No.

国際協力事業団
工業手工芸省
ラオス電力公社

ラオス国

送変電設備マスタープラン調査

ファイナル・レポート
（付　録）

平成14年9月

日本工営株式会社
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ラオス国

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ファイナル・レポート

(付録)

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電 力 法

THE ELECTRICITY LAW

Adopted by the National Assembly 12 April 1997
Promulgated by the President of the State 31 May 1997
Effective 29 August 1997
(90 days from promulgation – 31 May 1997)

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(National Seal)

Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

No. 34/PDR

EXECUTIVE DECREE
of the
PRESIDENT
of the
LAO PEOPLE'S DEMOCRATIC REPUBLIC

On the promulgation of the Electricity Law

- Pursuant to Section V, Article 53, clause 1 of the Constitution of the Lao People's Democratic Republic;
- Based on the Resolution of the 10th ordinary session of the National Assembly, IIIrd Congress on the adoption of the Land Law No. 02-97/NA, dated 12 April 1997;
- Based upon the application of the Standing Committee of the National Assembly, No. 15/SC, dated 7 May 1997.

The President of the
Lao People's Democratic Republic
decrees:

Article 1: The promulgation of the Electricity Law.

Article 2: This Executive Decree is effective from the day it is signed.

Vientiane, 31 May 1997

(seal of the President of the Lao People's Democratic)
(signature)
Nouhak Phoumsavan

(National Seal)

Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

National Assembly

No. 02/97/NA
Date: 12/4/97

THE ELECTRICITY LAW

Chapter I
General Provisions

Article 1: Function of the Electricity Law

The Law on Electricity has the function of determining a regime for the administration, production, transmission and distribution of electricity, including export and import through the use of a highly productive natural resources potential to contribute to the implementation of the national socio-economic development plan and to upgrade the living standards of the people.

Article 2: Electricity

Electricity is a type of energy comprised of electricity, electrical currents, electrical intensity, and electrical energy produced by physical sources of electrical energy: water power, wind power, solar power, petroleum and coal. Electrical power from other sources is not included in this Law.

Article 3: Electricity Ownership

Physical sources of electricity throughout the Lao PDR are the property of the national community and the State administers, preserves, and conservatively uses such on a long term and productive basis.

Article 4: Promotion of Electrical Power Production and Development

The State promotes all sectors of the economy in investing in the production of electricity to meet the demands of the peoples in urban and rural areas, including the development of electricity as an exportable commodity.

Article 5: Protection of the Rights and Interests of Electricity Investors and Users

The State protects the rights and interests of those investing in electricity enterprises and users of electricity according to the laws and regulations of the Lao PDR.

Article 6: Environmental Protection

The undertaking of the electricity business commencing from the survey, agreement upon the size as well as the construction and the expansion of electricity must ensure economic productivity as well as projections of environmental impact, the natural environment, the ecological system, limiting social impact and wildlife habitats.

Article 7: Foreign Cooperation

The State has broadened foreign cooperation relative to the production, distribution, export and import and the development of electrical activities according to the law on the Promotion and Management of Foreign Investment in the Lao PDR.

Chapter II
Electricity Activities

Article 8: Electricity Activities

Electricity activities are undertakings relative to the survey, data collection, design, construction and installation, production, transmission and distribution, export and import, development and other services relative to electricity.

Article 9: Sizes of Electricity Enterprises

Electricity enterprises in the Lao PDR are divided into four sizes as follows:

1. Electricity with an installed capacity of more than fifty thousand (50,000) kilowatts is proposed by the Government to the National Assembly for approval;
2. Electricity with an installed capacity of more than two thousand (2,000) - fifty thousand (50,000) kilowatts is approved by the Government;
3. Electricity with an installed capacity of more than one hundred (100) - two thousand (2,000) kilowatts is approved by the provincial, prefectural or special zone administrative authorities according to approval from the Ministry of Industry and Handicraft;
4. Electricity with an installed capacity of less than one hundred (100) kilowatts is approved by the district administrative authorities with the approval of the province, the prefecture or the special zone.

Chapter III
Electricity Activities Concessions

Article 10: Investment in Electricity Activities

The State promotes investment in electricity activities with emphasis upon hydropower to use water sources which are a natural resources potential.

Investment in electricity activities may be undertaken by many different types of enterprises as follows:

1. The State invests alone
2. The State invests with other domestic or foreign parties;
3. A investor invests in a cooperative investment or privately within the country

Enterprises related to electricity activities may undertake [their activities] in the following forms:

1. Build, operate, and transfer (BOT)
2. Build, operate, own and transfer (BOOT)
3. Build, transfer, and finance (BTF)
4. State operated allowing the State electricity company to be the representative
5. Investment in some other form

Article 11: Concessions for Electricity Enterprises

All persons or organizations who seek to operate an electricity enterprise relative to the production, transmission and distribution, export and import or development of electricity must request a concession from the Government of the Lao PDR and must request approval to establish and register an enterprise as provided for in the Business Law.

Article 12: Procedures for Requesting a Concession

Requests [to establish] electricity enterprise concessions are comprised of studies, evaluation of the project, survey of initial data, application for investment, consideration of the investment application, a signing of a memorandum of association, survey, drafting of a feasibility study, an environmental impact assessment statement, consideration and approval of the concession and other works the procedures of which the Ministry of Industry and Handicrafts shall determine in detail.

The Government of the Lao PDR shall participate in the shareholding when there is a concession for an electricity enterprise.

Article 13: Feasibility Studies

Feasibility studies are comprised of the following contents:

1. Socio-Economic Results
2. Maximum producible electrical power
3. Estimated project value
4. Estimated project term and the life of the dam or estimated term and life of some other electrical system
5. Estimated electricity price
6. Plans and operation phases: construction, installation, and time period for commencing electricity supply

Article 14: Environmental Impact Assessment

Along with the feasibility study, the investor must draft an environmental impact assessment which shall be comprised of the following contents:

1. projection of environmental impacts in each case by proposing a methodology, relief measures or a means to minimize the adverse impacts upon the environment, ecology, society and wildlife habitats;
2. estimate the damage and the movement of peoples who will be affected by the electricity project to conduct their production [activities] somewhere else;
3. means to limit the impact upon the water volume below the hydropower dam, which is a major direct contributor to increased flooding during rainy season, by excavating a drainage ditch to divert the water if necessary or by some other means;
4. calculation of expenses for repairs provided for in clauses 1, 2, and 3 of this Article must be incorporated into the capital of the project.

Article 15. Conditions of those who will receive Concessions

Those who shall receive concessions must meet the following conditions:

1. Have financial and technical ability
2. Have a good and reputable business background;
3. The project must be productive economically and socially;
4. The concession must comply with the National Socio-Economic Development Plan and must not create adverse environmental impacts

When a concession applicant meets all of the conditions, the Government will consider the grant of a concession.

Article 16: Concession Term

Concession terms are not to exceed thirty (30) years, including the construction period, which shall commence from the date of concession approval. After the concession period has expired, the

concessionaire must transfer the entire enterprise back to the Government in a good and operational condition without any compensation whatsoever.

Concession terms may be extended, but shall not exceed 10 (ten) years as agreed to by the Government. Requests to extend concessions must be submitted five (5) years before the expiration of the concession.

Article 17: Rights of the Concessionaire

Concessionaires of electricity enterprises have the following rights:

1. Lease land necessary for the operations of the electricity enterprise, but before there is use of other resources on the leased land, there must first be Government approval [to use such].
2. To receive benefits from the concession'
3. To receive protection under the law
4. To receive technical and technological instructions from the Government relative to electricity
5. Request an extension to the concession term
6. Transfer or succeed to an electricity enterprise according to agreement by the Government

Article 18: Obligations of Concessionaires

Electricity enterprise concessionaires have the following major obligations:

1. Operate enterprises properly and in accordance with the conditions of the concession;
2. Deposit a guarantee with the Bank of the Lao PDR;
3. Import registered capital as foreign currency into the Lao PDR according to laws and regulations and according to the foreign investment contract;
4. Protect the environment;
5. Keep accounts as provided in the Enterprise Accounting Law;
6. Timely and completely pay taxes and duties and other obligations according to laws and regulations;
7. Pay damages in case where there has been damage to the environment, lives and property of people if there is a movement of peoples;
8. Train and build up expertise and guarantee social welfare for Lao laborers;
9. Record and report results of the concession according to a time period including detailed expenses of the project;
10. Maintain and repair machinery and electrical equipment to maintain such in good condition according to technical principles relative to electricity;
11. Strictly adhere to the Labor Law and other laws of the Lao PDR;
12. Hand over the project along with the feasibility study and other project documents to the Lao Government without any compensation in the case that the concessionaire does not continue the operations of the electricity enterprise;
13. Before such hand over of the electricity enterprise to the Government, the electricity enterprise operations must first pay all of its debts;

Article 19: Expiration of Concessions

Concessions shall expire in the following cases:

1. End of the concession term;
2. Voluntary cessation of the concession before its term with the approval of the Government;
3. Concession rights are withdrawn due to a serious violation of the laws and regulations;
4. Transfer of the enterprise to someone else with the approval of the Government.

Article 20: Exceptions to Concession Applications

Exceptions to concession applications are as follows:

1. Building of a small scale dam with an installed capacity of less than (two thousand) 2,000 kilowatts and with immaterial environmental impact;
2. Building and installation of equipment to produce electricity by means of electricity producing equipment by means of a heating system of less than five hundred (500) kilowatts.

Operation of an electricity enterprise as referred to above must conform with the National Masterplan and the requirements of the peoples.

Chapter IV
Installation and Determination of Electricity Equipment Standards

Article 21: Installation of Electricity

Installation of electricity is the building, installation, expansion and repair of an electrical system in order to use such for production, services and peoples daily lives by means of a complete electrical equipment system.

Article 22: Approval to Operate an Electricity Enterprise

Individuals and organizations who seek to operate an enterprise related to the installation of electricity must have received approval from the industry and handicraft divisions, must have received approval to register with the commerce division and must have completed tax registration with the finance division.

Article 23: Determination of Standards for Electrical Equipment

In order that electrical tools, electrical equipment, electricity transmission lines and items receiving electricity achieve [a certain standard], ensure safety, be energy saving and is a uniform system throughout the country, the Ministry of Industry and Handicraft shall determine, approve, inspect and conduct work inspections on the quality of all types of electrical equipment produced domestically and imported from abroad.

Chapter V
Electricity Production

Article 24: Electricity Production

Electricity production is the system of producing electricity from the unit generating electricity by water power, wind power, heat energy, geothermal power or other energy.

Article 25: Conditions of Electricity Production

Production of electricity must comply with the following conditions:

- use modern equipment;
- have equipment which limits environmental impact;
- be [of a certain standard] and quality provided for in specific regulations;
- adhere to other necessary conditions in the production of electricity.

Chapter V
Electricity Transmission

Article 26: Electricity Transmission

Electricity transmission is the system of sending and transporting electricity from the electricity production source to the electricity distribution station to urban areas located a long distance away or abroad.

Article 27: Installation and Building of Electricity Transmission Lines

The installation and building of electricity transmission lines must ensure safety and must restrict damage to nature and peoples property.

All citizens have the obligation to contribute to ensuring security, to protect and preserve electricity poles, electricity transmission lines and other equipment in the area where they reside.

Article 28: Transmission of Electricity via a System

The transmission of electricity via a system is the transmission of electricity over an electrical transmission system of another party. The owner of an electricity transmission system who is requested transmission of electricity over their electricity transmission system does not have the right to refuse unless the transmission of electricity over that transmission line cannot be technically guaranteed. Those who use the electricity transmission system of another must pay a service fee.

Article 29: The National Electricity Transmission Grid

The National Electricity Transmission Grid is the high power electricity transmission line system of the Government of the Lao PDR which connects one party to another party throughout the country and which is connected to foreign transmission lines to ensure the administration of production, transmission and distribution of electricity including the protection and preservation of the environment and peoples property.

All electricity production sources must send electricity into the National Electricity Transmission Grid, unless the distribution of electricity within the area where there is an electricity generating plan, there is production of small scale electricity or where there is yet no national transmission grid.

Chapter VII
Electricity Distribution

Article 30: Electricity Distribution

Electricity distribution is the distribution of electricity from the transmission system or from the electricity generating equipment to various types of electricity use sites which are referred to as the electricity distribution network by means of a high, medium or low power system.

Article 31: Principles of Electricity Distribution

Electricity distribution must be conducted based upon the following principles:

1. Continuous and regular electricity supply;
2. Broad-based and regular distribution of electricity;
3. Safe distribution of electricity;
4. Distribution of electricity for socio-economic development.

Article 32: Determination of Electricity Prices

The determination of electricity price is subject to socio-economic conditions and the standard of living from time to time. Electricity prices are divided into the following types:

1. The export commodity price and the import price;
2. The domestic price for industrial and agricultural production;
3. The price for rural and remote electricity use;
4. The price for electricity used in other services;

The Government shall agree to and shall approve a price for each type from time to time.

Article 33: Rights and Obligations of Electricity Distributors

Electricity distributors have the following rights:

1. Collect electricity fees from distribution and services;
2. Warn electricity users who violate regulations;
3. Suspend electricity distribution to users who seriously violate electricity use regulations;
4. Apply measures relative to electricity distribution to ensure public safety and the environment;
5. Inspect and install electricity for electricity users.

Electricity distributors have the following obligations:

1. Broadly and regularly supply electricity to those who request it;
2. Notify electricity users in advance of each instance of cut off;
3. Instruct regarding regulations and principles regarding the use of electricity;
4. Responsibly and timely give service to electricity users;
5. Ensure the safety and social welfare of the electrical workers, safety for society and the environment;
6. Pay taxes and duties and other fees to the State according to regulations and the law;
7. Pay damages in the case that the electricity destroys the environment, peoples lives or their property or public property;

Article 34: Rights and Obligations of Electricity Users

Electricity users have the following rights:

1. To use electricity;
2. To receive instructions relative to the use of electricity;
3. To receive safe electricity usage;
4. To receive service in installation and repairs of electricity in their homes;
5. Request inspection of electricity fee calculations that one views is incorrect.

Electricity users have the following obligations:

1. Pay electricity rates and service fees for electricity that one uses;
2. Adhere to regulations and instructions regarding electricity usage;
3. Facilitate the installation, repair, inspection and recording of electricity usage figures;
4. Ensure safety and to protect and preserve the environment relative to electricity usage;
5. Urgently notify electricity officials in case an electricity-related irregularity is discovered.

Chapter VII
Electricity Export and Import

Article 35: Electricity Export

The Government of the Lao PDR promotes the development of electricity as an export commodity [so long as there are] assurances that there will be sufficient electricity for industrial expansion and national socio-economic development.

Article 36: Electricity Import

]
Electricity can be imported into the Lao PDR provided only that it is necessary for the country's socio-economic development and with agreement of the Government.

Article 37: Transmission of Electricity through the Lao PDR

The transmission of electricity through the Lao PDR is the transmission of electricity from one country across the territory of the Lao PDR to some other country by agreement with the Government of the Lao PDR. The transmission of electricity across the Lao PDR must be conducted via the National Electricity Transmission Grid by payment of a service fee, unless the Lao PDR National Electricity Transmission Grid is unable to supply that need. In such case, the Government shall temporarily approve that a party may transmit power over their own transmission line system but under the administration and inspection of the relevant agency of the Lao PDR.

The transnational transmission of electricity over the Lao PDR must fulfil the following conditions:

1. Limit adverse environmental impacts and limit damage to the people;
2. Pay fees to traverse Lao territory and other service fees while also compensating for all damages which arise from the building of such transmission line system;
3. Allow the Lao PDR's use of that transmission line system if required.

Chapter IX
Electricity Development in the Localities and in Rural Areas

Article 38: Electricity in the Localities and in Rural Areas

Electricity in the localities and in rural areas is an electrical system which is connected to a common electrical system or is any area's separate electrical system which produces electricity by virtue of small scale hydropower, with petroleum-operated machinery, by solar energy, by wind power or by some other energy.

The State promotes the development of electricity in the localities and in rural areas for use in commodities production and for people's daily lives in remote areas.

Article 39: Approval to Establish an Electricity Enterprise in a Locality or in Rural Areas

The provincial, prefectural, or special zone industry and handicraft division will conduct surveys and collect information relative to small scale physical sources of electrical energy with power generating capacity of one hundred (100) to two thousand (2,000) kilowatts to incorporate such into the local electricity building and development plan within the areas of its administrative authority.

The provincial government, the prefecture mayor or the chief of the special zone shall be the party which approves applications to establish electricity in the locality within their area of responsibility according to technical approval from the Ministry of Industry and Handicraft.

The district industry and handicraft bureau shall conduct surveys and collect data relative to physical electricity energy sources within the areas of their administrative control. The district chief shall

approve applications to establish rural electricity according to the technical approval of the provincial, prefectural or special zone industry and handicraft division.

Article 40. Building Electricity in the Localities and in Rural Areas

Building and installing electricity in the localities and in rural areas may be conducted in the following forms:

1. Provinces, the prefecture, the special zone and districts conduct the building and installation themselves;
2. The Ministry of Industry and Handicraft builds and installs and hands it over to the province, the prefecture, the special zone, or the district;
3. Private parties or other parties build and install and thereafter hand it over to the province, the prefecture, the special zone, or the district

The Ministry of Industry and Handicraft and other relevant ministries have the right to make technical recommendations and instructions regarding the building, installing, the protection and preservation of the environment and operating electricity in the locality and in rural areas.

The province, the prefecture, the special zone and districts have the duty to report according to procedures relative to all building and installing of electricity in the locality or in the rural areas to the Ministry of Industry and Handicraft.

Article 41: The Fund to Develop Electricity in the Localities and in Rural Areas

The State establishes a fund for assistance and for loans for carrying out works in building, installing and developing electricity in the locality and in rural areas.

The Fund for Developing Electricity in the Localities and in Rural Areas comes from the following funding sources:

1. The State budget;
2. The State and the people;
3. Other enterprises
4. The people;
5. Domestic and foreign assistance.

In addition, the State may have a policy of exempting or minimizing taxes and duties, providing import credits for vehicles and equipment, for construction and for electricity operations in the localities and in rural areas.

Chapter X

Electrical Administration and Inspection Agencies

Article 42: Electrical Administration and Inspection Agencies

Electrical administration and inspection agencies are comprised of the following:

1. The Ministry of Industry and Handicraft;
2. The provincial, prefectural, or special zone industry and handicraft division;
3. The district industry and handicraft bureau;
4. The village administrative authority

Article 43: Rights and Duties of the Ministry of Industry and Handicraft

In the administration and inspection of electricity enterprises, the Ministry of Industry and Handicraft has the following rights and the duties:

1. Propagate the strategic plan relative to the development of electricity enterprises;
2. Survey and collect information, collect statistics regarding physical electrical energy sources throughout the country;
3. Draft a Masterplan regarding development of electricity enterprises including short-term, medium term and long term plans for the development of electricity enterprises and environmental protection;
4. Issue regulations regarding production and development of electricity enterprises;
5. Protect and preserve physical sources of electricity;
6. Research and give technical opinions relative to investment in electricity enterprises;
7. Research electricity prices to submit to the Government for agreement upon such and approval;
8. Coordinate with other parties and localities involved in the administration and inspection of electricity enterprises;
9. Cooperate with foreign parties and find funding sources for developing electricity enterprises;
10. Exercise other rights and fulfill other duties relative to the administration of electricity enterprises and regulations and the laws.

Article 44: Rights and Duties of the Provincial, Prefectural, or Special Zone Industry and Handicraft Division

In the administration and inspection of electricity enterprises, the provincial, prefectural or special zone industry and handicraft divisions have the following rights and duties:

1. Propagate the Ministry of Industry and Handicraft's Masterplan regarding development of electricity enterprises and the protection and preservation of the environment.
2. Survey, collect data, keep statistics and protect and preserve physical sources of electrical energy;
3. Research and give opinions regarding applications to establish small scale electrical production plants from two thousand (2,000) kilowatts down to one hundred (100) kilowatts to submit such to the provincial governor, the mayor of the prefecture or the chief of the special zone for approval;
4. Coordinate with other relevant parties regarding administration and inspection of electricity enterprises relative to production, transmission, and distribution of electricity and standards for electrical equipment, produced domestically and imported from abroad;
5. Exercise other rights and fulfill other duties relative to the administration of electricity enterprises according to its assigned authority from the Ministry of Industry and Handicraft.

Article 45: Rights and Duties of the District Industry and Handicraft Bureau

In the administration and inspection of electricity enterprises, the district industry and handicraft bureau has the following rights and duties:

1. Implement the plan, project, terms and regulations and instructions of the provincial, prefectural or special zone industry and handicraft division relative to electricity enterprises and the protection and preservation of the environment.
2. Research and give opinions regarding applications to establish small scale electrical production plants or electricity generating equipment of one hundred (100) kilowatts or less to submit such to the district governor for approval;
3. Coordinate with other relevant parties regarding administration and inspection of electricity enterprises within the area of its responsibility;
4. Exercise other rights and fulfill other duties relative to the administration of electricity enterprises according to its assigned authority from the industry and handicraft division.

Article 46: Rights and Duties of the Village Administrative Authority

In the monitoring and inspection of electricity enterprises, the village administrative authority has the following rights and duties:

1. Monitor and inspect the undertakings of small scale electricity enterprises within the area of its village;
2. Propose and report to [to the relevant] organization relative to the undertakings of the electricity enterprise affecting the rights and benefits of the people, fine traditions and laws and regulations;
3. Facilitate parties who are undertaking electricity enterprises within the area of its village;
4. Coordinate with parties who are conducting electricity enterprises to protect and preserve public order and peace within the area of its village;

Article 47: Inspection

Inspection of electricity enterprises is the inspection of the undertakings of an electricity enterprise in order that the electricity enterprise be productive, be technically assured, protect and preserve the environment, and to ensure that the electricity enterprise's undertakings are proper and in accordance with laws and regulations.

Article 48: Contents of an Inspection

Inspections of electricity enterprises have the following major contents:

1. Performance of phases of electricity enterprises undertakings;
2. Performance according to a time schedule;
3. Performance of the feasibility study;
4. Performance of an issued plan;'
5. Performance of technical safety measures;
6. Standards for electrical equipment;
7. Construction, installation, and management of electrical equipment;
8. Application of measures to limit environmental impacts;
9. Payment of damages to the environment and peoples lives and property;
10. Inspect the financial system and social welfare policies;
11. Performance of other regulations relative to undertakings of an electricity enterprise.

Article 49: The Technical Inspection Committee

In order that the building, installation, and undertakings of an electricity enterprise be technically guaranteed, ensures safety, and protects and preserves the environment, the Government may create a technical inspection committee which shall be comprised of the Ministry of Industry and Handicraft and other relevant ministries or agencies. That technical inspection committee shall be automatically terminated after having completed its duties as assigned.

Chapter XI

Measures [to be applied to those] Who Are Productive and Against Violators

Article 50: Policies for those who are Productive

Individuals or organizations achieving excellent results in the undertakings of electricity enterprises and the protection and preservation of the environment shall receive commendations and shall enjoy various policies: [financial] credit or extensions of the concession or other policies.

Article 51: Measures Against Violators

The following major measures shall be applied to those who violate this Law:
1. Educational and training measures;
2. Fines;
3. Criminal measures.

In addition, violators may receive additional punishment: suspension of business undertakings, withdrawal of licenses, nationalization of vehicles, or other equipment used in the offense, or suspension of payment for electricity.

Article 52: Educational and Training Measures

Individuals or organizations who have violated this Law in an immaterial manner: failure to report regarding the undertakings of the electricity enterprise, failure to timely make reports, failure to adhere to technical standards which failure is not dangerous shall be educated and trained.

Article 53: Fines

Individuals or organizations who have violated this Electricity Law shall be fined an equivalent of the amount of actual damages due to any one of the following acts:

1. Undertaking electricity enterprise [business[without approval;
2. Installing electricity without approval;
3. Installing electricity into one's home without a meter;
4. Allow others to draw electricity from one's home without approval;
5. Modifying electricity meters;
6. Failing to adhere to safety standards;
7. Failing to adhere to standards to limit adverse environmental impacts;
8. Failing to pay obligations, taxes, and duties;
9. Failing to pay damages which one causes to the environment, to peoples lives and property;
10. Failing to cooperate with electricity officials in [their] administrative and inspection [duties]

Article 54: Criminal Measures

Any individual violating this Law which act is a criminal violation: cutting of electrical lines, destroying electrical equipment, abuses one's title and position to derive personal benefit from electricity activities, failure to apply safety measures which causes a loss of life, damage to health or causes a person to become handicapped or causes damage to State assets, to cooperatives, or to the public shall be punished according to the Penal Code.

Chapter XII
Final Provisions

Article 55: Implementation

The Government of the Lao Peoples Democratic Republic is the party who shall implement this Law.

Article 56: Effectiveness

This Law is effective ninety (90) days from the date that the President of the Lao Peoples Democratic Republic issues a decree promulgating it.

Persons or organization who have received concessions before the date this Law becomes effective have the right to continue their enterprise operations. In the case that the provisions of this Law conflict with their interests, they have the right to propose to the competent agency for consideration of a resolution within a period of one hundred eighty (180) days from the effective date of this Law. Terms and provisions which conflict with this Law are hereby repealed.

Vientiane, date 12/4/1997
[seal and signature]
President of the National Assembly
Samane Vignaket

付録 5.4

電力需要予測の詳細

電力需要予測
北部地域の要約

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		317	317	317	317	317	317	317	317	317	317	317	317	317	317	317	317	317	317	317	317	317
Rural with road access		777	777	777	777	777	777	777	777	777	777	777	777	777	777	777	777	777	777	777	777	777
Rural without road access		2,107	2,107	2,107	2,107	2,107	2,107	2,107	2,107	2,107	2,107	2,107	2,107	2,107	2,107	2,107	2,107	2,107	2,107	2,107	2,107	2,107
Total		3,201	3,201	3,201	3,201	3,201	3,201	3,201	3,201	3,201	3,201	3,201	3,201	3,201	3,201	3,201	3,201	3,201	3,201	3,201	3,201	3,201
Population																						
Urban																						
Rural																						
Total	(x 1,000)	931.7	951.2	971.1	991.4	1,012.2	1,033.3	1,052.9	1,072.9	1,093.2	1,113.9	1,135.0	1,154.3	1,173.8	1,193.8	1,214.0	1,234.6	1,253.1	1,271.9	1,291.0	1,310.4	1,330.0
Household																						
Urban		15,087	15,411	15,742	16,080	16,426	16,779	17,107	17,440	17,781	18,128	18,482	18,806	19,136	19,472	19,813	20,161	20,475	20,794	21,117	21,446	21,780
Rural with road access		35,584	36,322	37,074	37,843	38,627	39,428	40,167	40,920	41,687	42,469	43,265	43,990	44,728	45,478	46,240	47,016	47,711	48,417	49,133	49,859	50,597
Rural without road access		99,288	101,352	103,459	105,610	107,807	110,050	112,120	114,230	116,379	118,570	120,803	122,837	124,905	127,009	129,149	131,326	133,277	135,258	137,270	139,311	141,384
Rural total		134,872	137,673	140,533	143,453	146,434	149,478	152,287	155,149	158,066	161,039	164,068	166,827	169,633	172,487	175,390	178,342	180,988	183,675	186,402	189,171	191,981
Total		149,959	153,084	156,275	159,533	162,860	166,257	169,394	172,590	175,847	179,167	182,550	185,633	188,769	191,958	195,203	198,503	201,463	204,468	207,519	210,617	213,762
Nos. of Village To be Electrifiec		276	363	442	526	608	680	762	838	914	994	1,072	1,197	1,306	1,431	1,547	1,673	1,785	1,906	2,024	2,140	2,259
Urban		165	195	215	261	277	284	297	305	309	313	316	317	317	317	317	317	317	317	317	317	317
Rural with access		107	160	215	253	308	351	394	432	466	496	521	585	634	678	716	748	758	767	775	779	779
Rural without access		4	8	12	12	23	45	71	101	139	185	235	295	355	432	505	593	689	796	900	1,007	1,120
New Village Connection after 1999 (Accum		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	30	50	76	92	99	112	120	124	128	131	132	132	132	132	132	132	132	132	132	132
Rural with access		0	53	108	146	201	244	287	325	359	389	414	478	527	571	609	641	651	660	668	672	672
Rural without access		0	4	8	10	21	43	69	99	137	183	233	293	353	430	503	591	687	794	898	1,005	1,118
Household to be Electrifiec		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		21,160	27,072	32,985	38,886	44,607	50,328	56,049	61,770	67,490	73,211	78,932	87,294	95,656	104,017	112,379	120,741	129,103	137,464	145,826	154,188	162,550
Rural with road access		9,248	11,006	12,327	14,797	15,579	16,277	16,827	17,354	17,781	18,128	18,482	18,806	19,136	19,472	19,813	20,161	20,475	20,794	21,117	21,446	21,780
Rural without road access		11,014	13,962	16,741	20,074	23,190	25,690	27,923	30,039	32,031	34,000	35,634	38,728	41,545	43,978	45,792	47,013	47,711	48,417	49,133	49,859	50,597
New Household Connection After 1999 (Ac		898	2,105	3,917	4,015	5,838	8,361	11,300	14,377	17,679	21,083	24,816	29,760	34,975	40,568	46,773	53,567	60,917	68,254	75,576	82,882	90,172
Urban		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rural with access		0	1,758	3,080	4,599	5,381	6,078	6,628	7,156	7,583	7,930	8,284	8,608	8,938	9,273	9,615	9,963	10,277	10,595	10,919	11,248	11,582
Rural without access		0	2,948	5,727	9,152	12,268	14,768	17,001	19,117	21,109	23,079	24,712	27,806	30,623	33,056	34,870	36,091	36,789	37,495	38,211	38,938	39,675
Energy Demand Forecast																						
Non-residential	(kWh)	34,404,977	37,240,685	40,358,621	43,788,105	47,561,636	51,715,250	55,985,477	60,661,684	65,784,285	71,397,898	77,551,794	83,159,212	89,215,011	95,756,417	102,823,859	110,461,250	118,716,296	127,640,838	137,291,218	147,728,681	159,019,813
Non-residential(New)	(kWh)	0	4,379,667	8,721,470	13,140,838	17,979,706	22,121,669	27,062,894	31,736,074	36,378,987	41,297,058	46,211,997	54,209,392	61,517,847	69,526,052	77,356,495	85,764,106	93,233,162	101,478,584	109,915,595	118,567,040	127,596,245
Additional Special Demanc	(kWh)	0	0	0	61,680	111,360	111,360	112,560	174,240	225,120	225,120	226,320	288,000	338,880	338,880	340,080	401,760	451,440	451,440	451,440	513,120	562,800
Sub-total	(kWh)	34,404,977	41,620,353	49,080,091	56,990,623	65,652,702	73,948,279	83,160,932	92,571,997	102,388,392	112,920,075	123,990,111	137,656,604	151,071,737	165,621,349	180,520,434	196,627,116	212,400,898	229,570,862	247,658,254	266,808,840	287,178,858
Residential (Already connected	(kWh)	16,701,302	17,536,367	18,413,185	19,333,844	20,300,537	21,315,563	22,381,342	23,500,409	24,675,429	25,909,201	27,204,661	28,564,894	29,993,138	31,492,795	33,067,435	34,720,807	36,456,847	38,279,689	40,193,674	42,203,358	44,313,526
Residential (New Connection)	(kWh)	0	4,676,830	9,193,106	13,896,100	18,466,996	22,649,631	26,669,985	30,775,003	34,874,088	39,084,866	43,163,320	49,400,372	55,664,177	61,814,615	67,543,102	72,827,248	77,652,714	82,718,458	88,039,630	93,627,981	99,495,783
Sub-total	(kWh)	16,701,302	22,213,197	27,606,291	33,229,945	38,767,532	43,965,195	49,051,326	54,275,412	59,549,518	64,994,067	70,367,981	77,965,266	85,657,315	93,307,410	100,610,537	107,548,055	114,109,561	120,998,148	128,233,304	135,831,339	143,809,309
Total Energy Demand	(kWh)	51,106,279	63,833,549	76,686,382	90,220,567	104,420,235	117,913,474	132,212,258	146,847,409	161,937,909	177,914,142	194,358,092	215,621,869	236,729,053	258,928,759	281,130,971	304,175,171	326,510,459	350,569,010	375,891,558	402,640,179	430,988,167
Annual Growth Rate	(%)	51.5	24.9	20.1	17.6	15.7	12.9	12.1	11.1	10.3	9.9	9.2	10.9	9.8	9.4	8.6	8.2	7.3	7.4	7.2	7.1	7.0
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	15,554,085	18,769,174	21,828,299	24,902,461	27,987,044	29,478,368	32,367,316	35,194,834	37,985,436	40,832,754	43,631,409	47,331,630	50,796,113	54,291,514	57,581,042	60,835,034	63,741,086	66,775,049	69,829,657	72,919,088	76,056,735
Total Energy Consumption	(kWh)	66,660,363	82,602,724	98,514,682	115,123,029	132,407,278	147,391,842	164,579,574	182,042,243	199,923,345	218,746,896	237,989,501	262,953,499	287,525,165	313,220,273	338,712,013	365,010,205	390,251,544	417,344,059	445,721,215	475,559,267	507,044,902
Annual Growth Rate	(%)	50.2	23.9	19.3	16.9	15.0	11.3	11.7	10.6	9.8	9.4	8.8	10.5	9.3	8.9	8.1	7.8	6.9	6.9	6.8	6.7	6.6
Peak Power Demand	(MW)	15.30	18.62	21.79	24.98	28.18	30.77	33.70	36.58	39.43	42.37	45.28	50.03	54.70	59.59	64.44	69.45	74.25	79.40	84.80	90.48	96.47
Annual Growth Rate	(%)	48.1	21.7	17.0	14.7	12.8	9.2	9.5	8.5	7.8	7.4	6.9	10.5	9.3	8.9	8.1	7.8	6.9	6.9	6.8	6.7	6.6
Load Factor	(%)	49.7	50.6	51.6	52.6	53.6	54.7	55.7	56.8	57.9	58.9	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Energy Demand by Category																						
Industrial		7,938,290	9,869,421	11,850,100	13,915,279	16,150,910	18,357,509	20,768,374	23,277,430	25,946,574	28,864,999	32,027,159	35,302,705	38,667,283	42,304,519	46,166,044	50,339,217	54,686,373	59,444,291	64,607,192	70,207,365	76,300,667
Agriculture		4,757,441	4,757,441	4,757,441	4,819,121	4,868,801	4,868,801	4,870,001	4,931,681	4,982,561	4,982,561	4,983,761	5,045,441	5,096,321	5,096,321	5,097,521	5,159,201	5,208,881	5,208,881	5,208,881	5,270,561	5,320,241
Services		21,709,246	26,993,490	32,472,550	38,256,222	44,632,991	50,721,969	57,522,557	64,362,886	71,459,256	79,072,515	86,979,191	97,308,457	107,308,133	118,220,509	129,256,869	141,128,697	152,505,643	164,917,690	177,842,181	191,330,914	205,557,950
Residential		16,701,302	22,213,197	27,606,291	33,229,945	38,767,532	43,965,195	49,051,326	54,275,412	59,549,518	64,994,067	70,367,981	77,965,266	85,657,315	93,307,410	100,610,537	107,548,055	114,109,561	120,998,148	128,233,304	135,831,339	143,809,309
Total		51,106,279	63,833,549	76,686,382	90,220,567	104,420,235	117,913,474	132,212,258	146,847,409	161,937,909	177,914,142	194,358,092	215,621,869	236,729,053	258,928,759	281,130,971	304,175,171	326,510,459	350,569,010	375,891,558	402,640,179	430,988,167

電力需要予測
中央1地域の要約

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		653	653	653	653	653	653	653	653	653	653	653	653	653	653	653	653	653	653	653	653	653
Rural with road access		1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532	1,532
Rural without road access		1,793	1,793	1,793	1,793	1,793	1,793	1,793	1,793	1,793	1,793	1,793	1,793	1,793	1,793	1,793	1,793	1,793	1,793	1,793	1,793	1,793
Total		3,978	3,978	3,978	3,978	3,978	3,978	3,978	3,978	3,978	3,978	3,978	3,978	3,978	3,978	3,978	3,978	3,978	3,978	3,978	3,978	3,978
Population																						
Urban																						
Rural																						
Total	(x 1,000)	2,120	2,170	2,221	2,273	2,327	2,382	2,433	2,486	2,540	2,595	2,651	2,704	2,757	2,812	2,867	2,924	2,976	3,029	3,083	3,138	3,195
Household																						
Urban		93,174	95,715	98,326	101,011	103,771	106,608	109,312	112,086	114,932	117,853	120,850	123,684	126,586	129,559	132,604	135,723	138,646	141,634	144,689	147,813	151,007
Rural with road access		129,416	132,284	135,217	138,218	141,287	144,426	147,348	150,332	153,379	156,489	159,665	162,589	165,568	168,605	171,700	174,855	177,721	180,636	183,602	186,620	189,690
Rural without road access		128,527	131,405	134,350	137,361	140,442	143,594	146,530	149,528	152,589	155,714	158,905	161,846	164,842	167,896	171,008	174,180	177,065	179,999	182,983	186,020	189,108
Rural total		257,942	263,689	269,567	275,579	281,729	288,020	293,878	299,860	305,968	312,204	318,571	324,435	330,411	336,501	342,709	349,035	354,785	360,635	366,585	372,640	378,799
Total		351,116	359,403	367,893	376,590	385,500	394,628	403,190	411,946	420,900	430,057	439,421	448,118	456,997	466,061	475,313	484,758	493,431	502,269	511,275	520,453	529,805
Nos. of Village To be Electrifiec		1,106	1,177	1,248	1,316	1,391	1,455	1,530	1,598	1,669	1,740	1,811	1,942	2,071	2,201	2,326	2,462	2,588	2,718	2,848	2,977	3,106
Urban		555	580	590	600	610	617	624	629	633	641	644	653	653	653	653	653	653	653	653	653	653
Rural with access		426	466	520	572	628	674	728	772	813	848	886	982	1,085	1,185	1,269	1,345	1,398	1,431	1,455	1,468	1,479
Rural without access		124	130	137	143	152	163	177	196	222	250	280	306	332	362	403	463	536	633	739	855	973
New Village Connection after 1999 (Accumulated																						
Urban		0	25	35	45	55	62	69	74	78	86	89	98	98	98	98	98	98	98	98	98	98
Rural with access		0	40	94	146	202	248	302	346	387	422	460	556	659	759	843	919	972	1,005	1,029	1,042	1,053
Rural without access		0	6	13	19	28	39	53	72	98	126	156	182	208	238	279	339	412	509	615	731	849
Household to be Electrifiec		150,876	162,301	173,726	185,151	196,576	208,001	219,426	230,851	242,276	253,701	265,126	286,074	307,022	327,970	348,918	369,866	390,813	411,761	432,709	453,657	474,605
Urban		87,869	92,145	95,742	99,222	102,552	105,728	108,702	111,645	114,529	117,466	120,472	123,684	126,586	129,559	132,604	135,723	138,646	141,634	144,689	147,813	151,007
Rural with road access		52,917	58,471	64,519	70,656	76,376	82,124	87,553	92,632	97,482	102,157	106,681	120,915	134,548	146,935	156,305	164,103	170,379	175,289	179,490	183,375	187,231
Rural without road access		10,090	11,686	13,465	15,273	17,647	20,148	23,172	26,574	30,266	34,078	37,974	41,475	45,887	51,475	60,008	70,040	81,789	94,838	108,530	122,469	136,367
New Household Connection After 1999 (Accumulatec																						
Urban		0	4,276	7,874	11,354	14,684	17,860	20,833	23,777	26,660	29,597	32,603	35,815	38,718	41,691	44,735	47,854	50,777	53,766	56,821	59,944	63,138
Rural with access		0	5,553	11,602	17,738	23,459	29,207	34,635	39,714	44,565	49,240	53,763	67,998	81,631	94,018	103,388	111,185	117,461	122,372	126,572	130,457	134,313
Rural without access		0	1,596	3,375	5,183	7,557	10,058	13,082	16,484	20,176	23,988	27,884	31,385	35,797	41,385	49,918	59,950	71,699	84,748	98,440	112,379	126,278
Energy Demand Forecast																						
Non-residential	(kWh)	265,930,685	284,401,350	304,456,239	326,240,181	349,912,143	375,646,694	401,885,182	430,292,493	461,060,330	494,398,506	530,536,756	562,964,054	597,653,050	634,771,478	674,500,278	717,034,693	762,585,460	811,380,108	863,664,366	919,703,694	979,784,952
Non-residential(New	(kWh)	0	3,747,169	7,493,801	11,326,410	15,691,326	19,593,014	24,274,809	28,635,404	33,210,265	38,042,990	42,991,573	52,467,508	62,171,681	72,353,637	82,358,478	93,083,418	103,140,696	113,170,332	123,373,370	133,617,466	144,250,941
Irrigation and other additional	(kWh)	0	0	7,665,000	13,667,544	21,332,544	21,090,240	21,090,240	26,814,960	26,850,480	26,850,480	26,850,480	32,610,720	32,610,720	32,610,720	32,646,240	38,370,960	38,370,960	38,406,480	38,895,720	44,131,200	44,131,200
Sub-total	(kWh)	265,930,685	288,148,519	319,615,040	351,234,136	386,936,013	416,329,948	447,250,231	485,742,857	521,121,076	559,291,976	600,378,809	648,042,281	692,435,450	739,735,835	789,504,995	848,489,071	904,097,116	962,956,920	1,025,933,455	1,097,452,360	1,168,167,094
Residential (Already connected	(kWh)	254,685,610	257,413,961	270,284,659	283,798,892	297,988,837	312,888,279	328,532,693	344,959,327	362,207,294	380,317,658	399,333,541	419,855,866	440,820,877	462,834,139	485,948,063	510,217,684	535,700,786	562,458,043	590,553,162	620,053,038	651,027,908
Residential (New Connection	(kWh)	0	26,909,576	36,218,483	46,607,658	56,505,437	66,910,657	77,448,314	88,885,370	100,068,154	111,726,772	123,916,260	150,131,127	175,600,617	201,093,966	224,406,520	247,636,048	269,297,318	290,327,801	311,513,405	333,929,822	356,891,134
Sub-total	(kWh)	254,685,610	284,323,537	306,503,142	330,406,551	354,494,274	379,798,936	405,981,007	433,844,697	462,275,448	492,044,430	523,249,801	569,986,993	616,421,494	663,928,104	710,354,583	757,853,731	804,998,104	852,785,843	902,066,568	953,982,860	1,007,919,041
Total Energy Demanc	(kWh)	520,616,295	572,472,056	626,118,182	681,640,686	741,430,287	796,128,884	853,231,238	919,587,554	983,396,523	1,051,336,406	1,123,628,610	1,218,029,275	1,308,856,944	1,403,663,939	1,499,859,579	1,606,342,802	1,709,095,220	1,815,742,763	1,928,000,023	2,051,435,220	2,176,086,135
Annual Growth Rate	(%)	20.2	10.0	9.4	8.9	8.8	7.4	7.2	7.8	6.9	6.9	6.9	8.4	7.5	7.2	6.9	7.1	6.4	6.2	6.2	6.4	6.1
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	158,448,438	168,325,716	178,220,627	188,144,802	198,720,505	199,032,221	208,882,336	220,397,017	230,673,259	241,290,323	252,243,157	267,372,280	280,847,846	294,316,632	307,200,155	321,268,560	333,648,071	345,855,764	358,166,012	371,519,764	384,015,200
Total Energy Consumption	(kWh)	679,064,733	740,797,772	804,338,809	869,785,489	940,150,792	995,161,105	1,062,113,574	1,139,984,571	1,214,069,782	1,292,626,728	1,375,871,767	1,485,401,554	1,589,704,790	1,697,980,571	1,807,059,733	1,927,611,363	2,042,743,291	2,161,598,528	2,286,166,035	2,422,954,984	2,560,101,335
Annual Growth Rate	(%)	19.2	9.1	8.6	8.1	8.1	5.9	6.7	7.3	6.5	6.5	6.4	8.0	7.0	6.8	6.4	6.7	6.0	5.8	5.8	6.0	5.7
Peak Power Demand	(MW)	137.8	149.4	161.5	173.7	186.6	196.2	207.9	221.6	234.3	247.7	261.8	282.6	302.5	323.1	343.8	366.7	388.6	411.3	435.0	461.0	487.1
Annual Growth Rate	(%)	17.1	8.4	8.1	7.5	7.5	5.1	6.0	6.6	5.7	5.7	5.7	8.0	7.0	6.8	6.4	6.7	6.0	5.8	5.8	6.0	5.7
Load Factor	(%)	56.2	56.6	56.8	57.2	57.5	57.9	58.3	58.7	59.1	59.6	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Energy Demand by Category																						
Industrial	(kWh)	97,119,641	106,974,632	125,620,986	137,324,202	157,862,313	171,846,534	186,418,317	202,230,921	219,506,158	238,427,578	259,106,219	278,223,686	298,711,090	320,746,880	344,363,916	369,802,697	397,061,077	426,368,667	457,962,749	492,026,592	528,830,513
Agriculture	(kWh)	29,519,559	29,519,559	29,519,559	35,522,103	35,522,103	35,279,799	35,279,799	41,004,519	41,040,039	41,040,039	41,040,039	46,800,279	46,800,279	46,800,279	46,835,799	52,560,519	52,560,519	52,596,039	53,085,279	58,320,759	58,320,759
Services	(kWh)	139,049,180	151,381,131	164,474,494	178,387,830	193,551,597	209,203,615	225,552,115	242,507,416	260,574,878	279,824,358	300,232,551	323,018,316	346,924,081	372,188,676	398,305,280	426,125,854	454,475,520	483,992,214	514,885,427	547,105,009	581,015,821
Residential	(kWh)	254,685,610	284,323,537	306,503,142	330,406,551	354,494,274	379,798,936	405,981,007	433,844,697	462,275,448	492,044,430	523,249,801	569,986,993	616,421,494	663,928,104	710,354,583	757,853,731	804,998,104	852,785,843	902,066,568	953,982,860	1,007,919,041
Total	(kWh)	520,373,991	572,198,859	626,118,182	681,640,686	741,430,287	796,128,884	853,231,238	919,587,554	983,396,523	1,051,336,406	1,123,628,610	1,218,029,275	1,308,856,944	1,403,663,939	1,499,859,579	1,606,342,802	1,709,095,220	1,815,742,763	1,928,000,023	2,051,435,220	2,176,086,135

電力需要予測
中央2地域の要約

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		351	351	351	351	351	351	351	351	351	351	351	351	351	351	351	351	351	351	351	351	351
Rural with road access		1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162	1,162
Rural without road access		937	937	937	937	937	937	937	937	937	937	937	937	937	937	937	937	937	937	937	937	937
Total		2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450
Population																						
Urban																						
Rural																						
Total	(x 1,000)	1,099.9	1,128.6	1,158.0	1,188.3	1,219.3	1,251.1	1,281.3	1,312.2	1,343.8	1,376.2	1,409.4	1,440.6	1,472.5	1,505.1	1,538.4	1,572.4	1,604.1	1,636.4	1,669.3	1,702.9	1,737.2
Household																						
Urban		26,455	27,146	27,856	28,584	29,331	30,098	30,825	31,570	32,332	33,113	33,913	34,664	35,432	36,218	37,020	37,841	38,604	39,383	40,177	40,988	41,814
Rural with road access		84,954	87,177	89,457	91,798	94,200	96,665	99,001	101,394	103,845	106,356	108,927	111,343	113,812	116,337	118,918	121,556	124,010	126,513	129,068	131,674	134,333
Rural without road access		67,413	69,159	70,950	72,788	74,673	76,608	78,439	80,314	82,235	84,201	86,215	88,104	90,036	92,009	94,026	96,088	98,002	99,955	101,948	103,980	106,053
Rural total		152,368	156,336	160,408	164,586	168,873	173,273	177,440	181,709	186,080	190,557	195,142	199,447	203,848	208,346	212,944	217,644	222,012	226,469	231,015	235,654	240,385
Total		178,822	183,482	188,263	193,170	198,205	203,371	208,265	213,278	218,412	223,670	229,055	234,112	239,280	244,564	249,964	255,485	260,616	265,852	271,192	276,641	282,200
Nos. of Village To be Electrified		646	692	739	790	840	885	935	986	1,033	1,079	1,129	1,235	1,343	1,446	1,549	1,660	1,763	1,868	1,971	2,078	2,183
Urban		261	289	314	331	339	343	346	348	349	351	351	351	351	351	351	351	351	351	351	351	351
Rural with access		314	327	345	374	411	448	490	534	576	615	661	765	864	946	1,017	1,055	1,083	1,105	1,123	1,138	1,146
Rural without access		71	76	80	85	90	94	99	104	108	113	117	119	128	149	181	254	329	412	497	589	686
New Village Connection after 1999 (Accumu		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	28	53	70	78	82	85	87	88	90	90	90	90	90	90	90	90	90	90	90	90
Rural with access		0	13	31	60	97	134	176	220	262	301	347	451	550	632	703	741	769	791	809	824	832
Rural without access		0	5	9	14	19	23	28	33	37	42	46	48	57	78	110	183	258	341	426	518	615
Household to be Electrified		67,990	73,475	78,960	84,445	89,930	95,416	100,901	106,386	111,871	117,356	122,841	137,524	152,207	166,891	181,574	196,257	210,940	225,624	240,307	254,990	269,673
Urban		24,334	26,057	27,270	28,355	29,187	30,031	30,825	31,570	32,332	33,113	33,913	34,664	35,432	36,218	37,020	37,841	38,604	39,383	40,177	40,988	41,814
Rural with road access		36,421	39,984	44,077	48,315	52,825	57,344	61,564	65,768	69,974	74,181	78,271	90,045	100,305	108,940	114,204	118,491	122,505	125,906	128,876	131,674	134,333
Rural without road access		7,236	7,434	7,614	7,775	7,918	8,041	8,511	9,048	9,565	10,062	10,657	12,815	16,470	21,733	30,350	39,925	49,831	60,334	71,253	82,329	93,526
New Household Connection After 1999 (Accu		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	1,724	2,936	4,021	4,854	5,697	6,491	7,236	7,998	8,779	9,579	10,331	11,099	11,884	12,687	13,507	14,270	15,049	15,843	16,654	17,481
Rural with access		0	3,564	7,656	11,895	16,405	20,923	25,144	29,348	33,553	37,760	41,851	53,624	63,884	72,519	77,783	82,070	86,084	89,486	92,456	95,253	97,912
Rural without access		0	198	378	539	682	805	1,275	1,812	2,329	2,827	3,421	5,579	9,234	14,498	23,114	32,690	42,596	53,099	64,018	75,093	86,290
Average Non-Residential Consumption Per Village																						
District center	(kWh)	663,570	690,113	717,717	746,426	776,283	807,334	839,628	873,213	908,141	944,467	982,246	1,021,536	1,062,397	1,104,893	1,149,089	1,195,052	1,242,854	1,292,568	1,344,271	1,398,042	1,453,964
Urban	(kWh)	45,990	47,830	49,743	51,732	53,802	55,954	58,192	60,520	62,940	65,458	68,076	70,799	73,631	76,577	79,640	82,825	86,138	89,584	93,167	96,894	100,770
Rural with access	(kWh)	39,420	40,997	42,637	44,342	46,116	47,960	49,879	51,874	53,949	56,107	58,351	60,685	63,113	65,637	68,263	70,993	73,833	76,786	79,858	83,052	86,374
Rural without access	(kWh)	23,652	24,598	25,582	26,605	27,669	28,776	29,927	31,124	32,369	33,664	35,011	36,411	37,868	39,382	40,958	42,596	44,300	46,072	47,915	49,831	51,824
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural with road access	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural without road access	(kWh)	100	103	106	109	113	116	119	123	127	130	134	138	143	147	151	156	160	165	170	175	181
Energy Demand Forecast																						
Non-residential	(kWh)	65,946,720	72,271,212	79,332,217	87,217,770	96,026,641	105,869,658	116,193,749	127,662,986	140,407,472	154,572,355	170,319,586	184,656,058	200,303,728	217,384,721	236,032,694	256,393,931	278,628,550	302,911,827	329,435,635	358,410,039	390,065,032
Non-residential(New)	(kWh)	0	2,557,062	5,301,933	8,286,730	11,262,458	14,093,951	17,334,143	20,800,234	24,223,991	27,759,016	31,740,985	39,766,246	48,164,521	56,287,987	64,491,129	72,342,865	79,913,235	87,743,856	95,732,288	104,193,253	112,668,074
Additional loads	(kWh)	0	0	0	19,882,608	19,882,608	44,921,040	67,149,540	85,499,148	113,493,080	117,325,580	159,483,080	164,546,120	168,378,620	182,175,620	213,346,052	248,558,660	248,558,660	252,901,592	252,901,592	272,784,200	288,114,200
Sub-total	(kWh)	65,946,720	74,828,274	84,634,149	115,387,108	127,171,707	164,884,649	200,677,433	233,962,368	278,124,543	299,656,951	361,543,651	388,968,424	416,846,869	455,848,328	513,869,875	577,295,455	607,100,445	643,557,275	678,069,515	735,387,492	790,847,306
Residential (Already connected)	(kWh)	50,397,141	52,916,998	55,562,848	58,340,990	61,258,040	64,320,942	67,536,989	70,913,839	74,459,531	78,182,507	82,091,632	86,196,214	90,506,025	95,031,326	99,782,892	104,772,037	110,010,639	115,511,171	121,286,729	127,351,066	133,718,619
Residential (New Connection)	(kWh)	0	4,921,634	10,153,789	15,711,528	21,610,590	27,867,412	34,148,970	40,716,611	47,667,429	55,019,590	62,665,486	80,448,039	97,533,653	113,682,885	126,655,674	139,108,722	151,771,196	164,278,522	176,833,217	189,774,324	203,156,232
Sub-total	(kWh)	50,397,141	57,838,632	65,716,637	74,052,519	82,868,630	92,188,354	101,685,959	111,630,449	122,126,959	133,202,097	144,757,119	166,644,253	188,039,677	208,714,211	226,438,566	243,880,759	261,781,834	279,789,693	298,119,946	317,125,390	336,874,851
Total Energy Demand	(kWh)	116,343,861	132,666,906	150,350,786	189,439,627	210,040,337	257,073,003	302,363,392	345,592,817	400,251,502	432,859,048	506,300,770	555,612,677	604,886,546	664,562,539	740,308,442	821,176,214	868,882,280	923,346,968	976,189,461	1,052,512,882	1,127,722,157
Annual Growth Rate	(%)	17.8	14.0	13.3	26.0	10.9	22.4	17.6	14.3	15.8	8.1	17.0	9.7	8.9	9.9	11.4	10.9	5.8	6.3	5.7	7.8	7.1
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	35,409,001	39,008,458	42,796,411	52,288,664	56,295,679	64,268,251	74,022,573	82,828,031	93,886,155	99,344,700	113,659,356	121,963,758	129,793,469	139,343,758	151,629,440	164,235,243	169,622,437	175,875,613	181,347,449	190,612,569	199,009,792
Total Energy Consumption	(kWh)	151,752,862	171,675,363	193,147,197	241,728,291	266,336,016	321,341,254	376,385,965	428,420,848	494,137,657	532,203,748	619,960,126	677,576,435	734,680,016	803,906,297	891,937,882	985,411,457	1,038,504,717	1,099,222,581	1,157,536,910	1,243,125,451	1,326,731,949
Annual Growth Rate	(%)	16.8	13.1	12.5	25.2	10.2	20.7	17.1	13.8	15.3	7.7	16.5	9.3	8.4	9.4	11.0	10.5	5.4	5.8	5.3	7.4	6.7
Peak Power Demand	(MW)	30.07	33.91	38.02	47.46	52.06	62.52	72.91	82.67	94.84	101.70	117.95	128.91	139.78	152.95	169.70	187.48	197.58	209.14	220.23	236.52	252.42
Annual Growth Rate	(%)	21.9	12.8	12.1	24.8	9.7	20.1	16.6	13.4	14.7	7.2	16.0	9.3	8.4	9.4	11.0	10.5	5.4	5.8	5.3	7.4	6.7
Load Factor	(%)	57.6	57.8	58.0	58.1	58.4	58.7	58.9	59.2	59.5	59.7	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Energy Demand by Catergory																						
Industrial		37,007,841	42,289,841	48,170,449	70,041,271	77,282,793	109,850,324	140,618,659	163,929,638	196,722,887	212,329,014	267,655,087	280,205,093	297,693,032	326,266,153	372,995,945	421,042,682	439,982,676	464,523,635	487,175,748	527,318,704	569,786,782
Agriculture		9,819,921	9,819,921	9,819,921	14,372,529	14,372,529	14,882,961	14,882,961	19,435,569	25,201,001	25,201,001	25,201,001	30,264,041	30,264,041	30,264,041	30,774,473	35,327,081	35,327,081	35,837,513	35,837,513	40,390,121	40,390,121
Services		19,118,958	22,718,512	26,643,779	30,973,308	35,516,386	40,151,364	45,175,813	50,597,161	56,200,655	62,126,936	68,687,563	78,499,290	88,889,796	99,318,134	110,099,458	120,925,692	131,790,688	143,196,127	155,056,255	167,678,667	180,670,403
Residential		50,397,141	57,838,632	65,716,637	74,052,519	82,868,630	92,188,354	101,685,959	111,630,449	122,126,959	133,202,097	144,757,119	166,644,253	188,039,677	208,714,211	226,438,566	243,880,759	261,781,834	279,789,693	298,119,946	317,125,390	336,874,851
Total		116,343,861	132,666,906	150,350,786	189,439,627	210,040,337	257,073,003	302,363,392	345,592,817	400,251,502	432,859,048	506,300,770	555,612,677	604,886,546	664,562,539	740,308,442	821,176,214	868,882,280	923,346,968	976,189,461	1,052,512,882	1,127,722,157

電力需要予測
南部地域の要約

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
Rural with road access		683	683	683	683	683	683	683	683	683	683	683	683	683	683	683	683	683	683	683	683	683
Rural without road access		1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195	1,195
Total		2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093	2,093
Population																						
Urban																						
Rural																						
Total	(x 1,000)	1,035.5	1,061.8	1,088.8	1,116.5	1,144.9	1,174.1	1,201.6	1,229.8	1,258.6	1,288.1	1,318.3	1,346.7	1,375.6	1,405.1	1,435.3	1,466.1	1,494.7	1,523.9	1,553.6	1,583.9	1,614.8
Household																						
Urban		18,510	18,984	19,470	19,969	20,481	21,006	21,503	22,011	22,532	23,065	23,611	24,123	24,646	25,181	25,727	26,285	26,803	27,331	27,870	28,420	28,981
Rural with road access		52,892	54,221	55,584	56,981	58,414	59,883	61,269	62,688	64,140	65,626	67,147	68,570	70,022	71,506	73,022	74,570	76,003	77,463	78,951	80,469	82,017
Rural without road access		101,602	104,204	106,874	109,613	112,423	115,305	118,030	120,821	123,678	126,603	129,598	132,406	135,274	138,205	141,201	144,262	147,101	149,997	152,951	155,963	159,035
Rural total		154,494	158,425	162,458	166,594	170,836	175,187	179,299	183,509	187,818	192,230	196,746	200,975	205,296	209,712	214,223	218,832	223,104	227,460	231,902	236,432	241,052
Total		173,003	177,409	181,928	186,563	191,317	196,193	200,802	205,520	210,351	215,295	220,357	225,098	229,943	234,892	239,950	245,117	249,907	254,791	259,772	264,852	270,032
Nos. of Village To be Electrifie		420	481	536	595	654	716	775	834	889	950	1,008	1,095	1,182	1,272	1,360	1,455	1,533	1,624	1,711	1,801	1,885
Urban		167	188	196	203	208	213	215	215	215	215	215	215	215	215	215	215	215	215	215	215	215
Rural with access		220	257	300	347	396	445	490	528	556	578	599	621	638	650	660	669	677	682	682	682	682
Rural without access		33	36	40	45	50	58	70	91	118	157	194	259	329	407	485	571	641	727	814	904	988
New Village Connection after 1999 (Accumu		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	21	29	36	41	46	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Rural with access		0	37	80	127	176	225	270	308	336	358	379	401	418	430	440	449	457	462	462	462	462
Rural without access		0	3	7	12	17	25	37	58	85	124	161	226	296	374	452	538	608	694	781	871	955
Household to be Electrifie		45,864	53,453	61,042	68,631	76,220	83,808	91,397	98,986	106,575	114,164	121,753	135,254	148,755	162,256	175,757	189,258	202,759	216,261	229,762	243,263	256,764
Urban		16,264	18,062	19,092	19,760	20,426	21,006	21,503	22,011	22,532	23,065	23,611	24,123	24,646	25,181	25,727	26,285	26,803	27,331	27,870	28,420	28,981
Rural with road access		23,472	28,563	34,304	40,142	45,311	49,822	53,823	57,588	60,492	62,818	64,955	67,436	69,213	70,996	72,809	74,570	76,003	77,463	78,951	80,469	82,017
Rural without road access		6,128	6,828	7,645	8,729	10,482	12,980	16,071	19,387	23,551	28,280	33,187	43,695	54,896	66,080	77,221	88,403	99,954	111,466	122,940	134,373	145,767
New Household Connection After 1999 (Acc		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	1,798	2,829	3,497	4,162	4,743	5,239	5,748	6,269	6,802	7,348	7,860	8,383	8,917	9,463	10,022	10,540	11,068	11,607	12,156	12,717
Rural with access		0	5,091	10,832	16,670	21,839	26,351	30,351	34,116	37,020	39,346	41,483	43,964	45,741	47,524	49,337	51,098	52,531	53,991	55,480	56,997	58,545
Rural without access		0	700	1,517	2,600	4,354	6,851	9,943	13,258	17,422	22,152	27,058	37,567	48,767	59,952	71,093	82,275	93,825	105,338	116,811	128,245	139,638
Energy Demand Forecast																						
Non-residential	(kWh)	43,049,304	46,601,158	50,530,569	54,879,347	59,694,106	65,026,824	70,555,255	76,646,045	83,358,794	90,759,639	98,921,994	106,356,735	114,423,004	123,176,214	132,676,773	142,990,545	154,189,356	166,351,539	179,562,541	193,915,581	209,512,370
Non-residential(New)	(kWh)	0	3,261,742	6,211,300	9,509,590	12,971,595	16,725,682	20,369,083	23,942,383	27,298,943	30,873,068	34,499,919	39,419,445	44,446,972	49,697,578	55,076,139	60,989,947	66,445,004	72,637,973	78,774,360	85,354,106	91,973,032
Irrigation and other additional	(kWh)	0	0	0	1,972,320	1,972,320	1,972,320	1,972,320	4,032,312	10,076,640	10,076,640	10,076,640	12,048,960	21,246,960	21,246,960	21,466,140	23,219,280	23,219,280	38,549,280	38,549,280	40,521,600	40,521,600
Sub-total	(kWh)	43,049,304	49,862,901	56,741,869	66,361,257	74,638,020	83,724,826	92,896,658	104,620,739	120,734,377	131,709,347	143,498,553	157,825,140	180,116,936	194,120,752	209,219,052	227,199,772	243,853,640	277,538,791	296,886,181	319,791,287	342,007,002
Residential (Already connected	(kWh)	38,531,766	40,458,354	42,481,272	44,605,335	46,835,602	49,177,382	51,636,251	54,218,064	56,928,967	59,775,415	62,764,186	65,902,395	69,197,515	72,657,391	76,290,261	80,104,774	84,110,012	88,315,513	92,731,288	97,367,853	102,236,246
Residential (New Connection	(kWh)	0	6,458,065	13,204,512	20,116,939	26,828,841	33,235,167	39,434,370	45,755,564	51,560,326	57,082,030	62,698,258	69,761,977	76,404,121	83,400,787	90,800,282	98,518,614	106,144,380	114,189,630	122,675,223	131,623,021	141,055,935
Sub-total	(kWh)	38,531,766	46,916,419	55,685,784	64,722,274	73,664,443	82,412,550	91,070,621	99,973,628	108,489,293	116,857,445	125,462,444	135,664,373	145,601,636	156,058,178	167,090,543	178,623,388	190,254,392	202,505,143	215,406,512	228,990,874	243,292,181
Total Energy Demanc	(kWh)	81,581,069	96,779,320	112,427,652	131,083,531	148,302,463	166,137,375	183,967,279	204,594,368	229,223,670	248,566,793	268,960,997	293,489,513	325,718,573	350,178,929	376,309,594	405,823,160	434,108,032	480,043,934	512,292,692	548,782,161	585,299,183
Annual Growth Rate	(%)	20.1	18.6	16.2	16.6	13.1	12.0	10.7	11.2	12.0	8.4	8.2	9.1	11.0	7.5	7.5	7.8	7.0	10.6	6.7	7.1	6.7
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	24,829,021	28,456,321	32,001,828	36,181,357	39,748,498	41,534,344	45,037,633	49,035,014	53,768,515	57,048,116	60,378,999	64,424,527	69,891,030	73,424,614	77,075,459	81,164,632	84,746,190	91,436,940	95,168,998	99,385,746	103,288,091
Total Energy Consumption	(kWh)	106,410,091	125,235,640	144,429,481	167,264,888	188,050,961	207,671,719	229,004,912	253,629,381	282,992,185	305,614,909	329,339,997	357,914,040	395,609,603	423,603,544	453,385,053	486,987,792	518,854,222	571,480,874	607,461,690	648,167,907	688,587,274
Annual Growth Rate	(%)	19.0	17.7	15.3	15.8	12.4	10.4	10.3	10.8	11.6	8.0	7.8	8.7	10.5	7.1	7.0	7.4	6.5	10.1	6.3	6.7	6.2
Peak Power Demand	(MW)	22.71	26.43	30.12	34.46	38.25	41.71	45.43	49.73	54.86	58.66	62.66	68.10	75.27	80.59	86.26	92.65	98.72	108.73	115.57	123.32	131.01
Annual Growth Rate	(%)	19.7	16.4	14.0	14.4	11.0	9.0	8.9	9.5	10.3	6.9	6.8	8.7	10.5	7.1	7.0	7.4	6.5	10.1	6.3	6.7	6.2
Load Factor	(%)	53.5	54.1	54.7	55.4	56.1	56.8	57.5	58.2	58.9	59.5	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Energy Demand be Category																						
Industrial		14,279,853	16,771,534	19,354,752	22,224,304	25,376,762	28,871,251	32,475,445	36,387,227	46,777,258	51,487,297	56,708,345	61,583,209	76,061,492	81,798,997	88,043,169	94,879,201	102,288,881	125,744,671	134,589,347	144,279,383	154,868,705
Agriculture		8,160,242	8,160,242	8,160,242	10,132,562	10,132,562	10,132,562	10,132,562	12,192,554	12,104,882	12,104,882	12,104,882	14,077,202	14,077,202	14,077,202	14,296,382	16,049,522	16,049,522	16,049,522	16,049,522	18,021,842	18,021,842
Services		20,609,209	24,931,125	29,226,875	34,004,391	39,128,696	44,721,013	50,288,651	56,040,959	61,852,237	68,117,168	74,685,327	82,164,729	89,978,242	98,244,553	106,879,501	116,271,049	125,515,237	135,744,598	146,247,312	157,490,062	169,116,455
Residential		38,531,766	46,916,419	55,685,784	64,722,274	73,664,443	82,412,550	91,070,621	99,973,628	108,489,293	116,857,445	125,462,444	135,664,373	145,601,636	156,058,178	167,090,543	178,623,388	190,254,392	202,505,143	215,406,512	228,990,874	243,292,181
Total		81,581,069	96,779,320	112,427,652	131,083,531	148,302,463	166,137,375	183,967,279	204,594,368	229,223,670	248,566,793	268,960,997	293,489,513	325,718,573	350,178,929	376,309,594	405,823,160	434,108,032	480,043,934	512,292,692	548,782,161	585,299,183

電力需要予測
Phongsaly Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Rural with road access		54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
Rural without road access		571	571	571	571	571	571	571	571	571	571	571	571	571	571	571	571	571	571	571	571	571
Total		663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663	663
Population																						
Urban																						
Rural																						
Total	(x 1,000)	169.6	173.0	176.4	180.0	183.6	187.2	190.6	194.0	197.5	201.1	204.7	208.0	211.3	214.7	218.1	221.6	224.7	227.9	231.1	234.3	237.6
Household		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		1,868	1,906	1,944	1,983	2,022	2,063	2,100	2,138	2,176	2,215	2,255	2,291	2,328	2,365	2,403	2,442	2,476	2,510	2,546	2,581	2,617
Rural with road access		2,242	2,287	2,333	2,379	2,427	2,475	2,520	2,565	2,611	2,658	2,706	2,750	2,794	2,838	2,884	2,930	2,971	3,012	3,055	3,097	3,141
Rural without road access		23,814	24,290	24,776	25,271	25,777	26,292	26,765	27,247	27,738	28,237	28,745	29,205	29,672	30,147	30,629	31,120	31,555	31,997	32,445	32,899	33,360
Rural total		26,056	26,577	27,108	27,650	28,203	28,767	29,285	29,812	30,349	30,895	31,451	31,955	32,466	32,985	33,513	34,049	34,526	35,009	35,500	35,997	36,501
Total		27,924	28,482	29,052	29,633	30,226	30,830	31,385	31,950	32,525	33,111	33,707	34,246	34,794	35,351	35,916	36,491	37,002	37,520	38,045	38,578	39,118
Nos. of Village To be Electrified		34	49	62	76	91	104	119	133	146	161	175	200	220	244	266	291	312	336	358	380	403
Urban		24	29	32	34	36	36	37	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Rural with access		8	16	24	30	34	37	41	42	44	47	48	52	55	55	55	55	55	55	55	55	55
Rural without access		2	4	6	12	21	31	41	53	64	76	89	110	127	151	173	198	219	243	265	287	310
New Village Connection after 1999 (Accumulat		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	5	8	10	12	12	13	14	14	14	14	14	14	14	14	14	14	14	14	14	14
Rural with access		0	8	16	22	26	29	33	34	36	39	40	44	47	47	47	47	47	47	47	47	47
Rural without access		0	2	4	10	19	29	39	51	62	74	87	108	125	149	171	196	217	241	263	285	308
Household to be Electrified		2,670	3,639	4,607	5,576	6,544	7,513	8,481	9,450	10,418	11,387	12,355	13,723	15,090	16,458	17,825	19,193	20,560	21,928	23,296	24,663	26,031
Urban		1,341	1,697	1,927	1,983	2,022	2,063	2,100	2,138	2,176	2,215	2,255	2,291	2,328	2,365	2,403	2,442	2,476	2,510	2,546	2,581	2,617
Rural with road access		1,035	1,201	1,407	1,717	2,044	2,254	2,457	2,565	2,611	2,658	2,706	2,750	2,794	2,838	2,884	2,930	2,971	3,012	3,055	3,097	3,141
Rural without road access		294	741	1,273	1,876	2,477	3,196	3,925	4,747	5,630	6,513	7,393	8,682	9,968	11,254	12,538	13,821	15,114	16,405	17,695	18,985	20,273
New Household Connection After 1999 (Accun		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	356	586	641	681	722	759	796	835	874	914	950	987	1,024	1,062	1,100	1,134	1,169	1,204	1,240	1,276
Rural with access		0	166	372	683	1,010	1,219	1,422	1,530	1,577	1,624	1,671	1,715	1,759	1,803	1,849	1,895	1,936	1,978	2,020	2,063	2,106
Rural without access		0	447	979	1,581	2,183	2,902	3,630	4,452	5,336	6,218	7,099	8,387	9,674	10,960	12,244	13,527	14,820	16,111	17,401	18,690	19,978
Average Non-Residential Consumption Per Village																						
District center	(kWh)	663,570	690,113	717,717	746,426	776,283	807,334	839,628	873,213	908,141	944,467	982,246	1,021,536	1,062,397	1,104,893	1,149,089	1,195,052	1,242,854	1,292,568	1,344,271	1,398,042	1,453,964
Urban	(kWh)	45,990	47,830	49,743	51,732	53,802	55,954	58,192	60,520	62,940	65,458	68,076	70,799	73,631	76,577	79,640	82,825	86,138	89,584	93,167	96,894	100,770
Rural with access	(kWh)	39,420	40,997	42,637	44,342	46,116	47,960	49,879	51,874	53,949	56,107	58,351	60,685	63,113	65,637	68,263	70,993	73,833	76,786	79,858	83,052	86,374
Rural without access	(kWh)	23,652	24,598	25,582	26,605	27,669	28,776	29,927	31,124	32,369	33,664	35,011	36,411	37,868	39,382	40,958	42,596	44,300	46,072	47,915	49,831	51,824
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural with road access	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural without road access	(kWh)	100	103	106	109	113	116	119	123	127	130	134	138	143	147	151	156	160	165	170	175	181
Energy Demand Forecast																						
Non-residential	(kWh)	7,819,176	8,478,333	9,201,532	9,995,259	10,866,685	11,823,743	12,804,686	13,876,504	15,048,009	16,328,906	17,729,891	19,006,645	20,383,089	21,867,305	23,468,057	25,194,848	27,057,983	29,068,644	31,238,961	33,582,100	36,112,351
Non-residential(New)	(kWh)	0	771,449	1,459,077	2,130,791	2,822,270	3,385,757	4,111,786	4,764,667	5,403,083	6,173,814	6,891,154	8,143,747	9,243,601	10,462,580	11,665,552	13,056,163	14,348,213	15,838,518	17,314,357	18,864,492	20,540,307
Irrigation and other additional	(kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	(kWh)	7,819,176	9,249,782	10,660,609	12,126,050	13,688,955	15,209,501	16,916,472	18,641,171	20,451,092	22,502,720	24,621,045	27,150,392	29,626,690	32,329,885	35,133,609	38,251,010	41,406,196	44,907,162	48,553,318	52,446,592	56,652,658
Residential (Already connected)	(kWh)	2,167,968	2,276,367	2,390,185	2,509,694	2,635,179	2,766,938	2,905,285	3,050,549	3,203,077	3,363,231	3,531,392	3,707,962	3,893,360	4,088,028	4,292,429	4,507,051	4,732,403	4,969,023	5,217,474	5,478,348	5,752,266
Residential (New Connection)	(kWh)	0	529,573	1,018,764	1,474,909	1,958,364	2,361,119	2,776,738	3,123,187	3,425,355	3,744,431	4,081,238	4,480,891	4,902,298	5,346,474	5,814,474	6,307,403	6,812,621	7,343,867	7,902,310	8,489,170	9,105,714
Sub-total	(kWh)	2,167,968	2,805,940	3,408,949	3,984,604	4,593,543	5,128,057	5,682,023	6,173,737	6,628,431	7,107,662	7,612,630	8,188,852	8,795,658	9,434,501	10,106,903	10,814,453	11,545,024	12,312,890	13,119,785	13,967,518	14,857,980
Total Energy Demand	(kWh)	9,987,144	12,055,722	14,069,557	16,110,654	18,282,498	20,337,557	22,598,495	24,814,907	27,079,524	29,610,382	32,233,675	35,339,245	38,422,348	41,764,387	45,240,512	49,065,464	52,951,220	57,220,052	61,673,103	66,414,109	71,510,638
Annual Growth Rate	(%)	94.6	20.7	16.7	14.5	13.5	11.2	11.1	9.8	9.1	9.3	8.9	9.6	8.7	8.7	8.3	8.5	7.9	8.1	7.8	7.7	7.7
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	3,039,566	3,544,781	4,004,812	4,446,823	4,900,133	5,084,389	5,532,412	5,947,374	6,351,987	6,795,825	7,236,131	7,757,395	8,244,472	8,757,049	9,266,129	9,813,093	10,337,091	10,899,058	11,457,059	12,027,752	12,619,524
Total Energy Consumption	(kWh)	13,026,710	15,600,503	18,074,369	20,557,477	23,182,631	25,421,947	28,130,906	30,762,282	33,431,511	36,406,207	39,469,806	43,096,640	46,666,820	50,521,436	54,506,641	58,878,556	63,288,310	68,119,109	73,130,162	78,441,862	84,130,163
Annual Growth Rate	(%)	93.0	19.8	15.9	13.7	12.8	9.7	10.7	9.4	8.7	8.9	8.4	9.2	8.3	8.3	7.9	8.0	7.5	7.6	7.4	7.3	7.3
Peak Power Demand	(MW)	2.97	3.49	3.97	4.43	4.90	5.28	5.73	6.16	6.58	7.04	7.51	8.20	8.88	9.61	10.37	11.20	12.04	12.96	13.91	14.92	16.01
Annual Growth Rate	(%)	93.0	17.4	13.6	11.6	10.7	7.7	8.7	7.4	6.8	7.1	6.6	9.2	8.3	8.3	7.9	8.0	7.5	7.6	7.4	7.3	7.3
Load Factor	(%)	50.0	51.0	52.0	53.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Energy Demand by Category																						
Industrial		1,563,835	1,919,524	2,270,035	2,627,910	3,009,002	3,389,833	3,814,877	4,259,555	4,740,989	5,286,196	5,873,751	6,465,282	7,082,951	7,747,114	8,462,579	9,250,452	10,095,187	11,025,236	12,032,511	13,131,345	14,333,767
Agriculture		781,918	781,918	781,918	781,918	781,918	781,918	781,918	781,918	781,918	781,918	781,918	781,918	781,918	781,918	781,918	781,918	781,918	781,918	781,918	781,918	781,918
Services		5,473,423	6,548,340	7,608,656	8,716,223	9,898,035	11,037,750	12,319,677	13,599,698	14,928,186	16,434,606	17,965,376	19,903,193	21,761,822	23,800,853	25,889,112	28,218,640	30,529,091	33,100,008	35,738,890	38,533,329	41,536,974
Residential		2,167,968	2,805,940	3,408,949	3,984,604	4,593,543	5,128,057	5,682,023	6,173,737	6,628,431	7,107,662	7,612,630	8,188,852	8,795,658	9,434,501	10,106,903	10,814,453	11,545,024	12,312,890	13,119,785	13,967,518	14,857,980
Total		9,987,144	12,055,722	14,069,557	16,110,654	18,282,498	20,337,557	22,598,495	24,814,907	27,079,524	29,610,382	32,233,675	35,339,245	38,422,348	41,764,387	45,240,512	49,065,464	52,951,220	57,220,052	61,673,103	66,414,109	71,510,638

電力需要予測
Luang Namtha Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Rural with road access		124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124
Rural without road access		279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279	279
Total		487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487	487
Population																						
Urban																						
Rural																						
Total	(x 1,000)	127.3	129.9	132.4	135.1	137.8	140.6	143.1	145.7	148.3	151.0	153.7	156.1	158.6	161.2	163.7	166.4	168.7	171.1	173.4	175.9	178.3
Household		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		3,590	3,662	3,735	3,810	3,886	3,964	4,035	4,108	4,182	4,257	4,334	4,403	4,474	4,545	4,618	4,692	4,758	4,824	4,892	4,960	5,030
Rural with road access		5,909	6,027	6,148	6,271	6,396	6,524	6,641	6,761	6,883	7,006	7,133	7,247	7,363	7,480	7,600	7,722	7,830	7,939	8,051	8,163	8,278
Rural without road access		13,260	13,525	13,796	14,072	14,353	14,640	14,904	15,172	15,445	15,723	16,006	16,262	16,522	16,787	17,055	17,328	17,571	17,817	18,066	18,319	18,575
Rural total		19,169	19,552	19,943	20,342	20,749	21,164	21,545	21,933	22,328	22,729	23,139	23,509	23,885	24,267	24,655	25,050	25,401	25,756	26,117	26,482	26,853
Total		22,759	23,214	23,679	24,152	24,635	25,128	25,580	26,041	26,510	26,987	27,472	27,912	28,359	28,812	29,273	29,742	30,158	30,580	31,008	31,443	31,883
Nos. of Village To be Electrified		34	49	62	79	90	97	108	117	127	135	146	167	184	205	224	246	264	284	304	322	342
Urban		24	29	32	65	71	75	81	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Rural with access		8	16	24	14	19	22	27	33	41	48	55	70	82	97	111	123	124	124	124	124	124
Rural without access		2	4	6	0	0	0	0	0	2	3	7	13	18	24	29	39	56	76	96	114	134
New Village Connection after 1999 (Accumu		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	5	8	21	27	31	37	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Rural with access		0	8	16	6	11	14	19	25	33	40	47	62	74	89	103	115	116	116	116	116	116
Rural without access		0	2	4	0	0	0	0	0	2	3	7	13	18	24	29	39	56	76	96	114	134
Household to be Electrified		2,670	3,639	4,607	5,564	6,341	7,117	7,894	8,670	9,447	10,223	11,000	12,444	13,888	15,332	16,776	18,220	19,664	21,107	22,551	23,995	25,439
Urban		1,341	1,697	1,927	3,649	3,851	3,964	4,035	4,108	4,182	4,257	4,334	4,403	4,474	4,545	4,618	4,692	4,758	4,824	4,892	4,960	5,030
Rural with road access		1,035	1,201	1,407	1,915	2,368	2,831	3,332	3,832	4,188	4,537	4,886	5,760	6,634	7,304	7,600	7,722	7,830	7,939	8,051	8,163	8,278
Rural without road access		294	741	1,273	0	122	322	526	730	1,077	1,430	1,780	2,281	2,780	3,482	4,558	5,806	7,076	8,344	9,609	10,872	12,132
New Household Connection After 1999 (Acc		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	356	586	1,357	1,559	1,672	1,743	1,816	1,890	1,965	2,042	2,111	2,182	2,253	2,326	2,400	2,466	2,532	2,600	2,668	2,738
Rural with access		0	166	372	972	1,425	1,889	2,389	2,890	3,245	3,594	3,943	4,817	5,692	6,362	6,658	6,779	6,887	6,997	7,108	7,221	7,335
Rural without access		0	447	979	0	122	322	526	730	1,077	1,430	1,780	2,281	2,780	3,482	4,558	5,806	7,076	8,344	9,609	10,872	12,132
Average Non-Residential Consumption Per Village																						
District center	(kWh)	663,570	690,113	717,717	746,426	776,283	807,334	839,628	873,213	908,141	944,467	982,246	1,021,536	1,062,397	1,104,893	1,149,089	1,195,052	1,242,854	1,292,568	1,344,271	1,398,042	1,453,964
Urban	(kWh)	45,990	47,830	49,743	51,732	53,802	55,954	58,192	60,520	62,940	65,458	68,076	70,799	73,631	76,577	79,640	82,825	86,138	89,584	93,167	96,894	100,770
Rural with access	(kWh)	39,420	40,997	42,637	44,342	46,116	47,960	49,879	51,874	53,949	56,107	58,351	60,685	63,113	65,637	68,263	70,993	73,833	76,786	79,858	83,052	86,374
Rural without access	(kWh)	23,652	24,598	25,582	26,605	27,669	28,776	29,927	31,124	32,369	33,664	35,011	36,411	37,868	39,382	40,958	42,596	44,300	46,072	47,915	49,831	51,824
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural with road access	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural without road access	(kWh)	100	103	106	109	113	116	119	123	127	130	134	138	143	147	151	156	160	165	170	175	181
Energy Demand Forecast																						
Non-residential	(kWh)	7,304,964	7,891,187	8,538,808	9,254,533	10,045,831	10,921,019	11,826,616	12,822,975	13,919,591	15,126,989	16,456,839	17,668,243	18,981,213	20,404,560	21,947,882	23,621,635	25,437,213	27,407,035	29,544,636	31,864,772	34,383,532
Non-residential(New)	(kWh)	0	492,194	1,130,552	1,725,884	2,465,357	2,992,749	3,812,110	4,511,485	5,207,223	5,842,349	6,618,616	8,048,559	9,312,294	10,898,039	12,456,594	14,155,493	15,387,042	16,731,869	18,143,537	19,531,147	21,082,195
Irrigation and other Additional	(kWh)	0	0	0	0	0	0	1,200	1,200	2,400	2,400	3,600	3,600	4,800	4,800	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Sub-total	(kWh)	7,304,964	8,383,381	9,669,360	10,980,417	12,511,188	13,913,768	15,639,925	17,335,659	19,129,214	20,971,738	23,079,055	25,720,401	28,298,307	31,307,399	34,410,476	37,783,127	40,830,256	44,144,904	47,694,173	51,401,918	55,471,726
Residential (Already connected)	(kWh)	2,911,091	3,056,645	3,209,478	3,369,952	3,538,449	3,715,372	3,901,140	4,096,197	4,301,007	4,516,057	4,741,860	4,978,953	5,227,901	5,489,296	5,763,761	6,051,949	6,354,546	6,672,274	7,005,887	7,356,182	7,723,991
Residential (New Connection)	(kWh)	0	719,858	1,482,907	2,291,091	3,036,535	3,752,471	4,504,183	5,298,544	5,990,866	6,714,750	7,478,261	8,947,426	10,499,387	11,897,609	12,919,027	13,775,210	14,643,280	15,554,254	16,510,068	17,512,741	18,564,380
Sub-total	(kWh)	2,911,091	3,776,503	4,692,384	5,661,043	6,574,984	7,467,842	8,405,323	9,394,741	10,291,873	11,230,807	12,220,122	13,926,379	15,727,288	17,386,905	18,682,788	19,827,159	20,997,827	22,226,528	23,515,955	24,868,922	26,288,371
Total Energy Demand	(kWh)	10,216,055	12,159,884	14,361,745	16,641,459	19,086,172	21,381,610	24,045,249	26,730,400	29,421,087	32,202,545	35,299,177	39,646,780	44,025,596	48,694,304	53,093,263	57,610,286	61,828,082	66,371,432	71,210,129	76,270,841	81,760,097
Annual Growth Rate	(%)	15.2	19.0	18.1	15.9	14.7	12.0	12.5	11.2	10.1	9.5	9.6	12.3	11.0	10.6	9.0	8.5	7.3	7.3	7.3	7.1	7.2
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	3,109,234	3,575,408	4,087,981	4,593,335	5,115,537	5,345,403	5,886,596	6,406,460	6,901,243	7,390,748	7,924,305	8,702,952	9,446,788	10,210,096	10,874,524	11,522,057	12,070,024	12,642,178	13,228,759	13,812,829	14,428,252
Total Energy Consumption	(kWh)	13,325,289	15,735,292	18,449,726	21,234,794	24,201,709	26,727,013	29,931,845	33,136,860	36,322,329	39,593,293	43,223,482	48,349,732	53,472,383	58,904,400	63,967,787	69,132,344	73,898,106	79,013,610	84,438,888	90,083,670	96,188,350
Annual Growth Rate	(%)	14.2	18.1	17.3	15.1	14.0	10.4	12.0	10.7	9.6	9.0	9.2	11.9	10.6	10.2	8.6	8.1	6.9	6.9	6.9	6.7	6.8
Peak Power Demand	(MW)	3.04	3.52	4.05	4.57	5.12	5.55	6.10	6.64	7.15	7.66	8.22	9.20	10.17	11.21	12.17	13.15	14.06	15.03	16.07	17.14	18.30
Annual Growth Rate	(%)	14.2	15.8	15.0	12.9	11.9	8.4	10.0	8.8	7.7	7.2	7.3	11.9	10.6	10.2	8.6	8.1	6.9	6.9	6.9	6.7	6.8
Load Factor	(%)	50.0	51.0	52.0	53.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Energy Demand by Category																						
Industrial		2,191,489	2,587,204	3,043,044	3,517,652	4,055,949	4,596,309	5,213,295	5,851,082	6,531,972	7,272,692	8,103,499	8,946,246	9,825,192	10,808,259	11,859,608	12,996,493	14,150,938	15,412,007	16,789,985	18,290,070	19,937,173
Agriculture		1,460,993	1,460,993	1,460,993	1,460,993	1,460,993	1,460,993	1,462,193	1,462,193	1,463,393	1,463,393	1,464,593	1,464,593	1,465,793	1,465,793	1,466,993	1,466,993	1,466,993	1,466,993	1,466,993	1,466,993	1,466,993
Services		3,652,482	4,335,184	5,165,323	6,001,772	6,994,246	7,856,466	8,964,438	10,022,385	11,133,849	12,235,652	13,510,963	15,309,563	17,007,323	19,033,346	21,083,875	23,319,641	25,212,324	27,265,905	29,437,196	31,644,856	34,067,560
Residential		2,911,091	3,776,503	4,692,384	5,661,043	6,574,984	7,467,842	8,405,323	9,394,741	10,291,873	11,230,807	12,220,122	13,926,379	15,727,288	17,386,905	18,682,788	19,827,159	20,997,827	22,226,528	23,515,955	24,868,922	26,288,371
Total		10,216,055	12,159,884	14,361,745	16,641,459	19,086,172	21,381,610	24,045,249	26,730,400	29,421,087	32,202,545	35,299,177	39,646,780	44,025,596	48,694,304	53,093,263	57,610,286	61,828,082	66,371,432	71,210,129	76,270,841	81,760,097

電力需要予測
Oudomxay Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		121	121	121	121	121	121	121	121	121	121	121	121	121	121	121	121	121	121	121	121	121
Rural with road access		142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142	142
Rural without road access		541	541	541	541	541	541	541	541	541	541	541	541	541	541	541	541	541	541	541	541	541
Total		804	804	804	804	804	804	804	804	804	804	804	804	804	804	804	804	804	804	804	804	804
Population																						
Urban																						
Rural																						
Total	(x 1,000)	237.8	243.5	249.4	255.4	261.5	267.8	273.7	279.7	285.8	292.1	298.6	304.5	310.6	316.8	323.2	329.6	335.6	341.6	347.7	354.0	360.4
Household		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		5,887	6,028	6,173	6,321	6,473	6,628	6,774	6,923	7,075	7,231	7,390	7,538	7,688	7,842	7,999	8,159	8,306	8,455	8,607	8,762	8,920
Rural with road access		6,616	6,775	6,938	7,104	7,275	7,449	7,613	7,781	7,952	8,127	8,305	8,472	8,641	8,814	8,990	9,170	9,335	9,503	9,674	9,848	10,025
Rural without road access		25,101	25,703	26,320	26,952	27,598	28,261	28,882	29,518	30,167	30,831	31,509	32,139	32,782	33,438	34,107	34,789	35,415	36,052	36,701	37,362	38,034
Rural total		31,717	32,478	33,257	34,056	34,873	35,710	36,496	37,298	38,119	38,958	39,815	40,611	41,423	42,252	43,097	43,959	44,750	45,555	46,375	47,210	48,060
Total		37,603	38,506	39,430	40,376	41,345	42,338	43,269	44,221	45,194	46,188	47,204	48,148	49,111	50,094	51,096	52,117	53,056	54,011	54,983	55,972	56,980
Nos. of Village To be Electrified		60	82	102	121	143	161	183	202	222	244	263	294	321	353	380	411	440	469	499	528	557
Urban		50	66	78	88	96	99	105	109	113	117	120	121	121	121	121	121	121	121	121	121	121
Rural with access		10	16	24	33	46	56	65	72	76	81	83	95	106	120	131	142	143	143	143	143	143
Rural without access		0	0	0	0	1	6	13	21	33	46	60	78	94	112	128	148	176	205	235	264	293
New Village Connection after 1999 (Accumul		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	16	28	38	46	49	55	59	63	67	70	71	71	71	71	71	71	71	71	71	71
Rural with access		0	6	14	23	36	46	55	62	66	71	73	85	96	110	121	132	133	133	133	133	133
Rural without access		0	0	0	0	1	6	13	21	33	46	60	78	94	112	128	148	176	205	235	264	293
Household to be Electrified		4,764	6,138	7,512	8,886	10,260	11,633	13,007	14,381	15,755	17,129	18,503	20,692	22,881	25,070	27,259	29,448	31,637	33,826	36,015	38,204	40,393
Urban		2,918	3,797	4,583	5,198	5,661	6,125	6,494	6,836	7,075	7,231	7,390	7,538	7,688	7,842	7,999	8,159	8,306	8,455	8,607	8,762	8,920
Rural with road access		1,536	1,718	1,994	2,443	2,976	3,448	3,788	4,142	4,602	5,072	5,475	6,375	7,276	8,161	8,878	9,170	9,335	9,503	9,674	9,848	10,025
Rural without road access		309	623	934	1,244	1,622	2,060	2,726	3,403	4,078	4,826	5,638	6,779	7,917	9,067	10,382	12,119	13,996	15,868	17,733	19,593	21,447
New Household Connection After 1999 (Accu		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	879	1,665	2,280	2,743	3,207	3,575	3,918	4,157	4,312	4,472	4,619	4,770	4,924	5,081	5,241	5,388	5,537	5,689	5,844	6,002
Rural with access		0	182	458	907	1,440	1,911	2,252	2,605	3,066	3,536	3,939	4,839	5,740	6,624	7,342	7,634	7,799	7,967	8,138	8,312	8,489
Rural without access		0	313	625	935	1,313	1,751	2,416	3,094	3,769	4,517	5,329	6,470	7,607	8,758	10,072	11,810	13,687	15,558	17,424	19,284	21,138
Average Non-Residential Consumption Per Village																						
District center	(kWh)	663,570	690,113	717,717	746,426	776,283	807,334	839,628	873,213	908,141	944,467	982,246	1,021,536	1,062,397	1,104,893	1,149,089	1,195,052	1,242,854	1,292,568	1,344,271	1,398,042	1,453,964
Urban	(kWh)	45,990	47,830	49,743	51,732	53,802	55,954	58,192	60,520	62,940	65,458	68,076	70,799	73,631	76,577	79,640	82,825	86,138	89,584	93,167	96,894	100,770
Rural with access	(kWh)	39,420	40,997	42,637	44,342	46,116	47,960	49,879	51,874	53,949	56,107	58,351	60,685	63,113	65,637	68,263	70,993	73,833	76,786	79,858	83,052	86,374
Rural without access	(kWh)	23,652	24,598	25,582	26,605	27,669	28,776	29,927	31,124	32,369	33,664	35,011	36,411	37,868	39,382	40,958	42,596	44,300	46,072	47,915	49,831	51,824
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural with road access	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural without road access	(kWh)	100	103	106	109	113	116	119	123	127	130	134	138	143	147	151	156	160	165	170	175	181
Energy Demand Forecast																						
Non-residential	(kWh)	9,457,296	10,216,244	11,054,679	11,981,285	13,005,731	14,138,784	15,311,205	16,601,131	18,020,854	19,583,999	21,305,676	22,874,007	24,573,831	26,416,552	28,414,598	30,581,505	32,932,025	35,482,234	38,249,657	41,253,397	44,514,283
Non-residential(New)	(kWh)	0	1,311,013	2,543,627	3,768,131	5,174,736	6,261,722	7,634,680	8,846,820	10,075,436	11,468,103	12,692,745	14,631,704	16,442,644	18,641,737	20,656,533	22,941,943	24,908,706	26,936,630	29,109,297	31,341,231	33,680,882
Irrigation and other Additional	(kWh)	0	0	0	49,680	99,360	99,360	99,360	149,040	198,720	198,720	198,720	248,400	298,080	298,080	298,080	347,760	397,440	397,440	397,440	447,120	496,800
Sub-total	(kWh)	9,457,296	11,527,257	13,598,306	15,799,097	18,279,827	20,499,865	23,045,245	25,596,991	28,295,010	31,250,822	34,197,140	37,754,111	41,314,555	45,356,370	49,369,211	53,871,208	58,238,171	62,816,304	67,756,394	73,041,748	78,691,966
Residential (Already connected)	(kWh)	4,040,007	4,242,008	4,454,108	4,676,813	4,910,654	5,156,187	5,413,996	5,684,696	5,968,931	6,267,377	6,580,746	6,909,783	7,255,273	7,618,036	7,998,938	8,398,885	8,818,829	9,259,771	9,722,759	10,208,897	10,719,342
Residential (New Connection)	(kWh)	0	1,015,429	2,093,187	3,236,175	4,384,732	5,543,537	6,550,645	7,601,196	8,711,843	9,805,878	10,888,628	12,678,927	14,570,659	16,549,093	18,434,620	19,891,726	21,240,169	22,659,040	24,151,711	25,721,712	27,372,735
Sub-total	(kWh)	4,040,007	5,257,437	6,547,295	7,912,988	9,295,386	10,699,724	11,964,642	13,285,892	14,680,773	16,073,255	17,469,375	19,588,711	21,825,932	24,167,129	26,433,558	28,290,611	30,058,998	31,918,810	33,874,470	35,930,609	38,092,077
Total Energy Demand	(kWh)	13,497,303	16,784,694	20,145,600	23,712,085	27,575,213	31,199,589	35,009,886	38,882,883	42,975,783	47,324,077	51,666,515	57,342,822	63,140,487	69,523,499	75,802,769	82,161,818	88,297,169	94,735,115	101,630,865	108,972,357	116,784,042
Annual Growth Rate	(%)	68.0	24.4	20.0	17.7	16.3	13.1	12.2	11.1	10.5	10.1	9.2	11.0	10.1	10.1	9.0	8.4	7.5	7.3	7.3	7.2	7.2
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	4,107,875	4,935,255	5,734,319	6,544,952	7,390,796	7,799,897	8,570,885	9,319,038	10,080,739	10,861,264	11,598,605	12,587,449	13,548,364	14,577,508	15,525,868	16,432,364	17,237,296	18,044,784	18,880,042	19,735,151	20,608,949
Total Energy Consumption	(kWh)	17,605,178	21,719,949	25,879,920	30,257,037	34,966,009	38,999,487	43,580,772	48,201,921	53,056,522	58,185,341	63,265,120	69,930,270	76,688,851	84,101,006	91,328,637	98,594,182	105,534,465	112,779,898	120,510,907	128,707,508	137,392,991
Annual Growth Rate	(%)	66.6	23.4	19.2	16.9	15.6	11.5	11.7	10.6	10.1	9.7	8.7	10.5	9.7	9.7	8.6	8.0	7.0	6.9	6.9	6.8	6.7
Peak Power Demand	(MW)	4.02	4.86	5.68	6.52	7.39	8.09	8.88	9.65	10.44	11.26	12.04	13.30	14.59	16.00	17.38	18.76	20.08	21.46	22.93	24.49	26.14
Annual Growth Rate	(%)	66.6	21.0	16.9	14.7	13.4	9.5	9.8	8.7	8.2	7.8	6.9	10.5	9.7	9.7	8.6	8.0	7.0	6.9	6.9	6.8	6.7
Load Factor	(%)	50.0	51.0	52.0	53.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Energy Demand by Category																						
Industrial		2,837,189	3,498,930	4,163,994	4,859,660	5,623,259	6,361,267	7,177,939	8,023,156	8,936,551	9,955,629	11,039,496	12,109,309	13,235,032	14,489,609	15,814,710	17,266,705	18,777,157	20,419,419	22,216,136	24,175,865	26,317,903
Agriculture		1,891,459	1,891,459	1,891,459	1,941,139	1,990,819	1,990,819	1,990,819	2,040,499	2,090,179	2,090,179	2,090,179	2,139,859	2,189,539	2,189,539	2,189,539	2,239,219	2,288,899	2,288,899	2,288,899	2,338,579	2,388,259
Services		4,728,648	6,136,867	7,542,853	8,998,297	10,665,748	12,147,779	13,876,486	15,533,336	17,268,280	19,205,014	21,067,465	23,504,943	25,889,984	28,677,221	31,364,962	34,365,283	37,172,114	40,107,986	43,251,359	46,527,303	49,985,804
Residential		4,040,007	5,257,437	6,547,295	7,912,988	9,295,386	10,699,724	11,964,642	13,285,892	14,680,773	16,073,255	17,469,375	19,588,711	21,825,932	24,167,129	26,433,558	28,290,611	30,058,998	31,918,810	33,874,470	35,930,609	38,092,077
Total		13,497,303	16,784,694	20,145,600	23,712,085	27,575,213	31,199,589	35,009,886	38,882,883	42,975,783	47,324,077	51,666,515	57,342,822	63,140,487	69,523,499	75,802,769	82,161,818	88,297,169	94,735,115	101,630,865	108,972,357	116,784,042

電力需要予測
Bokeo Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Rural with road access		101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101
Rural without road access		201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201	201
Total		322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322
Population																						
Urban																						
Rural																						
Total	(x 1,000)	124.2	126.3	128.5	130.7	132.9	135.1	137.2	139.2	141.3	143.4	145.6	147.5	149.4	151.3	153.3	155.3	157.0	158.7	160.5	162.2	164.0
Household		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		1,217	1,238	1,259	1,280	1,302	1,324	1,344	1,364	1,384	1,405	1,426	1,445	1,463	1,483	1,502	1,521	1,538	1,555	1,572	1,589	1,607
Rural with road access		5,433	5,525	5,619	5,715	5,812	5,911	5,999	6,089	6,181	6,273	6,367	6,450	6,534	6,619	6,705	6,792	6,867	6,942	7,019	7,096	7,174
Rural without road access		14,874	15,127	15,384	15,646	15,912	16,182	16,425	16,671	16,921	17,175	17,433	17,659	17,889	18,122	18,357	18,596	18,800	19,007	19,216	19,428	19,641
Rural total		20,307	20,652	21,003	21,360	21,723	22,093	22,424	22,760	23,102	23,448	23,800	24,110	24,423	24,740	25,062	25,388	25,667	25,949	26,235	26,524	26,815
Total		21,524	21,890	22,262	22,640	23,025	23,417	23,768	24,124	24,486	24,853	25,226	25,554	25,886	26,223	26,564	26,909	27,205	27,504	27,807	28,113	28,422
Nos. of Village To be Electrified		29	41	55	67	80	91	104	116	130	142	155	171	185	201	216	232	246	261	277	291	307
Urban		17	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Rural with access		12	21	35	47	59	63	67	70	74	77	81	90	98	101	101	101	101	101	101	101	101
Rural without access		0	0	0	0	1	8	17	26	36	45	54	61	67	76	86	96	104	114	124	133	143
New Village Connection after 1999 (Accumulat		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Rural with access		0	9	23	35	47	51	55	58	62	65	69	78	86	89	89	89	89	89	89	89	89
Rural without access		0	0	0	0	1	8	17	26	36	45	54	61	67	76	86	96	104	114	124	133	143
Household to be Electrified		2,787	3,828	4,868	5,908	6,948	7,989	9,029	10,069	11,109	12,150	13,190	14,275	15,361	16,446	17,532	18,617	19,703	20,788	21,874	22,959	24,045
Urban		1,123	1,238	1,259	1,280	1,302	1,324	1,344	1,364	1,384	1,405	1,426	1,445	1,463	1,483	1,502	1,521	1,538	1,555	1,572	1,589	1,607
Rural with road access		1,665	2,590	3,173	3,733	4,293	4,689	5,018	5,311	5,577	5,845	6,085	6,450	6,534	6,619	6,705	6,792	6,867	6,942	7,019	7,096	7,174
Rural without road access		0	0	436	895	1,353	1,976	2,667	3,395	4,148	4,900	5,679	6,381	7,363	8,345	9,325	10,304	11,298	12,291	13,283	14,274	15,264
New Household Connection After 1999 (Accun		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	115	136	157	179	201	221	241	262	282	303	322	341	360	379	399	415	432	449	467	484
Rural with access		0	925	1,508	2,068	2,629	3,025	3,354	3,646	3,913	4,180	4,421	4,786	4,869	4,954	5,040	5,128	5,202	5,278	5,354	5,431	5,509
Rural without access		0	0	436	895	1,353	1,976	2,667	3,395	4,148	4,900	5,679	6,381	7,363	8,345	9,325	10,304	11,298	12,291	13,283	14,274	15,264
Average Non-Residential Consumption Per Village																						
District center	(kWh)	663,570	690,113	717,717	746,426	776,283	807,334	839,628	873,213	908,141	944,467	982,246	1,021,536	1,062,397	1,104,893	1,149,089	1,195,052	1,242,854	1,292,568	1,344,271	1,398,042	1,453,964
Urban	(kWh)	45,990	47,830	49,743	51,732	53,802	55,954	58,192	60,520	62,940	65,458	68,076	70,799	73,631	76,577	79,640	82,825	86,138	89,584	93,167	96,894	100,770
Rural with access	(kWh)	39,420	40,997	42,637	44,342	46,116	47,960	49,879	51,874	53,949	56,107	58,351	60,685	63,113	65,637	68,263	70,993	73,833	76,786	79,858	83,052	86,374
Rural without access	(kWh)	23,652	24,598	25,582	26,605	27,669	28,776	29,927	31,124	32,369	33,664	35,011	36,411	37,868	39,382	40,958	42,596	44,300	46,072	47,915	49,831	51,824
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural with road access	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural without road access	(kWh)	100	103	106	109	113	116	119	123	127	130	134	138	143	147	151	156	160	165	170	175	181
Energy Demand Forecast																						
Non-residential	(kWh)	4,932,724	5,352,418	5,812,319	6,316,435	6,869,193	7,475,480	8,095,798	8,772,700	9,511,585	10,318,389	11,199,644	12,002,823	12,867,818	13,799,567	14,803,418	15,885,165	17,051,084	18,307,975	19,663,211	21,124,781	22,701,352
Non-residential(New)	(kWh)	0	640,168	1,381,476	2,060,435	2,808,959	3,335,489	3,954,887	4,548,654	5,269,921	5,932,073	6,694,550	7,759,962	8,775,863	9,606,457	10,298,785	11,024,006	11,697,723	12,490,262	13,319,826	14,141,072	15,047,861
Irrigation and other additional	(kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	(kWh)	4,932,724	5,992,586	7,193,796	8,376,870	9,678,152	10,810,969	12,050,685	13,321,354	14,781,506	16,250,462	17,894,194	19,762,785	21,643,681	23,406,024	25,102,203	26,909,171	28,748,807	30,798,237	32,983,037	35,265,854	37,749,213
Residential (Already connected)	(kWh)	2,812,158	2,952,765	3,100,404	3,255,424	3,418,195	3,589,105	3,768,560	3,956,988	4,154,837	4,362,579	4,580,708	4,809,744	5,050,231	5,302,742	5,567,880	5,846,274	6,138,587	6,445,517	6,767,792	7,106,182	7,461,491
Residential (New Connection)	(kWh)	0	964,333	1,616,117	2,286,531	2,996,416	3,594,514	4,159,922	4,720,198	5,284,536	5,879,619	6,477,010	7,246,291	7,735,505	8,249,118	8,788,222	9,353,954	9,926,156	10,525,601	11,153,465	11,810,970	12,499,389
Sub-total	(kWh)	2,812,158	3,917,098	4,716,520	5,541,955	6,414,611	7,183,619	7,928,482	8,677,186	9,439,374	10,242,198	11,057,718	12,056,034	12,785,736	13,551,861	14,356,101	15,200,227	16,064,743	16,971,118	17,921,257	18,917,152	19,960,880
Total Energy Demand	(kWh)	7,744,882	9,909,684	11,910,316	13,918,826	16,092,763	17,994,587	19,979,167	21,998,540	24,220,880	26,492,660	28,951,913	31,818,820	34,429,417	36,957,885	39,458,304	42,109,398	44,813,549	47,769,355	50,904,294	54,183,006	57,710,093
Annual Growth Rate	(%)	108.5	28.0	20.2	16.9	15.6	11.8	11.0	10.1	10.1	9.4	9.3	9.9	8.2	7.3	6.8	6.7	6.4	6.6	6.6	6.4	6.5
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	2,357,138	2,913,775	3,390,197	3,841,840	4,313,233	4,498,647	4,891,165	5,272,377	5,681,441	6,080,283	6,499,409	6,984,619	7,387,689	7,749,234	8,081,821	8,421,880	8,748,462	9,098,925	9,456,529	9,812,670	10,184,134
Total Energy Consumption	(kWh)	10,102,019	12,823,459	15,300,513	17,760,666	20,405,996	22,493,234	24,870,332	27,270,918	29,902,321	32,572,943	35,451,322	38,803,439	41,817,106	44,707,118	47,540,125	50,531,278	53,562,011	56,868,280	60,360,823	63,995,676	67,894,228
Annual Growth Rate	(%)	106.7	26.9	19.3	16.1	14.9	10.2	10.6	9.7	9.6	8.9	8.8	9.5	7.8	6.9	6.3	6.3	6.0	6.2	6.1	6.0	6.1
Peak Power Demand	(MW)	2.15	2.69	3.18	3.65	4.15	4.52	4.94	5.36	5.81	6.26	6.74	7.38	7.96	8.51	9.04	9.61	10.19	10.82	11.48	12.18	12.92
Annual Growth Rate	(%)	115.7	25.2	18.1	14.9	13.7	9.0	9.4	8.4	8.5	7.8	7.7	9.5	7.8	6.9	6.3	6.3	6.0	6.2	6.1	6.0	6.1
Load Factor	(%)	53.7	54.4	55.0	55.6	56.2	56.8	57.4	58.1	58.7	59.4	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Energy Demand by Category																						
Industrial		892,894	1,135,438	1,392,598	1,647,723	1,924,400	2,166,882	2,426,820	2,700,987	3,013,693	3,343,488	3,715,399	4,099,461	4,498,479	4,890,713	5,291,278	5,727,876	6,197,820	6,717,365	7,284,544	7,900,899	8,577,730
Agriculture		398,755	398,755	398,755	398,755	398,755	398,755	398,755	398,755	398,755	398,755	398,755	398,755	398,755	398,755	398,755	398,755	398,755	398,755	398,755	398,755	398,755
Services		3,641,074	4,458,392	5,402,443	6,330,393	7,354,997	8,245,331	9,225,110	10,221,612	11,369,057	12,508,219	13,780,040	15,264,570	16,746,446	18,116,556	19,412,169	20,782,540	22,152,231	23,682,117	25,299,738	26,966,199	28,772,728
Residential		2,812,158	3,917,098	4,716,520	5,541,955	6,414,611	7,183,619	7,928,482	8,677,186	9,439,374	10,242,198	11,057,718	12,056,034	12,785,736	13,551,861	14,356,101	15,200,227	16,064,743	16,971,118	17,921,257	18,917,152	19,960,880
Total		7,744,882	9,909,684	11,910,316	13,918,826	16,092,763	17,994,587	19,979,167	21,998,540	24,220,880	26,492,660	28,951,913	31,818,820	34,429,417	36,957,885	39,458,304	42,109,398	44,813,549	47,769,355	50,904,294	54,183,006	57,710,093

電力需要予測
Huaphanh Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
Rural with road access		356	356	356	356	356	356	356	356	356	356	356	356	356	356	356	356	356	356	356	356	356
Rural without road access		515	515	515	515	515	515	515	515	515	515	515	515	515	515	515	515	515	515	515	515	515
Total		925	925	925	925	925	925	925	925	925	925	925	925	925	925	925	925	925	925	925	925	925
Population																						
Urban																						
Rural																						
Total	(x 1,000)	272.8	278.5	284.3	290.3	296.4	302.6	308.4	314.3	320.2	326.3	332.5	338.2	343.9	349.8	355.7	361.7	367.2	372.7	378.3	383.9	389.7
Household		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		2,524	2,577	2,631	2,687	2,743	2,801	2,854	2,908	2,963	3,020	3,077	3,129	3,183	3,237	3,292	3,348	3,398	3,449	3,501	3,553	3,606
Rural with road access		15,384	15,707	16,037	16,374	16,718	17,069	17,393	17,724	18,061	18,404	18,753	19,072	19,396	19,726	20,062	20,403	20,709	21,019	21,335	21,655	21,979
Rural without road access		22,240	22,707	23,183	23,670	24,167	24,675	25,144	25,621	26,108	26,604	27,110	27,571	28,039	28,516	29,001	29,494	29,936	30,385	30,841	31,304	31,773
Rural total		37,624	38,414	39,221	40,044	40,885	41,744	42,537	43,345	44,169	45,008	45,863	46,643	47,436	48,242	49,062	49,896	50,645	51,404	52,175	52,958	53,752
Total		40,148	40,991	41,852	42,731	43,628	44,545	45,391	46,253	47,132	48,028	48,940	49,772	50,618	51,479	52,354	53,244	54,043	54,853	55,676	56,511	57,359
Nos. of Village To be Electrified		119	142	161	183	204	227	248	270	289	312	333	365	396	428	461	493	523	556	586	619	650
Urban		50	51	53	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
Rural with access		69	91	108	129	150	173	194	215	231	243	254	278	293	305	318	327	335	344	352	356	356
Rural without access		0	0	0	0	0	0	0	1	4	15	25	33	49	69	89	112	134	158	180	209	240
New Village Connection after 1999 (Accumu		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	1	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Rural with access		0	22	39	60	81	104	125	146	162	174	185	209	224	236	249	258	266	275	283	287	287
Rural without access		0	0	0	0	0	0	0	1	4	15	25	33	49	69	89	112	134	158	180	209	240
Household to be Electrified		8,268	9,829	11,391	12,953	14,514	16,076	17,637	19,199	20,761	22,322	23,884	26,160	28,436	30,712	32,987	35,263	37,539	39,815	42,091	44,367	46,642
Urban		2,524	2,577	2,631	2,687	2,743	2,801	2,854	2,908	2,963	3,020	3,077	3,129	3,183	3,237	3,292	3,348	3,398	3,449	3,501	3,553	3,606
Rural with road access		5,743	7,252	8,760	10,266	11,508	12,468	13,328	14,189	15,052	15,888	16,482	17,393	18,307	19,056	19,725	20,399	20,709	21,019	21,335	21,655	21,979
Rural without road access		0	0	0	0	263	807	1,456	2,102	2,745	3,415	4,325	5,638	6,946	8,419	9,970	11,516	13,433	15,347	17,256	19,159	21,057
New Household Connection After 1999 (Acc		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	53	107	162	219	276	330	384	439	495	553	605	658	712	767	823	874	925	976	1,029	1,082
Rural with access		0	1,509	3,016	4,523	5,765	6,725	7,584	8,446	9,309	10,145	10,738	11,649	12,563	13,312	13,982	14,656	14,965	15,276	15,591	15,911	16,236
Rural without access		0	0	0	0	263	807	1,456	2,102	2,745	3,415	4,325	5,638	6,946	8,419	9,970	11,516	13,433	15,347	17,256	19,159	21,057
Average Non-Residential Consumption Per Village																						
District center	(kWh)	663,570	690,113	717,717	746,426	776,283	807,334	839,628	873,213	908,141	944,467	982,246	1,021,536	1,062,397	1,104,893	1,149,089	1,195,052	1,242,854	1,292,568	1,344,271	1,398,042	1,453,964
Urban	(kWh)	45,990	47,830	49,743	51,732	53,802	55,954	58,192	60,520	62,940	65,458	68,076	70,799	73,631	76,577	79,640	82,825	86,138	89,584	93,167	96,894	100,770
Rural with access	(kWh)	39,420	40,997	42,637	44,342	46,116	47,960	49,879	51,874	53,949	56,107	58,351	60,685	63,113	65,637	68,263	70,993	73,833	76,786	79,858	83,052	86,374
Rural without access	(kWh)	23,652	24,598	25,582	26,605	27,669	28,776	29,927	31,124	32,369	33,664	35,011	36,411	37,868	39,382	40,958	42,596	44,300	46,072	47,915	49,831	51,824
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural with road access	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural without road access	(kWh)	100	103	106	109	113	116	119	123	127	130	134	138	143	147	151	156	160	165	170	175	181
Energy Demand Forecast																						
Non-residential	(kWh)	4,890,817	5,302,503	5,751,283	6,240,593	6,774,197	7,356,225	7,947,173	8,588,374	9,284,246	10,039,614	10,859,744	11,607,494	12,409,061	13,268,433	14,189,904	15,178,097	16,237,991	17,374,950	18,594,754	19,903,631	21,308,296
Non-residential(New)	(kWh)	0	1,164,843	2,206,738	3,455,596	4,708,384	6,145,952	7,549,431	9,064,448	10,423,324	11,880,719	13,314,932	15,625,420	17,743,443	19,917,238	22,279,031	24,586,502	26,891,478	29,481,304	32,028,578	34,689,098	37,245,000
Irrigation and other Additional	(kWh)	0	0	0	12,000	12,000	12,000	12,000	24,000	24,000	24,000	24,000	36,000	36,000	36,000	36,000	48,000	48,000	48,000	48,000	60,000	60,000
Sub-total	(kWh)	4,890,817	6,467,347	7,958,021	9,708,189	11,494,581	13,514,176	15,508,604	17,676,822	19,731,570	21,944,334	24,198,677	27,268,914	30,188,504	33,221,671	36,504,935	39,812,599	43,177,469	46,904,254	50,671,331	54,652,729	58,613,295
Residential (Already connected)	(kWh)	4,770,078	5,008,582	5,259,011	5,521,961	5,798,059	6,087,962	6,392,360	6,711,978	7,047,577	7,399,956	7,769,954	8,158,452	8,566,374	8,994,693	9,444,427	9,916,649	10,412,481	10,933,105	11,479,761	12,053,749	12,656,436
Residential (New Connection)	(kWh)	0	1,447,637	2,982,132	4,607,394	6,090,949	7,397,991	8,678,497	10,031,878	11,461,489	12,940,188	14,238,183	16,046,838	17,956,327	19,772,321	21,586,759	23,498,956	25,030,489	26,635,696	28,322,076	30,093,389	31,953,565
Sub-total	(kWh)	4,770,078	6,456,218	8,241,143	10,129,355	11,889,008	13,485,953	15,070,857	16,743,857	18,509,066	20,340,144	22,008,136	24,205,289	26,522,701	28,767,014	31,031,187	33,415,605	35,442,970	37,568,802	39,801,836	42,147,137	44,610,001
Total Energy Demand	(kWh)	9,660,894	12,923,565	16,199,164	19,837,544	23,383,589	27,000,130	30,579,461	34,420,678	38,240,636	42,284,478	46,206,813	51,474,203	56,711,205	61,988,685	67,536,122	73,228,204	78,620,439	84,473,056	90,473,168	96,799,866	103,223,296
Annual Growth Rate	(%)	21.1	33.8	25.3	22.5	17.9	15.5	13.3	12.6	11.1	10.6	9.3	11.4	10.2	9.3	8.9	8.4	7.4	7.4	7.1	7.0	6.6
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	2,940,272	3,799,956	4,610,991	5,475,511	6,267,344	6,750,032	7,486,258	8,249,584	8,970,026	9,704,634	10,372,958	11,299,215	12,168,801	12,997,628	13,832,700	14,645,641	15,348,213	16,090,106	16,807,268	17,530,684	18,215,876
Total Energy Consumption	(kWh)	12,601,167	16,723,521	20,810,154	25,313,054	29,650,933	33,750,162	38,065,720	42,670,263	47,210,662	51,989,112	56,579,771	62,773,418	68,880,006	74,986,313	81,368,822	87,873,845	93,968,652	100,563,162	107,280,436	114,330,551	121,439,171
Annual Growth Rate	(%)	20.0	32.7	24.4	21.6	17.1	13.8	12.8	12.1	10.6	10.1	8.8	10.9	9.7	8.9	8.5	8.0	6.9	7.0	6.7	6.6	6.2
Peak Power Demand	(MW)	3.12	4.06	4.92	5.82	6.63	7.33	8.04	8.77	9.45	10.14	10.76	11.94	13.11	14.27	15.48	16.72	17.88	19.13	20.41	21.75	23.10
Annual Growth Rate	(%)	14.8	30.2	21.2	18.4	13.9	10.6	9.7	9.1	7.7	7.3	6.1	10.9	9.7	8.9	8.5	8.0	6.9	7.0	6.7	6.6	6.2
Load Factor	(%)	46.2	47.1	48.3	49.7	51.1	52.6	54.0	55.5	57.0	58.5	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Energy Demand by Category																						
Industrial		452,882	728,324	980,429	1,262,334	1,538,299	1,843,216	2,135,442	2,442,651	2,723,369	3,006,994	3,295,013	3,682,408	4,025,629	4,368,823	4,737,869	5,097,691	5,465,270	5,870,264	6,284,017	6,709,186	7,134,095
Agriculture		224,316	224,316	224,316	236,316	236,316	236,316	236,316	248,316	248,316	248,316	248,316	260,316	260,316	260,316	260,316	272,316	272,316	272,316	272,316	284,316	284,316
Services		4,213,619	5,514,706	6,753,276	8,209,538	9,719,965	11,434,644	13,136,846	14,985,854	16,759,884	18,689,024	20,655,347	23,326,189	25,902,558	28,592,532	31,506,750	34,442,592	37,439,882	40,761,674	44,114,998	47,659,227	51,194,884
Residential		4,770,078	6,456,218	8,241,143	10,129,355	11,889,008	13,485,953	15,070,857	16,743,857	18,509,066	20,340,144	22,008,136	24,205,289	26,522,701	28,767,014	31,031,187	33,415,605	35,442,970	37,568,802	39,801,836	42,147,137	44,610,001
Total		9,660,894	12,923,565	16,199,164	19,837,544	23,383,589	27,000,130	30,579,461	34,420,678	38,240,636	42,284,478	46,206,813	51,474,203	56,711,205	61,988,685	67,536,122	73,228,204	78,620,439	84,473,056	90,473,168	96,799,866	103,223,296

電力需要予測
Vientiane Municipality

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305
Rural with road access		104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104
Rural without road access		77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77
Total		486	486	486	486	486	486	486	486	486	486	486	486	486	486	486	486	486	486	486	486	486
Population																						
Urban																						
Rural																						
Total	(x 1,000)	611	629	648	667	687	708	728	748	769	790	813	834	855	878	900	924	946	969	992	1,016	1,040
Household																						
Urban		66,055	68,037	70,078	72,180	74,346	76,576	78,720	80,924	83,190	85,520	87,914	90,200	92,545	94,951	97,420	99,953	102,352	104,808	107,324	109,899	112,537
Rural with road access		22,444	23,118	23,811	24,525	25,261	26,019	26,747	27,496	28,266	29,058	29,871	30,648	31,445	32,262	33,101	33,962	34,777	35,612	36,466	37,342	38,238
Rural without road access		16,498	16,993	17,502	18,027	18,568	19,125	19,661	20,211	20,777	21,359	21,957	22,528	23,114	23,715	24,331	24,964	25,563	26,176	26,805	27,448	28,107
Rural total		38,942	40,110	41,313	42,553	43,829	45,144	46,408	47,708	49,044	50,417	51,828	53,176	54,559	55,977	57,433	58,926	60,340	61,788	63,271	64,790	66,345
Total		104,997	108,147	111,391	114,733	118,175	121,720	125,129	128,632	132,234	135,936	139,743	143,376	147,104	150,928	154,853	158,879	162,692	166,596	170,595	174,689	178,882
Nos. of Village To be Electrifiec		413	422	428	435	441	452	458	465	471	480	486	486	486	486	486	486	486	486	486	486	486
Urban		294	298	300	302	304	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305
Rural with access		81	84	88	91	93	98	102	104	105	105	105	105	105	105	105	105	105	105	105	105	105
Rural without access		38	40	40	42	44	49	51	56	61	70	76	76	76	76	76	76	76	76	76	76	76
New Village Connection after 1999 (Accumulated																						
Urban		0	4	6	8	10	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Rural with access		0	3	7	10	12	17	21	23	24	24	24	24	24	24	24	24	24	24	24	24	24
Rural without access		0	2	2	4	6	11	13	18	23	32	38	38	38	38	38	38	38	38	38	38	38
Household to be Electrifiec		84,135	89,542	94,950	100,357	105,765	111,172	116,580	121,988	127,395	132,803	138,210	142,277	146,345	150,412	154,479	158,546	162,613	166,680	170,747	174,814	178,882
Urban		65,202	67,613	69,881	72,180	74,346	76,576	78,720	80,924	83,190	85,520	87,914	90,200	92,545	94,951	97,420	99,953	102,352	104,808	107,324	109,899	112,537
Rural with road access		17,933	19,613	21,260	22,935	24,215	25,455	26,574	27,496	28,266	29,058	29,871	30,648	31,445	32,262	33,101	33,962	34,777	35,612	36,466	37,342	38,238
Rural without road access		1,000	2,316	3,809	5,242	7,204	9,141	11,286	13,567	15,939	18,225	20,425	21,429	22,355	23,198	23,957	24,631	25,484	26,260	26,957	27,573	28,107
New Household Connection After 1999 (Accumulated																						
Urban		0	2,411	4,679	6,979	9,144	11,374	13,519	15,723	17,989	20,318	22,712	24,998	27,343	29,750	32,218	34,751	37,150	39,607	42,122	44,698	47,335
Rural with access		0	1,680	3,327	5,001	6,282	7,522	8,640	9,563	10,333	11,125	11,938	12,715	13,512	14,329	15,168	16,029	16,844	17,678	18,533	19,408	20,305
Rural without access		0	1,316	2,809	4,243	6,205	8,141	10,286	12,567	14,939	17,226	19,425	20,430	21,355	22,198	22,958	23,631	24,485	25,261	25,958	26,574	27,107
Average Non-Residential Consumption Per Villag																						
District center	(kWh)	878,190	913,318	949,850	987,844	1,027,358	1,068,452	1,111,191	1,155,638	1,201,864	1,249,938	1,299,936	1,351,933	1,406,010	1,462,251	1,520,741	1,581,571	1,644,833	1,710,627	1,779,052	1,850,214	1,924,222
Urban	(kWh)	61,320	63,773	66,324	68,977	71,736	74,605	77,589	80,693	83,921	87,277	90,769	94,399	98,175	102,102	106,186	110,434	114,851	119,445	124,223	129,192	134,360
Rural with access	(kWh)	48,618	50,563	52,585	54,689	56,876	59,151	61,517	63,978	66,537	69,199	71,967	74,845	77,839	80,953	84,191	87,558	91,061	94,703	98,491	102,431	106,528
Rural without access	(kWh)	26,718	27,787	28,898	30,054	31,256	32,507	33,807	35,159	36,565	38,028	39,549	41,131	42,776	44,487	46,267	48,118	50,042	52,044	54,126	56,291	58,542
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	1,500	1,545	1,591	1,639	1,688	1,739	1,791	1,845	1,900	1,957	2,016	2,076	2,139	2,203	2,269	2,337	2,407	2,479	2,554	2,630	2,709
Rural with road access	(kWh)	1,500	1,545	1,591	1,639	1,688	1,739	1,791	1,845	1,900	1,957	2,016	2,076	2,139	2,203	2,269	2,337	2,407	2,479	2,554	2,630	2,709
Rural without road access	(kWh)	100	103	106	109	113	116	119	123	127	130	134	138	143	147	151	156	160	165	170	175	181
Energy Demand Forecast																						
Non-residential	(kWh)	182,259,699	193,745,874	206,081,214	219,329,886	233,561,008	248,849,036	264,271,373	280,773,211	298,431,808	317,330,063	337,556,942	355,490,444	374,465,231	394,542,766	415,788,198	438,270,582	462,063,120	487,243,413	513,893,726	542,101,276	571,958,531
Non-residential(New	(kWh)	0	457,907	808,068	1,184,092	1,527,230	2,080,809	2,439,248	2,796,313	3,111,018	3,518,096	3,839,080	3,954,252	4,072,880	4,195,066	4,320,918	4,450,546	4,584,062	4,721,584	4,863,232	5,009,129	5,159,402
Irrigation and other Additiona	(kWh)	0	0	0	3,056,064	3,056,064	2,778,240	2,778,240	5,556,480	5,556,480	5,556,480	5,556,480	8,334,720	8,334,720	8,334,720	8,334,720	11,112,960	11,112,960	11,112,960	11,112,960	13,891,200	13,891,200
Sub-total	(kWh)	182,259,699	194,203,782	206,889,283	223,570,042	238,144,302	253,708,084	269,488,861	289,126,004	307,099,306	326,404,640	346,952,502	367,779,416	386,872,831	407,072,552	428,443,836	453,834,088	477,760,142	503,077,957	529,869,918	561,001,605	591,009,134
Residential (Already connected	(kWh)	193,299,429	192,958,471	202,606,395	212,736,714	223,373,550	234,542,228	246,269,339	258,582,806	271,511,946	285,087,544	299,341,921	314,864,665	330,580,116	347,081,339	364,407,624	382,600,222	401,702,451	421,759,791	442,819,998	464,933,216	488,152,094
Residential (New Connection	(kWh)	0	21,561,517	25,207,445	29,676,070	33,341,742	37,297,008	41,318,680	46,114,873	50,491,429	55,189,132	60,228,190	66,266,294	71,536,518	77,171,145	83,192,387	90,179,397	96,724,556	103,695,215	111,116,227	119,569,486	127,971,414
Sub-total	(kWh)	193,299,429	214,519,988	227,813,839	242,412,785	256,715,292	271,839,236	287,588,019	304,697,679	322,003,375	340,276,676	359,570,110	381,130,959	402,116,634	424,252,484	447,600,011	472,779,620	498,427,007	525,455,006	553,936,225	584,502,702	616,123,508
Total Energy Demand	(kWh)	375,559,128	408,723,769	434,703,122	465,982,827	494,859,594	525,547,320	557,076,880	593,823,683	629,102,681	666,681,315	706,522,612	748,910,375	788,989,464	831,325,036	876,043,846	926,613,707	976,187,150	1,028,532,963	1,083,806,143	1,145,504,306	1,207,132,642
Annual Growth Rate	(%)	19.5	8.8	6.4	7.2	6.2	6.2	6.0	6.6	5.9	6.0	6.0	6.0	5.4	5.4	5.4	5.8	5.3	5.4	5.4	5.7	5.4
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	114,300,604	120,178,305	123,735,526	128,619,445	132,633,843	131,386,830	136,379,817	142,321,379	147,567,295	153,008,826	158,607,117	164,394,960	169,297,334	174,310,088	179,430,667	185,322,741	190,570,400	195,911,041	201,339,481	207,453,536	213,023,407
Total Energy Consumption	(kWh)	489,859,732	528,902,074	558,438,648	594,602,272	627,493,437	656,934,150	693,456,697	736,145,062	776,669,976	819,690,142	865,129,729	913,305,336	958,286,799	1,005,635,125	1,055,474,514	1,111,936,449	1,166,757,549	1,224,444,004	1,285,145,624	1,352,957,842	1,420,156,049
Annual Growth Rate	(%)	18.4	8.0	5.6	6.5	5.5	4.7	5.6	6.2	5.5	5.5	5.5	5.6	4.9	4.9	5.0	5.3	4.9	4.9	5.0	5.3	5.0
Peak Power Demand	(MW)	94.7	102.1	107.6	114.4	120.5	126.0	132.8	140.7	148.2	156.2	164.6	173.8	182.3	191.3	200.8	211.6	222.0	233.0	244.5	257.4	270.2
Annual Growth Rate	(%)	16.6	7.8	5.4	6.3	5.4	4.5	5.4	6.0	5.3	5.4	5.4	5.6	4.9	4.9	5.0	5.3	4.9	4.9	5.0	5.3	5.0
Load Factor	(%)	59.1	59.2	59.2	59.3	59.4	59.5	59.6	59.7	59.8	59.9	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Energy Demand by Catergory																						
Industrial	70,611,862	76,413,015	82,671,591	89,453,417	96,797,024	104,781,746	112,900,130	121,655,444	131,099,272	141,299,829	152,304,900	161,945,527	172,212,796	183,147,437	194,792,830	207,195,173	220,403,668	234,470,716	249,452,122	265,407,319	282,399,604
Agriculture	15,144,541	15,144,541	15,144,541	18,200,605	18,200,605	17,922,781	17,922,781	20,701,021	20,701,021	20,701,021	20,701,021	23,479,261	23,479,261	23,479,261	23,479,261	26,257,501	26,257,501	26,257,501	26,257,501	29,035,741	29,035,741
Services	96,503,296	102,646,225	109,073,151	115,916,020	123,146,673	131,003,557	138,665,951	146,769,539	155,299,013	164,403,789	173,946,581	182,354,628	191,180,774	200,445,854	210,171,745	220,381,414	231,098,973	242,349,740	254,160,295	266,558,545	279,573,789
Residential	193,299,429	214,519,988	227,813,839	242,412,785	256,715,292	271,839,236	287,588,019	304,697,679	322,003,375	340,276,676	359,570,110	381,130,959	402,116,634	424,252,484	447,600,011	472,779,620	498,427,007	525,455,006	553,936,225	584,502,702	616,123,508
Total	375,559,128	408,723,769	434,703,122	465,982,827	494,859,594	525,547,320	557,076,880	593,823,683	629,102,681	666,681,315	706,522,612	748,910,375	788,989,464	831,325,036	876,043,846	926,613,707	976,187,150	1,028,532,963	1,083,806,143	1,145,504,306	1,207,132,642

電力需要予測

Luang Prabang Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132
Rural with road access		252	252	252	252	252	252	252	252	252	252	252	252	252	252	252	252	252	252	252	252	252
Rural without road access		830	830	830	830	830	830	830	830	830	830	830	830	830	830	830	830	830	830	830	830	830
Total		1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
Population																						
Urban																						
Rural																						
Total	(x 1,000)	409	418	427	436	446	456	465	474	484	493	503	512	521	531	540	550	559	568	577	586	596
Household																						
Urban		7,455	7,619	7,787	7,958	8,133	8,312	8,478	8,648	8,821	8,997	9,177	9,343	9,511	9,682	9,856	10,034	10,194	10,357	10,523	10,691	10,862
Rural with road access		13,781	14,084	14,394	14,710	15,034	15,365	15,672	15,985	16,305	16,631	16,964	17,269	17,580	17,897	18,219	18,547	18,843	19,145	19,451	19,762	20,079
Rural without road access		45,451	46,451	47,473	48,517	49,585	50,676	51,689	52,723	53,777	54,853	55,950	56,957	57,982	59,026	60,088	61,170	62,149	63,143	64,153	65,180	66,223
Rural total		59,232	60,535	61,867	63,228	64,619	66,040	67,361	68,708	70,083	71,484	72,914	74,226	75,562	76,922	78,307	79,717	80,992	82,288	83,605	84,942	86,301
Total		66,687	68,154	69,653	71,186	72,752	74,352	75,840	77,356	78,903	80,482	82,091	83,569	85,073	86,604	88,163	89,750	91,186	92,645	94,127	95,634	97,164
Nos. of Village To be Electrifiec		176	190	202	214	227	239	252	264	276	290	302	351	400	450	499	549	597	646	696	744	794
Urban		72	80	84	89	95	100	106	111	115	121	124	132	132	132	132	132	132	132	132	132	132
Rural with access		51	53	57	61	64	68	71	75	78	80	85	115	152	189	220	244	252	252	252	252	252
Rural without access		53	57	61	64	68	71	75	78	83	89	93	104	116	129	147	173	213	262	312	360	410
New Village Connection after 1999 (Accumulated																						
Urban		0	8	12	17	23	28	34	39	43	49	52	60	60	60	60	60	60	60	60	60	60
Rural with access		0	2	6	10	13	17	20	24	27	29	34	64	101	138	169	193	201	201	201	201	201
Rural without access		0	4	8	11	15	18	22	25	30	36	40	51	63	76	94	120	160	209	259	307	357
Household to be Electrifiec		15,373	16,323	17,273	18,223	19,173	20,123	21,073	22,023	22,973	23,923	24,873	29,587	34,300	39,014	43,728	48,441	53,155	57,869	62,582	67,296	72,010
Urban		5,040	5,712	6,277	6,843	7,411	7,900	8,314	8,632	8,821	8,997	9,177	9,343	9,511	9,682	9,856	10,034	10,194	10,357	10,523	10,691	10,862
Rural with road access		4,316	4,428	4,636	4,846	5,057	5,350	5,708	6,165	6,753	7,357	7,961	11,182	14,058	16,595	17,897	18,547	18,843	19,145	19,451	19,762	20,079
Rural without road access		6,017	6,183	6,360	6,534	6,705	6,872	7,051	7,226	7,399	7,568	7,735	9,062	10,732	12,737	15,975	19,861	24,118	28,367	32,608	36,842	41,069
New Household Connection After 1999 (Accumulated																						
Urban		0	672	1,237	1,803	2,371	2,860	3,274	3,592	3,781	3,957	4,137	4,303	4,471	4,642	4,816	4,994	5,154	5,317	5,483	5,651	5,822
Rural with access		0	112	320	530	741	1,034	1,392	1,849	2,437	3,041	3,645	6,866	9,742	12,279	13,581	14,231	14,527	14,829	15,135	15,446	15,763
Rural without access		0	166	343	517	688	855	1,034	1,209	1,382	1,552	1,718	3,045	4,715	6,720	9,958	13,844	18,101	22,350	26,591	30,825	35,052
Average Non-Residential Consumption Per Villag																						
District center	(kWh)	663,570	690,113	717,717	746,426	776,283	807,334	839,628	873,213	908,141	944,467	982,246	1,021,536	1,062,397	1,104,893	1,149,089	1,195,052	1,242,854	1,292,568	1,344,271	1,398,042	1,453,964
Urban	(kWh)	45,990	47,830	49,743	51,732	53,802	55,954	58,192	60,520	62,940	65,458	68,076	70,799	73,631	76,577	79,640	82,825	86,138	89,584	93,167	96,894	100,770
Rural with access	(kWh)	39,420	40,997	42,637	44,342	46,116	47,960	49,879	51,874	53,949	56,107	58,351	60,685	63,113	65,637	68,263	70,993	73,833	76,786	79,858	83,052	86,374
Rural without access	(kWh)	23,652	24,598	25,582	26,605	27,669	28,776	29,927	31,124	32,369	33,664	35,011	36,411	37,868	39,382	40,958	42,596	44,300	46,072	47,915	49,831	51,824
Average Energy Consumption/Household																						
Urban	(kWh)	600	618	637	656	675	696	716	738	760	783	806	831	855	881	908	935	963	992	1,021	1,052	1,084
Rural with road access	(kWh)	600	618	637	656	675	696	716	738	760	783	806	831	855	881	908	935	963	992	1,021	1,052	1,084
Rural without road access	(kWh)	100	103	106	109	113	116	119	123	127	130	134	138	143	147	151	156	160	165	170	175	181
Energy Demand Forecast																						
Non-residential	(kWh)	17,491,189	18,978,149	20,599,876	22,368,948	24,299,160	26,405,646	28,545,983	30,869,597	33,392,743	36,133,180	39,110,314	41,824,601	44,735,569	47,857,908	51,207,447	54,801,239	58,657,666	62,796,544	67,239,235	72,008,780	77,130,032
Non-residential(New)	(kWh)	0	715,508	1,316,887	1,991,515	2,749,803	3,506,097	4,352,364	5,197,769	6,018,407	7,015,048	7,943,046	11,286,171	14,646,631	18,237,797	21,792,083	25,346,002	28,445,505	31,462,748	34,680,911	37,970,147	41,497,907
Irrigation and other Additiona	(kWh)	0	0	0	53,760	53,760	53,760	53,760	107,520	107,520	107,520	107,520	161,280	161,280	161,280	161,280	215,040	215,040	215,040	215,040	268,800	268,800
Sub-total	(kWh)	17,491,189	19,693,657	21,916,762	24,414,223	27,102,723	29,965,503	32,952,107	36,174,886	39,518,670	43,255,748	47,160,880	53,272,052	59,543,479	66,256,985	73,160,810	80,362,281	87,318,211	94,474,332	102,135,186	110,247,727	118,896,739
Residential (Already connected	(kWh)	15,563,041	16,341,194	17,158,253	18,016,166	18,916,974	19,862,823	20,855,964	21,898,762	22,993,700	24,143,385	25,350,555	26,618,082	27,948,986	29,346,436	30,813,758	32,354,445	33,972,168	35,670,776	37,454,315	39,327,031	41,293,382
Residential (New Connection)	(kWh)	0	743,914	1,522,780	2,350,592	3,229,738	4,162,712	5,137,917	6,170,814	7,264,135	8,420,731	9,643,577	14,335,554	18,909,682	23,350,941	26,550,387	29,112,380	31,329,201	33,662,504	36,117,733	38,700,574	41,416,967
Sub-total	(kWh)	15,563,041	17,085,107	18,681,033	20,366,758	22,146,712	24,025,535	25,993,881	28,069,576	30,257,835	32,564,116	34,994,132	40,953,636	46,858,668	52,697,377	57,364,144	61,466,826	65,301,368	69,333,280	73,572,048	78,027,605	82,710,349
Total Energy Demand	(kWh)	33,054,230	36,778,764	40,597,796	44,780,981	49,249,435	53,991,038	58,945,988	64,244,463	69,776,505	75,819,864	82,155,012	94,225,688	106,402,148	118,954,362	130,524,954	141,829,106	152,619,579	163,807,611	175,707,233	188,275,332	201,607,089
Annual Growth Rate	(%)	21.6	11.3	10.4	10.3	10.0	9.6	9.2	9.0	8.6	8.7	8.4	14.7	12.9	11.8	9.7	8.7	7.6	7.3	7.3	7.2	7.1
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	10,059,983	10,814,173	11,555,909	12,360,337	13,199,990	13,497,760	14,430,761	15,397,433	16,367,328	17,401,280	18,442,962	20,683,688	22,831,230	24,942,044	26,734,027	28,365,821	29,794,260	31,201,450	32,641,265	34,097,107	35,577,722
Total Energy Consumption	(kWh)	43,114,214	47,592,937	52,153,705	57,141,318	62,449,425	67,488,798	73,376,749	79,641,896	86,143,834	93,221,144	100,597,974	114,909,376	129,233,378	143,896,406	157,258,981	170,194,928	182,413,840	195,009,061	208,348,498	222,372,439	237,184,810
Annual Growth Rate	(%)	20.6	10.4	9.6	9.6	9.3	8.1	8.7	8.5	8.2	8.2	7.9	14.2	12.5	11.3	9.3	8.2	7.2	6.9	6.8	6.7	6.7
Peak Power Demand	(MW)	8.8	9.6	10.5	11.4	12.4	13.3	14.4	15.5	16.6	17.9	19.1	21.9	24.6	27.4	29.9	32.4	34.7	37.1	39.6	42.3	45.1
Annual Growth Rate	(%)	21.7	9.9	9.0	8.9	8.6	7.3	8.0	7.7	7.4	7.4	7.1	14.2	12.5	11.3	9.3	8.2	7.2	6.9	6.8	6.7	6.7
Load Factor	(%)	56.1	56.4	56.7	57.1	57.4	57.8	58.2	58.7	59.1	59.6	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Energy Demand by Category																						
Industrial		1,778,246	2,158,172	2,524,206	2,935,034	3,391,810	3,880,821	4,401,447	4,959,533	5,551,577	6,226,650	6,942,776	7,932,037	8,920,683	9,972,006	11,049,015	12,158,184	13,242,311	14,367,175	15,590,002	16,910,742	18,350,397
Agriculture		710,164	710,164	710,164	763,924	763,924	763,924	763,924	817,684	817,684	817,684	817,684	871,444	871,444	871,444	871,444	925,204	925,204	925,204	925,204	978,964	978,964
Services		15,002,779	16,825,320	18,682,392	20,715,265	22,946,989	25,320,758	27,786,736	30,397,669	33,149,409	36,211,414	39,400,420	44,468,570	49,751,352	55,413,534	61,240,351	67,278,892	73,150,695	79,181,953	85,619,980	92,358,021	99,567,378
Residential		15,563,041	17,085,107	18,681,033	20,366,758	22,146,712	24,025,535	25,993,881	28,069,576	30,257,835	32,564,116	34,994,132	40,953,636	46,858,668	52,697,377	57,364,144	61,466,826	65,301,368	69,333,280	73,572,048	78,027,605	82,710,349
Total		33,054,230	36,778,764	40,597,796	44,780,981	49,249,435	53,991,038	58,945,988	64,244,463	69,776,505	75,819,864	82,155,012	94,225,688	106,402,148	118,954,362	130,524,954	141,829,106	152,619,579	163,807,611	175,707,233	188,275,332	201,607,089

電力需要予測
Xayabuly Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Rural with road access		416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416	416
Rural without road access		210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
Total		676	676	676	676	676	676	676	676	676	676	676	676	676	676	676	676	676	676	676	676	676
Population																						
Urban																						
Rural																						
Total	(x 1,000)	316	322	328	335	342	348	355	361	368	374	381	387	393	400	406	412	418	424	430	436	442
Household																						
Urban		4,515	4,605	4,697	4,791	4,887	4,984	5,074	5,166	5,258	5,353	5,449	5,537	5,625	5,715	5,807	5,900	5,982	6,066	6,151	6,237	6,324
Rural with road access		33,468	34,138	34,821	35,517	36,227	36,952	37,617	38,294	38,983	39,685	40,399	41,046	41,703	42,370	43,048	43,736	44,349	44,970	45,599	46,238	46,885
Rural without road access		16,842	17,179	17,522	17,873	18,230	18,595	18,930	19,270	19,617	19,970	20,330	20,655	20,986	21,321	21,662	22,009	22,317	22,630	22,946	23,268	23,593
Rural total		50,310	51,317	52,343	53,390	54,458	55,547	56,547	57,564	58,601	59,655	60,729	61,701	62,688	63,691	64,710	65,746	66,666	67,599	68,546	69,505	70,478
Total		54,825	55,922	57,040	58,181	59,344	60,531	61,621	62,730	63,859	65,009	66,179	67,238	68,313	69,406	70,517	71,645	72,648	73,665	74,697	75,742	76,803
Nos. of Village To be Electrified		97	118	141	161	185	204	228	248	271	292	315	334	354	371	388	409	428	447	464	484	502
Urban		46	49	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Rural with access		51	69	91	111	135	152	173	189	208	224	239	256	273	288	304	320	330	340	349	359	368
Rural without access		0	0	0	0	0	2	5	9	13	18	26	28	31	33	34	39	48	57	65	75	84
New Village Connection after 1999 (Accumulated)																						
Urban		0	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Rural with access		0	18	40	60	84	101	122	138	157	173	188	205	222	237	253	269	279	289	298	308	317
Rural without access		0	0	0	0	0	2	5	9	13	18	26	28	31	33	34	39	48	57	65	75	84
Household to be Electrified		9,525	11,931	14,337	16,743	19,149	21,556	23,962	26,368	28,774	31,180	33,586	36,440	39,295	42,149	45,003	47,858	50,712	53,566	56,421	59,275	62,129
Urban		3,797	4,339	4,542	4,709	4,877	4,984	5,074	5,166	5,258	5,353	5,449	5,537	5,625	5,715	5,807	5,900	5,982	6,066	6,151	6,237	6,324
Rural with road access		5,728	7,592	9,796	11,938	14,045	16,087	17,958	19,598	21,110	22,485	23,862	26,552	29,005	31,164	33,326	35,492	37,629	39,770	41,554	43,023	44,425
Rural without road access		0	0	0	96	227	484	930	1,605	2,405	3,341	4,274	4,352	4,664	5,270	5,871	6,466	7,100	7,731	8,716	10,015	11,380
New Household Connection After 1999 (Accumulated)																						
Urban		0	542	744	911	1,080	1,187	1,277	1,368	1,461	1,556	1,652	1,739	1,828	1,918	2,009	2,102	2,185	2,269	2,354	2,440	2,527
Rural with access		0	1,864	4,068	6,211	8,317	10,359	12,230	13,870	15,383	16,757	18,135	20,824	23,278	25,436	27,598	29,765	31,902	34,042	35,826	37,295	38,698
Rural without access		0	0	0	96	227	484	930	1,605	2,405	3,341	4,274	4,352	4,664	5,270	5,871	6,466	7,100	7,731	8,716	10,015	11,380
Average Non-Residential Consumption Per Village																						
District center	(kWh)	878,190	913,318	949,850	987,844	1,027,358	1,068,452	1,111,191	1,155,638	1,201,864	1,249,938	1,299,936	1,351,933	1,406,010	1,462,251	1,520,741	1,581,571	1,644,833	1,710,627	1,779,052	1,850,214	1,924,222
Urban	(kWh)	61,320	63,773	66,324	68,977	71,736	74,605	77,589	80,693	83,921	87,277	90,769	94,399	98,175	102,102	106,186	110,434	114,851	119,445	124,223	129,192	134,360
Rural with access	(kWh)	48,618	50,563	52,585	54,689	56,876	59,151	61,517	63,978	66,537	69,199	71,967	74,845	77,839	80,953	84,191	87,558	91,061	94,703	98,491	102,431	106,528
Rural without access	(kWh)	26,718	27,787	28,898	30,054	31,256	32,507	33,807	35,159	36,565	38,028	39,549	41,131	42,776	44,487	46,267	48,118	50,042	52,044	54,126	56,291	58,542
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	1,500	1,545	1,591	1,639	1,688	1,739	1,791	1,845	1,900	1,957	2,016	2,076	2,139	2,203	2,269	2,337	2,407	2,479	2,554	2,630	2,709
Rural with road access	(kWh)	1,500	1,545	1,591	1,639	1,688	1,739	1,791	1,845	1,900	1,957	2,016	2,076	2,139	2,203	2,269	2,337	2,407	2,479	2,554	2,630	2,709
Rural without road access	(kWh)	100	103	106	109	113	116	119	123	127	130	134	138	143	147	151	156	160	165	170	175	181
Energy Demand Forecast																						
Non-residential	(kWh)	12,892,530	13,871,073	14,946,115	16,127,584	17,426,478	18,854,976	20,321,874	21,926,870	23,683,577	25,607,012	27,713,743	29,633,495	31,705,381	33,941,922	36,356,706	38,964,483	41,781,269	44,824,456	48,112,935	51,667,227	55,509,631
Non-residential(New)	(kWh)	0	1,090,857	2,323,371	3,455,596	4,872,544	6,038,814	7,534,788	8,848,974	10,419,995	11,921,867	13,546,855	15,171,306	16,919,125	18,576,129	20,350,452	22,381,018	24,218,496	26,146,079	28,039,267	30,201,466	32,333,837
Irrigation and other Additional	(kWh)	0	0	0	115,200	115,200	115,200	115,200	230,400	230,400	230,400	230,400	345,600	345,600	345,600	345,600	460,800	460,800	460,800	460,800	576,000	576,000
Sub-total	(kWh)	12,892,530	14,961,930	17,269,486	19,698,380	22,414,221	25,008,990	27,971,862	31,006,245	34,333,972	37,759,278	41,490,997	45,150,401	48,970,106	52,863,651	57,052,758	61,806,301	66,460,565	71,431,336	76,613,001	82,444,692	88,419,468
Residential (Already connected)	(kWh)	8,572,582	9,001,211	9,451,271	9,923,835	10,420,027	10,941,028	11,488,080	12,062,483	12,665,608	13,298,888	13,963,832	14,662,024	15,395,125	16,164,882	16,973,126	17,821,782	18,712,871	19,648,515	20,630,940	21,662,487	22,745,612
Residential (New Connection)	(kWh)	0	2,230,446	4,594,719	7,014,659	9,544,569	12,102,664	14,625,910	17,064,051	19,508,066	21,941,287	24,507,048	28,712,028	32,880,073	36,926,870	41,193,613	45,690,168	50,368,316	55,291,937	59,981,999	64,463,620	69,065,821
Sub-total	(kWh)	8,572,582	11,231,657	14,045,991	16,938,494	19,964,596	23,043,692	26,113,990	29,126,534	32,173,673	35,240,175	38,470,880	43,374,052	48,275,198	53,091,752	58,166,739	63,511,950	69,081,187	74,940,451	80,612,939	86,126,108	91,811,432
Total Energy Demand	(kWh)	21,465,112	26,193,587	31,315,476	36,636,874	42,378,817	48,052,683	54,085,852	60,132,779	66,507,645	72,999,454	79,961,878	88,524,453	97,245,305	105,955,403	115,219,496	125,318,252	135,541,753	146,371,787	157,225,941	168,570,800	180,230,900
Annual Growth Rate	(%)	18.3	22.0	19.6	17.0	15.7	13.4	12.6	11.2	10.6	9.8	9.5	10.7	9.9	9.0	8.7	8.8	8.2	8.0	7.4	7.2	6.9
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	6,532,860	7,701,781	8,913,755	10,112,421	11,358,505	12,013,171	13,240,935	14,411,988	15,600,559	16,753,973	17,950,626	19,432,197	20,866,401	22,216,455	23,599,174	25,063,650	26,460,342	27,880,340	29,207,981	30,528,570	31,805,453
Total Energy Consumption	(kWh)	27,997,972	33,895,367	40,229,231	46,749,295	53,737,323	60,065,853	67,326,786	74,544,767	82,108,204	89,753,427	97,912,503	107,956,649	118,111,706	128,171,858	138,818,670	150,381,902	162,002,095	174,252,127	186,433,922	199,099,370	212,036,353
Annual Growth Rate	(%)	17.3	21.1	18.7	16.2	14.9	11.8	12.1	10.7	10.1	9.3	9.1	10.3	9.4	8.5	8.3	8.3	7.7	7.6	7.0	6.8	6.5
Peak Power Demand	(MW)	6.4	7.6	8.8	10.1	11.4	12.5	13.7	14.9	16.2	17.4	18.6	20.5	22.5	24.4	26.4	28.6	30.8	33.2	35.5	37.9	40.3
Annual Growth Rate	(%)	17.3	18.7	16.4	14.0	12.8	9.7	10.1	8.8	8.2	7.5	7.3	10.3	9.4	8.5	8.3	8.3	7.7	7.6	7.0	6.8	6.5
Load Factor	(%)	50.0	51.0	52.0	53.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Energy Demand by Catergory																						
Industrial		2,578,506	3,118,766	3,707,142	4,309,079	5,001,104	5,695,010	6,461,319	7,252,385	8,146,828	9,101,639	10,151,604	11,121,523	12,173,257	13,289,879	14,507,412	15,841,400	17,246,788	18,777,512	20,433,492	22,255,838	24,230,970
Agriculture		2,578,506	2,578,506	2,578,506	2,693,706	2,693,706	2,693,706	2,693,706	2,808,906	2,808,906	2,808,906	2,808,906	2,924,106	2,924,106	2,924,106	2,924,106	3,039,306	3,039,306	3,039,306	3,039,306	3,154,506	3,154,506
Services		7,735,518	9,264,658	10,983,838	12,695,595	14,719,411	16,620,274	18,816,837	20,944,953	23,378,238	25,848,733	28,530,488	31,104,771	33,872,743	36,649,666	39,621,240	42,925,596	46,174,471	49,614,517	53,140,204	57,034,349	61,033,992
Residential		8,572,582	11,231,657	14,045,991	16,938,494	19,964,596	23,043,692	26,113,990	29,126,534	32,173,673	35,240,175	38,470,880	43,374,052	48,275,198	53,091,752	58,166,739	63,511,950	69,081,187	74,940,451	80,612,939	86,126,108	91,811,432
Total		21,465,112	26,193,587	31,315,476	36,636,874	42,378,817	48,052,683	54,085,852	60,132,779	66,507,645	72,999,454	79,961,878	88,524,453	97,245,305	105,955,403	115,219,496	125,318,252	135,541,753	146,371,787	157,225,941	168,570,800	180,230,900

電力需要予測
Xieng Khuang Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
Rural with road access		211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211
Rural without road access		258	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258
Total		505	505	505	505	505	505	505	505	505	505	505	505	505	505	505	505	505	505	505	505	505
Population																						
Urban																						
Rural																						
Total	(x 1,000)	227	232	238	244	250	256	261	267	273	279	285	291	296	302	308	315	320	326	332	338	344
Household		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		2,808	2,876	2,945	3,015	3,088	3,162	3,231	3,302	3,375	3,449	3,525	3,596	3,668	3,741	3,816	3,892	3,962	4,033	4,106	4,180	4,255
Rural with road access		13,806	14,138	14,477	14,824	15,180	15,544	15,886	16,236	16,593	16,958	17,331	17,678	18,031	18,392	18,760	19,135	19,479	19,830	20,187	20,550	20,920
Rural without road access		16,844	17,248	17,662	18,086	18,520	18,964	19,381	19,808	20,244	20,689	21,144	21,567	21,998	22,438	22,887	23,345	23,765	24,193	24,628	25,072	25,523
Rural total		30,650	31,385	32,139	32,910	33,700	34,509	35,268	36,044	36,837	37,647	38,475	39,245	40,030	40,830	41,647	42,480	43,245	44,023	44,815	45,622	46,443
Total		33,458	34,261	35,083	35,925	36,787	37,670	38,499	39,346	40,212	41,096	42,000	42,840	43,697	44,571	45,463	46,372	47,207	48,056	48,921	49,802	50,698
Nos. of Village To be Electrified		52	59	66	74	81	86	93	101	108	115	123	148	172	198	221	246	269	294	320	345	368
Urban		29	32	33	33	33	34	34	34	34	35	35	36	36	36	36	36	36	36	36	36	36
Rural with access		23	27	33	41	48	52	59	66	72	77	84	106	129	152	167	180	193	200	207	207	208
Rural without access		0	0	0	0	0	0	0	1	2	3	4	6	7	10	18	30	40	58	77	102	124
New Village Connection after 1999 (Accumulated)																						
Urban		0	3	4	4	4	5	5	5	5	6	6	7	7	7	7	7	7	7	7	7	7
Rural with access		0	4	10	18	25	29	36	43	49	54	61	83	106	129	144	157	170	177	184	184	185
Rural without access		0	0	0	0	0	0	0	1	2	3	4	6	7	10	18	30	40	58	77	102	124
Household to be Electrified		4,505	5,069	5,634	6,199	6,763	7,328	7,892	8,457	9,022	9,586	10,151	13,371	16,592	19,812	23,033	26,253	29,474	32,694	35,915	39,135	42,355
Urban		2,410	2,584	2,758	2,900	3,032	3,118	3,199	3,283	3,367	3,449	3,525	3,596	3,668	3,741	3,816	3,892	3,962	4,033	4,106	4,180	4,255
Rural with road access		2,094	2,485	2,876	3,299	3,720	4,155	4,592	5,028	5,463	5,901	6,346	9,350	12,353	15,259	16,881	18,227	19,228	19,726	20,120	20,520	20,920
Rural without road access		0	0	0	0	11	55	101	147	192	236	280	426	571	813	2,336	4,134	6,284	8,935	11,689	14,435	17,180
New Household Connection After 1999 (Accumulated)																						
Urban		0	174	348	490	622	707	789	872	957	1,039	1,115	1,185	1,257	1,331	1,406	1,482	1,552	1,623	1,696	1,770	1,845
Rural with access		0	391	782	1,204	1,626	2,061	2,497	2,933	3,368	3,806	4,252	7,255	10,258	13,164	14,786	16,133	17,134	17,631	18,025	18,426	18,826
Rural without access		0	0	0	0	11	55	101	147	192	236	280	426	571	813	2,336	4,134	6,284	8,935	11,689	14,435	17,180
Average Non-Residential Consumption Per Village																						
District center	(kWh)	878,190	913,318	949,850	987,844	1,027,358	1,068,452	1,111,191	1,155,638	1,201,864	1,249,938	1,299,936	1,351,933	1,406,010	1,462,251	1,520,741	1,581,571	1,644,833	1,710,627	1,779,052	1,850,214	1,924,222
Urban	(kWh)	61,320	63,773	66,324	68,977	71,736	74,605	77,589	80,693	83,921	87,277	90,769	94,399	98,175	102,102	106,186	110,434	114,851	119,445	124,223	129,192	134,360
Rural with access	(kWh)	48,618	50,563	52,585	54,689	56,876	59,151	61,517	63,978	66,537	69,199	71,967	74,845	77,839	80,953	84,191	87,558	91,061	94,703	98,491	102,431	106,528
Rural without access	(kWh)	26,718	27,787	28,898	30,054	31,256	32,507	33,807	35,159	36,565	38,028	39,549	41,131	42,776	44,487	46,267	48,118	50,042	52,044	54,126	56,291	58,542
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural with road access	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural without road access	(kWh)	100	103	106	109	113	116	119	123	127	130	134	138	143	147	151	156	160	165	170	175	181
Energy Demand Forecast																						
Non-residential	(kWh)	8,801,610	9,469,652	10,203,573	11,010,151	11,896,894	12,872,116	13,873,554	14,969,270	16,168,557	17,481,668	18,919,914	20,230,511	21,644,968	23,171,834	24,820,384	26,600,689	28,523,683	30,601,238	32,846,252	35,272,734	37,895,907
Non-residential(New)	(kWh)	0	389,785	776,006	1,224,296	1,644,064	1,989,919	2,455,984	2,981,081	3,473,886	4,010,150	4,623,731	6,401,863	8,226,318	10,232,951	11,966,333	13,809,521	15,666,781	17,494,186	19,462,620	21,217,753	23,005,460
Irrigation and other Additional	(kWh)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	(kWh)	8,801,610	9,859,437	10,979,579	12,234,447	13,540,958	14,862,036	16,329,538	17,950,351	19,642,444	21,491,818	23,543,645	26,632,374	29,871,286	33,404,785	36,786,717	40,410,210	44,190,464	48,095,424	52,308,872	56,490,487	60,901,368
Residential (Already connected)	(kWh)	4,054,173	4,256,881	4,469,725	4,693,212	4,927,872	5,174,266	5,432,979	5,704,628	5,989,860	6,289,353	6,603,820	6,934,011	7,280,712	7,644,747	8,026,985	8,428,334	8,849,751	9,292,238	9,756,850	10,244,693	10,756,927
Residential (New Connection)	(kWh)	0	523,418	1,078,241	1,665,882	2,278,003	2,894,309	3,543,801	4,230,263	4,955,358	5,720,822	6,528,457	10,574,627	14,858,337	19,277,128	22,395,795	25,342,819	27,994,565	30,119,190	32,206,670	34,402,739	36,703,343
Sub-total	(kWh)	4,054,173	4,780,299	5,547,966	6,359,094	7,205,875	8,068,575	8,976,781	9,934,891	10,945,218	12,010,174	13,132,277	17,508,638	22,139,048	26,921,875	30,422,779	33,771,153	36,844,316	39,411,428	41,963,520	44,647,432	47,460,270
Total Energy Demand	(kWh)	12,855,783	14,639,736	16,527,545	18,593,541	20,746,833	22,930,611	25,306,319	27,885,242	30,587,662	33,501,992	36,675,922	44,141,012	52,010,335	60,326,660	67,209,497	74,181,363	81,034,780	87,506,852	94,272,392	101,137,919	108,361,638
Annual Growth Rate	(%)	25.6	13.9	12.9	12.5	11.6	10.5	10.4	10.2	9.7	9.5	9.5	20.4	17.8	16.0	11.4	10.4	9.2	8.0	7.7	7.3	7.1
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	3,912,630	4,304,567	4,704,462	5,132,144	5,560,632	5,732,653	6,195,323	6,683,240	7,174,884	7,688,982	8,233,370	9,689,490	11,160,112	12,649,138	13,765,800	14,836,273	15,819,539	16,667,972	17,513,053	18,316,316	19,122,642
Total Energy Consumption	(kWh)	16,768,412	18,944,303	21,232,008	23,725,685	26,307,465	28,663,263	31,501,642	34,568,482	37,762,545	41,190,974	44,909,292	53,830,502	63,170,447	72,975,799	80,975,297	89,017,636	96,854,318	104,174,824	111,785,445	119,454,235	127,484,280
Annual Growth Rate	(%)	24.5	13.0	12.1	11.7	10.9	9.0	9.9	9.7	9.2	9.1	9.0	19.9	17.4	15.5	11.0	9.9	8.8	7.6	7.3	6.9	6.7
Peak Power Demand	(MW)	3.8	4.2	4.7	5.1	5.6	5.9	6.4	6.9	7.4	8.0	8.5	10.2	12.0	13.9	15.4	16.9	18.4	19.8	21.3	22.7	24.25
Annual Growth Rate	(%)	24.5	10.8	9.9	9.6	8.8	7.0	7.9	7.8	7.4	7.2	7.2	19.9	17.4	15.5	11.0	9.9	8.8	7.6	7.3	6.9	6.7
Load Factor	(%)	50.0	51.0	52.0	53.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Energy Demand by Catergory																						
Industrial		1,518,030	1,794,275	2,391,020	2,749,942	3,136,043	3,550,861	4,000,168	4,498,764	5,039,892	5,645,059	6,318,218	7,093,267	7,912,854	8,797,618	9,689,008	10,645,435	11,673,626	12,756,983	13,937,347	15,174,974	16,525,015
Agriculture		1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322	1,760,322
Services		5,280,953	6,031,644	6,828,237	7,724,183	8,644,593	9,550,853	10,569,048	11,691,265	12,842,230	14,086,437	15,465,105	17,778,784	20,198,110	22,846,845	25,337,388	28,004,453	30,756,516	33,578,119	36,611,203	39,555,190	42,616,031
Residential		4,054,173	4,780,299	5,547,966	6,359,094	7,205,875	8,068,575	8,976,781	9,934,891	10,945,218	12,010,174	13,132,277	17,508,638	22,139,048	26,921,875	30,422,779	33,771,153	36,844,316	39,411,428	41,963,520	44,647,432	47,460,270
Total		12,613,478	14,366,540	16,527,545	18,593,541	20,746,833	22,930,611	25,306,319	27,885,242	30,587,662	33,501,992	36,675,922	44,141,012	52,010,335	60,326,660	67,209,497	74,181,363	81,034,780	87,506,852	94,272,392	101,137,919	108,361,638

電力需要予測
Vientiane Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88
Rural with road access		264	264	264	264	264	264	264	264	264	264	264	264	264	264	264	264	264	264	264	264	264
Rural without road access		146	146	146	146	146	146	146	146	146	146	146	146	146	146	146	146	146	146	146	146	146
Total		498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498	498
Population																						
Urban																						
Rural																						
Total	(x 1,000)	316.4	322.4	328.5	334.8	341.1	347.6	353.5	359.5	365.6	371.9	378.2	383.9	389.6	395.5	401.4	407.4	412.7	418.1	423.5	429.0	434.6
Household																						
Urban		9,530	9,712	9,896	10,084	10,276	10,471	10,649	10,830	11,014	11,201	11,392	11,563	11,736	11,912	12,091	12,272	12,432	12,593	12,757	12,923	13,091
Rural with road access		27,623	28,147	28,682	29,227	29,782	30,348	30,864	31,389	31,923	32,465	33,017	33,512	34,015	34,525	35,043	35,569	36,031	36,500	36,974	37,455	37,942
Rural without road access		15,217	15,506	15,801	16,101	16,407	16,718	17,003	17,292	17,586	17,885	18,189	18,461	18,738	19,019	19,305	19,594	19,849	20,107	20,368	20,633	20,902
Rural total		42,839	43,653	44,483	45,328	46,189	47,067	47,867	48,681	49,508	50,350	51,206	51,974	52,754	53,545	54,348	55,163	55,880	56,607	57,343	58,088	58,843
Total		52,370	53,365	54,379	55,412	56,465	57,538	58,516	59,511	60,522	61,551	62,598	63,536	64,490	65,457	66,439	67,435	68,312	69,200	70,100	71,011	71,934
Nos. of Village To be Electrified		256	264	271	277	287	293	303	309	316	324	332	349	362	379	393	412	428	442	459	472	489
Urban		78	81	82	84	86	86	87	87	87	88	88	88	88	88	88	88	88	88	88	88	88
Rural with access		147	152	156	160	166	171	178	184	189	195	201	212	222	232	240	250	258	260	261	262	263
Rural without access		30	30	32	32	34	35	37	37	39	40	42	48	51	58	64	73	81	93	109	121	137
New Village Connection after 1999 (Accumul		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	3	4	6	8	8	9	9	9	10	10	10	10	10	10	10	10	10	10	10	10
Rural with access		0	5	9	13	19	24	31	37	42	48	54	65	75	85	93	103	111	113	114	115	116
Rural without access		0	0	2	2	4	5	7	7	9	10	12	18	21	28	34	43	51	63	79	91	107
Household to be Electrified		27,241	28,110	28,979	29,848	30,717	31,587	32,456	33,325	34,194	35,063	35,932	39,496	43,060	46,624	50,187	53,751	57,315	60,879	64,443	68,007	71,571
Urban		8,877	9,118	9,361	9,608	9,844	10,047	10,235	10,425	10,618	10,814	11,013	11,563	11,736	11,912	12,091	12,272	12,432	12,593	12,757	12,923	13,091
Rural with road access		15,707	16,277	16,847	17,418	18,002	18,624	19,243	19,862	20,482	21,050	21,597	24,298	27,378	30,053	32,202	34,139	35,679	36,457	36,974	37,455	37,942
Rural without road access		2,657	2,716	2,771	2,823	2,871	2,916	2,978	3,037	3,093	3,199	3,322	3,635	3,946	4,658	5,895	7,340	9,204	11,829	14,712	17,629	20,538
New Household Connection After 1999 (Accu		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	240	484	730	967	1,170	1,357	1,548	1,741	1,937	2,136	2,685	2,859	3,035	3,213	3,395	3,554	3,716	3,879	4,045	4,213
Rural with access		0	570	1,140	1,711	2,295	2,917	3,536	4,155	4,775	5,343	5,890	8,591	11,671	14,346	16,495	18,432	19,972	20,750	21,267	21,748	22,235
Rural without access		0	59	115	166	215	259	321	380	436	542	665	979	1,289	2,002	3,238	4,683	6,548	9,172	12,055	14,972	17,881
Average Non-Residential Consumption Per Village																						
District center	(kWh)	663,570	690,113	717,717	746,426	776,283	807,334	839,628	873,213	908,141	944,467	982,246	1,021,536	1,062,397	1,104,893	1,149,089	1,195,052	1,242,854	1,292,568	1,344,271	1,398,042	1,453,964
Urban	(kWh)	45,990	47,830	49,743	51,732	53,802	55,954	58,192	60,520	62,940	65,458	68,076	70,799	73,631	76,577	79,640	82,825	86,138	89,584	93,167	96,894	100,770
Rural with access	(kWh)	39,420	40,997	42,637	44,342	46,116	47,960	49,879	51,874	53,949	56,107	58,351	60,685	63,113	65,637	68,263	70,993	73,833	76,786	79,858	83,052	86,374
Rural without access	(kWh)	23,652	24,598	25,582	26,605	27,669	28,776	29,927	31,124	32,369	33,664	35,011	36,411	37,868	39,382	40,958	42,596	44,300	46,072	47,915	49,831	51,824
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural with road access	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural without road access	(kWh)	100	103	106	109	113	116	119	123	127	130	134	138	143	147	151	156	160	165	170	175	181
Energy Demand Forecast																						
Non-residential	(kWh)	30,242,520	33,250,417	36,608,273	40,357,889	44,546,160	49,225,703	54,133,377	59,584,954	65,642,189	72,373,978	79,857,185	86,670,022	94,105,519	102,221,642	111,081,825	120,755,495	131,318,641	142,854,444	155,453,958	169,216,868	184,252,310
Non-residential(New)	(kWh)	0	439,862	781,117	1,151,068	1,712,095	2,076,239	2,681,918	3,121,139	3,590,404	4,193,598	4,783,251	5,888,938	6,873,063	8,067,880	9,140,710	10,547,016	11,830,563	12,876,126	14,072,948	15,142,591	16,456,769
Irrigation and other Additional	(kWh)	0	0	7,665,000	8,811,720	16,476,720	16,476,720	16,476,720	17,623,440	17,623,440	17,623,440	17,623,440	18,770,160	18,770,160	18,770,160	18,770,160	19,916,880	19,916,880	19,916,880	19,916,880	21,063,600	21,063,600
Sub-total	(kWh)	30,242,520	33,690,279	45,054,390	50,320,677	62,734,975	67,778,662	73,292,015	80,329,533	86,856,033	94,191,016	102,263,876	111,329,119	119,748,742	129,059,682	138,992,695	151,219,390	163,066,085	175,647,450	189,443,786	205,423,058	221,772,679
Residential (Already connected)	(kWh)	25,351,029	26,618,581	27,949,510	29,346,985	30,814,335	32,355,051	33,972,804	35,671,444	37,455,016	39,327,767	41,294,156	43,358,863	45,526,807	47,803,147	50,193,304	52,702,970	55,338,118	58,105,024	61,010,275	64,060,789	67,263,828
Residential (New Connection)	(kWh)	0	757,003	1,562,426	2,418,643	3,328,131	4,293,481	5,296,843	6,359,602	7,484,563	8,618,996	9,796,454	14,183,280	18,828,024	23,265,704	27,318,929	31,334,567	35,028,353	37,910,544	40,581,787	43,331,085	46,220,961
Sub-total	(kWh)	25,351,029	27,375,584	29,511,936	31,765,628	34,142,466	36,648,532	39,269,647	42,031,046	44,939,580	47,946,763	51,090,610	57,542,143	64,354,830	71,068,851	77,512,234	84,037,537	90,366,471	96,015,568	101,592,062	107,391,874	113,484,789
Total Energy Demand	(kWh)	55,593,550	61,065,863	74,566,327	82,086,305	96,877,441	104,427,195	112,561,662	122,360,579	131,795,613	142,137,779	153,354,486	168,871,263	184,103,572	200,128,533	216,504,928	235,256,927	253,432,556	271,663,018	291,035,848	312,814,932	335,257,468
Annual Growth Rate	(%)	20.5	9.8	22.1	10.1	18.0	7.8	7.8	8.7	7.7	7.8	7.9	10.1	9.0	8.7	8.2	8.7	7.7	7.2	7.1	7.5	7.2
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	16,919,776	17,955,383	21,224,839	22,657,262	25,965,400	26,106,799	27,556,589	29,326,089	30,915,020	32,621,785	34,426,517	37,069,302	39,504,005	41,962,434	44,344,383	47,051,385	49,474,881	51,745,337	54,065,948	56,651,523	59,163,083
Total Energy Consumption	(kWh)	72,513,326	79,021,246	95,791,165	104,743,567	122,842,841	130,533,993	140,118,252	151,686,668	162,710,633	174,759,565	187,781,003	205,940,564	223,607,578	242,090,968	260,849,311	282,308,313	302,907,437	323,408,355	345,101,796	369,466,455	394,420,550
Annual Growth Rate	(%)	19.4	9.0	21.2	9.3	17.3	6.3	7.3	8.3	7.3	7.4	7.5	9.7	8.6	8.3	7.7	8.2	7.3	6.8	6.7	7.1	6.8
Peak Power Demand	(MW)	16.82	17.94	21.30	22.81	26.21	27.30	28.73	30.51	32.12	33.86	35.73	39.18	42.54	46.06	49.63	53.71	57.63	61.53	65.66	70.29	75.04
Annual Growth Rate	(%)	12.9	6.6	18.8	7.1	14.9	4.1	5.2	6.2	5.3	5.4	5.5	9.7	8.6	8.3	7.7	8.2	7.3	6.8	6.7	7.1	6.8
Load Factor	(%)	49.2	50.3	51.3	52.4	53.5	54.6	55.7	56.8	57.8	58.9	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Energy Demand by Category																						
Industrial		17,542,545	19,871,119	30,116,270	33,027,056	43,989,975	47,653,747	51,575,453	55,926,755	60,790,590	66,253,221	72,350,335	77,962,635	84,091,954	90,821,405	98,174,392	106,263,005	115,107,068	124,761,032	135,354,038	146,961,728	159,709,045
Agriculture		3,518,756	3,518,756	3,518,756	4,665,476	4,665,476	4,665,476	4,665,476	5,812,196	5,812,196	5,812,196	5,812,196	6,958,916	6,958,916	6,958,916	6,958,916	8,105,636	8,105,636	8,105,636	8,105,636	9,252,356	9,252,356
Services		9,181,220	10,300,404	11,419,365	12,628,145	14,079,525	15,459,439	17,051,087	18,590,582	20,253,248	22,125,600	24,101,345	26,407,568	28,697,872	31,279,361	33,859,387	36,850,750	39,853,381	42,780,782	45,984,113	49,208,975	52,811,279
Residential		25,351,029	27,375,584	29,511,936	31,765,628	34,142,466	36,648,532	39,269,647	42,031,046	44,939,580	47,946,763	51,090,610	57,542,143	64,354,830	71,068,851	77,512,234	84,037,537	90,366,471	96,015,568	101,592,062	107,391,874	113,484,789
Total		55,593,550	61,065,863	74,566,327	82,086,305	96,877,441	104,427,195	112,561,662	122,360,579	131,795,613	142,137,779	153,354,486	168,871,263	184,103,572	200,128,533	216,504,928	235,256,927	253,432,556	271,663,018	291,035,848	312,814,932	335,257,468

電力需要予測
Bolikhamxai Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Rural with road access		224	224	224	224	224	224	224	224	224	224	224	224	224	224	224	224	224	224	224	224	224
Rural without road access		208	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208
Total		462	462	462	462	462	462	462	462	462	462	462	462	462	462	462	462	462	462	462	462	462
Population																						
Urban																						
Rural																						
Total	(x 1,000)	182	185	189	193	196	200	204	208	211	215	219	223	226	230	233	237	241	244	247	251	254
Household		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		2,022	2,062	2,103	2,145	2,188	2,232	2,272	2,313	2,355	2,397	2,440	2,479	2,519	2,559	2,600	2,642	2,679	2,716	2,754	2,793	2,832
Rural with road access		14,291	14,577	14,869	15,166	15,469	15,779	16,063	16,352	16,646	16,946	17,251	17,527	17,807	18,092	18,382	18,676	18,937	19,202	19,471	19,744	20,020
Rural without road access		13,260	13,525	13,796	14,072	14,353	14,640	14,904	15,172	15,445	15,723	16,006	16,262	16,522	16,787	17,055	17,328	17,571	17,817	18,066	18,319	18,575
Rural total		27,551	28,102	28,664	29,238	29,822	30,419	30,966	31,524	32,091	32,669	33,257	33,789	34,330	34,879	35,437	36,004	36,508	37,019	37,537	38,063	38,596
Total		29,573	30,164	30,767	31,383	32,010	32,651	33,238	33,837	34,446	35,066	35,697	36,268	36,848	37,438	38,037	38,646	39,187	39,735	40,291	40,856	41,428
Nos. of Village To be Electrified		100	105	114	122	130	134	142	150	159	164	172	192	214	233	255	276	295	317	337	358	379
Urban		27	28	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Rural with access		70	74	81	87	94	98	104	110	115	117	120	135	149	162	176	189	202	216	222	224	224
Rural without access		3	3	4	5	6	6	8	10	14	17	22	27	35	41	49	57	63	71	85	104	125
New Village Connection after 1999 (Accumul		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	1	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Rural with access		0	4	11	17	24	28	34	40	45	47	50	65	79	92	106	119	132	146	152	154	154
Rural without access		0	0	1	2	3	3	5	7	11	14	19	24	32	38	46	54	60	68	82	101	122
Household to be Electrified		9,313	10,065	10,816	11,567	12,318	13,070	13,821	14,572	15,323	16,075	16,826	18,937	21,049	23,160	25,272	27,383	29,494	31,606	33,717	35,829	37,940
Urban		1,916	2,040	2,103	2,145	2,188	2,232	2,272	2,313	2,355	2,397	2,440	2,479	2,519	2,559	2,600	2,642	2,679	2,716	2,754	2,793	2,832
Rural with road access		6,980	7,554	8,188	8,845	9,502	10,158	10,815	11,471	12,128	12,785	13,326	14,826	15,907	16,857	17,809	18,505	18,918	19,202	19,471	19,744	20,020
Rural without road access		417	471	524	577	629	680	734	788	841	893	1,060	1,632	2,623	3,744	4,862	6,236	7,897	9,687	11,492	13,292	15,088
New Household Connection After 1999 (Accu		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	123	187	229	272	316	356	397	438	481	524	563	603	643	684	726	763	800	838	877	916
Rural with access		0	574	1,208	1,864	2,521	3,178	3,834	4,491	5,147	5,804	6,346	7,846	8,926	9,876	10,829	11,525	11,938	12,222	12,491	12,763	13,040
Rural without access		0	54	108	160	212	263	317	371	424	477	643	1,215	2,206	3,328	4,445	5,820	7,481	9,271	11,075	12,875	14,671
Average Non-Residential Consumption Per Village																						
District center	(kWh)	878,190	913,318	949,850	987,844	1,027,358	1,068,452	1,111,191	1,155,638	1,201,864	1,249,938	1,299,936	1,351,933	1,406,010	1,462,251	1,520,741	1,581,571	1,644,833	1,710,627	1,779,052	1,850,214	1,924,222
Urban	(kWh)	61,320	63,773	66,324	68,977	71,736	74,605	77,589	80,693	83,921	87,277	90,769	94,399	98,175	102,102	106,186	110,434	114,851	119,445	124,223	129,192	134,360
Rural with access	(kWh)	48,618	50,563	52,585	54,689	56,876	59,151	61,517	63,978	66,537	69,199	71,967	74,845	77,839	80,953	84,191	87,558	91,061	94,703	98,491	102,431	106,528
Rural without access	(kWh)	26,718	27,787	28,898	30,054	31,256	32,507	33,807	35,159	36,565	38,028	39,549	41,131	42,776	44,487	46,267	48,118	50,042	52,044	54,126	56,291	58,542
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural with road access	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural without road access	(kWh)	100	103	106	109	113	116	119	123	127	130	134	138	143	147	151	156	160	165	170	175	181
Energy Demand Forecast																						
Non-residential	(kWh)	9,327,463	9,838,702	10,404,574	11,031,156	11,725,229	12,494,357	13,292,250	14,171,731	15,141,487	16,211,160	17,391,456	18,466,506	19,633,294	20,899,899	22,275,133	23,768,608	25,390,806	27,153,162	29,068,153	31,149,395	33,411,746
Non-residential(New)	(kWh)	0	263,466	725,821	1,162,554	1,610,542	1,884,305	2,352,954	2,848,026	3,376,788	3,709,546	4,196,382	5,516,673	6,957,368	8,329,670	9,932,414	11,548,081	13,166,000	15,039,280	16,623,871	18,183,244	19,717,983
Irrigation and other Additional	(kWh)	0	0	0	1,630,800	1,630,800	1,630,800	1,630,800	3,261,600	3,261,600	3,261,600	3,261,600	4,892,400	4,892,400	4,892,400	4,892,400	6,523,200	6,523,200	6,523,200	7,012,440	8,154,000	8,154,000
Sub-total	(kWh)	9,327,463	10,102,168	11,130,395	13,824,510	14,966,572	16,009,462	17,276,004	20,281,357	21,779,875	23,182,305	24,849,438	28,875,580	31,483,062	34,121,969	37,099,948	41,839,889	45,080,006	48,715,642	52,704,464	57,486,639	61,283,729
Residential (Already connected)	(kWh)	7,139,428	7,496,400	7,871,220	8,264,781	8,678,020	9,111,921	9,567,517	10,045,893	10,548,187	11,075,597	11,629,376	12,210,845	12,821,387	13,462,457	14,135,580	14,842,359	15,584,477	16,363,700	17,181,885	18,040,980	18,943,029
Residential (New Connection)	(kWh)	0	651,689	1,343,198	2,076,367	2,853,109	3,675,421	4,540,914	5,455,774	6,422,220	7,442,562	8,395,501	10,644,156	12,542,199	14,391,907	16,345,255	18,083,504	19,542,866	20,903,208	22,307,683	23,783,640	25,334,371
Sub-total	(kWh)	7,139,428	8,148,089	9,214,418	10,341,147	11,531,129	12,787,342	14,108,431	15,501,667	16,970,407	18,518,158	20,024,878	22,855,002	25,363,586	27,854,364	30,480,835	32,925,863	35,127,343	37,266,908	39,489,568	41,824,619	44,277,400
Total Energy Demand	(kWh)	16,466,891	18,250,257	20,344,813	24,165,658	26,497,701	28,796,804	31,384,435	35,783,024	38,750,283	41,700,464	44,874,315	51,730,581	56,846,648	61,976,332	67,580,782	74,765,752	80,207,349	85,982,550	92,194,032	99,311,258	105,561,129
Annual Growth Rate	(%)	19.9	10.8	11.5	18.8	9.7	8.7	9.0	14.0	8.3	7.6	7.6	15.3	9.9	9.0	9.0	10.6	7.3	7.2	7.2	7.7	6.3
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	5,011,663	5,366,179	5,791,024	6,670,146	7,101,998	7,199,201	7,683,326	8,576,097	9,089,572	9,570,598	10,073,826	11,355,493	12,197,864	12,995,037	13,841,847	14,953,150	15,658,008	16,377,629	17,126,955	17,985,503	18,628,435
Total Energy Consumption	(kWh)	21,478,554	23,616,436	26,135,837	30,835,804	33,599,699	35,996,005	39,067,762	44,359,121	47,839,855	51,271,062	54,948,141	63,086,075	69,044,512	74,971,370	81,422,629	89,718,903	95,865,357	102,360,179	109,320,986	117,296,762	124,189,564
Annual Growth Rate	(%)	18.9	10.0	10.7	18.0	9.0	7.1	8.5	13.5	7.8	7.2	7.2	14.8	9.4	8.6	8.6	10.2	6.9	6.8	6.8	7.3	5.9
Peak Power Demand	(MW)	5.6	6.0	6.4	7.3	7.7	7.9	8.3	9.2	9.6	10.0	10.5	12.0	13.1	14.3	15.5	17.1	18.2	19.5	20.8	22.3	23.6
Annual Growth Rate	(%)	16.1	5.8	6.6	14.3	5.2	3.6	5.1	10.2	4.7	4.1	4.2	14.8	9.4	8.6	8.6	10.2	6.9	6.8	6.8	7.3	5.9
Load Factor	(%)	43.4	45.1	46.9	48.3	50.1	51.8	53.4	55.0	56.7	58.4	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Energy Demand by Catergory																						
Industrial		2,107,318	2,428,101	2,813,841	3,229,006	3,681,620	4,152,637	4,674,817	5,252,291	5,888,694	6,563,757	7,331,904	8,145,197	9,022,919	9,955,844	10,981,654	12,083,304	13,272,086	14,578,701	15,942,734	17,408,846	18,996,618
Agriculture		4,332,568	4,332,568	4,332,568	5,963,368	5,963,368	5,963,368	5,963,368	7,594,168	7,594,168	7,594,168	7,594,168	9,224,968	9,224,968	9,224,968	9,224,968	10,855,768	10,855,768	10,855,768	11,345,008	12,486,568	12,486,568
Services		2,887,577	3,341,499	3,983,986	4,632,136	5,321,583	5,893,457	6,637,819	7,434,898	8,297,013	9,024,380	9,923,365	11,505,414	13,235,174	14,941,157	16,893,326	18,900,817	20,952,151	23,281,173	25,416,722	27,591,224	29,800,542
Residential		7,139,428	8,148,089	9,214,418	10,341,147	11,531,129	12,787,342	14,108,431	15,501,667	16,970,407	18,518,158	20,024,878	22,855,002	25,363,586	27,854,364	30,480,835	32,925,863	35,127,343	37,266,908	39,489,568	41,824,619	44,277,400
Total		16,466,891	18,250,257	20,344,813	24,165,658	26,497,701	28,796,804	31,384,435	35,783,024	38,750,283	41,700,464	44,874,315	51,730,581	56,846,648	61,976,332	67,580,782	74,765,752	80,207,349	85,982,550	92,194,032	99,311,258	105,561,129

電力需要予測
Xaisomboun Special Region

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Rural with road access		59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59
Rural without road access		66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
Total		137	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137
Population																						
Urban																						
Rural																						
Total	(x 1,000)	60	61	62	64	65	66	67	69	70	71	72	74	75	76	77	78	79	81	82	83	84
Household		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		789	805	821	837	854	871	887	903	919	935	952	967	983	999	1,015	1,031	1,045	1,060	1,075	1,090	1,105
Rural with road access		4,002	4,082	4,164	4,247	4,332	4,419	4,499	4,579	4,662	4,746	4,831	4,909	4,987	5,067	5,148	5,230	5,304	5,378	5,453	5,529	5,607
Rural without road access		4,415	4,504	4,594	4,686	4,779	4,875	4,963	5,052	5,143	5,236	5,330	5,415	5,502	5,590	5,679	5,770	5,851	5,933	6,016	6,100	6,185
Rural total		8,418	8,586	8,758	8,933	9,112	9,294	9,461	9,632	9,805	9,981	10,161	10,324	10,489	10,657	10,827	11,000	11,154	11,311	11,469	11,629	11,792
Total		9,207	9,391	9,579	9,770	9,966	10,165	10,348	10,534	10,724	10,917	11,113	11,291	11,472	11,655	11,842	12,031	12,200	12,370	12,544	12,719	12,897
Nos. of Village To be Electrified		12	19	26	33	40	47	54	61	68	75	81	82	83	84	84	84	85	86	86	88	88
Urban		9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Rural with access		3	7	14	21	28	35	41	44	46	50	52	53	55	57	57	57	58	58	59	59	59
Rural without access		0	0	0	0	0	0	1	5	10	13	17	17	16	15	15	15	15	16	15	17	17
New Village Connection after 1999 (Accumu		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Rural with access		0	4	11	18	25	32	38	41	43	47	49	50	52	54	54	54	55	55	56	56	56
Rural without access		0	0	0	0	0	0	1	5	10	13	17	17	16	15	15	15	15	16	15	17	17
Household to be Electrified		784	1,261	1,737	2,213	2,690	3,166	3,643	4,119	4,595	5,072	5,548	5,965	6,382	6,799	7,216	7,633	8,050	8,467	8,884	9,301	9,718
Urban		626	739	821	837	854	871	887	903	919	935	952	967	983	999	1,015	1,031	1,045	1,060	1,075	1,090	1,105
Rural with road access		158	522	916	1,376	1,836	2,295	2,665	3,012	3,279	3,522	3,717	4,059	4,402	4,746	5,089	5,230	5,304	5,378	5,453	5,529	5,607
Rural without road access		0	0	0	0	0	0	91	204	397	614	879	938	997	1,055	1,112	1,372	1,701	2,030	2,356	2,682	3,006
New Household Connection After 1999 (Acc		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	113	195	211	228	245	261	277	293	309	326	342	357	373	389	405	419	434	449	464	479
Rural with access		0	364	758	1,218	1,677	2,137	2,506	2,854	3,121	3,363	3,559	3,901	4,244	4,587	4,931	5,072	5,145	5,219	5,295	5,371	5,448
Rural without access		0	0	0	0	0	0	91	204	397	614	879	938	997	1,055	1,112	1,372	1,701	2,030	2,356	2,682	3,006
Average Non-Residential Consumption Per Village																						
District center	(kWh)	878,190	913,318	949,850	987,844	1,027,358	1,068,452	1,111,191	1,155,638	1,201,864	1,249,938	1,299,936	1,351,933	1,406,010	1,462,251	1,520,741	1,581,571	1,644,833	1,710,627	1,779,052	1,850,214	1,924,222
Urban	(kWh)	61,320	63,773	66,324	68,977	71,736	74,605	77,589	80,693	83,921	87,277	90,769	94,399	98,175	102,102	106,186	110,434	114,851	119,445	124,223	129,192	134,360
Rural with access	(kWh)	48,618	50,563	52,585	54,689	56,876	59,151	61,517	63,978	66,537	69,199	71,967	74,845	77,839	80,953	84,191	87,558	91,061	94,703	98,491	102,431	106,528
Rural without access	(kWh)	26,718	27,787	28,898	30,054	31,256	32,507	33,807	35,159	36,565	38,028	39,549	41,131	42,776	44,487	46,267	48,118	50,042	52,044	54,126	56,291	58,542
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural with road access	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural without road access	(kWh)	100	103	106	109	113	116	119	123	127	130	134	138	143	147	151	156	160	165	170	175	181
Energy Demand Forecast																						
Non-residential	(kWh)	4,915,674	5,247,482	5,612,615	6,014,566	6,457,214	6,944,859	7,446,771	7,996,860	8,599,969	9,261,445	9,987,202	10,648,475	11,363,088	12,135,507	12,970,586	13,873,597	14,850,274	15,906,851	17,050,107	18,287,415	19,626,794
Non-residential(New)	(kWh)	0	389,785	762,530	1,157,290	1,575,048	2,016,831	2,457,553	2,842,101	3,219,767	3,674,685	4,059,230	4,248,305	4,476,296	4,714,143	4,855,567	5,001,234	5,229,289	5,430,328	5,630,522	5,893,138	6,079,583
Irrigation and other additional	(kWh)	0	0	0	0	0	35,520	35,520	35,520	71,040	71,040	71,040	106,560	106,560	106,560	142,080	142,080	142,080	177,600	177,600	177,600	177,600
Sub-total	(kWh)	4,915,674	5,637,267	6,375,145	7,171,856	8,032,262	8,997,210	9,939,844	10,874,481	11,890,776	13,007,170	14,117,471	15,003,340	15,945,944	16,956,210	17,968,233	19,016,911	20,221,643	21,514,780	22,858,229	24,358,152	25,883,977
Residential (Already connected)	(kWh)	705,927	741,224	778,285	817,199	858,059	900,962	946,010	993,311	1,042,976	1,095,125	1,149,881	1,207,375	1,267,744	1,331,131	1,397,688	1,467,572	1,540,951	1,617,998	1,698,898	1,783,843	1,873,035
Residential (New Connection)	(kWh)	0	441,589	909,674	1,405,446	1,930,145	2,485,062	2,984,248	3,489,992	3,942,383	4,393,242	4,817,032	5,415,188	6,045,784	6,710,270	7,410,155	7,893,211	8,309,460	8,745,204	9,201,308	9,678,678	10,178,257
Sub-total	(kWh)	705,927	1,182,813	1,687,958	2,222,645	2,788,204	3,386,024	3,930,258	4,483,303	4,985,359	5,488,367	5,966,913	6,622,563	7,313,528	8,041,401	8,807,842	9,360,783	9,850,411	10,363,202	10,900,206	11,462,521	12,051,292
Total Energy Demand	(kWh)	5,621,601	6,820,080	8,063,103	9,394,501	10,820,466	12,383,234	13,870,102	15,357,784	16,876,135	18,495,537	20,084,385	21,625,903	23,259,472	24,997,612	26,776,075	28,377,694	30,072,054	31,877,982	33,758,435	35,820,673	37,935,269
Annual Growth Rate	(%)	77.7	21.3	18.2	16.5	15.2	14.4	12.0	10.7	9.9	9.6	8.6	7.7	7.6	7.5	7.1	6.0	6.0	6.0	5.9	6.1	5.9
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	1,710,922	2,005,329	2,295,112	2,593,047	2,900,136	3,095,808	3,395,585	3,680,791	3,958,599	4,244,877	4,508,739	4,747,149	4,990,899	5,241,435	5,484,256	5,675,539	5,870,640	6,071,997	6,271,330	6,487,208	6,694,459
Total Energy Consumption	(kWh)	7,332,523	8,825,409	10,358,215	11,987,548	13,720,602	15,479,042	17,265,687	19,038,575	20,834,734	22,740,415	24,593,124	26,373,053	28,250,371	30,239,047	32,260,332	34,053,232	35,942,694	37,949,978	40,029,765	42,307,881	44,629,728
Annual Growth Rate	(%)	76.2	20.4	17.4	15.7	14.5	12.8	11.5	10.3	9.4	9.1	8.1	7.2	7.1	7.0	6.7	5.6	5.5	5.6	5.5	5.7	5.5
Peak Power Demand	(MW)	1.7	2.0	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.4	4.7	5.0	5.4	5.8	6.1	6.5	6.8	7.2	7.6	8.0	8.5
Annual Growth Rate	(%)	76.2	18.0	15.1	13.5	12.3	10.8	9.6	8.3	7.5	7.3	6.3	7.2	7.1	7.0	6.7	5.6	5.5	5.6	5.5	5.7	5.5
Load Factor	(%)	50.0	51.0	52.0	53.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Energy Demand by Catergory																						
Industrial		983,135	1,191,184	1,396,916	1,620,668	1,864,737	2,131,713	2,404,983	2,685,749	2,989,307	3,337,424	3,706,483	4,023,498	4,376,626	4,762,691	5,169,607	5,616,196	6,115,529	6,656,549	7,253,016	7,907,144	8,618,865
Agriculture		1,474,702	1,474,702	1,474,702	1,474,702	1,474,702	1,510,222	1,510,222	1,510,222	1,545,742	1,545,742	1,545,742	1,581,262	1,581,262	1,581,262	1,616,782	1,616,782	1,616,782	1,652,302	1,652,302	1,652,302	1,652,302
Services		2,457,837	2,971,380	3,503,526	4,076,486	4,692,823	5,355,274	6,024,638	6,678,510	7,355,727	8,124,004	8,865,247	9,398,580	9,988,056	10,612,257	11,181,844	11,783,932	12,489,332	13,205,929	13,952,911	14,798,706	15,612,810
Residential		705,927	1,182,813	1,687,958	2,222,645	2,788,204	3,386,024	3,930,258	4,483,303	4,985,359	5,488,367	5,966,913	6,622,563	7,313,528	8,041,401	8,807,842	9,360,783	9,850,411	10,363,202	10,900,206	11,462,521	12,051,292
Total		5,621,601	6,820,080	8,063,103	9,394,501	10,820,466	12,383,234	13,870,102	15,357,784	16,876,135	18,495,537	20,084,385	21,625,903	23,259,472	24,997,612	26,776,075	28,377,694	30,072,054	31,877,982	33,758,435	35,820,673	37,935,269

電力需要予測
Khammouan Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118
Rural with road access		370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370
Rural without road access		386	386	386	386	386	386	386	386	386	386	386	386	386	386	386	386	386	386	386	386	386
Total		874	874	874	874	874	874	874	874	874	874	874	874	874	874	874	874	874	874	874	874	874
Population																						
Urban																						
Rural																						
Total	(x 1,000)	328.6	336.5	344.6	352.9	361.3	370.0	378.2	386.5	395.0	403.7	412.5	420.8	429.2	437.8	446.6	455.5	463.7	472.0	480.5	489.2	498.0
Household		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		7,583	7,765	7,951	8,142	8,337	8,537	8,725	8,917	9,113	9,314	9,519	9,709	9,903	10,101	10,303	10,509	10,699	10,891	11,087	11,287	11,490
Rural with road access		23,769	24,339	24,924	25,522	26,134	26,761	27,350	27,952	28,567	29,195	29,838	30,434	31,043	31,664	32,297	32,943	33,536	34,140	34,754	35,380	36,017
Rural without road access		24,805	25,400	26,010	26,634	27,273	27,928	28,542	29,170	29,812	30,468	31,138	31,761	32,396	33,044	33,705	34,379	34,997	35,627	36,269	36,922	37,586
Rural total		48,574	49,739	50,933	52,156	53,407	54,689	55,892	57,122	58,378	59,663	60,975	62,195	63,439	64,708	66,002	67,322	68,534	69,767	71,023	72,301	73,603
Total		56,156	57,504	58,884	60,297	61,745	63,226	64,617	66,039	67,492	68,977	70,494	71,904	73,342	74,809	76,305	77,831	79,232	80,658	82,110	83,588	85,093
Nos. of Village To be Electrified		279	290	300	312	326	335	349	361	371	382	394	425	458	489	519	552	583	614	645	677	708
Urban		84	90	96	102	107	110	113	115	116	118	118	118	118	118	118	118	118	118	118	118	118
Rural with access		135	137	140	144	151	155	164	172	180	186	197	227	259	281	292	305	318	330	338	346	354
Rural without access		60	63	64	66	68	70	72	74	75	78	79	80	81	90	109	129	147	166	189	213	237
New Village Connection after 1999 (Accumu		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	6	12	18	23	26	29	31	32	34	34	34	34	34	34	34	34	34	34	34	34
Rural with access		0	2	5	9	16	20	29	37	45	51	62	92	124	146	157	170	183	195	203	211	219
Rural without access		0	3	4	6	8	10	12	14	15	18	19	20	21	30	49	69	87	106	129	153	177
Household to be Electrified		24,135	25,277	26,418	27,560	28,701	29,843	30,984	32,126	33,267	34,409	35,550	39,727	43,904	48,080	52,257	56,434	60,611	64,787	68,964	73,141	77,318
Urban		6,523	7,008	7,495	7,913	8,193	8,470	8,725	8,917	9,113	9,314	9,519	9,709	9,903	10,101	10,303	10,509	10,699	10,891	11,087	11,287	11,490
Rural with road access		11,947	12,528	13,113	13,775	14,582	15,400	16,220	17,109	18,001	18,896	19,793	22,954	25,546	28,031	29,707	31,184	32,503	33,533	34,563	35,380	36,017
Rural without road access		5,665	5,741	5,810	5,871	5,926	5,973	6,039	6,099	6,152	6,199	6,238	7,064	8,454	9,948	12,247	14,740	17,409	20,363	23,314	26,474	29,811
New Household Connection After 1999 (Accu		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	484	972	1,390	1,670	1,947	2,202	2,394	2,590	2,790	2,995	3,186	3,380	3,578	3,780	3,986	4,175	4,368	4,564	4,763	4,966
Rural with access		0	582	1,167	1,829	2,635	3,453	4,273	5,163	6,055	6,949	7,846	11,007	13,599	16,085	17,760	19,237	20,556	21,586	22,616	23,433	24,070
Rural without access		0	76	144	206	261	308	374	434	487	534	573	1,398	2,789	4,282	6,581	9,075	11,744	14,698	17,649	20,809	24,146
Average Non-Residential Consumption Per Village																						
District center	(kWh)	663,570	690,113	717,717	746,426	776,283	807,334	839,628	873,213	908,141	944,467	982,246	1,021,536	1,062,397	1,104,893	1,149,089	1,195,052	1,242,854	1,292,568	1,344,271	1,398,042	1,453,964
Urban	(kWh)	45,990	47,830	49,743	51,732	53,802	55,954	58,192	60,520	62,940	65,458	68,076	70,799	73,631	76,577	79,640	82,825	86,138	89,584	93,167	96,894	100,770
Rural with access	(kWh)	39,420	40,997	42,637	44,342	46,116	47,960	49,879	51,874	53,949	56,107	58,351	60,685	63,113	65,637	68,263	70,993	73,833	76,786	79,858	83,052	86,374
Rural without access	(kWh)	23,652	24,598	25,582	26,605	27,669	28,776	29,927	31,124	32,369	33,664	35,011	36,411	37,868	39,382	40,958	42,596	44,300	46,072	47,915	49,831	51,824
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural with road access	(kWh)	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626
Rural without road access	(kWh)	100	103	106	109	113	116	119	123	127	130	134	138	143	147	151	156	160	165	170	175	181
Energy Demand Forecast																						
Non-residential	(kWh)	38,327,672	42,033,033	46,182,225	50,829,434	56,035,552	61,869,017	68,009,776	74,849,045	82,467,650	90,955,885	100,414,625	109,024,736	118,438,874	128,733,090	139,990,697	152,302,967	165,769,894	180,501,036	196,616,430	214,247,608	233,538,699
Non-residential(New)	(kWh)	0	561,669	1,151,927	1,859,417	2,703,463	3,285,220	4,189,712	5,010,307	5,764,843	6,583,001	7,535,121	9,817,119	12,367,891	14,662,792	16,679,460	18,997,048	21,352,930	23,796,870	26,219,097	28,812,089	31,469,032
Additional loads	(kWh)	0	0	0	2,510,880	2,510,880	20,906,880	27,805,380	34,915,260	62,398,760	66,231,260	77,728,760	80,239,640	84,072,140	97,869,140	113,199,140	131,040,020	131,040,020	134,872,520	134,872,520	137,383,400	137,383,400
Sub-total	(kWh)	38,327,672	42,594,703	47,334,153	55,199,731	61,249,895	86,061,117	100,004,869	114,774,612	150,631,253	163,770,145	185,678,506	199,081,496	214,878,905	241,265,022	269,869,297	302,340,035	318,162,844	339,170,426	357,708,047	380,443,098	402,391,131
Residential (Already connected)	(kWh)	18,933,045	19,879,697	20,873,682	21,917,366	23,013,235	24,163,896	25,372,091	26,640,696	27,972,731	29,371,367	30,839,935	32,381,932	34,001,029	35,701,080	37,486,134	39,360,441	41,328,463	43,394,886	45,564,631	47,842,862	50,235,005
Residential (New Connection)	(kWh)	0	995,771	2,057,153	3,187,509	4,390,359	5,669,394	7,002,670	8,417,273	9,917,221	11,506,719	13,190,166	17,875,420	22,185,172	26,616,287	30,318,952	33,976,859	37,602,515	41,037,393	44,649,348	48,147,298	51,559,792
Sub-total	(kWh)	18,933,045	20,875,468	22,930,835	25,104,875	27,403,594	29,833,290	32,374,761	35,057,968	37,889,952	40,878,086	44,030,101	50,257,352	56,186,201	62,317,368	67,805,086	73,337,300	78,930,978	84,432,280	90,213,979	95,990,160	101,794,797
Total Energy Demand	(kWh)	57,260,717	63,470,171	70,264,988	80,304,606	88,653,489	115,894,407	132,379,630	149,832,581	188,521,205	204,648,232	229,708,607	249,338,848	271,065,106	303,582,390	337,674,384	375,677,335	397,093,822	423,602,705	447,922,026	476,433,258	504,185,928
Annual Growth Rate	(%)	14.5	10.8	10.7	14.3	10.4	30.7	14.2	13.2	25.8	8.6	12.2	8.5	8.7	12.0	11.2	11.3	5.7	6.7	5.7	6.4	5.8
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	17,427,175	18,662,329	20,000,490	22,165,482	23,761,190	28,973,602	32,408,291	35,910,288	44,221,023	46,968,447	51,567,238	54,732,918	58,163,768	63,654,372	69,162,223	75,135,467	77,520,308	80,686,230	83,210,811	86,283,188	88,973,987
Total Energy Consumption	(kWh)	74,687,892	82,132,500	90,265,478	102,470,088	112,414,679	144,868,009	164,787,921	185,742,869	232,742,228	251,616,679	281,275,846	304,071,765	329,228,874	367,236,762	406,836,607	450,812,802	474,614,130	504,288,935	531,132,837	562,716,446	593,159,915
Annual Growth Rate	(%)	13.5	10.0	9.9	13.5	9.7	28.9	13.8	12.7	25.3	8.1	11.8	8.1	8.3	11.5	10.8	10.8	5.3	6.3	5.3	5.9	5.4
Peak Power Demand	(MW)	14.35	15.78	17.33	19.66	21.55	27.78	31.54	35.55	44.43	47.95	53.52	57.85	62.64	69.87	77.40	85.77	90.30	95.95	101.05	107.06	112.85
Annual Growth Rate	(%)	18.2	10.0	9.9	13.4	9.6	28.9	13.5	12.7	25.0	7.9	11.6	8.1	8.3	11.5	10.8	10.8	5.3	6.3	5.3	5.9	5.4
Load Factor	(%)	59.4	59.4	59.5	59.5	59.6	59.5	59.6	59.6	59.8	59.9	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Energy Demand by Catergory																						
Industrial		23,904,518	27,071,844	30,630,768	34,640,136	39,155,811	62,566,280	74,826,577	85,390,103	114,267,223	125,538,238	145,364,662	153,128,171	165,472,309	188,514,625	213,898,706	240,268,950	252,361,712	269,442,816	283,942,253	299,844,356	317,276,335
Agriculture		6,595,354	6,595,354	6,595,354	9,106,234	9,106,234	9,106,234	9,106,234	11,617,114	16,872,114	16,872,114	16,872,114	19,382,994	19,382,994	19,382,994	19,382,994	21,893,874	21,893,874	21,893,874	21,893,874	24,404,754	24,404,754
Services		7,827,800	8,927,505	10,108,031	11,453,361	12,987,850	14,388,603	16,072,057	17,767,396	19,491,916	21,359,794	23,441,730	26,570,331	30,023,602	33,367,403	36,587,598	40,177,211	43,907,259	47,833,736	51,871,920	56,193,988	60,710,042
Residential		18,933,045	20,875,468	22,930,835	25,104,875	27,403,594	29,833,290	32,374,761	35,057,968	37,889,952	40,878,086	44,030,101	50,257,352	56,186,201	62,317,368	67,805,086	73,337,300	78,930,978	84,432,280	90,213,979	95,990,160	101,794,797
Total		57,260,717	63,470,171	70,264,988	80,304,606	88,653,489	115,894,407	132,379,630	149,832,581	188,521,205	204,648,232	229,708,607	249,338,848	271,065,106	303,582,390	337,674,384	375,677,335	397,093,822	423,602,705	447,922,026	476,433,258	504,185,928

電力需要予測
Savannakhet Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		233	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233
Rural with road access		792	792	792	792	792	792	792	792	792	792	792	792	792	792	792	792	792	792	792	792	792
Rural without road access		551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551
Total		1,576	1,576	1,576	1,576	1,576	1,576	1,576	1,576	1,576	1,576	1,576	1,576	1,576	1,576	1,576	1,576	1,576	1,576	1,576	1,576	1,576
Population																						
Urban																						
Rural																						
Total	(x 1,000)	771	792	813	835	858	881	903	926	949	973	997	1,020	1,043	1,067	1,092	1,117	1,140	1,164	1,189	1,214	1,239
Household		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		18,872	19,381	19,905	20,442	20,994	21,561	22,100	22,652	23,219	23,799	24,394	24,955	25,529	26,116	26,717	27,332	27,906	28,492	29,090	29,701	30,324
Rural with road access		61,185	62,837	64,534	66,276	68,066	69,904	71,651	73,442	75,278	77,160	79,089	80,908	82,769	84,673	86,621	88,613	90,474	92,374	94,313	96,294	98,316
Rural without road access		42,609	43,759	44,941	46,154	47,400	48,680	49,897	51,145	52,423	53,734	55,077	56,344	57,640	58,965	60,322	61,709	63,005	64,328	65,679	67,058	68,466
Rural total		103,794	106,596	109,475	112,430	115,466	118,584	121,548	124,587	127,702	130,894	134,166	137,252	140,409	143,639	146,942	150,322	153,479	156,702	159,992	163,352	166,783
Total		122,666	125,978	129,379	132,873	136,460	140,145	143,648	147,239	150,920	154,693	158,561	162,208	165,938	169,755	173,659	177,653	181,384	185,193	189,082	193,053	197,107
Nos. of Village To be Electrifiec		367	402	439	478	514	550	586	625	662	697	735	810	885	957	1,030	1,108	1,180	1,254	1,326	1,401	1,475
Urban		177	199	218	229	232	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233
Rural with access		179	190	205	230	260	293	326	362	396	429	464	538	605	665	725	750	765	775	785	792	792
Rural without access		11	13	16	19	22	24	27	30	33	35	38	39	47	59	72	125	182	246	308	376	450
New Village Connection after 1999 (Accum		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	22	41	52	55	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56
Rural with access		0	11	26	51	81	114	147	183	217	250	285	359	426	486	546	571	586	596	606	613	613
Rural without access		0	2	5	8	11	13	16	19	22	24	27	28	36	48	61	114	171	235	297	365	439
Household to be Electrifiec		43,855	48,198	52,542	56,886	61,229	65,573	69,916	74,260	78,604	82,947	87,291	97,797	108,304	118,810	129,317	139,823	150,330	160,836	171,343	181,849	192,356
Urban		17,810	19,050	19,775	20,442	20,994	21,561	22,100	22,652	23,219	23,799	24,394	24,955	25,529	26,116	26,717	27,332	27,906	28,492	29,090	29,701	30,324
Rural with road access		24,474	27,456	30,963	34,540	38,243	41,944	45,345	48,659	51,972	55,285	58,478	67,091	74,759	80,909	84,497	87,307	90,002	92,374	94,313	96,294	98,316
Rural without road access		1,570	1,693	1,804	1,904	1,992	2,068	2,472	2,949	3,413	3,863	4,418	5,751	8,016	11,786	18,103	25,185	32,422	39,971	47,939	55,854	63,715
New Household Connection After 1999 (Ac		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	1,239	1,964	2,632	3,184	3,751	4,290	4,842	5,408	5,989	6,584	7,145	7,719	8,306	8,907	9,521	10,095	10,681	11,280	11,890	12,514
Rural with access		0	2,982	6,489	10,066	13,769	17,470	20,871	24,185	27,498	30,811	34,004	42,617	50,285	56,435	60,023	62,833	65,528	67,900	69,840	71,820	73,842
Rural without access		0	122	233	333	421	498	901	1,378	1,842	2,293	2,848	4,181	6,446	10,215	16,533	23,615	30,852	38,401	46,369	54,284	62,145
Energy Demand Forecast																						
Non-residential	(kWh)	27,619,048	30,238,179	33,149,991	36,388,336	39,991,089	44,000,641	48,183,973	52,813,941	57,939,822	63,616,470	69,904,961	75,631,322	81,864,854	88,651,631	96,041,997	104,090,963	112,858,656	122,410,791	132,819,205	144,162,431	156,526,333
Non-residential(New)	(kWh)	0	1,995,392	4,150,005	6,427,313	8,558,995	10,808,731	13,144,431	15,789,927	18,459,148	21,176,015	24,205,864	29,949,126	35,796,630	41,625,195	47,811,669	53,345,817	58,560,305	63,946,986	69,513,192	75,381,163	81,199,042
Additional loads	(kWh)	0	0	0	17,371,728	17,371,728	24,014,160	39,344,160	50,583,888	51,094,320	51,094,320	81,754,320	84,306,480	84,306,480	84,306,480	100,146,912	117,518,640	117,518,640	118,029,072	118,029,072	135,400,800	150,730,800
Sub-total	(kWh)	27,619,048	32,233,571	37,299,996	60,187,377	65,921,812	78,823,532	100,672,564	119,187,756	127,493,290	135,886,805	175,865,145	189,886,928	201,967,964	214,583,306	244,000,578	274,955,420	288,937,601	304,386,849	320,361,469	354,944,394	388,456,175
Residential (Already connected	(kWh)	31,464,096	33,037,301	34,689,166	36,423,624	38,244,805	40,157,046	42,164,898	44,273,143	46,486,800	48,811,140	51,251,697	53,814,282	56,504,996	59,330,246	62,296,758	65,411,596	68,682,176	72,116,284	75,722,099	79,508,204	83,483,614
Residential (New Connection)	(kWh)	0	3,925,863	8,096,636	12,524,020	17,220,230	22,198,018	27,146,300	32,299,338	37,750,208	43,512,871	49,475,320	62,572,619	75,348,480	87,066,598	96,336,722	105,131,863	114,168,681	123,241,129	132,183,868	141,627,026	151,596,440
Sub-total	(kWh)	31,464,096	36,963,164	42,785,801	48,947,644	55,465,036	62,355,064	69,311,198	76,572,481	84,237,008	92,324,011	100,727,017	116,386,901	131,853,476	146,396,843	158,633,480	170,543,459	182,850,857	195,357,414	207,905,967	221,135,230	235,080,054
Total Energy Demand	(kWh)	59,083,144	69,196,735	80,085,798	109,135,021	121,386,848	141,178,596	169,983,762	195,760,237	211,730,297	228,210,816	276,592,162	306,273,829	333,821,440	360,980,149	402,634,058	445,498,879	471,788,458	499,744,262	528,267,436	576,079,624	623,536,229
Annual Growth Rate	(%)	21.2	17.1	15.7	36.3	11.2	16.3	20.4	15.2	8.2	7.8	21.2	10.7	9.0	8.1	11.5	10.6	5.9	5.9	5.7	9.1	8.2
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	17,981,826	20,346,128	22,795,922	30,123,183	32,534,489	35,294,649	41,614,282	46,917,743	49,665,131	52,376,253	62,092,118	67,230,841	71,629,702	75,689,386	82,467,217	89,099,776	92,102,129	95,189,383	98,136,638	104,329,381	110,035,805
Total Energy Consumption	(kWh)	77,064,970	89,542,863	102,881,720	139,258,203	153,921,337	176,473,245	211,598,044	242,677,979	261,395,429	280,587,069	338,684,280	373,504,670	405,451,142	436,669,536	485,101,275	534,598,655	563,890,587	594,933,646	626,404,074	680,409,005	733,572,034
Annual Growth Rate	(%)	20.1	16.2	14.9	35.4	10.5	14.7	19.9	14.7	7.7	7.3	20.7	10.3	8.6	7.7	11.1	10.2	5.5	5.5	5.3	8.6	7.8
Peak Power Demand	(MW)	15.7	18.1	20.7	27.8	30.5	34.7	41.4	47.1	50.4	53.7	64.4	71.1	77.1	83.1	92.3	101.7	107.3	113.2	119.2	129.5	139.6
Annual Growth Rate	(%)	25.6	15.4	14.1	34.4	9.8	13.9	19.1	13.9	7.0	6.6	19.9	10.3	8.6	7.7	11.1	10.2	5.5	5.5	5.3	8.6	7.8
Load Factor	(%)	56.0	56.4	56.8	57.2	57.6	58.0	58.4	58.8	59.2	59.6	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Energy Demand by Catergory																						
Industrial		13,103,323	15,217,997	17,539,681	35,401,136	38,126,981	47,284,045	65,792,082	78,539,536	82,455,664	86,790,776	122,290,425	127,076,922	132,220,723	137,751,528	159,097,239	180,773,732	187,620,965	195,080,819	203,233,495	227,474,348	252,510,446
Agriculture		3,224,567	3,224,567	3,224,567	5,266,295	5,266,295	5,776,727	5,776,727	7,818,455	8,328,887	8,328,887	8,328,887	10,881,047	10,881,047	10,881,047	11,391,479	13,433,207	13,433,207	13,943,639	13,943,639	15,985,367	15,985,367
Services		11,291,158	13,791,007	16,535,748	19,519,946	22,528,536	25,762,760	29,103,755	32,829,765	36,708,739	40,767,143	45,245,833	51,928,959	58,866,194	65,950,731	73,511,860	80,748,481	87,883,429	95,362,391	103,184,334	111,484,679	119,960,361
Residential		31,464,096	36,963,164	42,785,801	48,947,644	55,465,036	62,355,064	69,311,198	76,572,481	84,237,008	92,324,011	100,727,017	116,386,901	131,853,476	146,396,843	158,633,480	170,543,459	182,850,857	195,357,414	207,905,967	221,135,230	235,080,054
Total		59,083,144	69,196,735	80,085,798	109,135,021	121,386,848	141,178,596	169,983,762	195,760,237	211,730,297	228,210,816	276,592,162	306,273,829	333,821,440	360,980,149	402,634,058	445,498,879	471,788,458	499,744,262	528,267,436	576,079,624	623,536,229

電力需要予測
Saravane Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
Rural with road access		282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282
Rural without road access		403	403	403	403	403	403	403	403	403	403	403	403	403	403	403	403	403	403	403	403	403
Total		731	731	731	731	731	731	731	731	731	731	731	731	731	731	731	731	731	731	731	731	731
Population																						
Urban																						
Rural																						
Total	(x 1,000)	291	299	306	314	322	330	337	345	353	361	369	377	385	393	401	410	418	425	434	442	450
Household		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		3,332	3,416	3,501	3,589	3,678	3,770	3,857	3,946	4,036	4,129	4,224	4,313	4,404	4,496	4,590	4,687	4,776	4,867	4,959	5,053	5,149
Rural with road access		18,492	18,955	19,429	19,914	20,412	20,922	21,404	21,896	22,400	22,915	23,442	23,934	24,437	24,950	25,474	26,009	26,503	27,006	27,520	28,042	28,575
Rural without road access		26,356	27,015	27,691	28,383	29,093	29,820	30,506	31,207	31,925	32,659	33,411	34,112	34,829	35,560	36,307	37,069	37,773	38,491	39,223	39,968	40,727
Rural total		44,849	45,970	47,119	48,297	49,505	50,742	51,909	53,103	54,325	55,574	56,852	58,046	59,265	60,510	61,780	63,078	64,276	65,498	66,742	68,010	69,302
Total		48,181	49,386	50,620	51,886	53,183	54,513	55,766	57,049	58,361	59,703	61,077	62,359	63,669	65,006	66,371	67,765	69,052	70,364	71,701	73,063	74,452
Nos. of Village To be Electrified		156	182	205	229	253	279	303	327	350	376	400	429	457	488	517	549	575	604	635	663	692
Urban		43	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
Rural with access		113	136	157	179	201	225	243	254	259	263	267	272	276	281	283	283	283	283	283	283	283
Rural without access		0	0	2	4	6	8	14	27	45	67	87	111	135	161	188	220	246	275	306	334	363
New Village Connection after 1999 (Accum		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Rural with access		0	23	44	66	88	112	130	141	146	150	154	159	163	168	170	170	170	170	170	170	170
Rural without access		0	0	2	4	6	8	14	27	45	67	87	111	135	161	188	220	246	275	306	334	363
Household to be Electrified		12,048	14,531	17,013	19,496	21,978	24,461	26,943	29,426	31,908	34,391	36,873	40,455	44,036	47,618	51,199	54,781	58,362	61,944	65,525	69,107	72,688
Urban		3,284	3,416	3,501	3,589	3,678	3,770	3,857	3,946	4,036	4,129	4,224	4,313	4,404	4,496	4,590	4,687	4,776	4,867	4,959	5,053	5,149
Rural with road access		8,764	11,115	13,512	15,832	17,602	19,039	20,208	21,133	21,978	22,620	23,262	23,934	24,437	24,950	25,474	26,009	26,503	27,006	27,520	28,042	28,575
Rural without road access		0	0	0	75	698	1,652	2,878	4,347	5,893	7,641	9,387	12,208	15,196	18,172	21,135	24,085	27,084	30,071	33,047	36,011	38,964
New Household Connection After 1999 (Acc		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	132	217	304	394	486	573	662	752	845	940	1,029	1,119	1,212	1,306	1,403	1,492	1,582	1,675	1,769	1,865
Rural with access		0	2,351	4,748	7,068	8,838	10,274	11,444	12,369	13,214	13,856	14,497	15,170	15,672	16,185	16,709	17,244	17,739	18,242	18,755	19,278	19,811
Rural without access		0	0	0	75	698	1,652	2,878	4,347	5,893	7,641	9,387	12,208	15,196	18,172	21,135	24,085	27,084	30,071	33,047	36,011	38,964
Average Non-Residential Consumption Per Village																						
District center	(kWh)	878,190	913,318	949,850	987,844	1,027,358	1,068,452	1,111,191	1,155,638	1,201,864	1,249,938	1,299,936	1,351,933	1,406,010	1,462,251	1,520,741	1,581,571	1,644,833	1,710,627	1,779,052	1,850,214	1,924,222
Urban	(kWh)	61,320	63,773	66,324	68,977	71,736	74,605	77,589	80,693	83,921	87,277	90,769	94,399	98,175	102,102	106,186	110,434	114,851	119,445	124,223	129,192	134,360
Rural with access	(kWh)	48,618	50,563	52,585	54,689	56,876	59,151	61,517	63,978	66,537	69,199	71,967	74,845	77,839	80,953	84,191	87,558	91,061	94,703	98,491	102,431	106,528
Rural without access	(kWh)	26,718	27,787	28,898	30,054	31,256	32,507	33,807	35,159	36,565	38,028	39,549	41,131	42,776	44,487	46,267	48,118	50,042	52,044	54,126	56,291	58,542
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	720	742	764	787	810	835	860	886	912	939	968	997	1,027	1,057	1,089	1,122	1,155	1,190	1,226	1,263	1,300
Rural with road access	(kWh)	720	742	764	787	810	835	860	886	912	939	968	997	1,027	1,057	1,089	1,122	1,155	1,190	1,226	1,263	1,300
Rural without road access	(kWh)	75	77	80	82	84	87	90	92	95	98	101	104	107	110	113	117	120	124	128	132	135
Energy Demand Forecast																						
Non-residential	(kWh)	8,139,910	8,745,920	9,416,644	10,159,279	10,981,851	11,893,312	12,838,778	13,880,856	15,029,826	16,297,099	17,695,344	18,968,914	20,351,096	21,851,452	23,480,410	25,249,342	27,170,651	29,257,867	31,525,752	33,990,415	36,669,436
Non-residential(New)	(kWh)	0	1,341,239	2,521,322	3,824,129	5,202,836	6,773,546	8,213,112	9,544,416	10,747,908	12,091,028	13,433,248	15,060,354	16,703,678	18,581,918	20,377,615	22,320,968	24,105,335	26,109,158	28,302,487	30,463,366	32,776,682
Additional loads	(kWh)	0	0	0	1,095,600	1,095,600	1,095,600	1,095,600	2,191,200	2,191,200	2,191,200	2,191,200	3,286,800	3,286,800	3,286,800	3,286,800	4,382,400	4,382,400	4,382,400	4,382,400	5,478,000	5,478,000
Sub-total	(kWh)	8,139,910	10,087,159	11,937,966	15,079,008	17,280,286	19,762,458	22,147,490	25,616,473	27,968,934	30,579,327	33,319,792	37,316,068	40,341,574	43,720,170	47,144,825	51,952,710	55,658,386	59,749,425	64,210,639	69,931,781	74,924,118
Residential (Already connected)	(kWh)	7,588,282	7,967,696	8,366,081	8,784,385	9,223,604	9,684,784	10,169,024	10,677,475	11,211,348	11,771,916	12,360,512	12,978,537	13,627,464	14,308,837	15,024,279	15,775,493	16,564,268	17,392,481	18,262,105	19,175,211	20,133,971
Residential (New Connection)	(kWh)	0	2,301,235	4,740,545	7,258,524	9,430,408	11,418,424	13,257,088	14,957,977	16,669,617	18,260,302	19,933,561	21,870,111	23,713,451	25,662,344	27,722,218	29,898,773	32,119,181	34,460,557	36,928,886	39,530,442	42,271,795
Sub-total	(kWh)	7,588,282	10,268,931	13,106,626	16,042,909	18,654,012	21,103,208	23,426,111	25,635,452	27,880,966	30,032,218	32,294,073	34,848,648	37,340,915	39,971,181	42,746,497	45,674,267	48,683,449	51,853,038	55,190,991	58,705,652	62,405,767
Total Energy Demand	(kWh)	15,728,192	20,356,090	25,044,592	31,121,917	35,934,299	40,865,666	45,573,601	51,251,924	55,849,900	60,611,545	65,613,865	72,164,716	77,682,490	83,691,351	89,891,322	97,626,977	104,341,835	111,602,462	119,401,630	128,637,433	137,329,884
Annual Growth Rate	(%)	27.7	29.4	23.0	24.3	15.5	13.7	11.5	12.5	9.0	8.5	8.3	10.0	7.6	7.7	7.4	8.6	6.9	7.0	7.0	7.7	6.8
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	4,786,841	5,985,364	7,128,786	8,590,196	9,631,225	10,216,416	11,157,023	12,283,519	13,100,594	13,910,846	14,729,643	15,841,035	16,668,712	17,548,187	18,411,476	19,525,395	20,369,522	21,257,612	22,181,330	23,296,543	24,234,685
Total Energy Consumption	(kWh)	20,515,033	26,341,454	32,173,378	39,712,113	45,565,524	51,082,082	56,730,624	63,535,443	68,950,494	74,522,391	80,343,509	88,005,751	94,351,202	101,239,538	108,302,798	117,152,372	124,711,356	132,860,074	141,582,960	151,933,977	161,564,569
Annual Growth Rate	(%)	26.6	28.4	22.1	23.4	14.7	12.1	11.1	12.0	8.5	8.1	7.8	9.5	7.2	7.3	7.0	8.2	6.5	6.5	6.6	7.3	6.3
Peak Power Demand	(MW)	5.0	6.2	7.4	8.9	10.0	10.9	11.8	12.9	13.7	14.5	15.3	16.7	18.0	19.3	20.6	22.3	23.7	25.3	26.9	28.9	30.74
Annual Growth Rate	(%)	18.4	24.9	18.9	20.3	11.8	9.4	8.4	9.4	6.1	5.7	5.5	9.5	7.2	7.3	7.0	8.2	6.5	6.5	6.6	7.3	6.3
Load Factor	(%)	47.0	48.3	49.6	50.9	52.2	53.5	54.8	56.1	57.4	58.7	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Energy Demand by Catergory																						
Industrial		2,489,872	3,064,830	3,622,165	4,234,336	4,897,963	5,638,005	6,366,634	7,117,894	7,902,625	8,772,508	9,727,977	10,627,946	11,594,723	12,660,318	13,792,966	15,023,192	16,345,093	17,797,321	19,388,575	21,116,308	23,007,131
Agriculture		2,214,905	2,214,905	2,214,905	3,310,505	3,310,505	3,310,505	3,310,505	4,406,105	4,406,105	4,406,105	4,406,105	5,501,705	5,501,705	5,501,705	5,501,705	6,597,305	6,597,305	6,597,305	6,597,305	7,692,905	7,692,905
Services		3,435,133	4,807,424	6,100,896	7,534,167	9,071,818	10,813,947	12,470,351	14,092,473	15,660,204	17,400,713	19,185,710	21,186,417	23,245,146	25,558,147	27,850,154	30,332,213	32,715,988	35,354,799	38,224,758	41,122,569	44,224,081
Residential		7,588,282	10,268,931	13,106,626	16,042,909	18,654,012	21,103,208	23,426,111	25,635,452	27,880,966	30,032,218	32,294,073	34,848,648	37,340,915	39,971,181	42,746,497	45,674,267	48,683,449	51,853,038	55,190,991	58,705,652	62,405,767
Total		15,728,192	20,356,090	25,044,592	31,121,917	35,934,299	40,865,666	45,573,601	51,251,924	55,849,900	60,611,545	65,613,865	72,164,716	77,682,490	83,691,351	89,891,322	97,626,977	104,341,835	111,602,462	119,401,630	128,637,433	137,329,884

電力需要予測
Sekong Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Rural with road access		110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110
Rural without road access		124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124
Total		278	278	278	278	278	278	278	278	278	278	278	278	278	278	278	278	278	278	278	278	278
Population																						
Urban																						
Rural																						
Total	(x 1,000)	71	72	74	75	76	78	79	81	82	83	85	86	87	89	90	91	92	94	95	96	97
Household		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		1,816	1,851	1,886	1,922	1,958	1,995	2,029	2,064	2,099	2,135	2,171	2,203	2,237	2,270	2,304	2,339	2,369	2,400	2,431	2,463	2,495
Rural with road access		4,106	4,184	4,264	4,345	4,427	4,511	4,588	4,666	4,745	4,826	4,908	4,982	5,056	5,132	5,209	5,287	5,356	5,426	5,496	5,568	5,640
Rural without road access		4,603	4,690	4,780	4,870	4,963	5,057	5,143	5,231	5,319	5,410	5,502	5,584	5,668	5,753	5,840	5,927	6,004	6,082	6,161	6,241	6,323
Rural total		8,709	8,874	9,043	9,215	9,390	9,568	9,731	9,896	10,065	10,236	10,410	10,566	10,724	10,885	11,049	11,214	11,360	11,508	11,657	11,809	11,962
Total		10,525	10,725	10,929	11,137	11,348	11,564	11,760	11,960	12,164	12,370	12,581	12,769	12,961	13,155	13,353	13,553	13,729	13,908	14,088	14,272	14,457
Nos. of Village To be Electrified		23	31	38	47	56	64	73	82	89	97	106	118	130	141	152	165	176	188	198	211	222
Urban		19	24	27	32	37	42	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Rural with access		4	7	11	15	19	22	29	36	41	47	54	65	74	81	89	98	106	111	111	111	111
Rural without access		0	0	0	0	0	0	0	2	4	6	8	9	12	16	19	23	26	33	43	56	67
New Village Connection after 1999 (Accumulat		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	5	8	13	18	23	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Rural with access		0	3	7	11	15	18	25	32	37	43	50	61	70	77	85	94	102	107	107	107	107
Rural without access		0	0	0	0	0	0	0	2	4	6	8	9	12	16	19	23	26	33	43	56	67
Household to be Electrified		2,025	2,490	2,956	3,421	3,887	4,352	4,818	5,283	5,749	6,214	6,680	7,323	7,967	8,610	9,254	9,897	10,540	11,184	11,827	12,471	13,114
Urban		1,144	1,333	1,523	1,713	1,903	1,995	2,029	2,064	2,099	2,135	2,171	2,203	2,237	2,270	2,304	2,339	2,369	2,400	2,431	2,463	2,495
Rural with road access		881	1,157	1,433	1,708	1,984	2,328	2,599	2,870	3,104	3,302	3,500	3,873	4,247	4,622	4,996	5,287	5,356	5,426	5,496	5,568	5,640
Rural without road access		0	0	0	0	0	29	190	349	546	778	1,009	1,247	1,483	1,719	1,953	2,271	2,815	3,358	3,900	4,440	4,979
New Household Connection After 1999 (Accun		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	189	379	569	760	852	886	920	955	991	1,027	1,060	1,093	1,127	1,161	1,195	1,226	1,256	1,288	1,319	1,351
Rural with access		0	276	552	827	1,102	1,447	1,718	1,989	2,223	2,421	2,619	2,992	3,366	3,740	4,115	4,406	4,475	4,545	4,615	4,687	4,759
Rural without access		0	0	0	0	0	29	190	349	546	778	1,009	1,247	1,483	1,719	1,953	2,271	2,815	3,358	3,900	4,440	4,979
Average Non-Residential Consumption Per Village																						
District center	(kWh)	878,190	913,318	949,850	987,844	1,027,358	1,068,452	1,111,191	1,155,638	1,201,864	1,249,938	1,299,936	1,351,933	1,406,010	1,462,251	1,520,741	1,581,571	1,644,833	1,710,627	1,779,052	1,850,214	1,924,222
Urban	(kWh)	61,320	63,773	66,324	68,977	71,736	74,605	77,589	80,693	83,921	87,277	90,769	94,399	98,175	102,102	106,186	110,434	114,851	119,445	124,223	129,192	134,360
Rural with access	(kWh)	48,618	50,563	52,585	54,689	56,876	59,151	61,517	63,978	66,537	69,199	71,967	74,845	77,839	80,953	84,191	87,558	91,061	94,703	98,491	102,431	106,528
Rural without access	(kWh)	26,718	27,787	28,898	30,054	31,256	32,507	33,807	35,159	36,565	38,028	39,549	41,131	42,776	44,487	46,267	48,118	50,042	52,044	54,126	56,291	58,542
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	720	742	764	787	810	835	860	886	912	939	968	997	1,027	1,057	1,089	1,122	1,155	1,190	1,226	1,263	1,300
Rural with road access	(kWh)	720	742	764	787	810	835	860	886	912	939	968	997	1,027	1,057	1,089	1,122	1,155	1,190	1,226	1,263	1,300
Rural without road access	(kWh)	75	77	80	82	84	87	90	92	95	98	101	104	107	110	113	117	120	124	128	132	135
Energy Demand Forecast																						
Non-residential	(kWh)	4,733,904	5,053,443	5,405,073	5,792,162	6,218,441	6,688,054	7,171,407	7,701,155	8,281,962	8,918,979	9,617,899	10,254,719	10,942,908	11,686,765	12,490,964	13,360,584	14,301,146	15,318,654	16,419,635	17,611,189	18,901,041
Non-residential(New)	(kWh)	0	466,028	881,487	1,455,466	2,063,091	2,649,502	3,281,793	3,864,524	4,356,090	4,937,108	5,614,404	6,560,106	7,495,048	8,376,625	9,337,477	10,465,811	11,532,550	12,589,443	13,421,982	14,433,694	15,397,517
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	(kWh)	4,733,904	5,519,470	6,286,560	7,247,628	8,281,533	9,337,557	10,453,200	11,565,679	12,638,052	13,856,087	15,232,303	16,814,825	18,437,956	20,063,390	21,828,440	23,826,395	25,833,696	27,908,097	29,841,617	32,044,883	34,298,559
Residential (Already connected)	(kWh)	1,822,091	1,913,195	2,008,855	2,109,298	2,214,763	2,325,501	2,441,776	2,563,865	2,692,058	2,826,661	2,967,994	3,116,394	3,272,213	3,435,824	3,607,615	3,787,996	3,977,396	4,176,266	4,385,079	4,604,333	4,834,550
Residential (New Connection)	(kWh)	0	431,561	889,015	1,373,528	1,886,312	2,401,531	2,820,721	3,263,417	3,693,183	4,108,157	4,545,844	5,220,971	5,933,488	6,685,074	7,477,478	8,207,933	8,684,689	9,184,367	9,707,988	10,256,615	10,831,358
Sub-total	(kWh)	1,822,091	2,344,756	2,897,870	3,482,826	4,101,075	4,727,032	5,262,497	5,827,282	6,385,241	6,934,818	7,513,838	8,337,365	9,205,702	10,120,898	11,085,094	11,995,930	12,662,085	13,360,633	14,093,067	14,860,948	15,665,908
Total Energy Demand	(kWh)	6,555,995	7,864,226	9,184,430	10,730,454	12,382,607	14,064,589	15,715,696	17,392,961	19,023,293	20,790,904	22,746,141	25,152,190	27,643,658	30,184,288	32,913,534	35,822,325	38,495,781	41,268,729	43,934,684	46,905,831	49,964,466
Annual Growth Rate	(%)	67.1	20.0	16.8	16.8	15.4	13.6	11.7	10.7	9.4	9.3	9.4	10.6	9.9	9.2	9.0	8.8	7.5	7.2	6.5	6.8	6.5
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	1,995,303	2,312,343	2,614,291	2,961,794	3,318,826	3,516,147	3,847,411	4,168,561	4,462,254	4,771,683	5,106,276	5,521,212	5,931,635	6,328,964	6,741,326	7,164,465	7,515,113	7,860,710	8,161,779	8,494,757	8,817,259
Total Energy Consumption	(kWh)	8,551,298	10,176,569	11,798,721	13,692,248	15,701,433	17,580,736	19,563,108	21,561,522	23,485,547	25,562,587	27,852,417	30,673,403	33,575,293	36,513,252	39,654,861	42,986,790	46,010,894	49,129,440	52,096,463	55,400,588	58,781,725
Annual Growth Rate	(%)	65.6	19.0	15.9	16.0	14.7	12.0	11.3	10.2	8.9	8.8	9.0	10.1	9.5	8.8	8.6	8.4	7.0	6.8	6.0	6.3	6.1
Peak Power Demand	(MW)	2.0	2.3	2.6	2.9	3.3	3.6	4.0	4.3	4.6	4.9	5.3	5.8	6.4	6.9	7.5	8.2	8.8	9.3	9.9	10.5	11.2
Annual Growth Rate	(%)	65.6	16.7	13.7	13.9	12.6	9.9	9.3	8.3	7.0	7.0	7.1	10.1	9.5	8.8	8.6	8.4	7.0	6.8	6.0	6.3	6.1
Load Factor	(%)	50.0	51.0	52.0	53.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Energy Demand by Catergory																						
Industrial		946,781	1,171,595	1,390,401	1,657,160	1,943,485	2,242,671	2,544,692	2,847,155	3,159,041	3,511,290	3,907,641	4,308,374	4,725,810	5,159,666	5,634,434	6,159,710	6,714,618	7,300,347	7,899,884	8,564,153	9,283,060
Agriculture		1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171	1,420,171
Services		2,366,952	2,927,704	3,475,988	4,170,297	4,917,876	5,674,714	6,488,337	7,298,353	8,058,840	8,924,625	9,904,491	11,086,280	12,291,975	13,483,553	14,773,835	16,246,514	17,698,907	19,187,578	20,521,562	22,060,559	23,595,328
Residential		1,822,091	2,344,756	2,897,870	3,482,826	4,101,075	4,727,032	5,262,497	5,827,282	6,385,241	6,934,818	7,513,838	8,337,365	9,205,702	10,120,898	11,085,094	11,995,930	12,662,085	13,360,633	14,093,067	14,860,948	15,665,908
Total		6,555,995	7,864,226	9,184,430	10,730,454	12,382,607	14,064,589	15,715,696	17,392,961	19,023,293	20,790,904	22,746,141	25,152,190	27,643,658	30,184,288	32,913,534	35,822,325	38,495,781	41,268,729	43,934,684	46,905,831	49,964,466

電力需要予測
Attapeu Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Rural with road access		65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
Rural without road access		113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113
Total		188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188	188
Population																						
Urban																						
Rural																						
Total	(x 1,000)	98	100	102	104	107	109	111	113	116	118	120	122	125	127	129	132	134	136	138	140	142
Household		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		886	906	926	946	967	988	1,008	1,028	1,049	1,070	1,091	1,111	1,131	1,151	1,172	1,193	1,212	1,231	1,251	1,271	1,291
Rural with road access		5,846	5,974	6,106	6,240	6,378	6,518	6,648	6,781	6,917	7,055	7,196	7,326	7,458	7,592	7,729	7,868	7,994	8,121	8,251	8,383	8,517
Rural without road access		10,189	10,414	10,643	10,877	11,116	11,361	11,588	11,820	12,056	12,297	12,543	12,769	12,999	13,233	13,471	13,713	13,933	14,156	14,382	14,612	14,846
Rural total		16,035	16,388	16,749	17,117	17,494	17,879	18,236	18,601	18,973	19,352	19,739	20,095	20,456	20,825	21,199	21,581	21,926	22,277	22,634	22,996	23,364
Total		16,922	17,294	17,674	18,063	18,461	18,867	19,244	19,629	20,021	20,422	20,830	21,205	21,587	21,976	22,371	22,774	23,138	23,508	23,885	24,267	24,655
Nos. of Village To be Electrified		21	27	33	40	47	54	61	68	74	80	87	92	98	103	109	115	118	125	129	136	140
Urban		8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Rural with access		9	13	18	24	30	37	43	49	54	58	62	63	64	64	64	64	64	64	64	64	64
Rural without access		4	4	5	6	7	7	8	9	10	12	15	19	24	29	35	41	44	51	55	62	66
New Village Connection after 1999 (Accumulat		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Rural with access		0	4	9	15	21	28	34	40	45	49	53	54	55	55	55	55	55	55	55	55	55
Rural without access		0	0	1	2	3	3	4	5	6	8	11	15	20	25	31	37	40	47	51	58	62
Household to be Electrified		1,878	2,860	3,843	4,825	5,807	6,789	7,771	8,753	9,736	10,718	11,700	12,684	13,669	14,653	15,638	16,622	17,607	18,591	19,576	20,560	21,544
Urban		886	906	926	946	967	988	1,008	1,028	1,049	1,070	1,091	1,111	1,131	1,151	1,172	1,193	1,212	1,231	1,251	1,271	1,291
Rural with road access		992	1,955	2,790	3,490	4,190	4,890	5,589	6,289	6,752	7,023	7,196	7,326	7,458	7,592	7,729	7,868	7,994	8,121	8,251	8,383	8,517
Rural without road access		0	0	127	389	650	911	1,174	1,436	1,935	2,625	3,413	4,248	5,081	5,911	6,738	7,562	8,401	9,239	10,073	10,906	11,736
New Household Connection After 1999 (Accun		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	19	39	60	81	102	122	142	162	183	205	224	244	265	285	307	326	345	365	385	405
Rural with access		0	963	1,798	2,498	3,198	3,898	4,598	5,297	5,760	6,031	6,204	6,334	6,466	6,600	6,737	6,876	7,002	7,129	7,259	7,391	7,526
Rural without access		0	0	127	389	650	911	1,174	1,436	1,935	2,625	3,413	4,248	5,081	5,911	6,738	7,562	8,401	9,239	10,073	10,906	11,736
Average Non-Residential Consumption Per Village																						
District center	(kWh)	878,190	913,318	949,850	987,844	1,027,358	1,068,452	1,111,191	1,155,638	1,201,864	1,249,938	1,299,936	1,351,933	1,406,010	1,462,251	1,520,741	1,581,571	1,644,833	1,710,627	1,779,052	1,850,214	1,924,222
Urban	(kWh)	61,320	63,773	66,324	68,977	71,736	74,605	77,589	80,693	83,921	87,277	90,769	94,399	98,175	102,102	106,186	110,434	114,851	119,445	124,223	129,192	134,360
Rural with access	(kWh)	48,618	50,563	52,585	54,689	56,876	59,151	61,517	63,978	66,537	69,199	71,967	74,845	77,839	80,953	84,191	87,558	91,061	94,703	98,491	102,431	106,528
Rural without access	(kWh)	26,718	27,787	28,898	30,054	31,256	32,507	33,807	35,159	36,565	38,028	39,549	41,131	42,776	44,487	46,267	48,118	50,042	52,044	54,126	56,291	58,542
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	720	742	764	787	810	835	860	886	912	939	968	997	1,027	1,057	1,089	1,122	1,155	1,190	1,226	1,263	1,300
Rural with road access	(kWh)	720	742	764	787	810	835	860	886	912	939	968	997	1,027	1,057	1,089	1,122	1,155	1,190	1,226	1,263	1,300
Rural without road access	(kWh)	75	77	80	82	84	87	90	92	95	98	101	104	107	110	113	117	120	124	128	132	135
Energy Demand Forecast																						
Non-residential	(kWh)	5,252,934	5,607,507	5,997,691	6,427,220	6,900,237	7,421,340	7,957,687	8,545,517	9,190,005	9,896,865	10,672,415	11,379,057	12,142,699	12,968,114	13,860,486	14,825,452	15,869,138	16,998,206	18,219,900	19,542,098	20,973,371
Non-residential(New)	(kWh)	0	326,625	622,663	989,296	1,377,366	1,813,218	2,247,832	2,706,891	3,129,882	3,547,242	4,022,734	4,358,651	4,749,195	5,087,853	5,482,968	5,897,212	6,202,752	6,697,960	7,080,841	7,621,218	8,042,877
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	(kWh)	5,252,934	5,934,132	6,620,354	7,416,516	8,277,603	9,234,558	10,205,519	11,252,408	12,319,887	13,444,107	14,695,149	15,737,708	16,891,895	18,055,966	19,343,454	20,722,664	22,071,890	23,696,166	25,300,741	27,163,316	29,016,248
Residential (Already connected)	(kWh)	1,690,364	1,774,882	1,863,626	1,956,807	2,054,648	2,157,380	2,265,249	2,378,511	2,497,437	2,622,309	2,753,424	2,891,095	3,035,650	3,187,433	3,346,804	3,514,145	3,689,852	3,874,344	4,068,062	4,271,465	4,485,038
Residential (New Connection)	(kWh)	0	910,483	1,767,785	2,557,683	3,394,043	4,278,975	5,211,597	6,196,959	6,997,639	7,639,990	8,210,502	8,758,275	9,334,589	9,940,810	10,578,370	11,248,767	11,930,308	12,645,683	13,396,454	14,184,248	15,010,768
Sub-total	(kWh)	1,690,364	2,685,364	3,631,411	4,514,490	5,448,690	6,436,355	7,476,845	8,575,471	9,495,076	10,262,299	10,963,926	11,649,371	12,370,239	13,128,242	13,925,174	14,762,912	15,620,159	16,520,028	17,464,515	18,455,712	19,495,806
Total Energy Demand	(kWh)	6,943,298	8,619,497	10,251,766	11,931,007	13,726,294	15,670,912	17,682,364	19,827,879	21,814,963	23,706,406	25,659,075	27,387,079	29,262,134	31,184,209	33,268,628	35,485,576	37,692,050	40,216,194	42,765,256	45,619,028	48,512,053
Annual Growth Rate	(%)	120.6	24.1	18.9	16.4	15.0	14.2	12.8	12.1	10.0	8.7	8.2	6.7	6.8	6.6	6.7	6.7	6.2	6.7	6.3	6.7	6.3
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	2,113,178	2,534,417	2,918,101	3,293,167	3,678,965	3,917,728	4,328,878	4,752,136	5,117,090	5,440,815	5,760,200	6,011,798	6,278,919	6,538,624	6,814,056	7,097,115	7,358,209	7,660,227	7,944,534	8,261,714	8,560,951
Total Energy Consumption	(kWh)	9,056,475	11,153,914	13,169,867	15,224,174	17,405,259	19,588,641	22,011,242	24,580,015	26,932,053	29,147,221	31,419,275	33,398,876	35,541,053	37,722,833	40,082,685	42,582,691	45,050,258	47,876,421	50,709,790	53,880,742	57,073,004
Annual Growth Rate	(%)	118.7	23.2	18.1	15.6	14.3	12.5	12.4	11.7	9.6	8.2	7.8	6.3	6.4	6.1	6.3	6.2	5.8	6.3	5.9	6.3	5.9
Peak Power Demand	(MW)	2.1	2.5	2.9	3.3	3.7	4.1	4.5	4.9	5.3	5.6	6.0	6.4	6.8	7.2	7.6	8.1	8.6	9.1	9.6	10.3	10.9
Annual Growth Rate	(%)	118.7	20.7	15.8	13.4	12.2	10.5	10.4	9.7	7.7	6.4	6.0	6.3	6.4	6.1	6.3	6.2	5.8	6.3	5.9	6.3	5.9
Load Factor	(%)	50.0	51.0	52.0	53.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Energy Demand by Catergory																						
Industrial		1,050,587	1,251,937	1,452,065	1,680,650	1,930,945	2,211,821	2,499,839	2,815,424	3,152,683	3,518,421	3,925,987	4,276,522	4,662,227	5,073,931	5,527,364	6,023,194	6,556,254	7,152,780	7,796,052	8,510,134	9,282,423
Agriculture		1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880	1,575,880
Services		2,626,467	3,106,316	3,592,409	4,159,986	4,770,778	5,446,857	6,129,800	6,861,104	7,591,324	8,349,806	9,193,282	9,885,306	10,653,787	11,406,155	12,240,210	13,123,589	13,939,756	14,967,506	15,928,809	17,077,302	18,157,945
Residential		1,690,364	2,685,364	3,631,411	4,514,490	5,448,690	6,436,355	7,476,845	8,575,471	9,495,076	10,262,299	10,963,926	11,649,371	12,370,239	13,128,242	13,925,174	14,762,912	15,620,159	16,520,028	17,464,515	18,455,712	19,495,806
Total		6,943,298	8,619,497	10,251,766	11,931,007	13,726,294	15,670,912	17,682,364	19,827,879	21,814,963	23,706,406	25,659,075	27,387,079	29,262,134	31,184,209	33,268,628	35,485,576	37,692,050	40,216,194	42,765,256	45,619,028	48,512,053

電力需要予測
Champasack Province

Item		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Villages																						
Urban		115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115
Rural with road access		225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225
Rural without road access		556	556	556	556	556	556	556	556	556	556	556	556	556	556	556	556	556	556	556	556	556
Total		896	896	896	896	896	896	896	896	896	896	896	896	896	896	896	896	896	896	896	896	896
Population																						
Urban																						
Rural																						
Total	(x 1,000)	576	591	607	624	640	658	674	691	708	726	744	761	779	797	815	834	851	869	887	906	925
Household		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		12,475	12,812	13,158	13,513	13,878	14,252	14,609	14,974	15,348	15,732	16,125	16,496	16,876	17,264	17,661	18,067	18,446	18,834	19,229	19,633	20,045
Rural with road access		24,448	25,108	25,786	26,482	27,197	27,931	28,629	29,345	30,079	30,831	31,601	32,328	33,072	33,832	34,611	35,407	36,150	36,909	37,684	38,476	39,284
Rural without road access		60,453	62,085	63,761	65,483	67,251	69,067	70,793	72,563	74,377	76,237	78,143	79,940	81,779	83,659	85,584	87,552	89,391	91,268	93,184	95,141	97,139
Rural total		84,900	87,193	89,547	91,965	94,448	96,998	99,423	101,908	104,456	107,067	109,744	112,268	114,850	117,492	120,194	122,959	125,541	128,177	130,869	133,617	136,423
Total		97,375	100,004	102,704	105,477	108,325	111,250	114,031	116,882	119,804	122,799	125,869	128,764	131,726	134,756	137,855	141,026	143,987	147,011	150,098	153,250	156,468
Nos. of Village To be Electrified		220	241	260	279	298	319	338	357	376	397	415	456	497	540	582	626	664	707	749	791	831
Urban		97	108	113	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115
Rural with access		94	101	114	129	146	161	175	189	202	210	216	221	224	224	224	224	224	224	224	224	224
Rural without access		29	32	33	35	37	43	48	53	59	72	84	120	158	201	243	287	325	368	410	452	492
New Village Connection after 1999 (Accumul		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	11	16	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Rural with access		0	7	20	35	52	67	81	95	108	116	122	127	130	130	130	130	130	130	130	130	130
Rural without access		0	3	4	6	8	14	19	24	30	43	55	91	129	172	214	258	296	339	381	423	463
Household to be Electrified		29,913	33,571	37,230	40,889	44,548	48,206	51,865	55,524	59,183	62,841	66,500	74,792	83,083	91,375	99,667	107,958	116,250	124,542	132,833	141,125	149,417
Urban		10,950	12,408	13,143	13,513	13,878	14,252	14,609	14,974	15,348	15,732	16,125	16,496	16,876	17,264	17,661	18,067	18,446	18,834	19,229	19,633	20,045
Rural with road access		12,835	14,336	16,569	19,112	21,536	23,566	25,427	27,295	28,657	29,873	30,997	32,302	33,072	33,832	34,611	35,407	36,150	36,909	37,684	38,476	39,284
Rural without road access		6,128	6,828	7,518	8,264	9,134	10,388	11,830	13,254	15,177	17,236	19,378	25,993	33,136	40,279	47,395	54,485	61,653	68,799	75,920	83,016	90,087
New Household Connection After 1999 (Accu		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urban		0	1,458	2,193	2,563	2,928	3,303	3,659	4,024	4,399	4,782	5,176	5,546	5,926	6,314	6,711	7,117	7,497	7,884	8,280	8,683	9,096
Rural with access		0	1,501	3,734	6,277	8,701	10,731	12,592	14,461	15,822	17,039	18,162	19,468	20,237	20,998	21,776	22,572	23,316	24,075	24,850	25,641	26,449
Rural without access		0	700	1,390	2,136	3,006	4,260	5,701	7,126	9,049	11,108	13,249	19,865	27,008	34,150	41,267	48,356	55,525	62,670	69,791	76,888	83,959
Average Non-Residential Consumption Per Village																						
District center	(kWh)	878,190	913,318	949,850	987,844	1,027,358	1,068,452	1,111,191	1,155,638	1,201,864	1,249,938	1,299,936	1,351,933	1,406,010	1,462,251	1,520,741	1,581,571	1,644,833	1,710,627	1,779,052	1,850,214	1,924,222
Urban	(kWh)	61,320	63,773	66,324	68,977	71,736	74,605	77,589	80,693	83,921	87,277	90,769	94,399	98,175	102,102	106,186	110,434	114,851	119,445	124,223	129,192	134,360
Rural with access	(kWh)	48,618	50,563	52,585	54,689	56,876	59,151	61,517	63,978	66,537	69,199	71,967	74,845	77,839	80,953	84,191	87,558	91,061	94,703	98,491	102,431	106,528
Rural without access	(kWh)	26,718	27,787	28,898	30,054	31,256	32,507	33,807	35,159	36,565	38,028	39,549	41,131	42,776	44,487	46,267	48,118	50,042	52,044	54,126	56,291	58,542
Irrigation allowance	(per HH)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Energy Consumption/Household																						
Urban	(kWh)	720	742	764	787	810	835	860	886	912	939	968	997	1,027	1,057	1,089	1,122	1,155	1,190	1,226	1,263	1,300
Rural with road access	(kWh)	720	742	764	787	810	835	860	886	912	939	968	997	1,027	1,057	1,089	1,122	1,155	1,190	1,226	1,263	1,300
Rural without road access	(kWh)	75	77	80	82	84	87	90	92	95	98	101	104	107	110	113	117	120	124	128	132	135
Energy Demand Forecast																						
Non-residential	(kWh)	24,922,556	27,194,289	29,711,160	32,500,686	35,593,577	39,024,118	42,587,384	46,518,517	50,857,001	55,646,697	60,936,336	65,754,044	70,986,301	76,669,883	82,844,913	89,555,168	96,848,421	104,776,812	113,397,255	122,771,879	132,968,522
Non-residential(New)	(kWh)	0	1,127,850	2,185,827	3,240,698	4,328,302	5,489,415	6,626,345	7,826,551	9,065,062	10,297,690	11,429,533	13,440,335	15,499,050	17,651,182	19,878,079	22,305,955	24,604,367	27,241,412	29,969,049	32,835,828	35,755,956
Additional demand	(kWh)	0	0	0	876,720	876,720	876,720	876,720	1,841,112	7,885,440	7,885,440	7,885,440	8,762,160	17,960,160	17,960,160	18,179,340	18,836,880	18,836,880	34,166,880	34,166,880	35,043,600	35,043,600
Sub-total	(kWh)	24,922,556	28,322,139	31,896,988	36,618,104	40,798,598	45,390,253	50,090,450	56,186,179	67,807,503	73,829,827	80,251,309	87,956,539	104,445,511	112,281,225	120,902,332	130,698,003	140,289,668	166,185,104	177,533,184	190,651,307	203,768,078
Residential (Already connected)	(kWh)	27,431,029	28,802,581	30,242,710	31,754,845	33,342,587	35,009,717	36,760,203	38,598,213	40,528,123	42,554,530	44,682,256	46,916,369	49,262,187	51,725,297	54,311,562	57,027,140	59,878,497	62,872,421	66,016,043	69,316,845	72,782,687
Residential (New Connection)	(kWh)	0	2,814,787	5,807,167	8,927,204	12,118,078	15,136,239	18,144,965	21,337,211	24,199,887	27,073,581	30,008,351	33,912,620	37,422,593	41,112,560	45,022,216	49,163,140	53,410,202	57,899,023	62,641,896	67,651,717	72,942,014
Sub-total	(kWh)	27,431,029	31,617,367	36,049,877	40,682,049	45,460,666	50,145,955	54,905,168	59,935,424	64,728,010	69,628,111	74,690,607	80,828,989	86,684,781	92,837,856	99,333,778	106,190,280	113,288,699	120,771,445	128,657,938	136,968,561	145,724,701
Total Energy Demand	(kWh)	52,353,585	59,939,507	67,946,865	77,300,153	86,259,264	95,536,209	104,995,617	116,121,603	132,535,513	143,457,938	154,941,917	168,785,528	191,130,292	205,119,081	220,236,109	236,888,283	253,578,367	286,956,548	306,191,122	327,619,869	349,492,779
Annual Growth Rate	(%)	7.8	14.5	13.4	13.8	11.6	10.8	9.9	10.6	14.1	8.2	8.0	8.9	13.2	7.3	7.4	7.6	7.0	13.2	6.7	7.0	6.7
Losses	(%)	23.3	22.7	22.2	21.6	21.1	20.0	19.7	19.3	19.0	18.7	18.3	18.0	17.7	17.3	17.0	16.7	16.3	16.0	15.7	15.3	15.0
	(kWh)	15,933,700	17,624,197	19,340,650	21,336,200	23,119,482	#########	25,704,321	27,830,797	31,088,577	32,924,773	34,782,879	37,050,482	41,011,763	43,008,840	45,108,601	47,377,657	49,503,346	54,658,390	56,881,355	59,332,732	61,675,196
Total Energy Consumption	(kWh)	68,287,285	77,563,704	87,287,515	98,636,353	109,378,746	119,420,261	130,699,938	143,952,401	163,624,091	176,382,710	189,724,796	205,836,010	232,142,055	248,127,921	265,344,710	284,265,939	303,081,713	341,614,939	363,072,477	386,952,601	411,167,975
Annual Growth Rate	(%)	6.9	13.6	12.5	13.0	10.9	9.2	9.4	10.1	13.7	7.8	7.6	8.5	12.8	6.9	6.9	7.1	6.6	12.7	6.3	6.6	6.3
Peak Power Demand	(MW)	13.7	15.4	17.2	19.3	21.3	23.1	25.1	27.6	31.2	33.6	36.1	39.2	44.2	47.2	50.5	54.1	57.7	65.0	69.1	73.6	78.2
Annual Growth Rate	(%)	8.4	12.6	11.7	12.1	10.2	8.5	8.9	9.6	13.3	7.5	7.5	8.5	12.8	6.9	6.9	7.1	6.6	12.7	6.3	6.6	6.3
Load Factor	(%)	56.9	57.4	57.8	58.3	58.7	59.0	59.3	59.6	59.8	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Energy Demand by Catergory																						
Industrial		9,792,613	11,283,172	12,890,121	14,652,158	16,604,369	18,778,754	21,064,280	23,606,754	32,562,909	35,685,078	39,146,739	42,370,367	55,078,732	58,905,082	63,088,404	67,673,105	72,672,916	93,494,223	99,504,835	106,088,788	113,296,092
Agriculture		2,949,286	2,949,286	2,949,286	3,826,006	3,826,006	3,826,006	3,826,006	4,790,398	4,702,726	4,702,726	4,702,726	5,579,446	5,579,446	5,579,446	5,798,626	6,456,166	6,456,166	6,456,166	6,456,166	7,332,886	7,332,886
Services		12,180,657	14,089,682	16,057,581	18,139,940	20,368,224	22,785,494	25,200,163	27,789,028	30,541,869	33,442,023	36,401,845	40,006,727	43,787,333	47,796,698	52,015,302	56,568,732	61,160,586	66,234,715	71,572,183	77,229,634	83,139,101
Residential		27,431,029	31,617,367	36,049,877	40,682,049	45,460,666	50,145,955	54,905,168	59,935,424	64,728,010	69,628,111	74,690,607	80,828,989	86,684,781	92,837,856	99,333,778	106,190,280	113,288,699	120,771,445	128,657,938	136,968,561	145,724,701
Total		52,353,585	59,939,507	67,946,865	77,300,153	86,259,264	95,536,209	104,995,617	116,121,603	132,535,513	143,457,938	154,941,917	168,785,528	191,130,292	205,119,081	220,236,109	236,888,283	253,578,367	286,956,548	306,191,122	327,619,869	349,492,779

付録 6.2

22 kV および低圧配電系統の検討

付録 6.2 22 kV および低圧配電系統の検討

本報告書で提案する送変電プロジェクトの包括的な評価を行なうために、配電系統に関わる検討を行なった。対象となる配電系統は、最適送電系統計画の中で提案されている 2000 年から 2020 年の間に完成予定の 115/22 kV 変電所からの高圧および低圧の配電系統である。

第 1 章で述べたように、本マスタープランの業務範囲は、国内需要向け送電系統の最適計画の策定にあり、配電系統に関わる検討は含まれていない。しかしながら、全国送電系統に新たに連系される配電系統についても、包括的かつ最適な電力系統を作成のためには必要であると考え、調査団の一存により検討することとした。

1. 基本設計条件

(1) 配電系統の標準電圧

架空地線配電方式（SWER）を除いて、ラオスの現在の標準配電電圧は 22 kV である。これは JICA の電力技術基準作成チームにも確認されている。

(2) 22 kV 配電線の架空電線種類

EDL の既設 22 kV 配電線に使用されている架空電線は多種多様にあり、標準電線は決められていない。配電系統の建設コスト見積もりのため、次にあげる AAC（アルミニウム合金より線）を標準電線として考慮する。

表1.2 電線の技術パラメータ

電線	より線 Nos./Dia.(mm)	断面積 (mm^2)	電線外径 (mm)	電流容量 (A)	重量 (kg/km)	引張強度 (kg)	抵抗（20°C） (Ω/km)
AAC 250 mm^2	19/4.22	265.70	21.10	600	731	4,120 kg	0.1083
AAC 185 mm^2	37/2.50	181.60	17.50	490	501	3,105 kg	0.1600
AAC 150 mm^2	19/3.25	157.60	16.24	430	434	2,620 kg	0.1825
AAC 70 mm^2	19/2.10	65.82	10.50	280	181	1,150 kg	0.4380

(3) 架空電線の送電容量

配電線末端における電圧降下を、送電端電圧（22 kV）の 10%以内に抑えることを基本方針とし、さらに配電線の亘長に負荷が平均一様に分散している場合と、送電端から配電線末端に向けて直線的に減少する場合を想定して、3 相 3 線式 1 回線配電線の送電容量は以下のように計算される。

$$Vd = 31/2 * I * (r * \cos\phi + x * \sin\phi) * L * S \quad \text{..... (1)}$$

ここに、
- Vd : 電圧降下 (volt)
- I : 送電端電流 (ampere)
- R : 電線抵抗 (ohm/km)
- X : 電線リアクタンス (ohm/km)
- ϕ : 電流 I の力率
- L : 配電線の距離 (km)
- S : 負荷係数

ラオスにて使用されている標準 22 kV 配電線による電力輸送の最大距離は、電圧降下 10 %として下記式にて算出される。

$$P = 3^{1/2} * I * Vr * \cos\phi \quad \text{.....(2)}$$

ここに、 P : 可能送電容量
Vr : 受電端電圧

上記 (1) 式より、

$$I = Vd / \{3^{1/2} * (r * \cos\phi + x * \sin\phi) * L * S\} \quad \text{.....(3)}$$

第 (3) 式を (2) 式に代入すると、

$$P = (Vd * \cos\phi * Vr) / \{(r * \cos\phi + x * \sin\phi) * L * S\} \quad \text{.....(4)}$$

導体のリアクタンスは (5) 式によって計算される。

$$x = 2 * \pi * f \{0.05 + 0.4605 \log D/r'\} * 10^{-3} \ (\Omega/km) \quad \text{.....(5)}$$

ここに、 f : 系統周波数
D : 等価線間距離 (1.2m 標準相間隔において 1.51m)
R : 導体半径

配電系統の平均力率 (cos φ) を 0.85 と仮定すれば、電線のインピーダンス (r*cosφ + x*sinφ) は下記の通りとなる。

表1.2 導体のリアクタンス

(**単位**: **Ω**/km)

電線	抵抗 (75°C)	リアクタンス	インピーダンス
AAC 250 mm^2	0.132	0.327	0.285
AAC 185 mm^2	0.195	0.339	0.344
AAC 150 mm^2	0.223	0.344	0.371
AAC 70 mm^2	0.534	0.371	0.649

最大電圧降下を 10 %とした場合の配電距離と配電容量の関係は、負荷分散係数を 1/2 または 1/3[1]として式 (4) から下記の様に求められる。

表1.3 距離に対する電線別の可能送電容量

(単位 : kW)

電線	負荷係数	距離						
		20 km	30 km	40 km	50 km	60 km	70 km	80 km
AAC 250 mm^2	1/3	19,500	13,000	9,700	7,800	6,500	5,500	4,800
	1/2	13,000	8,600	6,500	5,200	4,300	3,700	3,200
AAC 185 mm^2	1/3	16,100	10,700	8,100	6,400	5,400	4,600	4,000
	1/2	10,700	7,200	5,400	4,300	3,600	3,100	2,700
AAC 150 mm^2	1/3	15,000	10,000	7,500	6,000	5,000	4,200	3,700
	1/2	10,000	6,600	5,000	4,000	3,300	2,800	2,500
ACSR 70 mm^2	1/3	8,500	5,700	4,300	3,400	2,800	2,400	2,100
	1/2	5,700	3,800	2,800	2,300	1,900	1,600	1,400

[1] 負荷分散係数 1/2 は、配電線の亘長に負荷が平均一様に分散している場合に、また 1/3 は、電力の送出点から配電線末端に向けて直線的に減少する場合に適用する。

2. 配電設備の必要数量予測

(1) 配電設備の電力需要

第 5 章で述べたように、全国の郡別の電力需要の大半は、2010 年では 2,000kW 以下、2015 年では 3,000kW 以下、そして 2020 年のおいては 5,000kW 以下である。

115/22 kV 変電所からの 22 kV 配電線のフィーダー数と距離を、各 5 年ごとに以下に述べる手法により予測した。

(a) 115/22 kV 変電所は主要な電力消費センターの近隣に位置する。一般的に、変電所の近隣では負荷の需要密度が高く、変電所から配電線の末端に向かうに従って需要家数が減少するため、需要密度は徐々に低下していく。そこで、全ての配電線について、負荷は送電端から配電線末端に向けて直線的に減少すると仮定する。

(b) 各郡ごとの需要予測の結果を参考にして、変電所から配電線末端までの距離と可能送電容量の表を基に、変電所からのフィーダー数と各フィーダーの電線サイズを決定する。

(c) 配電線は、比較的電力需要の高い主要道路に沿って建設される。配電線の距離は、1:100,000 サイズの地図から計測する。

(d) 配電用変圧器(22/0.38-0.22 kV)の標準容量は、50、100、160 そして 250 kVA である。配電用変圧器の数量と単機容量は、これらの標準モデルから決定する。

(e) 22 kV 配電線の建設される地区の電力需要に従って、配電用変圧器は配電線に沿って相当の距離をおいて設置される。

(f) ひとつの変電所に付随する 22 kV 配電系統の配電用変圧器の総設備容量は、各年度において電力需要予測の 120%以上とする。

一方、低圧配電線については以下のように想定する。

(g) 低圧配電線の支持物は現地産のコンクリート柱とし、電線には 50/35 mm^2 ケーブルを採用する。低圧配電線の必要総延長距離は、ラオスの現状から想定して、22 kV 配電線の総亘長の 80%と仮定する。

(2) 115/22 kV 変電所毎の配電設備の必要数量

調査対象期間中に建設される 115/22 kV 変電所についての詳細は、本報告書の第 5 章および第 6 章に述べた通りであり、その電力需要予測は第 5 章の表 5.5-2 に示されている。

各変電所の電力供給地域に必要な配電設備は、第 7 章の図 7.8-1 に示すように 22 kV 配電系統の新設･拡張を地図上で想定した上で検討を行ない、5 年ごとの必要な数量を予想した。ビエンチャン特別市については、各変電所別ではなくビエンチャン市全体をひとつとして、電力需要の伸びをもとにして必要な配電設備の追加数量を予想した。

3. 配電設備のコスト見積もり

(1) 高圧および低圧配電設備の単価

ラオスにおける最近の地方電化プロジェクトの業者契約書と、調査団が入手している国際市場価格を参考に、以下の単価を想定し、配電設備のコスト算出に適用した。なお、この単価は 2001 年 12 月を基準とし、CIF と工事費用を含んだものである。

表3.1 配電設備の建設コスト

電圧	機器/材料	単価	摘要
22 kV	AAC 250 mm^2 O.H Line	11,000 US$/km	現地産コンクリート柱を使用
	AAC 185 mm^2 O.H Line	10,000 US$/km	現地産コンクリート柱を使用
	AAC 150 mm^2 O.H Line	9,000 US$/km	現地産コンクリート柱を使用
	AAC 70 mm^2 O.H Line	7,000 US$/km	現地産コンクリート柱を使用
	Transformer : 50 kVA	6,500 US$/unit	雑材料を含む
	Transformer : 100 kVA	7,000 US$/unit	雑材料を含む
	Transformer : 160 kVA	8,000 US$/unit	雑材料を含む
	Transformer : 250 kVA	8,500 US$/unit	雑材料を含む
	Step voltage regulator	50,000 US$/unit	4,000 kVA
	50 kVar shunt capacitor	15,000 US$/set	3 相用
380/220 V	AL 50/35 mm^2 O.H Line	5,000 US$/km	現地産コンクリート柱を使用

(2) 高圧および低圧配電系統の建設コスト

以上の検討結果から、各変電所および近隣地区へ 22 kV フィーダーにより電力供給を行なう発電所について、2020 年までに建設される配電設備のコストを 5 年単位に積算した。

調査対象期間中に必要な変電所別の配電設備の必要数量と建設コストを表 3.3 に示す。概要は下表に示す通りである。なお、コストはラオスの 2001 年市場価格を基にしている。

表3.4 建設コスト概要

(Unit : US$)

完成年	建設コスト		
	FC	LC	Total
2000 - 2005	29,503,200	7,375,800	36,879,000
2006 - 2010	37,876,400	9,469,100	47,345,500
2011 - 2015	35,704,800	8,296,200	44,631,000
2016 - 2020	32,052,800	8,013,200	40,066,000
合計	135,137,200	33,784,300	168,921,500

これらのコストは、最適送電系統計画の経済評価に使用する。

建設コストの支出計画は、表 3.5 に示す通りである。

4. EDL電力系統の予想販売電力量

各変電所毎の電力量需要は、第 5 章の表 5.5-1 に示す通りである。この表に示す電力量を需要家に供給するためには、EDL は 115 kV 送電系統の開発のみならず、全国に亘る配電設備の開発も実施する必要がある。

最適送電系統の開発計画と配電設備の新設･増強の実施は、2000 年以降の EDL 電力系統の販売電力量に便益を与える。表 4.1 は、2000 年以降の全ての変電所における年間販売電力量の増加分を示す。これは、本報告書で提案する最適系統計画と配電設備計画の実施によってもたらされる第一の便益である。その概要は、下表に示す通りである。

表4.2 EDL**電力系統の年間販売電力量における便益** (2000**年基準**)

	2005	2010	2015	2020
販売電力量における便益	486 GWh	1,216 GWh	2,219 GWh	3,349 GWh

表3.2 EDLの配電設備の標準単価

Facilities	Unit	EDL's Rate (US$)	Section or Project	Note	**JICA/MP** (Rate: US$)
22 kV ACSR 240mm^2 Line	km	10,600	Non Hai ~ Xanakham, 73 km	including materials, erection and civil works	**11,000** /km
22 kV ACSR 185mm^2 Line	km	9,800	Ponsavan Feeder-3, 16 km	-ditto-	**10,000** /km
22 kV ACSR 150mm^2 Line	km	n.a	-	-ditto-	**9,000** /km
22 kV ACSR 70mm^2 Line	km	6,500	M. Feuang Feeder-2, 19 km	-ditto-	**7,000** /km
22/0.4 kV Transformer : 50 kVA	pcs	6,400	PT & DP	including miscellaneous equipment & materials : (5,000+1,400)	**6,500** /set
22/0.4 kV Transformer : 100 kVA	pcs	7,000	PT & DP	including miscellaneous equipment & materials : (5,500+1,500)	**7,000** /set
22/0.4 kV Transformer : 160 kVA	pcs	7,700	PT & DP	including miscellaneous equipment & materials : (6,000+1,700)	**8,000** /set
22/0.4 kV Transformer : 250 kVA	pcs	8,400	PT & DP	including miscellaneous equipment & materials : (6,300+2,100)	**8,500** /set
22/0.4 kV Transformer : 400 kVA	pcs	9,200	PT & DP	including miscellaneous equipment & materials : (6,800+2,400)	**9,500** /set
LV Line (AAC & ABC) in township	connect.	227	PT & DP	including miscellaneous materials	**5,000** /km
LV Line (AAC & ABC) in village	connect.	249	PT & DP	including miscellaneous materials	**5,000** /km

Remarks:

Construction cost of LV lines per km

Number of connections		Rate/km	Note	
Case of 14 connections per km	:	3,220	(US$ 230 x 14 connections)	a connection in every 70 m
Case of 20 connections per km	:	4,600	(US$ 230 x 20 connections)	a connection in every 50 m
Case of 33 connections per km	:	8,250	(US$ 250 x 33 connections)	a connection in every 30 m
Average		(5,000)		

表3.3 変電所別の配電設備の必要数量と建設コスト

Substation	Particulars		Unit	Rate	Estimated Quantities					Cost Estimate (US$)				
				(US$)	2005	2010	2015	2020	Total	2005	2010	2015	2020	Total
Bounneua SS	22 kV Feeders	AAC 250mm²	km	11,000	0	0	0	0	0	0	0	0	0	0
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	95	0	0	95	0	855,000	0	0	855,000
		AAC 70mm²	km	7,000	0	30	130	130	290	0	210,000	910,000	910,000	2,030,000
	22 kV Trans. Station	50 kVA	unit	6,500	0	40	38	46	124	0	260,000	247,000	299,000	806,000
		100kVA	unit	7,000	0	20	0	4	24	0	140,000	0	28,000	168,000
		160 kVA	unit	8,000	0	0	0	0	0	0	0	0	0	0
		250 kVA	unit	8,500	0	0	0	0	0	0	0	0	0	0
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	0	100	104	104	308	0	500,000	520,000	520,000	1,540,000
	Total		-	-						0	1,965,000	1,677,000	1,757,000	5,399,000
Luang Namtha SS	22 kV Feeders	AAC 250mm²	km	11,000	0	180	0	0	180	0	1,980,000	0	0	1,980,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	0	30	120	40	190	0	210,000	840,000	280,000	1,330,000
	22 kV Trans. Station	50 kVA	unit	6,500	0	40	44	49	133	0	260,000	286,000	318,500	864,500
		100kVA	unit	7,000	0	19	20	22	61	0	133,000	140,000	154,000	427,000
		160 kVA	unit	8,000	0	10	6	6	22	0	80,000	48,000	48,000	176,000
		250 kVA	unit	8,500	0	4	2	2	8	0	34,000	17,000	17,000	68,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	0	168	96	40	304	0	840,000	480,000	200,000	1,520,000
	Total		-	-						0	3,537,000	1,811,000	1,017,500	6,365,500
Oudomxai SS	22 kV Feeders	AAC 250mm²	km	11,000	123	135	83	0	341	1,353,000	1,485,000	913,000	0	3,751,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	95	185	80	70	430	665,000	1,295,000	560,000	490,000	3,010,000
	22 kV Trans. Station	50 kVA	unit	6,500	40	40	42	28	150	260,000	260,000	273,000	182,000	975,000
		100kVA	unit	7,000	30	26	30	20	106	210,000	182,000	210,000	140,000	742,000
		160 kVA	unit	8,000	12	14	20	10	56	96,000	112,000	160,000	80,000	448,000
		250 kVA	unit	8,500	4	6	10	5	25	34,000	51,000	85,000	42,500	212,500
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	2	2	0	0	0	30,000	30,000
		SVR	unit	50,000	0	0	1	0	1	0	0	50,000	0	50,000
	LV Facilities		km	5,000	176	256	64	56	552	880,000	1,280,000	320,000	280,000	2,760,000
	Total		-	-						3,498,000	4,665,000	2,571,000	1,244,500	11,978,500
Huaxai SS	22 kV Feeders	AAC 250mm²	km	11,000	0	0	0	0	0	0	0	0	0	0
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	45	60	0	105	0	405,000	540,000	0	945,000
		AAC 70mm²	km	7,000	0	30	75	50	155	0	210,000	525,000	350,000	1,085,000
	22 kV Trans. Station	50 kVA	unit	6,500	20	29	49	28	126	130,000	188,500	318,500	182,000	819,000
		100kVA	unit	7,000	4	7	20	15	46	28,000	49,000	140,000	105,000	322,000
		160 kVA	unit	8,000	0	0	5	3	8	0	0	40,000	24,000	64,000
		250 kVA	unit	8,500	0	0	0	0	0	0	0	0	0	0
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	0	60	108	40	208	0	300,000	540,000	200,000	1,040,000
	Total		-	-						158,000	1,152,500	2,103,500	861,000	4,275,000
Nam Beng PS	22 kV Feeders	AAC 250mm²	km	11,000	0	0	0	0	0	0	0	0	0	0
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	0	55	0	0	55	0	385,000	0	0	385,000
	22 kV Trans. Station	50 kVA	unit	6,500	0	32	41	21	94	0	208,000	266,500	136,500	611,000
		100kVA	unit	7,000	0	12	9	12	33	0	84,000	63,000	84,000	231,000
		160 kVA	unit	8,000	0	2	2	2	6	0	16,000	16,000	16,000	48,000
		250 kVA	unit	8,500	0	0	0	0	0	0	0	0	0	0
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	0	44	0	0	44	0	220,000	0	0	220,000
	Total		-	-						0	913,000	345,500	236,500	1,495,000
Hongsa SS	22 kV Feeders	AAC 250mm²	km	11,000	0	85	60	10	155	0	935,000	660,000	110,000	1,705,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	10	0	0	10	0	90,000	0	0	90,000
		AAC 70mm²	km	7,000	0	0	95	0	95	0	0	665,000	0	665,000
	22 kV Trans. Station	50 kVA	unit	6,500	0	62	24	44	130	0	403,000	156,000	286,000	845,000
		100kVA	unit	7,000	0	18	8	30	56	0	126,000	56,000	210,000	392,000
		160 kVA	unit	8,000	0	8	4	12	24	0	64,000	32,000	96,000	192,000
		250 kVA	unit	8,500	0	6	20	6	32	0	51,000	170,000	51,000	272,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	0	76	124	0	200	0	380,000	620,000	0	1,000,000
	Total		-	-						0	2,049,000	2,359,000	753,000	5,161,000

表3.3 変電所別の配電設備の必要数量と建設コスト

Substation	Particulars		Unit	Rate	Estimated Quantities					Cost Estimate (US$)				
				(US$)	2005	2010	2015	2020	Total	2005	2010	2015	2020	Total
Xayabuly SS	22 kV Feeders	AAC 250mm²	km	11,000	0	0	0	0	0	0	0	0	0	0
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	90	0	0	0	90	810,000	0	0	0	810,000
		AAC 70mm²	km	7,000	0	89	70	0	159	0	623,000	490,000	0	1,113,000
	22 kV Trans. Station	50 kVA	unit	6,500	41	10	33	30	114	266,500	65,000	214,500	195,000	741,000
		100kVA	unit	7,000	12	5	14	16	47	84,000	35,000	98,000	112,000	329,000
		160 kVA	unit	8,000	8	0	4	5	17	64,000	0	32,000	40,000	136,000
		250 kVA	unit	8,500	4	0	0	0	4	34,000	0	0	0	34,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	72	71	56	0	199	360,000	355,000	280,000	0	995,000
	Total		-	-						1,618,500	1,078,000	1,114,500	347,000	4,158,000
Paklay SS	22 kV Feeders	AAC 250mm²	km	11,000	0	90	0	55	145	0	990,000	0	605,000	1,595,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	30	0	0	30	0	270,000	0	0	270,000
		AAC 70mm²	km	7,000	0	0	50	80	130	0	0	350,000	560,000	910,000
	22 kV Trans. Station	50 kVA	unit	6,500	22	42	25	28	117	143,000	273,000	162,500	182,000	760,500
		100kVA	unit	7,000	6	13	10	14	43	42,000	91,000	70,000	98,000	301,000
		160 kVA	unit	8,000	2	5	2	3	12	16,000	40,000	16,000	24,000	96,000
		250 kVA	unit	8,500	0	2	0	0	2	0	17,000	0	0	17,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	0	96	40	108	244	0	480,000	200,000	540,000	1,220,000
	Total		-	-						201,000	2,161,000	798,500	2,009,000	5,169,500
Xam Nua SS	22 kV Feeders	AAC 250mm²	km	11,000	0	90	0	55	145	0	990,000	0	605,000	1,595,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	30	0	0	30	0	270,000	0	0	270,000
		AAC 70mm²	km	7,000	0	0	50	80	130	0	0	350,000	560,000	910,000
	22 kV Trans. Station	50 kVA	unit	6,500	22	42	25	28	117	143,000	273,000	162,500	182,000	760,500
		100kVA	unit	7,000	6	13	10	14	43	42,000	91,000	70,000	98,000	301,000
		160 kVA	unit	8,000	2	5	2	3	12	16,000	40,000	16,000	24,000	96,000
		250 kVA	unit	8,500	0	2	0	0	2	0	17,000	0	0	17,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	1	1	0	0	0	15,000	15,000
		SVR	unit	50,000	0	0	1	1	2	0	0	50,000	50,000	100,000
	LV Facilities		km	5,000	0	96	40	108	244	0	480,000	200,000	540,000	1,220,000
	Total		-	-						201,000	2,161,000	848,500	2,074,000	5,284,500
Non Hai SS	22 kV Feeders	AAC 250mm²	km	11,000	55	0	0	0	55	605,000	0	0	0	605,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	0	45	0	0	45	0	315,000	0	0	315,000
	22 kV Trans. Station	50 kVA	unit	6,500	18	10	26	24	78	117,000	65,000	169,000	156,000	507,000
		100kVA	unit	7,000	6	1	13	10	30	42,000	7,000	91,000	70,000	210,000
		160 kVA	unit	8,000	0	0	0	0	0	0	0	0	0	0
		250 kVA	unit	8,500	0	0	0	0	0	0	0	0	0	0
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	44	36	0	0	80	220,000	180,000	0	0	400,000
	Total		-	-						984,000	567,000	260,000	226,000	2,037,000
Ban Don SS	22 kV Feeders	AAC 250mm²	km	11,000	10	0	0	0	10	110,000	0	0	0	110,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	0	55	0	0	55	0	385,000	0	0	385,000
	22 kV Trans. Station	50 kVA	unit	6,500	20	10	29	29	88	130,000	65,000	188,500	188,500	572,000
		100kVA	unit	7,000	6	2	15	12	35	42,000	14,000	105,000	84,000	245,000
		160 kVA	unit	8,000	0	0	2	2	4	0	0	16,000	16,000	32,000
		250 kVA	unit	8,500	0	0	0	0	0	0	0	0	0	0
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	8	44	0	0	52	40,000	220,000	0	0	260,000
	Total		-	-						322,000	684,000	309,500	288,500	1,604,000
Luang Prabang SS	22 kV Feeders	AAC 250mm²	km	11,000	95	0	0	0	95	1,045,000	0	0	0	1,045,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	60	0	0	10	70	540,000	0	0	90,000	630,000
		AAC 70mm²	km	7,000	0	70	50	0	120	0	490,000	350,000	0	840,000
	22 kV Trans. Station	50 kVA	unit	6,500	18	25	54	60	157	117,000	162,500	351,000	390,000	1,020,500
		100kVA	unit	7,000	11	18	35	36	100	77,000	126,000	245,000	252,000	700,000
		160 kVA	unit	8,000	6	10	13	16	45	48,000	80,000	104,000	128,000	360,000
		250 kVA	unit	8,500	4	4	6	8	22	34,000	34,000	51,000	68,000	187,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	124	56	40	8	228	620,000	280,000	200,000	40,000	1,140,000
	Total		-	-						2,481,000	1,172,500	1,301,000	968,000	5,922,500

表3.3 変電所別の配電設備の必要数量と建設コスト

Substation	Particulars		Unit	Rate	Estimated Quantities					Cost Estimate (US$)				
				(US$)	2005	2010	2015	2020	Total	2005	2010	2015	2020	Total
Phonsavan SS	22 kV Feeders	AAC 250mm²	km	11,000	50	0	0	0	50	550,000	0	0	0	550,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	80	0	0	0	80	720,000	0	0	0	720,000
		AAC 70mm²	km	7,000	0	50	45	0	95	0	350,000	315,000	0	665,000
	22 kV Trans.	50 kVA	unit	6,500	50	18	60	45	173	325,000	117,000	390,000	292,500	1,124,500
	Station	100kVA	unit	7,000	20	14	37	30	101	140,000	98,000	259,000	210,000	707,000
		160 kVA	unit	8,000	0	0	6	4	10	0	0	48,000	32,000	80,000
		250 kVA	unit	8,500	0	0	0	2	2	0	0	0	17,000	17,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	26	64	36	8	134	130,000	320,000	180,000	40,000	670,000
	Total		-	-						1,865,000	885,000	1,192,000	591,500	4,533,500
Nam Leuk PS	22 kV Feeders	AAC 250mm²	km	11,000	100	0	0	0	100	1,100,000	0	0	0	1,100,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	0	50	0	0	50	0	350,000	0	0	350,000
	22 kV Trans.	50 kVA	unit	6,500	30	18	26	28	102	195,000	117,000	169,000	182,000	663,000
	Station	100kVA	unit	7,000	0	0	0	0	0	0	0	0	0	0
		160 kVA	unit	8,000	0	0	0	0	0	0	0	0	0	0
		250 kVA	unit	8,500	0	0	0	0	0	0	0	0	0	0
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	80	40	0	0	120	400,000	200,000	0	0	600,000
	Total		-	-						1,695,000	667,000	169,000	182,000	2,713,000
Vangvieng SS	22 kV Feeders	AAC 250mm²	km	11,000	100	0	0	10	110	1,100,000	0	0	110,000	1,210,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	70	0	0	0	70	630,000	0	0	0	630,000
		AAC 70mm²	km	7,000	0	45	0	0	45	0	315,000	0	0	315,000
	22 kV Trans.	50 kVA	unit	6,500	46	21	35	42	144	299,000	136,500	227,500	273,000	936,000
	Station	100kVA	unit	7,000	21	10	19	18	68	147,000	70,000	133,000	126,000	476,000
		160 kVA	unit	8,000	18	4	8	8	38	144,000	32,000	64,000	64,000	304,000
		250 kVA	unit	8,500	6	0	4	6	16	51,000	0	34,000	51,000	136,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	1	0	0	1	0	50,000	0	0	50,000
	LV Facilities		km	5,000	136	36	0	8	180	680,000	180,000	0	40,000	900,000
	Total		-	-						3,051,000	783,500	458,500	664,000	4,957,000
Vientiane Mun.	22 kV Feeders	AAC 250mm²	km	11,000	20	20	25	30	95	220,000	220,000	275,000	330,000	1,045,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	50	60	70	80	260	450,000	540,000	630,000	720,000	2,340,000
		AAC 70mm²	km	7,000	100	130	165	250	645	700,000	910,000	1,155,000	1,750,000	4,515,000
	22 kV Trans.	50 kVA	unit	6,500	0	0	0	0	0	0	0	0	0	0
	Station	100kVA	unit	7,000	200	260	265	320	1045	1,400,000	1,820,000	1,855,000	2,240,000	7,315,000
		160 kVA	unit	8,000	90	100	170	220	580	720,000	800,000	1,360,000	1,760,000	4,640,000
		250 kVA	unit	8,500	50	80	100	150	380	425,000	680,000	850,000	1,275,000	3,230,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	1	0	0	1	0	50,000	0	0	50,000
	LV Facilities		km	5,000	160	210	270	360	1000	800,000	1,050,000	1,350,000	1,800,000	5,000,000
	Total		-	-						4,715,000	6,070,000	7,475,000	9,875,000	28,135,000
Pakxan SS	22 kV Feeders	AAC 250mm²	km	11,000	0	0	0	15	15	0	0	0	165,000	165,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	20	25	50	0	95	180,000	225,000	450,000	0	855,000
		AAC 70mm²	km	7,000	0	0	0	0	0	0	0	0	0	0
	22 kV Trans.	50 kVA	unit	6,500	10	10	25	30	75	65,000	65,000	162,500	195,000	487,500
	Station	100kVA	unit	7,000	5	7	15	15	42	35,000	49,000	105,000	105,000	294,000
		160 kVA	unit	8,000	5	5	5	7	22	40,000	40,000	40,000	56,000	176,000
		250 kVA	unit	8,500	0	2	5	5	12	0	17,000	42,500	42,500	102,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	12	20	40	12	84	60,000	100,000	200,000	60,000	420,000
	Total		-	-						380,000	496,000	1,000,000	623,500	2,499,500
Thakhek SS	22 kV Feeders	AAC 250mm²	km	11,000	20	70	40	5	135	220,000	770,000	440,000	55,000	1,485,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	5	5	0	0	10	45,000	45,000	0	0	90,000
		AAC 70mm²	km	7,000	0	0	0	0	0	0	0	0	0	0
	22 kV Trans.	50 kVA	unit	6,500	85	110	140	120	455	552,500	715,000	910,000	780,000	2,957,500
	Station	100kVA	unit	7,000	40	60	80	60	240	280,000	420,000	560,000	420,000	1,680,000
		160 kVA	unit	8,000	20	40	60	50	170	160,000	320,000	480,000	400,000	1,360,000
		250 kVA	unit	8,500	10	25	40	35	110	85,000	212,500	340,000	297,500	935,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	1	0	1	0	0	15,000	0	15,000
		SVR	unit	50,000	0	0	1	0	1	0	0	50,000	0	50,000
	LV Facilities		km	5,000	20	65	37	30	152	100,000	325,000	185,000	150,000	760,000
	Total		-	-						1,442,500	2,807,500	2,980,000	2,102,500	9,332,500

表3.3 変電所別の配電設備の必要数量と建設コスト

Substation	Particulars		Unit	Rate	Estimated Quantities					Cost Estimate (US$)				
				(US$)	2005	2010	2015	2020	Total	2005	2010	2015	2020	Total
Nam Theun 2	22 kV Feeders	AAC 250mm²	km	11,000	0	0	0	0	0	0	0	0	0	0
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	20	0	0	20	0	180,000	0	0	180,000
		AAC 70mm²	km	7,000	0	20	60	0	80	0	140,000	420,000	0	560,000
	22 kV Trans. Station	50 kVA	unit	6,500	0	37	33	33	103	0	240,500	214,500	214,500	669,500
		100kVA	unit	7,000	0	10	10	10	30	0	70,000	70,000	70,000	210,000
		160 kVA	unit	8,000	0	0	4	4	8	0	0	32,000	32,000	64,000
		250 kVA	unit	8,500	0	0	0	0	0	0	0	0	0	0
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	0	32	48	30	110	0	160,000	240,000	150,000	550,000
	Total		-	-						0	790,500	976,500	466,500	2,233,500
Xaibouathong S	22 kV Feeders	AAC 250mm²	km	11,000	90	25	15	10	140	990,000	275,000	165,000	110,000	1,540,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	0	0	0	0	0	0	0	0	0	0
	22 kV Trans. Station	50 kVA	unit	6,500	20	40	30	20	110	130,000	260,000	195,000	130,000	715,000
		100kVA	unit	7,000	10	25	20	10	65	70,000	175,000	140,000	70,000	455,000
		160 kVA	unit	8,000	9	10	20	10	49	72,000	80,000	160,000	80,000	392,000
		250 kVA	unit	8,500	5	10	20	7	42	42,500	85,000	170,000	59,500	357,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	72	20	12	8	112	360,000	100,000	60,000	40,000	560,000
	Total		-	-						1,664,500	975,000	890,000	489,500	4,019,000
Pakbo SS	22 kV Feeders	AAC 250mm²	km	11,000	80	18	67	35	200	880,000	198,000	737,000	385,000	2,200,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	5	15	10	15	45	45,000	135,000	90,000	135,000	405,000
		AAC 70mm²	km	7,000	0	0	0	0	0	0	0	0	0	0
	22 kV Trans. Station	50 kVA	unit	6,500	21	100	120	120	361	136,500	650,000	780,000	780,000	2,346,500
		100kVA	unit	7,000	10	70	90	100	270	70,000	490,000	630,000	700,000	1,890,000
		160 kVA	unit	8,000	5	30	50	50	135	40,000	240,000	400,000	400,000	1,080,000
		250 kVA	unit	8,500	5	12	26	30	73	42,500	102,000	221,000	255,000	620,500
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	68	26	62	36	192	340,000	130,000	310,000	180,000	960,000
	Total		-	-						1,554,000	1,945,000	3,168,000	2,835,000	9,502,000
Kengkok SS	22 kV Feeders	AAC 250mm²	km	11,000	92	30	15	10	147	1,012,000	330,000	165,000	110,000	1,617,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	58	10	5	15	88	522,000	90,000	45,000	135,000	792,000
		AAC 70mm²	km	7,000	0	0	0	0	0	0	0	0	0	0
	22 kV Trans. Station	50 kVA	unit	6,500	20	20	40	50	130	130,000	130,000	260,000	325,000	845,000
		100kVA	unit	7,000	20	20	30	30	100	140,000	140,000	210,000	210,000	700,000
		160 kVA	unit	8,000	20	20	30	30	100	160,000	160,000	240,000	240,000	800,000
		250 kVA	unit	8,500	10	10	20	20	60	85,000	85,000	170,000	170,000	510,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	120	32	16	20	188	600,000	160,000	80,000	100,000	940,000
	Total		-	-						2,649,000	1,095,000	1,170,000	1,290,000	6,204,000
Xepon SS	22 kV Feeders	AAC 250mm²	km	11,000	70	20	15	15	120	770,000	220,000	165,000	165,000	1,320,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	35	10	5	5	55	315,000	90,000	45,000	45,000	495,000
		AAC 70mm²	km	7,000	0	0	0	0	0	0	0	0	0	0
	22 kV Trans. Station	50 kVA	unit	6,500	100	100	80	100	380	650,000	650,000	520,000	650,000	2,470,000
		100kVA	unit	7,000	20	45	40	40	145	140,000	315,000	280,000	280,000	1,015,000
		160 kVA	unit	8,000	10	10	20	23	63	80,000	80,000	160,000	184,000	504,000
		250 kVA	unit	8,500	6	10	10	20	46	51,000	85,000	85,000	170,000	391,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	84	24	16	16	140	420,000	120,000	80,000	80,000	700,000
	Total		-	-						2,426,000	1,560,000	1,335,000	1,574,000	6,895,000
Xepon PS	22 kV Feeders	AAC 250mm²	km	11,000	0	0	0	0	0	0	0	0	0	0
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	20	0	20	0	0	180,000	0	180,000
		AAC 70mm²	km	7,000	0	0	20	20	40	0	0	140,000	140,000	280,000
	22 kV Trans. Station	50 kVA	unit	6,500	0	0	33	15	48	0	0	214,500	97,500	312,000
		100kVA	unit	7,000	0	0	5	1	6	0	0	35,000	7,000	42,000
		160 kVA	unit	8,000	0	0	0	0	0	0	0	0	0	0
		250 kVA	unit	8,500	0	0	0	0	0	0	0	0	0	0
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	0	0	32	16	48	0	0	160,000	80,000	240,000
	Total		-	-						0	0	729,500	324,500	1,054,000

表3.3 変電所別の配電設備の必要数量と建設コスト

Substation	Particulars		Unit	Rate	Estimated Quantities					Cost Estimate (US$)				
				(US$)	2005	2010	2015	2020	Total	2005	2010	2015	2020	Total
Saravan SS	22 kV Feeders	AAC 250mm²	km	11,000	0	50	20	0	70	0	550,000	220,000	0	770,000
		AAC 185mm²	km	10,000	0	60	15	15	90	0	600,000	150,000	150,000	900,000
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	0	0	0	0	0	0	0	0	0	0
	22 kV Trans. Station	50 kVA	unit	6,500	0	80	25	30	135	0	520,000	162,500	195,000	877,500
		100kVA	unit	7,000	0	17	10	10	37	0	119,000	70,000	70,000	259,000
		160 kVA	unit	8,000	0	10	5	7	22	0	80,000	40,000	56,000	176,000
		250 kVA	unit	8,500	0	4	5	6	15	0	34,000	42,500	51,000	127,500
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	0	128	48	24	200	0	640,000	240,000	120,000	1,000,000
	Total		-	-						0	2,543,000	925,000	642,000	4,110,000
Bang Yo SS	22 kV Feeders	AAC 250mm²	km	11,000	80	5	10	20	115	880,000	55,000	110,000	220,000	1,265,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	40	0	5	0	45	280,000	0	35,000	0	315,000
	22 kV Trans. Station	50 kVA	unit	6,500	42	100	150	30	322	273,000	650,000	975,000	195,000	2,093,000
		100kVA	unit	7,000	10	40	80	10	140	70,000	280,000	560,000	70,000	980,000
		160 kVA	unit	8,000	5	12	20	7	44	40,000	96,000	160,000	56,000	352,000
		250 kVA	unit	8,500	2	5	10	6	23	17,000	42,500	85,000	51,000	195,500
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	96	4	12	16	128	480,000	20,000	60,000	80,000	640,000
	Total		-	-						2,040,000	1,143,500	1,985,000	672,000	5,840,500
Lakpet SS	22 kV Feeders	AAC 250mm²	km	11,000	0	75	10	15	100	0	825,000	110,000	165,000	1,100,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	0	0	0	10	10	0	0	0	70,000	70,000
	22 kV Trans. Station	50 kVA	unit	6,500	0	82	80	150	312	0	533,000	520,000	975,000	2,028,000
		100kVA	unit	7,000	0	15	17	58	90	0	105,000	119,000	406,000	630,000
		160 kVA	unit	8,000	0	5	10	30	45	0	40,000	80,000	240,000	360,000
		250 kVA	unit	8,500	0	2	5	20	27	0	17,000	42,500	170,000	229,500
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	0	60	8	20	88	0	300,000	40,000	100,000	440,000
	Total		-	-						0	1,820,000	911,500	2,126,000	4,857,500
Ban Boun SS	22 kV Feeders	AAC 250mm²	km	11,000	65	15	15	0	95	715,000	165,000	165,000	0	1,045,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	0	0	0	0	0	0	0	0	0	0
	22 kV Trans. Station	50 kVA	unit	6,500	12	35	50	50	147	78,000	227,500	325,000	325,000	955,500
		100kVA	unit	7,000	10	12	12	15	49	70,000	84,000	84,000	105,000	343,000
		160 kVA	unit	8,000	3	5	5	10	23	24,000	40,000	40,000	80,000	184,000
		250 kVA	unit	8,500	3	3	3	4	13	25,500	25,500	25,500	34,000	110,500
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	52	12	12	0	76	260,000	60,000	60,000	0	380,000
	Total		-	-						1,172,500	602,000	699,500	544,000	3,018,000
Thakho SS	22 kV Feeders	AAC 250mm²	km	11,000	55	10	65	10	140	605,000	110,000	715,000	110,000	1,540,000
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	0	0	0	0	0	0	0	0	0	0
	22 kV Trans. Station	50 kVA	unit	6,500	10	10	15	20	55	65,000	65,000	97,500	130,000	357,500
		100kVA	unit	7,000	6	6	5	8	25	42,000	42,000	35,000	56,000	175,000
		160 kVA	unit	8,000	5	5	5	5	20	40,000	40,000	40,000	40,000	160,000
		250 kVA	unit	8,500	3	3	5	5	16	25,500	25,500	42,500	42,500	136,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	1	0	1	0	0	15,000	0	15,000
		SVR	unit	50,000	0	0	1	0	1	0	0	50,000	0	50,000
	LV Facilities		km	5,000	44	8	52	8	112	220,000	40,000	260,000	40,000	560,000
	Total		-	-						997,500	322,500	1,255,000	418,500	2,993,500
Attapeu SS	22 kV Feeders	AAC 250mm²	km	11,000	0	0	0	0	0	0	0	0	0	0
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	65	0	65	0	0	585,000	0	585,000
		AAC 70mm²	km	7,000	0	0	15	75	90	0	0	105,000	525,000	630,000
	22 kV Trans. Station	50 kVA	unit	6,500	20	14	35	33	102	130,000	91,000	227,500	214,500	663,000
		100kVA	unit	7,000	5	3	11	9	28	35,000	21,000	77,000	63,000	196,000
		160 kVA	unit	8,000	2	0	4	4	10	16,000	0	32,000	32,000	80,000
		250 kVA	unit	8,500	0	0	2	2	4	0	0	17,000	17,000	34,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	0	0	44	60	104	0	0	220,000	300,000	520,000
	Total		-	-						181,000	112,000	1,263,500	1,151,500	2,708,000

表3.3 変電所別の配電設備の必要数量と建設コスト

Substation	Particulars		Unit	Rate	Estimated Quantities					Cost Estimate (US$)				
				(US$)	2005	2010	2015	2020	Total	2005	2010	2015	2020	Total
Xeset	22 kV Feeders	AAC 250mm²	km	11,000	0	0	0	0	0	0	0	0	0	0
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	70	0	0	50	120	490,000	0	0	350,000	840,000
	22 kV Trans. Station	50 kVA	unit	6,500	30	0	0	26	56	195,000	0	0	169,000	364,000
		100kVA	unit	7,000	16	0	0	10	26	112,000	0	0	70,000	182,000
		160 kVA	unit	8,000	7	0	0	5	12	56,000	0	0	40,000	96,000
		250 kVA	unit	8,500	4	0	0	4	8	34,000	0	0	34,000	68,000
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	56	0	0	40	96	280,000	0	0	200,000	480,000
	Total		-	-						1,167,000	0	0	863,000	2,030,000
Sekong SS	22 kV Feeders	AAC 250mm²	km	11,000	0	0	0	0	0	0	0	0	0	0
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	0	10	10	50	70	0	70,000	70,000	350,000	490,000
	22 kV Trans. Station	50 kVA	unit	6,500	0	21	12	13	46	0	136,500	78,000	84,500	299,000
		100kVA	unit	7,000	0	6	0	2	8	0	42,000	0	14,000	56,000
		160 kVA	unit	8,000	0	2	0	0	2	0	16,000	0	0	16,000
		250 kVA	unit	8,500	0	0	0	0	0	0	0	0	0	0
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	0	8	8	40	56	0	40,000	40,000	200,000	280,000
	Total		-	-						0	304,500	188,000	648,500	1,141,000
Pakxon SS	22 kV Feeders	AAC 250mm²	km	11,000	0	0	0	0	0	0	0	0	0	0
		AAC 185mm²	km	10,000	0	0	0	0	0	0	0	0	0	0
		AAC 150mm²	km	9,000	0	0	0	0	0	0	0	0	0	0
		AAC 70mm²	km	7,000	30	20	20	0	70	210,000	140,000	140,000	0	490,000
	22 kV Trans. Station	50 kVA	unit	6,500	11	13	16	23	63	71,500	84,500	104,000	149,500	409,500
		100kVA	unit	7,000	2	2	3	5	12	14,000	14,000	21,000	35,000	84,000
		160 kVA	unit	8,000	0	0	2	2	4	0	0	16,000	16,000	32,000
		250 kVA	unit	8,500	0	0	0	0	0	0	0	0	0	0
	22 kV Ancillaries	S. Capacitor	unit	15,000	0	0	0	0	0	0	0	0	0	0
		SVR	unit	50,000	0	0	0	0	0	0	0	0	0	0
	LV Facilities		km	5,000	24	16	16	0	56	120,000	80,000	80,000	0	280,000
	Total		-	-						415,500	318,500	361,000	200,500	1,295,500
Grand Total										36,879,000	47,345,500	44,631,000	40,066,000	168,921,500
FC portion (80%)										29,503,200	37,876,400	35,704,800	32,052,800	135,137,200
LC portion (20%)										7,375,800	9,469,100	8,926,200	8,013,200	33,784,300

Note: In the areas which are being supplied through import from neighboring countries or IPP plants, investment costs for MV & LV facilities meeting growing demand before completion of new substations are excluded for economic evaluation purpose.

表3.5 配電設備建設コストの支出計画

(Unit:1,000US$)

Name of Substation	Disbursement Schedule																			
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1 Phonetong	943.0	943.0	943.0	943.0	943.0	1,214.0	1,214.0	1,214.0	1,214.0	1,214.0	1,495.0	1,495.0	1,495.0	1,495.0	1,495.0	1,975.0	1,975.0	1,975.0	1,975.0	1,975.0
2 Thanaleng																				
3 Tha Ngon																				
4 Lakxaosi																				
5 Naxaithong																				
6 Phonesoung																				
7 Nam Ngum 1																				
8 Vangvieng	610.2	610.2	610.2	610.2	610.2	156.7	156.7	156.7	156.7	156.7	91.7	91.7	91.7	91.7	91.7	132.8	132.8	132.8	132.8	132.8
9 Luang Prabang	496.2	496.2	496.2	496.2	496.2	234.5	234.5	234.5	234.5	234.5	260.2	260.2	260.2	260.2	260.2	193.6	193.6	193.6	193.6	193.6
10 Oudomxai			1,166.0	1,166.0	1,166.0	933.0	933.0	933.0	933.0	933.0	514.2	514.2	514.2	514.2	514.2	248.9	248.9	248.9	248.9	248.9
11 Nam Beng						182.6	182.6	182.6	182.6	182.6	69.1	69.1	69.1	69.1	69.1	47.3	47.3	47.3	47.3	47.3
12 Boun Neua						393.0	393.0	393.0	393.0	393.0	335.4	335.4	335.4	335.4	335.4	351.4	351.4	351.4	351.4	351.4
13 Luang Namptha						707.4	707.4	707.4	707.4	707.4	362.2	362.2	362.2	362.2	362.2	203.5	203.5	203.5	203.5	203.5
14 Xayabury	323.7	323.7	323.7	323.7	323.7	215.6	215.6	215.6	215.6	215.6	222.9	222.9	222.9	222.9	222.9	69.4	69.4	69.4	69.4	69.4
15 Hongsa								683.0	683.0	683.0	471.8	471.8	471.8	471.8	471.8	150.6	150.6	150.6	150.6	150.6
16 Huaxai	31.6	31.6	31.6	31.6	31.6	230.5	230.5	230.5	230.5	230.5	420.7	420.7	420.7	420.7	420.7	172.2	172.2	172.2	172.2	172.2
17 Paklay	40.2	40.2	40.2	40.2	40.2	432.2	432.2	432.2	432.2	432.2	159.7	159.7	159.7	159.7	159.7	401.8	401.8	401.8	401.8	401.8
18 Non Hai	196.8	196.8	196.8	196.8	196.8	113.4	113.4	113.4	113.4	113.4	52.0	52.0	52.0	52.0	52.0	45.2	45.2	45.2	45.2	45.2
19 Ban Don	64.4	64.4	64.4	64.4	64.4	136.8	136.8	136.8	136.8	136.8	61.9	61.9	61.9	61.9	61.9	57.7	57.7	57.7	57.7	57.7
20 Phonsavan	373.0	373.0	373.0	373.0	373.0	177.0	177.0	177.0	177.0	177.0	238.4	238.4	238.4	238.4	238.4	118.3	118.3	118.3	118.3	118.3
21 Xam Nua	40.2	40.2	40.2	40.2	40.2	432.2	432.2	432.2	432.2	432.2	169.7	169.7	169.7	169.7	169.7	414.8	414.8	414.8	414.8	414.8
22 Nam Leuk	339.0	339.0	339.0	339.0	339.0	133.4	133.4	133.4	133.4	133.4	33.8	33.8	33.8	33.8	33.8	36.4	36.4	36.4	36.4	36.4
23 Paxan	76.0	76.0	76.0	76.0	76.0	99.2	99.2	99.2	99.2	99.2	200.0	200.0	200.0	200.0	200.0	124.7	124.7	124.7	124.7	124.7
24 Thakhek	288.5	288.5	288.5	288.5	288.5	561.5	561.5	561.5	561.5	561.5	596.0	596.0	596.0	596.0	596.0	420.5	420.5	420.5	420.5	420.5
25 Xaibouathong			554.8	554.8	554.8	195.0	195.0	195.0	195.0	195.0	178.0	178.0	178.0	178.0	178.0	97.9	97.9	97.9	97.9	97.9
26 Pakbo	310.8	310.8	310.8	310.8	310.8	389.0	389.0	389.0	389.0	389.0	633.6	633.6	633.6	633.6	633.6	567.0	567.0	567.0	567.0	567.0
27 Kengkok	529.8	529.8	529.8	529.8	529.8	219.0	219.0	219.0	219.0	219.0	234.0	234.0	234.0	234.0	234.0	258.0	258.0	258.0	258.0	258.0
28 Xepon			808.7	808.7	808.7	312.0	312.0	312.0	312.0	312.0	267.0	267.0	267.0	267.0	267.0	314.8	314.8	314.8	314.8	314.8
29 Saravan								847.7	847.7	847.7	185.0	185.0	185.0	185.0	185.0	128.4	128.4	128.4	128.4	128.4
30 Xeset 1	233.4	233.4	233.4	233.4	233.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	172.6	172.6	172.6	172.6	172.6
31 Bang Yo	408.0	408.0	408.0	408.0	408.0	228.7	228.7	228.7	228.7	228.7	397.0	397.0	397.0	397.0	397.0	134.4	134.4	134.4	134.4	134.4
32 Pakxon			138.5	138.5	138.5	63.7	63.7	63.7	63.7	63.7	72.2	72.2	72.2	72.2	72.2	40.1	40.1	40.1	40.1	40.1
33 Ban Boun			390.8	390.8	390.8	120.4	120.4	120.4	120.4	120.4	139.9	139.9	139.9	139.9	139.9	108.8	108.8	108.8	108.8	108.8
34 Thakho			332.5	332.5	332.5	64.5	64.5	64.5	64.5	64.5	251.0	251.0	251.0	251.0	251.0	83.7	83.7	83.7	83.7	83.7
35 Sekong								101.5	101.5	101.5	37.6	37.6	37.6	37.6	37.6	129.7	129.7	129.7	129.7	129.7
36 Attapeu	36.2	36.2	36.2	36.2	36.2	22.4	22.4	22.4	22.4	22.4	252.7	252.7	252.7	252.7	252.7	230.3	230.3	230.3	230.3	230.3
37 Xepon PS											145.9	145.9	145.9	145.9	145.9	64.9	64.9	64.9	64.9	64.9
38 Lakpet			0.0	0.0	0.0	364.0	364.0	364.0	364.0	364.0	182.3	182.3	182.3	182.3	182.3	425.2	425.2	425.2	425.2	425.2
39 Nam Theun 2 PS						158.1	158.1	158.1	158.1	158.1	195.3	195.3	195.3	195.3	195.3	93.3	93.3	93.3	93.3	93.3
Total	5,341.0	5,341.0	8,732.3	8,732.3	8,732.3	8,489.8	8,489.8	10,122.0	10,122.0	10,122.0	8,926.2	8,926.2	8,926.2	8,926.2	8,926.2	8,013.2	8,013.2	8,013.2	8,013.2	8,013.2
FC Portion	4,272.8	4,272.8	6,985.9	6,985.9	6,985.9	6,791.8	6,791.8	8,097.6	8,097.6	8,097.6	7,141.0	7,141.0	7,141.0	7,141.0	7,141.0	6,410.6	6,410.6	6,410.6	6,410.6	6,410.6
LC Portion	1,068.2	1,068.2	1,746.5	1,746.5	1,746.5	1,698.0	1,698.0	2,024.4	2,024.4	2,024.4	1,785.2	1,785.2	1,785.2	1,785.2	1,785.2	1,602.6	1,602.6	1,602.6	1,602.6	1,602.6

Note: Costs shown in the line for Phonethong substation mean total costs for MV & LV construction required for all substations in Vientiane Municipality.

表4.1 変電所別の年間販売電力量の増加分(2000年基準)

Name of Substation	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1 Phonetong	18,299	37,608	59,133	-73,103	-60,158	-46,931	-32,879	-18,000	-2,155	-32,515	-19,077	-4,882	10,112	25,949	42,679	60,240	78,784	98,365	119,042	140,875
2 Thanaleng	12,049	15,860	22,728	7,021	12,048	17,173	23,758	29,551	35,736	42,285	49,700	56,359	63,393	70,822	79,782	88,020	96,720	105,906	116,717	126,960
3 Tha Ngon	2,697	5,603	9,506	12,716	16,182	19,760	24,396	28,564	33,067	37,933	43,317	48,245	53,518	59,160	65,974	72,402	79,287	86,662	95,340	103,813
4 Lakxaosi				173,784	183,495	193,336	206,362	217,397	229,137	241,611	257,417	269,857	282,995	296,871	314,166	329,543	345,778	362,919	383,655	402,762
5 Naxaithong										76,481	80,782	85,325	90,122	95,188	100,539	106,149	112,072	118,324	124,925	131,893
6 Phonesoung	2,790	5,698	9,535	12,990	16,694	20,584	25,407	29,745	34,463	10,232	14,932	19,144	23,280	27,558	32,938	37,903	43,269	49,118	56,061	62,899
7 Nam Ngum 1	485	1,041	1,982	2,648	3,350	4,112	5,271	6,180	7,141	8,228	9,588	10,671	11,840	13,103	14,868	16,338	17,926	19,645	21,862	23,875
8 Vangvieng	1,398	10,577	12,219	21,665	25,205	27,383	29,791	32,344	35,110	38,028	41,640	45,531	49,642	53,479	57,350	61,323	65,468	69,971	74,810	80,004
9 Luang Prabang	1,861	3,839	6,045	13,274	16,433	19,687	23,257	26,923	30,866	35,124	41,530	47,820	54,188	60,255	66,574	73,163	80,131	87,590	95,464	103,915
10 Oudomxai					21,477	24,044	26,715	39,689	43,590	49,462	56,010	62,853	70,178	76,845	83,811	90,683	97,914	105,577	113,884	122,626
11 Nam Beng						6,006	6,805	7,662	8,628	9,605	11,477	13,401	15,582	17,754	19,549	21,128	22,735	24,541	26,367	28,363
12 Boun neua								9,877	10,838	11,866	12,994	14,122	15,370	16,701	18,171	19,659	21,317	23,017	24,859	26,853
13 Luang Namtha								23,052	25,255	27,702	31,259	34,864	38,672	42,184	45,897	49,417	53,228	57,297	61,566	66,201
14 Xayabury			14,246	16,713	19,249	22,023	24,946	27,905	30,853	24,636	27,160	29,491	31,549	33,762	36,169	38,465	40,898	43,430	46,235	49,101
15 Hongsa										23,374	27,454	31,790	36,330	41,147	46,400	51,899	57,730	63,341	68,922	74,681
16 Huaxai												21,549	23,355	25,199	27,139	29,104	31,296	33,602	36,028	38,631
17 Paklay								17,599	19,340	21,181	22,688	24,249	25,867	27,586	29,525	31,442	33,478	35,641	38,061	40,506
18 Non Hai			3,179	3,517	3,884	4,271	4,689	5,088	5,576	6,103	7,511	9,013	10,616	12,324	14,215	15,828	17,026	18,304	19,669	21,126
19 Ban Don			3,218	3,672	4,054	4,565	5,059	5,597	6,249	6,889	8,698	10,566	12,626	14,757	17,100	19,599	21,541	23,267	25,002	26,910
20 Phonsavan			11,462	12,825	14,175	15,672	17,308	19,034	20,801	22,812	27,790	33,010	38,510	42,616	46,777	50,655	54,647	58,817	63,302	67,964
21 Xam Nua												34,058	37,353	40,821	44,389	47,970	51,836	55,852	60,156	64,675
22 Nam Leuk	241	444	3,178	3,889	4,663	5,413	6,123	6,918	7,716	8,531	9,426	10,295	11,251	12,265	13,018	13,819	14,753	15,675	16,664	17,696
23 Paxan	1,211	2,622	6,073	7,656	8,789	10,489	14,229	16,204	18,183	20,277	24,840	27,168	29,426	31,908	36,475	39,185	42,168	45,757	50,583	54,161
24 Thakhek			9,427	16,656	32,883	44,307	55,165	81,578	94,581	108,539	122,137	137,884	158,403	172,057	219,811	235,623	255,809	273,576	295,086	315,955
25 Xaibouathong					13,530	17,944	24,265	28,826	30,474	41,223	44,281	46,945	55,572	73,646	76,959	80,107	83,483	87,023	91,114	94,870
26 Pakbo	8,077	16,738	-2,588	3,352	16,463	23,193	40,231	48,579	56,973	81,335	95,196	108,265	120,883	133,995	177,394	190,077	204,386	218,980	235,249	282,706
27 Kengkok			30,485	34,601	43,097	48,108	54,614	60,227	66,026	72,239	82,806	91,833	100,944	109,401	119,335	128,356	137,961	148,221	160,298	171,986
28 Xepon					25,250	42,715	45,261	47,815	50,434	68,621	74,159	80,014	86,050	107,003	112,830	118,659	124,305	129,621	166,096	171,823
29 Saravan										25,275	28,159	30,608	33,240	35,985	39,299	42,179	45,256	48,526	52,411	56,113
30 Xeset 1	2,893	5,944	9,960	12,978	16,071	19,002	22,548	25,343	28,308	10,797	13,028	14,854	16,837	18,908	21,608	23,885	26,399	29,026	32,280	35,254
31 Ban Yo	7,900	16,271	26,823	36,176	9,607	14,840	21,374	33,594	40,285	26,318	33,019	48,462	55,215	62,456	54,598	47,451	48,486	54,780	52,380	59,131
32 Pakxon					5,599	6,113	6,667	7,264	7,906	8,579	9,416	10,280	11,237	12,227	13,319	14,441	15,677	16,959	18,369	19,834
33 Ban Boun					18,579	20,696	23,298	25,749	28,221	30,742	34,419	37,415	40,470	43,737	47,558	51,212	55,164	59,388	64,282	69,065
34 Thakho					11,281	13,169	15,618	17,235	18,811	20,493	22,590	24,330	26,219	28,406	30,759	32,957	35,291	37,818	40,891	43,688
35 Sekong										5,891	6,269	6,671	7,099	7,554	8,039	8,550	9,093	9,672	10,288	10,945
36 Attapeu												17,085	18,433	19,847	21,415	25,249	27,138	29,053	31,190	33,363
37 Xepon PS												5,566	5,964	6,347	6,757	7,191	7,655	8,199	8,730	9,297
38 Lakpet										21,106	23,024	25,038	27,177	29,509	48,551	66,494	92,502	98,719	115,364	123,005
39 Nam Theun 2 PS								7,052	7,804	8,607	10,611	12,481	14,414	16,410	18,924	21,188	23,136	25,113	27,345	29,414
40 Theun Hinboun																				
41 Hoay Ho	463	875	3,701	4,523	6,068	7,026	8,051	9,052	10,024	11,043	12,018									
42 Nam Mo																				
43 Import at Xepon	1,330	2,795	19,813	21,383																
44 Import at Houphan	2,016	3,956	6,154	8,259	10,287	12,292	14,407	16,454	18,699	20,775	22,984									
45 Import at Bokeo	726	1,239	2,931	3,713	4,412	5,068	5,769	8,448	9,458	10,566	11,874									
46 Import at Kenthao	430	891	4,318	5,242	6,029	6,840	7,637													
47 Nam Theun 3																				
48 Nam Ou																				
49 Xe-kamang-3																				
50 Xe-kamang-1																				
51 Sekong-5																				
52 Xepien Xenamony																				
53 Supply from Province																				
Total	64,868	132,001	273,529	366,149	508,695	628,899	756,143	948,546	1,068,395	1,261,995	1,433,128	1,632,230	1,813,930	2,015,743	2,270,661	2,457,552	2,671,745	2,877,292	3,140,549	3,402,939

Note: The above figures show the incremental annual sold energy for each substation based on the annual sold energy in the year 200

付録 6.4

既設 115 kV 変電所の詳細データ

付録6.4 既設115 kV変電所の詳細データ （建設中のものも含む）

Summary

	Busbar system	115kV TR (Nos)	TR Capaciy (MVA)	115kV feeder (nos)	115 kV CB (nos)	22 kV feeder (nos)	note
Substations (existing)							
Bang Yo	double (M&T)	3	32	2	6	8	
Luang Prabang	double (M&T)	1	12.5	1	2	3	
Pakbo	single	2	20	1	3	4	
Pakxan	double (M&T)	1	5	2	4	3	
Phonesoung	without (T-off)	1	10	1	1	4	
Phonetong	double	3	90	6	10	10	
Thanaleng	single	2	22	2	2	3	10MVA-TR, standby
Tha Ngone	without (T-off)	1	22	1	1	4	
Vangvieng	double (M&T)	1	12.5	2	3	3	
Power Station (existing)							
Nam Ngum PS	double (M&T)	1	7.5	4	9(+1GIS)	2	step-up Tr not includin
Power Station (extension of 115 kV switch yard)							
Nam Leuk PS (PTD)	double (M&T)	1	10	2(+1)	6(+1)	2	step-up Tr not includin
							SWL
total of 115 kV TR for domestic supply		**17**	**243.5**				
Theun Hinboun (230 kV)		1	50				step-up Tr not includin
Switching Station (existing)							
Thalat SwS (PTD)	double (M&T)	0	0	3	2	0	to B.Don is U/C
Nakxaytong SwS	single	0	0	2	0	0	
Substations (under construction)							
PTD project							
Ban Don	double (M&T)	1	16	2	4	2	SWL
Non Hai	double (M&T)	1	16	1	3	1	SWL
Phonesavan	double (M&T)	1	16	1	3	3	SWL
Xayabury	double (M&T)	1	16	1	3	2	SWL
SPRE project							
Kengkok	single	2	20	1	0	4	TR from Pakbo
Pakbo (extension)	single	2	40	2	4	6	
Switching Station (under construction)							
Xieng Ngen SwS (PTD)	without (T-off)	0	0	1	0	0	

Station Name	**Bang Yo**
Province	Champasak
District	Pakse
Year of Construction	1989
Communication System	PLC, Telephone, Radio
Protection System	Distance, 67R, 67N, OC(51R), OC(51N), AR(79), Check Synchronizing
Busbar	Double (Main and Transfer Bus)

Site visit 22-Jun-01

☑ **Single Line Diagram**

☐ **Layout**

115 kV Switchyard No. of bays : 6

	Connection	CB	DS	CT	PT	Communication	note
No.1	Sirindhorn	1	3	3	2	PLC, Tel, Radio	**EGAT**
No.2	Xeset	1	3	3	2	PLC, Tel, Radio	
No.3	TR#1	1	3	3			
No.4	Bus-tie	**1**	3	3	3		
No.5	TR#2	**1**	3	3			
No.6	TR#3	1	3	3			

22 kV Feeders (outdoor)

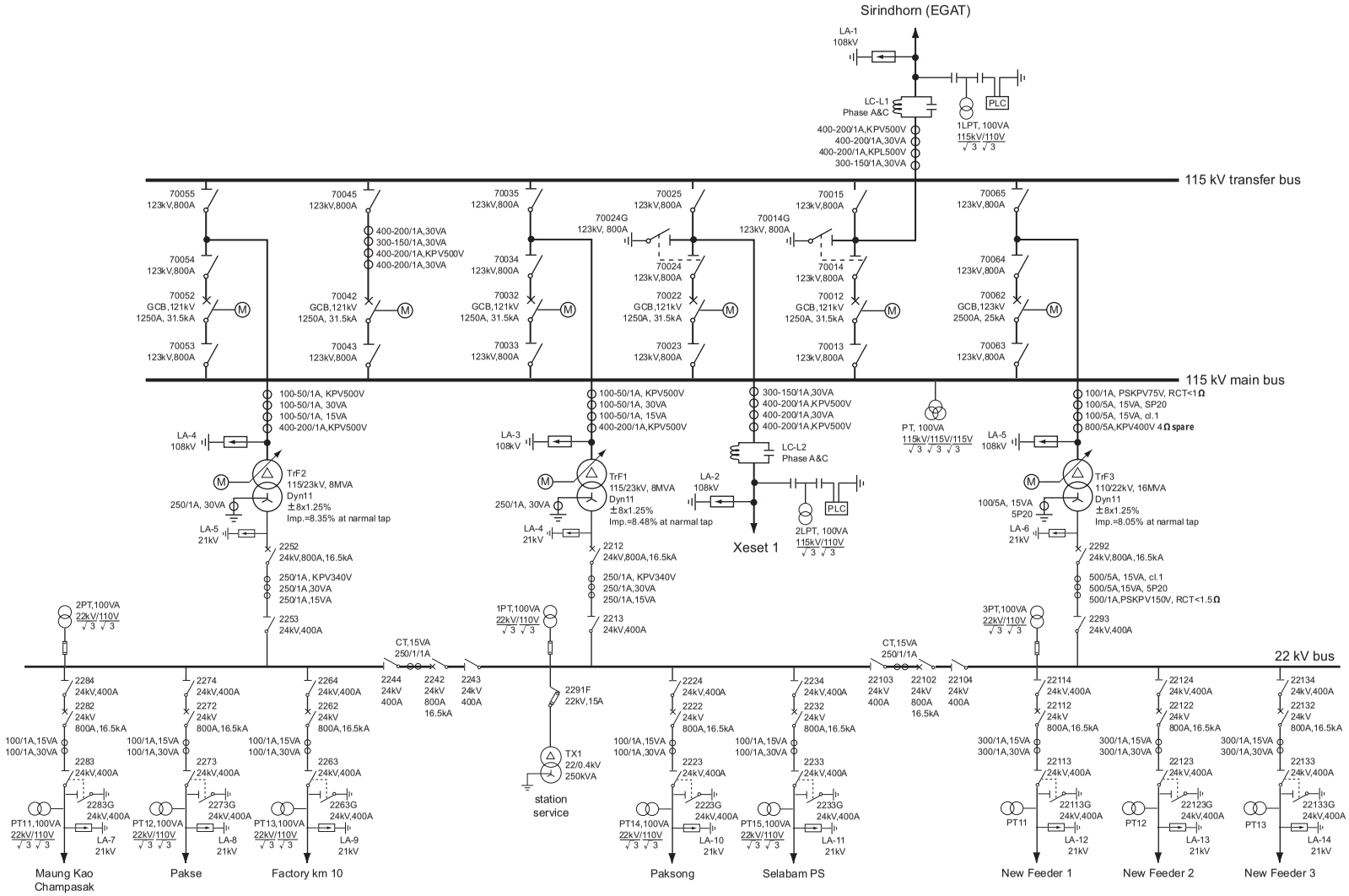
Tr. from	bays	feeders	from TR	PT	spair feeder	service TR	Bus-tie
TR#1	5	2	1	3	0	1	1
TR#2	5	3	1	3	0	0	1
TR#3	5	3	1	3	0	0	0

Transformers No. of Tr. : 3

Items	No.1	No.2	No.3
Voltage (kV)	115/23	115/23	110/22
Capacity (MVA)	8.0	8.0	10/16
Connection	Dyn11	Dyn11	Dyn11
Tap ratio	±**8**x1.25%	±8x1.25%	±**7**x1.25%
	(17 taps)	(17 taps)	(15 taps)
Cooling System	ONAN	ONAN	ONAN/ONAF
% impedance at normal ta	8.48	8.35	8.16
No. of Windings	2	2	2
Installation Year	1991	1991	1997
Manufacture	Hyosung, Korea	Hyosung, Korea	Pauwels Trafo, Belgium
Manufacturing Year	1989	1989	1989
Manufacturing No.	P89-8501	P89-8501	8846392
Peak Demand (MW)	7.1	7.1	standby
Peak time and day	7:00 PM	7:00 PM	
	2001/5/9	2001/5/9	

CIRCUIT BREAKERS No. of CB : 6

	No.1	No.2	No. 3	No. 4	No. 5	No. 6
Bays	Sirindhorn	Xeset	TR#1	Bus-tie	TR#2	TR#3
Rated Voltage (KV)	121	121	121	121	121	123
Rated Capacity (A)	1250	1250	1250	1250	1250	2500
Short circuit current (KA)	31.5	31.5	31.5	31.5	31.5	25
Rated breaking time (sec)						
Type	HGF112/1	HGF112/1	HGF112/1	HGF112/1	HGF112/1	FXT11
Manufacture	Specher Energie	Specher Energie	Specher Energie	Specher Energie	Specher Energie	GEC Alsthom
Manufacturing year	1989	1989	1989	1989	1989	1997
Manufacturing No.	2130951-01	2130951-01	2130951-01	2130951-03	2130951-02	
Installation Year	1989	1989	1989	1989	1989	1997



as of June 22, 2001

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title Bang Yo Substation Single Line Diagram

Station Name	**Luang Prabang**
Province	Luang Prabang
District	Luang Prabang
Year of Construction	1994
Communication System	PLC, Telephone,Radio, SCADA
Protection System	Distance, 2pole IDMT O/C, IDMT Earth fault, Sensitive Earth fault
Busbar	Double (Main & Transfer)

Site visit 02-Jul-01

☑ **Single Line Diagram**

☐ **Layout**

115 kV Switchyard No. of bays : 3

	Connection	CB	DS	CT	PT	Communication	note
No.1	TR#1	1	3	3	0		**BCT**
No.2	Bus-tie	1	2	0	0		
No.3	Vangvieng	0	2	0	2	PLC, Tel, Radio, SCADA	

There are 2 spare bay for transmission line and 1 for transformers.

22 kV Feeders (outdoor)

Tr. from	bays	feeders	from TR	incoming	PT	service TR	SWER system
TR#1	8	3	1	1	3	1	1

Transformers No. of Tr. : 1

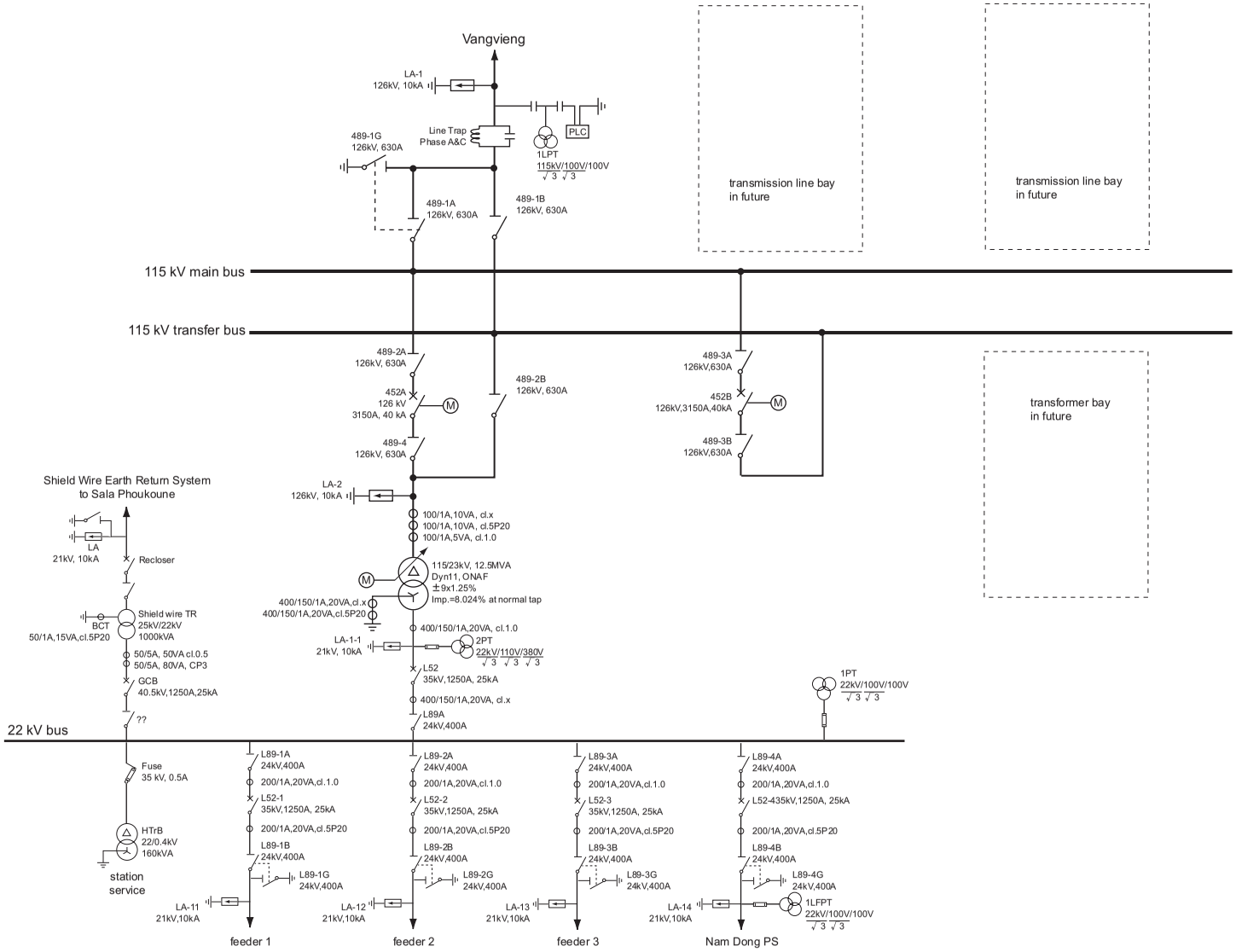
Items	No.1		SWER system
Voltage (kV)	115/23		25/22
Capacity (MVA)	12.5		1000 kVA
Connection	Dyn11		1 phase
Tap ratio	±8x1.25% (17 taps)		±2x2.5% (5 taps)
Cooling System	ONAF		ONAN
% impedance at normal ta	8.024		5.97
No. of Windings	2		
Installation Year	1994		2001
Manufacture	Fuzhou, China		Thai Maxwell
Manufacturing Year	Dec. 1985		2000
Manufacturing No.	346101		1010394
Peak Demand (MW)	5.2		
Peak time and day	8:00 PM 2001/4/13		

Shield Wire Earth Return system

to Sala Phoukoune, 1 phase, 25 kV

CIRCUIT BREAKERS No. of CB : 2

	No.1	No.2			
Bays	TR#1	Bus tie			
Rated Voltage (KV)	126	126			
Rated Capacity (A)	3150	3150			
Short circuit current (KA)	40	40			
Rated breaking time (sec)					
Type	LW6-126	LW6-126			
Manufacture	Pingdingchan	Pingdingchan			
Manufacturing year	Dec. 1992	Dec. 1992			
Manufacturing No.	92222	92223			
Installation Year	1994	1994			



as of July 11, 2001

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Luang Prabang Substation Single Line Diagram

Station Name	**Pakbo**
Province	Savannakhet
District	Khanthaburi
Year of Construction	1996
Communication System	PLC, Telephone, Radio
Protection System	Inverse time phase & ground O/C & Instantaneous O/C relay
Busbar	Single

Site visit 20-Jun-01

☑ **Single Line Diagram**

☐ **Layout**

115 kV Switchyard No. of bays : 3

	Connection	CB	DS	CT	PT	Communication	note
No.1	TR#1	1	2	3	0		
No.2	TR#2	1	2	3	0		
No.3	Mukdahan	1	3	3	3	PLC, Tel, Radio	EGAT
No.4							

22 kV Feeders (outdoor)

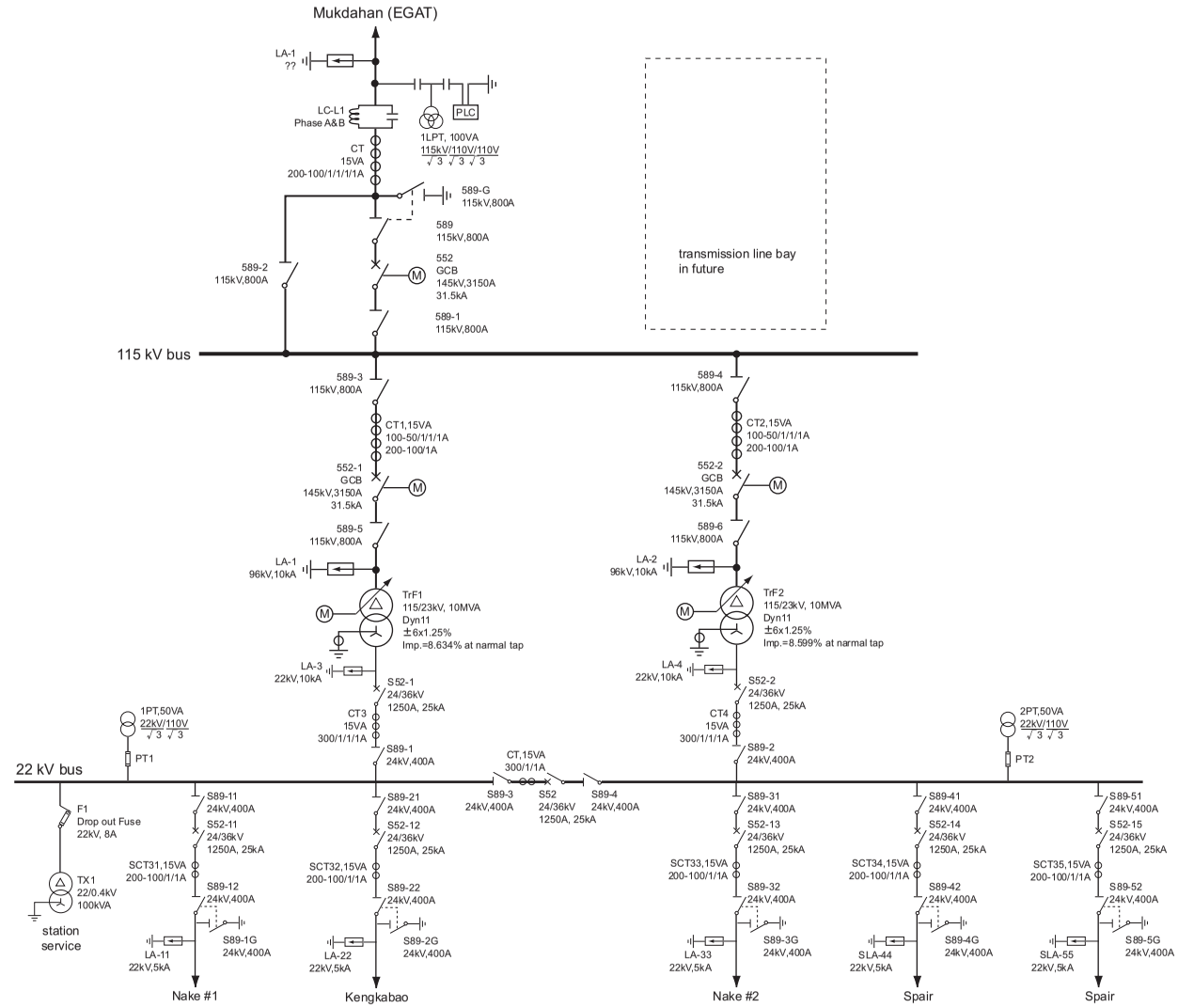
Tr. from	bays	feeders	from TR	bus-tie	PT	spair feeder	service TR
TR#1	5	2	1	1	0	0	1
TR#2	4	2	1		0	1	0
Busbar					3		

Transformers No. of Tr. : 2

Items	No.1	No.2	
Voltage (kV)	115/23	115/23	
Capacity (MVA)	10.0	10.0	
Connection	Dyn11	Dyn11	
Tap ratio	±7x1.25% (15 taps)	±7x1.25% (15 taps)	
Cooling System	ONAN	ONAN	
% impedance at normal ta	8.634	8.599	
No. of Windings	2	2	
Installation Year	1996	1996	
Manufacture	Crompton Greaves	Crompton Greaves	
Manufacturing Year	1996	1996	
Manufacturing No.	T8540/1	T8540/2	
Peak Demand (MW)	7.78	7.78	
Peak time and day	7:00 PM 2001/3/16	7:00 PM 2001/3/16	

CIRCUIT BREAKERS No. of CB : 3

	No.1	No.2	No. 3		
Bays	TR#1	TR#2	Mukdahan		
Rated Voltage (KV)	145	145	145		
Rated Capacity (A)	3150	3150	3150		
Short circuit current (KA)	31.5	31.5	31.5		
Rated breaking time (sec)	3	3	3		
Type	S1-145F1	S1-145F1	S1-145F1		
Manufacture	AEG	AEG	AEG		
Manufacturing year	1996	1996	1996		
Manufacturing No.	3005558/3	3005558/3	3005558/3		
Installation Year	1996	1996	1996		



as of June June 20, 2001

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Pakbo Substation Single Line Diagram

Station Name	**Pakxan**	Site visit	18-Jun-01
Province	Bolikhamxai	☑ **Single Line Diagram**	
District	Pakxan	☐ **Layout**	
Year of Construction	1999 (115 kV), 1996 (22 kV)		
Communication System	PLC, Telephone, Radio, SCADA		
Protection System	Distance, Directional Earth Fault, Inverse Earth Fault, Inverse O/C		
Busbar	Double (Main and Transfer bus)		

115 kV Switchyard No. of bays : 4

	Connection	CB	DS	CT	PT	Communication	note
No.1	TR#1	1	3	3	0		
No.2	Bus-tie	1	2	0	3		
No.3	Bungkan SS	1	3	3	3	PLC, Tel, Radio, SCADA	EGAT
No.4	Numleuk PS	**1**	3	3	3	PLC, Tel, Radio, SCADA	

There are 2 spare bay for transmission line and 1 for transformers.

22 kV Feeders (outdoor)

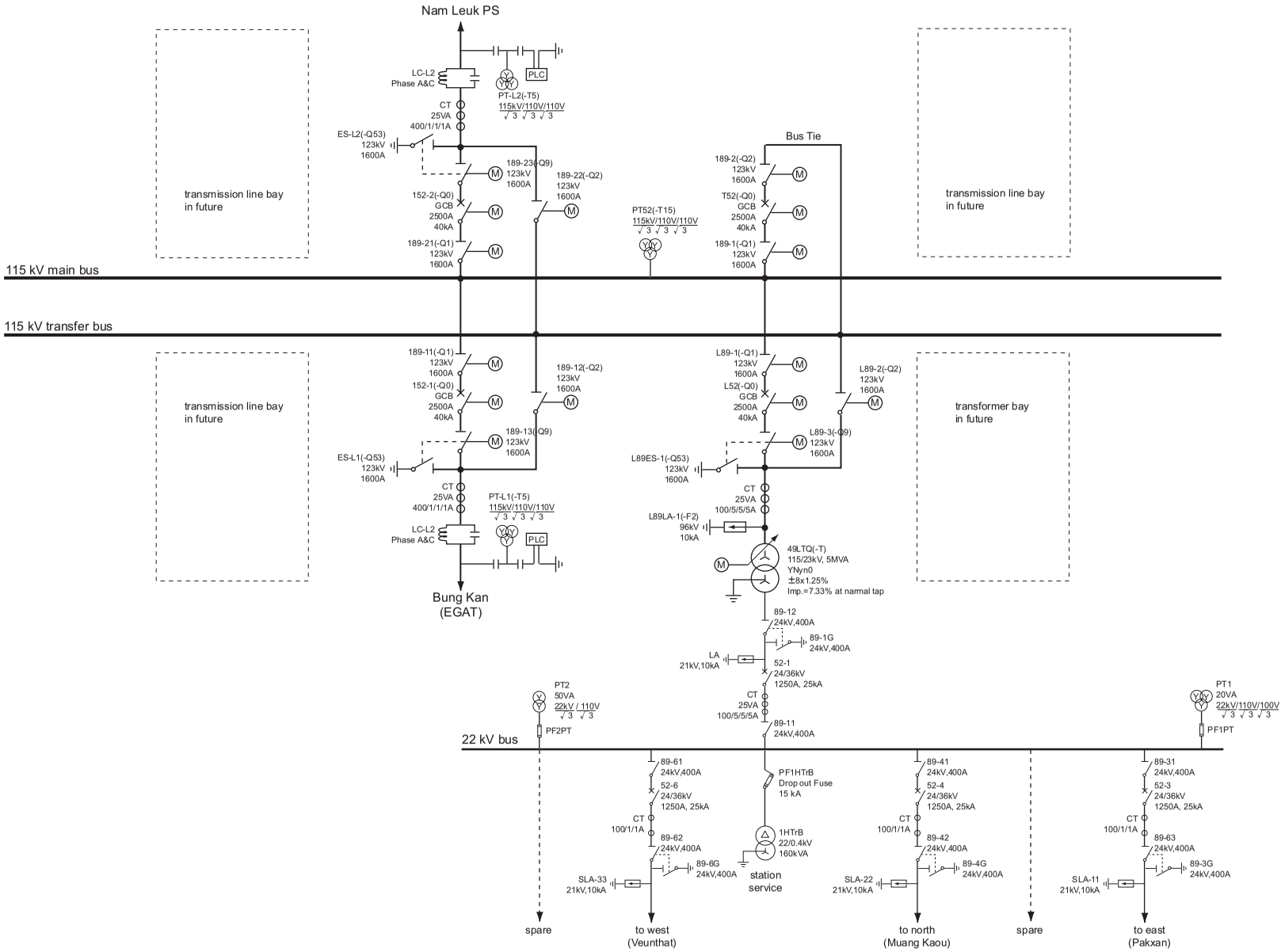
Tr. from	bays	feeders	from TR	bus-tie	PT	spair feeder	service TR
TR#1	5	3	1	0		0	1
Busbar					6		

Transformers No. of Tr. : 1

Items	No.1		
Voltage (kV)	115/23		
Capacity (MVA)	5.0		
Connection	YNyn0		
Tap ratio	±8x1.25% (17 taps)		
Cooling System	ONAN		
% impedance at normal ta	7.93		
No. of Windings	2		
Installation Year	2000		
Manufacture	ABB, Elta Sp.		
Manufacturing Year	1999		
Manufacturing No.	1133014		
Peak Demand (MW)	3.8		
Peak time and day	11:00 AM 31/Jan/01		

CIRCUIT BREAKERS No. of CB : 4

	No.1	No.2	No. 3	No. 4	
Bays	TR#1	Bus-tie	Bung Kan SS	Num Leuk PS	
Rated Voltage (KV)	145	145	145	145	
Rated Capacity (A)	2500	2500	2500	2500	
Short circuit current (KA)	40	40	40	40	
Rated breaking time (sec)	3	3	3	3	
Type	HGF112/1	HGF112/1	HGF112/1	HGF112/1	
Manufacture	ABB	ABB	ABB	ABB	
Manufacturing year	1999	1999	1999	1999	
Manufacturing No.	8423079	8423080	8423078	8423077	
Installation Year	2000	2000	2000	2000	



as of July, 2002

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Pakxan Substation Single Line Diagram

Station Name	**Phonesoung**
Province	Vientiane
District	Phonhong
Year of Construction	1989
Communication System	PLC, Telephone, Radio
Protection System	Distance, Synchrocheck, Instantaneous and Definite time lag O/C
Busbar	Tap off

Site visit 5-Jul-01

☑ **Single Line Diagram**

☐ **Layout**

115 kV Switchyard No. of bays : 1

	Connection	CB	DS	CT	PT	Communication	note
No.1	TR#1	1	1	3	3		
	Phongtong					PLC, Tel, Radio	
	Thalat					PLC, Tel, Radio	

22 kV Feeders 22 kV switchgears are indoor cubicle type.

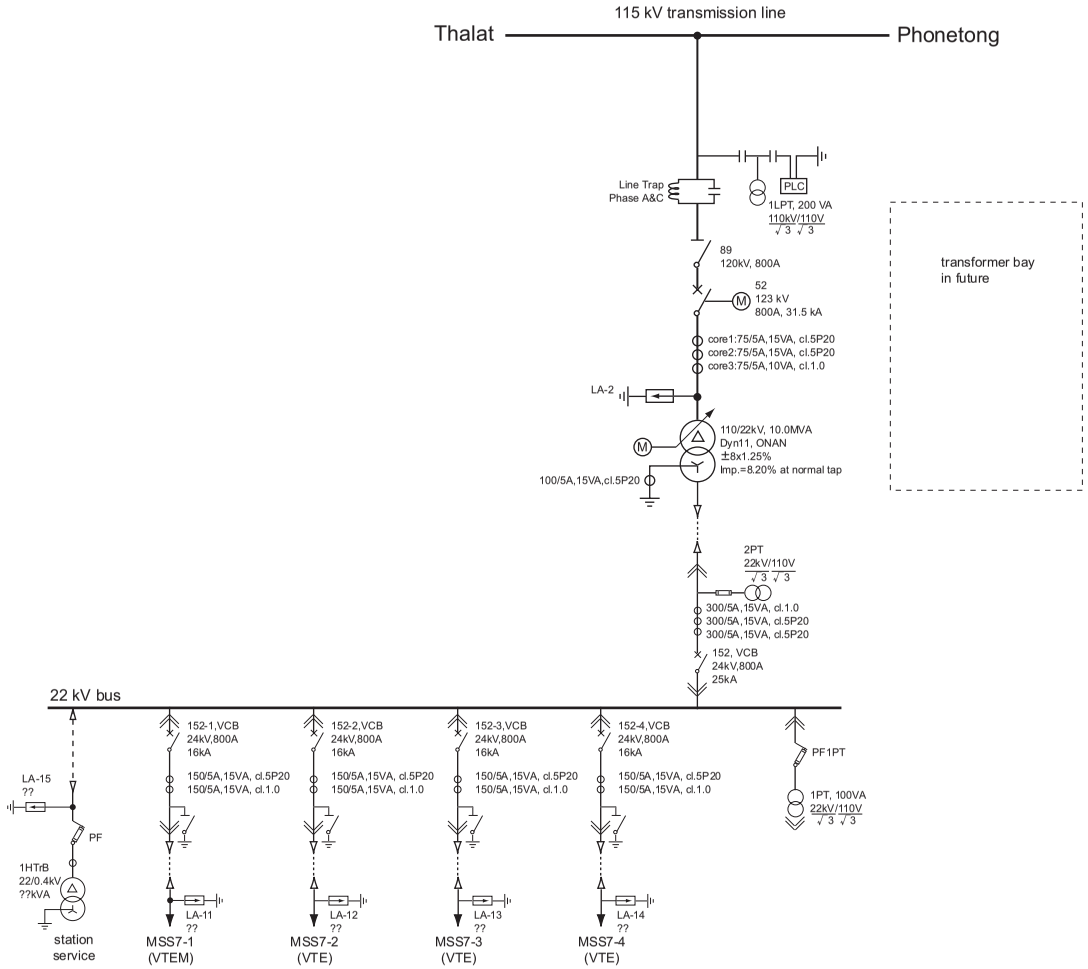
Tr. from	Cubicles	feeders	from TR	bus-tie	PT	spair feeder	service TR
TR#1	6	4	1	0	3	0	(1)

Transformers No. of Tr. : 1

Items	No.1		
Voltage (kV)	110/22		
Capacity (MVA)	10.0		
Connection	Dyn11		
Tap ratio	±8x1.25% (17 taps)		
Cooling System	ONAN		
% impedance at normal ta	8.20		
No. of Windings	2		
Installation Year	1989		
Manufacture	Trafo-Union		
Manufacturing Year	1988		
Manufacturing No.	339471		
Stabdard	IEC78		
Peak Demand (MW)	8.6		
Peak time and day	7:00 PM 2001/4/11		

CIRCUIT BREAKERS No. of CB : 1

	No.1				
Bays	TR#1				
Rated Voltage (KV)	123				
Rated Capacity (A)	800				
Short circuit current (KA)	31.5				
Rated breaking time (sec)	1				
Type	3AQ1				
Manufacture	Siemens				
Manufacturing year	1988				
Manufacturing No.	K88/31237989				
Installation Year	1989				



as of July 14, 2001

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Phonesoung Substation Single Line Diagram

Station Name	**Phonetong**	Site visit	26-Jun-01
Province	Vientiane Municipality	☑ **Single Line Diagram**	
District	Chanthabuli	☐ **Layout**	
Year of Construction	1966		
Communication System	PLC, Telephone, Radio		
Protection System	Distance, Synchrocheck, Instantaneous and Definite time lag O/C		
Busbar	Double		

115 kV Switchyard No. of bays : 9

	Connection	CB	DS	CT	PT	Communication	note
No.1	Nam Ngum#1	1	3	3	3	PLC, Tel, Radio	
No.2	Nam Ngum#2	1	3	3	3	PLC, Tel, Radio	
No.3	TR#3	1	2	3			
No.4	Nam Ngum#3	**1**	3	3	3	PLC, Tel, Radio	
No.5	Bus-tie	**1**	2	3	6		
No.6	Tanaleng	**1**	3	3	3	PLC, Tel, Radio	
No.7	TR#2 & 1	**1**	2+1	3			
		1	1	3			
No.8	Udon II	**1**	3	3	3	PLC, Tel	**EGAT**
No.9	Nongkhai	**1**	3	3	5	PLC, Tel	**EGAT**

22 kV Feeders (Outdoor)

Tr. from	bays	feeders	from TR	PT	Capacitor	service TR	Bus-tie
TR#1	6	3	1	3	2 X 5 Mvar	1	1
TR#2	5	3	1	3	0	0	1
TR#3	8	6	1	3	3 X 5 Mvar	0	0

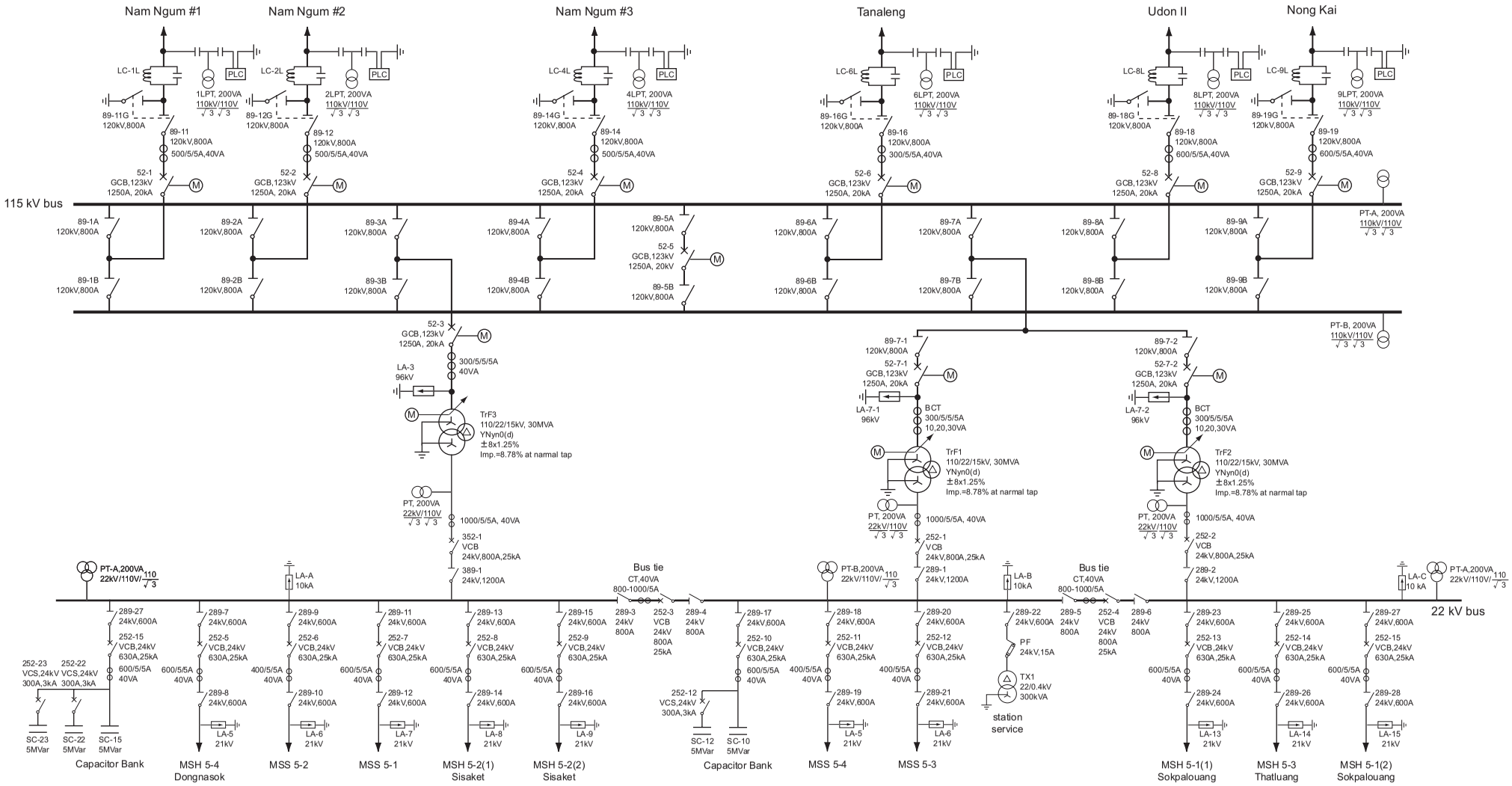
Transformers No. of Tr. : 3

Items	No.1	No.2	No.3
Voltage (kV)	110/22/15	110/22/15	110/22/15
Capacity (MVA)	30.0	30.0	30.0
Connection	YNyn0(d)	YNyn0(d)	YNyn0(d)
Tap ratio	±8x1.25%	±8x1.25%	±8x1.25%
	(17 taps)	(17 taps)	(17 taps)
Cooling System	ONAN/ONAF	ONAN/ONAF	ONAN/ONAF
% impedance at normal ta	8.78	8.78	8.78
Standard	IEC-76, 1993	IEC-76, 1993	JEC-168, 1966
No. of Windings	3	3	3
Installation Year	1997	1997	1977
Manufacture	GEC Alsthom	GEC Alsthom	Meiden, Japan
Manufacturing Year	1997	1997	1977
Manufacturing No.	159141	158637	578882T1
Peak Demand (MW)	24.5	24.2	24
Peak time and day	7:00 PM	7:00 PM	7:00 PM
	2001/4/1	2001/4/1	2001/4/1

115 kV CIRCUIT BREAKERS No. of CB : 10

	No.1	No.2	No. 3	No. 4	No. 5	No. 6
Bays	Nam Ngum #1	Nam Ngum #2	TR#3	Nam Ngum #3	Bus-tie	Tanaleng
Insulation	GCB	GCB	GCB	GCB	GCB	GCB
Rated Voltage (KV)	123	123	123	123	123	123
Rated Capacity (A)	1250	1250	1250	1250	1250	1250
Short circuit current (KA)	20	20	20	20	20	20
Rated breaking time (sec)	1	1	1	1	1	1
Type	3AQ1FG	3AQ1FG	3AQ1FG	3AQ1FG	3AQ1FG	3AQ1FG
Manufacture	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS
Manufacturing year	1995	1995	1995	1995	1995	1995
Manufacturing No.	95/K350,13295	95/K350,13296	95/K350,13297	95/K350,13298	95/K350,13299	95/K350,13300
Installation Year	1997	1997	1997	1997	1997	1997

	No.7	No.8	No.9	No.10		
Bays	TR#1	TR#2	Udon II	Nong Kai		
Insulation	GCB	GCB	GCB	GCB		
Rated Voltage (KV)	123	123	123	123		
Rated Capacity (A)	1250	1250	1250	1250		
Short circuit current (KA)	20	20	20	20		
Rated breaking time (sec)	1	1	1	1		
Type	3AQ1FG	3AQ1FG	3AQ1FG	3AQ1FG		
Manufacture	SIEMENS	SIEMENS	SIEMENS	SIEMENS		
Manufacturing year	1995	1995	1995	1995		
Manufacturing No.	95/K350,13301	95/K350,13304	95/K350,13303	95/K350,13302		
Installation Year	1997	1997	1997	1997		



as of June 26, 2001

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Phonetong Substation Single Line Diagram

Station Name	**Thanaleng**	Site visit	12-Jul-01
Province	Vientiane Municipality	☑ **Single Line Diagram**	
District	Hatxayphong	☐ **Layout**	
Year of Construction	1976		
Communication System	PLC, Telephone, Radio, SCADA		
Protection System	Distance, Synchrocheck, Instantaneous and Definite time lag O/C		
Busbar	Single		

115 kV Switchyard No. of bays : 2

	Connection	CB	DS	CT	PT	Communication	note
No.1	TR#1	1	1	3	0		**standby**
No.2	TR#2	1	1	3	0		
No.3	Phongtong	0	0	0	3	PLC, Tel, Radio, SCADA	
No.4	Nongkhai	**0**	0	3	3	PLC, Tel, Radio, SCADA	EGAT

22 kV Feeders 22 kV switchgears are indoor cubicle type.

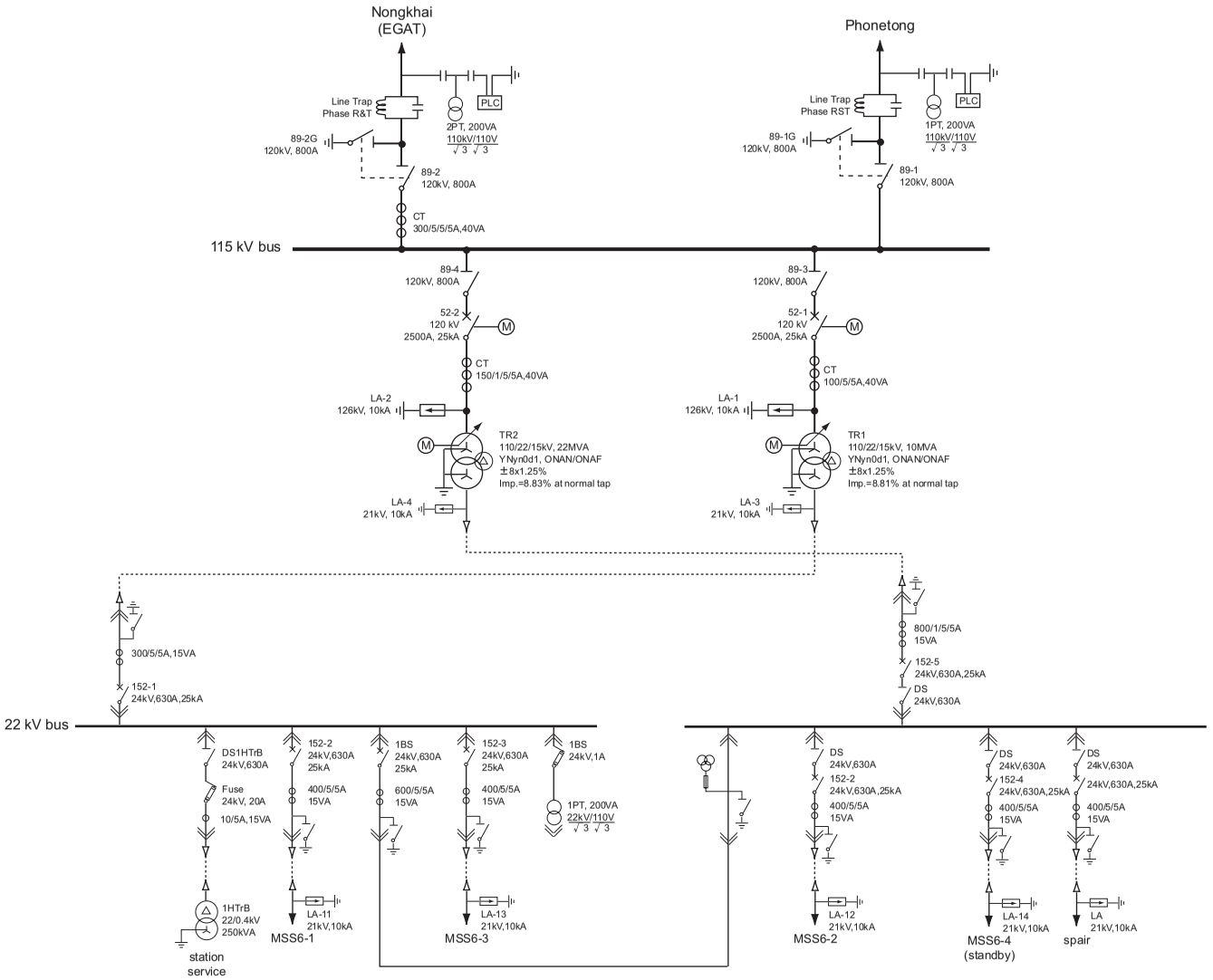
Tr. from	Cubicles	feeders	from TR	bus-tie	PT	spair feeder	service TR
TR#1	6	2	1	1	3	0	1
TR#2	5	1	1	1	3	2	0

Transformers No. of Tr. : 2

Items	No.1	No.2	
Voltage (kV)	110/22	110/22/15	
Capacity (MVA)	7.0/10.0	22.0/17.6	
Connection	YNyn0d1	YNyn0d1	
Tap ratio	±8x1.25% (17 taps)	±8x1.25% (17 taps)	
Cooling System	ONAN/ONAF	ONAN/ONAF	
% impedance at normal ta	6.61/8.81	8.83/7.06	
No. of Windings	3	3	
Installation Year	1977	1997 from Pongtong	
Manufacture	Meiden, Japan	Meiden, Japan	
Manufacturing Year	June, 1977	April, 1968	
Manufacturing No.	5J8883T1	2T52092	
Stabdard	JEC-168(1966)	JEC-168(1966)	
Peak Demand (MW)	standby	15	
Peak time and day		19:30 Jan. & Feb,01	

CIRCUIT BREAKERS No. of CB : 2

	No.1	No.2			
Bays	TR#1	TR#2			
Rated Voltage (KV)	123	123			
Rated Capacity (A)	2500	2500			
Short circuit current (KA)	25	25			
Rated breaking time (sec)	3	3			
Type	FXT11	FXT11			
Manufacture	Alsthom	Alsthom			
Manufacturing year	1997	1997			
Manufacturing No.					
Installation Year					



as of July 13, 2001

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title Thanaleng Substation Single Line Diagram

Station Name	**Tha Ngone**
Province	Vientiane Municipality
District	Xaythani
Year of Construction	1989
Communication System	PLC, Telephone, Radio, SCADA
Protection System	Distance, Synchrocheck, Instantaneous and Definite time lag O/C
Busbar	Tap off

Site visit 26-Jun-01

☑ **Single Line Diagram**

☐ **Layout**

115 kV Switchyard No. of bays : 1

	Connection	CB	DS	CT	PT	Communication	note
No.1	TR#1	1	1	3	3		
	Naxaythong SwS					PLC, Tel, Radio, SCADA	T-branch

22 kV Feeders (outdoor)

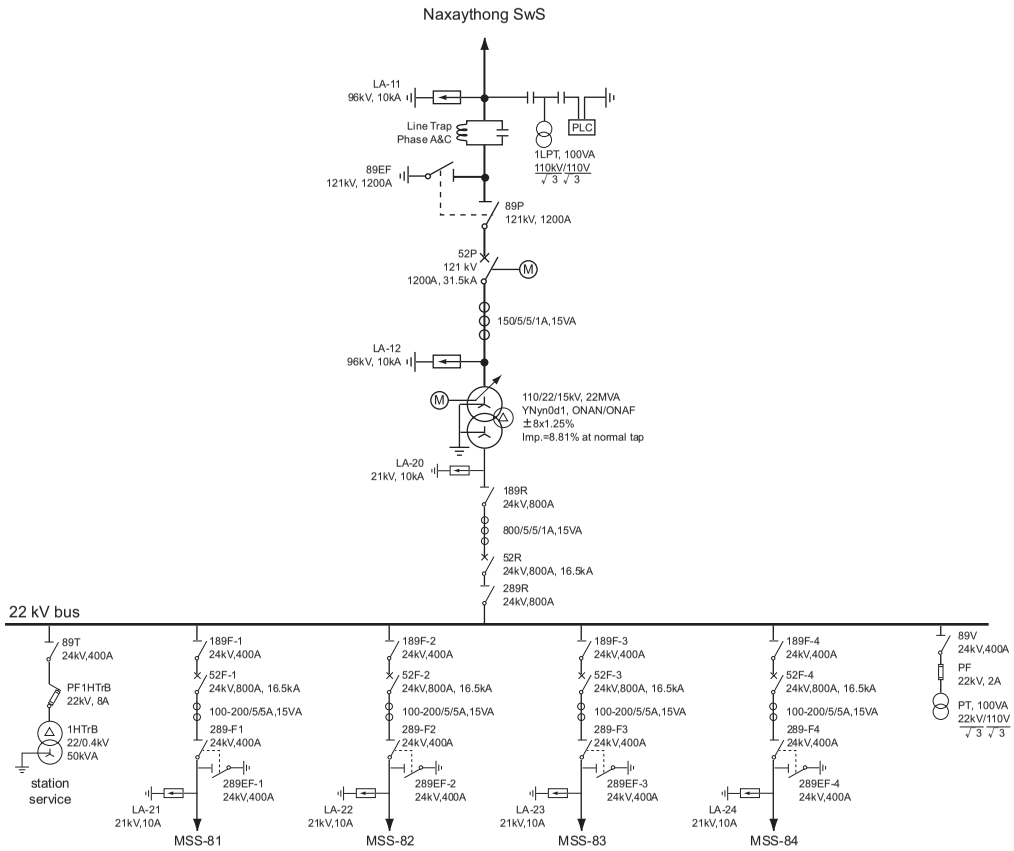
Tr. from	bays	feeders	from TR	bus-tie	PT	spair feeder	service TR
TR#1	7	4	1	0	3	0	1

Transformers No. of Tr. : 1

Items	No.1		
Voltage (kV)	110/22/15		
Capacity (MVA)	22.0/17.6		
Connection	YNyn0d1		
Tap ratio	±8x1.25% (17 taps)		
Cooling System	ONAN/ONAF		
% impedance at normal ta	8.81/7.05		
No. of Windings	3		
Installation Year	1997 from Pongtong		
Manufacture	Meiden, Japan		
Manufacturing Year	April, 1968		
Manufacturing No.	2T52091		
Stabdard	JEC-168(1966)		
Peak Demand (MW)	9.4		
Peak time and day	19:00 10-Apr-01		

CIRCUIT BREAKERS No. of CB : 1

	No.1				
Bays	TR#1				
Rated Voltage (KV)	121				
Rated Capacity (A)	1200				
Short circuit current (KA)	31.5				
Rated breaking time (sec)					
Type	FKF2-6				
Manufacture	Sprecher Energie				
Manufacturing year	1989				
Manufacturing No.	2130586-01				
Installation Year	1989				



as of June June 26, 2001

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Tha Ngone Substation Single Line Diagram

Station Name	**Vangvien**
Province	Vientiane
District	Vangvien
Year of Construction	1994
Communication System	PLC, Telephone,Radio, SCADA
Protection System	Distance, 2pole IDMT O/C, IDMT Earth fault, Sensitive Earth fault
Busbar	Double (Main & Transfer)

Site visit no visit

☑ **Single Line Diagram**

☐ **Layout**

115 kV Switchyard No. of bays : 3

	Connection	CB	DS	CT	PT	Communication	note
No.1	TR#1	1	3	3	0		
No.2	TR#2	0	0	3	0		not use
No.3	Thalat	0	2	0	2	PLC, Tel, Radio, SCADA	
No.4	Lunag Prabang	**1**	3	3	3	PLC, Tel, Radio, SCADA	
No.5	Bus-tie	**1**	2	0	0		

22 kV Feeders (outdoor)

Tr. from	bays	feeders	from TR	incoming	PT	service TR	SWER system
TR#1	7	3	1	0	3	1	1

Transformers No. of Tr. : 1

Items	No.1	SWER*1	SWER*2
Voltage (kV)	115/23	25/22	25/22
Capacity (MVA)	12.5	1000 kVA	800 kVA
Connection	Dyn11	1 phase	1 phase
Tap ratio	±8x1.25% (17 taps)		
Cooling System	ONAF		
% impedance at normal ta	8.005		
No. of Windings	2		
Installation Year	April, 2001		
Manufacture	Fuzhou, China		
Manufacturing Year	2001		
Manufacturing No.	A88401		
Peak Demand (MW)	3.3		
Peak time and day	7:00 PM 2001/4/9		

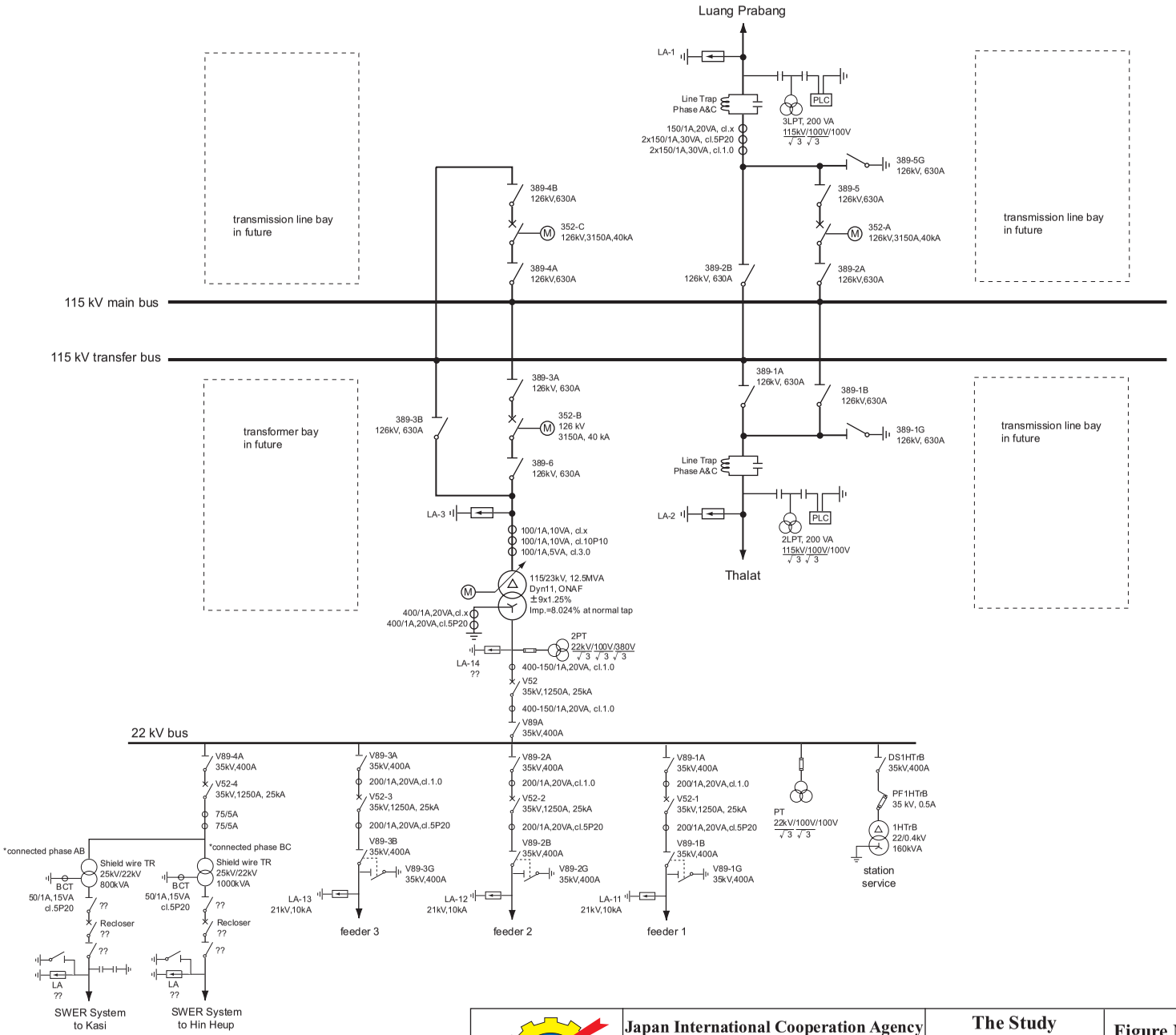
Shield Wire Earth Return system

*1:to Hin Heup, 1 phase, 25 kV

*2:to Kasi, 1 phase, 25 kV

CIRCUIT BREAKERS No. of CB : 3

	No.1	No.2	No.3		
Bays	TR#1	Bus tie	Luang Prabang		
Rated Voltage (KV)	126	126	126		
Rated Capacity (A)	3150	3150	3150		
Short circuit current (KA)	40	40	40		
Rated breaking time (sec)					
Type	LW6-126	LW6-126	LW6-126		
Manufacture	Pingdingchan	Pingdingchan	Pingdingchan		
Manufacturing year	Dec. 1992	Dec. 1992	Dec. 1992		
Manufacturing No.	9226	9224	9225		
Installation Year	1994	1994	1994		



as of July 14, 2001

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title Vangvieng Substation Single Line Diagram

Station Name	**Thalat**
Province	Vientiane
District	Phonhong
Year of Construction	1994
Communication System	PLC, Telephone, Radio, SCADA
Protection System	Distance, 2 pole IDMT O/C, IDMT earth fault, Sensitive earth fault
Busbar	Double (main and transfer)

Site visit 5-Jul-01

☑ **Single Line Diagram**

☐ **Layout**

115 kV Switchyard No. of bays : 4

	Connection	CB	DS	CT	PT	Communication	note
No.1	Nam Ngum	0	2	0	2	PLC, Tel, Radio, SCADA	
No.2	Phongtong	0	2	0	2	PLC, Tel, Radio, SCADA	
No.3	Bus-tie	**1**	2	0	0		
No.4	Vangvieng	**1**	3	3	3	PLC, Tel, Radio, SCADA	

22 kV Feeders 0

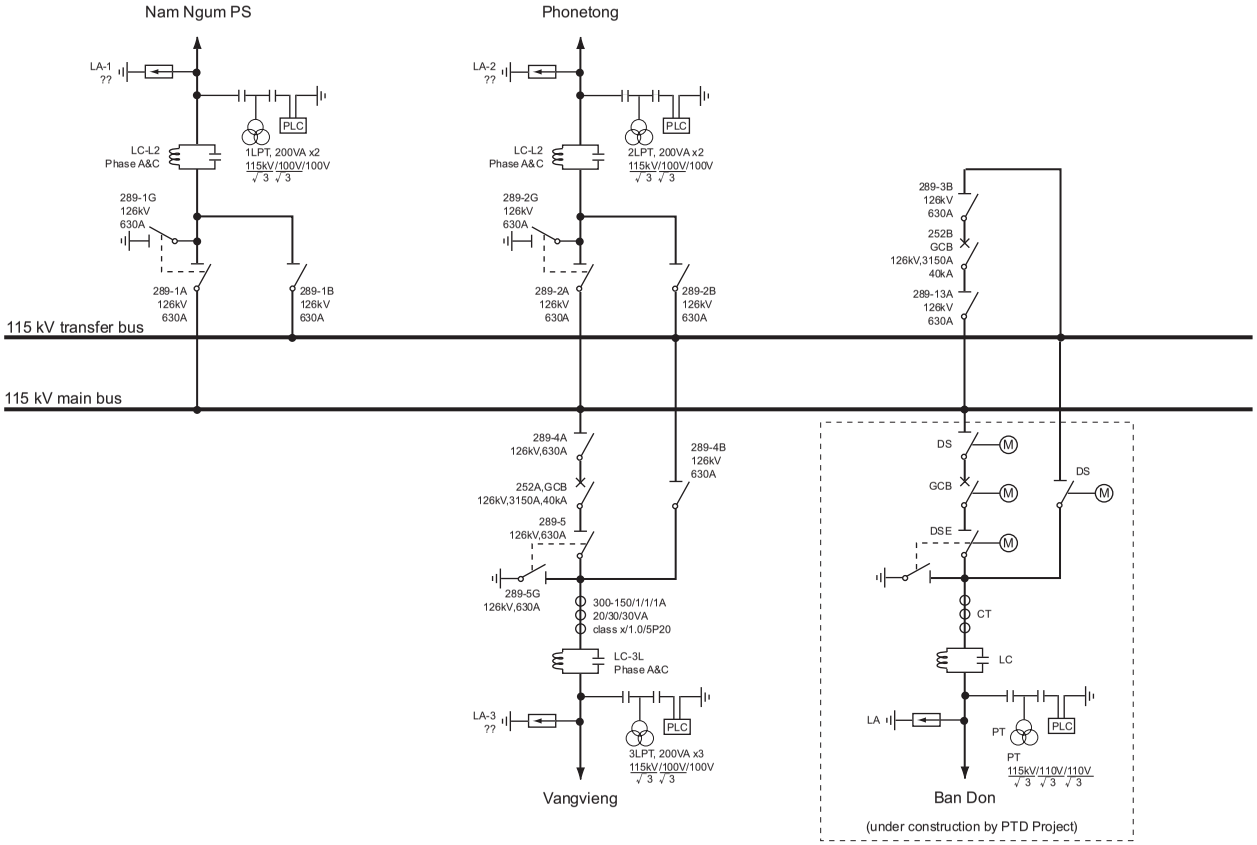
Tr. from	Cubicles	feeders	from TR	bus-tie	PT	spair feeder	service TR

Transformers No. of Tr. : 0

Items			
Voltage (kV)			
Capacity (MVA)			
Connection			
Tap ratio			
Cooling System			
% impedance at normal tap			
No. of Windings			
Installation Year			
Manufacture			
Manufacturing Year			
Manufacturing No.			
Stabdard			
Peak Demand (MW)			
Peak time and day			

CIRCUIT BREAKERS No. of CB : 2

	No.1	No.2			
Bays	Bus-tie	Vangvieng			
Rated Voltage (KV)	126	126			
Rated Capacity (A)	3150	3150			
Short circuit current (KA)	40	40			
Rated breaking time (sec)					
Type	LW6	LW6			
Manufacture	Pingdingshan	Pingdingshan			
Manufacturing year	1992	1992			
Manufacturing No.	92220	92221			
Installation Year	1994	1994			



as of July 5, 2001

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Thalat Switching Station Single Line Diagram

Station Name	**Naxaythong**
Province	Vientiane Municipality
District	Xaythani
Year of Construction	1989
Communication System	
Protection System	
Busbar	Single

Site visit 26-Jun-01

☑ **Single Line Diagram**

☐ **Layout**

115 kV Switchyard No. of bays : 3

	Connection	CB	DS	CT	PT	Communication	note
No.1	Nam Ngum	0	1	0	2		
No.2	Thalat	0	1	0	2		
No.3	Tha Ngone	**0**	1	0	2		
No.4							

22 kV Feeders 0

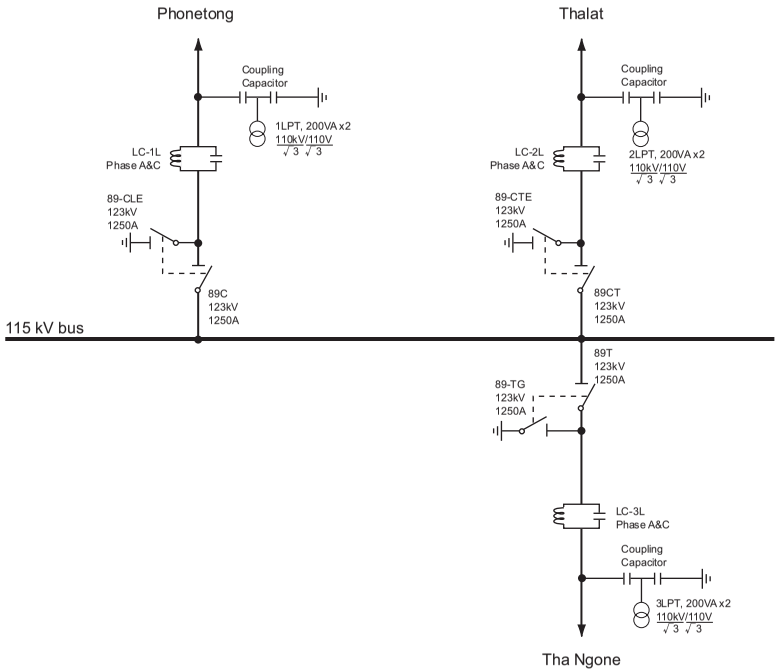
Tr. from	Cubicles	feeders	from TR	bus-tie	PT	spair feeder	service TR

Transformers No. of Tr. : 0

Items			
Voltage (kV)			
Capacity (MVA)			
Connection			
Tap ratio			
Cooling System			
% impedance at normal tap			
No. of Windings			
Installation Year			
Manufacture			
Manufacturing Year			
Manufacturing No.			
Stabdard			
Peak Demand (MW)			
Peak time and day			

CIRCUIT BREAKERS No. of CB : 0

	No.1	No.2			
Bays					
Rated Voltage (KV)					
Rated Capacity (A)					
Short circuit current (KA)					
Rated breaking time (sec)					
Type					
Manufacture					
Manufacturing year					
Manufacturing No.					
Installation Year					



as of June June 26, 2001

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Naxaythong Switching Station Single Line Diagram

Station Name	**Ban Don**
Province	Vientiane
District	
Year of Construction	under construction by PTD project
Communication System	PLC, Telephone, Radio, SCADA
Protection System	
Busbar	Double (main and transfer)

Site visit 5-Jul-01

☑ **Single Line Diagram**

☐ **Layout**

115 kV Switchyard No. of bays : 4

	Connection	CB	DS	CT	PT	Communication	note
No.1	TR#1	1	3	3	0		
No.2	Bus-tie	1	2	3	6		
No.3	Non Hai	1	3	3	3	PLC, Tel, Radio, SCADA	
No.4	Thalat	1	3	3	3	PLC, Tel, Radio, SCADA	

22 kV Feeders (indoor cubicles)

Tr. from	Cubicles	feeders	from TR	bus-tie	PT	spair feeder	service TR
TR#1	6	2	1	0	3	1	1

Transformers No. of Tr. : 1

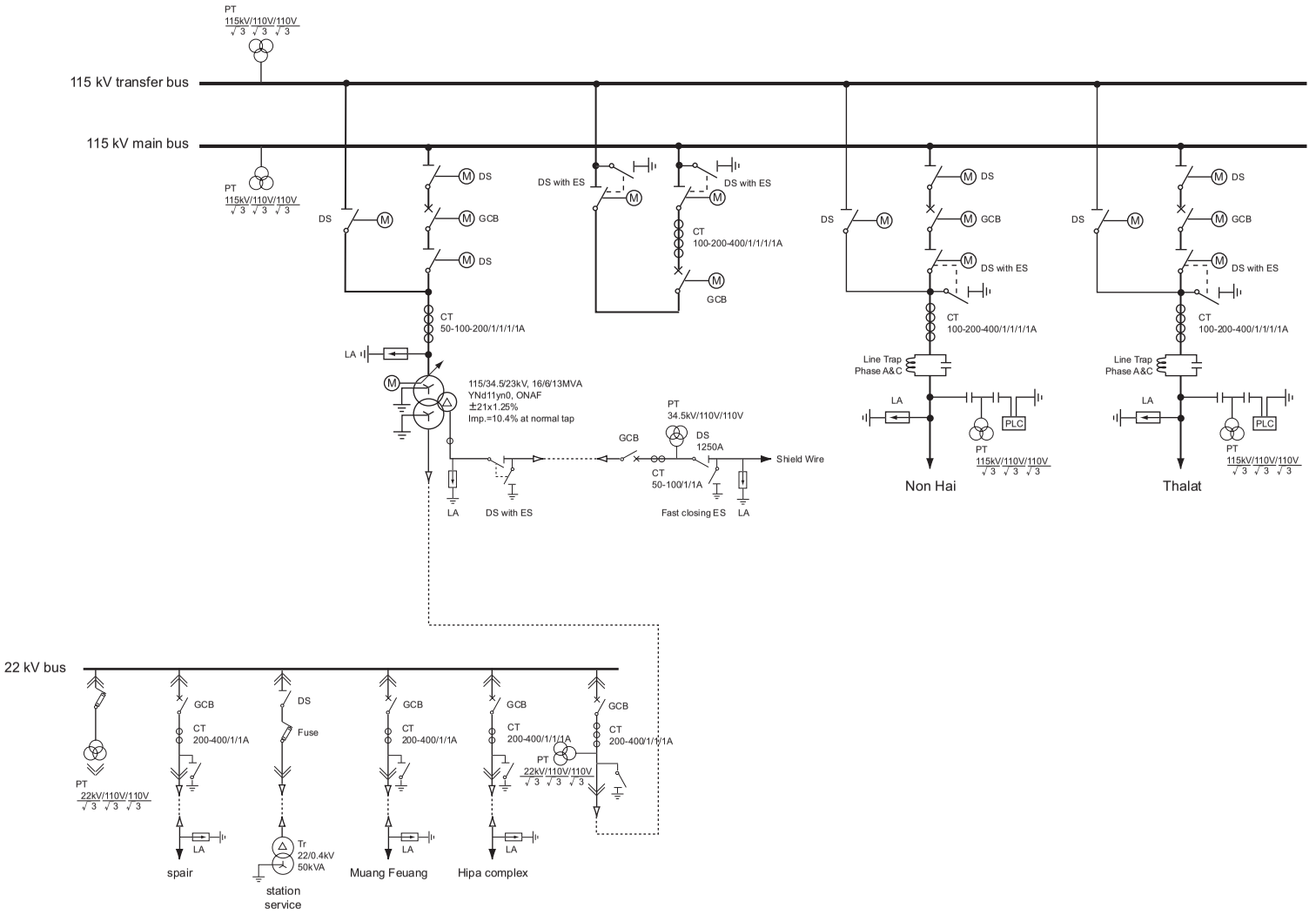
Items	No. 1		
Voltage (kV)	115/34.5/23		
Capacity (MVA)	16/6/13		
Connection	YNd11yn0		
Tap ratio	±10x1.25% (21 taps)		
Cooling System	ONAF		
% impedance at normal ta	10.40		
No. of Windings	3		
Installation Year	2001		
Manufacture	ABB, India		
Manufacturing Year	2000		
Manufacturing No.			
Stabdard	IEC76		
Peak Demand (MW)	---		
Peak time and day	---		

Shield Wire Earth Line

2 lines - 1 phase

CIRCUIT BREAKERS No. of CB : 4

	No.1	No.2	No.3	No.4	
Bays	TR#1	Bus-tie	Non Hai	Thalat	
Rated Voltage (KV)					
Rated Capacity (A)					
Short circuit current (KA)					
Rated breaking time (sec)					
Type					
Manufacture	ABB	ABB	ABB	ABB	
Manufacturing year	2000	2000	2000	2000	
Manufacturing No.					
Installation Year	2001	2001	2001	2001	



Under construction by PTD Project

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Ban Don Substation Single Line Diagram

Station Name	**Non Hai**
Province	Vientiane
District	
Year of Construction	under construction by PTD project
Communication System	PLC, Telephone, Radio, SCADA
Protection System	
Busbar	Double (main and transfer)

Site visit no visit

☑ **Single Line Diagram**

☐ **Layout**

115 kV Switchyard No. of bays : 3

	Connection	CB	DS	CT	PT	Communication	note
No.1	TR#1	1	3	3	0		
No.2	Bus-tie	1	2	3	6		
No.3	Ban Don	1	3	3	3	PLC, Tel, Radio, SCADA	
No.4							

22 kV Feeders (indoor cubicles)

Tr. from	Cubicles	feeders	from TR	bus-tie	PT	spair feeder	service TR
TR#1	5	1	1	0	3	1	1

Transformers No. of Tr. : 1

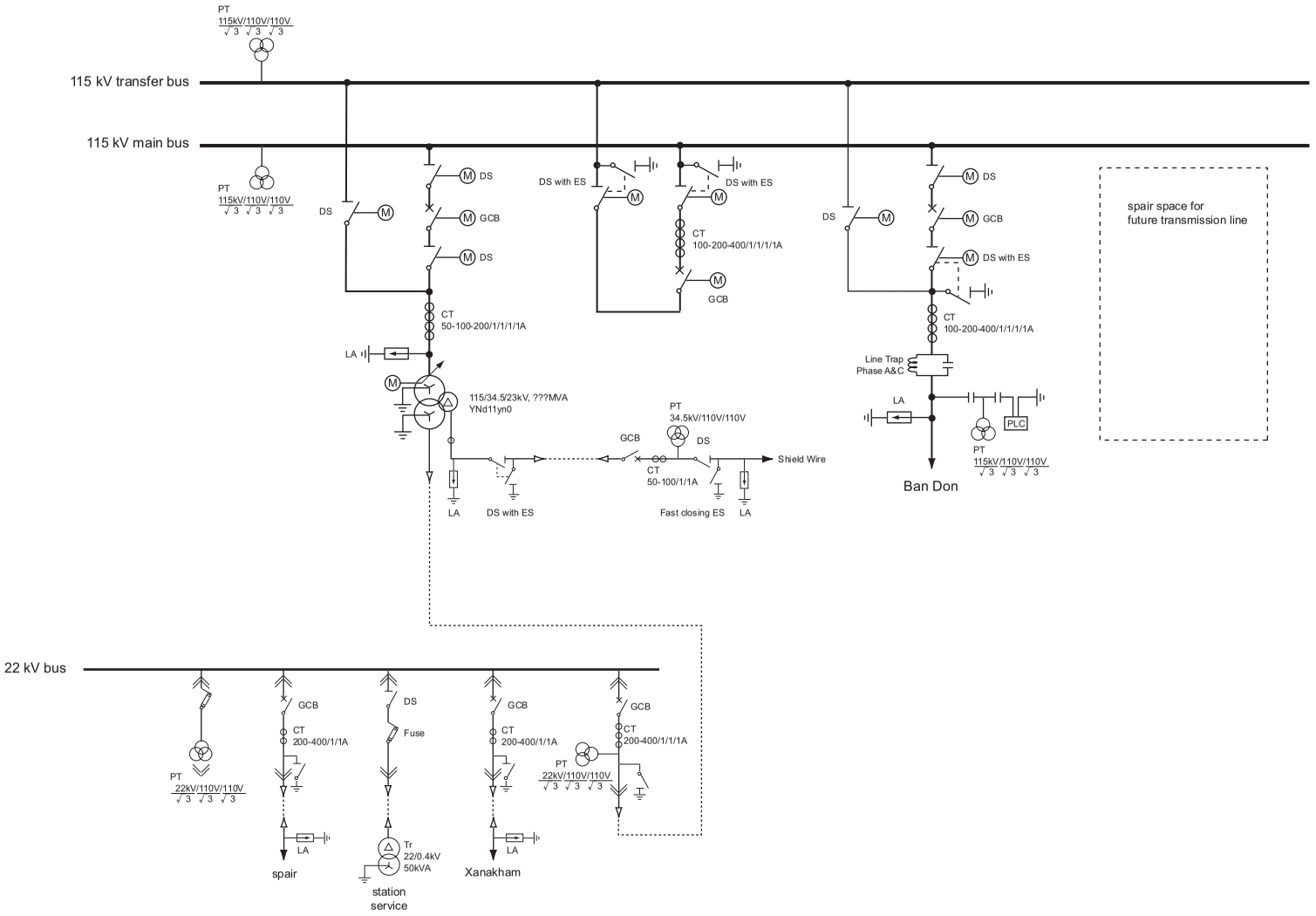
Items	No. 1		
Voltage (kV)	115/34.5/23		
Capacity (MVA)			
Connection	YNd11yn0		
Tap ratio			
Cooling System			
% impedance at normal tap			
No. of Windings	3		
Installation Year			
Manufacture			
Manufacturing Year			
Manufacturing No.			
Stabdard			
Peak Demand (MW)	---		
Peak time and day	---		

Shield Wire Earth Line

2 lines - 1 phase

CIRCUIT BREAKERS No. of CB : 3

	No.1	No.2	No.3		
Bays	TR#1	Bus-tie	Ban Don		
Rated Voltage (KV)					
Rated Capacity (A)					
Short circuit current (KA)					
Rated breaking time (sec)					
Type					
Manufacture					
Manufacturing year					
Manufacturing No.					
Installation Year					



Under construction by PTD Project

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Non Hai Substation Single Line Diagram

Station Name	**Phonsanan**
Province	Xieng Khuang
District	
Year of Construction	under construction by PTD project
Communication System	PLC, Telephone, Radio, SCADA
Protection System	
Busbar	Double (main and transfer)

Site visit no visit

☑ **Single Line Diagram**

☐ **Layout**

115 kV Switchyard No. of bays : 3

	Connection	CB	DS	CT	PT	Communication	note
No.1	TR#1	1	3	3	0		
No.2	Bus-tie	1	2	3	6		
No.3	Nam Leuk	1	3	3	3	PLC, Tel, Radio, SCADA	
No.4							

22 kV Feeders (indoor cubicles)

Tr. from	Cubicles	feeders	from TR	bus-tie	PT	spair feeder	service TR
TR#1	7	3	1	0	3	1	1

Transformers No. of Tr. : 1

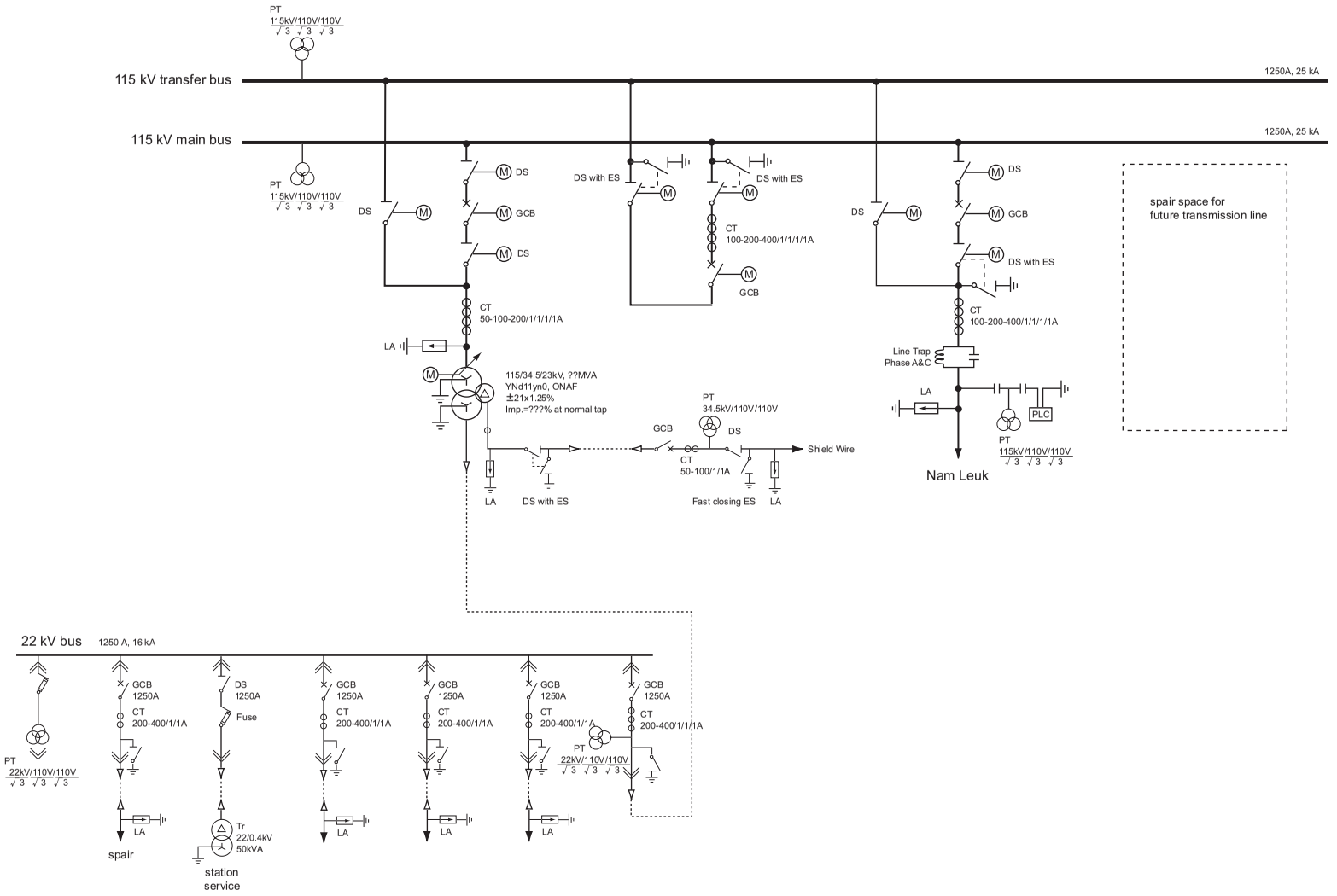
Items	No. 1		
Voltage (kV)	115/34.5/23		
Capacity (MVA)			
Connection	YNd11yn0		
Tap ratio	±10x1.25% (21 taps)		
Cooling System	ONAF		
% impedance at normal tap			
No. of Windings	3		
Installation Year			
Manufacture			
Manufacturing Year			
Manufacturing No.			
Stabdard	IEC76		
Peak Demand (MW)	---		
Peak time and day	---		

Shield Wire Earth Line

2 lines - 1 phase

CIRCUIT BREAKERS No. of CB : 3

	No.1	No.2	No.3		
Bays	TR#1	Bus-tie	Nam Leuk		
Rated Voltage (KV)					
Rated Capacity (A)					
Short circuit current (KA)					
Rated breaking time (sec)					
Type					
Manufacture					
Manufacturing year					
Manufacturing No.					
Installation Year					



Under construction by PTD Project

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Phonsavan Substation Single Line Diagram

Station Name	**Xayabury**
Province	Xayabury
District	
Year of Construction	under construction by PTD project
Communication System	PLC, Telephone, Radio, SCADA
Protection System	
Busbar	Double (main and transfer)

Site visit 3-Jul-01

☑ **Single Line Diagram**

☐ **Layout**

115 kV Switchyard No. of bays : 3

	Connection	CB	DS	CT	PT	Communication	note
No.1	TR#1	1	3	3	0		
No.2	Bus-tie	1	2	3	6		
No.3	Xieng Nguen	1	3	3	3	PLC, Tel, Radio, SCADA	
No.4							

22 kV Feeders (indoor cubicles)

Tr. from	Cubicles	feeders	from TR	bus-tie	PT	spair feeder	service TR
TR#1	6	2	1	0	3	1	1

Transformers No. of Tr. : 1

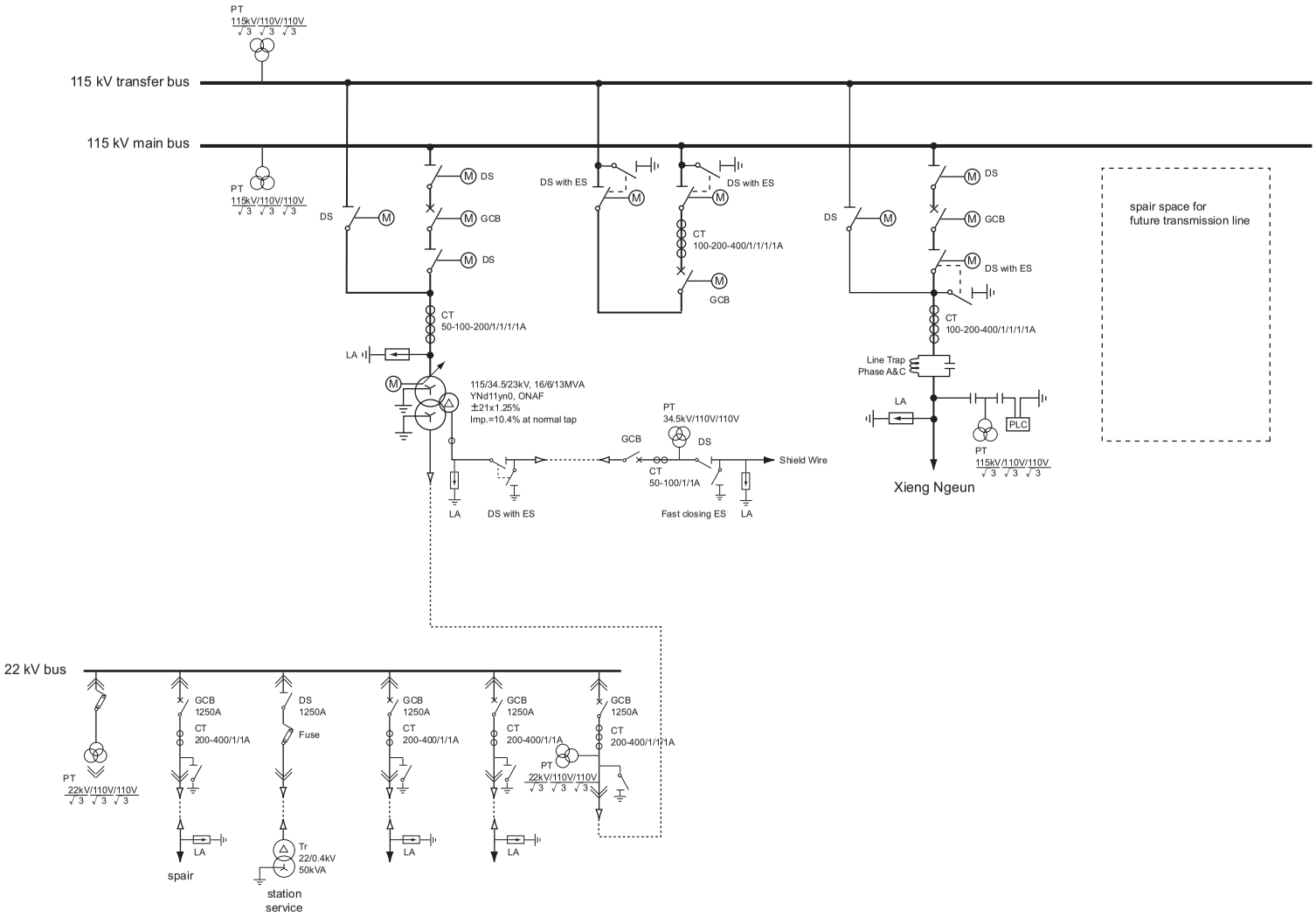
Items	No. 1		
Voltage (kV)	115/34.5/23		
Capacity (MVA)	16/6/13		
Connection	YNd11yn0		
Tap ratio	±10x1.25% (21 taps)		
Cooling System	ONAF		
% impedance at normal ta	10.40		
No. of Windings	3		
Installation Year	2001		
Manufacture	ABB, India		
Manufacturing Year	2000		
Manufacturing No.			
Stabdard	IEC76		
Peak Demand (MW)	---		
Peak time and day	---		

Shield Wire Earth Line

2 lines - 1 phase

CIRCUIT BREAKERS No. of CB : 3

	No.1	No.2	No.3		
Bays	TR#1	Bus-tie	Xieng Nguen		
Rated Voltage (KV)					
Rated Capacity (A)					
Short circuit current (KA)					
Rated breaking time (sec)					
Type					
Manufacture	ABB	ABB	ABB		
Manufacturing year	2000	2000	2000		
Manufacturing No.					
Installation Year	2001	2001	2001		



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Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Xayabury Substation Single Line Diagram

Station Name	**Xieng Ngeun**
Province	Luang Prabang
District	
Year of Construction	under construction by PTD project
Communication System	PLC
Protection System	
Busbar	Tap-off

Site visit no visit

☑ **Single Line Diagram**

☐ **Layout**

115 kV Switchyard No. of bays : 1

	Connection	CB	DS	CT	PT	Communication	note
No.1	Xayabury	0	1	0	2		
	Luang Praban	0	0	0	2	PLC	
	Vangvien	0	0	0	2	PLC	

22 kV Feeders 0

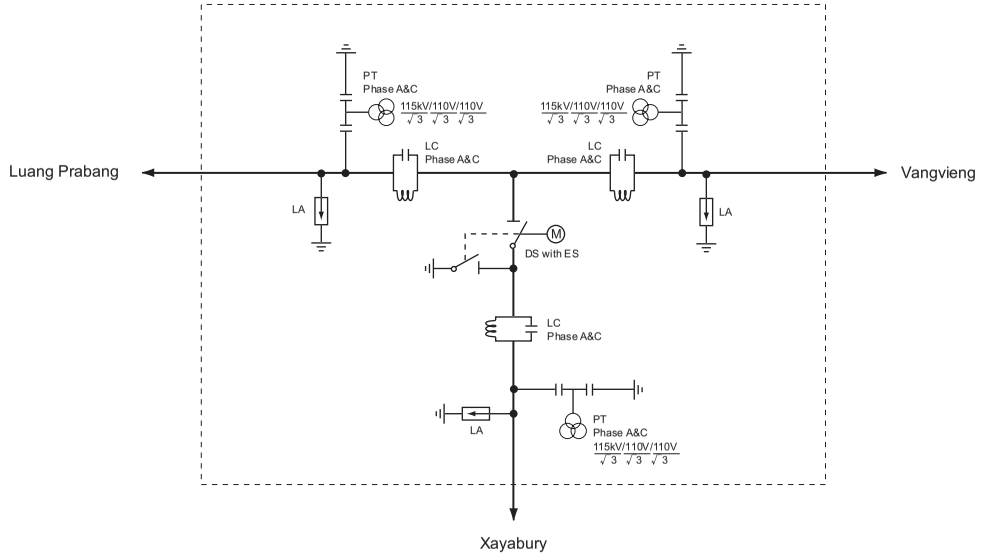
Tr. from	Cubicles	feeders	from TR	bus-tie	PT	spair feeder	service TR
	0						

Transformers No. of Tr. : 0

Items	No. 1		
Voltage (kV)			
Capacity (MVA)			
Connection			
Tap ratio			
Cooling System			
% impedance at normal tap			
No. of Windings			
Installation Year			
Manufacture			
Manufacturing Year			
Manufacturing No.			
Stabdard			
Peak Demand (MW)			
Peak time and day			

CIRCUIT BREAKERS No. of CB : 0

	No.1				
Bays					
Rated Voltage (KV)					
Rated Capacity (A)					
Short circuit current (KA)					
Rated breaking time (sec)					
Type					
Manufacture					
Manufacturing year					
Manufacturing No.					
Installation Year					



under construction by PTD project

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Xieng Ngeun Switching Station Single Line Diagram

Station Name	**Nam Leuk PS 115 kV Switch Yard**	Site visit	25-Mar-01
Province	Saisomboune Special Resion	☑ **Single Line Diagram**	
District	Longxan	☐ **Layout**	
Year of Construction	2000 (under construction of extension by PTD project)		
Communication System	PLC, Telephone, Radio, SCADA		
Protection System			
Busbar	Double (main and transfer)		

115 kV Switchyard No. of bays : 7

	Connection	CB	DS (ES)	CT	PT	Communication	note
No.1	HG#1	1	3 (1)	3	0		
No.2	HG#2	1	3 (1)	3	0		
No.3	TR#1	1	3 (1)	3	0		
No.4	Pakxan	1	3 (1)	3	3	PLC, Tel, Radio, SCADA	
No.5	Nam Ngum	1	3 (1)	3	3	PLC, Tel, Radio, SCADA	
No.6	Bus-tie	1	2	0	3		
No.7	Phonsavan	1	3 (1)	3	3		U/C

22 kV Feeders (indoor cubicles)

Tr. from	Cubicles	feeders	from TR	bus-tie	PT	spair feeder	service TR
TR#1	5	2	1	0	0	1	1

Transformers No. of Tr. : 3

Items	No. 1	HG#1	HG#2
Voltage (kV)	115/34.5/23	121/11	121/11
Capacity (MVA)	10/4.5/8	34.5/23	34.5/23
Connection	YNd11yn0	YNd11	YNd11
Tap ratio	±8x1.25% (17 taps)	±2x2.5% (5 taps)	±2x2.5% (5 taps)
Cooling System	ONAN	ONAN/ONAF	ONAN/ONAF
% impedance at normal ta	10.56	10.08	10.03
No. of Windings	3	2	2
Installation Year	2000	2000	2000
Manufacture	ABB,Elta Sp.	ABB,Elta Sp.	ABB,Elta Sp.
Manufacturing Year	1998	1998	1998
Manufacturing No.	1133013	1133011	1133012
Stabdard	IEC76	IEC76	IEC76
Peak Demand (MW)	---	---	---
Peak time and day	---	---	---

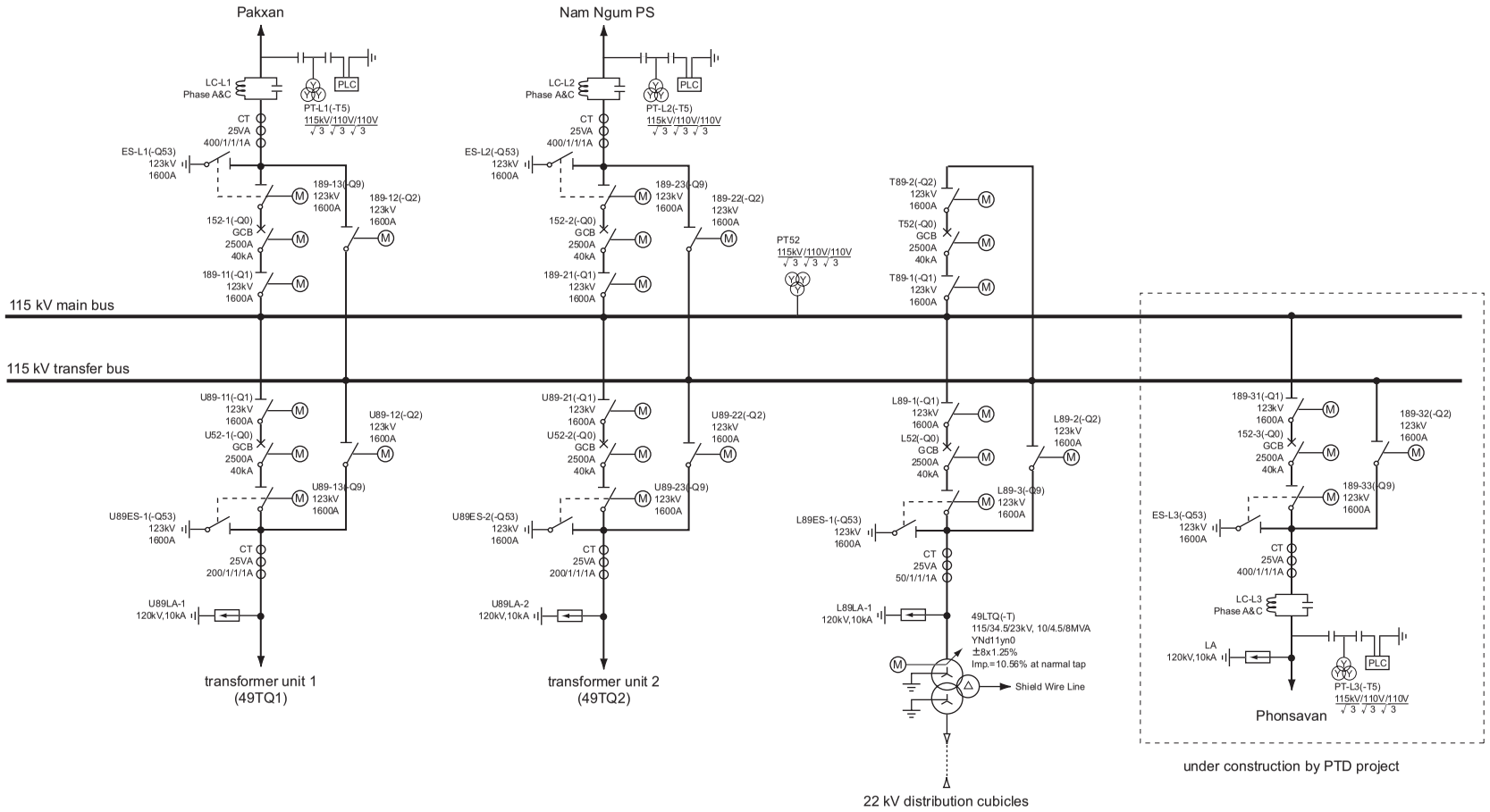
Shield Wire Earth Line

2 lines - 1 phase

115 kV CIRCUIT BREAKERS No. of CB : 7

	No.1	No.2	No.3	No.4	No.5	No.6
Bays	HG#1	HG#2	TR#1	Pakxan	Nam Ngum	Bus-tie
Rated Voltage (KV)	145	145	145	145	145	145
Rated Capacity (A)	2500	2500	2500	2500	2500	2500
Short circuit current (KA)	40	40	40	40	40	40
Rated breaking time (sec)	3	3	3	3	3	3
Type	LTB145D1/B	LTB145D1/B	LTB145D1/B	LTB145D1/B	LTB145D1/B	LTB145D1/B
Manufacture	ABB, Sweden	ABB, Sweden	ABB, Sweden	ABB, Sweden	ABB, Sweden	ABB, Sweden
Manufacturing year	1998	1998	1998	1998	1998	1998
Manufacturing No.						
Installation Year	2000	2000	2000	2000	2000	2000

	No.7					
Bays	Phonsavan					
Rated Voltage (KV)						
Rated Capacity (A)						
Short circuit current (KA)						
Rated breaking time (sec)						
Type	U/C					
Manufacture						
Manufacturing year						
Manufacturing No.						
Installation Year						



Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Nam Leuk PS Switch Yard Single Line Diagram

Station Name	**Kengkok**	Site visit	20-Jun-01
Province	Savannakhet	☑ **Single Line Diagram**	
District		☐ **Layout**	
Year of Construction	under construction by SPRE project		
Communication System	PLC, Telephone, Radio		
Protection System			
Busbar	Single		

115 kV Switchyard No. of bays : 3

	Connection	CB	DS	CT	PT	Communication	note
No.1	TR#1	0	1	3	0		
No.2	TR#2	0	1	3	0		
No.3	Pakbo	0	1	0	1	PLC, Tel, Radio	
No.4							

22 kV Feeders (outdoor)

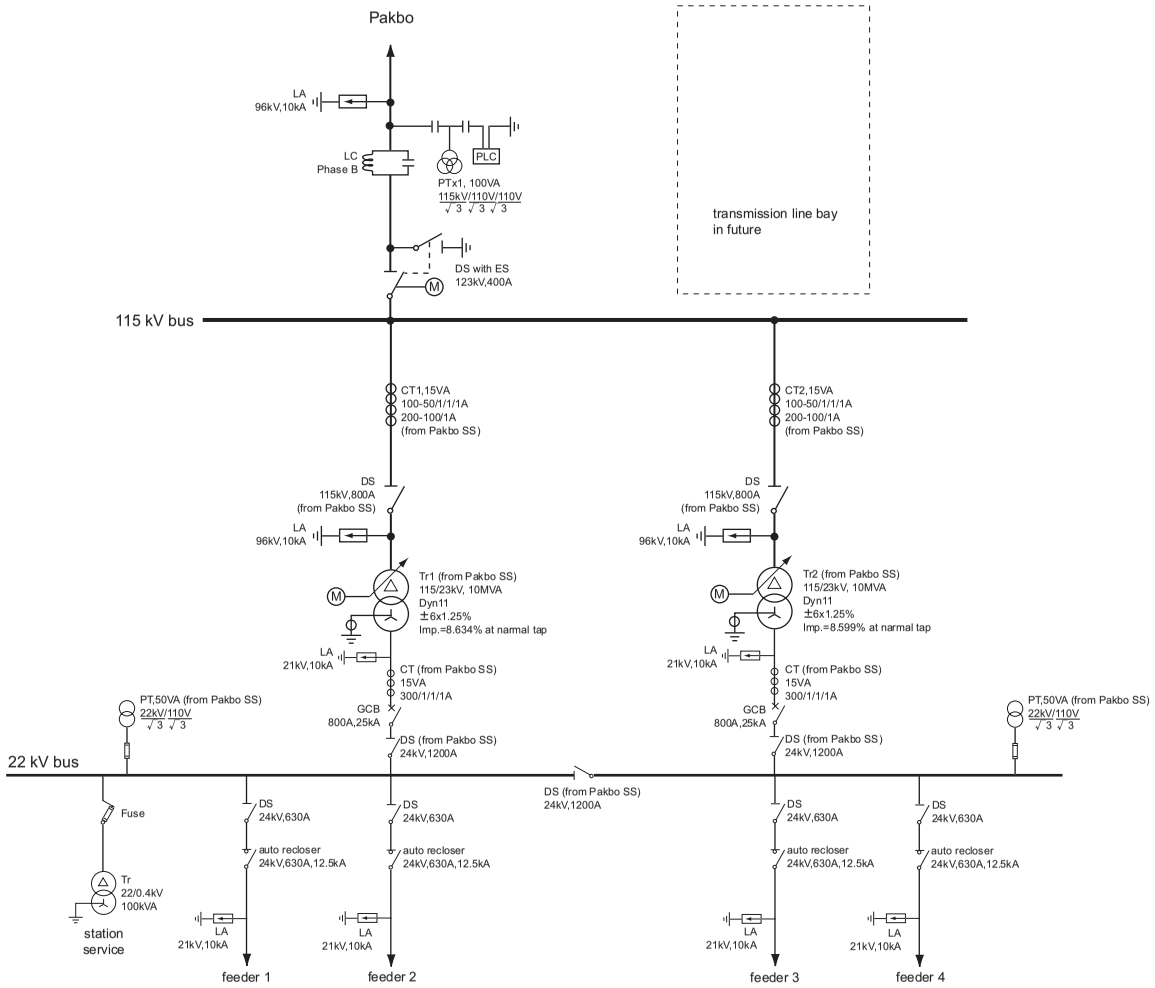
Tr. from	bays	feeders	from TR	bus-tie	PT	spair feeder	service TR
TR#1	6	2	1	1	3	0	1
TR#2	4	2	1		3	0	

Transformers No. of Tr. : 2

Items	No.1	No.2	
Voltage (kV)	115/23	115/23	
Capacity (MVA)	10.0	10.0	
Connection	Dyn11	Dyn11	
Tap ratio	±7x1.25% (15 taps)	±7x1.25% (15 taps)	
Cooling System	ONAN	ONAN	
% impedance at normal ta	8.634	8.599	
No. of Windings	2	2	
Installation Year	---	---	from Pakbo
Manufacture	Crompton Greaves	Crompton Greaves	
Manufacturing Year	1996	1996	
Manufacturing No.	T8540/1	T8540/2	
Peak Demand (MW)			
Peak time and day			

115 kVCIRCUIT BREAKERS No. of CB : 0

	No.1	No.2			
Bays					
Rated Voltage (KV)					
Rated Capacity (A)					
Short circuit current (KA)					
Rated breaking time (sec)					
Type					
Manufacture					
Manufacturing year					
Manufacturing No.					
Installation Year					



under construction by SPRE project

Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Kengkok Substation Single Line Diagram

Station Name	**Pakbo (Extension)**
Province	Savannakhet
District	Khanthaburi
Year of Construction	1996 (under construction by SPRE project)
Communication System	PLC, Telephone, Radio
Protection System	Inverse time phase & ground O/C & Instantaneous O/C reray
Busbar	Single

Site visit

☑ **Single Line Diagram**

☐ **Layout**

115 kV Switchyard No. of bays : 3+1

	Connection	CB	DS	CT	PT	Communication	note
No.1	TR#1	1	2	3	0		
No.2	TR#2	1	2	3	0		
No.3	Mukdahan	1	3+1	3	3	PLC, Tel, Radio	EGAT
No.4	Kengkok	**1**	3+1	3	3	PLC, Tel, Radio	U/C

22 kV Feeders (outdoor)

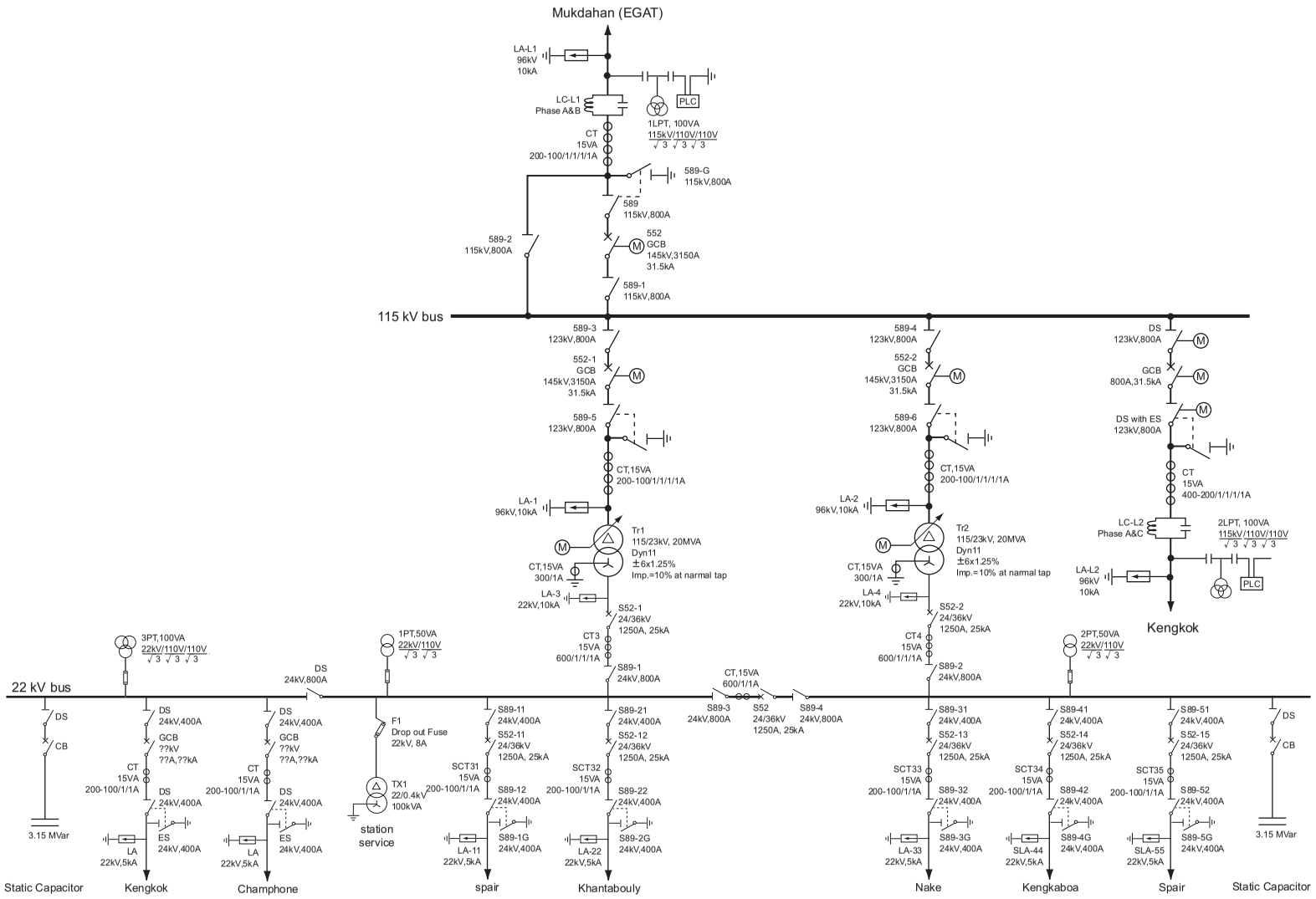
Tr. from	bays	feeders	from TR	bus-tie	PT	spair feeder	service TR
TR#1	6	2	1	1	3	0	1
TR#2	5	2	1		3	1	0
TR#1(EX)	4	2	0	1	3		

Transformers No. of Tr. : 2

Items	No.1	No.2	
Voltage (kV)	115/23	115/23	
Capacity (MVA)	20.0	20.0	
Connection	Dyn11	Dyn11	
Tap ratio	±6x1.25% (13 taps)	±6x1.25% (13 taps)	
Cooling System			
% impedance at normal ta	10	10	
No. of Windings	2	2	
Installation Year			
Manufacture			
Manufacturing Year			
Manufacturing No.			
Peak Demand (MW)			
Peak time and day			

CIRCUIT BREAKERS No. of CB : 3

	No.1	No.2	No. 3	No. 4	
Bays	TR#1	TR#2	Mukdahan	Mukdahan	
Rated Voltage (KV)	145	145	145		
Rated Capacity (A)	3150	3150	3150	2000	
Short circuit current (KA)	31.5	31.5	31.5	31.5	
Rated breaking time (sec)	3	3	3	3	
Type	S1-145F1	S1-145F1	S1-145F1		
Manufacture	AEG	AEG	AEG	NMG	
Manufacturing year	1996	1996	1996		
Manufacturing No.	3005558/3	3005558/3	3005558/3		
Installation Year	1996	1996	1996		



Electricite du Laos	Japan International Cooperation Agency (JICA) Joint Venture Nippon Koei Co., Ltd. & Tokyo Electric Power Company	The Study on Master Plan of Transmission Line and Substation System	Figure No. Title: Pakbo Substation Single Line Diagram (after SPRE Project)