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ELECTRICITY GENERATION FROM 1996 TO 2017 IN GUATEMALA

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Summary. The present study investigates the evolution of electric power generation in the public and private sectors due to the change in the electric legislation in 1996, by means of the General Electricity Law, for this purpose the synthetic analytical method was used, the study is carried out from the qualitative approach, with mixed methodology, the information is obtained from secondary sources, the information is obtained from secondary sources, which correspond to publications of entities of the electricity sector made by the international network, or by information provided, for the years under study and the variables defined, the analysis of the articles of the law that regulates the generation of electric energy and the selection of the experts interviewed for the question posed, was carried out according to the researcher's criteria; with the information obtained, it was found the increase in the generation of electric energy from the private sector, due to the opening to the investment of private capitals in electric projects and the possibility of entering the market, the change in the legislation causes the increase of the participants in the private subsector, registered as market agents, among which are the generating agents, the generation of electric energy available in 2017 is adequate to achieve the satisfaction of the electric energy service to the users, in peak hours.

Key words: legislation, electricity, generation, private sector, public sector.

LA GENERACIÓN DE ENERGÍA ELECTRICA DE 1996 A 2017 EN GUATEMALA

Resumen. En el presente estudio se investigan la evolución de la generación de energía eléctrica del sector público y del sector privado por el cambio en la legislación eléctrica en 1996, por medio de la Ley General de Electricidad, para el efecto se utilizó el método analítico sintético, el estudio se realiza desde el enfoque

cualitativo, con metodología mixta, la información se obtiene de fuentes secundarias, que corresponden a publicaciones de entidades del sector eléctrico efectuadas por la red internacional, o por información proporcionada, para los años en estudio y las variables definidas, el análisis de los artículos de la ley que regula la generación de energía eléctrica y la selección de los expertos entrevistados para la pregunta planteada, se realizó de acuerdo al criterio del investigador; con la información conseguida, se encontró el incremento de la generación de energía eléctrica del sector privado, debido a la apertura a la inversión de capitales privados en los proyectos eléctricos y a la posibilidad de entrar al mercado, el cambio en la legislación causa el incremento de los participantes en el subsector privado, registrados como agentes de mercado, entre los cuales se encuentran los agentes generadores, la generación de energía eléctrica disponible en el año 2017 es adecuada para lograr la satisfacción del servicio de energía eléctrica a los usuarios, en horas pico.

Palabras clave: legislación, electricidad, generación, sector privado, sector público.

Introduction

This research studies the legal effects of the change in electricity legislation due to the enactment of the General Electricity Law, Decree 93-96 of the Congress of the Republic of Guatemala, and specifically, in the generation of electric energy, a stage of the electric energy process, which is developed by converting a form of energy through conversion systems, to electric energy.

Electricity law regulates the electricity process and its stages, which include the generation, transmission, distribution and commercialization of electricity.

To establish the effects of the change in electricity legislation carried out in the year 1996, the relevant articles of the General Electricity Law, the consultation of a question posed to experts, and the data of electricity generation by sector in the year 1996 and in the year 2017 are selected for analysis.

The information is obtained from the General Electricity Law, consultation with experts and sources of information from publications consulted on the Internet on the web pages of the bodies of the electricity subsector in Guatemala, as well as from international organizations.

Consultation with experts provides elements of judgment to relate the results of the legal analysis of the law and the quantitative information on public and private generation.

Investigation of the consequences of the change in legislation from the legal point of view and in the electricity generation of the public and private sectors.

In order to carry out the research, the research approach was elaborated with the justification of the study, the definition of the problem to be solved, and the objectives to be achieved.

Through the study, it is desired to know the situation of electric power generation, in the year 1996 and 2017, as a result of the change in the electric legislation, the methodology, procedures and research techniques to be carried out are described, consistent with the selected sample, and to the established research variables.

The results of the legal analysis, of the articles of the General Electricity Law, of the consultation with experts and of the quantitative information related to the generation of electric power, private and public, are presented, discussed and allow the elaboration of the conclusions and recommendations of the research.

The stated objectives allow to know the results of electric power generation, the stage of the electric process studied in the years 1996, and 2017, according to the local legal framework.

The conclusions are made after the results have been obtained and discussed, in relation to the General Electricity Law, the expert consultation and the data of public and private generation.

Method

Research Problem

According to García Ramis, L. J. (2012, p. 46-50) the defined problem synthesizes an analyzed situation, in order to order the research process according to the state of the art.

The general question of this research is presented as follows: What is the relationship between the change in electricity legislation and the generation of electricity in the private and public sectors in Guatemala?

Research objectives

The general objective, state Quisbert Vargas, Misael and Ramirez Flores, Dennis. (2011, p. 463-64) is related to the problem to be investigated and to the specific objectives, which need to be achieved as an answer to the general question, below are the general objective and the specific objectives.

General Objective

Investigate the relationship between the change in legislation in the electricity sub-sector and electricity generation in the private and public sectors.

Specific objectives

Investigate the articles of the Law that regulate the generation of electric energy

To know the generation of electric energy in the public sector

To know the generation of electric power in the private sector

Research Paradigm

For Villabella Armengol, Carlos Manuel. (2015 p. 927) in qualitative type research the paradigm is constructivist, social situations are studied in time and place.

The present research studies the effects of the electric legislation and its legal and social consequences, in the mentioned years and place, in the qualitative or constructivist approach, it analyzes and describes the information obtained, with respect to the norms that regulate the generation of electric energy.

The interpretation of the selected articles will be made in accordance with the Judicial Branch Law, Decree 2-89 of the Congress of the Republic, which establishes in Article 10.

The rules shall be interpreted according to their text, according to the proper meaning of their words, to their context and in accordance with the constitutional provisions. When a law is clear, its literal tenor shall not be disregarded under the pretext of consulting its spirit.

The whole of a law will serve to illustrate the content of each of its parts, but the passages of the law may be clarified in the following order:

a) To the purpose and spirit of the same;

- b) To the reliable history of its institution;
- c) To the provisions of other laws on analogous cases or situations;
- d) In the manner that appears most in conformity with equity and the general principles of law.

Research methodology

Rodríguez, A. and Pérez, A. O. (2017, p. 181) describe that the method is conduit or means required to achieve the objective of the study and respond to the research problem posed.

The synthetic analytical method

According to Rodríguez, A. and Pérez, A. O. (2017, p.187) the synthetic analytical method is useful in searching for information or data from documentary sources, by means of analysis, it is possible to decompose the information into parts, with attention to the object of study, on the other hand, through the synthesis it is generalized and an answer is given to the solution of the problem posed, likewise the general principles of knowledge are obtained, although it is not used to obtain concrete or specific knowledge.

The inductive-deductive method

In the deductive inductive method one starts from the particular to the general, while with the deductive method one goes from the general to the particular, Rodríguez, A. and Pérez, A. O. (2017, p. 187) confirm that with the use of the inductive method the steps of observation, hypothesis statement, verification, thesis, law and theory are carried out, it is used to build knowledge,

By means of the inductive method, the punctual or concrete aspects of the situation are generalized, contrasted with the theory, principles and laws of reference; while with the deductive method the conclusions of the investigation are obtained, the combination of these methods allows the construction of knowledge.

The documentary method

Guzmán, V. (2021 p. 21) points out that in the documentary method, information on the research topic is sought, which is consulted, reviewed and organized, then classified, the documents with relevant information are selected, the content of the document is read and the corresponding record is made in the research instrument.

Triangulation

To make the contrast of the results obtained with the information from the sources of information consulted, triangulation is used, according to Hernández Sampieri, R. at all (2014, p. 417) in research it is better to use several sources of information and methodologies, for the collection, processing of information and obtaining the results.

Regarding triangulation, Forni Pablo and De Grande Pablo (2020, p. 163) confirm that the positivist paradigm includes quantitative methods, with the use of statistics to relate the results, and they also consider that the hermeneutic paradigm corresponds to the qualitative approach in which the starting point is induction according to the angle of vision of the experts through interviews and other research resources.

The use of mixed methodology and triangulation makes it possible to compare research results with respect to the particular situation under study.

Data analysis

Regarding data analysis, Hernández Sampieri, Roberto et al (2014, p. 418) express that it occurs in parallel with the corresponding collection.

The quantitative analysis of the data is carried out by grouping and ordering the data according to the periods to be compared. The legal analysis is carried out by means of the selected articles of the General Electricity Law.

Quantitative data analysis

Sampieri, R. Fernández Collado, C. and Baptista Lucio, M. (2014, p.272), the steps in the data analysis are carried out with the selection of the program with which the quantitative procedures grouped in tables will be carried out and by means of the figures, the variables under study will be visualized, according to the model that represents the data.

In order to analyze the data, descriptive statistics techniques are used in the grouping process, and then the information is expressed in tables and figures during the period of time under study, to illustrate, describe and interpret the changes in the variables under study, derived from the change in the electricity legislation.

Research design

According to Hernández Sampieri, R. et all (2014, p. 129), the research design is the selection of the strategies that are planned in order to achieve the general objective that provides the answer to the problem, in positivist approach, from the quantitative point of view, the research design is raised to test according to the selected test statistic, the defined statistical hypotheses.

Research with a qualitative approach is non-experimental; in this type of research, the variables under study are described, the effects of changes in the independent variable on the dependent variables.

The quantitative information available in publications of the entities of the electricity subsector will be compiled and recorded by means of the defined research instrument, with the answer to the pertinent question regarding electricity generation, which will provide results, which will be related to those obtained in the analysis of the articles and recitals of the General Electricity Law and the analysis of those obtained from the answers of the professionals consulted, with the purpose of improving the elements of judgment and vision to obtain the conclusions of the study related to electricity generation of the private sector and the public sector.

The selection of the sources of information, of the articles to be analyzed, of the experts who are consulted and the documentary information on the generation of electric power, is made according to the researcher's criteria, within the legal sphere, the articles of the law that regulate the activity of electric power generation will be searched and selected; by means of the respective research instrument, the information of the consultation to experts is obtained, the quantitative information collected and organized, the information of the generation of electric energy by the public sector and by the private sector is observed, with that information the results, the discussion and the conclusions of the study are obtained.

Population and sample

The population corresponds to the total number of individuals and the sample to part of the population, in the selection of the sample, Hernandez Sampieri, R. Fernández Collado, C. and Baptista Lucio, M. (2014, 175-176) say that, in the non-probabilistic, the selection of the sample depends on the researcher's criteria,

The sample of experts who will participate in the survey is made at the discretion of the researcher, it is considered professionals with experience in the electricity subsector of different professions, will respond to the question posed.

The articles of the standards will be selected for the regulation of electric power generation in the national legal framework.

The selection of the numerical information is selected to compare the generation of electric power in 1996 and 2020, which is the object of the study.

Research techniques

Research techniques, state Ñaupás Paitán, Humberto, Mejía, Elías, Novoa Ramírez Eliana and Villagómez Paucar Alberto (2014, p. 135) are procedures applicable in the studies during the execution of the research, they are classified as conceptual, descriptive and quantitative.

The field observation technique requires the recording of data collected by means of the research instrument, while the documentary technique requires the recording of data by means of an electronic sheet, organized by the variable and period of study, in this case it is the change in electricity legislation and the generation of electricity in the private sector and the generation of electricity in the public sector.

Variables

For Carballo Barcos, Miriam, and Guelmes Valdés, Esperanza Lucía. (2016, p. 141), a variable is integrated with variable or constant concepts, quantitatively or qualitatively, variables are classified by their nature in qualitative and quantitative, by their complexity, in simple and complex, by their relationship in ordinal, nominal, interval and ratio, and measurement in ordinal, nominal, interval and ratio, qualitative variables are grouped by attributes, quantitative variables are expressed in numerical values, discrete or continuous type.

In the present investigation, the independent and dependent variables are extracted from the following general question:

what is the relationship between the change in electricity legislation and the generation of electricity by the private sector and the public sector in Guatemala?

The independent variable is the change in legislation, while the dependent variables is private sector and public sector electricity generation.

Investment in electric power generation projects is observed through the generation of electric power by electricity market agents, both from the private and public sectors.

The Research Instrument

The research instrument of documentary observation was designed in a Microsoft Excel sheet to record each relevant numerical data of the variables defined in the research problem, a research instrument is used to record the articles of the laws to be analyzed, and the documents with which the theoretical framework was made.

In the research, the instrument is required to collect the data, to achieve the specific objectives, it is expected to obtain evidence through the selected sources of information.

The collection and processing of quantitative information will use a Microsoft Excel file to represent the data in tables for the years under study.

The research instrument to be answered by the experts consists of the question posed in a closed form, with observations that the experts wish to make, on the generation of electric power.

Expected results

The change in the electricity legislation entails observing the legal effects that allow the participation of private capital in electricity generation projects, in accordance with the General Electricity Law.

The results of the research will describe the legal effects and the effects on electricity generation of the change in legislation, with attention to the de-monopolization and the opening of the market to private investment in electricity projects, and will be related to the results from the experts' answers, and those from the numerical information of the variables, in order to corroborate the results of the change in legislation in the electricity subsector.

Results

Results of the expert consultation

The experts consulted regarding the situation of electric power generation said that this is due to the opening of the electricity market, the liberalization of the electricity market and the legal security for the participation of the private sector.

The Organic Law of the National Electrification Institute (INE)

The organic law of the National Electrification Institute -INDE- Decree No. 64-94 and its reforms regulates the adaptation of this State agency in the electric sub-sector to the constitutional norms, in the second recital of said law the harmonization with articles 129 and 130 of the current Political Constitution is expressed.

The fourth recital states the scarce use of hydraulic resources in the country; the fifth recital states that economic development with the participation of the private sector is necessary; the seventh recital regulates the autonomy of INDE, and that it is one more entity in the organization of the electric sub-sector; article 1 of the Organic Law establishes that the NSDI is an entity with legal personality, assets and autonomy, while Article 4 of said law regulates the purposes of the NSDI, among the most important of which are to provide a solution to the shortage of electric energy, contribute to the use of natural resources in a sustainable manner, estimate the generation of electric energy with the use of renewable energy sources in the country, participate in electric projects and have its electric energy transmission facilities available for the use of generating entities; the aforementioned law regulates the manner in which the NSDI is organized.

Decree 93-96 and articles 129 and 130 of the Constitution.

With respect to the articles of the General Electricity Law and its regulations that regulate the generation of electric energy.

Article 1, paragraph a) regulates that the generation of electric energy is free, without State intervention, with the requirements expressed in the Constitution, the article in its pertinent part establishes "a) The generation of electricity is free and does not require prior authorization or condition by the State, other than those recognized by the Political Constitution of the Republic of Guatemala and the laws of the country".

The current Political Constitution of the Republic of Guatemala is the supreme law and of the highest legal hierarchy, it is in force since January 14, 1986, in Article 129 of the Constitution, it allows the participation of private initiative and considers the electrification of the republic as a matter of urgency, in its conductive part, Article 129 establishes: "The electrification of the country is declared of national urgency, based on plans formulated by the State and the municipalities, in which private initiative may participate." The electrification of the country includes the execution of electricity projects to provide electricity service to new users with sufficient capacity, for which it is necessary to expand the infrastructure that includes transportation, distribution and power generation networks.

Article 130 of the Constitution regulates the prohibition of monopolies and the equal treatment of private parties participating in the activities:

Monopolies and privileges are prohibited. The State shall limit the operation of companies that absorb or tend to absorb, to the detriment of the national economy, the production of one or more branches of industry or of the same commercial or agricultural activity. The laws shall determine what is related to this matter. The State shall protect the market economy and prevent associations that tend to restrict market freedom or harm consumers.

Article 130 allows the State to protect freedom in the market, together with the prohibition of privileges to public or private persons, and allows the issuance of laws that eliminate monopolistic practices, with the opening of the market to investment, with freedom to carry out the stages of the processes, including the production of electricity.

The General Electricity Law regulates the elimination of vertical integration of the electricity process and monopolistic practices, provisions that are in harmony with the constitutional law, which establishes in Article 129 that private initiative may participate in the electrification of the country and in Article 130 the prohibition of monopolies.

Thus, the General Electricity Law and its regulations regulate the activities of the electricity sub-sector, in accordance with the principles established in Title I, in a market, with the participation of private and public capital, the elimination of vertical integration in the electricity process, and monopolistic practices.

Results of the analysis of the General Electricity Law

The market was opened to private sector investment, through private entities, the private sector participates with market agents, according to the activity in which they are registered.

Each market agent may only participate in one of the activities of the electric energy process: generation, transmission, distribution and commercialization of electric energy.

The unregulated market includes end users with maximum demand greater than 100 kilowatts, registered in the Registry of Market Agents and End Users.

In the unregulated market, the conditions and prices of electricity are free and are established by agreement and free contracting between the commercial agent and the large electricity user.

The General Electricity Law regulates the opening of investment to the private sector, the role of the State is to establish the policies of the electricity subsector and regulate it, the governing body is the Ministry of Energy and Mines and the regulatory body is the National Electric Energy Commission whose provisions regulate the electricity subsector, the Wholesale Market Administrator schedules the dispatch of the electricity load, in the wholesale market participate the electricity market agents and large users.

Investment

The increased investment of the private sector in infrastructure and electric energy projects is due to the de-monopolization of the sub-sector and the opening of the market, the participating entities must be registered in the Registry of Market Agents and Large Users, the generating agents are those that produce electric energy from renewable and non-renewable energy sources.

Market Agents

The National Electrification Institute (INDE) participates through the Electric Power Generation Company, registered as a market agent in the electric power generation activity, participates in the transportation activity through the Electric Power Transportation and Control Company, registered as a transportation agent, and in the commercialization of electric power through the Electric Power Commercialization Company, registered as a commercializing agent.

Empresa Eléctrica de Guatemala, S.A. (EEGSA) is registered as an electricity distributor, with operations in the departments of Guatemala, Sacatepéquez and Escuintla.

Related to the electric company is Comercializadora Eléctrica de Guatemala, S.A. (COMEGSA), a market agent that trades blocks of energy and electric power.

The role of the State

Before the change in the legislation, the State intervened in the market and in the electricity sub-sector through INDE and EEGSA, of which, through INDE, it was the majority shareholder.

With the change in legislation due to the enactment of the General Electricity Law, the State now has a regulatory role in the electricity subsector, with the Ministry of Energy and Mines in charge of directing policies in the electricity subsector.

Public sector and private sector participation in electricity generation

Private sector investment in electricity generation has been growing during the years under study, while public investment has tended to remain constant and decrease.

Private sector participation before and after the change in electricity legislation

Prior to the change in the electricity legislation, the private sector participated in an emerging manner in contracts granted by the State, although no private capital was invested in the electricity sub-sector to commercialize in any of the stages of the electricity process.

After the change in the legislation, private capital was invested, through registered market agents, in the Wholesale Market Administrator, the different transactions of

electric energy and power in the wholesale market are made, the market structure changed with the monopolistic practices in the electric market to not having protected monopolistic entities, nor vertical integration of the electric process.

End-users with regulated tariffs defined by the State, went to the regulated market with the tariffs authorized by the National Electric Energy Commission according to the prices established in the operations related to the generation, transmission and distribution of electric energy.

Increased investment

Next question: is the increase in investment in electricity generation in Guatemala related to the change in electricity legislation?

Table 1

Answer to the question

Yes	No
10%	0%

Table 1 shows the result of the question on the growth of investment and electricity generation, due to the change in legislation since the General Electricity Law came into force, with 100% affirmative answers.

Response Comments

Expert 1 states that the increase in electricity generation is related to the change in electricity legislation in Guatemala, and the increased participation of the private sector in the electricity generation activity.

Expert 2 mentions that, with the change in legislation following the entry into force of the General Electricity Law, electricity generation was improved due to the liberalization of the Guatemalan electricity market, in order to promote investment in electricity generation in the other activities of the electricity production process, which includes the supply of electricity to the end user

The answer of experts 1 and 2 is in accordance with the purpose of the General Electricity Law in that aspect, so that the increase in electricity generation is higher.

Expert 3 comments that the installed capacity has been improved because the legislation allows the existence of an open and competitive electricity market, but it is necessary to carry out the bidding processes carried out by the electricity distributors and to use the incentives established in the regulation that encourages the operation of renewable generators.

Results of electric power generation by the private sector and by the public sector

The results in relation to the years in comparison and mainly to private generation and public generation are shown in Table 2, together with information on maximum demand, installed capacity, exports, imports and electricity coverage, in which the comparison between 1996 and 2017 of maximum demand, installed capacity, public

generation of electricity, private generation of electricity, exports of electricity, imports of electricity and coverage are observed for those years.

Table 2

Quantitative results

Year	Maximum demand KW	Installed capacity KW	Public generation GWH	Private generation GWH	Export GWH	Import GWH	Cober- Tura % Tura % Tura % Tura % Tura % Tura %
1996	733.	1145.5	2409.5	1286.	42.5	20.	53.30%
2017	1749.5	4597	2149.	9340.	1857.	891.	92.
Change	1016.1	3451.5	-260.2	8054.	1815.	871.	39.

Table 3 shows the market participants, in 1996, the entities that participated with vertical integration in the electricity process were Empresa Eléctrica de Guatemala, S. A., (EEGSA) and Instituto Nacional de Electrificación (INDE), in 2017 the participating persons were 159, each market agent only participates in one category, generation, transmission, distributor and marketer.

Table 3

Market participants

Year	Participants	Quantity
1996	INDE	1
	EEGSA	1
Total		2
Year	Participants	
2017	Large users	9
	Generating agent	114
	Marketing agent	21
	Forwarding agent	12
	Marketing agent	3
Total		159

Note: Source: Own elaboration with data from the Wholesale Market Administrator http://www.amm.org.gt/pdfs2/Listado_Agentes.pdf

Private equity participation

In the first recital of the General Law of Electricity it expresses the insufficient installed capacity to satisfy the maximum demand, this situation prevents development, for this situation the electric sub-sector is released to increase electric production, then in the other recitals it expresses the need to invest in electric projects, through the opening of the market to private investment, to the de-monopolization, which is established by means of articles 1 and 7 of the General Law of Electricity.

With the quantitative data for the period under study, corresponding to the generation of electricity by sector, and the international electricity transactions carried out, it can be deduced that there are private sector electricity market agents that participate in transactions in the electricity market, after having satisfied the local demand.

The private sector has invested in power generation projects, increasing installed capacity to meet peak demand and allowing market agents, mostly from the private sector, to export electricity to neighboring countries through the Wholesale Market Administrator.

Private and public investment

The General Electricity Law, in accordance with the Political Constitution of the Republic, establishes equal conditions for those who invest in the electricity sub-sector, the private sector invests in electricity projects, under equal conditions as state entities registered as market agents.

The experts consulted mentioned that the opening of the market to private capital has led to an increase in the project in the stages of the electricity process, while the State has maintained its investment in the electricity sub-sector without growth.

The information obtained with respect to electricity generation shows that private investment has had a sustained growth during the period under study as a result of the change in legislation, while private sector investment remains at a constant level or tends to decrease.

Discussion and conclusions

Legal effects

According to the legal analysis of the law, from the change in the electricity legislation, the legal effects were the elimination of monopolistic practices, vertical integration, the opening of the electricity market to the investment of private capital, the liberation of the electricity market, the State stopped intervening in the market, the Ministry of Energy and Mines governs the electricity subsector, the National Electricity Commission is the regulatory body with provisions issued by means of resolutions published on its website, the participants in the electric process are called market agents, among which are the generating agents, transporters, distributors and marketers who participate under equal conditions, with freedom to perform one of the joint activities in which it is authorized according to the General Law of Electricity and its regulations, the transactions between electric market agents and large users are made through the Wholesale Market Administrator.

Electric power generation

According to Table 1, from the consultation with experts it is clear that there is greater generation of electric power due to the change in the legislation, according to the statistics found, Table 2 shows that in 2017 there is greater generation of electric power than in 1996, also with respect to the base data of 1996, that private generation increased by 626.16%, while public generation decreased by 10.79%

The information is complemented based on 1996 data, it is found that the maximum demand increased by 138.54%, electricity imports by 43.18%, exports by 42.71% and coverage increased by 73.36%

Table 3 shows that in 1996 two entities participate with vertical integration practices, while in 2017 there are 119 agents of which 114 are electricity generating agents.

According to article 1 of the General Law of Electricity, the generation of electric energy is released, to which in the 12-04-2005 sentence it affirms:

The purpose of the General Electricity Law, as can be seen in its recitals and Article 1, is to promote the production, transmission and distribution of electricity, optimize the growth of the electricity sub-sector, as well as decentralize and de-monopolize the electricity transmission and distribution systems in order to speed up the growth of the supply and satisfy the social and productive needs of the inhabitants of the Republic. Gaceta Jurisprudencial No. 76, joined cases No. 1932-2004 and 2157-2004, judgment: 12-04-2005.

Discussion

Vay et al. (2014, p. 55) describe that before privatization, INDE generated almost all of the electricity with which the domestic market was satisfied, while at present, this entity generates almost 30% of the total electricity. During this period of privatization, INDE transferred 7.3 billion Quetzals for social tariffs, but this aid did not reach the poorest users in rural areas.

Investment in the electricity market

Prior to the change in legislation, investment in electricity projects was controlled by the State, through the monopolistic entities, INDE at the national level and EEGSA, which operated in the departments of Guatemala, Sacatepéquez and Escuintla.

After the change in the electricity legislation, with the enactment of the General Electricity Law, the electricity market was opened, together with the national and international situation, private sector investment in electricity projects increased, which resulted in greater installed capacity, an increase in electricity coverage and the satisfaction of the maximum demand.

Vay et al. (2014, p. 16-17) quotes CEPAL (2012, p.53) and states that electricity generation increased 234% of which 215% is from hydraulic sources, "growth in net electricity generation implied two inevitable factors in any basic reading of the subject: First, the loss of energy sovereignty of the State of Guatemala; second, the growing aggravation of socio-environmental conflicts."

Urizar Hernández (2016, p.79) mentions as results the increase in private investments, which represents 80% of electric power generation, the installed capacity increased by more than 280%, almost double the maximum demand, so the risk of power outages is null, coverage increased to 90% by 2015, on the other hand, Guatemala has been the only country in the region without rationing since the 1996 reform, while tariffs were no longer established with political criteria, through the electricity laws, the way to calculate transmission and distribution prices is defined, the transmission tariffs are set every 2 years and the distribution value added, every 5 years. Electricity tariffs between large users and market agents are free, the reform eliminates barriers to entry for the private sector and opens the market to competition.

Conclusions

The Organic Law of INDE Decree 64-94, with the necessary reforms to harmonize it with the Political Constitution of the Republic of Guatemala of 1985, allows changing the role of the State, which was responsible for the investment in the infrastructure for the supply of electricity to the population, to stop intervening in the electricity market, according to the General Law of Electricity that allows participation in a free and open market for investment with private capital.

Articles 129 and 130 of the Constitution establish the priority of national electrification with the participation of the private sector and the prohibition of monopolies, in harmony with the General Electricity Law, which regulates the liberalization of electric power generation.

The General Electricity Law repeals the Geothermal Law, the Law of Easements for electrical works and installations and any other provision that opposes it according to the legal hierarchy, and the Regulations of the General Electricity Law and the Wholesale Market Administrator were issued to develop the law.

Due to changes in electricity regulation in 1996, the joint activities of the electricity process were liberalized, monopolistic practices and vertical integration were eliminated, and the participation of electricity market agents in the generation, transmission, distribution and commercialization of electricity was observed.

The investment of private entities in electricity generation increased, while public generation decreased in the years studied, due to the motivation of the private sector to participate in electricity generation projects, which allow the satisfaction of the maximum demand during peak hours and the export of electricity to neighboring countries.

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