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The Economy-wide Impact of Fuel Oil, Gas and Electricity Pricing and Subsidy Policies as well as Their Consumption Improvement Efficiency in Indonesia

Djoni Hartono
(University of Indonesia)

Budy Resosudarmo
(Australian National University)

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Center for Economics and Development Studies,
Department of Economics, Padjadjaran University
Jalan Cimandiri no. 6, Bandung, Indonesia.
Phone/Fax: +62-22-4204510
http://www.lp3e-unpad.org

1. Background

The 1997 depreciation of Indonesia's rupiah caused a full-blown economic crisis and damaged the real sectors in Indonesia. Indonesian gross domestic product (GDP) decreased significantly as much as 13.68% and per capita income declined from approximately US$ 1,000 to approximately US$ 500 (BPS DKI Jakarta, 1999)[1]. Subsidies budget for fuel[2] and electricity increased sharply and raised the deficit[3] of national budget considerably.

The *International Monetary Fund* (IMF) gave a serious attention on the deficit of Indonesia's national budget problem and government policies on fuel subsidy and electricity subsidy. IMF thought that fuel subsidy and electricity subsidy caused significant pressure to the national budget. Therefore, in the *Letter of Intent* (LoI) that is signed by Indonesia and IMF, it mentioned the obligation of the Indonesian Government to revise fuel subsidy and electricity subsidy policies. As a consequence, the Indonesian government raised fuel price and electricity price (LoI RI – IMF, 2000, energy sector, section 28 subsection 2). The pressure to increased fuel price and electricity price was even greater because of the significant increased of the world price of crude oil in the last two years.

But in actual state, the Indonesian government realized that these subsidies would not be efficient in meeting the target (Law No. 25/2000 on National Economic Planning 2000-2004). BPS's[4] (Statistics Indonesia, 1999)

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1 See Hal Hill, 1999: "The Indonesian Economy in Crisis". Indonesian economic growth dropped significantly as much as 13.68%. It was bigger than those of two neighboring countries: Malaysia (-6.7%) and Thailand (-6.5%).

2 Fuel sector includes *gasoline, high speed diesel oil, industrial diesel oil*, *fuel oil*, *kerosene* and *refinery gas*.

3 The weakening of rupiah's against US dollar resulted significant increase in crude oil import budget and fuel import budget. These factors forced Indonesian government to spend more money for subsidies, and determined the domestic price of fuel oil. However, the government also earned income from export of crude oil and gas.

4 This estimation could be wrong if the analyst only considers household consumption data on kerosene from National household survey. It is important to consider utilization of each type of fuel in each sector so the estimation can be clearer and more appropriate.

estimation in the case of kerosene shows several conclusions: (i) 20% of the poorest people only received approximately 530 billion rupiahs subsidies, whereas 20% of the richest people received approximately 2.13 quintillion rupiahs subsidies; (ii) rural people only received 2.63 quintillion rupiahs, whereas urban people received 3.87 quintillion rupiahs. In conclusion, even though the poor received fuel subsidy, but at the same time the rich enjoyed even greater subsidies. Therefore, it is important to find better strategies in order to help the poor.

Fuel subsidy also caused fuel smuggling because the domestic price was cheaper than other countries such as Singapore (Petrominer No. 10, 15 October 2000). In addition, electricity subsidy caused stealing and overly luxurious life style (Kompas, Sunday, 19 January 2003). These subsidies clearly did not support the efficient energy utilization which was an important issue in the world.

Government policies on fuel price and electricity price caused a great opposition from many groups in the society. The general opinion is that the increase of fuel and electricity price would create bad implication on the poor and decreased economic growth. A lot of protests in line with these perceptions created worse economic condition.

According to the aforementioned description, we acknowledge the importance of analyzing the impact of the fuel price and electricity price escalation on economic growth and income distribution. Therefore, this paper will emphasize on three issues, i.e. i) the implications of subsidies (fuel, electricity, and gas) reduction policy on economic growth and income distribution; ii) the implications of energy utilization efficiency by households and industries; iii) the appropriate policies on energy sector.

The objectives of this paper are:

- To construct an Indonesian Energy Sector Social Accounting Matrix as the reliable data system to analyze the implications of energy price escalation on economy.

- To develop a Dynamic Computable General Equilibrium (CGE) Model of Indonesian Energy Sector.
- To analyze the implications of subsidies (fuel, electricity, and gas) reduction policy on economic growth and income distribution, then identify group of households who severe the most.
- To analyze the economic impact of direct cash transfer policy to compensate the reducing of fuel subsidy on poor households.
- To conduct simulations in order to analyze the implications of energy utilization efficiency by households and industries
- To formulate the appropriate policies on energy sector to minimize the negative implications of subsidies (fuel, electricity, and gas) reduction policy on economic growth and poor-household's income

2. An Overview of Oil, Gas and Electricity in Indonesia

In this section, we will give brief summaries of oil, gas and electricity overview in Indonesia. **First**, Oil sector in Indonesia have significantly changed after Indonesian Parliament issued Law No. 2 / 2001 which replaced Law No. 8 / 1971[5]. The main aspect of this new law is to regulate production activities in upstream sector and downstream sector. This law regulates that upstream sector which includes exploration and exploitation activities have to be managed by companies both private or Pertamina (state owned oil company) based on agreement with *BP Migas* (Executive Agency for Upstream Oil and Gas Business Activities). This agreement must be approved by the minister. The downstream sector which includes processing, distribution, storing and selling activities has to be managed in such a way that is in line with proper, fair, and transparent

[5] There are three sections which opposed the basic regulation: 1945 Constitution. Constitutional Court (MK) stated three sections (Sect. 12 Par (3), Sect. 22 Par. (1) and Sect. 28 Par. (2)) already revised and Law No. 22 / 2001 is still valid because those three sections are not the fundamental of the Law.

competitive market mechanism. These activities is controlled by *BPH Migas* (Executive Agency for Downstream Oil and Gas Business Activities)

Second, Indonesian Parliament also issued Law No. 20 / 2002. This regulation is concerned on electricity. The objectives are to achieve electricity supplying activities efficiently based on competitiveness and transparency in healthy market, and all producers must be treated equally. They have to provide benefit for all customers fairly. However, within very short time the Constitutional Court annulled this regulation because of the consideration that the three sections[6] in this Law oppose the basic principles stated in the 1945 Constitution. Those three sections are the fundamental of this Law.

After that, government re-implemented Law No. 15 / 1985. PLN (state own electricity company) still has monopoly right to supply electricity in Indonesia from the upstream sector to downstream sector which include generation, transmission, distribution and selling. As the follow up of this condition, government revised Government Regulation No. 10 / 1989 (about supplying and utilization electricity) and issued PP No. 3, 2005. The main important changes are: (i) national electricity blueprint must consider advices from local government and its citizens; (ii) utilization of renewable energy must be considered as the first priority; (iii) central and local government must provide budget for electricity facilitation; (iv) regulation for private companies that are willing to involve in electricity sector; (v) electricity price is regulated; (vi) controlling and standardization in electricity supplying are regulated.

Based on the data that is provided by Energy Information Centre, Ministry of Energy and Mineral Resources (PIE–DESDM), in 1990-2003 transportation sector consumed the biggest percentage of fuel with the average consumption rate approximately 43.66% or 116,146 thousand SBM (Barrel Oil

[6] The sections are: (i) Sect. 16 (fraction of electricity supplying activities); (ii) Sect. 17 (electricity supplying activities competition); (iii) Sect. 68 (transferring electricity supplying licensed).

Equivalence) per year. Meanwhile, commercial[7] sector consumed the smallest percentage of fuel with the average consumption rate approximately 2.03% or 5,410 thousand SBM per year.

Based on the types of fuel, the highest consumption was on ADO (Automotive Diesel Oil) with the consumption rate approximately 41.59% in 2003. Meanwhile, the consumption rate of gasoline and kerosene was only 25.31% and 20.31%.

In 1992-2003, city gas[8] consumption was dominated by industry sector and commercial sector with the average consumption rate around 1,582 million cubic meters (98.08%). Meanwhile, household consumption and transportation consumption on this type of energy only 16 million cubic meter (0.99%) and 15 million cubic meter (0.93%).

Data of PIE-DESDM shows the household average consumption on *Liquified Petroleum Gas* (LPG) in period 1992-2003 was about 2,479 ton per year. Industry sector and commercial sector consumed 2,759 ton per year. In addition, industry sector and household sector were the top two electricity consumers in 2003. The average industry consumption on electricity in the period 1990-2003 was approximately 26.78 thousand *Giga Watt Hours* (GWh) per year and the average household consumption was approximately 21.68 thousand GWh. Whereas, the average consumption in other sectors, i.e. commercial sector, public traffic lighting, social, and government in succession 7,14%, 0,79%, 1,25% and 1,29%.

3. Previous Study

Some studies have been conducted to analyze energy problems by using *Computable General Equilibrium* (CGE) Model for Indonesian economy and other countries. Those studies also considering environment as a factor that relate to

[7] Commercial sector includes inns, restaurants, trades, financial services, entertainment and social.

[8] City gas is processed gas that is produced by National Gas Company (PGN).

energy problems. Some studies that will be highlighted in this paper are Lewis (1993), Resosudarmo (1996 and 2002), Garbaccio et al (1998), Naqvi (1998), Bohringer (1998), Negara (2000), Xie and Saltzman (2000), O'Ryan and De Miguel (no year given), Nikensari (2001), PIE-DESDM (2001), Felder and Schleiniger (2002), Bohringer et al (2003), Oktaviani et al (2005), and LPEM-FEUI (2005).

Lewis (1993) analyzes the economic impacts of tax system and energy subsidies on Indonesian economy in 1980's. This study reveals the small impacts of tax or subsidies abolition on energy consumption. The taxes or subsidies abolition affects consumption through income effect. Within the types of fuel taxes and subsidies, the gasoline tax abolition gives the biggest impact to the increasing of fuel consumption. Meanwhile, the kerosene subsidy abolition gives the biggest impact to the decreasing of fuel consumption. According to the results of simulation, we can conclude that tax system and energy subsidies cause a significant distortion on Indonesian economy and the level of welfare.

Resosudarmo (1996) develops CGE model that consider air quality as a result of economic activities. This model also presents the impact of air quality on economy. Resosudarmo analyzes the implications of clean air program on economic growth and household income in different socio-economic level.

Garbaccio et al (1998) analyze the usefulness of tax in order to reduce carbon emission in China. It presents dynamic CGE model of China economy. This model use market institution and planning component to measure the effect of tax on population growth, capital accumulation, technology improvement and changes in demand. In the simulation, they assume that there are 5%, 10% and 15% reduction in carbon emission. The results show that those carbon emission reductions reduce GDP and consumption in the first year. However, the impact will be positive in the next 30 years, for example 5% carbon emission reduction will increase GDP approximately 34% in the next 30 years.

Naqvi (1998) develops Energy CGE model in Pakistan which is known as GE-PAK. This model is based on a neo-classic assumption and can capture the relationship between economy, energy and social equity. GE-PAK is constructed by using Social Accounting Matrix (SAM) data which has complete Input-Output (I-O) table. This I-O table consists of 131 commodities from 128 industries and income-expenditure data from 4 institutions, i.e. households, companies, government and external institution.

Bohringer (1998) develops complete format of CGE model in order to mix the definition of production possibilities in economies of scale. Energy sector is presented by bottom up activities analysis meanwhile other sectors are presented by top down production function character. The objective of using this approach is to improve credibility of energy CGE model. It is important because policy makers need strong recommendations, for example is the payment to workers and stakeholders in industries as a compensation of energy policy implementation. Bohringer also makes simulations in order to analyze the impacts of ad valorem tax implementation which increase the price of energy as a primary input in electricity production approximately 25%, 50%, 100%, and 200%. The result of these simulations shows two important points. First, if the government increases the tax, the activities of industries that are based on simple technology will increase; meanwhile the activities of energy-intensive industries will decrease. Second, ad valorem tax policy reduces the output and decreases the demand of electricity and some other output in related sectors.

Negara (2000) uses CGE model that focus on the impact of the increasing of energy price on GDP, unemployment rate, saving rate, and income distribution. Negara argues that the policy to increase the fuel price is an effective tool to increase efficiency in energy consumption and strengthen the government budget. However, this policy increases the level of unemployment.

Xie and Saltzman (2000) develop CGE model which integrate economic model and environment model as consideration in making environment policies in developing countries. This model consists of various components of environment such as environment tax, subsidies, and reforestation activities.

This model also uses *Environmentally Extended Social Accounting Matrix* (ESAM) which presents consistent data regarding economy and environment. After that, Xie and Saltzman use data of China by categorizing it into 7 production sectors, i.e. agriculture, mining, light-industry, energy, heavy-industry, construction, and services. Production factors consist of 2 primary factors (capital and labor) and intermediary input. Supply of labor, supply of capital, average wages, exchanges rate, government expenditure on consumptive goods, subsidies, and debt are categorized as exogenous factors.

O'Ryan and De Miguel (no year given) analyze the direct and indirect impacts of Green tax policy (tax for environment quality improvement) on macro economic variables and environment variables in Chili. They use CGE model that is based on I-O table in 1992. The results show that tax implementation on PM10 emission have bigger impacts on reducing other emission (such as SO_2, NO_2, CO dan VOC) compare to the same tax implementation on SO_2, and NO_2. The biggest impact is experienced by transportation sector. However, green tax policy only has a slight implication for income distribution.

Nikensari (2001) uses CGE model to analyze two problems, i.e. i) the impact of hypothetical changes in fuel price and electricity price policy through simulation; ii) the level of energy price, both fuel price and electricity price. The results show the positive impact of subsidies reduction policy on government budget because of the increasing of income in the long-run economy.

PIE-DESDM (2001) develops CGE model for Indonesian economy, which is known as INDOCEM (*Indonesian Comprehensive Energy-Economy Model*). This model has a flexibility to separate the negative impacts of the increasing of fuel price and the positive impacts of the higher fuel price on energy utilization efficiency. They use Indonesian I-O table in 2000 and the results show two important points. First, the increasing of fuel price cause 0,77% inflation rate if the increasing of fuel price is not followed by the compensation in wages, and cause 1,3% inflation rate if it is followed by compensation. Second, this policy has a slight implication approximately 0,026% to 0,27% for economic growth. Furthermore, communication and transportation sector is the sector that received the biggest effect.

Resosudarmo (2002) analyzes the impacts of clean air program on national economic performance and household income from different socio-economic level. The objective of this study is to find out the strategy to achieve high economic performance and increase the income of low-level income household.

Felder and Schleiniger (2002) analyze the impacts of Switzerland government policy to ratify Kyoto Protocol through Carbon Tax policy. They use CGE model and Switzerland's data in 1990. The results show the effectiveness of externalities internalization to reduce CO_2 emission approximately 30% to 50%. It can improve the quality of environment and people welfare in the country up to 5 billion Frank Swiss.

Bohringer et al (2003) analyze the impacts of emission reduction policy by using two types approach, i.e. environment tax escalation and Joint Implementation (JI). JI is cooperation activities between German and other countries (e.g. India). German gives funding to India for emission reduction program implementation which will improve air quality in the world. This paper reveals that the JI approach much more cost-efficient compare to environment tax escalation policy.

Oktaviani et al (2005) develop recursive dynamic CGE by using Indonesian I-O data and SAM data in 2000. This paper analyzes fuel price policy and its impacts on macro economy, agriculture, and poverty. The increasing of fuel price raises output price of energy-intensive industries such as transportation and fishery. This policy reduces people real income and people welfare. In general, this policy increases poverty level. However, this policy does not affect rice price.

LPEM-FEUI (2005) analyzes energy problems in Indonesia by using INDOCEM model. This study concludes three important points. First, energy price policy increases poverty index from 16,3% to 16,7%. Second, compensation program implementation compensates the negative impact of this policy and reduces poverty level up to 2,84%. Third, miss-management in compensation program implementation has bigger impacts than fuel price policy without any compensation program, e.g. 25% budget leaking increase poverty approximately 0,55%.

4. Methodology and Data

4.1. Methodology

Dynamic Computable General Equlibrium (CGE) is developed in this paper to analyze the impacts of energy price policy on economic growth and income distribution. CGE Model is a non-linear simultaneous equations model which accommodates price and quantity variables adjustment as input factor market equalizer or commodity market equalizer in economic simulation. In other words, CGE Model simulates the optimal condition of consumers and producers in an economy. In addition, CGE Model also simulates government role as economic actor. Generally, this model comprehends all transactions in money cycle, commodity cycle and services cycle in economic mechanism (Lewis, 1991). If we add some dynamic equations which represent time factor, the equations will change from CGE Model to Dynamic CGE Model.

CGE model is used because of several reasons i.e. (i) this model can accommodate price variable adjustment which cannot be accommodated by other models, such as Input-Output and SAM; (ii) CGE model has good ability to accommodate structural changes in the economies; (iii) Dynamic CGE which uses Indonesian Energy Sector SAM data can provide possibilities to substitute energy input factor with capital factor and labor factor more accurately. It can identify economic impacts of price changes because of the decreasing of subsidies, compensation of reducing the fuel subsidy and escalation of energy utilization efficiency on economic growth and household incomes. Furthermore, dynamic CGE model approach for energy has not been broadly used.

Dynamic CGE model for Indonesia is constructed from 7 blocks, namely:

- Production Block: the equation in this block illustrates the structure and behavior of the production sector.
- Household Block: the equation in this block illustrates the behavior of household and other institutions.
- Government Block: the equation in this block illustrates the behavior of government as an economic actor in economy.
- Investment and Capital Block: the equation in this block simulates the decision to invest in the economy and the demand for goods and services that provide new resources.
- Export-Import Block: the equation in this block shows the decision of a nation/region to export or import goods and services.
- Market Clearing Block: the equation in this block shows the market clearing for labor, goods and services in the economy. The national balance of payment is also included here.
- Inter-temporal Block: the equation in this block is the dynamic that connects the economy of the current year with past years.

4.2. Data

This paper uses Indonesian Energy Social Accounting Matrix (ESAM) data in 2000. ESAM is developed from Indonesian SAM data in 2000.

5. Dynamic Computable General Equilibrium for Indonesian Energy

This section explains some important features of the Indonesian dynamic CGE model which is consist of production block, inter-temporal block, and energy function specification.

5.1 Production Block

This block illustrates the structures and behavior of the production sector[9]. Specifically, producer behavior in CGE model is the central which connect labor market, output, wages, and price (Devarajan, 1998). Figure 1 illustrates the structures of production sector function. Output is produced from combination of intermediate input and value added. Production process applies technology which follows Nested Constant Elasticity of Substitution (CES) production function. CES has 3 level production functions.

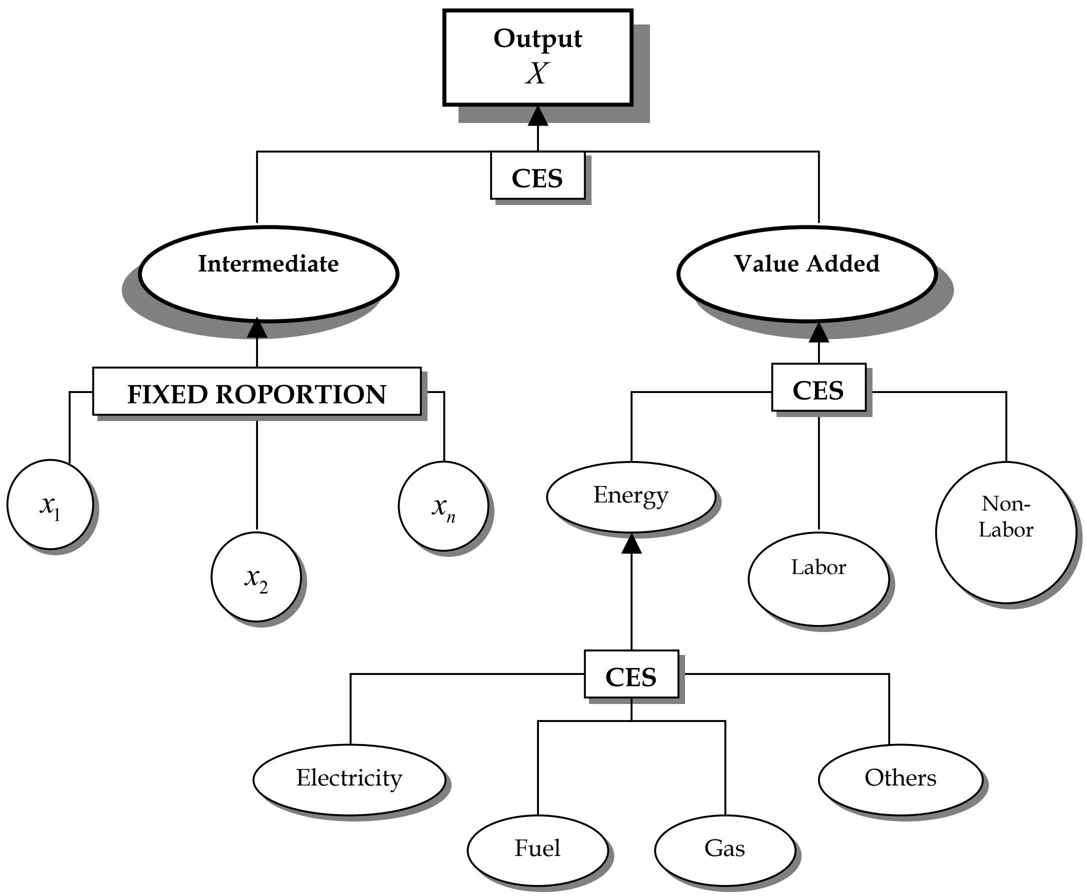

Figure 1 Production Function Structure

[9] The development of such production function structures gives possibility to substitute energy with capital and labor as production factors. There are only few researches in Indonesia that are already implement this method

5.2 Inter-Temporal Block

In order to have dynamic CGE model which can be used for a few years, capital function and labor supply function must be dynamic functions. These functions illustrate the changing from year to year, which is defined as equation [1] and [2]:

$$K_{i,t+1} = K_{i,t}.\left(1 - depr_i\right) + DK_{i,t} \qquad [1]$$

Where:

t	is years index
K	is capital per year for each sector
$depr$	is depreciation rate
DK	is new capital investment per year for each sector

$$LB_{t+1} = LB_t.\left(1 + rl\right) \qquad [2]$$

Where:

LB	is labor supply
rl	is growth of labor supply

5.3 Energy Function Specification

Value added function

Value added function illustrates the combination of labor, capital, land, and energy utilization. This function also illustrates the substitution rate between production factors that creates possibilities to substitute energy with labor and capital as production factors. Value added function is:

$$VA_i = alphav_i \cdot \sum_{fe} (betav_{i,fe} \cdot FACDEM_{i,fe}^{-rhov_i})^{-\frac{1}{rhov_i}} \qquad [3]$$

Sector-energy factor function

Sector-energy factor function illustrates the construction of energy production factor from various types of energy which creates the possibility to substitute energy with other production factors. This function is a combination of various types of energy, i.e. coal, liquid natural gas, gasoline, ADO, IDO, MFO, refinery gas, kerosene, electricity, and city gas. The form of sector-energy factor function is:

$$FACDEM_{i,energi} = alphav_i^{energi} \cdot \sum_e (betav_{i,e}^{energi} \cdot INT_{e,i}^{-rhoe_i})^{-1/rhoe_i} \qquad [4]$$

6. Results

There are several scenarios in this paper that can be grouped into three main scenarios i.e. (i) price changing scenario because of the decreasing of subsidies and implementation of compensation program which is not followed by escalation in energy utilization efficiency; (ii) price changing scenario because of the decreasing of subsidies and implementation of compensation program which is followed by escalation in energy utilization efficiency by Industry sector; (iii) price changing scenario because of the decreasing of subsidies and implementation of compensation program which is followed by escalation in energy utilization by industry sector and household sector.

In the three scenarios, price changing and the decreasing of subsidies are only implemented on seven types of energy, i.e. gasoline, ADO, IDO, kerosene, refinery gas, MFO and electricity. The decrease of subsidies on those types of energy is implemented step by step, so there will be no subsidies on them except kerosene and electricity for poor households in ten years forward.

Implementation of compensation program is applied by two mechanisms, i.e. direct targeted subsidies to poor households such as BLT (Cash Transfer Payment), P3 (Facilities Escalation Program), combination[10] between BLT and P3, and increase government expenditure (PAP) on specific economic sector. In this paper, poor households are defined as those whose head are Agricultural

[10] The objectives of P3 (Facilities escalation program) are to escalate road facilities, clean water, electricity, health facilities, market, etc. In addition, this program also provides work opportunities for poor household. Combination between BLT and P3 implement by run BLT in the first four years, followed by P3 in the following six years.

Employees, Small Farmers, Rural Low Income Earners and Urban Low Income Earners.

Indonesian Dynamic CGE model was developed based on several assumptions i.e. (i) This model used Indonesian Energy Sector SAM 2000; (ii) Price index in the ten years period was made constant, so that the prices generated from simulation are formulated in real term; (iii) Export price, import price, world price on commodities and services was constant; (iv) Energy subsidies decreased gradually by 10% every year and there will be no subsidies in ten years forward except 10% subsidies on kerosene and electricity; (v) Government foreign debt decreased by 0.3% every year, debt installment decreased slightly about 0.1% and interest payment decreased slightly approximately 0.15% per year; (vi) Private foreign debt decreased around 0.5%, debt installment decreased slightly about 0.3% and interest payment decreased approximately 0.45% per year; (vii) Investment growth from foreign capital was only 1% per year; (viii) Industry sector efficiency rate and household sector efficiency rate was 10% and 5%; (ix) Labor growth was 2.5% per year.

According to the results of dynamic CGE model, the conclusions of this paper are:

- Policy implementation on reducing the subsidies which is not followed by escalation in energy utilization efficiency caused several implications i.e. (i) It is predicted that GDP will increase about 0.48% - 0.51% in 2010 compared to 2000 and income distribution will be spread evenly (Gini coefficient in 2010 will decrease 7.9% compare to the base condition); (ii) Without BLT Program (income transfer to the poor, as a compensation to the decreasing of oil subsidy), most of the poor household incomes will be lower than the base scenario; (iii) Policy Implementation on Reducing the fuel subsidy which followed by BLT program (third sub-scenario) will increase GDP and poor household incomes with the biggest percentages

(0.06% - 1.33%); (iv) Miss-management on BLT program (25% inappropriate spending) will decrease poor household incomes about -34.23% - -366.60%.

- Policy implementation on reducing the subsidies which is followed by escalation in energy utilization efficiency by industry sector caused several implications i.e. (i) It is predicted that GDP will increase about 1.39% - 1.43% in 2010 compared to 2000 and income distribution will become better (Gini coefficient in 2010 will decrease 7.9% as compared to the base condition); (ii) Most of the combination in this scenario will increase all poor household incomes; (iii) the fuel subsidy reduction policy which followed by BLT (twelfth sub-scenario) program will increase GDP and poor household incomes with the biggest percentages (0.87% - 2.10%); (iv) Mis-management on BLT program (25% inappropriate spending) will decrease poor household incomes about -20.84% - -29.66%; (v) Implementation of this policy will increase GDP and household incomes more optimal than the first scenario.
- The subsidies reduction policy which is followed by escalation in energy utilization efficiency by industry sector and household sector caused several implications i.e. (i) It is predicted that GDP will increase about 1.45% - 1.48% in 2010 compared to 2000 and income distribution will be spread evenly (Gini coefficient in 2010 will decrease 7.9% compare to the base condition); (ii) All combination in this scenario will increase all poor household incomes; (iii) Policy Implementation on reducing the fuel subsidy which is followed by BLT program (twenty first sub-scenario) will increase GDP and poor household incomes with the biggest percentages (0.89% - 2.13%); (iv) Mis-management on BLT program (25% inappropriate spending) will decrease poor household incomes about -20.42% - -29.23%; (v) Implementation of this policy will increase GDP and

household incomes more optimal than the first scenario and second scenario.

- Energy policy which is followed or not followed by escalation in energy utilization efficiency will decrease domestic trade on energy, increase import of energy and decrease export of energy relative to energy policies in the base scenario.
- Energy policy which is followed by escalation in energy utilization efficiency will make trade balance on energy better than that of the energy policy which is not followed by escalation in energy utilization efficiency.
- There are several factors that are important to consider i.e. (i) If there is no possibility to escalate energy utilization efficiency, Policy Implementation on reducing the fuel subsidy have to be followed by BLT program; (ii) If there is a possibility to escalate energy utilization efficiency, Policy on reducing the fuel subsidy could be implemented with combination between BLT and P3, BLT and PAP or without BLT program; (iii) BLT program should be implemented only in particular time because BLT could make poor households become non-productive and if miss-targeting occurs in that program, poor households' income will decline; (iv) Combination between energy policies, Implementation of BLT program and escalation in energy utilization efficiency is the best condition; (v) escalation in energy utilization efficiency by industry is more important than that of the households; (vi) Mis-targeting in BLT implementation will cause big losses for household and create social conflict; (vii) Bad management on BLT implementation will cause two problems. First, if there is no possibility to escalate energy utilization efficiency, government could have few alternatives. Second, if there is a possibility to escalate energy utilization efficiency, government could

combine the policies with Compensation of Reducing the Fuel Subsidy (PAP and P3).

7. Discussion

According to the results of this paper, there are some policies to be considered and important to be implemented, i.e.

- The policy to reduce the poor household subsidies will not be appropriate if the households and industries are predicted not to increase energy utilization efficiency and BLT is not feasible to be implemented in good management.
- BLT has to be implemented in the short term because its negative impacts such as miss-targeted and reduce the productivities of poor people.
- Long term subsidies policy could be implemented through P3, PAP, or even the subsidies reduction policy which is not followed by BLT program as long as the households and industries could increase the efficiency of energy utilization.
- Government has to implement the efficiency escalation program which is concern on three basic things, i.e. i) the efficiency escalation program on ADO and electricity utilization in industries and the efficiency escalation program on refinery gas and electricity in households. This is an important matter because affects household income significantly; ii) the main concern of the efficiency escalation program has to be on industries. This strategy will increase household income in the largest proportion; iii) the efficiency escalation program is important because it can increase economic growth and poor household income. Furthermore, it will decrease import and then shift the balance of payment of energy in the positive way.
- Specifically, the energy efficiency escalation program that could be conducted by government are: i) improve public transportation

management and services; ii) invest on the facilities that will create energy utilization efficiency; iii) evaluate public and private car emission standard regularly; iv) encourage the automotive industry to import the more efficient engine; v) evaluate the industries and households effort in energy utilization efficiency and give them reward; vi) develop information centers that can provide clear information about the types of technology and procedure to utilize energy efficiently; vii) create opportunities and give incentive for production process improvement through tariff reduction, tax and cut over the disincentive retributions. Further research is needed in this problem; viii) promote and socialize the energy efficiency escalation program.

- Government need to formulate strategies to implement the subsidies reduction policy such as: i) provide information about the procedure to utilize the energy efficiently; ii) give incentive to industries and households who already utilize the energy efficiently; iii) reduce the subsidies step by step in order to give a chance for industries and households to adapt with the new energy price by adopting efficient energy utilization.
- Government need to develop alternative mechanisms for BLT program in order to compensate the increasing of energy price.
- Government has to control and evaluate the direct targeted subsidies program such as BLT in order to minimize the mis-targeted and the negative impacts that could be caused by this program. Control and evaluation is very important because the direct targeted subsidies program can increase economic growth and create better income distribution.

8. Research Boundaries

First, boundaries of SAM method are: (i) This method is simple and does not consist of price variable which is the important variable in energy especially in fuel, gas and electricity; (ii) This method is static so it will inappropriate for long term forecasting; (iii) This method has a *fixed Leontief technology* assumption which means the technology is pretend to be constant. Demand and supply are in the equal condition, there is no implication of price on input, all commodities are demand driven which mean there are no trouble to fulfill supply. Basically, these boundaries are similar with I-O model boundaries.

Second, boundaries of Dynamic CGE are: (i) assumptions in this model could cause inaccuracy results; (ii) simulation result is extremely depend on data; (iii) This model is inappropriate to calculate inflation because there is no monetary variables in model; (iv) This model is deterministic, so it can not accommodate uncertainty condition; (v) This model can not provide information about what types of energy that should be more concerned.

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