Cogeneration in Indonesia: Current Situation and Prospects

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1. Introduction

The history of electricity in Indonesia can be traced back to 19th century during Dutch occupation, when some tea and sugar factory installed electricity generators for their own use. Around the same time, another Dutch gas company expanded its business into supplying electricity for public. After Indonesia proclaimed its independence in 1945 from its Dutch colonisers, the government established a state-owned electricity and gas company, which later in 1964, came to be known as PLN (state-owned electricity company) and PGN (state-owned gas company). Since then, the electricity production, transmission and distribution for public are fully managed by government through PLN with a monopolistic structure. Participation of private sectors in supplying electricity started in 1992 is rather limited, though some efforts have been made in the form of implementation of government regulation No. 10/1989 concerning supply and utilization of electricity based on Law No.15 of 1985 for Electricity.

Government regulation No.10/1989 allows the license holder of electricity supply for own use to sell excess electricity to PLN. Therefore, this regulation is considered as one of the main instruments which is expected to have an impetus on the development of cogeneration in Indonesia. The cogeneration installed capacity neared 834MW in 1997 with industrial sector being the major consumer. However, the extent of this development hindered due to subsidies availability for both electricity and fuel price. Most of industries provide for their energy systems either by buying from PLN or generating electricity from their own genset. In 2001, the capacity of captive power existed to be around 13,000 MW or about 50% of national electricity installed capacity. These subsidies have dampened any investment into the power sector.

The economic crisis of 1997caused a severe depreciation of its currency against other foreign currencies spiraling a serious of problems in the power sector as PLN depended heavily on foreign loans for financing most of its operations. 20 million homes out of 50 million households still wait in vain for getting connected to the grid.

Following the economic and political catastrophes, Indonesia also experienced the transformation from centralized government into decentralization. This situation forced government to initiate restructuring of power sector. Some measures have been effectuated, such as, gradual elimination of energy subsidies and ratification of Electricity Law No.20 of 2002, harmonized with Autonomy Law. In near future, it is expected that a competitive and efficient electricity business are foreseen as a result of these measures.

In the following sections, an overview on current situation of electricity and cogeneration in Indonesia will be described, which includes the policies and regulations related to development of cogeneration and its potential resources.

2. Electricity Situation

In 2001, the installed capacity of national electricity grid was 23,425 MW, which consisted of 21,058 MW installed capacity owned by PLN and 2,367 MW by private generators, taking the total production to 101,654 GWh. A huge captive power capacity of 13,856 MW cannot be ignored in Indonesia. Captive power plants are common arrangements by industries and other sectors to generate electricity for own consumption. The total capacity of captive power exceeded 50% capacity of total national electricity capacity simply reflects the prevailing poorly structured, insufficient electricity supply industry.

Currently, with a growth rate of approximately 10% per annum (see Figure1) Indonesia needs substantial investment to install new facilities. During summer time especially in the recent years, frequent black outs were a common phenomenon.

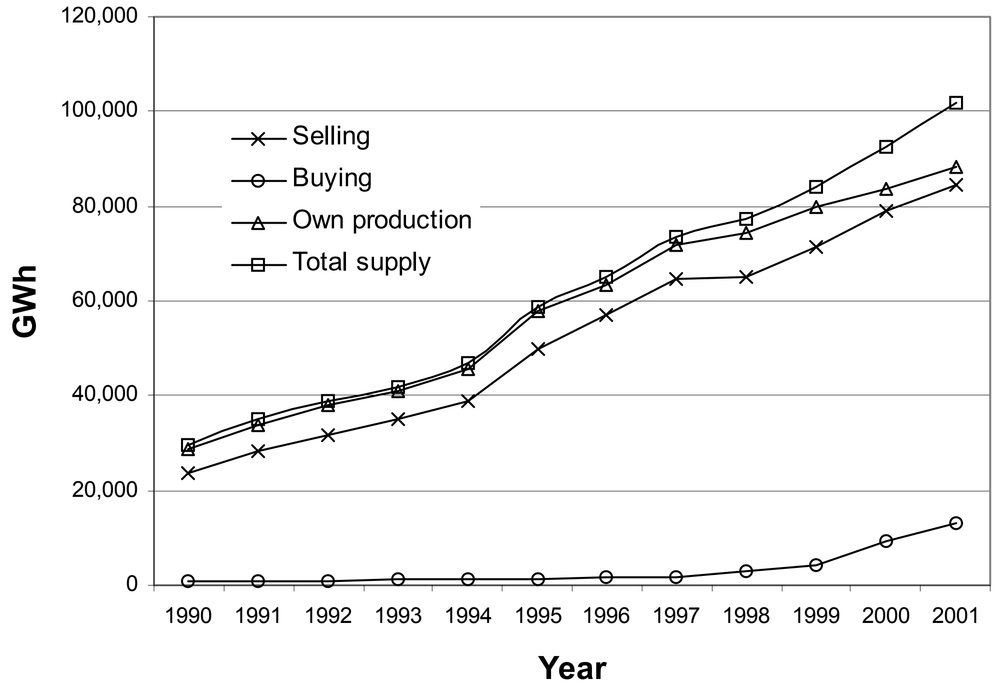

Figure 1. Electricity Sales Growth by PLN

While PLN is still reeling under financial problems, the independent power producers (IPP/SPP) found themselves in a situation so as to increase their presence as supplements to fill the gap that was caused by lack of sufficient electricity installations. The following are two significant measures which are expected to attract more investment in this sector:

- *Elimination of energy subsidies*, prevalent since 2001. Current average electricity rate is 6 US cents (with rate of 8,500 IDR / US$) and it aimed to achieve its commercial rate of 7 US cents per kWh by 2005.
- *Restructuring of power sector based on Electricity Law No.20 of 2002*, which includes that, electricity supply activities shall be conducted by individual business entities under a competitive system. Within this competitive system, the business licensees shall have access to activities to govern generation, transmission, distribution, sales agency and electricity market as well as system operation, while in non-competitive area, the electricity market operator and electricity system operator are not included. Under these measures, Batam has been identified to be the first such competitive area and expected

to be implemented by 2004 followed by Jawa-Bali in 2007.The structure of electricity supply ventures shown in Figure 2.

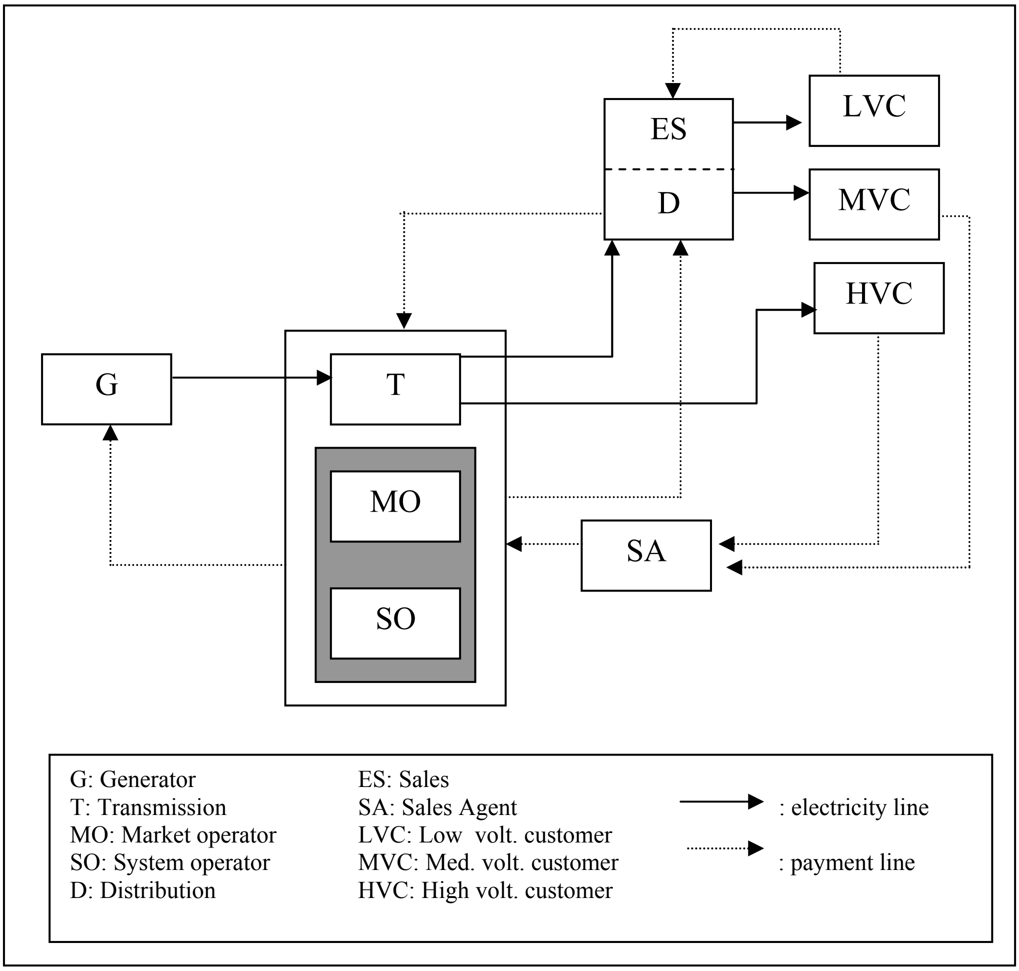

Figure 2. The structure of electricity supply ventures

Other measures which are presumed to contribute to better future of power sector is the enactment of Oil and Gas Law No.22/2001, where Pertamina (State-owned Oil Company) will be stripped of its monopolizing status of the only distributor of fuel in the country. In addition, the establishment of piped gas in Sumatera, Jawa and South Sulawesi in future is set to accelerate new investments in electricity generation facility.

3. Cogeneration Situation

Industrial sector is the biggest known consumer of electricity supplied by PLN while its share was 43% of total sales in 2000, or approx. 34,000 GWh. Further, based on the statistical data for medium to large scale industries, the potential industrial sector for cogeneration implementation (pulp & paper, petrochemical, textile, food etc.) consumed almost 29,000 GWh or approx. 30% of PLN supply in 2000 while about 9,000 GWh was produced by themselves as captive power.(see Table 1).

Table 1: Electricity consumption in industries potential for cogeneration (Data of 2000)

Sector	Self-generated (GWh)	Purchase (GWh)
Food and bevarage	1,615	4,949
Textile	1,733	1,144
Wood	1,257	1,921
Puplp and paper	679	3,264
Chemical and Fertilizers	1,165	3,556
Rubber	365	2,456
Cement and Glass	1,494	5,307
Metal	842	5,159
Material from metal	109	1,041
TOTAL	9,260	28,798

Source: Central Bureau of Statistic

From the data compiled by EERDC (see Table 2), there exists 25 cogeneration plants currently with the total capacity of approx. 1200 MW (excluding combined cycle plant by IPP), and about 834 MW of capacity has been operational before 2001. Paper mills which consumed 516 MW of electricity formed the largest user of cogeneration, followed by chemical industries (fertilizer, petrochemical and cement) which consumed a total capacity of 278 MW. To assess the existing capacity, based on an assumption that each plant has 5000 working hours per year and no electricity is sold to PLN, it is ascertained that cogeneration formed a 10% share in the total electricity produced by PLN, though the share should have been lesser attributing to the steam generation and consumption occurring at cogeneration site.

Reflecting on this share, Cogeneration appears to be popular amongst the big industries, and also the need basis of efficient energy options. This kind of popularity seems to be to a smaller extent in smaller industries owing largely to the information disparity and in general a lack of awareness of benefits by cogeneration.

Table 2: Existing Cogeneration Plants by Type of industry/Sector

No.	Industry/sector	No. Plant/Company	Capacity (MW)
1	**Chemicals**		
	Fertilizer	6	213
	Petrochemical	1	53
	Cement	1	12
2	**Pulp & Paper**	7	516.4
3	**Textile**	2	21
4	Food	2	39
5	Petroleum	1	300
6	Agriculture	4	40.7
7	Commercial	1	8
	Total	25	1184

Source: Data compiled by EERDC

Similar scenario applies to the agriculture and commercial sectors too. However, recently since all sectors were affected by frequent black outs due to limited electricity production by PLN, which left self-power generation become an imperative solution. Currently, more than 20 potential cogeneration projects with total capacity of 200 MW have been identified for dissemination.

Following the Electricity Law No.20/2002, many formulations of regulations in power sector still at a nascent stage are taking shape. For promoting cogeneration in Indonesia, it is an accepted notion by policy makers that more stimulus has to be given specifically for financial accessibility for investments in small scale cogeneration plants and electricity sales regulations which favor the penetration of cogeneration.

4. Conclusions

Indonesia with its growing captive power market, an insufficient monopolistic power supply market from government, some pro-reform electricity regulations and availability of huge biomass resources is definitely a promising market for cogeneration. Lack of awareness, lack of gas pipe line infrastructure and also lack of financial incentives and accessibilities are hindering the development in cogeneration. In future factors like, the existence of commercial energy rates and infrastructure for piped gas in place, and much more favourable regulations are expected to contribute significantly towards promoting power from cogeneration in Indonesia.