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Alternative Policy Solutions for Geothermal Development in Indonesia

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ABSTRACT

Two hundred and seventeen geothermal prospects have been identified in Indonesia with total potential of 19,658 MW. Geothermal energy is a renewable, non-exportable and clean energy resource.

To date, however, only 647 MW of Indonesia's total potential has been developed. Although in its diversification policy the Government of Indonesia has made geothermal one of the preferred domestic energy resources, the industry feels the government does not provide a suitable climate or sufficient incentives for further geothermal development.

This paper discusses Alternative Policy Solutions for Geothermal Development in Indonesia using a Rationalist Method developed by D. L. Weimer and A. R. Vining (in Policy Analysis-Concepts and Practice, Prentice Hall 1989). The Method starts with identifying issues of market, distribution and governmental problems. Then the alternative policy solutions of market mechanism, incentive, rule, non-market supply and insurance are analyzed.

1. INTRODUCTION

Market failures are conditions when the utility-maximizing behavior of people and the profit-maximizing behavior of firms make everyone else worse off. Market failures could occur due to public goods, externalities, natural monopoly, information asymmetry, non-competitive behavior, preference, uncertainty, intertemporal problems and adjustment cost.

We build a government for justice and to organize the fulfillment of the people's needs for public goods. Government's tasks in implementing justice are to practise good governance and overcome market failures and distributional concerns. Distributional concerns include equality of opportunity and equality of outcomes.

Government failures typically arise when government recognizes market failures but chooses an intervention that is itself inefficient. But government failures are also manifested as forgone opportunities for efficient interventions because an interest group may be able to stop correction of a market failure. Government failures may occur in the forms of democracy, representative government, bureaucratic supply and decentralization.

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This paper discusses alternative policy solutions for geothermal development in Indonesia using a rationalist method developed by Weimer and Vining (in Policy Analysis Concepts and Practice, Prentice Hall 1989). The Method starts with identifying issues of market, distribution and government's problems. Then the alternative policy solutions of market mechanism, incentive, rule, non-market supply and insurance are analyzed.

2. METHODOLOGY

Weimer and Vining (1989) indicate generic policy categories that are most likely to provide solutions for each of the major market failures, government failures and distributional concerns, as shown in Table 1.

The methodology starts with recognizing the problems of market failures, government failures and distributional concerns. Then alternative policies related to the problem in the form of market mechanism, incentives, rules, non-market supply and insurance and cushions are introduced and evaluated.

3. PROBLEMS

Problems of market failures, distributional concerns and government failures are presented as follows:

3.1 Market Failures

Geothermal is a common property resource type of public goods. Indonesia has the largest geothermal potential in the world with potential of 19,658 MW. However only 647 MW have been developed.

From the externality point of view, geothermal is a renewable and relatively clean energy source.

Many Indonesia people and leaders believe that Indonesia is a country rich with oil and gas. In fact, the Indonesia oil reserve is only 0.6 percent and gas reserve is only 1.4 percent of that in the world. This information asymmetry leads to high resistance for policy on eliminating petroleum fuel subsidy.

The non-competitive behavior of petroleum fuel subsidies makes it difficult for non-petroleum energies to enter the energy market because their prices cannot compete with subsidized petroleum fuel prices, Partowidagdo (1992).

Petroleum fuel subsidies lead to preference for inefficient energy consumption which will make Indonesia become a net oil importing country.

Not only is the geothermal price higher than subsidized petroleum fuel prices, it is also high compared to gas and

coal prices. One of the causes of higher geothermal energy prices compared to other energy prices is that a contractor has to offer the electricity price before signing an agreement, while uncertainty is still high because no exploration well has been drilled. The price will be lower if it is fixed after exploration and the exploration results show that the geothermal fields can be produced with higher productivity wells or lower costs, (Partowidagdo, 2000).

Indonesia's oil production is declining and gas and coal reserves will also become exhausted in the future because they are non-renewable energy resources. For the sake of the next generation (intertemporal problem) the government has to set aside some of the revenue from non-renewable energy production in order to assist the development of renewable energies, including geothermal.

Renewable energies have higher production costs than non-renewable ones but they are sustainable. Therefore, the government should put some funds for adjustment (initial) costs to encourage the development of renewable energies, including geothermal.

3.2 Distributional Concerns

Although some of Indonesia's regions are rich with petroleum and coal resources, many are not. However, many of these non-renewable energy-poor regions are rich with geothermal energy resources. The government should assist these regions to develop geothermal energy in order to reduce their dependence on energy from outside.

3.3 Government Failures

From the point of view of democracy, it is important as soon as possible to make more Indonesian people and leaders (executive, legislative and judicial) understand the critical energy situation in Indonesia and the importance of geothermal energy development.

There is a need for good government that is participative, transparent and accountable. It must also be efficient, effective and fair as well as lawful. Apart from the need for good government, political, social and economic stability is required to attract investors (Partowidagdo *et al*., 2001).

The problem of bureaucratic supply lies in the need for better coordination between governmental institutions. For example, incentive programs for geothermal development will not be effective without approval from the finance department or maybe pressure from the House of Representatives.

With its new laws on regional autonomy in 1999 and on regional finance in 2000, Indonesia encouraged more decentralization. However, there are some complaints from investors, including energy companies, about the implementation of the regulations. The investors want better coordination between central and regional government to avoid multiple taxation.

4. ALTERNATIVE POLICIES

Alternative policies for market failures, distributional concerns and government failures in the forms of market mechanism (M), incentives (I), rules (R), non-market supply (NMS) and insurance and cushions (IC) for geothermal development in Indonesia are presented in Table 2.

5. CONCLUSIONS

It is difficult to maintain geothermal development in Indonesia without appropriate government policies. The alternative policies introduced in this paper hopefully could assist decision makers in Indonesia to improve the quality of government policies supporting geothermal energy development. However, further evaluation is required for each alternative policy.

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APPENDIX 1. CALCULATION EXAMPLE OF DEPLETION PREMIUM FOR OIL

Depletion premium is the net present value of the difference between the oil price in the future, arising because the government has to import oil as a result of not using depletion premium funds for energy development, and the oil production cost in the future should the government still be able to enjoy domestic oil production as a result of using the funds.

$$DP = \frac{P - C}{(1+i)^r}$$

where :

DP = Depletion Premium, \$/bbl

P = Price, \$ 15/bbl

C = Cost, \$ 6/bbl

i = Discount Rate, 10%

r = Proven Reserves (PR) to Production (Q) Ratio

In the case of Indonesia :

$PR = 5 \times 10^9$ bbl and $Q = 0.5 \times 10^9$ bbl/year

$$DP = \frac{\$(15-6)/bbl}{(1+0.1)^{10}} = \frac{\$9/bbl}{2.59} = \$3.5/bbl$$

Therefore r = 10 years

Meaning Indonesia Government should spend \$ 3.5 per barrel of oil produced, or 23 percent of oil revenue in the country, for energy development if the government wants to have sustainable supply.

Table 1: Searching for Generic Policy Solutions

	Market Mechanisms	Incentives	Rules	Non Market Supply	Insurance and Cushions
Traditional Market Failures					
Public goods	S	S	S	P	
Externalities	S	P	P	S	
Natural monopoly	S	S	P	P	
Information asymmetry			P	S	S
Other Limitations of the Competitive Framework					
Noncompetitive behavior			P		
Preference-related problems	S	S	P		
Uncertainty problems			S		S
Intertemporal problems					P
Adjustment costs					P
Distributional Concerns					
Equity of opportunity		S	S		P
Equality of outcomes			S		P
Governmental Failures					
Direct democracy			P		
Representative government	P		S		
Bureaucratic supply	P	S	S	S	
Decentralization	S	P		S	

P: Primary source of policy solutions
S: Secondary source of policy solutions
* Remember, this framework is primarily normative (the generic policies that "make sense" rather than policies most often adopted).

Table 2: Alternatives Policies for Geothermal Development in Indonesia

Problems	Alternative Policies
Public good	M: Eliminate petroleum fuel subsidy I: Reduce government take for geothermal development to reduce price by allowing tax holiday and investment tax credit R: More supportive geothermal regulations NMS: Better education and training, and improve research on geothermal
Externalities	M: Charging on environmental tax I: Reduce government take for geothermal development to reduce price R: Requirement to limit power plant emission NMS: Initial exploration by the government institution to reduce uncertainty and price
Information asymmetry	NMS: Public information about the Indonesian energy situation to reduce resistance to the elimination of petroleum fuel subsidies
Non-competitive Behavior	M: Eliminate petroleum fuel subsidy and the subsidy is directly given
Preference	M: Eliminate petroleum fuel subsidy I: Incentive for efficient and renewable energy use R: Give priority for domestic energy use
Uncertainty Intertemporal problem & adjustment cost	R: Depletion premium from oil and gas for geothermal* IC: Exploration insurance funded by the government to reduce price. The government has to repay the exploration costs when the results of exploration show that the geothermal fields can not produce electricity with the price competitive with the market price**
Distributional Concerns	I: Incentives for non-renewable energy-poor regions to develop geothermal energy
Democracy	R: More supportive energy regulations for sustainable development and public campaign for that
Government	M: Direct appointment by people for Central and Local House Representatives and the President R: Regulations needed for good governance
Bureaucratic supply	NMS: Better coordination between governmental institutions
Decentralization	NMS: Better coordination between central and local government to avoid multiple taxation

Notes:

- Depletion premium funds from non-renewable energy sources such as oil and gas have to be used to maintain the stock of energy, including renewable ones, by using the funds for human resources development, research and development and exploration. Depletion premium fund is just like replantation fund for forestry sector. The calculation example of depletion premium for oil is shown in Appendix 1.

- The suggested exploration insurance for geothermal energy development in Indonesia was presented at World Geothermal Congress by the author at Beppu, Japan in 2000.