and procurement of materials? Could some of these economies of scale be achieved using INDE (eg for INDE to procure equipment)?

We were unable to find firm evidence that other providers could offer lower prices for connection or that DEOCSA and DEORSA were making large profits from connections. But there is some limited evidence to suggest that the current arrangements improve on the former arrangement when INDE contracted for the electrification of communities on a piecemeal basis. The concentration of the funding on the two (one) organisations allows economies of scale in contracting and procurement of materials that helped to drive down the cost of connections.

Although there is no direct evidence that the price of US\$650/connection is too high, nevertheless it would be relatively easy to test this by inviting bids from companies for a price-per-connection for the next tranche of rural electrification - in competition with DEOCSA and DEORSA. DEOCSA and DEORSA should take over the operation of networks when they are energised. There are an estimated 3,000 communities that will continue to be without electricity at the end of the initial PER programme.

There is no good reason why the successful bidder for the next tranche of connections should be limited to connecting consumers for DEOCSA and DEORSA. They could also build connections for other utilities, including the municipalities. However, some observers have noted that municipal schemes in Guatemala are poorly managed. There is therefore a separate policy issue, not addressed here, concerning whether it is wise to encourage municipal schemes.

Supply to consumers in isolated grids could also be tendered to the same organisation that is tendering for the next tranche of connections, or to another organisation. The tenderer(s) could be responsible for one or all of construction, operation and generation in these isolated grids. The tender process could also offer possibilities of non-grid solutions using, for example, photovoltaics.

A different question is whether the funds should also be available to local communities that wish to construct their own network and connect it to the DEOCSA/DEORSA grid. Guatemala has experience with self-help municipal schemes using material and advice supplied by INDE and labour provided by the local community but there is no documentation of the successes and failures of these schemes. Elsewhere, a US style (NRECA) model has been adopted in countries such as Bangladesh and the Philippines with mixed results, mostly depending on the managerial competence of the local community. Without further assessment, we would hesitate to suggest this approach in preference to the implementation of the next tranche of the electrification through a contractor operating on a large scale.

## 8.4 Targeting

The US\$650/connection is paid for all connections that are included in a list originally prepared by Government or those communities that meet certain criterion evaluated by CODERURAL. The issues are:

- ❑ Is it possible to avoid bureaucratic procedures for targeting the subsidy (ie the socio-economic evaluation, the 200 metre rule) - for example by giving a grant to all connections irrespective of whether they satisfy certain socio-economic criteria?
- ❑ Should the subsidy be better targeted - for example by subsidising connections to the most remote areas first?

Firstly, does the socio-economic evaluation by CODERURAL and the targeting of communities by INDE add any value to the electrification programme. For example, could DEOCSA/DEORSA be left to choose the communities to be electrified without the intervention<sup>18</sup> of GERO and CODERURAL?

If left to themselves, DEOCSA and DEORSA would choose to electrify the areas with the lowest costs and highest density of households. But there is no evidence to suggest that the communities proposed by INDE are in the more remote areas or in low density areas that would not be attractive to the distribution companies without the subsidy; and the CODERURAL evaluation considers only very simple criterion, such as whether the community is within the zona franja. The current arrangement, with the list and the 'socio-economic' evaluation, provides an opportunity for politicisation or corruption in the selection of communities for electrification but without offering any benefits of targeting the subsidy where it is most needed. This does not imply that the selection process is politicised or corrupt in Guatemala but there is always a danger that this could happen if a similar scheme is introduced in other countries.

But should the subsidy be targeted at the higher cost rural areas that would not otherwise be connected by DEOCSA/DEORSA? Clearly, the funds available for subsidising rural electrification are limited and selective targeting of limited resources would be attractive. The issue is whether the cost of attempting to target the subsidy outweighs the benefits. No real attempt has been made to target the subsidy in Guatemala so this case study does not provide any strong insights except that attempts in the past in Guatemala at introducing bureaucratic systems for selecting communities (pre-PER) tend to become politicised, inefficient and cumbersome.

## 8.5 Inconsistency

The targeting of the PER funds at connections that are greater than 200 metres from the existing network means that in some cases one community may be given a free

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<sup>18</sup> The certification process clearly needs to take place.

connection but a neighbouring village only 0.5 km away may be required to make a reimbursable connection charge of anything up to US\$3,000. The existence of a programme such as PER raises expectations among communities, often fuelled by politicians; and inconsistencies such as this can lead to much ill feeling and may undermine the political sustainability of subsidy schemes. The issues are:

- ❑ Is it possible to avoid inconsistencies by, for example, providing the subsidy to all connections in designated areas? Is the 200 metre rule sensible?

One senior representative from a municipality commented that it would be fairer to offer a lower subsidy for connections but share this among all rural consumers rather than only those outside the 200 metre zone. Households would then be asked to contribute a non-refundable connection fee but lower than the fee requested by DEOCSA/DEORSA from consumers within the zone at present.

From the viewpoint of economic efficiency, the spreading of the subsidy among all consumers would lead to fewer distortions than the current arrangements; there would be fewer households seeking connections when their willingness-to-pay is less than the cost of the connection, and therefore less inefficiency.

From the viewpoint of equity, it would also be conspicuously fairer to those households lying just inside the *zona franja*. The 200 metre criterion is not necessarily a useful way of targeting the poor since there is no evidence to suggest that those 200 metres from a network are poorer than those close to a network.

The main disadvantage is that it could slow the electrification programme while communities raise the cash to pay the subsidised connection fee. But this would seem a relatively trivial disadvantage.

## 8.6 Fixed fee per connection

The payment of US\$650 per connection is constant over the five year period of the programme but connection costs are likely to be below this level during the early period and above this level toward the end. The issues are:

- ❑ Does the single, fixed payment mean that DEOCSA/DEORSA will be reluctant to connect consumers later in the period?
- ❑ Would it have been better to have a graded payment scale, starting at a lower level with gradually increasing per-connection payments? This would have avoided the need to introduce a penalty if the companies delay connections or fail to complete the programme.

Given the lack of data on the true cost of connections, it would seem unlikely that Guatemala could have found an optimum path for the connection rising from, say US\$500/connection for the first set of communities in year 1 to US\$800/connection for the last set in year 5. However, one option might have been to tender smaller tranches of connections that could be completed within, say, one year. The one year tender period is consistent with Union Fenosa's one-year agreements with its 18

contractors for undertaking the construction of the networks. This would then have revealed whether the cost is rising over time as the more remote and lower density communities are connected.

On the negative side, tenders for one-year contracts would yield lower economies-of-scale in the procurement of material and equipment for electrification and, possibly, higher costs.

No definitive recommendation is possible on whether tenders should be conducted annually, or every five-years, or some other period. Guatemala is a sample of only one but it would be interesting to examine the experience from other countries in terms of economies-of-scale from, say, one-year, three-year or five year agreements for private contractors.

## 8.7 Fixed and variable charges

The fixed costs (meter reading, billing, collection) for supplying rural consumers are likely to be higher than the fixed costs of supplying urban areas. A low fixed charge in the tariff may undermine the sustainability of the scheme. The question is:

- ☐ Should the connection charge be raised for rural consumers? This would mean that rural consumers on average will pay higher charges per kWh than urban consumers but it would improve the incentives to the utility.

It would be sensible for charges to be cost reflective to the extent possible, including fixed and variable components of those charges. However, we are not able to comment on whether the current charging structure is cost reflective or otherwise.

## 8.8 Connection fees

One unusual feature of the PER scheme is that consumers are asked to pay a connection fee that is refunded within five years (see Section 4.6). For poor rural communities inside the zona franja this is often an insurmountable barrier to connection. Communities could obtain loans to cover the connection charge and which would be repaid by DEOCSA and DEORSA within five years but none appear to be doing so. But it is not obvious why it should be more efficient for small users rather than DEOCSA/DEORSA to seek financing from banks to pay for connections. The scheme appears to be more appropriate to large customers that have dealings with banks and that could obtain credit to cover connection fees. For small users, an obvious solution is for DEOCSA/DEORSA to finance the connection costs through loans and to recover the cost of servicing these loans through slightly higher tariffs.

A common practice, and one that is adopted in the telecom sector in Guatemala, is for connection costs to be non-refundable but recovered from the household by the utility as an annual payment for a fixed number of years. The utility would then need to make arrangements to finance the connection costs.

These two alternative approaches to connection fees (above) will cause insignificant distortions to incentives but will be far more favourable to small rural communities that do not have easy access to financing.

## Annexes

### A1 Summary of General Electricity Law

The general law of electricity (LGE) was approved in November 13, 1996. This law established new rules for the electric sector, mainly to permit development of the sector through elimination of monopoly, private participation and creation of wholesale of electricity market, and regulates the activities of generation, transmission, distribution and commercialisation.

#### 1. The Main Law Definitions are as Follows:

- ☐ Generation is open to anyone; it only requires fulfilment of laws and regulation of Guatemala.
- ☐ The transmission and distribution activities are open to anyone, except when the assets are public. Public assets require authorisation.
- ☐ The prices are unregulated, except transmission and distribution activities that require authorisation. All transactions between agents are regulated by this law and its regulations.
- ☐ This law is applicable to all agents who undertake activities in the Electric Sector.
- ☐ MEM is responsible to apply this law, control the agents and generate the general plan to guide sector development.

#### 2. National Commission of Electric Energy – CNEE

The law created this commission to control and regulate the Electric Sector. CNEE is an office of MEM but with independence in the following actions:

- ☐ To apply the law and regulations and apply penalties for non-compliance.
- ☐ To control the obligations of the agents, to protect the consumer rights and to avoid un-competitive practices.
- ☐ To define tariffs for transmission and distribution and the methodology for calculating tariffs.
- ☐ To solve disagreement between sector agents.
- ☐ To prepare technical norms and regulate their implementation.
- ☐ To issue norms to permit free access and use of transmission and distribution networks.

- ☐ This commission has three members, one from the University of Guatemala, one from the MEM, one from the Wholesale Market. The commission members change every five years.
- ☐ To finance its activities this commission receives from the distributors 0.3 % of total energy sells.

3. *Definitions*

- ☐ Self-producer. Who have generation for their own-use.
- ☐ Agents in Wholesale. Generators, distributors, transmitters, commercial agents, and commercial agents with other countries. All of these over the minimum levels established in this law.
- ☐ Generator. Who have a plan and sell all or some of the electricity produced.
- ☐ Distributor. Who have networks to sell energy to final consumers.
- ☐ Commercial Agents. Who buy and sell energy blocks, but are not otherwise agents in the Market.
- ☐ Environmental Impact Evaluation – Environmental study for specific project.
- ☐ Big Consumer. A consumer who consumes energy in excess of the minimum level established in this law.
- ☐ Wholesale. Buys and sells of demand and energy blocks between the agents, in short or large time.
- ☐ Toll. Payment received by transmission and distribution owners for energy wheeled through their own networks.
- ☐ Private Distribution Service. Who sells energy with free agreement prices with the consumers and does not use public networks.
- ☐ Final Distribution Service. Who supply energy to the consumers under quality and prices regulated by the CNEE.
- ☐ Way leaves. The landowners are legally obliged to permit the construction of lines and substations on their properties.
- ☐ Transmission System. Lines and substations between generators and distributors or big consumers.
- ☐ Principal System. A part of the System where the generators are connected.
- ☐ Secondary System. The rest of the System.



- ☐ Distribution System. Lines and substations designed for distribution activities under regulations.
- ☐ National Electric System. Installations of generation, transmission and distribution which are undertaking energy transactions.
- ☐ National Interconnected System. The interconnected part of the National Electric System.
- ☐ Transmission. Activity that has the objective of carrying energy through the System.
- ☐ Transport Agent. The owner of transmission installations.
- ☐ Consumer. Owner of land, houses, factories, etc., who receives electric energy.

#### 4. *Separation of Activities.*

The companies that perform different activities must be unbundled. The generation and distribution companies can have secondary lines to connect them to the System. The above rules are not applicable to generators under 5 MW and municipality companies.

#### 5. *Generation, Transmission and Distribution Construction.*

- ☐ Any party can build and operate new generation plants.
- ☐ Transmission and generation projects must have environmental evaluation that must be approved by CONAMA (environmental office).

#### 6. *Authorizations*

- ☐ Generators, Transmission Agents and Distributors require authorization to use public assets.
- ☐ Distribution authorisation covers a zone up to 200 meters from the actual network.

#### 7. *Generation and Transmission Operation*

The administration of the Wholesale Market is the responsibility of the AMM, a private office. AMM is responsible to: a) coordinate the operation of generation and transmission with minimum global cost, b) establish prices in short term in the market, except when the agents have long term contracts, c) give guaranty of supply energy.

#### 8. *Distribution Operation*

- ☐ Distribution Companies are obliged to supply energy to all people within the Distribution Zone (200 m) or if they construct new lines up to the zone border.



- ❑ [Article 47] The government can give resources to construct rural electrification installations, outside the distribution zones. These resources are considered a subsidy, and this cost must not be included as a cost to the consumers. These installations must be operated by the Distributor to which they are connected. The projects must have the socio-economic study prepared by MEM.
- ❑ When the distributors collect charges from the consumer for the a new connection, the distributor must return this amount. CNEE must determine the maximum amount that the distributors can collect.
- ❑ The consumer must not consume more than the contracted demand. If the consumer exceeds the contracted demand the distributor can collect the difference in tariff amounts.
- ❑ If the consumers fails to pay two consecutive monthly bills, the distributor can cut supply. The distributors can cut supply of consumers who do not comply with contract conditions or are connected without contract.
- ❑ The consumers have right to demand the service in quality established by regulation.
- ❑ The distributors are obliged to have contracts with generators to guarantee the supply to the consumers, for two years minimum.
- ❑ The distributors are responsible for maintaining the supply of energy to the consumers. If they do not supply energy in short or long term they must pay to the consumers a price determined by the regulation.

9. *Rescind the Authorization*

- ❑ The authorization to distributors can be rescinded if they do not connect new consumer in accordance with the regulation or continue to provide poor service over a period of time after penalties are applied.
- ❑ The authorisation to the transmission agents can be rescinded if they do not permit access to the network by others in accordance with regulations.
- ❑ The MEM can take over the operation of distribution company for with authorization has been rescinded and transfer to new owners.

10. *Electricity Prices*

- ❑ Can determined in contracts entered into freely between generators and distributors.
- ❑ Except for contracts, the prices are regulated as follow: a) for all the transactions between the agents as result of minimum cost system operation, b) transmission and distribution use-of-system, c) tariff for

final consumers under the regulation limit; over this limit consumers can contract freely with the distributor or other agents.

- ☐ Toll calculations must be based on efficient investment and operation costs.
- ☐ Distribution price calculations are based on standard costs for similar efficient companies.
- ☐ Tariffs for final consumers must be calculated based on contracted generation prices plus transmission use-of-system charges and a distribution margin. The tariffs must not cross subsidise between categories of consumers.
- ☐ The distributors can buy energy through public tendering.

#### 11. *Transmission and Distribution Use-of-System Tariffs*

- ☐ The tariffs can result from negotiations between agents. If agreement cannot be reached, CNEE can determine the prices in agreement with the AMM.
- ☐ For use of the Principal System all the agents must pay per demand connected. For use of Secondary System the agents must pay in accordance with the use of the network.
- ☐ Transmission Agents and Distributors must permit the use of the installations for supply of energy to big consumers.
- ☐ Principal System use-of-system must be calculated using the annuity of investment, maintenance and operation cost of an optimal network, divided by the total firm demand connected.
- ☐ Secondary System or Distribution Tolls must be paid by generators in proportion their use of the networks.

#### 12. *Final Consumer Tariffs*

- ☐ Tariffs to final consumers must be calculated from the addition of the average of contracted generation prices, transmission use-of-system and the distribution margin (VAD). The VAD includes investment costs, maintenance and operation cost of an efficient company in the same zone.
- ☐ VAD must contain: a) cost per consumer independent of the consumption, b) demand and energy distribution losses, c) distribution cost of investments, maintenance and operation per unit of demand supplied.
- ☐ Investments cost are the annuity of the total replacement value of an optimal network.

- ☐ Revisions to the tariff calculation must be done every five (5) years.
- ☐ The interest for calculating annuities of investments is determined by the CNEE within the range 7% to 13 %.

13. *Penalties*

- ☐ CNEE can apply penalties to agents or consumers, and these values are calculated in kWh.

## A2 Regulation on Distribution and Rural Electrification

This regulation was approved May 2,1997. The following is a summary of the Regulation.

- ☐ For installation and operation of distribution networks intended to provide energy to final consumers authorization from the MEM is required. This authorization also permits public operators to construct networks and ask for right of way.
- ☐ Large consumers can freely contract their supply with generators or commercial agents, and are obliged to pay to the distributor for the use of his networks to transmit power and energy. Large consumers are those end-users with a contracted demand of at least 100 kW.
- ☐ Voltage limit definitions: a) under 1000 V, Low Tension (LT), b) between 1000 and 60000 V, Medium Tension (MT), c) over 60000 V, High Tension (HT).
- ☐ If the distributor's networks are connected to installations belonging to generators, large consumers or other distributors, the distribution company is obliged to perform the transmission function, under regulated rules.
- ☐ Payments to distributors that perform transmission function must be calculated as the VAD (value added or margin) at the related voltage level.
- ☐ Distributors are obliged to connect consumers that request supply and are located within 200 meters on either side of existing installations.
- ☐ Distributors are obliged to connect consumers that request supply and are located outside the 200 meters zone if the consumer constructs the line from the border of the zone to the point of supply.
- ☐ The connection costs within the 200 meters zone are at the cost of the distributor.
- ☐ The distributor must meet any requirement to supply within 30 days. If the installations serving the area do not have enough capacity to meet the new requirement, the distributor has 4 months to make the connection.
- ☐ The distributor and the consumer must sign a contract that establishes a) consumer name and address, b) tariff applicable, c) regulatory rights and penalties.
- ☐ Distributors are owners of the electric meters, except in the case of large consumers.

- ☐ Distributors can collect from the consumer partly or totally the connection cost, up to the limit value established by CNEE, but is obliged to reimburse this payment to the customer in no more than 5 years.
- ☐ For the application of Article 47 of the law, the MEM must define the procedure to be followed for the socio-economic evaluation for rural electrification projects.
- ☐ CNEE must define standards for: a) design and operation of distribution installations(NTDOID), b) provision of distribution service (NTSD).
- ☐ Base tariff for each voltage level must include: a) charge per consumer, b) charge per peak demand, c) charge per out - peak demand, d) charge per energy.
- ☐ CNEE must approve tariff categories for different kinds of consumers based on the above criteria and calculations.
- ☐ Tariff cost include: a) price of energy purchase, comprising generation and transmission costs, b) annuity of replacement investment costs of an efficient reference company, c) commercial costs (metering, billing, and commercial activities), d) taxes, e) operation costs, f) maintenance costs, g) general and administration costs, h) reasonable provision for penalties.
- ☐ Tariff calculations must be performed every five years.
- ☐ The price of generation and transmission included in tariff must consider: a) demand prices contracted by distributors, b) annual average energy prices calculated by AMM.
- ☐ The tariff is adjusted every three months.
- ☐ Distribution Value Added (VAD) is the average cost of investment and operation of an efficient company serving a defined zone.
- ☐ A payment guarantee must be provided by the consumer at the time he is connected and the related value is the average of two monthly bills for this category of consumer.
- ☐ The meter reading and billing must be doing monthly or bimonthly.
- ☐ Quality Service must be recorded following these parameters:
  1. Product quality
    - 1.1. Voltage level
    - 1.2. Phase unbalancing
    - 1.3. Perturbations
    - 1.4. Interference to communication systems

- 2. Technical service quality
  - 2.1. Average of interruption frequency
  - 2.2. Total time of interruption
  - 2.3. Energy not supplied.
- 3. Commercial service quality
  - 3.1. Consumer claims
  - 3.2. Billing
  - 3.3. Attention to the consumers
- ☐ Meter checking must be performed by the distributors.
- ☐ The information on meter testing must be sent to the CNEE.
- ☐ Reasons for issuing penalties to the distributors are as follows:
  - 1. Failure to connect consumers in regulated terms.
  - 2. Failure to reimburse connection payments to consumers in regulated terms.
  - 3. Non fulfilment of quality regulations
  - 4. Non fulfilment of safety regulations
  - 5. Apply tariffs above maximum authorized values
  - 6. Non supply to MEM of required information.
  - 7. Use right of way for purpose different to the authorized
  - 8. Non supply of financial resources to the CNEE
- ☐ Reasons for the issuing of penalties to consumers are as follows:
  - 1. Manipulation of the meter
  - 2. Fraudulent consumption
  - 3. Not allowance of reading or meter supervision
  - 4. Produce perturbations exceeding regulated limits

## A3 Fideicomison Contract

1. This contract was signed by the President of INDE, the General Manager of DEOCSA/DEORSA (DISCOS) and the General Manager of the BANCO AGRICOLA MERCANTIL DE GUATEMALA (BANK)
  - ❑ INDE – National Institute of Electrification, a Public Electric Company of Generation and Transmission. INDE sold, in 1998, the DISCOS to Unión Fenosa (Spanish Utility).
  - ❑ DISCOS – The Distribution Companies of the West (DEOCSA) and the East (DEORSA) of Guatemala. These companies cover the Country except the Capital City and 18 municipalities.
  - ❑ BANK – The BANCO AGRICOLA MERCANTIL DE GUATEMALA is the local Bank and acts in its own representation. The BANK also acts in representation of THE BANK OF NEW YORK, the foreign Bank, that participates in this Contract together the local Bank.
2. INDE sold the DISCOS and all the revenues went to the Trust Fund (US\$ 100,835,778). INDE is obligated to add more funds following the schedule shown in this Contract to complete the financial of the Plan of Rural Electrification (PER).
3. The objective is to provide electricity to rural areas that do not have this service.
4. DISCOS are obligated to construct all the PER, provide electricity in rural areas, operate and maintain this service.
5. All the investments are financed by the Trust Fund, the construction is totally subsidized.
6. All the projects of Rural Electrification require a socio-economical study by the MINISTRY OF ENERGY AND MINES (MEM).
7. The Contract has a specific plan for Transmission (lines and substations) and a list of communities to provide electricity, named a Distribution Plan. PER includes both plans. The Distribution Plan has 2,633 communities with 280,629 connections, in five (5) years.
8. The banks are responsible for administration and investment of the funds following rules written in this contract.
9. Part of the funds can be invested in the Government of Guatemala in US\$ (BOTES).
10. Technical Committee (CT) comprises technical people who represent: A) the Direction Committee of INDE, B) the Ministry (MEM), C) the DISCOS. The CT is responsible for the Annual Plan for Transmission and Distribution. The CT can change the priorities in the construction plan if it has agreement of the

- Committee. CT also decides on penalties that can apply to DISCOS when the execution of the plan is behind schedule.
11. Electric Distributor of the Caribe (local company of Union Fenosa) owns 80% of the property of DISCOS.
  12. INDE and the DISCOS have a Construction Contract to execute the PER. The DISCOS constructs and INDE pays from the Fund.
  13. The ownership of the Transmission assets rests with INDE, and the property of Distribution assets are with the DISCOS.
  14. Cost to connect one community: is the fixed cost for each connection increased by the number of consumers connected.
  15. Cost of Distribution Builds: is the cost to connect all the communities include in the PER.
  16. Cost of Transmission Builds: is the cost of all the transmission lines and substations include in the PER, US\$ 150,974,301.
  17. Cost per each connection: US\$ 650. This number is the amount of Distribution Plan applied in the connections planned.
  18. The Banks must invest all the funds, except what is necessary to pay for constructions, only in US\$: A) governments debts of G-7, B) government debt of Guatemala under US\$ 60,000, C) debts of companies qualified AA by recognized international qualification. All the financial revenues will increase the Fund.
  19. INDE has a schedule to increase and complete the Fund, to a total of US\$ 333,569,435.
  20. The Main Account of Trust Fund is with the Bank of New York, in US\$. All the financial profits and the revenues from INDE must be deposited in this account. The banks is responsible for administration of this account.
  21. The Auxiliary Account is with the Bank of Guatemala, in local money (Quetzales). All the payments to the DISCOS are from this account. The cost of exchanging money is paid by the Fund.
  22. Deposits and payments. All the deposits made in local currency (Quetzales) in the Auxiliary Account, must immediately be changed to US\$ and transferred to the Main Account. When payments to the DISCOS is necessary, the CT must communicate 30 days in advance to the local Bank , who is responsible for transferring this money from the Main Account to the Auxiliary Account. All the movements in the accounts must be communicated to the CT monthly.
  23. The limit between Distribution and Transmission is 60 kV (sixty kilovolts). Over 60 kV: transmission. Under 60 kV: distribution.



24. The cost of the connection subsidized must not be paid to the consumers directly or through tariffs.
25. CT must contract an Independent Supervisor to do a final technical control of the constructions and to do the certification of the connections done. This control must be done each two months, based in the report sent from the DISCOS. With this certification, CT approves and communicates to the Bank the next payment to DISCOS. INDE can also supervise the construction and the connections. If INDE and the Independent Supervisor have differences in the certifications, the CT decision is accepted.
26. PER Plan will be done to develop the network and substations for transmission to support the growth of consumers, and the distribution lines and transformers to connect all the consumers planned. The design of the installations will be done under the Law and Regulations requirements of products and services. The DISCOS are responsible to propose the design of the grid and the installations. INDE must provide to the DISCOS with the information required for the projects.
27. Procedure to changing communities. To change communities in the same zone is necessary to consider similar rates of consumers per kilometres of line and kilometres of line per community. It is possible to substitute communities in one zone by communities in other zone, if it maintains the global cost of the plan.
28. In the PER the following characteristics cannot change: A) the communities listed, except the substitutions authorized, B) the number of consumers in each community, C) technical criteria and regulations to design the installations.
29. The detailed plan of Transmission must have for each line and substation with technical justification, the electric solution, voltage level, positional drawing in a zone map, place of connection to the actual network, cost, prioritisation in the year and schedule of construction.
30. The detailed plan of Distribution must have a list of communities to electrify, number of consumers to connect, voltage levels, cost, electric solution, positional drawing on a zone map, place of connection to the actual network, prioritisation and schedule of construction.
31. If INDE does not contribute complementary funds in the schedule, the DISCOS are not obliged to construct the installations planned.
32. The schedule of the Trust Fund is sixty (60) months. If the execution of the plan requires more time to complete the PER, the CT can extend the schedule.
33. At the beginning of each year INDE pays the DISCOS 20% an advance equal to the total amount of the plan for that year.
34. If it is necessary to undertake environmental studies, the Trust Fund must pay them.

35. The fund is not liable for taxes in Guatemala.
36. For the construction, the DISCOS are obliged to contract a minimum of 40% to Guatemala people.
37. DISCOS are obligated to do undertake public tendering in Guatemala for contract construction companies. If, for any reason, there are no contractors, the DISCOS are obliged to construct using their own resources.
38. INDE can substitute the Banks with others. The banks can propose transfers of the contract to other banks.
39. The Trust Fund can close for the following reasons: A) the end of the schedule B) execution is impossible, C) special agreement between INDE and DISCOS, D) the PER plan is completed. When all payments have been made and all constructions and connections completed, the residual funds must be returned to INDE, except in C) where the funds go to both parts by agreement.
40. The Fund must escalate each year by PPI (Producers Price Index of USA)
41. All costs must be paid by each party, not through the Fund.
42. Penalties. If the DISCOS do not execute a specific project of the plan in one period of two month, they have 30 days to complete the construction and connections. If, after 3 months they have not completed a project or plan, payment will be reduced by 5%. If after 6 months the project or plan has not been completed, the payment will be 10% less. If 9 months pass and the project or plan has not been completed, the payment will be 15% less. If pass 12 months and don't close, the payment is 15% less and INDE can contract other company to do it. CT don't apply penalties if understand that the DISCOS is not responsible per delays.
43. Spends paid by Trust Fund. Banks: 0%. Members of CT: US\$ 250 per each meeting. Independent Supervisors: CT decides this cost through a bit.
44. The Contract of Trust Fund only can change if all parts are in agree.
45. INDE and the DISCOS can transfer rights in agree of both, but are ever finally responsible for this contract.
46. Schedule of funds sending from the INDE to the Trust Fund:
  - US\$ 100,835,778 – when this contract was signed.
  - US\$ 54,075,826 - before September 1, 1999.
  - US\$ 40,000,000 – before July 1, 2001.
  - US\$ 60,000,000 – before December 31, 2001.

After this deposits, to complete US\$ 333,569,435 the CT decide each six month, how much funds are necessary for the next six month and the INDE must

deposit this amount. INDE isn't obligated to deposit if the DISCOS don't complete 80% of the plan in the past six month.

47. Date of the Contract: May 4, 1999.

## **A4 Rural Electrification Plan**

### **A4.1 Action plan for rural electrification**

The Ministry of Energy and Mines (MEM) with the main objective of increasing the electrification index to 90% in the 2004 and to reach 96% in the 2006, is carrying out the biggest efforts in the following actions: strengthening of the Rural Electrification Coordinator- *CODERURAL*; continuing of the execution of the Administration Trust Fund - INDE , East and West Works, and the Expansion Programs of the Electrical Distribution companies.

The expectation is that the Electrification Index will be 87% in the year 2004; The elaboration of the Strategy Study for the Rural Electrification Expansion in Guatemala contemplates action areas outside the scope of the Trust Fund Contract and the obligatory service area of the electrical distribution companies.

### **A4.2 Rural Electrification Coordinator - CODERURAL**

The Rural Electrification Coordinator, CODERURAL, is an administrative unit under the General Energy Administration of MEM and has the following objectives:

- ☐ Encourage the effective coordination of the development programmes of rural electrification executed by the government and not government organisations.
- ☐ Influence efficiency in the construction of infrastructure through technical and economic supervision of those Projects.
- ☐ To cooperate with donor countries relating to the financing of rural electrification programs, and to promote the effective coordination of these electrification programs.
- ☐ To cooperate in looking after that the electrical distribution companies that give service inside the obligatory area defined by the electricity general law (within 200m of their network).

The main activities executed by CODERURAL are the following:

- ☐ Establishment of a Data Base of Applications of communities and government authorities.
- ☐ To give verdicts on socio-economic evaluations.
- ☐ Liase with the Technical Committee.
- ☐ To define priorities and listings of communities to electrify each semester (listing of towns included and not included in the Trust Fund) according to the technical characteristics of the system and government priorities.

- ☐ To define the towns that will replace in the Trust Fund the electrified towns (According to the Contract Procedures).
- ☐ To define unitary cost parameters for communities outside of the Trust Fund.
- ☐ Supervise the execution of the projects outside the Trust Fund.

The financing of CODERURAL will be carried out with the ordinary budget of MEM. The financing of those works inside the Trust Fund will be carried out according to the procedure indicated in the Trust Fund Contract. The financing works executed by government and not government organizations (Secretaries, Development Council, FONAPAZ, Social Fund Investment, Municipalities, donor countries, etc.) will be coordinated for CODERURAL, contracting and supervising the construction works with private companies.

### **A4.3 Trust Fund Administration (INDE) West & East Rural Works**

The Trust Fund Contract is the most important Rural Electrification Program that has been formulated from the electric and financial point of view. It considers the connection of 280,798 new users benefiting 1,575,000 Guatemalans and an investment of U.S \$333,569,435. Of which approximately the 44.0% will be used to reinforce the transmission network and the rest in the construction of the distribution infrastructure in rural areas.

This program contemplates eight regional projects that will allow the connection to the electric network of:

- ☐ 280,798 new users in 2,634 communities;
- ☐ 1,283 km of lines of 69 kV
- ☐ 28 substations with a capacity of 235 MVA;
- ☐ 6,686 km of distribution lines at 7.6, 13.2, 19.9 and 34.5 kV and. 11,353 km of distribution electrical nets.

With the execution of these projects it is expected to achieve in the year 2004 an Electrification Index of 87.4% at a national level.

#### **A4.3.1 Rural Electrification in the North Traverse Area**

The project, besides constituting the first phase to electrify the north of the High Verapaz Department, will allow:

- ☐ Incorporation of the Fray Bartolomé isolated system; for years it has been served by a small thermal power plant;
- ☐ To begin the interconnection of the Petén isolated system to the SNI; and

- ☐ To connect the electrical distribution network with the Quiché electric system.

The investment of US\$47.2 millions, will allow the construction of:

- ☐ 254 km 69 kV transmission lines
- ☐ Three substations (Chisec, Cantabál and Fray Bartolomé) with installed capacity of 30 MVA, and transformation from 69 kV to 34.5 kV and 13.8 kV.
- ☐ 1,478 km lines and distribution electrical nets.

This program will benefit 22,461 users located in 168 communities of 7 municipalities. The construction of the Las Verapaces Substation is essential for the electric support of the program.

#### **A4.3.2 Quiché Rural Electrification Program**

The program represents the electrification of the north of the Quiché department; and when completed it will allow the connection of the electric distribution system with the electric system of North Traverse Area.

The investment of about U. S. \$109.6 millions, besides connecting 76,000 new users of 708 communities of 21 municipalities, it will involve the construction of:

- ☐ 201 km of 69 kV transmission lines
- ☐ Five new substations (Sacapulas, Chajul, Chicamán, Zacualpa, New Community) and the expanding of the Santa Cruz Substation fed in 69 kV with lines in 34.5 kV. and 13.8 kV, with an installed capacity of 80 MVA; and
- ☐ 5,848 km of electrical distribution nets and lines.

#### **A4.3.3 Petén Rural Electrification Program**

When the program is completed it will connect the electric distribution system with the electric system of North Traverse Area.

The number of users that will be connected is 18,259 from 150 communities and 11 municipalities in the Petén department.

The investment of about US \$33.0 millions, will allow the construction of:

- ☐ 263 km of 69 kV transmission lines.
- ☐ Three new substations, Sayaxché and Modest Méndez, fed in 69 kV with lines in 34.5 kV and 13.8 kV, with an installed capacity of 20 MVA; and
- ☐ 1,189 km of lines and electrical distribution nets; and 166 km of upgrading.

#### **A4.3.4 East Rural Electrification Program**

The program affects the whole oriental region of the country and benefits 46,464 new users in 514 communities.

The investment of about US\$38.6 millions, will allow the construction of:

- ☐ 66 km of 69 kV transmission lines
- ☐ Five new substations; and
- ☐ 2,457 km of lines and distribution electrical nets.

#### **A4.3.5 Atlantic Rural Electrification Program**

The program includes part of the Izabal Department benefiting 13,742 new users in 109 Communities.

The investment of about US \$17.6 millions, will allow the construction of: 133 km of 69 kV transmission lines, three new substations; and 499 km of lines and distribution electrical networks.

#### **A4.3.6 Western Highlands Rural Electrification Program**

The program affects mainly the Chimaltenango, Sololá, Totonicapán, Huehuetenango departments and the Quetzaltenango and the northern part of San Marcos. It will benefit 50,171 new users and 522 communities.

The investment of US\$69.3 million will construct:

- ☐ 238 km of 69 kV transmission lines
- ☐ Five new substations; and
- ☐ 23,180 km of lines and electrical distribution networks.

#### **A4.3.7 Western Coast Rural Electrification Program**

The program affects the whole region of the western south coast mainly in the Suchitepequez and Retalhuleu departments and in San Marcos coast part and Quetzaltenango.

The investment of about US\$24.9 millions, besides including to 31,154 new users of 242 communities, will allow the construction of:

- ☐ 55 km of 69 kV transmission lines
- ☐ Three new substations; and
- ☐ 1,603 km of lines and electrical distribution nets.

#### **A4.3.8 Low North Rural Electrification Program**

The program has included the Baja Verapaz and High Verapaz departments, connecting 22,548 new users of 221 communities.

The investment of about US\$22.2 millions will result in:

- ☐ 73 km of 69 kV transmission lines
- ☐ 1,791 km of lines and electrical distribution nets.

## **A4.4 Strategy Study for Rural Electrification Expansion**

### **A4.4.1 General Objective**

The general objective is the elaboration of a planning study that includes the activities and works that are necessary to increase the electrification index from 85% to 95% in the whole country by the year 2006.

### **A4.4.2 Specific objectives**

- ☐ The planning study will include the towns that will have to electrify to reach 95% of index electrification. These towns will be located outside of the obligatory area, will have to consider the electrified towns at the moment and those that will electrify through the Trust Fund Contract.
- ☐ Evaluate the options to supply power electricity to the rural area of towns by the private companies, according to the principles contained in the Electricity General Law and their Regulation.
- ☐ Evaluate the potential electric market considering the demand in the different rural sectors according to diverse uses.
- ☐ Define the financing mechanisms, so much of Government as of the private initiative, contemplating all those incentives that contribute to the sustainable development of the rural electrification projects.
- ☐ Define the capacity (willingness) of the inhabitants to pay in each town.
- ☐ Define the institutional arrangements, the appropriate financial instruments and the subsidies and other necessary incentives to achieve the participation of private companies in financing and operation of the energy systems and in this way to achieve the sustainable and development of these systems.

### **A4.4.3 Tasks**

The study will be elaborated by a consultant and will contain as a minimum the following:

- ☐ Review of the several studies carried out previously, especially the related with payment capacity, willingness-to-pay, unitary consumptions, potential market, etc. It is necessary to consider also the rural electrification development for private and decentralized entities, in order to include their experience in the general study.
- ☐ Brief analysis of the planned, executed and financed projects by non-government entities.



- ☐ Analysis of the electric generation offer and their projection (according to the power supply), and the existent transmission lines, with the objective to define the necessary requirements to cover the present general study.
- ☐ Definition of the institutional context, the instruments and the subsidies and other necessary incentives to promote the effective participation of the private companies in financing and continuity of the project.

#### **A4.4.4 Outputs**

- ☐ Coverage
  - ☐ Listing of towns (Consider only those that are located outside of the obligatory area of the 200 m of the existent infrastructure)
- ☐ Geographical location
  - ☐ Electrical net Topology
  - ☐ Electrification index for next 8 years
- ☐ Technical analysis:
  - ☐ Interconnected or Isolated system
  - ☐ Standards Quality
  - ☐ Estimate Demand
  - ☐ Load flow
- ☐ Quantity of Works:
  - ☐ Total of beneficiaries
  - ☐ Kilometres of line
  - ☐ Electrical Distribution Net
  - ☐ Quantity of Sub-stations
- ☐ Budget:
  - ☐ Isolated systems Unitary costs (photovoltaic)
  - ☐ Electrical lines and nets Unitary costs
  - ☐ Sub-stations Unitary costs
  - ☐ Town Costs

#### **A4.4.5 Strategy**

- ☐ Financing:
  - ☐ Government
  - ☐ Private company
  - ☐ Donors (Loans, Donations, etc)
- ☐ Execution:

- ❑ Execution options (administration, contract, trust fund, etc)
- ❑ Schedule

#### **A4.4.6 Profitability**

The financial analysis will use a discount rate of 12%.

Financial: From the perspective of the distribution company or of the private entity, cooperative, etc. This point is referring to the companies in charge of the operation and maintenance of the projects. The results were expressed in the IRR, NPV and cost/benefit.

Economic: From the perspective of the country, considering those additional benefits produce by the electric power, when beneficiaries substituting the current energy, used by them. The results you they expressed in IRR, NPV and cost/benefit.

### **A4.5 Other initiatives of rural electrification**

#### **A4.5.1 Community Electrification Program, Frontier Town**

INDE has an agreement with the Electricity National Commission of Mexico to electrify 40 communities with the Republic of Mexico. Such a program has been formulated in the following three phases:

- ❑ Phase I: the objective is electrifying 15 villages of 4 municipalities of the Huehuetenango department, benefiting 1,086 users. The investment is US\$1.12 millions, it includes 54.6 km of electrical distribution lines operated in 7.6 kV.
- ❑ Phase II: the objective is electrifying 15 villages of 2 municipalities of the San Marcos department, benefiting 1,626 users. The investment is US\$1.65 millions, it includes 122 km of electrical distribution lines operated in 7.6 kV.; and
- ❑ Phase III: the objective is electrifying 10 villages of 2 municipalities of those Departments of San Marcos and Huehuetenango, benefiting at 1,009 users. The investment of US\$982 thousand, it includes 73.5 km of electrical distribution lines operated in 7.6 kV.

#### **A4.5.2 Solar Panels Installation Program**

The Solar Panels Installation Programme, to be developed by the MEM will install 6,000 solar panels in the period 2000-2004, in Huehuetenango, Petén, High Verapaz, Chiquimula, San Marcos and Jutiapa departments.

## A5 Socio-Economic Evaluation by MEM

MINISTRY OF ENERGY AND MINES  
REPORT OF SOCIOECONOMIC EVALUATION  
REPORT VI-2001  
GENERAL ADMINISTRATION OF ENERGY  
RURAL ELECTRIFICATION DEPARTMENT

### LOCALITIES:

71 evaluated

55 with favourable report

16 with unfavourable report

Requested for

INDE: 64

MEM: 07

### I. INTRODUCTION

Attending to the applications in official documents Ref. 0-400-320-2000, of the 21/11/2000; 0-400-167-2001, of date 17/05/2001, respectively of the National Institute of Electrification - INDE - related with the socio-economic evaluation of 64 localities of San Marcos's department, in which electric power will be introduced through lines and electrical distribution nets; these localities can substitute some others which are electrified of the original list of the Contract of Trust Fund of the INDE. Likewise they visited one another 7 communities that are neighbouring to those that were evaluated according to the program. These communities are proposed by the Ministry of Energy and Mines.

The Rural Electrification Department, of the General Administration of Energy, proceeded to make the evaluation according it is established in the Article 47 of the General Law of Electricity, to check that the invested resources are considered as subsidy and that they are not transferred as the user's cost.

### II. PROCEDURE

To carry out the evaluation, initially the list of localities was analysed, separating them for regions, corresponding in this opportunity to San Marcos's department; the localities contained in the applications mentioned previously will be pending, and will be programmed for their evaluation according to the availability of personnel.

Next the analysis of the requested localities is described:

#### a) Localities to evaluate.

The remaining localities were evaluated through the Form of Socio-economic Evaluation that the personal of the Department carried out during the technical inspection in each Village, Canton, Property, etc., during the days from 12/06/2001 up to the 30/06/2001. Of these localities, 64 were requested by the INDE and 7 by the Ministry of Energy and Mines.

b) In the Table N° 1 are the localities that were not evaluated for difficulties in the access because was impossible to access by repairs in the road

Table N° 1

Localities that were not evaluated for difficulties in the access.

No.	Request	Communities	Municipality	Department
1	INDE	Santo Domingo	Concepción Tutuapa	San Marcos
2	INDE	Sequetzal	Concepción Tutuapa	San Marcos
3	INDE	Nueva Victoria	Concepción Tutuapa	San Marcos
4	INDE	Tijquitel	Concepción Tutuapa	San Marcos
5	INDE	Santa Clara	La Reforma	San Marcos
6	INDE	Provincia Chiquita	San Pedro Sacatepéquez	San Marcos
7	INDE	Colcothuitz Chantzaj	Tajumulco	San Marcos

c) Localities that were not located.

In the Table No.2 is listed the community that was not possible to locate , because during the technical evaluation in the place, none of the neighbours or local authorities indicated to know its location and for such a reason was not carried out the evaluation.

Table No.2

Localities that were not located.

No.	Request	Communities	Municipality	Department
1	INDE	Sol y Sombra	Tacaná	San Marcos

### III. ADOPTED CRITERIA

According to the content of the Article 47 of the General Law of Electricity, the purpose of carrying out the socioeconomic evaluation is to guarantee that the resources that the State grants in the construction of projects of rural electrification, be guided those that will be of social benefit or of public utility and that they are developed outside of a defined territorial area. That is to say, outside of the 200 (m) of the current lines and electrical nets of distribution property of the electrical distribution companies

Attending this content, the criterions to emit the FAVORABLE REPORT OF SOCIOECONOMIC EVALUATION are the following ones:

- a) That the locality is located in the rural area of the country.
- b) That the locality is located outside of the 200 (m) of the obligatory area of the Electrical Distribution companies.
- c) That there are not contributions of other entities neither contributions cash from the community to the electrical distribution company.
- d) That are not in execution (not contracted by UNION FENOSA) or that they have been built before the signature of the Contract of Trust Fund of the INDE (04/05/99).
- e) That the users are not located in private properties, living as colonists y/o formed communities inside the property.

#### IV.RESULTS

After the evaluation carried out in each one of the localities, the results can group in:

- a). Localities that the FAVORABLE REPORT OF SOCIOECONOMIC EVALUATION is emitted

In the Table No 5 are listed 55 localities that they fulfil all the suitable criterions previously mentioned and the FAVORABLE REPORT OF SOCIOECONOMIC EVALUATION OF THE MEM is emitted. It is important to mention that the users indicated in the table are only those that were located during the field inspection to more than 200 (m) of the electrical lines and existent electrical distribution nets; for such a reason, they can differ of the contained users in the listing of the application of the INDE or of any other institution.

- b) Localities that the UNFAVORABLE REPORT OF SOCIOECONOMIC EVALUATION are omitted.

In the Table No 6, 16 localities are listed that when making their study, they don't fulfil all or some of the criterions mentioned previously, for such a reason the report is not favourable, that is to say that an unfavourable report of socioeconomic evaluation is emitted.

B1 Localities that are located inside the area of the 200 (m)

In the table N° 3 are listed the towns that have unfavourable report because they are located inside the obligatory area of the 200 (m) and for such a reason they are sent to DEOCSA for their execution

TABLE No.3

Localities inside the area of the 200 (m).

No.	Request	Communities	Municipality	Department	Report
1	MEM	Caserío Unión Reforma	Sibinal	San Marcos	Unfavourable
2	INDE	Caserío 20 de octubre	Malacatán	San Marcos	Unfavourable

No.	Request	Communities	Municipality	Department	Report
3	INDE	El Carmen Frontera	Malacatán	San Marcos	Unfavourable
4	INDE	Aldea San José Zelandia	San Pablo	San Marcos	Unfavourable
5	INDE	Caserío Nueva Buena Vista	San Pablo	San Marcos	Unfavourable
6	INDE	Comunidad El Chagülte	Malacatán	San Marcos	Unfavourable
7	INDE	Caserío Colben	Tejuta	San Marcos	Unfavourable

B3. Localities suspended in their execution and that they were initiate with funds of the community.

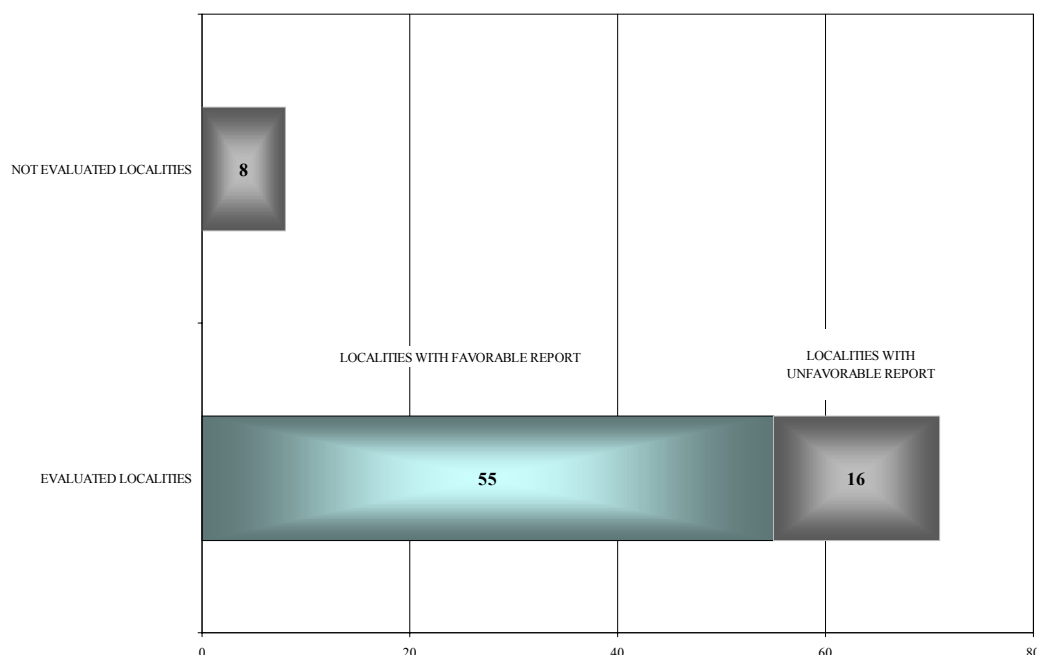
In the Table No.4 is listed the towns that when making its socioeconomic study, the unfavourable report is emitted, because they began with funds of the community and other institutions and at the moment they are in execution or suspended, for this reason they move to the INDE for its execution

TABLE No.4

Initiate localities with community funds and suspended

No.	Request	Communities	Municipality	Department	Report
1	INDE	Cantón Buena Vista	Tacaná	San Marcos	Unfavourable
2	INDE	Cantón Pin Pin, Aldea Majada	Tacaná	San Marcos	Unfavourable
3	INDE	Tojchoc Grande, Sector 2	Tacaná	San Marcos	Unfavourable
4	INDE	Cantón Tuisajchis, Aldea Chequín	Tacaná	San Marcos	Unfavourable
5	INDE	Aldea Toacá	Tacaná	San Marcos	Unfavourable
6	INDE	Cantón Tuichapse, Aldea Cunlaj	Tacaná	San Marcos	Unfavourable

Socioeconomic Evaluation: Report VI-2001



The results of the evaluation indicate that 55 (77.46%) have Favorable Report, 16 (22.54%) with Unfavourable Report: 8 towns were not evaluated because the access route was impassable.

#### V. REMARKS

It was found that of 55 localities with favorable report, 58.19% has not begun the work of electric infrastructure; 34.54% the work is in construction and 7.27% the work it was already executed; even when it has not been emitted the favorable report of socioeconomic evaluation of the Ministry of Energy and Mines. It would be convenient that the works that are part of the Trust Fund, before executing them, be had the corresponding Favorable Report.

Most of localities in those that the project was already executed, or they are in construction, the companies didn't pay the non qualified manpower, it is estimated in Q. 669,225.00. it was also observed that in some villages they negotiated the non qualified manpower by the calibration of the meters.

Table: Contributions in Manpower

No.	Community	Municipality	Department	Works days	Wage Q	Number of users	Manpower
1	El Edén Molino Viejo	Comitancillo	San Marcos	45	25.00	78	Q 83,070.00
2	Caserío Chamuí	Concepción Turuapa	San Marcos	30	20.00	104	62,400.00
3	Aldea Huispaché	Concepción Tutuapa	San Marcos	15	30.00	300	Q135,000.00
4	Caserío Santa Rosa de Lima	Malacatán	San Marcos	10	30.00	150	Q 45,000.00
5	Caserío La Cuchilla	San Pedro Sacatepéquez	San Marcos	10	20.00	133	25600.00
6	Aldea Escupijá	Sipacapa	San Marcos	12	30.00	53	Q 19,080.00
7	Aldea San José La Paz	Taiumulco	San Marcos	1	25.00	100	Q 2,500.00
8	Aldea Unión Tolax	Tajumulco	San Marcos	1	25.00	100	Q 2,500.00
9	Caserío Chacojom	Tejutla	San Marcos	16	25.00	51	Q 20,400.00
10	Finca San Juan de Loarca	Tumbador	San Marcos	3	30.00	45	Q 4,050.00
11	Aldea Los Cerezos	Tejutla	San Marcos	8	35.00	43	Q 12,040.00
12	Aldea Nueva Esperanza	Tejutla	San Marcos	25	50.00	69	Q 82,110.00
13	Caserío California	Tejutla	San Marcos	30	35.00	34	Q 35,700.00
14	14 Caserío Piedra Parada	San Pedro Sacatepéquez	San Marcos	25	25.00	91	Q 56,875.00
	15 Caserío Cha 1	Concepción Tutuapa	San Marcos	30	30.00	91	Q 81,900.00
						TOTAL	Q 669,225.00



TABLE No. 5

## Localities with favourable report

No.	Request by	Community	Municipality	Department	Users*	Latitude (N)	Longitude (W)
1	INDE	Casarío Perú Bolivia	Catarina	San Marcos	75	15°01,871´	92°03,666´
2	INDE	Sector la Unión, San Miguel	Catarina	San Marcos	10	15°01,533´	92°03,350´
3	INDE	El Edén, Molino Vio o	Comitancillo	San Marcos	78	15°04,524´	91°47,524´
4	INDE	El Salitre	Comitancillo	San Marcos	70	15°05,139´	91°47,139´
5	INDE	Chamul	Concepción Tutuapa	San Marcos	104	15°21,031´	91°46,453´
6	INDIE	Chapil	Concepción Tutuapa	San Marcos	91	15°19,812´	91°46,338´
7	INDE	Huispache	Concepción Tutuapa	San Marcos	360	15°15,557´	91°56,068´
8	INDE	Trampa del Coyote	Concepción Tutuapa	San Marcos	80	15°21,031´	91°46,453´
9	INDE	20 de Agosto	Malacatán	San Marcos	300	14°56,893´	92°03,982´
10	INDE	La Central	Malacatán	San Marcos	100	14°59,528´	92°05,204´
11	INDE	Santa Rosa de Lima	Malacatán	San Marcos	162	15°01,073´	91°57,463´
12	INDE	Sector y Finca Verapaz	Nueve Progreso	San Marcos	28	14°57,896´	92°00,174´
13	INDE	Suchiate -	Sabinal	San Marcos	80		
14	INDE	Aldea La Florida Paraje Tuichuna	San Miguel Ixtahuacán	San Marcos	200	15°18,639´	91°46,908´
15	INDE	La Cuchilla	San Pedro Sacatepéquez	San Marcos	135	14°59,244´	91°44,533´
16	INDE	Piedra Parada Sector	Son Pedro Sacatepéquez	San Marcos	91	15°18,639´	91°46,908´
17	INDE	Escupija	Sipacapa	San Marcos	53	15°12,284´	91°43,273´
18	INDE	Agua zarca	Tacanán	San Marcos	80	15°15,112´	92°06,891´
19	INDE	Colonia Belén	Tacanán	San Marcos	89	15°13,627´	92°03,710´

No.	Request by	Community	Municipality	Department	Users*	Latitude (N)	Longitude (W)
20	INDE	Cruz de Barranca	Tacanán	San Marcos	300	15°18,868´	92°06,612´
21	INDr	Chiquilau	Tacanán	San Marcos	80	15°15,425´	92°00,351´
22	INDE	La Reforma	Tacanán	San Marcos	30	15°15,425´	92°00,351´
23	INDE	Las Salvias	Tacanán	San Marcos	60	15°16,073´	92°08,170´
24	INDE	Nueva Esperancita	Tacanán	San Marcos	45	15°18,868´	92°06,612´
25	INDE	San Antonio Tojcheche	Tacanán	San Marcos	72	15°15,897´	92°00,748´
26	INDE	Tohaman, Aldea Chequin	Tacanán	San Marcos	126	15°15,112´	92°06,891´
27	INDE	Vista Hermosa	Tacanán	San Marcos	90	15°16,073´	92°08,171´
28	INDE	El Porvenir	Tacanán	San Marcos	77	15°14,829´	92°03,422´
29	INDE	Chana	Tajumulco	San Marcos	50	14°59,245´	91°44,540´
30	INDE	El Naran o	Tajumulco	San Marcos	30	15°01,389´	91°57,250´
31	INDE	Nueva Florida	Tajumuco	San Marcos	153	15°02,845´	92°03,900´
32	INDE	Nuevo Suchiate	Tajumulco	San Marcos	50	15°01,731´	92°04,275´
33	INDE	San José U Pez	Tajumulco	San Marcos	102	14°59,528´	92°05,204´
34	INDE	Taxbal	Tajumulco	San Marcos	11	15°01,801´	92°57,221´
35	INDE	Tocuto	Tajumulco	San Marcos	106	15°05,070´	91°55,266´
36	INDE	Tochincuto	Tajumulco	San Marcos	66	15°02,408´	91°57,279´
37	INDE	Totana	Tajumulco	San Marcos	40	15°01,730´	92°03,900´
38	INDE	Tuixcún	Tajumulco	San Marcos	99	15°02,122´	91°57,224´
39	INDE	Unión Tolax	Tajumulco	San Marcos	150	15°01,073´	91°57,463´
40	INDE	Vista Frontera	Tajumulco	San Marcos	137	15°02,845´	92°03,900´
41	INDE	Plan Villa Nueva	Tajumulco	San Marcos	70	14°56,893´	92°03,982´
42	INDE	Malacate	Tajumulco	San Marcos	77	15°04,621´	91°56,259´
43	INDE	California	Tejutla	San Marcos	34	15°18,650´	91°46,910´
44	INDE	Los Cerezos	Tejutla	San Marcos	43	15°12,292´	91°43,233´
45	INDE	Nueva Esperanza	Tejutla	San Marcos	69	15°18,639´	91°46,908´
46	INDE	Provincia,	Tejutla	San Marcos	20	15°04,525´	91°47,158´

No.	Request by	Community	Municipality	Department	Users*	Latitude (N)	Longitude (W)
		La Democracia					
47	INDE	Chacojom	Tejutla	San Marcos	51	15°36,700'	91°48,827'
48	INDE	San Juan de Loarca	Tumbador	San Marcos	45	14°52,524'	91°58,519'
49	INDE	La Soledad	Tumbador	San Marcos	67	15°04,260'	92°03,666'
50	MEM	Aldea Tuichuna	Concepción Tutuapa	San Marcos	42	15°18,303'	91°47,031'
51	MEM	Cantón Nueva Reforma	Tacaná	San Marcos	100	15°17,328'	92°05,167'
52	MEM	Cantón Belesquizón	Tacaná	San Marcos	25	15°15,425'	92°00,351'
53	MEM	Aldea El Malacatio	Tajumulco	San Marcos	60	15°04,621'	91°56,259'
54	MEM	Cieneguillas	Tejutla	San Marcos	95	15°11,595'	91°51,759'
55	MEM	San Luis Tuimuj	Comitancillo	San Marcos	180	15°04,730'	91°47,325'

\*Users at June 2001

Table No. 6

## Localities with unfavourable report

No.	Request by	Community	Municipality	Department	Users*	Latitude (N)	Longitude (W)
1	MEM	Caserío Unión Reforma	Sibinal	San Marcos	22	15°04,260´	91°52,616´
2	INDE	Caserío 20 de octubre	Malacatán	San Marcos	10	15°01,073´	91°57,463´
3	INDE	El Carmen Frontera	Malacatán	San Marcos	88	14°59,528´	92°05,204´
4	INDE	Comunidad El Chagüite	Malacatán	San Marcos	30	14°59,528´	92°05,204´
5	INDE	Aldea San José Zelandia	San Pablo	San Marcos	15	14°57,895´	92°00,174´
6	INDE	Caserío Nueva Buena Vista	San Pablo	San Marcos	50	14°52,524´	91°58,519´
7	INDE	Aldea El Olvido	Malacatán	San Marcos	0	15°01,871´	92°03,666´
8	INDE	Cantón Tolá	Tajumulco	San Marcos	16	15°14,829´	92°03,422´
9	INDE	Caserío Colben	Tejutla	San Marcos	42	15°19,773´	91°46,358´
10	INDE	Cantón Buena Vista	Tacaná	San Marcos	90	15°14,829´	92°03,422´
11	INDE	Cantón Pin Pin	Tacaná	San Marcos	410	15°12,609´	92°00,296´
12	INDE	Tojchoc Grande	Tacaná	San Marcos	281	15°08,777´	92°02,916´
13	INDE	Cantón Tuichapse	Tacaná	San Marcos	140	15°14,330´	92°03,730´
14	INDE	Cantón Tuisajchis	Tacaná	San Marcos	140	15°16,869´	92°07,295´
15	INDE	Aldea Toacá	Tacaná	San Marcos	75	15°12,611´	92°00,320´
16	INDE	La Blanca	Ocos	San Marcos	0	14°57,896´	92°00,174´

\*Users at June 2001

## V. ANNEXES

Basic Information for the socioeconomic evaluation of localities with FAVORABLE REPORT.

Basic Information for the socioeconomic evaluation of localities with UNFAVORABLE REPORT.

# COMMUNITIES WITH FAVORABLE REPORT

(AN EXAMPLE)

## BASIC INFORMATION FOR THE SOCIOECONOMIC EVALUATION OF LOCALITIES REQUESTED BY MEM

### I. Evaluator and Dates

Evaluator: Engineer Francisco Gómez C.

Dates: 13/06/2001

### II. Identificación of the Project

Locality: San Luis Tuimuj

Municipality Evaluator: Comitancillo

Department Evaluator: San Marcos

Latitude: 15°04.730'

Longitude: 91°47.325'

### III. Economic activities

Main economic activity: Farmers, carpenters, bricklayers, blacksmiths, tailors and bakers

Monthly Incomes for family: Q450.00

Services: All the services in the center of the village

Business: All the business in the center of the village

Local impact: Carpentry shops, tailorings and mechanics

### IV. Bulding Company

Name: ----

Address: ----

### V. Contributions

Contribute community

Cash: Q. 0 In manpower: Q. 0

In feeding: Q. 0 For drawings: Q. 10,800.00

Others: ----

Contribute of other entities:

Value: ----Entity: ----

Value: ----Entity: ----

### IV. Data of the Project

New: --- Amplification: x

In construction--- Finished--- Not initiate x

Users' number: 180

Distances (mts) of the line before executing the project: 350 (mts)

#### VII Construction Date

Dates of beginning: ---

Finalization date: ----

#### VIII. Information of the Committee of Development

President: Reyes David López and López

Person who gave the information: President of the Committee

IX. Remarks: The community paid the topography of the electrical net

X. Report: On the basis of the analysis of the information is presented the Favorable report of socioeconomic evaluation of San Luis Tuimuj, Comitancillo, San Marcos.

# COMMUNITIES WITH UNFAVORABLE REPORT

(AN EXAMPLE)

**MINISTRY OF ENERGY AND MINES  
GENERAL ADMINISTRATION OF ENERGY**

Ref.: DGE-409-2001  
**Guatemala, July 12 2001**

Alcon Engineer :

I have the pleasure to contact you, to report that during the date from 12 up to 30 of June of the present year, it was carried out the Socioeconomic Evaluation according to the Article 47 of the General Law of Electricity, in different localities that are located in the rural area of the country whose results are expressed in the REPORT - IVI - 2001.

In the mentioned evaluation were found localities with Unfavourable Socioeconomic Evaluation Report, because they are located in the obligatory area authorized to the companies DEORSA AND DEOCSA; for such a reason assisting to that settled down in the article 65 of the Regulation of the General Law of Electricity, I request you to sent their instructions to where it corresponds, to the effects of connecting the electric power to the housings of each one of the following localities:

Nº	LOCALITY	MUNICIPALITY	DEPARTMENT
1	Caserío Unión Reforma	Sibinal	San Marcos
2	Caserío 20 de octubre	Malacatán	San Marcos
3	El Carmen frontera	Malacatán	San Marcos
4	Comunidad El Chagüite	Malacatán	San Marcos
5	Aldea San José Zelandia	San Pablo	San Marcos
6	Caserío Nueva Buena Vista	San Pablo	San Marcos
7	Caserío Colben	Tejutla	San Marcos

Information taken from the Report SEE-2001, (Rural Electrification Department)

Best Regards

Sincerely,

Rudy H. Nájera Sagastume Engineer  
GENERAL DIRECTOR OF ENERGY

Mr. Engineer  
Ignacio Alcon  
ELECTRIFICATION RURAL PLAN MANAGER  
UNION FENOSA

### **BASIC INFORMATION FOR THE SOCIOECONOMIC EVALUATION OF LOCALITIES REQUESTED BY MEM**

#### **I. Evaluator and Dates**

Evaluador: Ing. Francisco Gómez C.  
Dates: 19/06/2001

#### **II. Identificación of the Project**

Locality : Caserfo Unión Reforma  
Municipality Evaluator : Sibinal  
Department Evaluator : San Marcos  
Latitud: 15°04.260'  
Longitude: 91°52.616'

#### **III. Economic activities**

Main economic activity: Farmers, carpenters, bricklayers, , and tailors  
Monthly Incomes for family : Q500.00  
Services: 1 primary school; 1 communal living room; drinkable water  
Business: 1 nixtamal mill; 4 stores ; 1 carpentry  
Local impact: None

#### **IV. Bulding Company**

Name: ----  
Address: ----

#### **V. Contributions**

Contribute community  
Cash: Q. 0                      In manpower: Q. 0  
In feeding: Q. 0              For drawings: Q. 0  
Others: -----  
Contribute of other entities:  
Value: ----- Entity: -----  
Value: ----- Entity: -----



IV. Data of the Project

New: --- Amplification: x

In construction--- Finished--- Not initiate x

Users' number: 22

Distances (mts) of the line before executing the project: 150 (mts)

VII Construction Date

Dates of beginning: ---

Finalization date: ----

VIII. Information of the Committee of Development

President : Andrés Martiniano Marroquín

Person who gave the information: Encarnación Miguel Ramirez (Secretary)

IX. Remarks In the year 2000 Union Fenosa carried out the topographical studies of the electrical net.

X. Report: On the basis of the analysis of the information is presented the Unfavourable report of socioeconomic evaluation of Caserío Unión Reforma, Sibinal, San Marcos.

**MINISTRY OF ENERGY AND MINES  
GENERAL ADMINISTRATION OF ENERGY  
RURAL ELECTRIFICATION DEPARTMENT**

**EVALUATION FORM OF COMMUNITIES TO EMIT VERDICT OF  
REQUESTED SOCIOECONOMIC EVALUATION FOR THE INDE**

**I. EVALUATOR AND DATES**

EVALUATOR: \_\_\_\_\_

EVALUACIÓN DATE \_\_\_\_\_

**II. IDENTIFICATION OF THE PROJECT**

COMMUNITY: \_\_\_\_\_

MUNICIPALITY \_\_\_\_\_

DEPARTMENT: \_\_\_\_\_

**III. ECONOMIC ACTIVITIES**

MAIN ECONOMIC ACTIVITY OF THE POPULATION: \_\_\_\_\_

AVERAGE INCOMES MONTHLY OF THE FAMILY: \_\_\_\_\_

UTILITIES: \_\_\_\_\_

BUSINESS: \_\_\_\_\_

PRODUCTIVES ACTIVITIES GENERATED BY THE ELECTRIC ENERGY

LOCAL IMPACT LOCAL IN THE BENEFICIARIES (, SHOPS, ETC.):

---

#### IV. DATA OF THE PROJECT

NEW \_\_\_\_\_ AMPLIFICATION \_\_\_\_\_

THE COMMUNITY IS ELECTRIFIED YES \_\_\_\_\_ NO \_\_\_\_\_

NUMBER OF USERS: \_\_\_\_\_

DISTANCES TO THE ELECTRICAL LINE OR NET THAT EXISTED BEFORE OF  
EXECUTING THE PROJECT: \_\_\_\_\_

#### V. CONTRIBUTIONS (COSTS OF THE WORK)

##### a) COMMUNITY CONTRIBUTION

In cash \_\_\_\_\_

In non qualified  
manpower \_\_\_\_\_  
(opening of holes, transfer of poles, transfer of materials to the place of the work, stretched  
of cables, , etc.)

In feeding (not paid by the construction company ):

Other payments ( specify quantity and object):

\_\_\_\_\_  
(lodging, transport of personal, etc.)

##### b) OTHER CONTRIBUTIONS

FONAPAZ, FODIGUA, FOGUAVI, MEM, MUNICIPALITY, DEPARTMENTAL  
GOVERNMENT, FIS, CODEDUR, EMBASSIES, ANOTHER:

\_\_\_\_\_  
QUANTITY Q.: \_\_\_\_\_

STUDY EXECUTION: \_\_\_\_\_

WHO PAY THE PLANES, STUDY, VALUE: \_\_\_\_\_

#### VI. CONSTRUCTION COMPANY

CONSTRUCTION COMPANY

\_\_\_\_\_  
ADDRESS OF THE COMPANY:

VII. DATE OF CONSTRUCTION

DATES OF BEGINNING OF THE CONSTRUCTION: \_\_\_\_\_  
(SEE OPENING OF IT WORKS)

DATE OF FINISHING OF THE CONSTRUCTION: \_\_\_\_\_  
(RECEPTION OF THE WORK)

VIII. INFORMATION OF THE COMMITTEE OF DEVELOPMENT

PRESIDENT OF THE COMMITTEE LOCAL: \_\_\_\_\_

PERSON WHO PROVIDE THE INFORMATION: \_\_\_\_\_

IX. REMARKS:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

X. REGISTRATIONS

Satellite \_\_\_\_\_  
Map \_\_\_\_\_  
Pointer \_\_\_\_\_  
Elevation \_\_\_\_\_  
Longitude \_\_\_\_\_  
Latitude \_\_\_\_\_

XI. DRAWING:

## A6 Definition of a house for electrification purposes

In the Electricity Law a consumer (usuario in Spanish) is an immovable (building) owner that has electricity service. More generally it is not clear whether a building needs to comply with certain minimum conditions (eg one brick wall and a roof) before it has a right to an electricity connection.

For the purposes of certification of electrification of houses under the PER scheme, the Technical Committee (CT, see Section 3.4) sets a minimum requirement as follows:

- 1) Minimum dimensions of 2.50 m x 3.00 m and height of 1.90 m.
- 2) With continuous roof and walls, except for doors and windows.
- 3) The floor should be smooth. The land around the household should be level.
- 4) It must have a door.
- 5) It must be constructed with “formal” building materials such as: wood, tiles, roofing tiles, concrete, concrete bricks, clay bricks, steel plates or similar.
- 6) If it does not fulfil the above requirements, it can be connected to an electric supply if it is under construction or if it is occupied.

## **A7 Progress Report of INDE on PER**

NATIONAL INSTITUTE OF ELECTRIFICATION

# RURAL ELECTRIFICATION PLAN

TRUST FUND OF ADMINISTRATION (INDE)

RURAL WORKS OF WEST AND EAST (2000-2004)

(2000-2004)

GUATEMALA, FEBRUARY 2002

## Plan of rural electrification

The Plan of rural Electrification is an execution through the TRUST FUND of Administration (INDE) Rural Works of West and East, constituting an obligation on behalf of the electrical distribution companies, building the included projects in the referential rural electrification plan (PER).

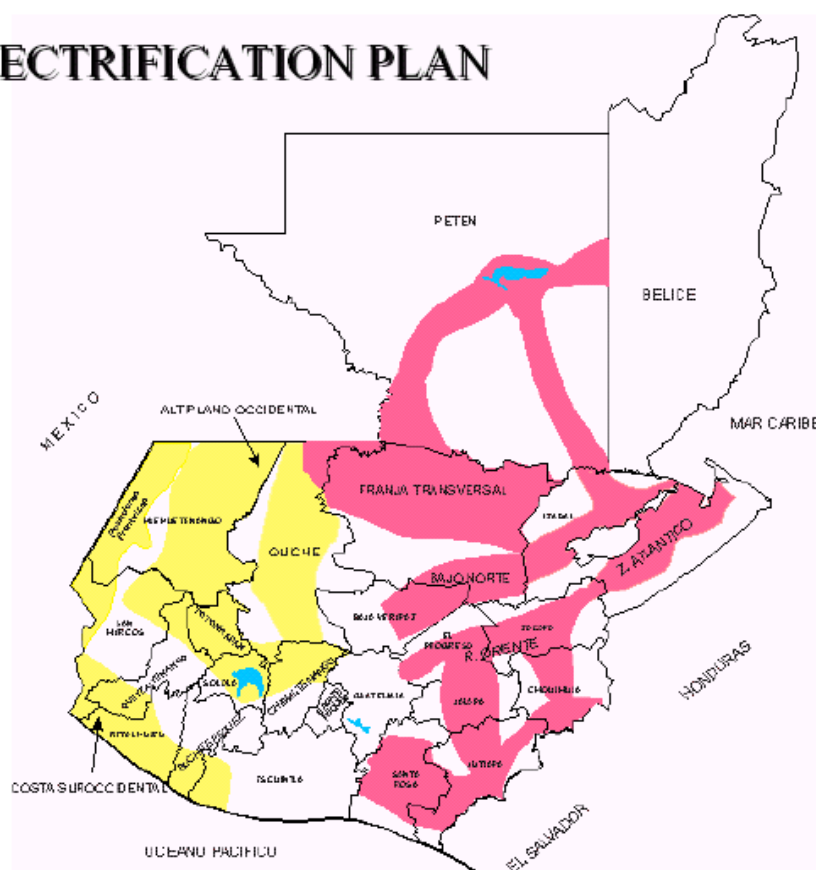
### Objectives.

- To introduce electric power to 280.000 new users, equivalent to 1.5 million inhabitants.
- To build works of electric power transmission
- To increase the index of rural electrification in the country to 90%

The Plan of Electrification contemplates transmission projects and distribution of electric power in the east and West region of the country, interconnecting the department of The Petén.

## Plan of rural electrification to be executed in 2000-2004

### RURAL ELECTRIFICATION PLAN



## Infrastructure of electric Transmission of the INDE.

EAST		MILLIONS US\$
16 SUBSTATIONS	507 MVA	39.00
TRANSMISSION LINES	780 KMS	66.00

WEST		MILLIONS US\$
12 SUBSTATIONS	168 MVA	18.00
TRANSMISSION LINES	500 KMS	28.41
	TOTAL	151.41

## Rural Electrification. Investments in distribution

Regional programs	Customers	Inhabitants	Communities	Millions US\$
East Distribution	123,315	690,564	1,161	75,55
West Distribution	157,324	881,014	1,472	107,04
Total	280,639	1,571,578	2,633	182,59

## STRUCTURES OF THE TRUST FUND

The fiduciary bank selected for the services of Administration is Banco Agrícola Mercantil de Guatemala (Banco Agromercantil de Guatemala S.A) and The Bank of New York

Trustees: DEORSA AND DEOCSA

Trustor: INDE

### Patrimony

The patrimony will constitute it a total mount of US\$ 333 millions.

For the conformation of the same one, contributions coming from several sources:

Contribute to the TRUST FUND:

EXECUTED:

- 101.0 MUS\$ Sale of 80% works of the distribution companies (4/5/99)
- 51.0 MUS\$ Treasure Bond MFP (5/1/00)
- 6.3 MUS\$ Sale 5% shares (to Union Fenosa 3/11/2000)
- 10.9 MUS\$ for concept of yielded interests.



169.2

## CONTRIBUTE TO THE TRUST FUND.

### PROJECTED:

- 52.0 MUS\$ Loan to the BCIE (in procedure)
- 90.0 MUS\$ Loan to the IDB (in procedure)
- 7.0 MUS\$ Interests TRUST FUND (rest of years)
- 2.8 MUS\$ Sale to employees (5.51 % works)
- 12.0 MUS\$ Sale dispersed remainder shares

## PRINCIPAL ACCOUNT

The principal account of the TRUST FUND is an investment account in dollars in The Bank of New York with the following characteristics:

- Investment Account of variable yield
- Investment briefcase according to the approaches of the contract
  - i) Fixed rent Investment of sovereign debt of countries member of the one G7
  - ii) Debt emitted by corporations or companies or entities whose credit qualification is AA - or bigger according to Standards & Poors
  - iii) Nominated in dollars or with total cover of exchange risk.

## TECHNICAL COMMITTEE OF THE TRUST FUND.

### Conformation:

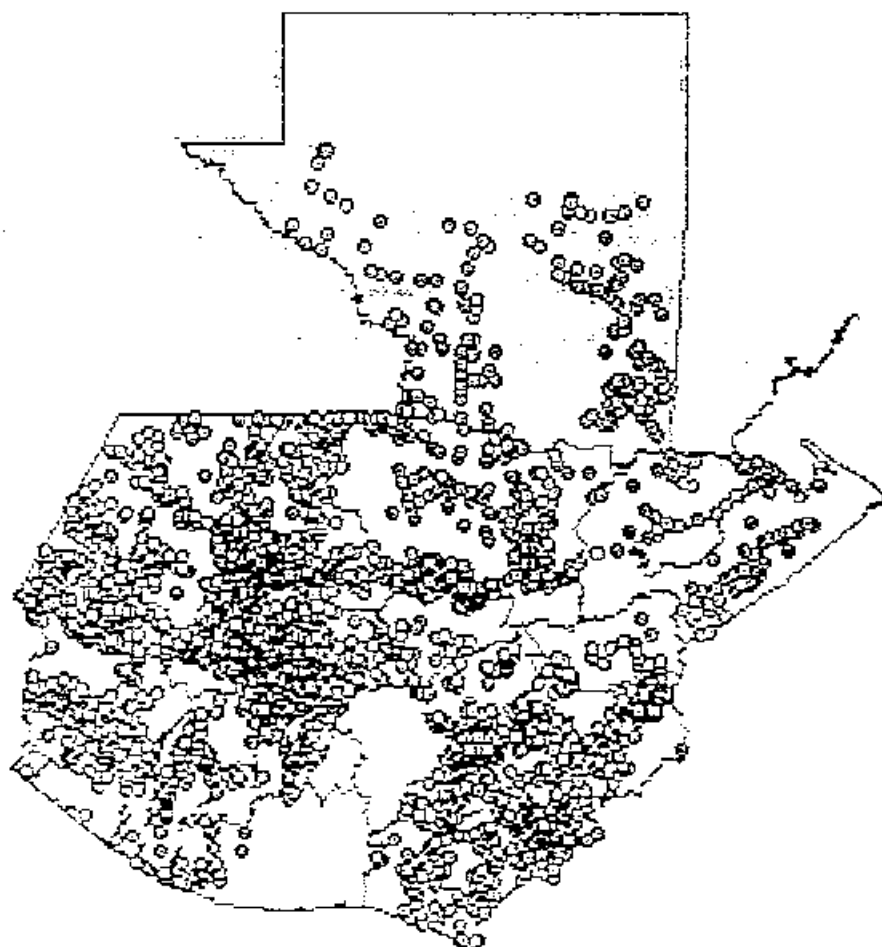
- A representative of the MEM
- A representative of the INDE
- A representative of the electrical companies distribution

## WORK OF THE TECHNICAL COMMITTEE.

- a) Approve the Plan of Rural Electrification
- b) Prioritize the works
- c) Approve the substitution of communities
- d) Certify the conclusion of the works as well as to approve the respective payment
- e) Solve any controversy
- f) Propose the increment to the duration term of the PER
- g) Give continuity to the works of the PER
- h) Determine not foreseen costs and quantities.
- i) Revise the mechanism of substitution of communities and to modify it if being necessary
- j) Solve not foreseen cases.

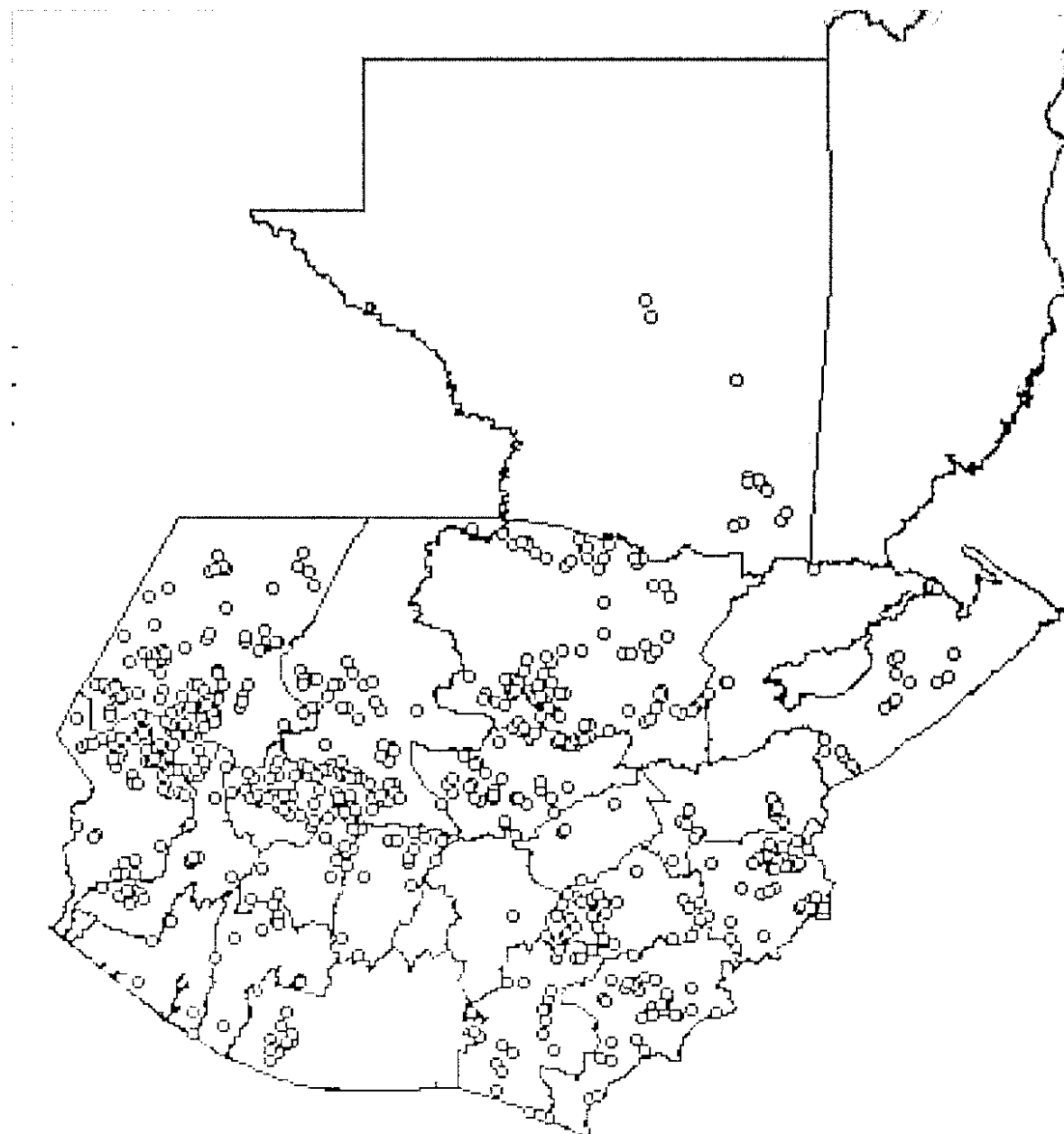
Remarks: the functions in red(?) are decisions taken unanimously for the Technical Committee.

## Referential Plan of rural electrification



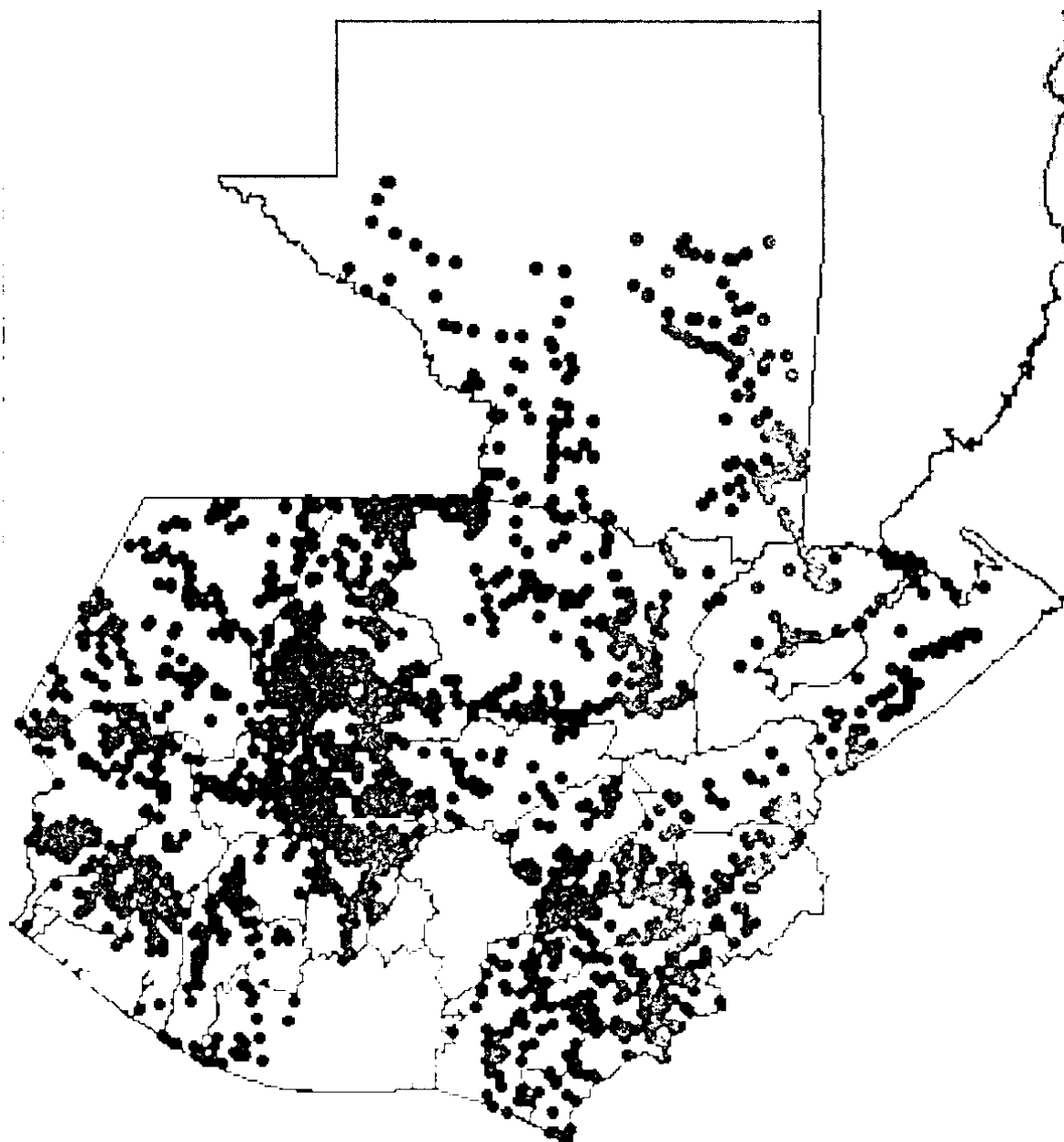
TOTAL	COMUNITIES	USERS
	2,633	280,639

## Plan of rural electrification executed (31/01/02)



TOTAL	COMUNITIES	USERS
	963	105.332

## Plan of rural electrification to execute.



TOTAL	COMUNITIES	USERS
	1.670	175.307

## PER EXECUTED INVESTMENT AT 31/01/2002

	US\$ MILLIONS
DISTRIBUTION	61,99
TRANSMISSION	40,21
TOTAL	102,20

## EXECUTED COMMUNITIES

DEPARTMENT	COMMUNITY	USERS
ALTA VERAPAZ	110	11,031
BAJA VERAPAZ	48	4,568
CHIMALTENANGO	32	3,400
CHIQUMULA	60	4,576
ELPROGRESO	3	138
EL QUICHE	108	10,229
ESCUINTLA	16	2,536
HUEHUETENANGO	117	15,779
IZABAL	33	3,920
JALAPA	46	4,937
JUTIAPA	72	6,955
PETEN	16	1,195
QUETZALTENANGO	39	4,273
RETALHULEU	9	1,793
SAN MARCOS	128	15,167
SANTA ROSA	40	3,640
SOLOLA	12	951
SUCHITEPEQUEZ	23	3,327
TOTONICAPAN	32	5,336
ZACAPA	19	1,581
TOTALS	963	105,332

## Comunidades Finalizadas en Supervisión

## FINISHED COMMUNITIES (waiting for certification)

DEPARTMENT	COMMUNITY	USERS
BAJA VERAPAZ	2	234
CHIMALTENANGO	3	125
CHIQUMULA	18	1,920
EL QUICHE	8	822
ESCUINTLA	5	342
HUEHUETENANGO	32	4,364
IZABAL	5	403
JALAPA	6	947
JUTIAPA	3	355
QUETZALTENANGO	5	1,275
RETALHULEU	1	61
SAN MARCOS	31	2,943
SANTA ROSA	3	124
SOLOLA	2	125
SUCHITEPEQUEZ	2	288
ZACAPA	1	148
TOTAL	127	14,243

## COMMUNITIES IN EXECUTION

DEPARTMENT	COMMUNITY	USERS
ALTA VERAPAZ	39	4,060
BAJA VERAPAZ	4	462
CHIQUMULA	24	2,269
PETEN	13	1,148
ELPROGRESO	7	708
EL QUICHE	3	239
ESCUINTLA	5	1,095
HUEHUETENANGO	17	1,288
IZABAL	3	329
JALAPA	1	46
JUTIAPA	4	195
QUETZALTENANGO	9	640
RETALHULEU	3	372
SAN MARCOS	11	1,079
SANTA ROSA	7	375
SUCHITEPEQUEZ	5	426
TOTAL	155	14



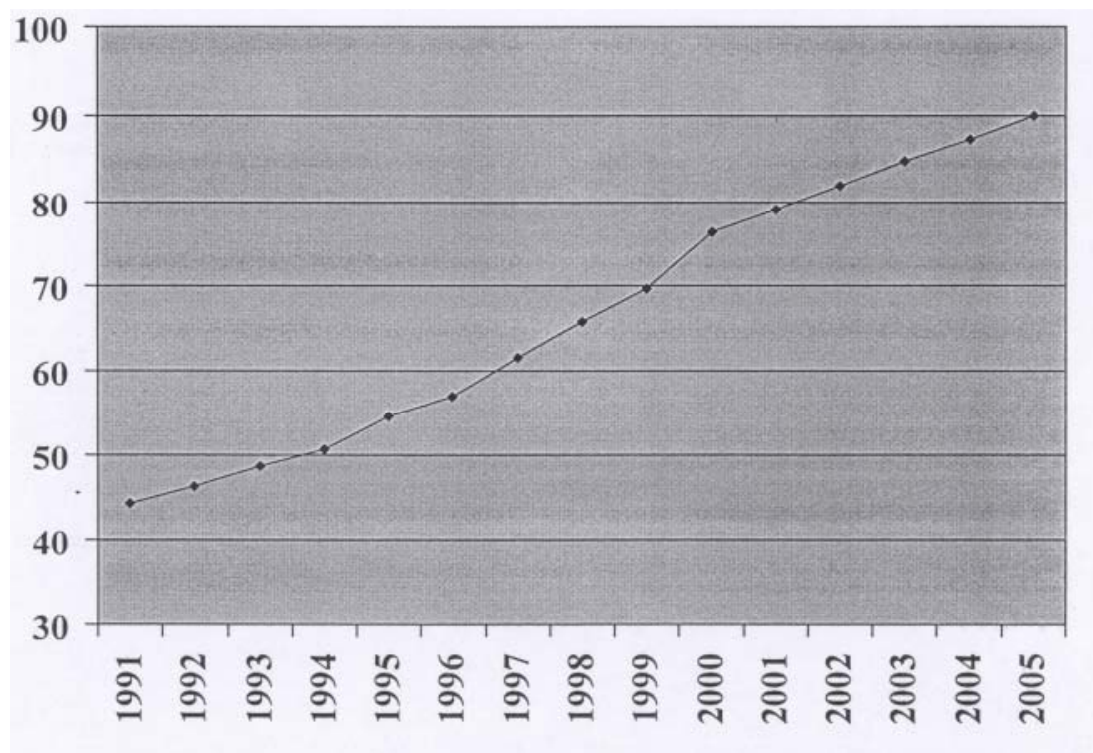
## PHYSICAL ADVANCE OF TRANSMISSION WORKS AT 31/12/2001

Transmisson lines	Length km	Accumulated Advance Year 2001 %
Chisec - Coban	56.62	90
Jalapa - Sanarate	30.21	72
Río Dulce - Ruidosa	34.9	83
Brillantes - Champerico	50.44	73
San Marcos - Tejutla	23.32	98
Huehuetenango - Ixtahuacan	36.25	67
Quiche - Zacualpa	40.74	63
La Maquina - Mazatenango	39.53	67
Huehuetenango - Soloma	41.78	83
Total	353.79	

## PHYSICAL ADVANCE OF TRANSMISSION WORKS AT 31/12/2001

Substations	Transformer kV	Accumulated Advance Year 2001 %
Soloma 10/14 MVA	69/34.5	86
Río Dulce 10/14 MVA	69/34.5	96
Mayuelas 10/14 MVA	69/34.5	100
Jalapa 10/14 MVA	69/34.5	99
El Rancho 10/14 MVA	69/34.5	99
Chisec 10/14 MVA	69/34.5	99
Zacualpa 10/14 MVA	69/13.8	98
Tejutla 10/14 MVA	69/13.8	99
La Maquina 10/14 MVA	69/13.8	99
Ixtahuacan 10/14 MVA	69/13.8	98
Champerico 10/14 MVA	69/13.8	98
Moyuta 10/14 MVA	138/13.8	100

## Evolution of the Electrification Index



## A8 Other INDE information on the progress of PER

### A8.1 Transmission - Planned

PHYSICAL ADVANCE  
ACCUMULATED

PLANNED

	Annual plans						
TRANSMISSION LINES	Km	1999	2000	2001	2002	2003	2004
<b>DEORSA</b>							
Chisec - Coban 69 kV	56.62		100				
Jalapa - Sanarate 69 kV	30.21		100				
Río Dulce - La Ruidosa 69 kV	34.90		100				
Tactic Sta Elena 230 kV	282.00			15	50	85	100
Guate Norte - Panaluya 230kV	137.00			10	55	100	
R. Dulce - Poptun 69 kV	94.00			100			
Chisec - Playa Grande 69 kV	70.00			70	100		
Estor - Río Dulce 69 Kv	50.00			30	100		
Jalapa - San Rafael Las Flores 69kV	30.00			70	100		
Bartolorne - Chisec 69kV	49.00				71	100	
Asuncion Mita - Progreso 69 kV	20						100
Rabinal - Salarna 69 kV	20.00						100
<b>DEOCSA</b>							
Brillantes - Champerico 69 kV	50.44		100				
Huehuetenango - Ixtahuacan 69 kV	36.25		100				
Huehuetenango - San Juan Ixcoy 69 kV	41.70		100				
La Máquina - Mazatenango 69 kV	39.53		100				
Quiche - Zacualpa 69 kV	40.74		100				
San Marcos - Chamac 69 kV	2.44		100				
Channac - Tejutla 69 kV	20.88		100				
Barillas - San Juan Ixcoy 69 kV	50.00			70	100		
Tacana - Tejutla 69 kV	35.00			100			
Chicaman - San Julian 69 kV	55.00				82	100	
Chicaman - Sacapulas 69 kV	35.00				43	100	
San Marcos - El Porvenir 69kV	20.00				100		
Chajul - Sacapulas as 69 kV	30.00					100	
Jacaltenango - S. Juan Ixcoy 69 kV	35.00						100

	Annual plans						
SUBSTATIONS	MVA	1999	2000	2001	2002	2003	2004
DEORSA							
Sub Moyuta 138/13.8 kV	14		100				
Sub Chisec 69/34.5 kV	14		100				
Sub Jalapa 69/34.5 kV	14		100				
Sub Mayuelas 69/34.5 kV	14		100				
Sub Rio Dulce 69/34.5 kV	14		100				
Sub El Rancho 69/34.5 kV	14		100				
Sub Sta Elena 230/34.5kV	25			5	50	100	
Sub Poptun 69/34.5 kV	14			100			
Sub Tactic 230/69 KV	150			100			
Sub Estor 69/13.8 KV	14			20	100		
Sub San Rafael Las Flores 69/13.8 kV	14			70	100		
Sub Bartolome 69/13.8 kV	14				60	100	
Sub Panaluya 230/69 kV	150				20	80	100
Sub Asuncion Mita 69/13.8 kV	14						100
Sub Rabinal 69/13.8 kV	14						100
DEOCSA							
Sub Champerico 69/13.8 kV	14		100				
Sub Ixtahuacan 69/13.8 kV	14		100				
Sub La Maquina 69/13.8 kV	14		100				
Sub San Juan Ixcoy 69/13.8 kV	14		100				
Sub Tejutla 69/13.8 kV	14		100				
Sub Zacualpa 69/13.8 Kv	14		100				
Sub Barillas 69/13.8 kV	14			70	100		
Sub Tacana 69/13.8 kV	14			100			
Sub Playa Grande 69/34 kV	14			70	100		
Sub Sacapulas 69/13.8 kV	14				40	100	
Sub Chicaman 69/13.8 kV	14				80	100	
Sub Chajul 69/13.8 kV	14					100	
Sub Jacaltenango 69/34 kV	14						100

## Remarks:

Substation Mataquescuintla is the same of substation San Rafael Las Flores

Substation Soloma is the same of substation San Juan Ixcoy

Substation Morales is the same of substation La Ruidosa

## A8.2 Transmission - status

Status of transmission projects as of 31/12/2001.

TRANSMISSION LINES			
Project	kV	km	Physical Advance Accumulated (%)
L T Chisec - Cobán	69	56.62	90
L.T. Jalapa - Sanarate	69	30.21	72
L.T. Río Dulce - Ruidosa	69	34.90	83
L.T. Brillantes - Champerico	69	50.44	73
L.T. San Marcos - Tejutla	69	23.32	98
L T Huehuetenango - Ixtahuacán	69	36.25	67
L.T. Quiché - Zacualpa	69	40.74	63
L.T. Máquina - Mazatenango	69	39.53	67
L.T. Huehuetenango - Soloma	69	41.70	83
L.T Barillas - San Juan Ixcoy	69	50.00	1
L T Chisec - Playa Grande	69	70.00	0
L T Estor - Río Dulce	69	50.00	10
L T Guate Norte - Panaluya	230	137.00	0
L T Jalapa - San Rafael Las Flores	69	30.00	47
L T Río Dulce - Poptun	69	94.00	23
L T. Tacana - Tejutla	69	35.00	40
L. T. Tactic - Santa Elena	230	282.00	0

SUBSTATIONS			
Project	MVA	km	Physical Advance Accumulated (%)
S/E Chisec	69/34.5	14	99
SIE Mayuelas	69/34.5	14	100
SIE El Rancho	69/34.5	14	99
S/E Moyuta	138/13.8	14	100
SIE Río Dulce	69/34.5	14	96
S/E Jalapa	69/34.5	14	99
SIE Champerico	69/13.8	14	98
S/E Tejutla	69/13.8	14	99
SIE Zacualpa	69/13.8	14	98
S/E Máquina	69/13.8	14	99
S/E Ixtahuacan	69/13.8	14	98
S/E Soloma (San Juan Ixcoy	69/13.8	14	86
SIE Barillas	69/13.8	14	0
S/E Estor	69/13.8	14	5
SIE Playa Grande	69/34.5	14	4.9
SIE Poptun	69/34.5	14	4.7
S/E San Rafael Las Flores	69/13.8	14	4.9
S/E Santa Elena	230/34.5	25	0
SIE Tacana	69/13.8	14	0
S/E Tactic	230/69	150	4

### A8.3 Distribution - status

#### DISTRIBUTION CONSUMERS CONNECTED

ANNUAL PLAN	PLANNED	EXECUTED CERTIFIED
1999	32,819	32,819
2000	54,501	51,351
2001	51,556	21,267
2002	51,530	
2003	45,112	
2004	45,111	
TOTAL	280,629	105,437

AT 31/01/2002

## A9 Certification procedures

The following provides examples of documentation used by independent certification bodies.

### REPORT OF CERTIFICATION WORK P.E.R RURAL ELECTRIFICATION PLAN

01) GENERAL INFORMATION OF THE REPORT  
01005

ANNUAL PLAN P.E.R.: 2001

PAYMENT: 007 (SEVEN)

FORMAT: IGGP-

Certifier: PROSELSA - SEGESA Number of given Certificates: 127 Geographical Ambit: ALL Dates of the Reports::  
certification

### 02) DATA OF NEW USERS

SERIAL NUMBER	DATA OF THE WORK TO CERTIFY			CERTIFIED NUMBER	DATES OF THE EXECUTED VISIT TO WORK	TOTAL USERS						APPROVED BY TEC. COM	ENERGIZE DATES AND REFERENCES
	COMMUNITY	MUNICIPALITY	DEPARTMENT			In Certi- fication	Nonexistent	Supervised	Non Qualified housing	Users A -200M	Total to Retain		
000	ALDEA EL COLMILLO	SAN JUAN CHAMELCO	ALTA VERAPAZ	235	LUN-17.ABR.2001	135	0	135	1	5	6	0	31.MARCH.2001
001	TONTOLES	ESQUIPULAS	CHIQUMULA S	252		062					000		23/9/01
002	SAN ANDRÉS LA LIMA	MALACATAN	SAN MARCOS P	253		151					000		9/10/01
003	LAS DELICIAS EL CHANITO	SAN RAFAEL LAS FLORES	SANTA ROSA S	254		040					000		15/10/01
004	ALDEA SAN ANTONIO TOJCHECHÉ	TACANÁ	SAN MARCOS P	255		053					000		12/6/01
005	CASERIO BUENOS AIRES	TAJUMULCO	SAN MARCOS P	256		030					000		12/10/01
006	CASERIO BUENOS AIRES TUIQU	TAJUMULCO	SAN MARCOS P	257		089					000		12/10/01
007	SAN RAFAEL BUENA VISTA	TAJUMULCO	SAN MARCOS P	258		042					000		15/10/01
008	SAN ANTONIO TOJCHECHÉ SEC	TACANÁ	SAN MARCOS P	259		006					000		14/6/01
009	COMUNIDAD CHIQUILILÁ	IXTAHUACÁN	HUEHUETENANGO P	260		148					000		10/10/01
010	CHEANGES	TAJUMULCO	SAN MARCOS P	261		057					000		13/10/01
011	PANIYÁ	MALACATANCITO	HUEHUETENANGO P	262		032					000		16/10/01
012	BACÚ SECTOR II	CONCEPCIÓN HUISTA	HUEHUETENANGO P	263		317					000		18/10/01
013	ALDEA YOCULTAC	SAN MATEO IXTATAN	HUEHUETENANGO P	264		338					000		17/10/01
014	CASERIO SAN RAFAEL CHICHI	LA DEMOCRACIA	HUEHUETENANGO P	265		053					000		30/10/01
015	TZABAL	SAN SEBASTIÁN HUEHUE.	HUEHUETENANGO P	266		090					000		26/10/01
016	LA FORTUNA	NENTON	HUEHUETENANGO P	267		213					000		24/10/01
017	COLONIA 15 DE SEPTIEMBRE LA BLANCA	OCOS	SAN MARCOS P	268		161					000		19/11/01
018	SECTOR DE LOS LEONES, CASE	EL TUMBADOR	SAN MARCOS P	269		036					000		20/9/01
019	SANTA ROSA EL AHUMADO	CHIQUMULILLA	SANTA ROSA S	270		007					000		17/10/01
020	PATZAC	SAN ANDRÉS SAJCABAJÁ	EL QUICHE P	271		040					000		30/10/01



SERIAL NUMBER	DATA OF THE WORK TO CERTIFY			CERTIFIED NUMBER	DATES OF THE EXECUTED VISIT TO WORK	TOTAL USERS						APPROVED BY TEC. COM	ENERGIZE DATES AND REFERENCES
	COMMUNITY	MUNICIPALITY	DEPARTMENT			In Certi- fication	Nonexistent	Supervised	Non Qualified housing	Users A -200M	Total to Retain		
021	ALDEA BUEYERO	ESQUIPULAS	CHIQUMULA S	272		041					000		30/10/01
022	MATAMOROS EL AHUMADO	CHIQUMULILLA	SANTA ROSA S	273		077					0		19/9/01
023	CHIMISTÁN	CANILLA	EL QUICHE P	274		049					000		6/11/01
024	COMBALCOL	SAN MARTÍN JILOTEPEQUE	CHIMALTENANGO P	275		067					000		5/11/01
026	CASERÍO BELICE, ALDEA IXCON	COLOTENANGO	HUEHUETENANGO P	276		042					000		17/11/01
026	CASERÍO SANTA TERESA, ASU	TECPAN	CHIMALTENANGO P	277		021					000		8/10/01
027	XEBALANGUAC	JOYABAJ	EL QUICHÉ P	278		136					000		6/11/01
028	SILLÓN ARRIBA	CHIQUMULA	CHIQUMULA S	279		080					000		5/11/01
029	TUNUCO ABAJO SECTOR 11	JOCOTÁN	CHIQUMULA S	280		065					000		30/10/01
030	CASERÍO TUIBOCH	TODOS LOS SANTOS CUCHUMA	HUEHUETENANGO P	281		194					000		24/11/01
031	MAJADAS	AGUACATÁN	HUEHUETENANGO P	282		063					000		16/11/01
032	EL LLANO	IPALA	CHIQUMULA S	283		027					000		27/10/01
033	EL SABINO	CUILCO	HUEHUETENANGO P	284		193					000		16/11/1
034	CASERÍO EL SOCORRO	COATEPEQUE	QUETZALTENANGO P	285		188					000		10/10/01
035	CORRAL DE PIEDRA	SAN JUAN ERMITA	CHIQUMULA S	286		076					000		21/11/01
036	EL AGUACATE	LIVINGSTON	IZABAL S	287		060					000		31/11/01
037	VISTA HERMOSA II	FLORES COSTA CUCA	QUETZALTENANGO P	288		130					000		16/10/01
038	TOJLATE, CASERÍO SABINO	COLOTENANGO	HUEHUETENANGO P	289		098					000		18/10/01
039	FINCA NAVIDAD	TAJUMULCO	SAN MARCOS P	290		021					000		22/11/01
040	TOTANA, CASERÍO 20 DE FEBRERO	TAJUMULCO	SAN MARCOS P	291		070					000		22/11/01
041	CASERÍO PLAN VILLA NUEVA	TAJUMULCO	SAN MARCOS P	292		070					000		22/11/01
042	EL GARROBO	MOYUTA	JUTIAPA S	293		049					000		9/11/01
043	NUEVO SUCHIATÉ	TAJUMULCO	SAN MARCOS P	294		050					000		11/10/01
044	EL PORVENIR	TACANÁ	SAN MARCOS P	295		068					000		29/10/01
045	RUTA A CRUZ DE BARRANCA	TACANÁ	SAN MARCOS P	296		098					000		10/10/01
046	SUNTELAJ	SAN MIGUEL ACATÁN	HUEHUETENANGO P	297		182					000		15/11/01
047	CASERÍO VISTA FRONTERA	TAJUMULCO	SAN MARCOS P	298		139					000		22/10/01
048	LA COFRADIA II, EL ISLAM	CUILCO	HUEHUETENANGO P	299		026					000		22/11/01
049	LOS ENCUENTROS	COATEPEQUE	QUETZALTENANGO P	300		363					000		7/11/01
050	IXTENAM	SAN MATEO IXTATÁN	HUEHUETENANGO P	301		130					000		22/11/01
051	JOLOMHUITZ	SAN JUAN IXCOY	HUEHUETENANGO P	302		356					000		24/11/01
052	MANZANILLAS	TEJUTLA	SAN MARCOS P	303		032,					000		31/10/01
053	LOMA DE LA NIÑA, ALDEA EL T	LA LIBERTAD	HUEHUETENANGO P	304		031					000		8/11/01
054	SAN ANTONIO TOJCHECHÉ, PIE	TACANÁ	SAN MARCOS P	305		043					000		11/11/01
055	NUEVA FLORIDA	TAJUMULCO	SAN MARCOS P	306		195					000		17/11/01
056	LA LIMA CHECOJ	SAN PEDRO NECTA	HUEHUETENANGO P	307		080					000		9/11/01
057	CANTÓN LOS CIPRESALES	CHIANTLA	HUEHUETENANGO P	308		223					000		14/11/01

SERIAL NUMBER	DATA OF THE WORK TO CERTIFY			CERTIFIED NUMBER	DATES OF THE EXECUTED VISIT TO WORK	TOTAL USERS						APPROVED BY TEC. COM	ENERGIZE DATES AND REFERENCES
	COMMUNITY	MUNICIPALITY	DEPARTMENT			In Certi- fication	Nonexistent	Supervised	Non Qualified housing	Users A -200M	Total to Retain		
058	TZALBAL	NEBAJ	EL QUICHE P	309		057					000		23/11/01
059	SANTO DOMINGO HUICÁ	LA LIBERTAD	HUEHUETENANGO P	310		140					000		23/11/01
060	SAN JUAN BULLAJ	TAJUMULCO	SAN MARCOS P	311		155					000		9/11/01
061	COLONIA BELÉN	TACANÁ	SAN MARCOS P	312		095					000		23/11/01
062	TOJLATE	COLOTENANGO	HUEHUETENANGO P	313		192					000		28/11/01
063	CASERÍO NARANJO	TAJUMULCO	SAN MARCOS P	314		033					000		28/11/01
064	ALDEA TOCUTO	TAJUMULCO	SAN MARCOS P	315		099					000		27/11/01
065	LINDA VISTA	TACANÁ	SAN MARCOS P	316		080					000		23/11/01
066	COCOB	NEBAJ	EL QUICHE P	317		043					000		22/11/01
067	LA CEIBA	MOYUTA	JUTIAPA S	318		197					000		25/11/01
068	SAN FRANCISCO EL RETIRO	CUILCO	HUEHUETENANGO P	319		158					000		30/11/01
069	LOS ENCUENTROS	SAN JUAN ERMITA	CHIQUMULA S	320		051					000		4/12/01
070	SAN ANTONIO LAS LAJAS	SAN JUAN ERMITA	CHIQUMULA S	321		114					000		4/12/01
071	RIO ARRIBA	SAN JUAN ERMITA	CHIQUMULA S	322		066					000		3/12/01
072	CASERÍO PATZOJÓN CHIQUITO	SAN PEDRO JOCOPILAS	EL QUICHÉ P	323		219					000		29/11/01
073	TOCHINCUTO	TAJUMULCO	SAN MARCOS P	324		065					000		28/11/01
074	TIJQUIJEL	CONCEPCION TUTUAPA	SAN MARCOS P	325		223					000		22/10/01
075	XABIL	CUNEN	EL QUICHÉ P	326		030					000		29/11/01
076	TUICOPOTE	OLOPA	CHIQUMULA S	327		144					000		8/11/01
077	TUICOJEL	SAN BARBARA	HUEHUETENANGO P	328		100					000		26/11/01
078	SAN MARCOS NISA	MAZATENANGO	SUCHITEPEQUEZ P	329		077					000		5/10/01
079	PACUT	SANTA CATARINA IXTAHUACAN	SOLOLÁ P	330		053					000		6/10/01
080	CHUICOMO	SANTA CATARINA IXTAHUACAN	SOLOLÁ P	331		072					000		5/10/01
081	CALLE MOGOLLÓN A LAS PAM	NUEVA CONCEPCIÓN	ESCUINTLA P	332		032					000		6/10/01
082	AGUA FRIA	LA UNIÓN	ZACAPA S	333		148					000		24/11/01
083	PANIYA EL RODEO	MALACATANCITO	HUEHUETENANGO P	334		124					000		7/12/01
084	TALAJCHEU, EL CUATE	SAN JUAN ATITÁN	HUEHUETENANGO P	335		043					000		4/12/01
085	CASERÍO LA VEGA	SAN JUAN ATITÁN	HUEHUETENANGO P	336		049					000		3/12/01
086	CASERÍO TAXBAL	TAJUMULCO	SAN MARCOS P	337		012					000		28/11/01
087	PACUMAL	SAN MATEO IXTATÁN	HUEHUETENANGO P	338		102					000		5/12/01
088	CHANA (SECTOR LOS PEREZ)	TAJUMULCO	SAN MARCOS P	339		054					000		11/12/01
089	PAMISCALCHÉ	CUBULCO	BAJA VERAPAZ S	340		123					000		4/12/01
090	CHUIPAPOP	CUBULCO	BAJA VERAPAZ S	341		108					000		4/12/01
091	CHANCÓ	SAN JUAN ERMITA	CHIQUMULA S	342		065					000		4/12/01
092	CASERÍO AZUCENAS	JOYABAJ	EL QUICHE P	343		275					000		7/12/01
093	TARACENA	SANTO DOMINGO	SUCHITEPEQUEZ P	344		211					000		17/12/01
094	TROCHA 14	NUEVA CONCEPCIÓN	ESCUINTLA P	345		032					000		24/12/01

SERIAL NUMBER	DATA OF THE WORK TO CERTIFY			CERTIFIED NUMBER	DATES OF THE EXECUTED VISIT TO WORK	TOTAL USERS						APPROVED BY TEC. COM	ENERGIZE DATES AND REFERENCES
	COMMUNITY	MUNICIPALITY	DEPARTMENT			In Certi- fication	Nonexistent	Supervised	Non Qualified housing	Users A -200M	Total to Retain		
095	TROCHA 12, CALLE 5	NUEVA CONCEPCIÓN	ESCUINTLA P	346		050					000		24/12/01
096	CALLE DEL BANCO, CHAPARRA	NUEVA CONCEPCIÓN	ESCUINTLA P	347		052					000		20/12/01
097	CHICORRAL	CHICAMAN	EL QUICHE P	348		109					000		19/12/01
098	LA CANDELARIA	SAN PEDRO PINULA	JALAPA S	349		055					000		27/11/01
099	EL CUJITO	SAN PEDRO PINULA	JALAPA S	350		043					000		26/11/01
100	CASERIO SANTA ISABEL	RETALHULEU	RETALHULEU P	351		061					000		26/12/01
101	LA UNIÓN TOLASH	TAJUMULCO	SAN MARCOS P	352		410					000		17/12/01
102	TROCHA 13	NUEVA CONCEPCIÓN	ESCUINTLA P	353		176					000		24/12/01
103	ALDEA CRUZ QUEMADA	SANTA BARBARA	HUEHUETENANGO P	354		140					000		18/12/01
104	RUTA A CRUZ DE BARRANCA	TACANÁ	SAN MARCOS P	355		133					000		20/12/01
105	ALDEA YALAMBOJOCH	NENTÓN	HUEHUETENANGO P	356		151					000		18/12/01
106	GUAYABQUEJ	SAN MATEO XTATAN	HUEHUETENANGO P	357		099					000		7/12/01
107	VUELTA GRANDE	CUILCO	HUEHUETENANGO P	358		128					000		14/12/01
108	EL TROJE	COATEPEQUE	QUETZALTENANGO P	359		459					000		19/12/01
109	CHAMUXÚ	LA DEMOCRACIA	HUEHUETENANGO P	360		139					000		28/12/01
110	TZAN ABAJ, ALDEA PARCORRAL	TECPÁN	CHIMALTENANGO P	361		037					000		10/12/01
111	LAGUNA SECA	SAN PEDRO PINULA	JALAPA S	362		093					000		13/12/01
112	SAN JOSÉ LA PAZ	TAJUMULCO	SAN MARCOS P	363		233					000		18/12/01
113	MONTE GRANDE LA LAGUNA	IPALA	CHIQUMULA S	364		045					000		19/12/01
114	QUEQUEXQUE	SAN JUAN ERMITA	CHIQUMULA S	365		039					000		20/12/01
115	SAN ISIDRO	ESQUIPULAS	CHIQUMULA S	366		242					000		11/12/01
116	POTRERILLOS	ESQUIPULAS	CHIQUMULA S	367		030					000		21/12/01
117	VALLE DE JESIJS	ESQUIPULAS	CHIQUMULA S	368		162					000		21/12/01
118	PEDREGALITO	QUETZALTEPEQUE	CHIQUMULA S	369		090					000		21/12/01
119	MORRITO	SAN PEDRO PINULA	JALAPA S	370		080					000		12/12/01
120	AGUAMECATE	SAN PEDRO PINULA	JALAPA S	371		245					000		12/12/01
121	LA PASTORIA	JALAPA	JALAPA S	372		431					000		18/12/01
122	CHACALTÉ	LIVINGSTON	IZABAL S	373		097					000		19/12/01
123	PARCELAMIENTO NUEVO SAN	LIVINGSTON	IZABAL S	374		025					000		19/12/01
124	LA ESPERANZA	LIVINGSTON	IZABAL S	375		012					000		26/12/01
125	PALLMILLA ARRIBA	QUETZALTEPEQUE	CHIQUMULA S	376		221					000		26/12/01
126	ALDEA MONTUFAR	LOS AMATES	IZABAL S	377		219					000		12/12/01
127	LLANO LARGO, CANTÓN VALEN	JUTIAPA	JUTIAPA S	378		109					000		25/10/01
					TOTALES	14243	000	0	000	0	0		

NOTES:

- 01) THIS FORMAT HAS 200 LINES, HIDDEN AMONG THE LINE 069 AND THE 223; IN CASE OF REQUIRING A BIGGER QUANTITY, YOU CAN INSERT AS MANY LINES AS NEED (AMONG THE LINE 221 AND THE 222).
- 02). WITH THIS DOCUMENT IT WILL EXECUTE THE VISITS TO WORK. . ATTACH WILL BE ABLE TO INCLUDE ALL THOSE DOCUMENTS THAT THE CERTIFIER CONSIDERS PERTINENT . ANY IMPORTANT EXPLANATION SHOULD MAKE IT IN WRITING IN PAPER, SO THAT IT IS PRESENTED TO THE TECHNICAL COMMITTEE. THE ANNEXED PAPER "REPORT OF THE CERTIFIER" SHOULD BE FILLED FOR EACH WORK AND THERE CAN WRITE THE DETAILS, COMMENTS OR REMARKS OF THE FIELD VISIT.
- 03) THIS FORM HAVE TO BE DELIVERED PRINTED TO THE PERMISSION DEPARTMENT OF THE PER IN THE CENTRAL OFFICE, SO THAT THE ORIGINAL CERTIFICATE WILL BE SIGNED BY THE TECHNICAL REPRESENTANT.  
ANY DOUBTS CAN SEND TO THE FOLLOWING ADDRESS: JRLOPEZ@UEF.COM.GT 0 TO CONTACT THE ENGINEER J. RAÚL LÓPEZ G. TO THE 367-9300 EXTENSION 79531 ARE IMPORTANT THAT THIS SUMMARY WILL BE APPROPRIATE WITH THE REPORTS OF THE CERTIFIER
- 04) THE CERTIFIERS WILL REPORT THE NUMBER OF USERS TO FEWER OF TWO HUNDRED ( MTS) AND WITH NON QUALIFIED HOUSINGS, BUT IT WILL BE THE TECHNICAL COMMITTEE WHO DEFINES IN THEIR MONTHLY MEETING WHICH WILL BE RETAINED TO THE DISTRIBUTOR.

**REQUESTS MANAGEMENT  
P.E.R.**

**TECHNICAL COMMITTEE  
CERTIFIER  
(PROSELSA)**

**TECHNICAL COMMITTEE  
CERTIFIER  
(SEGESA)**

**Vo.Bo. TECHNICAL COMMITTEE  
CERTIFIER  
(REPRESENTANT)**

**ING. FERNANDO QUEVEDO**  
NAME AND ADDRESS

NAME AND ADDRESS

NAME AND ADDRESS

NAME AND ADDRESS

**PLAN OF RURAL ELECTRIFICATION (P.E.R.)  
REPORT OF THE TECHNICAL COMMITTEE CERTIFIER**

01) GENERAL DATA:

FORM: IGGP-01010

<b>CERTIFIER:</b>	SEGESA	Certified Number :	_____	Date of Visit:	_____
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02) COMMENTS AND REMARKS:	Elaboration date:
Ref. SEGESA -110 -11 – 2001	

COMMUNITY:
MUNICIPALITY:
DEPARTMENT:
CERTIFICATE NUMBER
COORDENADAS UTM
ENERGIZE DATES AND REFERENCES:
NUMBER OF USERS:
NUMBER OF THE UNFOUNDED USERS
CRITERIA NON QUALIFIED HOUSING
NON QUALIFIED HOUSING TO FEWER OF THE TWO HUNDRED (MTS):
NON QUALIFIED HOUSING TO FAR OF THE TWO HUNDRED (MTS):
TOTAL OF NON QUALIFIED HOUSINGS
CRITERIA OF THE TWO HUNDRED (MTS)
USERS TO FEWER OF THE TWO HUNDRED (MTS)
USERS TO FAR OF THE TWO HUNDRED METERS:
NONEXISTENT USERS
NUMBER OF NONEXISTENT USERS:
METER NUMBER OF USERS WITH HOUSING NOT QUALIFIED, NONEXISTENT OR DAMAGED:
REMARKS
* IN MEETING (INDE - UNION FENOSA) OF THE DAY MONDAY 22 OCTOBER OF 2001, ARE INFORMED THAT THE TECHNICAL COMMITTEE WILL DEFINE CRITERION OF THE UNFOUNDED USERS.
* * IN THE USERS TO FEWER OF TWO HUNDRED ( MTS) ARE NOT TAKING INTO ACCOUNT THE NON QUALIFIED HOUSINGS TO FEWER OF THE TWO HUNDRED (MTS)

REPORT OF THE TECHNICAL COMMITTEE CERTIFIER

SEGESA

ING. OSCAR CACEROS

COLEGIADO NÚM. 5.834

PROJECT MANAGER

\_\_\_\_\_  
NAME AND SIGN

**PLAN OF RURAL ELECTRIFICATION (P.E.R.)  
REPORT OF THE TECHNICAL COMMITTEE CERTIFIER**

01) GENERAL DATA:

FORM: IGGP-01010

Certifier:	SEGESA	Certified Number : 340	Date of Visit.: February 8, 2002
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02) COMMENTS AND REMARKS:

Elaboration date: 18-Feb-02

Ref. SEGESA -011 -01 – 2002

COMMUNITY: PIMISCALCHÉ
MUNICIPALITY: CUBULCO
DEPARTMENT: BAJA VERAPAZ
CERTIFICATE NUMBER: 340
COORDENADAS UTM 15 P 752304E 1673018N
ENERGIZE DATES: December 4, 2001
NUMBER OF USERS: 123
NUMBER OF THE UNFOUNDED USERS: 0
CRITERIA NON QUALIFIED HOUSING
NON QUALIFIED HOUSING TO FEWER OF THE TWO HUNDRED (MTS): 0
NON QUALIFIED HOUSING TO FAR OF THE TWO HUNDRED (MTS):0
TOTAL OF NON QUALIFIED HOUSINGS: 0
CRITERIA OF THE TWO HUNDRED (MTS)
USERS TO FEWER OF THE TWO HUNDRED (MTS). 0
USERS TO FAR OF THE TWO HUNDRED METERS: 123
NONEXISTENT USERS
NUMBER OF NONEXISTENT USERS: 0
METER NUMBER OF USERS WITH HOUSING NOT QUALIFIED, NONEXISTENT OR DAMAGED:
REMARKS
* IN MEETING (INDE - UNION FENOSA) OF THE DAY MONDAY 22 OCTOBER OF 2001, ARE INFORMED THAT THE TECHNICAL COMMITTEE WILL DEFINE CRITERION OF THE UNFOUNDED USERS.
** IN THE USERS TO FEWER OF TWO HUNDRED ( MTS) ARE NOT TAKING INTO ACCOUNT THE NON QUALIFIED HOUSINGS TO FEWER OF THE TWO HUNDRED (MTS)

REPORT OF THE TECHNICAL COMMITTEE CERTIFIER  
SEGESA  
ING. OSCAR CACEROS

**COLEGIADO NÚM. 5.834**

**PROJECT MANAGER**

\_\_\_\_\_  
NAME AND SIGN

PLAN OF RURAL ELECTRIFICATION (P.E.R.)

**CERTIFICATION OF WORKS 2001**

01) GENERAL DATA:

Energize dates: December 4, 2001

FORM: IGGP-99006

Date of Verification: February 8, 2002

Code Works:	4.15.04.01.06.274	Community:	PAMISCALCHÉ	Area U.F. :	NORTE
No. Of Actions :	01 (UNA)	Municipality:	CUBULCO	Contractor:	COIMPER
Action Code:	1504093.1			Supervision:	SEGESA
No. Of Users :	123	Department :	BAJA VERAPAZ	Certification No.:	340 ((Three hundred Forty))

02) FICHA DE ESTADO DE CUENTA DE LA OBRA

CONCEPT	COST (USD)	No. OF USERS (NÚM)	PERCENTAGE (%)	AMOUNT (USD)
A) AMOUNT P.E.R. OF THE WORK	650.66	123.00	100.00%	80,031.18
B) ADVANCED OFFERED (20%)	650.66	123.00	20.00%	16,006.24
C) TO CHARGE (80%)	650.66	123.00	80.00%	64,024.94
D) AMOUNT TO AUTHORIZE:	TOTAL AMOUNT TO CHARGE			64,024.94
E) TOTAL AMOUNT IN LETTERS:	("SIXTY AND FOUR THOUSAND TWENTY-FOUR AMERICAN DOLLARS 94/00 USD")			

03) CERTIFICATION OF THE WORK FOR OF THE EXTERNAL SUPERVISION OF THE TECHNICAL COMMITTEE

03) CERTIFICATION OF THE WORK FOR OF THE EXTERNAL SUPERVISION OF THE TECHNICAL COMMITTEE

LAST DAY: 8 OF THE MONTH OF: FEBRUARY OF THE YEAR: 2002, OUR COMPANY SEGESA SUPERVISED THE COMMISSIONING OF THE WORK THAT WAS ABOVE-MENTIONED. THE WORK IS COMPLETELY CONNECTED AND IN OPERATION, FOR WHAT WE CERTIFY THE END AND WE RECEIVE IT IN REPRESENTATION OF THE TECHNICAL COMMITTEE OF THE FUND TRUST, SINCE THE WORK IS ADJUSTED TO THE REGULATE- CONDITIONS , AND THE NEW CLIENTS WERE FAR OF 200 (MTS) OF THE EXISTENT INITIAL ELECTRICAL NET.

**CERTIFICATED BY SUPERVISION OF THE  
TECHNICAL COMMITTEE  
SERVICIOS GENERALES DE ELECTRICIDAD, S.A.  
SEGESA**

**ING. OSCAR CACEROS  
COLEGIADO NÚM. 5.634  
PROJECT MANAGER**

NAME AND SIGN

**Vo.Bo. MANAGEMENT  
P.E.R.**

**ING. FERNANDO QUEVEDO**

NAME AND SIGN

PHYSICAL UNITS -WORKS (PER) AND OPENING OF WORKS

PAMISCALCHE

CODE WORK	TRANSF. 10 kVA 13.2 kV	TRANSF. 15 kVA 13.2 kV	TRANSF. 25 kVA 13.2 kV	TRANSF. 37.5 kVA 13.2 kV	TRANSF. 10 kVA 34.5 kV	TRANSF. 15 kVA 34.5 kV	TRANSF. 25 kVA 34.5 kV	TRANSF. 37.5 kVA 34.5 kV
415042001060274	12	1			0	0	0	-
TOTAL	12	1	0	0	0	0	0	0

CODE WORK	KMS/LMT 13.2 kV MONO PHASE.	KMS/LMT 13.2 kV TWO PHASE	KMS/LMT 13.2 kV THREE PHASE	KM/LMT 34.5 kV MONO PHASE.	KM/LMT 34.5 kV TWO PHASE	KM/LMT 34.5 kV THREE PHASE.	KM/LBT 2F+ N	TOTAL INSTALLED POWER	N° OF USERS	COMMISSIO NING DATE	DELIVERED DATE UUFF
415042001060274	5390						7433	135	123	4/12/2001	17/12/2001
TOTAL	5390	0	0	0	0	0	7433	135	123	4/12/2001	17/12/2001



PHYSICAL UNITS -WORKS (PER) AND OPENING OF WORKS

CODE WORK	TRANSF. 10 kVA 13.2 kV	TRANSF. 15 kVA 13.2 kV	TRANSF. 25 kVA 13.2 Kv	TRANSF. 37.5 kVA 13.2 kV	TRANSF. 10 kVA 34.5 kV	TRANSF. 15 kVA 34.5 kV	TRANSF. 25 kVA 34.5 kV	TRANSF. 37.5 kVA 34.5 kV
415042001060274	12	1						
TOTAL	12	1	0	0	0	0	0	0

CODE WORK	KMS/LMT 13.2 kV MONO PHASE.	KMS/LMT 13.2 kV TWO PHASE	KMS/LMT 13.2 kV THREE PHASE	KM/LMT 34.5 kV MONO PHASE.	KM/LMT 34.5 kV TWO PHASE	KM/LMT 34.5 kV THREE PHASE.	KM/LBT 2F+ N	TOTAL INSTALLED POWER	N° OF USERS	COMMISSIO NING DATE	DELIVERED DATE UUFF
415042001060274	5390						7433	135	123	4/12/01	17/12/01
TOTAL	5390	0	0	0	0	0	7433	135	123		

## RURAL ELECTRIFICATION PLAN (P.E.R.) COLLECTION OF BASIC DATA OF NEW USERS

FORM: IGGP-99010

Code works:	415042001060274	Community:	Pamiscalche	Municipality:	Cubulco	Area U.F.:	RECEPTION DATES:
Actuation Number	Concerted 2001	N° Users:	123	Department:	Baja Verapaz	Contractor:	ENERGIZE DATES:
						COIMPER	-

### 02) DATA OF NEW USERS

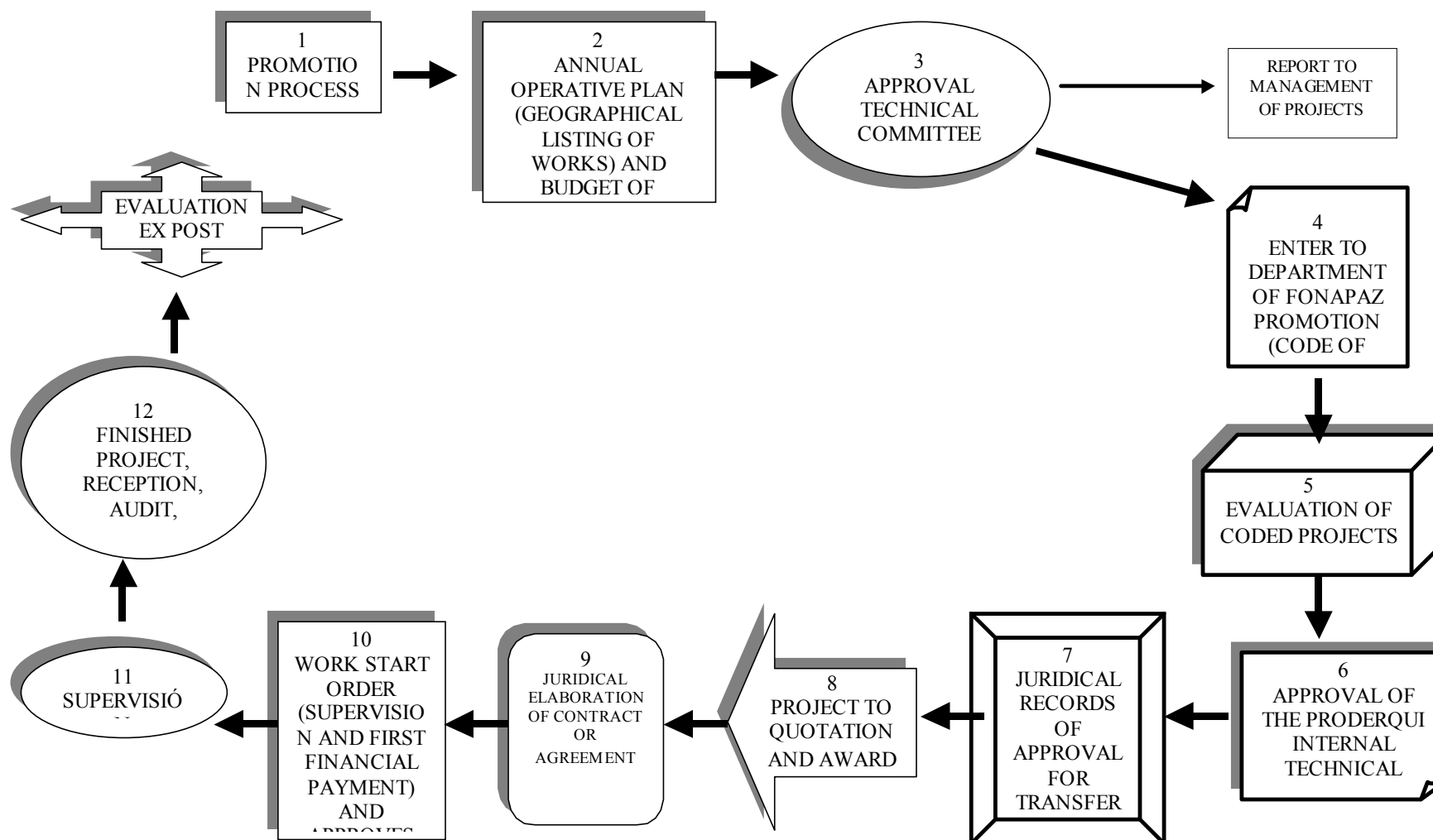
		PEOPLE ID CARD		ELECTRIC METER INFORMATION ASSOCIATED TO THE USER							INFORMATION OF THE TRANSFORMER ASSOCIATED TO THE USER
NUMBER (COL. 01)	USER NAME (COL. 02)	RECORD NUMBER (COL. 03)	AREA (COL. 04)	SERIAL NUMBER (COL. 05)	VOLTAGE (COL. 06)	CLASE (COL. 07)	BRAND (COL. 08)	TYPE			PLATE NUMBER (COL. 12)
								ANALOGI C	CLOCK	OTHER	
001	Senon Soto Cabrera	0000007698	Ñ-15	0011028482	110	100	Nansen		"5C"		54976
002	Mynor Israel Soto Arevalo	0000022208	Ñ-15	0011028474	110	100	Nansen		"5C"		
003	Elmer Roderico Soto Arevalo	0000023761	Ñ-15	0011028473	110	100	Nansen		"5C"		
004	Isabel Pérez Ramíres	0000011333	Ñ-15	0011030060	110	100	Nansen		"5C"		54977
005	Pablo Bacaj	0000017206	Ñ-15	0011030061	110	100	Nansen		"5C"		
006	Tomasa Raymundo Santos	0000013115	Ñ-15	0011030062	110	100	Nansen		"5C"		
007	Jose Raymundo López	0000022425	Ñ-15	0011030063	110	100	Nansen		"5C"		
008	Ciriaca Raymundo López	0000020599	Ñ-15	0001103064	110	100	Nansen		"5C"		
009	Lorenza de la Cruz Pablo	0000018594	Ñ-15	0011030059	110	100	Nansen		"5C"		
010	Andres Raymundo Santos	0000017993	Ñ-15	0011030053	110	100	Nansen		"5C"		
011	Cupertino Morente Hernández	0000017971	Ñ-15	0001130058	110	100	Nansen		"5C"		
012	Lorenzo Ramos Camajá	0000017910	Ñ-15	0001130057	110	100	Nansen		"5C"		
013	Mateo Raymundo Santos	0000003460	Ñ-15	0001130054	110	100	Nansen		"5C"		
014	Baleriano Santos Primero	0000001359	Ñ-15	0001130056	110	100	Nansen		"5C"		
015	Ana Velásquez de la Cruz	0000018593	Ñ-15	0011027651	110	100	Nansen		"5C"		54978
016	Domingo Velásquez Santos	0000014771	Ñ-15	0011027648	110	100	Nansen		"5C"		
017	Juan Velásquez de la Cruz	0000009843	Ñ-15	0011027650	110	100	Nansen		"5C"		
018	Francisco Velásquez de la Cruz	0000011760	Ñ-15	0011027652	110	100	Nansen		"5C"		
019	Demetrio Velásquez de la Cruz	0000011252	Ñ-15	0011027649	110	100	Nansen		"5C"		
020	Cupertino Reginaldo Morente Hernandez	0000002999	Ñ-15	0011027646	110	100	Nansen		"5C"		
021	Domingo Morente Ixtup	0000001218	Ñ-15	0001130055	110	100	Nansen		"5C"		54979
022	Samuel Gabriel	0000006888	Ñ-15	0011027647	110	100	Nansen		"5C"		
023	Romi Leonel Reyes Herrera	0000018988	Ñ-15	0011029914	110	100	Nansen		"5C"		
024	Pablo Calo Raymundo	0000001111	Ñ-15	0011027645	110	100	Nansen		"5C"		

		PEOPLE ID CARD		ELECTRIC METER INFORMATION ASSOCIATED TO THE USER							INFORMATION OF THE TRANSFORMER ASSOCIATED TO THE USER
NUMBER (COL. 01)	USER NAME (COL. 02)	RECORD NUMBER (COL. 03)	AREA (COL. 04)	SERIAL NUMBER (COL. 05)	VOLTAGE (COL. 06)	CLASE (COL. 07)	BRAND (COL. 08)	TYPE			PLATE NUMBER (COL. 12)
								ANALOGIC (C. 09)	CLOCK (C.10)	OTHER (C. 11)	
025	Francisco Raymundo Alvarado	0000021131	Ñ-15	0010229159	110	100	Nansen		"5C"		
026	Cirilo Hernández	0000016789	Ñ-15	0011028477	110	100	Nansen		"5C"		
027	Eleodoro Jerónimo Primero	0000007486	Ñ-15	0011027531	110	100	Nansen		"5C"		
028	Celsa Raymundo Antrete	0000009020	Ñ-15	0011027644	110	100	Nansen		"5C"		
029	Tomás Sunun Morente	0000003974	Ñ-15	0110329460	110	100	Nansen		"5C"		
030	Fulgencio Raymundo Antrete	0000003650	Ñ-15	0011027641	110	100	Nansen		"5C"		54980
031	Juan Raymundo Raymundo	0000014699	Ñ-15	0011027643	110	100	Nansen		"5C"		
032	Julio Camajá Rosales	0000014686	Ñ-15	0011029456	110	100	Nansen		"5C"		
033	Francisco Velásquez Raymundo	0000010065	Ñ-15	0011029917	110	100	Nansen		"5C"		
034	Baleriano Velásquez Santos	0000004685	Ñ-15	0011029916	110	100	Nansen		"5C"		
035	Juan Raymundo Raymundo	0000014307	Ñ-15	0011029909	110	100	Nansen		"5C"		
036	Luis Camaja Primero	0000018441	Ñ-15	0011029918	110	100	Nansen		"5C"		
037	Frenando Raymundo y Raymundo	0000019322	Ñ-15	0011029919	110	100	Nansen		"5C"		
038	Matías Raymundo Canto	0000002240	Ñ-15	0011029920	110	100	Nansen		"5C"		
039	Catalina Raymundo Luisa Sunun Chiroy	0000011191	Ñ-15	0011029912	110	100	Nansen		"5C"		
040	Luisa Sunun Chiroy	0000016593	Ñ-15	0011029911	110	100	Nansen		"5C"		54981
041	Balvina Raymundo Sunun	0000019242	Ñ-15	0011029910	110	100	Nansen		"5C"		
042	Pedro Chiroy	0000004928	Ñ-15	0011029915	110	100	Nansen		"5C"		
043	Manuela Rayundo Calo	0000009622	Ñ-15	0011026017	110	100	Nansen		"5C"		
044	Julián Raymundo Antrete	0000007046	Ñ-15	0011026820	110	100	Nansen		"5C"		
045	José Antonio Reys Herrera	0000013191	Ñ-15	0011026824	110	100	Nansen		"5C"		
046	César Hernández Raymundo	0000019501	Ñ-15	0011026818	110	100	Nansen		"5C"		
047	Berta Cotzalo Sunun	0000019563	Ñ-15	0011026821	110	100	Nansen		"5C"		
048	Nicolas Rayundo Rodríguez	0000014964	Ñ-15	0011026813	110	100	Nansen		"5C"		
049	Ricardo Raymundo Rodríguez	0000022200	Ñ-15	0011026816	110	100	Nansen		"5C"		54982
050	José Raymundo Rodríguez	0000013304	Ñ-15	0011026823	110	100	Nansen		"5C"		
051	Maria Telefor Rodríguez	0000001993	Ñ-15	0011026815	110	100	Nansen		"5C"		
052	Carmen Rodríguez	0000001904	Ñ-15	0011026822	110	100	Nansen		"5C"		
053	Paulina Ramos	0000002939	Ñ-15	0011026814	110	100	Nansen		"5C"		
054	Victoria Raymundo Ramos	0000009210	Ñ-15	0011030193	110	100	Nansen		"5C"		
055	Maria Taperia Alonzo	0000007384	Ñ-15	0011030193	110	100	Nansen		"5C"		
058	Juan Taperia Alonzo	0000007257	Ñ-15	0011030261	110	100	Nansen		"5C"		54983
057	Pedro Melchor Canto	0000007383	Ñ-15	0011030265	110	100	Nansen		"5C"		
058	Luciano Alonzo Canto	0000007259	Ñ-15	0011030267	110	100	Nansen		"5C"		
059	José Alonzo	0000001934	Ñ-15	0011030257	110	100	Nansen		"5C"		

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NUMBER (COL. 01)	USER NAME (COL. 02)	RECORD NUMBER (COL. 03)	AREA (COL. 04)	SERIAL NUMBER (COL. 05)	VOLTAGE (COL. 06)	CLASE (COL. 07)	BRAND (COL. 08)	TYPE			PLATE NUMBER (COL. 12)
								ANALOGIC (C. 09)	CLOCK (C.10)	OTHER (C. 11)	
060	Diego Tista	0000001934	Ñ-15	0011030259	110	100	Nansen		"5C"		
061	Diego Santiago Canto	0000022476	Ñ-15	0011030262	110	100	Nansen		"5C"		
062	Teodora de la Cruz Primero	0000012155	Ñ-15	0011030258	110	100	Nansen		"5C"		
063	José Leonardo Santiago	0000015905	Ñ-15	0011030264	110	100	Nansen		"5C"		
064	Sebastian Santiago Canto	0000012516	Ñ-15	0011030260	110	100	Nansen		"5C"		
065	Miguel Santiago Canto	0000018955	Ñ-15	0011027528	110	100	Nansen		"5C"		
066	Catalina Raymundo Luisa Sunun Chiroy	0000010082	Ñ-15	0011030266	110	100	Nansen		"5C"		
067	Petronila Alonzo Hernández	0000013091	Ñ-15	0011030185	110	100	Nansen		"5C"		54984
068	Pedro Alonzo Canto	0000004784	Ñ-15	0011030195	110	100	Nansen		"5C"		
069	Timoteo Rosales Miranda	0000009411	Ñ-15	0011030194	110	100	Nansen		"5C"		
070	Dominga Raymundo Raymundo	0000021297	Ñ-15	0011030192	110	100	Nansen		"5C"		
071	María Herlinda Raymundo	0000016176	Ñ-15	0011030191	110	100	Nansen		"5C"		
072	Boluciano Alonzo Tamos	0000007481	Ñ-15	0011030187	110	100	Nansen		"5C"		
073	José Rosales López	0000012357	Ñ-15	0011030186	110	100	Nansen		"5C"		
074	Casimiro Jerónimo Ortiz	0000016137	Ñ-15	0011030188	110	100	Nansen		"5C"		
075	Fidencio Chubaja Rodríguez	0000015221	Ñ-15	0011030190	110	100	Nansen		"SC"		
076	Felipe Cabrera García	0000010082	N-15	0011030263	110	100	Nansen		"5C"		
077	Manuela Teletor González	0000009839	N-15	0011027527	110	100	Nansen		"5C"		
078	Martín López Sunún	0000002517	Ñ-15	0011027529	110	100	Nansen		"5C"		54985
079	Martín López Sunún	0000002517	Ñ-15	0012015385	220	100	Nansen		"5C"		
080	Andres Raymundo Primero	0000017499	Ñ-15	0011027532	110	100	Nansen		"5C"		
081	Leonisio Rayundo Pérez	0000004709	Ñ-15	0011027530	110	100	Nansen		"5C"		
082	Santos Raymundo Pérez	0000012424	Ñ-15	0011027523	110	100	Nansen		"5C"		
083	Victoria Raymundo Primero	0000019030	N-15	0011027521	110	100	Nansen		"5C"		
084	Andres Raymundo Raymundo	0000018435	N-15	0011027522	110	100	Nansen		"5C"		
085	Maria Trinidad Ruíz Santiago	0000017005	Ñ-15	0011027524	110	100	Nansen		"5C"		
086	Luciano Ramires	0000012928	Ñ-15	0110227940	110	100	Nansen		"5C"		
087	Pedro Riz Vasquez	0000005794	Ñ-15	0011027525	110	100	Nansen		"5C"		
088	Santos Calo Gómez	0000020007	Ñ-15	0011027526	110	100	Nansen		"5C"		
089	Francisco Rodriguez Primero	0000005085	Ñ-15	0011029640	110	100	Nansen		"5C"		54986
090	Josefa Calo Hernández	0000005084	Ñ-15	0011029639	110	100	Nansen		"5C"		
091	Luciano Calo Hernández	0000000305	Ñ-15	0011029638	220	100	Nansen		"5C"		
092	Francisco Calo Hernández	0000005045	Ñ-15	0011029639	110	100	Nansen		"5C"		
093	Francisco Calo Hernández	0000005045	Ñ-15	0012008751	220	100	Nansen		"5C"		
094	Maria Raymundo y Raymundo	0000005046	Ñ-15	0011029635	110	100	Nansen		"5C"		

		PEOPLE ID CARD		ELECTRIC METER INFORMATION ASSOCIATED TO THE USER							INFORMATION OF THE TRANSFORMER ASSOCIATED TO THE USER
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								ANALOGIC (C. 09)	CLOCK (C.10)	OTHER (C. 11)	
095	Pedro Lajom Calo	0000011158	Ñ-15	0011029636	110	100	Nansen		"5C"		
096	Alejandro Reyes Teletor	0000016287	Ñ-15	0011029634	110	100	Nansen		"5C"		
097	Froylan Arévalo Dubón	0000014206	Ñ-15	0011028678	110	100	Nansen		"5C"		
098	Antonio Arevalo Hernández	0000015150	Ñ-15	0011028679	110	100	Nansen		"5C"		
099	Teresa Ramos Calo	0000009687	Ñ-15	0011028686	110	100	Nansen		"5C"		
100	María Lajom Calo	0000004340	Ñ-15	0011029633	110	100	Nansen		"5C"		
101	Macario Primero Raymundo	0000015253	Ñ-15	0011029632	110	100	Nansen		"5C"		
102	Francisca Vicenta Lajom Calo	0000015519	Ñ-15	0011029631	110	100	Nansen		"5C"		
103	Emilio Lajom Raymundo	0000019842	Ñ-15	0011029630	110	100	Nansen		"5C"		
104	Quirina Lajom Raymundo	0000003899	Ñ-15	0011029629	110	100	Nansen		"5C"		
105	José María Lajom Morente	0000020092	Ñ-15	0011028687	110	100	Nansen		"5C"		
106	Elvira Natalia Lajom Calo	0000021767	Ñ-15	0011028688	110	100	Nansen		"5C"		
107	Alfonso Aivarado Ramírez	0000011826	Ñ-15	0011028681	110	100	Nansen		"5C"		
108	José Fidel Alvarado Ramirez	0000013459	Ñ-15	0011028684	110	100	Nansen		"5C"		
109	Lucas Primero	0000004619	Ñ-15	0011028683	110	100	Nansen		"5C"		
110	Luciano Calo Hernández	0000000305	Ñ-15	0012008756	110	100	Nansen		"5C"		
111	Ponciano Raymundo Alvarado	0000013391	Ñ-15	0011028680	110	100	Nansen		"5C"		54987
112	Diego Reyes Primero	0000021098	Ñ-15	0011028682	110	100	Nansen		"5C"		
113	Francisco Ramos Camaja	0000006852	Ñ-15	0011028685	110	100	Nansen		"5C"		
114	Julio Victor Ruiz Calo	0000000325	Ñ-15	0011028677	110	100	Nansen		"5C"		
115	Carmen Alvarado Garcia	0000003011	Ñ-15	0011028476	110	100	Nansen		"5C"		
116	Israel de Jesus Arevalo Dubon	0000022277	Ñ-15	0011028483	110	100	Nansen		"5C"		
117	Juan Jose Arevalo Dubon	0000001650	Ñ-15	0011028480	110	100	Nansen		"5C"		
118	Ceferino Hernandez Ruiz	0000014716	Ñ-15	0011028479	110	100	Nansen		"5C"		
119	Pedro Izaguirre Hernandez	0000014998	Ñ-15	0011028481	110	100	Nansen		"5C"		54988
120	Magdalena Hernandez Ruiz	0000009164	Ñ-15	0011028475	110	100	Nansen		"5C"		
121	Leona Hernandez Ruiz	0000025905	Ñ-15	0011028484	110	100	Nansen		"5C"		
122	Diego Pablo	0000008226	Ñ-15	0011028478	110	100	Nansen		"5C"		
123	Lena Roduiguez Santiago	0000024661	Ñ-15	0011030189	110	100	Nansen		"5C"		

## A10 FONAPAZ procedures for approving projects



## Project Cycle

The proposal is based on the premise that would leave that the approval that FONAPAZ through to the TECHNICAL COMMITTEE OF PROJECTS carries out outside of the ANNUAL OPERATIVE PLAN (POA), which includes the geographical listing of works to carry out (listing of projects foreseen with specific location, beneficiaries and investments), in this way being approved the POA, automatically the projects that are contemplated for the execution of the annual period would be approved, being pending only the entrance to the department of Promotion of the projects so that these are coded and registered in FONAPAZ, in this way the approval would be avoided by blocks of projects and it would be defined a global approval, in a single session of the TECHNICAL COMMITTEE, what would reduce the time substantially that at the moment requires this phase of the cycle.

PRODERQUI would have the responsibility of implementing an internal Committee of Projects that would be responsible for analyzing in specific form some internal aspects of each one of the projects that they are evaluated by the team of Evaluation of the Program, this Committee will have the responsibility of guaranteeing that the projects fulfil the technical, economic, and legal requirements for its effective execution. The later phases of the cycle would be carried out at local level, what will be a more agile process to be a process that will know specific projects and only inside the program.

At the moment it is had the following departments:

1. Promotion
2. Evaluation
3. Supervision
4. Financial-administrative
5. Legal department

It should be implemented the following ones:

1. Auditoría Intern
2. Purchases and Awards Department

Next each one of the phases of the cycle of projects and the conditions are detailed that should be given for their effective operation, (according to that detailed in outline. above mentioned):

No.	DESCRIPTION OF THE PHASE	ELEMENTS OR NECESSARY CONDITIONS	CURRENT SITUATION
1	Promotion process: Basically it is the process of community approach that concludes with: 1). Rural diagnosis , 2) Community Development Plan and 3) Project file of the prioritized project requested the PRODERQUI	Technical Facilitators Team and Social Promoters with capacity of community work with participate methods	It lacks to contract of Technical Facilitator and 3 Social Promoters
2	Annual Operative plan (POA): As a consequence of the of Promotion process arise the initiatives of prioritized projects by the organizations or communities or groups of interest	Multitask work team of the Unit of Administration Program (UGP)	At the moment it is not had some professional position
3	Technical committee: Basically it is the instance that would approve the operative plans previous to a technical presentation of the investment as much in operation as in projects.	That Technical Committee this in the disposition of making the decision to do flexible the current process of approval.	The approval is carried out for Blocks of projects that are approved monthly.
4	Code of Projects department of Promotion (FONAPAZ): it is a process in which the projects are entered to the system of registration of FONAPAZ and which are selected to be evaluated, the base data used for such objective is structured in Lotus Notes	To have a net point in El Quiché, because at the present time it is necessary to be located in FONAPAZ center to enter projects to the system.	It is necessary to be located in Guatemala what requires Time and human resources, logistical and financial.
5	Evaluation of coded Projects: once the projects are coded, entered to the Promotion department of FONAPAZ, these they are in the condition to be evaluated.	To have the properly qualified team of evaluation of projects.	There is an adequate professional team, being pending the contract of Civil an Engineer to evaluate work of physical infrastructure.



6	Internal Technical committee: The referred instance would be integrated with three people of the Team of program work and they would have the responsibility of giving the final technical approval to each one of the evaluated projects, guaranteeing the execution of projects that they generate positive impacts in the population objective.	This instance is not defined at the moment and it would be practically the responsible that the projects to execute have a real positive impact.	The UGP Team has the people who are able to integrate the instance mentioned.
7	Juridical records: it is the records that defines that legally requirements of the approval of the projects was fulfilled and that it serves as base for the invitation process to quote the projects to execute.	This requires of having the guarantee so that the current legal advisory is authorized to fulfil the respective approval records of concrete projects.	At the moment it is a process centralized in the Juridical Management of FONAPAZ.
8	Quote of projects and award: This phase is very important and it is the one that defines that a company, ONG y/o consultant, municipality or local organization is invited to offer the execution of a work or to give a service or is defined the elaboration of a cooperation agreement when is according to the project type or it works to execute.	decentralize actions that at the moment are executed in central FONAPAZ and that it retard the processes excessively.	Several processes of importance are carried out in central FONAPAZ.
9	Contract elaboration or agreement: This phase is which is legalized documents of the contractual commitments for the execution of the work, project or to give a certain service.	Delegated in the legal Adviser of the Program the elaboration of the mentioned legal Documents.	At the moment this phase is carried out in Guatemala what retards the processes of subscription of agreements / contracts
10	Order of Beginning of Work: this process is very important and in this process takes several actors as a Project assigned to the project, works or service who make the administrations to get the check of first payment, the check should be audit for the internal Auditor of the Program.	That it is had two accountants people at internal level in the Program and also with a specific internal auditor for the Program.	At the moment alone a person is an Accountant (The financial-administrative one) and the auditor also comes every week of FONAPAZ Every week different auditor.

11	Supervision: once is defined the order of beginning work or project, begin with the execution of the work, which is supervised periodically to verify the execution of the contractual commitments defined in the contracts or agreements, this phase also defines the authorization of the subsequent payments for the normal execution of the work or project.	Supervision personnel, qualified and working a full time	At the moment it has a team of supervisors, but it is necessary to contract a Supervisor of infrastructure works.
12	Audit and Liquidation of the Works y/o projects: This phase is carried out through the clearing commission of FONAPAZ that verifies the efficient execution of the physical work and the financial aspect who makes respective records of liquidation.	That FONAPAZ activate the administrative Liquidation in time.	It doesn't have the agility in the liquidation of the works to have the legal verdict of conclusion of the work y/o project.
13	EX POST evaluation it is an evaluation that determines the impacts that generate the execution of the work y/o project in the objective population of the program.	It should be contract to the Responsible for the Unit of S&E.	At the moment they are had defined the indicators for type project to facilitate the measurement of impacts through very defined indicators.

## A11 Electricity tariffs

### TARIFF APPROVED BY CNEE AND APPLIED TO EEGSA, DEOCSA AND DEORSA PREVIOUS AND CURRENT TRIMESTER - FIGURES IN QUETZALES/kWh

#### SOCIAL TARIFF

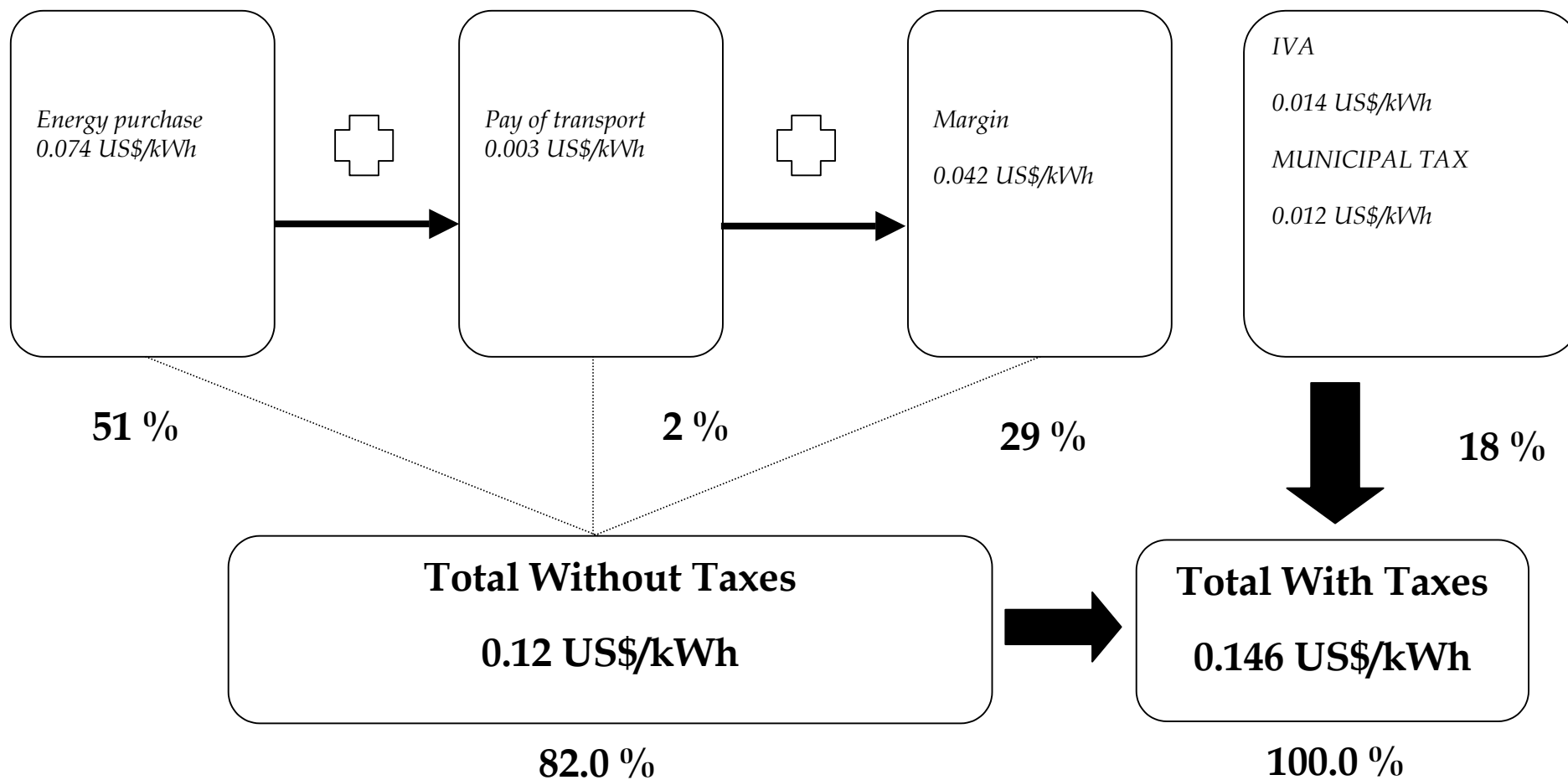
DISTRIBUIDORA	PREVIOUS TRIMESTER Billing November 2001 - January 2002		CURRENT TRIMESTER Billing February-April 2002	
	Approved by CNEE	Actual	Approved by CNEE	Actual
EEGSA	0.6144	0.6141	0.6215	0.6233
DEOCSA	0.5908	0.5908	0.6069	0.6095
DEORSA	0.5919	0.5919	0.6109	0.6139

#### BTS TARIFF

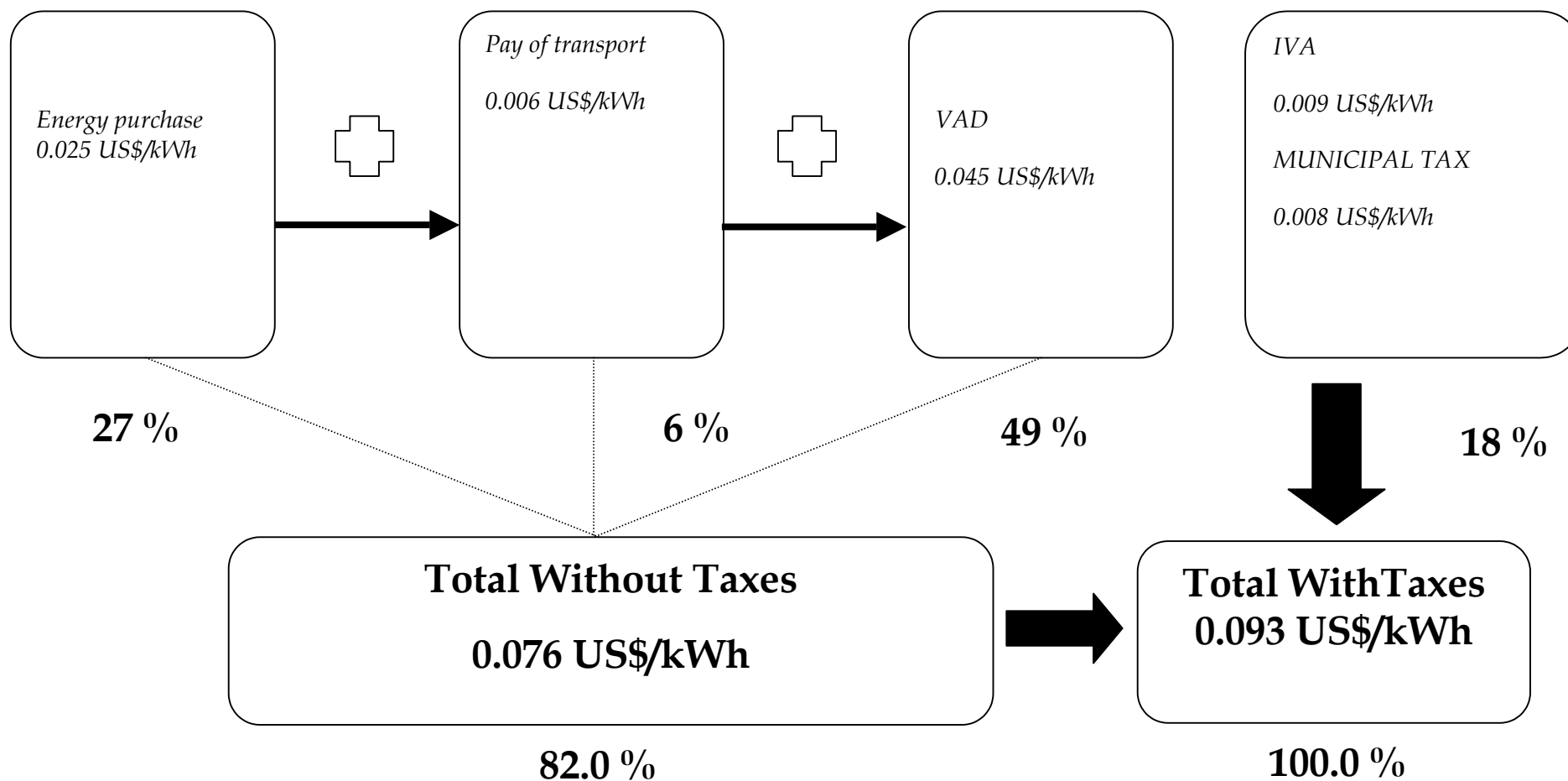
DISTRIBUIDORA	PREVIOUS TRIMESTER Billing November 2001 - January 2002		CURRENT TRIMESTER Billing February-April 2002	
	Approved by CNEE	Actual	Approved by CNEE	Actual
EEGSA	1.0587	1.1884	1.0923	1.1871
DEOCSA <sup>(*)</sup>	0.9318	0.9425	0.9538	0.9973
DEORSA <sup>(*)</sup>	0.9201	0.9545	0.8827	0.9082

(\*)The cycle of rate billing BTS of DEOCSA and DEORSA, are different to that of EEGSA. For DEOCSA and DEORSA the previous trimester refers to the billings of the period October-December 2001 and the current trimester refers a period January-March 2001.

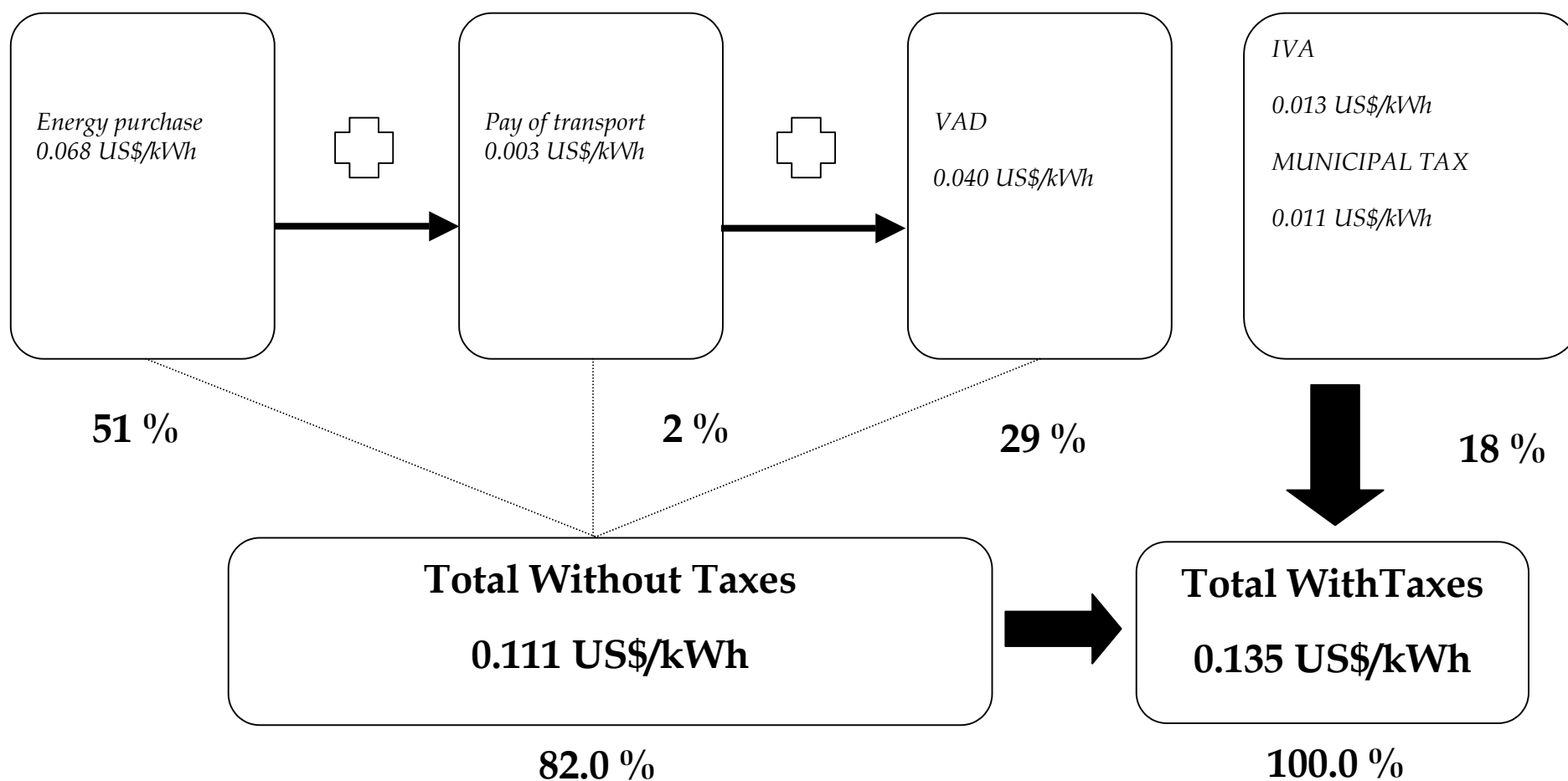
INTEGRATION OF THE TARIFF  
DEOCSA: LOW SIMPLE VOLTAGE (BTS)  
APPLIED TO THE CONSUMPTION JANUARY - MARCH 2002



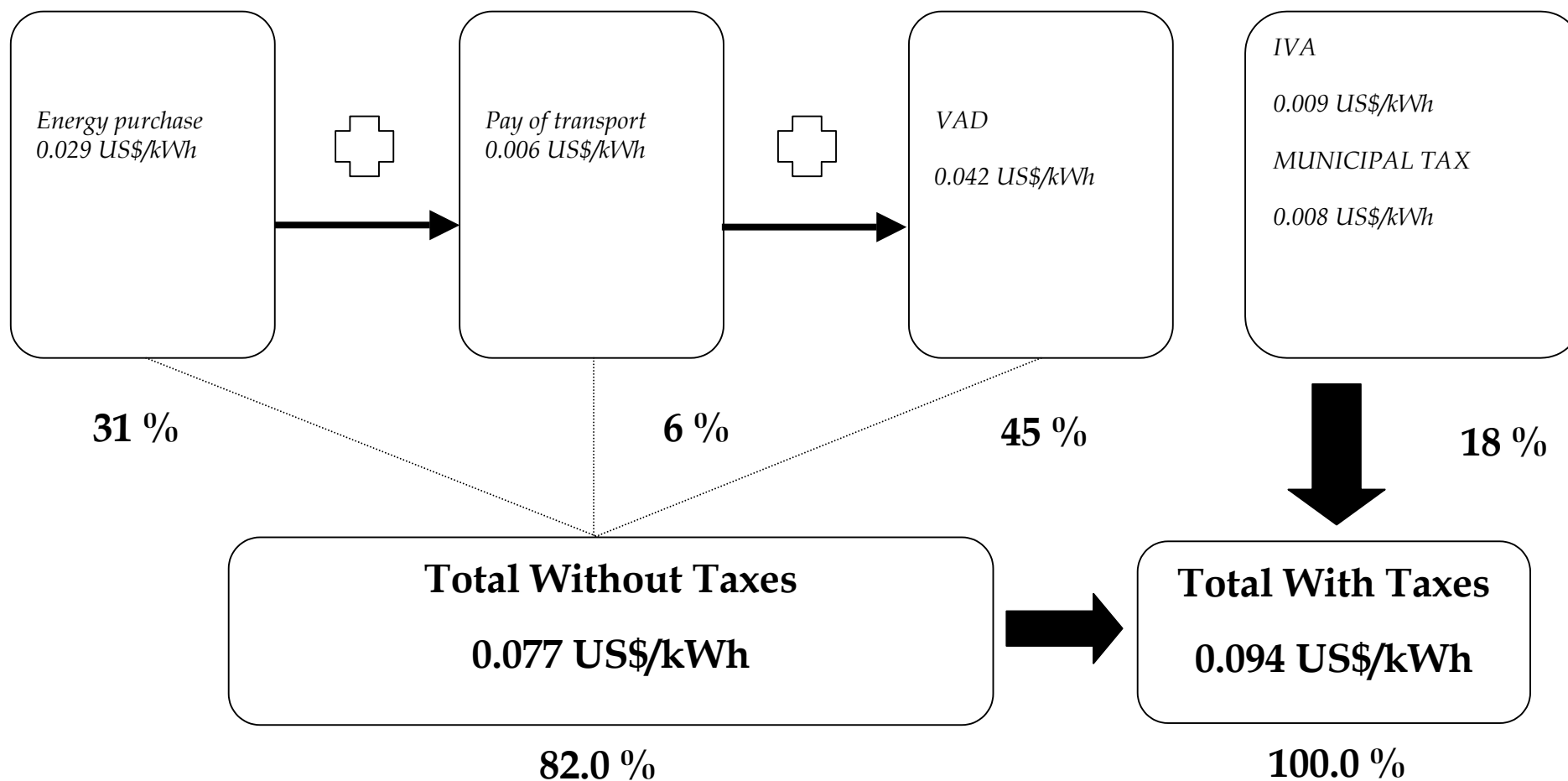
**DEOCSA: SOCIAL TARIFF**  
APPLIED TO THE CONSUMPTIONS JANUARY - MARCH 2002



INTEGRATION OF THE TARIFF  
DEORSA: LOW SIMPLE VOLTAGE (BTS)  
APPLIED TO THE CONSUMPTIONS JANUARY - MARCH 2002



**INTEGRATION OF THE TARIFF**  
**DEORSA: SOCIAL TARIFF**  
APPLIED TO THE CONSUMPTIONS JANUARY - MARCH 2002



## A12 Technical standards

### A12.1 LINES

- ☐ Isolators. Apply Standard ANSI C29.1-1988 for dry lighting, recognised international standard. Mechanical design isn't especially requirements. Don't specify especial kind of isolator.
- ☐ Earth connections. Minimum requirements to guaranty people and workers safety.
- ☐ Conductors. Non-isolated conductors are allowed for overhead lines. Conductor materials are the most frequently used: copper, aluminium and aluminium/steel. Current limits are normally used at international standards.
- ☐ Minimum distances. Safety distances between conductors with tension and earth (routes and rail cross, etc.) are normally used and don't have particular requirements. Also distances between conductors with tension and buildings or other structures are reasonable.
- ☐ Household connections. Conductor isolation for household connections is normally required by standards.
- ☐ Wind speed. Wind speeds specified for mechanical design of lines are from 80 until 120 km/h, low values that determine inexpensive structures (poles, cross arms, foundations, isolators).
- ☐ Structure classes. They have two structure classes, one especial for risk zones and other normal for not risk zones.
- ☐ Poles. Are allowed cement, wood and steel as material for poles. This two first are the most common used for lines.
- ☐ Foundations. In agree with mechanical design of line structure and for different kinds of ground.
- ☐ Surcharge factors. For mechanical designs, surcharge factors are reasonable.

### A12.2 SUBSTATIONS

- ☐ Substations. Are required minimum conditions for safety performance (breaker for protection with enough capacity, etc.) and for not affect the system when fail. Isn't required particular topology.
- ☐ Substation safety. Soil substations must be inside buildings or with fences around, with appropriate advertisements for public.



- ❑ Minimum safety distances. Are normally used at international standards.
- ❑ Fire protection. Normal requirements for this kind of installations.
- ❑ Earth grid. Recommend IEEE 80, the whole world used for substation earth design, recognised for installations and workers protection.
- ❑ Electrical equipment. Don't specify electrical parameters, only talk about safety conditions of installation.

### **A12.3 EARTH SYSTEMS**

- ❑ Earth systems. Connections to earth and earth systems are normally used for different kinds of lines or equipment, don't require especial conditions.

## A13 Statistical annex

### A13.1 Demographic data for rural areas

**Table 16 Demographic data by department DEORSA**

DEMOGRAPHIC INFORMATION	Zapaca	Chiquimula	El Progreso	Izabal
Total Population	207,584	305,329	140,090	327,120
Urban Population	61,184	80,306	38,625	69,388
Rural Population	146,400	225,023	101,465	257,732
Degree of Urbanisation	29%	26%	28%	21%
Area (kms 2):	2,690	2,376	1,922	9,038
Population Density (person/km <sup>2</sup> )	77	129	73	36
Electrification Index	85,5	50,1	94,8	45,5

**Table 17 Demographic data by department DEORSA - continued**

DEMOGRAPHIC INFORMATION	Jutiapa	Jalapa	Santa Rosa	Total
Total Population	380,382	262,621	313,971	980,123
Urban Population	83,093	73,986	79,318	249,503
Rural Population	297,289	188,635	234,653	730,620
Degree of Urbanisation	22%	28%	25%	25%
Area (kms 2):	3,219	2,063	2,955	16,026
Population Density (person/km2)	118	127	106	61
Electrification Index	56,5	47,4	80,2	

Table 18 Demographic data by department DEOCSA

DEMOGRAPHIC INFORMATION	Escuintla	Alta Verapaz	Baja Verapaz	Chimaltenango	Quetzaltenango	Totonicapan	San Marcos
Total Population	477,931	781,197	199,145	416,904	661,805	353,302	826,059
Urban Population	178,899	136,830	43,579	173,097	265,012	45,488	123,294
Rural Population	299,032	644,367	155,566	243,807	396,793	307,814	702,765
Degree of Urbanisation	37%	18%	22%	42%	40%	13%	15%
Area (kms 2):	4,384	8,686	3,124	1,979	1,951	1,061	3,791
Population Density (person/km2)	109	90	64	211	339	333	218
Electrification Index	86,4	17,5	48	73,1	82,3	76,3	46

Table 19 Demographic data by department DEOCSA - continued

DEMOGRAPHIC INFORMATION	Suchitepequez	Retalhuleu	Solola	Quiche	Huehuetenango	Peten	Total
Total Population	395,473	237,852	299,007	575,104	854,137	320,213	3,716,343
Urban Population	122,378	68,312	101,215	97,616	139,936	88,381	966,199
Rural Population	273,095	169,540	197,792	477,488	714,201	231,832	2,750,144
Degree of Urbanisation	31%	29%	34%	17%	16%	28%	26%
Area (km <sup>2</sup> ):	2,510	1,856	1,061	8,378	7,400	35,854	24,976
Population Density (persons/km <sup>2</sup> )	158	128	282	69	115	9	149
Electrification Index	54,3	68,8	75,1	44,4	39,4	36,2	