TRENDS IN SUPPLY / DEMAND FOR INDONESIAN COAL PERIOD 2005 - 2025

TRISWAN SUSENO
R & D Centre for Mineral and Coal Technology
Jalan Jenderal Sudirman 623 Bandung 40211,
Ph. 022 6030483, fax. 022 6003373
e-mail: triswan@tekmira.esdm.go.id

ABSTRACT

In 2008, Indonesia mineable coal reserve was recorded around 7.12 billion tons. During that year, around 231.18 million tons were exploited. Of such a figure, 69.44 million tons went to domestic market and the rest belonged to export. Yet, in 2025 the need of coal for local consumption may reach 192.33 million tons that include 99.86 million tons for steam power plant, 30.58 million tons for cement industries, and 17.59 million tons for textile industries. Pulp and other industries may consume 2.92 million tons and 41.39 million tons respectively. It is assumed that in 2025, Indonesian coal export will increase to 260.92 million tons

Coal export is assumed to increase figuring Coal Mining Agreement as the biggest exporter (94.03%). The rest goes to Mine authority (3.55%) and State-owned Enterprises (2.43%). However, the possibility of unrecorded coal utilization for ether domestic use and export reaches 51.66 million tons. As a result, it is presumed that Indonesian coal production in 2025 is around 504.92 million tons. The production rate during 2010-2025 is 4.9% per annum. According to the above condition, the mineable coal reserve of 7.12 million tons will probably be finished for about 18 years. In addition, the coal-steamed power that operates until now has an age of 26 years. If the reserve is not well-managed, it will immediately be finished in the shorter time. That is why, it needs an anticipative step of a policy concept that can maintain a sustainability of the domestic coal stock by implementing a limited export.

Keywords : Production, consumption, export, projection, mining age

INTRODUCTION

High condition of fuel price results in increasing coal demand worldly. Coal is preferred to replace petroleum as the material technically and economically satisfies the requirement for fuel. As one of world coal producers, Indonesia gains the impact of coal demand increase, noted by the increase of coal production. From 22.25 billion tons coal, 7.12 billion tons belongs to ready reserves (Sukhyar, 2009). During 2000 – 2008, Indonesian coal production achieves 299.69%. Yet, it only 25.86% of such a production belongs to domestic need; the rest goes to export interests. Domestic coal selling is relatively stable in 8 years though the average domestic coal consumption rises up to 10.79% per annum. Of the total domestic consumption, steam power plant absorbs around 71.79% and the rest goes to other industries such as cement, textile etc. Domestic coal utilization will expand continuously as Indonesian government issues a program deal with 33% contribution of coal to energy mix in 2025.

Indonesian government's project to develop 10,000-MW steam power plant for first stage and followed by the second stage indicates that domestic need for coal will be significant. Referring to such condition, it requires a calculation to estimate the coal need for the next few years in order to guarantee that government can fulfill coal domestic need. Estimating domestic coal need, export and production may be conducted by analyses approach.

METHODOLOGY

Steam power plant requires coal as its main fuel. Due to its dependence, the availability of coal needs to be awoken in order to make the operation of steam power plant run smoothly. Other industries that employ coal as its fuel include cement, textile, pulp and metallurgy industries as

 Received : 22 February 2010, first revision : 18 March 2010, second revision : 7 June 2010, accepted : June 2010

well. Of several islands in Indonesia, Sumatera and Kalimantan serve as the biggest coal producers and supply such a material to the plants. Referring to those conditions, a policy of coal production should properly be made by stressing to domestic usage, export purposes and production itself

Data

Data collection for analyzing the problem employed survey and non survey methods. Both were derived from interrelated institutions such as Energy and Mine Service, Manpower and Transmigration Service, Industrial Affairs Service, PT Pelindo, Harbor Administrator, etc; by either providing questioners or requesting available data.

Forecasting Model

A regression analysis is a study of dependent variables on independent ones. Its purpose is to estimate the average population or average value of dependent variables that based on independent variables (Gujarati, 1978). Regression analysis is stated by a regression coefficient for each independent variable by predicting dependent variables with a determined equation.

Coal production is affected by domestic and foreign market behaviors such as domestic needs and exports. This results in a correlation among them as stated by Gujarati (198) and Kuncoro (2004) through the equation:

$$Y_t = a_0 + a_1 X_{1t} + a_2 X_{2t} + x_t \quad \text{..... (1)}$$

$$X_{1t} = b_0 + b_1 t \quad \text{..... (2)}$$

$$X_{2t} = g_0 + g_1 t \quad \text{..... (3)}$$

where:

Y_t = coal production at year t
X_{1t} = domestic need at year t
X_{2t} = export quantity at year t
a_0, b_0, g_0 = intersection lines
a_i, b_1, g_1 = regression coefficient for variable k; k = 1, 2.
x_t = projection deviation

NATIONAL COAL DEVELOPMENT

Coal Production

Sukhyar (2009) stated that Indonesian coal resources through 2008 are 104.76 billion tons performing probable and proven reserves around 15.13 billion an 7.12 billion tons respectively. Yet, the entrepreneurs for producing coal include State-owned Companies (PTBA), Coal Mining Agreement, Mining Authorization Holder and Rural Cooperatives. The coal comes from coal mine area at Ombilin, Sawahlunto – West Sumatera and Tanjungenim, Muara Enim - South Sumatera. Both areas are managed by PTBA. Almost 59 coal entrepreneurs involved in mining activities; 34 of them held KK/PKP2B licenses, 22 bore KP licenses and 1 kept KUD license (*Directorate Program Supervision of Mineral*, *Coal and Geothermal*, 2003, 2004, 2008 and 2009 dan www.esdm.go.id., 2009).

It was recorded that in 2008, Indonesian coal production related to 231.18 million tons, bigger than that of in 1986 (485,699 tons, Figure 1). State-owned company dominated coal production through

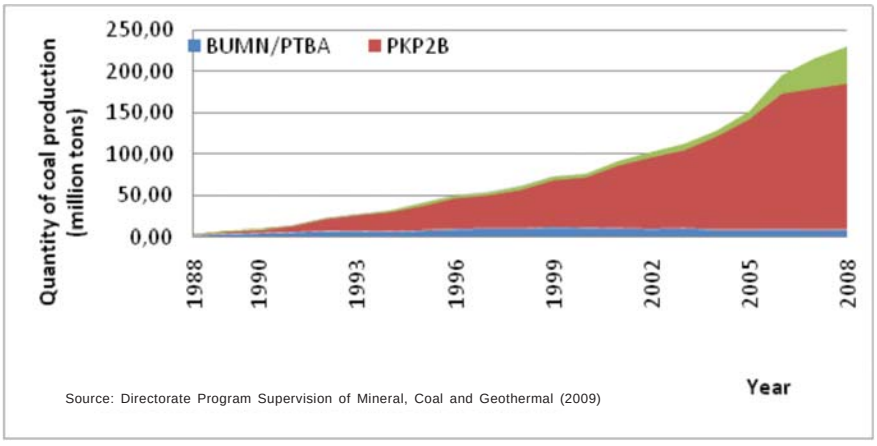


Figure 1. Indonesian coal production from 1988 through 2008

1990; however, entering 1991 a lot of private companies granted a license to mine the coal. Almost 57.68%, the segment of coal production was controlled by private companies. Such condition lasted through 2008 and increases sharply through 93.55%. East and South Kalimantan are two centers to produce coal nationally. Around 9.55% of coal material came from both provinces.

Domestic Selling

Coal domestic selling reached 3.09 million tons in 1988. The state-owned company ruled 67.99% of domestic market which than declined to 49.74% in 1999. Yet, in 2000 Coal Mining Agreement took over around 57.41% domestic market and continued through 2009 by increasing the selling to 73.30% (www.esdm.go.id., 2009). Compared to domestic selling in 1988, the selling performed 69.44 million tons. It increased 1,476.33% (Figure 2). Such situation was affected by the fact that government policy to lessen RFO subsidy. A lot of industries substituted its fuel to coal. In addition, almost 90.66% coal domestic selling occurred in Java and the rest went to outside of Java. Steam Power Plant was the biggest domestic consumers and absorbed around 70.33%. The next industries were cement (14.78%), textile (7.65%) paper (5.28%), metallurgy (0.65%) and other industries (1.31%).

The steam power plants that employ coal as its fuel include Suralaya, Bukit Asam, Paiton, Ombilin, Sijantang and Tarahan. During 1988 – 2007, coal consumption of steam power plants increased to 12.60% per annum. Development in coal consumption was triggered as two of new steam power plants (Cilacap, 2x330 MW and Tanjung Jati B, 2x660 MW) had been operated. Both required 2.2 and 3.6 million tons coal respectively. They were supplied by PT Adaro, Kideco, Jorong Barutama Greston and Kaltim Prima Coal (KPC). Entering 2005, many industries including textile and paper industries and cement industry as well replaced their fuel to coal. Cement industries became the third-biggest coal consumer after steam power plants while the coal need for textile industries increased significantly to 24.33% or 3.34 million tons in 2007 if compared to that of 2005.

Export

According to Miranti (2008), Indonesia resided 7th rank position (4.2%) in coal trade after China (46.0%), the United States of America (17.70%), India, Australia, South Africa and Rusia. The country exported 58.52 million tons coal in 2000 and 160.08 million tons in 2008. The increase in 8 years was 173.55% (Figure 2). Referring to such condition, Indonesia became the 2nd biggest coal exporting country after Australia that exported 183 million tons of coal. The high demand of world coal insinuaates that the increase of world coal occurs rapidly. Though they are known as the biggest coal producer countries; China and India, in fact, import coal material from Indonesia as they lack to self supply the material. High world coal demand results in coal entrepreneur developments by many investors. It reaches 118 companies that include local and foreign ones.

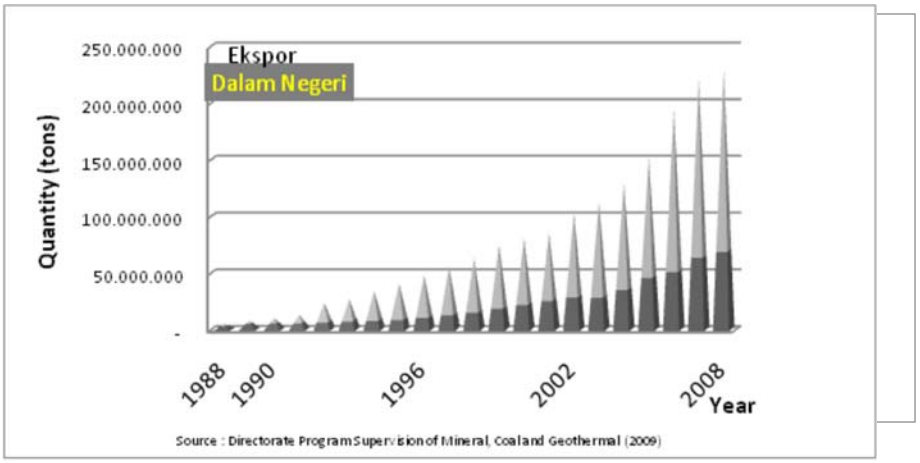


Figure 2. Indonesian coal production during 1988 - 2008

Of whole exported coal; almost 96.27% came from Coal Mining Agreement followed by PTBA (2.91%) and Mine Authorization Holder (2.91%) as shown in Table 1. Asian countries are destination counties to export Indonesian coal. Japan, Taiwan, India, South Korea and China are among them. Around 75.71% of the total export goes to those countries while 11.34% and 12.95% belong to Europe and other countries respectively. Switzerland, Spain and Italy are big consumers of Indonesian coal (www.dbm.djmbp.esdm.go.id, 2009). The increase of coal usage is triggered by Steam power plant establishments in foreign countries such as in China and India.

COAL PROSPECT ANALYSES

Domestic Use

Government idea to construct 10,000-MW electric power station in two stages (Stage 1 and 2) is an effort to satisfy domestic demand on electric energy. The stage 1 development of 10,000-MW electric power station will be operated in 2011 and will apply coal as their fuel. Stage 2 is predicted to be finished in 2014 and will consume 26% coal as their fuel (PLN, 2009). Coal requirement is assumed to increase in accordance with steam power plant establishment in several areas. Some have already operated such as at Cilacap, Tanjung Jati, Sibolga and Labuhan Angin consuming around 7.2 million of coal. Steam Power Plant 3 and 4 at Paiton is planned to be run in 2010, hence the need of coal will be up to 9.6 million tons. The operation of 10,000-MW electric power station for Stage 1 will also contribute to heighten coal consumption to 32 million tons. The operation of Stage 2 in 2013 will require 12.50 million tons coal. It is assumed that in 2025, the total need of coal belongs to 99.86 million tons.

Cement making is another industry that utilizes coal as its fuel. Its production is still high (14.96%). Referring to such a fact, the industry will consume 30.58 million tons coal in 2025 (Table 2). Metallurgy industry such as metal smelting and refining also change its fuel to coal. The industry develops significantly and consumed 14.34% coal per annum during 1998 – 2007. The highest coal need for metallurgy industry occurred in 2006 (299,990 tons). Other industries that significantly develop and employed coal as its fuel are textile and paper industries. The former consumed 15.56% while the later required 6.74% coals. Based on those conditions, the total coal consumptions in 2025 for either textile or paper industries are 17.59 million and 2.92 million tons respectively.

Export

Based on export development during 1991 – 2008, it is presumed that Coal Mine Agreement will conduct coal export to 39.86% while Mining Authorization Holder will increase its coal export to 12.05% and PTBA to 15.00% per annum. Coal Mining Agreement is represented by PT Kaltim Prima Coal, Pt Adaro Indonesia, PT Arutmin Indonesia, Pt Kideco Agung Jaya and PT Indominco Mandiri. High consumption of coal can not be separated from world market demand, mainly from Japan and South Korea. Indonesia has been a destination country for those who import coal since China limits its coal export to other countries. It is noted that the exported coal from Indonesia was 140 million tons in 2008 and this condition causes the country as the second-big exporter country after Australia. The growth rate of coal demand in Asia region is 10.34%; the highest figure if compared to that of Europe (6.51%), Australia – the United States of America (7.40%) and other countries (8.05%). Such a fact implies that some Asian countries such as Japan, Taiwan, South Korea and Hongkong may serve as the main Indonesian coal importer.

Coal will have an important role as the main energy. The material is needed for either electric power station or other industries. In 2006, almost 26% of coal served as primary energy after petroleum (34.41%). As electric generator, coal is used in Poland (96%), South Africa (93%), Australia (80%), China (78%), India (69%) and Indonesia (71%). Steel industries consume 13% of coal boiler production and almost 70% of global steel productions depend on coal. Around 54% of world coal consumption belongs to Japan, Taiwan, South Korea and India. Miranti (2008) stated that Japan imported 182 million tons of coal in 2007, followed by South Korea (88 million tons) and Taiwan (69 million tons). Referring to such data, it is assumed that Indonesian coal export will be raised significantly as shown in Table 3. Its growth rate and total export will be 3.62% and 270 million tons respectively in 2025. The Coal Mining Agreements still perform the biggest exporter and dominate almost 94.03% of world coal market, while the Mining Authorization Holders and State-owned Companies are only 3.55% and 2.43% respectively.

Tabel 1. Coal domestic use based on consumer type

Consumers	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Steam power steam	10,911,341	13,047,717	13,943,613	19,165,256	21,902,161	23,810,054	23,492,328	25,132,174	27,758,317	30,658,875
Cement	1,265,123	2,308,691	3,366,824	5,541,088	4,883,003	4,692,819	5,653,992	6,023,248	5,300,552	6,443,864
Textile	-	-	-	-	-	-	-	1,307,610	2,683,944	3,336,248
Paper	692,737	805,397	766,549	804,202	471,751	1,080,304	1,106,227	2,272,443	2,289,474	2,302,800
Metallurgy	144,907	123,226	134,393	220,666	236,802	225,907	122,827	160,490	299,990	282,730
Others	2.630,513	2,611,657	5,582,408	2,438,932	3,817,189	5,614,976	5,642,585	445,850	532,545	571,338
Total	15,644,621	18,896,688	23,793,787	28,170,144	31,310,907	35,424,060	36,017,959	35,341,815	38,864,822	43,595,855

Source: Modified from Directorate Program Supervision of Mineral, Coal and Geothermal (2009), Mujib et.al. (1998), Suseno et.al. (2004) and Suherman et.al. (2006).

Table 2. Domestic coal usage based on coal consumers

Year	Steam power plants[1)]	Cement [2)]	Textile [3)]	Paper [4)]	Others [5)]	Total
2011	68,728,000	8,922,000	7,964,213	2,364,743	3,475,890	91,454,846
2013	77,124,000	8,922,000	10,159,873	2,396,337	3,772,852	102,375,063
2015	81,789,000	14,365,000	10,701,310	2,428,353	15,648,838	124,932,501
2017	82,294,201	14,365,000	11,271,601	2,460,797	16,125,896	126,517,496
2019	82,810,578	14,365,000	11,872,284	2,493,674	16,732,327	128,273,863
2021	83,338,378	23,135,000	12,504,978	2,526,990	39,204,448	160,709,794
2023	83,877,853	23,135,000	13,171,389	2,560,751	40,188,885	162,933,878
2025	99,856,948	30,579,582	17,587,695	2,917,533	41,391,636	192,333,393

Table 3. Indonesian coal export based on coal producers

Year	State-owned Company	Coal Mining Agreement	Mine Authorization Holder	Total
2011	4,342,781	151,387,026	6,087,542	161,817,349
2013	4,626,434	164,807,509	6,540,805	175,974,748
2015	4,910,088	178,227,991	6,994,068	190,132,147
2017	5,193,742	191,648,473	7,447,331	204,289,546
2019	5,477,395	205,068,955	7,900,595	218,446,945
2021	5,761,049	218,489,437	8,353,858	232,604,344
2023	6,044,703	231,909,919	8,807,121	246,761,743
2025	6,328,356	245,330,401	9,260,384	260,919,142

Production

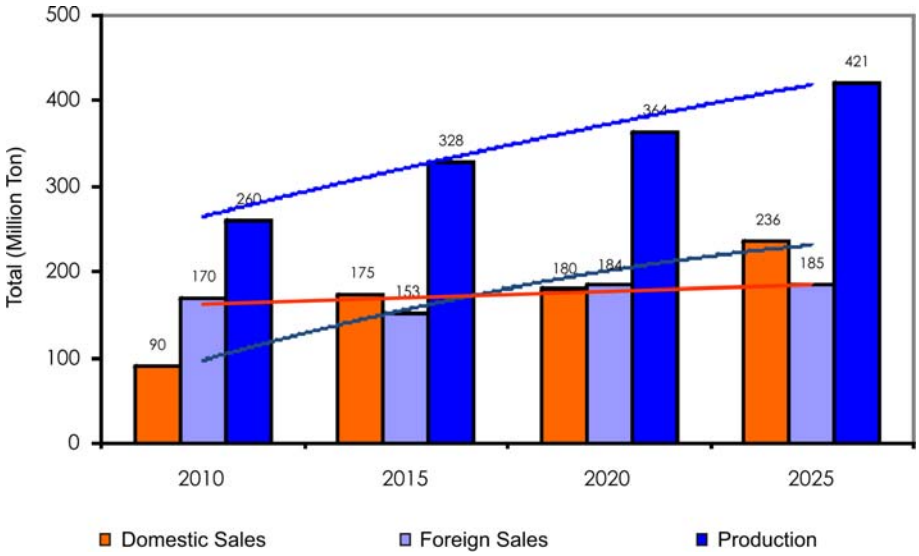
Domestic coal consumption is predicted to raising 9.22% during 2009 – 2025 while demand from other countries will increase to 3.62%. Both conditions affect Indonesian coal production to 5.72 per annum performing Coal Mining Agreements, Mining Authorization Holders and State-owned Companies as dominated coal producers. Through 2025, Indonesian coal mining business is still prospect for either domestic or world market. Establishing some local steam power plants in Indonesia that will employ coal as its fuel and substituting fuel from RFO to coal for electric power plant in China and India incite domestic coal production significantly as shown in Table 2 and 3. Total coal production in 2025 will be 504.92 million tons that consists of domestic usage (192.33 tons) and export need (260.92 tons)

Coal demand for 2025 as shown in table 2 will be fulfilled by domestic production (Table 4). This means that each increase of coal demand will be followed by the increase of coal production. Referring to such a fact, the produced coal during 2009 – 2025 will be 6.21 billion tons and this fact implies that the reserves of coal ready for mining will be completed in 18 years. However, if the quota to export the coal is defined amounted to 150 million tons per annum, the mine life of coal reserves can be lengthened to 28 years (www.esdm.go.id*, 2009*). This measures needs to be conducted to anticipate the continuity of the availability of domestic coal energy sustainably.

When the coal production projection as the result of the calculation according to the historic fact (Table 4) compared with the plan that is made based on the National Energy Policy (Figure 3), it shows a big difference. In other word, volume of the coal production is predicted to more exceed the production plan issued by the government (Presidential Regulation No. 5 Year 2006 about the National Energy Policy). This means that the goal of the coal energy conservation according to this policy will fail. That is why, it requires a tight production control in order to maintain the longer mining age.

Table 4. Presumption of coal production from 2010 – 2025 according to its coal producers

Year	Predicted Production			
	SoC [1)]	CMA [2)]	CoWM [3)]	Total
2011	13,396,297	235,506,048	27,984,548	276,886,893
2013	14,131,096	259,744,178	31,023,143	304,898,416
2015	15,507,669	295,572,759	37,043,832	348,124,260
2017	15,727,644	310,513,186	37,690,231	363,931,061
2019	15,957,070	325,624,296	38,380,545	379,961,910
2021	17,878,427	371,291,668	46,932,645	436,102,740
2023	18,133,647	386,868,615	47,742,814	452,745,077
2025	19,887,550	429,511,775	55,516,818	504,916,144



Source : Perpres No. 5 Tahun 2006

Figure 3. Plan of production, domestic sales and exports of coal by Government

CONCLUSIONS AND SUGGESTION

Conclusions

Through 2008, reserve of Indonesian coal was predicted around 22.25 billion tons that consisted of probable and mineable reserves around 15.13 billion tons and 7.12 billion tons respectively. In 2008, coal production was 231.18 million tons; 76.6% of them came from Coal Mining Agreement, 19.51% was from CoW Mining and 3.91% was produced by State-owned Company. Its domestic selling achieved 69.44 million tons. It increased to 1,476.33% compared to previous selling in 1988. The increase was affected by government policy to lessen subsidy for fuel sector and resulted in utilizing coal as alternative energy for fuel.

Not only are steam power plants and cement industries coal user but also other industries such as textile, pape, etc employ the material as fuel. It is assumed that the need of coal for domestic purposes will increase due to development for new steam power plant as well substitution of fuel from refined fuel oil to coal by some industries. In 2025, domestic coal need will be 192.33 million tons, 99.86 million tons for steam power plants, 30.58 million tons for cement industries, 17.59 million tons for textile industries, 2.92 million tons for paper industries and 41.39 million tons for other industries.

In 2000, Indonesian coal export was 58.52 million tons and it increased to 160.08 million tons in 2008. Indonesia is the second exporting country for coal after Australia. The rate of export growth increases to 3.62% in accordance with the export quantity around 26.920 million tons. The Coal Mining Agreement contributes 94.03% of export market, followed by CoW Mining and State-owned Company, namely 3.55 and 2.43 % respectively. If domestic coal user reaches 192.33 million tons in 2025 and coal export tends to be 260.92 million tons, Indonesian coal production will be 504.92 million tons. In 2010, the production is forecasted to be 245,648,668 tons and in 2025, the production will reach 4.9 per annum.

Suggestion

It requires several policies to anticipate the endurance of domestic coal availability continuously. One of them is coal export limitation.

REFERENCES

Directorate Program Supervision of Mineral, Coal and Geothermal, 2003. *Indonesia Mineral, Coal, Geothermal and Groundwater 2008*. Directorate General of Mineral, Coal and Geothermal, Ministry of Energy and Mineral Resources, Jakarta, 2003.

Directorate Program Supervision of Mineral, Coal and Geothermal, 2004. *Indonesia Mineral, Coal, Geothermal and Groundwater 2008*. Directorate General of Mineral, Coal and Geothermal, Ministry of Energy and Mineral Resources, Jakarta, 2004.

Directorate Program Supervision of Mineral, Coal and Geothermal, 2008. *Indonesia Mineral, Coal, Geothermal and Groundwater 2008*. Directorate General of Mineral, Coal and Geothermal, Ministry of Energy and Mineral Resources, Jakarta, 2008.

Directorate Program Supervision of Mineral, Coal and Geothermal, 2009. *Indonesia Mineral, Coal, Geothermal and Groundwater 2008*. Directorate General of Mineral, Coal and Geothermal, Ministry of Energy and Mineral Resources, Jakarta, 2009.

Gujarati, D., 1978. *Econometrics*. Bernard Baruch College City University of New York,*Basic,* McGraw-Hill Kogakusha, LTD, Tokyo. p. 11 – 25.

Kuncoro, M., 2004. *Metode Kuantitatif : Teori dan Aplikasi Untuk Bisnis dan Ekonomi*. Penerbit dan Pencetak AMP YKPN, Yogyakarta. p. 75 – 128.

Miranti, E., 2008. Prospek Industri Batubara di Indonesia, *Economic Review*, Analisis Riset Bisnis dan Ekonomi pada Bank BUMN.

Mujib, Suseno, T., dan Saleh R., 1998. *Pengkajian Keterkaitan Sektor Pertambangan Batubara Terhadap Struktur Perekonomian Indonesia*, Puslitbang Teknologi Mineral, Bandung.

PLN, 2009. *Kebutuhan Pasokan Batubara Untuk Pembangkit PT. PLN (Persero) dan IPP Tahun 2009-2015*, Jakarta.

Suherman, I., Suseno, T., Jafril, Sujarwo dan Sabur, U., 2006. *Kajian Batubara Nasional*. Puslitbang Tekmira, ESDM, Bandung.

Sukhyar, R., 2009. Sumberdaya dan Cadangan Batubara Indonesia, *Seminar dan Workshop* "*Indonesian Coal Conference*". Gran Melia, Jakarta, 18 Maret 2009.

Suseno, T., Suherman, I., Jafril, Sujarwo dan Sabur, U., 2004. *Pola Distribusi Batubara untuk Boiler Industri Tekstil di Provinsi Jawa Barat*. Puslitbang Tekmira, Bandung.

www.dbm.djmbp.esdm.go.id, 2009. Laporan Tahunan Perusahaan Batubara : Produksi, Rabu, 25 Maret 2009 10:46:46 AM.

www.esdm.go.id*, 2009. ESDM - Mulai Tahun 2010 Ekspor Batubara Dibatasi*, 27 Sep 2007.