

## Current Policy and Challenges of Energy Utilities in Taiwan

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**Abstract.** Accompanying the great growth of total energy consumption over the past two decades, these years, regulations as adjust tools to ensure energy system getting more sustainable, competitive and secure are prosperous. This paper will focus on the current situation that conventional utilities are governed by new legislation aiming at liberation. This paper will briefly touch on the industries, such as petroleum, gas, electricity, that developed in different ways obviously in Taiwan, and is meant to provide a perspective on the results verified with consumer choice theory for more comprehensive discussions.

**Keywords:** liberalization, energy utility, policy, competition, consumer

### 1. Introduction

Accompanying the great growth of total energy consumption over the past two decades, these years, regulations as adjust tools to ensure energy system getting more sustainable, competitive and secure are prosperous. In early times, Taiwan's energy industry is particularly protected and managed by the government for a long time. It adopted the monopoly and state-owned operation method, so as to ensure the stable supply of various energy resources and government liabilities. However, it also resulted in the corruption and inefficiency of the public enterprises. Under the global trend of internalization, liberalization and privatization, Taiwan's energy industry is gradually stepping into the open status to some extent, but some cases and experiences of market competition failure still occur.

As J. Gregory Sidak and Daniel F. Spulber stressed, regulators should be concerned with achieving competition "fairly," rather than the equity of the outcomes that they produce. Furthermore, free-market competition likely will bring significant benefits to consumers by enhancing the productive efficiency of companies in electric power, and other network industries. Competition will increase the variety of products and services that are offered and stimulate technological innovation. In the process for an orderly transition to competition that rely on competitive innovation and cost cutting as the sources of consumer benefits, regulators should establish basic rules to achieve fully the benefits of competition while preserving fairness.

In this essay, we invoke the fundamental principles Sidak and Spulber proposed, especially equal opportunity, and impartiality to review current policy of energy utilities in Taiwan, and simultaneously to agitate more reasonable reform. In Part II we characterize current energy Market in Taiwan, and state recent legislative progress and achievements in Part III. Then, we discuss predicament under the conditions of energy shortage and energy price on the increase, and finally provides some point of views for further discussion in last Part.

### 2. Current Energy Market in Taiwan

The Taiwan's total energy consumption has grown greatly over the past two decades, going from 53.25 million kiloliters of oil equivalent in 1991 to 111.92 million kiloliters in 2011, which is an average annual

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growth of 3.78%. Of that in 2011, 80.95% was for energy use, and non-energy uses consumed 19.05%. When classified by consumer, the consumption of energy for each sector in 2011 was as follows: energy and industrial sectors consumed 45.78%; transportation sector, 12.08%; agriculture, forestry and fishery sectors, 0.86%; services sector, 11.06%; residential sector, 11.16%. Classified by form of energy, coal and coal products contributed 8.37% of consumption in 2011; petroleum products provided 38.22%; natural gas shared 3.06%; biomass and waste accounted for 0.17%; electricity constituted 49.79%; solar thermal 0.10% and heat 0.29%.

Since Taiwan went from a supply of 58.33 million kiloliters of oil equivalent in 1991 to 138.24 million kiloliters in 2011, an average annual growth of 4.41%, really, the imported energy occupied 97.93%. Classified by energy form, coal contributed 31.38% in 2011, oil constituted 46.17%, natural gas shared 11.78%, biomass and waste accounted for 1.38%, hydro power provided 0.28%, nuclear power provided 8.82%, geothermal, solar and wind power provided 0.11%, and solar thermal 0.08%.

## **2.1. Petroleum and Natural Gas**

In great detail, Petroleum product consumption grew from 29.73 million kiloliters of oil equivalent in 1991 to 45.61 million kiloliters in 2011, an average annual growth of 2.16%. Of this total in 2011, 6.22% was used to produce electricity, 47.23% was consumed for non-energy use, and 46.55% went to fuel use.

In 2011 imports of Liquefied Natural Gas(LNG) reached a total of 15,986 million cubic meters, and in 1991 it was 2,070 million cubic meters, an average annual increase of 10.76%. In 2011, the consumption of LNG was 14,638 million cubic meters, while in 1991 it was only 1,472 million cubic meters, an average annual increase of 12.17%. Of the total in 2011, power generation comprised 85.70%, industrial 12.25%, services use 1.55%, residential use 0.50%.

## **2.2. Electricity**

Electricity production grew from 99.2 TWh in 1991 to 252.2 TWh in 2011, an average annual increase of 4.78%. Of the total electricity production in 2011, Taipower's hydro power comprised 2.69%, thermal power 47.72% (coal shared 26.92%, oil 2.90%, LNG 17.90%), nuclear power 16.70%, wind power 0.32%, cogeneration 15.77%, and IPP 16.79%. Also, the peak load in 2011 reached a record 33,787 MW. Electricity consumption went from 93.4 TWh in 1991 to 242.2 TWh in 2011, an average annual increase of 4.88%. Classified by sector, energy and industrial consumed 60.69% of electricity in 2010, transportation occupied 0.50%, agricultural 1.13%, residential accounted for 18.34%, services 19.35%.

Generally speaking, currently, Taiwan's dependence on imported energy was 97.68%; the value of energy imports was US\$57.5 billion, which was 27.44% more than the previous year; the per capita energy imports cost burden in 2011 was NT\$69,004, which was an increase of 17.20% compared with NT\$80,870 in 2010.

## **3. Energy Policy Progress**

In Taiwan, the Bureau of Energy, Ministry of Economic Affairs is the authority responsible for drafting and carrying out the national energy policies, laws and regulations. To cope with the internationalized and liberalized trend of economic development, the energy policies have changed greatly in recent years. On the one hand, it actively encourages energy enterprises to become liberalized and private, opens private power plants and petroleum refining industry, so as to make the domestic oil and electricity price regulated and transparent, and strengthens the management of energy demands. On the other hand, it emphasizes the energy and environmental issues and countermeasures, with the expectation of achieving economic growth, environmental protection and balance of energy demands. Taiwan's energy policies entered into the germinal stage in 1973 when Taiwan's Energy Policy was announced and implemented. Then until it was revised for the third time in 1990, it first announced the domestic petroleum market would step into liberalization. By declaring the Energy Policy White Papers in 1998 and 2005, White Paper of Energy Technology Research and Development in 2007, Sustainable Energy Policy Layout in 2008, as well as Energy-Industrial Technology White Paper in 2010 and 2012, it clearly lays down the national development direction, wherein opening up the market for energy enterprises is one of the important energy policies in Taiwan. Aside from

the Energy Management Law, and the Enforcement Rules for the Energy Management Law, different energy resources mainly follow the Petroleum Administration Act (2001), the Natural Gas Enterprise Law (2011), Electricity Law, and the Renewable Energy Development Regulation (2009) which is the key to future energy development.

All these indicate that Taiwan's energy industry is stepping into liberalization through the relevant laws and regulations. However, since there are still many social factors needed to be taken into consideration with these liberalization policies, the legislations seem not take effect as expected. During recent years, advanced countries such as EU, U.S. and Japan are accelerating this deregulated process through the formulation of plans.

With regard to the thinking of the above, thereafter we'll focus on competition of energy utilities(e.g. petroleum, gas, electricity)in Taiwan and the achievements in the stage.

### **3.1. Petroleum Industry- Open-Up but Still Oligopoly**

For a long time in the past, the CPC Corporation monopolized the market of Taiwan's petroleum industry. However, with the petroleum market liberalization and the open-up policy of the petroleum product import, the private filling stations were opened in 1987, the private petroleum refining plants were established in 1996, three petroleum products including fuel oil, Liquefied Petroleum Gas (LPG), and jet fuel were launched in 1999, and the import of eight major petroleum products was started in 2001. Moreover, the primary Petroleum Administration Act were passed in 2001, and later the 18 sub-laws were announced and implemented successively, which are taken as the foundation to manage Taiwan's petroleum industry. In order to further liberalize petroleum products, and explore the feasibility of lowering the qualification for the petroleum practitioners to enter the market, the Amendments to Some Articles of the Petroleum Administration Act, were announced in 2008, which lowers the minimum safe stock of the petroleum products for the petroleum import industry from 50,000kl to 10,000kl, so as to encourage domestic practitioners to enter the market, further expand the liberalization achievements, bring more benefits to the consumers and promote the industrial competition. Later in 2010, the Amendments to Some Articles of the Petroleum Administration Act were announced again, which takes the economic trades of the middle and downstream LPG suppliers into the management scope. What is special is that, for the open-up and industrial competition of Taiwan's petroleum refining industry, the CPC Corporation and the Formosa Petrochemical Corporation (FPCC) got the operating license for the petroleum refining industry; while the LCY Chemical Industry Corporation and the Industrial Limited Company of Favor of the Universe got the operating license for the LPG import industry. In the past, the petroleum refining business was monopolized by the CPC Corporation. However, with the Sixth Naphtha Plan made by the government, the FPCC is responsible for constructing Refining Plants, Naphtha Cracking Plants and Cogeneration Plants, in which the Refining Plants increase the productivity based on the consideration of the optimal process and capacity. From then on, the CPC Corporation faced the challenge from the competitors. After Formosa Petrochemical Corporation entered the market, the domestic petroleum supply has formed the oligopoly market. The market of the petroleum products has seemed liberalized until now. The FPCC can also provide products similar to what the CPC Corporation offers, ranging from petrochemical materials to gas. Theoretically, due to the market competition, they can provide the petroleum products and service that has good quality but low price. However, although the petroleum products are liberalized, the CPC Corporation is still state-owned. As a result, the competition that is supposed to occur after liberalization doesn't come into being. Instead, it forms the abnormal structure wherein the state-owned enterprise cooperates and competes with the private enterprises. Thus, the consumers are left with very few choices.

### **3.2. LNG Industry- Liberalize Pipeline Service but Regional Exclusive**

The production and import of natural gas in Taiwan are all controlled by CPC Corporation which, as a state-owned company, is in charge of petroleum exploitation and development in Taiwan. As for the related management regulations, it violates the state-owned enterprise management rules or the internal regulations within the company. For the natural gas utilities, there are 23 private and 2 public gas pipeline companies (except for the direct branches of CPC Corporation in Hsinchu and Miaoli, there are 23 other natural gas enterprises from the South to the North) which purchase the natural gas from the CPC Corporation, and

distribute it to the 3 million end users, including households, businesses, service industry and some industrial users. This violates the Supervisory Regulations on the Private Utilities and the Rules Governing Gas Enterprises. For the natural gas enterprises with the operating sites in the urban areas, the coverage of gas supply is more than 60%. Since the Supervisory Regulations on the Private Utilities are for the common enterprises, the natural gas import and production enterprises violate the regulations related to the state-owned regulations, without any exclusive regulation for the 3 million end consumers. Fortunately, considering the CPC Corporation will be finally privatized, and the access possibility for other competitors in the future; furthermore, in order to improve the management of the natural gas utilities, and take the production or import of natural gas into the management scope, the Natural Gas Enterprise Law was passed early in 2011 after being reviewed by the Legislative Yuan (the supreme legislature of Taiwan) several times, and was announced to take effect on Feb. 1<sup>st</sup> of the same year.

However, as stipulated in the new law, the utilities should supply gas by district in the municipalities, and by township (town, city or district) in the counties (cities), and they shouldn't supply natural gas out of the coverage area without the permission from the central authority (see Article 8 of Natural Gas Enterprise Law). In other words, after the new law, Taiwan's natural gas enterprises still monopolized the market in each designated area. What's more, even if the production or import markets have been opened access, it still requires that every enterprise should provide storage capacity for a certain period", and deletes the articles in the draft of "contractual gas transmission and storage". On the whole, not only the regional consumers still have no choice relating to sales, but the upstream market also remains quite difficult to be activated.

For this industry, we should particularly pay attention to the fact that, pipeline enterprises has monopolized the pipeline configuration in nature, and the natural gas is a necessity for livelihood, so its distribution show monopoly by district. There are about 400,000 users for each enterprise in all districts. However, some enterprises only have about 1,000 users, and small operating sites, which is too small for the development of a scale economy. That is the special situation for the market operation and competition of the current gas pipeline enterprises in Taiwan. For the use of the natural gas, most of it is consumed as fuel for power generation, and the rest consumed by the households and industries. In the early times, the gas used by the industries only can be supplied by the CPC Corporation. Even if the pipeline of the private enterprise was closer to the industrial user, it can't supply gas legally. Since the price and quantity of the gas used by the households are low, the pipeline enterprises also wish to provide service for the industrial users with huge volume consumption at a higher price. Then, as the private pipeline enterprises became the provider for the industrial-use gas, it resulted in competition on the industrial-use gas market between the CPC Corporation and the private gas enterprises in urban and suburban areas. However, in the natural gas market, the CPC Corporation acts as both the wholesaler and the retailer, and it monopolizes the production and supply of natural gas. Thus, it may easily violate the laws during the industrial-use gas competition with the private enterprises, which requires the clarification and the prevention made by the related authorities in advance.

### **3.3. Electric Power Industry- Only Liberalize Power Generation**

In the upstream of Taiwan's power industry currently, shown by the market layout of the power generation, TaiPower accounts for 68%, the private power plants account for 16%, and the qualified cogeneration systems account for 16%. The private power plants and the cogeneration systems sell the power they produce to TaiPower, which then distributes the power to the end users. Therefore, TaiPower monopolizes the power transmission, distribution and sale in the middle and downstream. Put simply, according to the current Electricity Act, the power industry in Taiwan is now composed of one state-owned integrated power company, several private power producers and self-use power generation equipments (including the cogeneration systems and the renewable energy generators). At present, the redundant power of the self-use power generation equipments and all the power produced by the cogeneration systems and private power plants are wholesaled to TaiPower for uniform distribution. From the layout of Taiwan's power market currently, we can clearly see that TaiPower is the only integrated company in power generation, transmission and distribution, which is also responsible for supplying power to the users in Taiwan, Penghu, Kinmen and Matsu areas within the coverage scope. In case of insufficient power, it opens the Independent Power Producers (IPP) to construct power plants, which sign a 25-year

contract with TaiPower, agreeing to wholesale all the power to TaiPower. Consequently, for the end users, they can't choose to purchase power from a certain company.

On the whole, the energy industry is directly related to the national economic development though. Taiwan's energy industry is particularly protected and managed by the government for a long time. In early times, it adopted the monopoly and state-owned operation method, so as to ensure the stable supply of various energy resources and to implement policies. However, it also resulted in the corruption and inefficiency of the public enterprises. Under the global trend of internalization, liberalization and privatization, Taiwan's energy industry is gradually stepping into the open status to some extent, but some cases and experiences of market competition failure still occur. As the strategies which government takes to regulate industries could either direct control or competition mechanism formed by market, it is the crucial point for us to make further observation about Taiwan's energy policy and see how it will develop in these conditions to achieve the goal of maximum efficiency and consumer sovereign.

#### 4. Conclusion

Following the preceding discussions, the important factor affecting nation-wide energy politics has shifted from security to shortage. With the urgent goal as well as environmental protection, energy utilities transform their organization structures gradually into faction sectors and open those competitive markets for new participators. Within this paper has been shown that Taiwan's energy industry is the product of era that engages high-level regulation, and so far the laws seldom think to reform the regulation system from the perspective of consumer who is involved in the economic activities. Regarding the central power supply regulation model, as well as the top-to-bottom demand and supply model of the energy has changed whether it is for the petroleum, liquefied gas, natural gas or electricity industry. In the future, demand side management of energy saving and energy use will surely grant more rights to the consumers. This research suggests: since the diverse and autonomous energy sources will form the decentralized supply, and energy arrangement based on the demands will be smarter and more efficient, any unnecessary legal barriers should be removed. Except grid networks remain as public utility, the regulatory development based on the Consumer Choice should be an overall system established for the sake of most people in general. At the micro level, it is even the advanced perception that makes use of the user's creativity to increase the economic efficiency of energy. Meanwhile, it should be noticed the rationality of taxation and subsidy for energy entrants in the beginning stage, possible unfair competition in the process, and the goal of energy conservation we schedule.

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