Full Length Research Paper

Income tax incentives on renewable energy industry: Case of geothermal industry in USA and Indonesia

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Renewable energy is derived from natural processes that are replenished constantly. In its various forms, it derives directly from the sun or from heat generated deep within the earth. Included in the definition is electricity and heat generated from solar, wind, ocean, hydropower, biomass, geothermal resources and biofuels, and hydrogen derived from renewable resources. USA is a market leader in terms of geothermal power, while Indonesia also has huge potential in geothermal industry. Tax incentives are also given in favor to develop this renewable energy industry. Due to the large capital investment required to install some of these systems, the tax incentives could prove to be the deciding factor when determining whether to pursue projects of this type. Indonesia as a developing country could learn and review incentives given by USA specifically in geothermal industry. Our study show that Indonesia might consider to give an indirect income tax incentives as tax credit for personal and corporate taxpayer who install a renewable energy system in their office or residence. This tax credit will indirectly boost sales of renewable energy industry and increase the attractiveness of Indonesia as a place of investment. This option can be considered as Indonesia has a huge potential for investment in renewable energy industry.

Key words: Geothermal, renewable energy, income tax incentives, tax, tax credit.

INTRODUCTION

Renewable energy is energy which comes from natural resources such as sunlight, wind, rain, tides, and geothermal heat, which are renewable (naturally replenished). In 2008, about 19% of global final energy consumption came from renewables. New renewables (small hydro, modern biomass, wind, solar, geothermal and biofuels) are growing very rapidly.

Geothermal resources provide energy in the form of direct heat. Since 2004, significant additions of electric capacity have occured in Indonesia, Iceland, New Zealand, USA, and Turkey. Global capacity has increased 1.8 GW since 2004. (Renewable Energy Policy Network for the 21st Century, 2007 and 2010). Climate change concerns, coupled with high oil prices, peak oil, and increasing government support, are driving increasing renewable energy legisla-tion, incentives and commercialization. New government spending, regulation and policies helped the industry weather and the global financial crisis better than other sectors. Tax incentives are designed to encourage and facilitate the purchase, installation or manufacture of renewable energy systems, equipment and facilities. Therefore, tax incentives are important instruments to develop renewa-ble energy industry (Tavallali, 2010). Due to the large capital investment required to install some of these systems, the tax incentives could prove to be the deciding factor when determining whether to pursue projects of this type.

The main objective of this study is to compare income tax incentives given from government to renewable energy industry. We compare between USA and Indonesia, in order to have a better view regarding income tax incentives given by governement of USA which might be adopted by government of Indonesia, if it is feasible. We choose USA as subject of comparison mainly because USA is still the market leader of

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Abbreviation: VAT, Value added tax.

geothermal power in terms of existing capacity as at the end of 2009.

LITERATURE REVIEW

Income tax incentives

From the economist's standpoint, environmental issues and economic issues are two sides of a coin. Western economists apply the externality of economic activities to interpret the formation of environmental issues. The externality of economic activities is divided into external economics and external diseconomics (Lee and Lin, 2011). The external economics is also known as the constructive, positive or beneficial externality. The external diseconomics is known as the destructive, negative or harmful externality. Tax incentives is one example of external economics.

Tax policies sometimes have large effects on a variable of interest but often have little or no effect (Deskins, 2005). According to Wasylenko (1997), the general conclusion of the literature he reviewed on the interregional effects of tax policy is that, tax policy is a statistically significant determinant of economic activity.

Taxation system impose a variety of taxes that affect most activities of economic life either at the corporate or household level. Taxation for example can affect the work effort of individuals, labour supply, consumer demand, household savings, enterprise and risk taking, corporate investment (Anastassiou, 2011).

Many developing countries use tax incentives to promote investment. By applying reduced corporate income tax rates, granting tax holidays, allowing extra investment deductions from tax liabilities, etc. to certain economic activities governments try to reallocate or attract domestic and foreign mobile capital (Van Parys and James, 2010). A company which receive tax incentives obtains an advantage over its competitors (Fernandez de Soto Blass, 2011). One question arised is could this tax incentives sustain renewable energy or not (Harder, 2010).

Overview of renewable energy

Renewable energy flows involve natural phenomena such as sunlight, wind, tides, and geothermal heat. Renewable energy is derived from natural processes that are replenished constantly. In its various forms, it derives directly from the sun, or from heat generated deep within the earth. Included in the definition is electricity and heat generated from solar, wind, ocean, hydropower, biomass, geothermal resources, biofuels and hydrogen derived from renewable resources. (International Energy Agency, 2002).

Renewable energy replaces conventional fuels in four distinct area: Power generation, hot water/space heating, transport fuels, and rural (off-grid) energy services.

Indonesia's renewable energy potential

Indonesia has a large new and renewable energy potential, which includes 450 MW of mini/micro hydro power, 50 GW of biomass, 4.80 KWh/m^2/day solar power, 3-6 M/s wind power, and 3 GW of nuclear energy. Currently, the development of renewable energy is regulated by Presidential Decree 5/2006 regarding the national energy policy.

The decree states that the contribution of new and renewable energy in the 2025 national primary energy mix is estimated at 17%, consisting of 5% biofuel, 5% geothermal power, biomass, nuclear, hydro, and wind, and also liquefied coal at 2%.

The steps needed for biomass development involves waste recycling from the farming and forestry industry as a source of energy which is integrated with its respective industry, integrating biomass development with the local economic development, boost the fabrication of biomass energy convert technology including its supporting sectors, increasing research and development of waste recycling, including city waste, for energy.

Efforts to develop wind energy includes its development for both electricity and non-electricity usage (as a pump for irrigation and clean water), development of small scale (10 KW) and middle scale (50-100 MW) wind energy technology. Development of solar energy includes the use of solar powered power plants in the rural and city areas, supporting the commercialization of solar powered power plants by maximizing the private sector role, development of domestic solar powered power plants industry, and the creation of an efficient funding system through the involvement of the banking sector.

To develop nuclear energy, the government needs to take socialization measures to gain the support of the public and coordinate with several countries to master its technology. In developing microhydro, the government needs to integrate the microhydro-powered power plants with the local economy, maximizing the irrigation potential for the power plant and developing the domestic microhydro industry, and developing several partnerships and funding patterns.

To support development on renewable energy industry, government also gives tax incentives as stated on Finance Minister Regulation 21/2010. The government believes that with application of this tax incentives, will encourage the development on renewable energy industry in Indonesia.

Geothermal power

Geothermal resources provide energy in the form of direct heat and electricity. Since 2004, significant additions of electric capacity have occured in Indonesia,

Table 1. Summary of geothermal industry's income tax incentives in USA.

Type	Amount	Maximum amount	Remarks
Personal tax credit	30% of expenditures	Placed in services in 2008: $2,000. Placed in services after December 31, 2008: no limit	A taxpayer may claim a credit of 30% of qualified expenditures for a system that serves a dwelling unit located in the USA and used as a residence
Corporate tax credit	10% of expenditures	N/A	Includes geothermal heat pumps and equipment used to produce, distribute or use energy derived from a geothermal deposit. Credit for geothermal property, except of geothermal heat pumps, has no stated expiration date
Corporate tax credit	2.2¢/kWh	N/A	Per-kilowatt-hour tax credit for electricity generated by qua lified energy resources and sold by taxpayer to an unrelated person during the taxable year.

Iceland, New Zealand, USA, and Turkey. Global capacity has increased 1.8 GW since 2004. During 2009, USA has six new plants increasing domestic capacity by an estimated 181 MW, or 6%. Followed by Indonesia (137 MW), Turkey (47 MW), and Italy (40 megawatts), for a total of at least 405 MW added. By the end of 2009, geothermal power plants operated in twenty-four countries and totaled approximately 10.7 GW of capacity, generating more than 67 TWh of electricity annually. Nearly 88% of that capacity is located in seven countries: USA (3,150 MW), Philippines (2,030 MW), Indonesia (1,200 MW), Mexico (960 MW), Italy (840 MW), New Zealand (630 MW), and Iceland (580 MW).

As the geothermal market continues to broaden, a significant acceleration in installations is expected, with advanced technologies allowing for development of geothermal power projects in new countries alongside with financial and tax incentives from the government to ensure it will grow as expected.

Position of USA and Indonesia in geothermal power

In terms of its existing capacity as at the end of 2009, Indonesia is the third in the world while USA is the leader. Philippines has second largest capacity in the world, followed consecutively by Indonesia, Mexico, and Italy. Indonesia's geothermal potential is also cited by Al Gore, nobel laureate and former US vice President. He said that Indonesia could be a super power of geothermal electricity. With the new regional super grids that are being proposed on every continent, it can be a signifcant advance for Indonesia's economy (Satriastanti, 2011). Realizing this potential, government should encourage this industry to grow rapidly. Without any incentives from government, growth rate might be not as it is expected. In order to analyze which tax incentives should be

implemented, we make a comparison with incentives given by governemnt of USA as the largest country of current geothermal power capacity.

USA tax incentives

While the incentives to pursue renewable energy projects have never been greater, recent changes in legislation have modified existing incentives as well as created new ones. The incentives come in a variety of forms, such as tax deductions, tax credits, tax exemptions, loans and grants (Bourgeois et al., 2010). Investment tax credit for renewable energy (IRC section 48) is eligible for systems that use energy from geothermal resources to generate electricity. The generation equipment and the distribution system equipment are both eligible, up to the point of electrical transmission. In addition, systems that use the ground or ground water to heat or cool a building are also eligible. Eligible equipment and systems are allowed a credit of 10% of the value of the installed system, with no maximum.

Table 1 presented tax incentives available in USA for geothermal energy industry, which include incentive for personal and corporate tax payer (Jones and Luscombe 2008). Database of State Incentives for Renewables and Efficiency, 2010) with tax rate in USA as reference presented in Table 2. Basically, income tax incentive given by USA government to geothermal industry energy is mostly indirect incentive (except for the third incentive below). By giving personal or corporate tax credit if they install, a renewable energy system will indirectly boost sales of renewable energy (in this case: Geothermal energy). Although not all energy-related tax credit for corporation could be used due to General Business Credit limitations in the regular tax (Carlson and Metcalf 2008). Renewable energy industry in turn have increasing

Table 2. Tax Rate in USA.

Layer of taxable income (USD)	Tax rate (%)
> 0 – 50,000	15
> 50,000 – 75,000	25
> 75,000 – 100,000	34
> 100,000 – 335,000	39
> 335,000 – 10,000,000	34
> 10,000,000 – 15,000,000	35
> 15,000,000 – 18,333,333	38
> 18,333,333	Flat rate 35

Table 3. Summary of depreciation rate in Indonesia.

Type of asset	Depreciation rate/straight line (with Incentives) (%)	Depreciation rate/straight line (no Incentives) (%)	Depreciation rate/double declining (withIncentives) (%)	Depreciation rate/double declining (no incentives) (%)
Non Building– Group I	50	25	100	50
Non Building– Group II	25	12.5	50	25
Non Building– Group III	12.5	6.25	25	12,5
Non Building– Group IV	10	5	20	10
Permanent Building	10	5	-	-
Non permanent building	20	10	-	-

sales, and furthermore they also have corporate tax credit (third incentive) for electricity sold to an unrelated person that are generated by qualified energy resources.

Indonesia tax incentives

Indonesia also gives income tax incentives for renewable energy industry. There are five income tax incentives, value added tax (VAT) incentives, and also custom incentives. Because we are focusing on income tax incentives, VAT and custom incentives are not discussed in detail.

VAT incentives are given to import of taxable goods. In general practice, import of taxable goods are subject to VAT 10%. Although the mechanism for VAT in Indonesia is credited VAT In (VAT paid when buy/import goods) with VAT Out (VAT collected when sell goods), the 10% was burden to the industry at first. VAT incentives are given for import of machine and equipment, either in form of completely build up or completely knock down. But, sparepart is excluded from this incentive. Custom incentives are also given for renewable energy industry in order to boost investment in this sector.

In income tax incentives, there are five incentives given by government through regulation from Ministry of Finance Republic Indonesia (2010) as follows:

1. Reducing of net income amounted to 30% of invest-

ment. These amount are allocated for six years, with each year's amount is 5% of investment. In Indonesia, corporate income tax rate is 25% while for micro, small and medium enterprise is eligible for 50% reduction from income tax rate. But for renewable energy industry most likely is not eligible for being qualified as a micro, small, and medium enterprise as it needs quite a lot of investment.

2. Accelerated depreciation and amortization. In Indonesia, corporation allowed to choose straight line or double declining (exclusion for building assets) as its depreciation method. But Directorate General of tax classify to a certain group. For example, a non-building assets is categorized under four groups (according to its nature) and building assets is categorized under permanent and non permanent. In Table 3, we summarize the depreciation rate with straight line and double declining method under this incentives and without this incentives. Accelerated depreciation would only have impact as a time difference on income tax impact, not as a permanent difference. For example, in non building group I; with incentives that asset will be fully depreciated in two years, while without incentives, asset will be fully depreciated in four years. It means from year five, they will not have impact towards net income (income tax).

3. Income tax on dividends to foreign taxpayer amounted to 10% or with lower rate according to tax treaty between Indonesia and the dividends holder's country.

4. Loss carry forward extended for more than five years,

but did not exceed ten years. For general taxpayers in Indonesia, loss carry forward lasted only for five years.
5. Exclusion from income tax article 22 on import for machine and equipment (completely knock down or completely built up; sparepart is excluded from this incentive). In Indonesia, besides subject to VAT as we have discussed earlier for importing goods; it is also subject to income tax article 22 (amounted to 2.5% or 7.5%). The mechanism of income tax article 22, actually is a tax credit to be calculated in annual tax. So the exclusion from income tax article 22 could leave the burden for corporation at the time they import the goods, but actually do not have significant impact on income tax calculation.

Comparison of USA and Indonesia tax incentives

We make comparison of USA and Indonesia tax incentives, focusing on its direct incentive. The objective

of this comparison is to gather the information, which tax incentive is better to use by Indonesia: reduced net income in six years or in term of corporate tax credit depending of its sales. But it should have be mention earlier that beside tax incentive in corporate tax credit given by USA, they also give indirect tax incentive as discussed earlier.

RESEARCH METHODOLOGY

We use research methodology to compare USA and Indonesia tax incentives as proposed by Anwar and Mulyadi (2011). As income tax incentives in Indonesia would take place at least six years, we do make a series assumption of net income for six years. We also make assumption of the investment expenditure by shareholders. Again, under assumption that net income is distributed directly to shareholders so we will measure effectivity of tax incentives by shareholders' view. Shareholders' view is maxi-mizing value of its investment, so we could conclude that incentives which create maximal value to shareholder could see as an attractive destination as compared to the other.

$$SV_I = -AINV + \frac{NI_{I,1}}{(1+r)^1} + \frac{NI_{I,2}}{(1+r)^2} + \frac{NI_{I,3}}{(1+r)^3} + \frac{NI_{I,4}}{(1+r)^4} + \frac{NI_{I,5}}{(1+r)^5} + \frac{NI_{I,6}}{(1+r)^6}$$

$$SV_A = -AINV + \frac{NI_{C,1}}{(1+r)^1} + \frac{NI_{C,2}}{(1+r)^2} + \frac{NI_{C,3}}{(1+r)^3} + \frac{NI_{C,4}}{(1+r)^4} + \frac{NI_{C,5}}{(1+r)^5} + \frac{NI_{C,6}}{(1+r)^6}$$

$$NI_{I,y} = (AI_y - 5\% \times AINV) \times (1-TR)$$

$$NI_{A,y} = (AI_y \times TR) - TC$$

Where: SV_I is shareholders' value with Indonesian income tax incentives, SV_A is shareholders' value with USA income tax incentives, AINV is assumed investment, $NI_{I,y}$ is net Income based on Indonesian income tax incentives on year-y, $NI_{A,y}$ is net income based on USA income tax incentives on year-y, r is Indonesian Central Bank rate, AI_y is assumed income before tax on Year-y, TR is tax rate and TC is the tax credit.

RESULTS AND DISCUSSION

USA gives three income tax incentives, where two incentives are indirect incentives. Indirect incentives given by government of USA is a tax credit for either personal or corporate taxpayers if they install a system of renewable energy. For personal taxpayers, they can install at their residence, while for corporation they can install it in their office. Of course, there are certain limitation given, such as eligibility of system and also maximum tax credit. But, in general, this indirect incentive is attractive to encourage taxpayers to use the geother-

mal power. Because if they do so, they will have tax credit for their income tax.

In Indonesia, indirect incentives towards renewable energy (geothermal) industry is only related to VAT and also income tax article 22 (import) while actually, it could not count as an incentive. For VAT when they imported goods, if they are a general corporation, the VAT In will be credited to VAT Out when they sell the products to customers. The difference between VAT In and VAT Out go directly to the government. It would not impact anything, but the amount paid at first. The same condition also for income tax article 22, if they are a general corporation, once they imported the goods they have to pay income tax article 22 while at the end of year, the amount paid will be calculated as tax credit.

We use formula as stated in research methodology in comparing direct tax incentives of Indonesia and USA. We make assumption that investment made of shareholders to renewable energy corporation is $1,000,000, while assumption on first year net income is $335,000 (assumption used: sell 5,000 MWH in the first year; selling price per year: $67/MWH based on report of California Energy Commission 2007). Net income assumed increase constantly by 10% each year. Indonesia Central Bank rate which used as a discount

Table 4. Simulation on shareholders' value using Indonesian income tax incentives.

Amount in $	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	SV
Assumed income	335,000	368,500	405,350	445,885	490,474	539,521	
Tax incentives	50,000	50,000	50,000	50,000	50,000	50,000	
Earning before taxes	285,000	318,500	355,350	395,885	440,474	489,521	
Tax rate (%)	25	25	25	25	25	25	
Earning after taxes	213,750	238,875	266,513	296,914	330,355	367,141	
Shareholders' value	127,612	85,141	56,712	37,720	25,056	16,624	(651,135)

Table 5. Simulation on Shareholders' Value using USA Income Tax Incentives.

Amount in $	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	SV
Assumed income	335,000	368,500	405,350	445,885	490,474	539,521	
MWH sold	5,000	5,500	6,050	6,655	7,321	8,053	
Tax rate (%)	15 – 39	15 – 39	15 – 39	15 – 39	15 – 39	15 – 39	
Tax	113,900	165,965	171,659	187,468	204,857	223,986	
Tax credit	110,000	121,000	133,100	146,410	161,051	177,156	
Earning after taxes	331,100	323,535	366,791	404,827	446,677	492,691	
Shareholders' value	197,672	115,317	78,050	51,429	33,877	22,309	(501,345)

rate is 6.75%, a rate constantly used as benchmark by bank of Indonesia from February to July, 2011. Our results are summarized on Tables 4 and 5. As we can see above, simulation using several assumptions both resulted in negative shareholders' value. Although both simulation result in negative share-holder value, share-holders' value using USA income tax incentives is greater than Indonesia. It should be noted that this simulation only take account of direct tax incentives, while USA still give indirect tax incentives to geothermal in-dustry. We can conclude that USA income tax incentives scheme is more attractive to shareholders than Indonesia income tax incentives.

We believe that the main objective of Indonesian government is to keep investors to make a long-term investment in Indonesia so they allocate reduction of 30% from investment during six years. We also are aware that net income of renewable energy corporation is not as simple as increase 10% constantly per year. But, with assumption of ceteris paribus, we compare the same data and formulate using tax incentives scheme for each country and resulted that USA is more favorable to investors. Given this result, Indonesian government and authority should also consider to give tax credit for each KWH sold by renewable energy industry.

Indonesia should also consider to issue a new indirect incentives like what have been doing in USA. By creating indirect incentives, people will be encouraged to use/buy from renewable energy (geothermal) industry. Although it gives tax credit to the buyer, indirectly higher sales to the industry and in turn will create higher bottom line and also higher tax paid to the government. Besides, as USA is a market leader on geothermal power, Indonesia could also learn something from their fiscal policy regarding this industry.

Conclusion

Renewable energy is derived from natural processes that are replenished constantly. In its various forms, it derives directly from the sun, or from heat generated deep within the earth. Included in the definition is electricity and heat generated from solar, wind, ocean, hydropower, biomass, geothermal resources, and biofuels and hydrogen de-rived from renewable resources. USA is a market leader in geothermal power industry.

Meanwhile, Indonesia, as a developing country also has large renewable energy potential, which include huge potential in geothermal power. Specific incentives in this study is income tax incentives. As tax incentives are important instruments to develop renewable energy industry, it is important for government to decide which tax incentives to implement. Due to the large capital investment required to install some of these systems, the tax incentives could prove to be the deciding factor when determining whether to pursue projects of this type.

From our study, we find out that most of incentives from USA mostly are indirect incentives which encourage people to buy/install renewable energy system and give them tax credit as return. This incentives could boost sales of renewable energy industry. Indonesia could consider to create an incentives similar like these, to encourage development of geothermal industry in

Indonesia. While comparison between USA and Indonesia, direct tax incentive resulted favorable incentive for investor in USA. This also mean that Indonesia should consider giving the tax credit as incentive of renewable energy industry instead of reduction in net income.

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