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MONTHLY BULLETIN

JANUARY 2019

A New Energy Paradigm for National Development

By: The Purnomo Yusgiantoro Center Research Team



Fossil energy has been one of the main support for Indonesia's economic growth since forty years ago. In 1962, Indonesia officially joined Organisation of Petroleum Exporting Countries (OPEC) for the first time and produced up to 1.6 million barrels per day oil production. Indonesia's oil withdrawal rate limit in 1960s was calculated to be between 0.9 to 1 million barrels per day to maintain sustainable supply. Crossing the threshold would disturb the balance between the rate of extraction and regeneration and could lead to a rapid decline of oil reserve. In the New Order era, oil, or so called "The Black Gold", became Indonesia's top commodity by possessing 98 percent of national exports. The extensive oil production, combined with the high price of oil, helped Indonesia to recover from its economic catastrophe in the New Order era. The importance of oil in the national economy is shown by the *lex specialis* policy directed to the sector. On the other hand, extensive coal and natural gas exploitation only started in the 1980s during the Dutch Disease [1]. During this period, natural gas production increased from 654 mmscf to 1,600 mmscf and coal production escalated from 650 thousand ton to more than 3.09 million ton. However, despite the large production, most of the natural gas and coal produced were

traded in the international market as export commodities. Subsequently, energy became a strategic political issues since it affected the national economy, national resilience and social issues, especially on the energy price subsidies implementation and development equitability.

In the last five years, the national revenue from oil and gas has decreased by 13% each year[2]. Report from the Ministry of Finance of Indonesia shows that the contribution of oil and gas sector was around 77.2 trillion rupiah or 28 percent of the total non-tax national income only in 2018[3]. The domination of oil and gas has significantly reduced due to the oil price fall in the 2014, when oil price collapsed from about USD100 per barrel to USD57 per barrel. Although the oil price has started to recover, many doubt it will ever hit USD100 again due to the abundant supply of shale oil in the US and the decreasing trend of renewable energy prices. Furthermore, the national fossil fuel production has performed a major decline as the effect of past extensive exploitation. In the third quarter of 2018, the report from Ministry of Energy and Mineral Resources showed that oil, coal, and natural gas were all failed at reaching the national production target.

Today, fossil energy should not be treated as a source of national income, but as a vital aspect for national development. Prioritizing national energy supply through Domestic Market Obligation (DMO) for coal, oil, and natural gas is necessary to fulfill the national energy demand. An optimal DMO program implementation highly depends on how far the government is willing to interfere the market and the balance between domestic demand and producers' profitability.

To increase the economic impact of fossil energy, Indonesia need to focus on the development of fossil energy processing plant. Processing of fossil energy resources to its derived products, such as naphtha, paraffin, propane and dymethyl ether (DME), will provided additional value to Indonesia's fossil energy resources. In this case, technology plays an important role to process the fossil energy resources to the more valuable product. However, significant amount of investments is required to implement the processing technology.

To summarize, it is necessary to revolutionize our paradigm on the fossil energy utilization. Various alternatives could be implemented in the fossil energy utilization aside from relying on its role as the source of income. The alternatives include increasing its value for the international market trading, utilizing it in a more environmentally friendly way, as well as using it as a

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capital of the national development. To overcome the related challenges, the upcoming International Energy Conference (IEC) 2019 will provide a platform to discuss related policies, investment and technology in the energy sector. We invite everyone to participate and contribute to the issues through IEC 2019 for a better national future.

Bibliography

[1] State where there is a sudden drop of oil price which significantly affects the economy of oil producer countries

[2] <https://finance.detik.com/energi/d-3504809/penerimaan-negara-dari-migas-turun-rp-235-t-dalam-2-tahun> (Detik Finance, 2017)

[3] <https://www.kemenkeu.go.id/rapbn2018> (Kementerian Keuangan Republik Indonesia, 2018)

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Facing Oil and Gas Price and Production Vulnerability

By: The Research Team of Purnomo Yusgiantoro Center (PYC)



Since the 1970s, the oil and gas price has fluctuated irrepressibly. The price fluctuation is not only controlled by the fundamental issues acting as supply and demand but also non-fundamental issues such as political instability, economic crisis, and market psychology. The fluctuation of oil and gas price will affect both producer and consumer countries.

There were four oil crises recorded from 1970 to 2018 (Yusgiantoro & Yusgiantoro, 2018). The first oil crisis occurred in 1973 – 1974 when the industrial era started to emerge and pushed consumer countries to demand more oil while the U.S. and Canada experienced a decrease in oil demand. The second oil crisis happened not long after the first oil crisis in 1978-1979 due to the political instability in the Middle East. The Middle East, as the biggest oil producer, was taking an important role in the global market of oil and gas supply. The Iran revolution led to a drop in the oil production for more than 6 MMBOPD, in which produce oil to only 2.4 MMBOPD. After being hit by two major oil crises, oil consumer countries started to be more prepared of another oil crisis, where they developed “Strategic Petroleum Reserves (SPR)”, established alternative energy as well as promoting energy efficiency and conservation. The third oil crisis occurred in 2007-2008 which triggered by economic and political factors. It all started in Central Asia where there was the longest winter in the last 50 years. On one hand, this inflated the energy and food prices. On the other hand, OPEC tried to keep the oil price raised to improve its member revenue up to more than USD120 per barrel by cutting the production quota. The oil price surged became a nightmare for countries whom applied

price subsidize for their energy sector. The government budget swelled uncontrollably, and there was no other option than to increase these countries’ energy price. Then, the last oil crisis hit on 2011 – 2013 due to the “Arab Spring”. Political instability in the Middle East brought a significant impact on the oil price to be more than USD100 per barrel. However, the massive discoveries of shale oil and gas in the U.S. had succeeded in dropping the oil price to become USD 50-55 per barrel in 2017.

Indonesia used to be a net importer oil country which benefited by the windfall profit due to the increases in oil price. However, the price subsidy of all fuels reduced the profit. The import bills also jumped since Indonesia still import its capital goods from countries which suffered from the increasing of oil price. Although it seems that oil producer countries were not much affected by the oil price fluctuation, there was also a time when the oil price fall and create an economic crisis to oil producer countries, or known as “Dutch Disease”. The abundance of natural resources often creates a trap where the government only focuses on gaining revenue from natural resources while overlooking the development of other sectors such as manufacture, agriculture, and tourism. Indonesia has suffered from the first Dutch Disease in the 1980s due to the sudden drop of oil price which resulted in the energy diversification through extensive production of natural gas and coal. The country also experienced another Dutch Disease in the 1990s along with the economic crisis of 1998. Some said that the country has not yet recovered from it. It is aggravated by the fact that oil production keeps declining while the consumption keeps increasing at a steady pace.

Indonesia has been classified as an oil importer country because oil consumption was surpassing oil production since 2004. Thus, Indonesia is more vulnerable to the fluctuation of the oil price. Regardless, oil is still dominating the national energy mix for about 42%, while natural gas takes about 22% in the national energy mix by 2017 (Purnomo Yusgiantoro Center, 2018). The government has succeeded in removing the price subsidies for avtur, avgas, diesel, and fuel oil in 2005, while slowly replacing premium with pertalite, kerosene with LPG and solar with biodiesel. There is also a new regulation regarding the obligation to sell all national crude oil from KKKS to Pertamina. It aims to reduce the oil imports, cut down the transportation costs and minimize the risk of oil price volatility. Although it is hard to control the oil price, there are some options available to reduce the oil import budget. One of the options is applying Enhanced Oil Recovery (EOR), also called tertiary recovery, in the mature fields when its production rate is significantly declining. EOR could be the fastest and a short term solution to increase national oil production and cut down the oil import. However, to support the EOR, the government have to guarantee the availability and affordability of the surfactant as the injection material and provide attractive incentives to the investors. To overlook on this case, International Energy Conference (IEC 2019) will provide the

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discussion with energy experts to let everyone understand more about this topic from various perspectives. We invite everyone to participate and contribute in the IEC 2019 for a better national future.

Bibliography

[1] Purnomo Yudiantoro Center. (2018). PYC Indonesia's Renewable Energi Booklet 2018. Jakarta: Purnomo Yudiantoro Center.

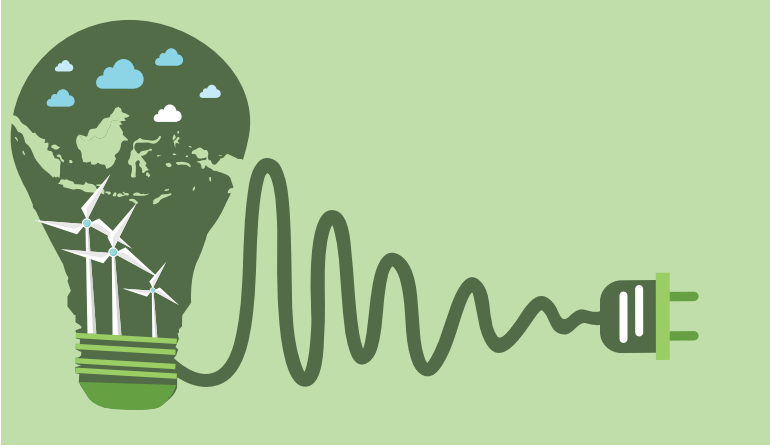
[2] Yudiantoro, P., & Yudiantoro, L. (2018). Ekonomi Energi: Teori & Aplikasi. Jakarta: Yayasan Purnomo Yudiantoro.

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MARCH 2019

Energy Efficiency and Conservation for Sustainable Development in Indonesia

By: The Purnomo Yusgiantoro Center Research Team



As emerging economies continue to expand, the energy needs are growing dramatically in the coming years. The IEA, (2018) predicted that global energy use would increase by 30 percent over the next two and a half decades. In particular, crude oil consumption will increase by 30 percent over those decades. However, excessive energy use leads to greenhouse gas effects and climate change. The environmental issue has become a concern in all over the world with many forums have gathered experts from various disciplines discussing climate issues.

According to IEA(2018), energy efficiency and conservation are important measures to support the sustainable global energy system to mitigate climate change, improve energy security, and grow economies while delivering environmental and social benefits. Energy efficiency has become one of the indicators of Sustainable Development Goals (SDG), especially SDG goal number 7 (SDG7). The SDG7 also targets a double improvement in energy efficiency by 2030 while pushing universal energy access. This means that a more efficient energy resource use will help more people gain access to modern energy services.

Achieving SDG 7 also enhances opportunities to reach targets of non-energy sector related to SDGs for example, climate change mitigation (SDG 13), reducing premature deaths and illnesses caused by energy-related or pollution

(SDG 3), and improving incomes of household (SDG 8) (IEA, 2018). IEA(2018) reported that strong global economic growth impacts an increased use of emissions-intensive fuels. In 2017, energy-related GHG emissions increased by 1.4 percent to 32.5 Gt CO₂-eq. This is the first significant increase since 2014. Meanwhile, energy efficiency measures help to constrain the recent emission growth.

In 2018, The American Council for an Energy-Efficient Economy (ACEEE) International Energy Efficiency Scorecard has analyzed effective policies and efficiency performances of the 25 world's top energy-consuming countries. The ACEEE evaluated and scored each of countries efficiency efforts using 36 policy and performance metrics spreading over four categories: national efforts, industry, buildings and transportation. The findings show that Italy and Germany are positioned in the first place with the highest score of 75.5 out of 100 possible points. While France, the United Kingdom, and Japan are ones of the top five, and Indonesia ranked 17 with a total score of 45 points (ACEEE, 2018).

Indonesia's low score is the lack of efficiency measures reflected from its rank for each category. The country ranked in the 15th in the national efforts category. Indonesia is estimated to have the highest potential in South East Asia in ensuring effective energy efficiency with policies such as government loans and tax incentives for energy efficiency programs. In the industrial energy efficiency category, Indonesia ranked in the 11th. Meanwhile, Indonesia ranked in 19 in the building category. In the transportation sector, Indonesia was the second best in the vehicle miles traveled per capita for passenger vehicles compared with other countries in Asia-Pacific. However, Indonesia must improve energy efficiency use in the transportation sector. As reported by IEA(2018), the policy of transportation in Indonesia has the lowest coverage because Indonesia does not have fuel efficiency standards for passenger cars and trucks.

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Indonesia has energy management policies through the Minister of Energy and Mineral Resources Regulation (MEMR) No. 14/2012 which states that industries with more than 6,000 TOE of energy use must implement an energy management system, meanwhile and industries with energy use less than 6,000 TOE to implement an energy management system or make energy savings. Indonesia has a potential to further improve the energy efficiency in the industrial sector by implementing standards performance of motors and enacting policies to encourage the deployment of Combined Heat and Power (CHP) technology.

In conclusion, Indonesia still has rooms to improve the energy efficiency and conservation implementation for sustainable development. Thus, the PYC International Energy Conference (IEC) 2019 will be a platform for energy experts to discuss the topics on energy efficiency and conservation from various perspectives. Purnomo Yusgiantoro Center invites everyone to participate and contribute to the PYC IEC 2019 for better development in the energy sector.

References

ACEEE. (2018). The 2018 International Energy Efficiency Scorecard. ACEEE.

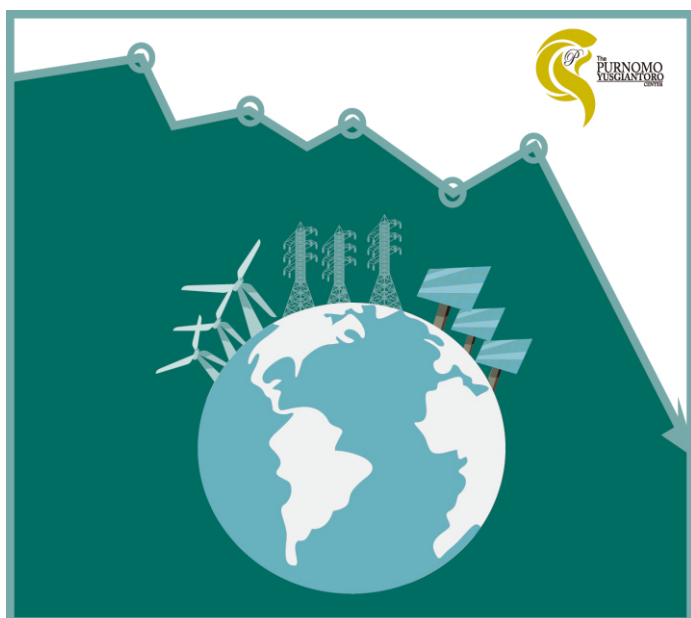
IEA. (2018). Energy Efficiency 2018: Analysis and outlooks to 2040. International Energy Agency (IEA).

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APRIL 2019

Renewable Energy Price Competitiveness

By : The Purnomo Yusgiantoro Center Research Team



Energy is one of the key commodities in the global market. The energy sources, such as coal and crude oil, are the main commodities that are sold among the countries throughout the world. Many countries, including Indonesia, depend on coal exports as one of the main sources of national income. In 2017, Indonesia exported around 65% of the coal produced (Ministry of Energy and Mineral Resources, 2018). Today, coal is mostly used to power most of the electricity generator in Indonesia due to the relatively low-cost. However, despite the low-cost of coal, producing energy through coal-fired power plant is considered to be not environmentally friendly as it produces a significant amount of greenhouse gases (GHGs) and other hazardous substances throughout its supply chain. Nevertheless, there has been a growing awareness towards environmental sustainability and thus, there has been a shift towards a more sustainable way of producing energy. At the same time, the demand for energy is growing rapidly. Therefore, alternative renewable energy sources, such as geothermal, wind, hydropower, biomass, and solar are needed to be explored further.

Indonesia has acknowledged the importance to shift towards these more renewable sources. It is mentioned in the Presidential's Regulation No. 22/2017 on General Planning for National Energy (RUEN), which stated that there is a goal to achieve a 23% of new and renewable energy (NRE) on national energy mix by 2025. However, coal remained the prime source for the energy generation in Indonesia (around 60%) in 2018 (Direktorat Jenderal Ketenagalistrikan, 2018), due to its low cost, as well as its abundant resource and reserve. On the other hand, renewable energy still has a higher cost, despite its sustainability and benefits to the environment. This higher cost is indicated in the levelized cost of electricity (LCOE), which is the estimated lifetime cost of a power plant, considering the capital, financing, fixed, and variable cost. This LCOE varies depending on the technology used, capacity, and policies applied in the region. Indonesia, in general, the LCOE of renewable energy has a higher cost than the electricity generation cost (BPP) (Yusgiantoro & Yusgiantoro, 2018). This translates into an unfavorable situation for the renewable energy business to invest, especially after the government issued the MEMR Regulation 12/2017 which is revoked and replaced by MEMR Regulation No. 50/2017 regarding the Utilization of Renewable Energy for Power Supply.

Furthermore, the introduction of the Build, Own, Operate, and Transfer (BOOT) policy also became a hindrance for the investors to provide collaterals for the financial institutions when they applied for funding. Consequently, this led to a decreasing number of investors in this renewable sector because they could not meet the financial close. On the other hand, the potential to develop cheaper renewable energy is still vast, for example, solar PV. Solar PV is getting cheaper in the future (Reichelstein & Yorston, 2013), and the implication must be massive for the future of renewable energy development, including in Indonesia.

In respond to the renewable energy price competitiveness, several strategies can be done. First, to implement the carbon tax system. This carbon tax would consider the external costs that are usually ignored, for example, the impacts on the environment and human. Second, an auction system to attract more investors while promoting a lower price of renewable energy technology. In addition, feed-in tariff adjustment for renewable technologies is also needed. And lastly, incentives to promote new and renewable energy development, both fiscal and non-fiscal (regulation, ease of permission).

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In summary, renewable energy plant is still less competitive economically than the conventional energy, especially coal in the short run. To improve its competitiveness, the government needs to incentivize renewable energy development through supporting policies. This incentive could promote further investment in this sector and eventually lead to more production using renewable sources.

More investment, better technology, and supporting policies for the renewable energy sector development in Indonesia are essential in the long run. These topics will be discussed deeply in the International Energy Conference (IEC) on 13 November 2019 held by Purnomo Yusgiantoro Center (PYC). This conference will serve as a platform for the researchers, universities, industries, and government representatives as well as the public to discuss and exchange ideas about the energy issues. Thus, PYC invites everyone to take part in the IEC 2019 and contribute to shaping a better world.

Bibliography

- [1] Direktorat Jenderal Ketenagalistrikan . (2018). Laporan Kinerja. Jakarta: Kementerian Energi dan Sumber Daya Mineral (KESDM).
- [2] Minister of Energy and Mineral Resources (MEMR) Number 50 of 2017 concerning Utilisation of Renewable Energy Resources for Provision of Electricity. (n.d.).
- [3] Ministry of Energy and Mineral Resources. (2018). Handbook of Energy & Economic Statistics of Indonesia. Jakarta: Ministry of Energy and Mineral Resources.
- [4] Presidential Regulation Number 22 of 2017 concerning General Planning for National Energy . (n.d.).
- [5] Purnomo Yusgiantoro Center. (2018). PYC Indonesia's Renewable Energy Booklet 2018. Jakarta: Purnomo Yusgiantoro Center.
- [6] Reichelstein, S., & Yorston, M. (2013). The prospects for cost competitive solar PV power. Energy Policy, 55, 117-127.
- [7] Yusgiantoro, P., & Yusgiantoro, L. (2018). Ekonomi Energi: Teori dan Praktik. Jakarta: Yayasan Purnomo Yusgiantoro.

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MAY 2019

Reducing Oil Import Dependency

By : The Purnomo Yusgiantoro Center Research Team



Oil has been the vital energy source since the mid of the 1950s and the primary commodity for industrialized nations. Most of the oil goes for gasoline, and the rest is used for plastic, asphalt, cosmetics, synthetic rubber, medicine, and a few other oil made products. As oil is needed in every sector, some countries have a highly dependency on oil. This becomes an issue because oil renews in a very long time and is known as a vulnerable commodity as its price fluctuates every day. Furthermore, oil price affects other energy and commodity prices directly (Yusgiantoro & Yusgiantoro, 2018). Since 2014, global oil consumption has been rising, and it is projected to keep raising in the future (EIA, 2019), with the developing countries as its biggest consumer. Even though global oil production can match its consumption, it will be a major hit for some countries that are unable to catch its national consumption growth, such as Indonesia.

Although Indonesia is one of the oil-producing countries, its daily consumption is twice higher than its daily production. This is due to high consumption of gasoline and liquefied petroleum gas (LPG) as well as Indonesia's low capacity of oil refinery. The

government have to import oil and its processed products to fulfill its oil demand. In 2018, Pertamina spent US\$ 15.04 billion to import gasoline and other oil processed products, which is 23% higher than what they spent in 2017. This condition certainly will burden the state budget as the consumption is projected to keep rising in the future. Indonesia's government must find an alternative strategy to reduce oil import dependency but still able to fulfill its national demand. Optimizing oil production could act as a short-term solution. However, due to limited resources and sustainable development in the future, energy diversification must be encouraged massively.

Since 2004, the number of vehicles has significantly increased, and it already reaches 15 million cars and 113 million motorcycles in 2017 (Statistics Indonesia, 2018). This uncontrollable growth is one of the reason for high gasoline consumption, so the growth must be controlled. At the same time, the government must continue the development of electric vehicles, increase the quality of public transportation and encourage people to use it. Since 2018, Indonesia has been introduced with several electric vehicles such as massive rapid transit (MRT), light rail transit (LRT), electric taxi (Bluebird group), and electric buses. Still, the government must provide the supporting infrastructure to improve people's convenience. As the other solution; the government can develop green fuel instead of biofuel. Green fuel is more friendly than biofuel in terms of engine longevity, efficiency, and durability even though both come from low-quality palm. The development of green fuel has been impressively done by the Chemical Engineering Department, Institute Technology of Bandung (ITB). Despite its benefits, the development of green fuel has the potency to trigger land use change (LUC) which should be considered by the government.

Other than gasoline, high consumption of LPG is the reason behind Indonesia's high import of oil. LPG is massively used since the introduction of 3 kg tube to replace kerosene. As it grows significantly, fulfilling the demand by utilizing the national production becomes difficult. As a solution, replacing LPG with Dimethyl Ether (DME) from coal, liquefied natural gas (LNG) and developing the household gas program can be alternative solutions. These options are possible given the large reserve of coal and natural gas in Indonesia and it has not been fully utilized yet. Another alternative is biogas that is renewable and produced from manure and food/crop waste.

Until major oil discovery is found, and the supporting infrastructures

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are ready, it is impossible to rely on national production to satisfy the national consumption. Therefore, Indonesia must import to fulfill its demand. The government must enhance national production and boost energy diversification. In addition to the advanced technology, government's commitment is a key to develop its supporting policy as well as attract investment from both public and private sectors. This topic will be discussed in International Energy Conference (IEC) which will be held by Purnomo Yusgiantoro Center (PYC) in this coming November. The theme for the conference is "The Role of New, Renewable, and Clean Energy in Achieving SDG7: Policy, Investment, and Technology". This conference will serve as a platform for the researchers, universities, industries, and government representatives as well as the public to discuss and exchange ideas about energy issues. Thus, PYC invites everyone to take part in the IEC 2019 and contribute to a better world.

References

EIA. (2019). Short-Term Energy Outlook (STEO). Retrieved from https://www.eia.gov/outlooks/steo/pdf/steo_full.pdf

Statistics Indonesia. (2018). Number of motor vehicles by types, Indonesia 1989-2013. <https://doi.org/10.1016/j.jvolgeores.2016.05.016>

Yusgiantoro, P., & Yusgiantoro, L. (2018). Ekonomi Energi, Teori dan Aplikasi (1st ed.). Jakarta Selatan: Yayasan Purnomo Yusgiantoro.

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JUNE 2019

The Importance of National Energy Reserves

By : The Purnomo Yusgiantoro Center Research Team



Energy sources such as oil, gas, and coal are one of the most vital aspects to run daily activities. Energy sources can be used directly, for vehicle fuel and electricity generation, or indirectly, for other essential activities, for instance, foods or goods production. The high dependency on energy sources has raised concern regarding the future of energy reserves. Energy reserves itself can be defined as the number of energy source (oil, gas, or coal) that can be technically extracted at a cost that is financially feasible at the current price.

Based on Indonesia energy mix in 2017 (Purnomo Yusgiantoro Center, 2018), fossil fuel still dominated the energy consumption in Indonesia, reached around 94%, consist of 42% oil, 30% coal, and 22% gas. However, the availability of these fossil fuels is limited and may run out sooner than expected if no strategic measures enforced. As recorded in 2019 Activity Plan and Budget (RKAB 2019), Indonesia's coal reserve is reported at 39.89 billion tons, while the production is targeted at 490 million tons per year (Arvirianty, www.cnbcindonesia.com, 2019). In case of no additional reserve, Indonesia will run out of their domestic coal in 81 years. While for gas, the Ministry of

Energy and Mineral Resources (MEMR) state that the current reserves only can last for 25 - 50 years (ESDM, 2018). Even worst, in 2018, the recorded reserve for oil was 3.15 billion barrels, while the production was 750,000 - 780,000 barrel per day resulted in only 10 - 12 years reserve (Arvirianty, www.cnbcindonesia.com, 2019).

The concern regarding the depletion of oil reserves made Kerschner and Klaus (2009) study the effect of declining oil supply in the UK. The paper shows that even as little as a 10% reduction in oil supply will have a significant impact, especially on the electricity sector, railways, air transport, postal service, and the wholesale. Hence, Indonesia is expected to experience an even worse impact due to the high expense on energy subsidy, which makes Indonesia more vulnerable to oil price shocks. Based on this issue and continuous growth in demand as well as a decline in supply, it is crucial to explore more potential energy reserves.

The two most important factors that could lead to a boost in energy reserves are exploration activities and technology. The estimated energy reserves may increase through more exploration activities. Simultaneously, by developing the technology, the uneconomical resources might become the precious reserves, as it is now possible to extract the natural resources while generating a profit margin.

However, exploration activities are subject to the oil price. One of the mainstream strategies taken by companies to face a low oil price pressure is to cut exploration expenditures, consequently, less exploration and less new reserve discoveries. The recent low oil price in 2015 - 2017 made oil and gas companies cut their exploration budget for more than 60% (Muin, 2018). In order to face this issue, there are several points that the government can pursue to attract the investors in energy sector; (1) streamlining the oil and gas business governance from upstream to downstream; (2) developing midstream infrastructure (transmission pipeline); (3) providing reliable, accessible, and low-cost energy database; and (4) inducing policy stimulation that can make the investors keen to conduct exploration in the new area.

In addition, there are other options to increase the national energy reserves, namely, overseas oil and gas field acquisition, use the petroleum fund to study and evaluate the new prospects, exploring and developing unconventional resources, for example, CBM (coal bed methane), tight oil, and shale gas, and utilization of artificial intelligent in energy industry, including exploration. At the same time, it is also essential to prepare for a smooth transition to green and renewable energy as an effort to fulfill our commitment to SDG7.

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Considering the importance of this issue, Purnomo Yusgiantoro Center will hold an International Energy Conference which focuses on energy sustainability, inviting experts and academics all around the world to hold discussions and brainstorming the issue from various perspectives.

Bibliography

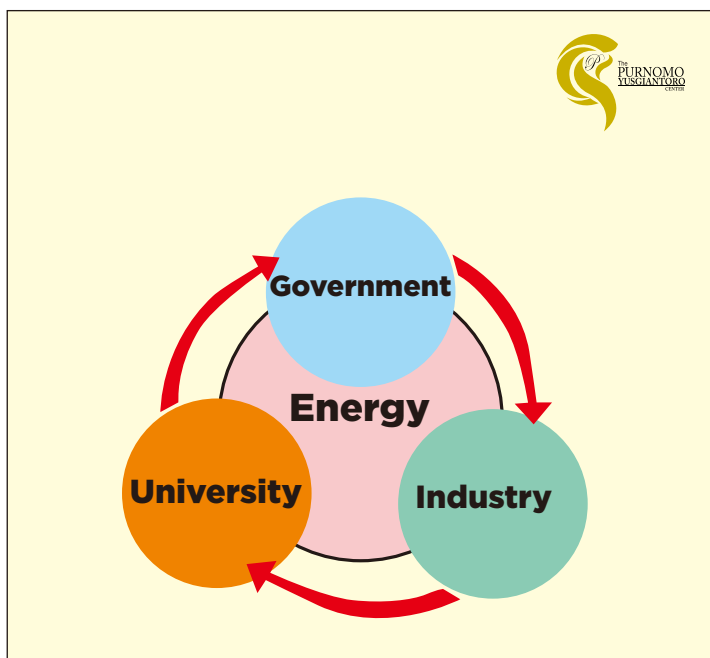
- [1] Arvirianty, A. (2019, June 24). Retrieved from www.cnbcindonesia.com:
<https://www.cnbcindonesia.com/news/20190624120905-4-80160/cadangan-batu-bara-ri-naik-jadi-3989-miliar-ton>
- [2] Arvirianty, A. (2019, January 16). Retrieved from www.cnbcindonesia.com:
<https://www.cnbcindonesia.com/news/20190116111811-4-50891/waduh-cadangan-minyak-ri-turun-sisa-10-tahun-lagi>
- [3] ESDM, T. K. (2018, March 26). Retrieved from www.esdm.go.id:
<https://www.esdm.go.id/id/media-center/arsip-berita/ini-angka-cadangan-migas-indonesia-dan-cara-meningkatkannya>
- [4] Kerschner, C., & Klaus, H. (2009). Assessing the suitability of input-output analysis for enhancing our understanding of potential economic effects of Peak Oil. In *Energy* (Vol. 34).
<https://doi.org/10.1016/j.energy.2008.07.009>
- [5] Muin, A. (2018, May 30). *Krisis Harga Minyak Dunia: Tantangan Eksplorasi dan Produksi Migas Kedepan*. Jakarta, Indonesia.
- [6] Purnomo Yusgiantoro Center. (2018). *PYC Indonesia's Renewable Energi Booklet 2018*. Jakarta: Purnomo Yusgiantoro Center.

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Role of Triple Helix in Developing Energy Sector

By : The Purnomo Yusgiantoro Center Research Team



In 1990s, "Triple Helix" model that explains the roles and relations between university, industry and government, was introduced in a study called "The Triple Helix -- University-Industry-Government Relations: A Laboratory for Knowledge Based Economic Development". The study highlighted the importance of synergy among the university, industry and government. The synergy between these entities could drive technology innovation and accelerate economic development. The government, as the policymaker, has an important role in supporting the university and industry innovation through changes in the regulatory framework and incentives. On the other hand, the university could encourage its students to gain practical experience by interning at the industry or government. The contrary is also possible, where the industry makes use of the university facilities such as laboratory to conduct some research. Lastly, the industry could collaborate with the university by providing the industrial-scale facilities needed by the university to run its pilot project. If the results from the pilot project seem promising, the industry could benefit from it and thus it is a win-win situation for both parties. In other words, to realize this triple helix model, university, industry and government are interdependent.

Today, energy is one of the rapidly growing sectors in Indonesia. The goal set by Indonesia to achieve a 23% renewable energy in the national energy mix stimulates the energy industry development, especially the renewable energy sector. The energy is a multidimensional and dynamic sector that overlaps with many elements like economy, policy and technology. Hence, developing this sector requires collaboration among the stakeholders, such as academia, governments, industries, society, NGOs, local communities and many others. Advanced technology may produce cleaner energy, however, a supporting policy is required to enable its implementation. The government may set an ambitious goal to reduce greenhouse gas (GHG) emission from energy production. However, it necessitates research of appropriate technologies to achieve this goal, which involves universities and research institutions. Therefore, to meet the ambitious goal, triple helix model should be carried out.

For example, in Indonesia, the laboratory of Chemical Reaction and Catalyst Technology (TRKK) of Institute Technology of Bandung (ITB) has developed catalysts that can convert crude palm oil (CPO) into fuel through co-processing in refineries such as Merah Putih catalyst. Pertamina provides the refineries used for the pilot project implementation. Apart from that, this success implementation is also made possible through the funding support from the Ministry of Research, Technology and Higher Education (Ristekdikti). This example demonstrates the importance of triple helix implementation to accelerate technology innovation.

To conclude, the adoption of the triple helix model could drive technology innovation and economic growth, including development in the energy sector. To enable this adoption, communication among university-industry-government is essential. That being said, the International Energy Conference (IEC) 2019 held by the Purnomo Yusgiantoro Center (PYC) may serve as one of the platforms that draw these stakeholders together. The PYC is looking forward to welcoming the academia, industries, and government to the conference to have a fruitful discussion.

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Bibliography

[1]CNN Indonesia. (2019, May 2). Cerita Dosen ITB Rintis Bisnis Teknologi Pemroses Biofuel. CNN Indonesia. Retrieved from <https://www.cnnindonesia.com/ekonomi/20190430235947-97-391001/cerita-dosen-itb-rintis-bisnis-teknologi-pemroses-biofuel>

[2]Etzkowitz, H., & Leydesdorff, L. (1995, January 1). The Triple Helix -- University-Industry-Government Relations: A Laboratory for Knowledge Based Economic Development. EASST Review, 14(1), 14-19. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2480085

[3]Savitri, F. N. (2019, February 18). ITB Kembangkan Katalis untuk Konversi Sawit menjadi Bahan Bakar Nabati. Institut Teknologi Bandung. Retrieved from <https://www.itb.ac.id/news/read/56990/home/itb-kembangkan-katalis-untuk-konversi-sawit-menjadi-bahan-bakar-nabati>

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Geopolitics and Environmental Issues in Energy Sector

By : The Purnomo Yusgiantoro Center Research Team



Geopolitics is the branch of geography, which explains the relationship between geographical reality and international affairs. The association has existed since the time of the ancient Greeks. Rudolf Kjellen (1899) describes that geopolitics is the analysis of the geographic influences of the state on power relationships in international relations.

In the modern age, geopolitical issues link to various sectors, especially the energy sector. The geopolitics in the world related to energy, which includes the geographical reserves concentration of oil, natural gas, and coal, has influenced the configuration of the international geopolitical landscape. For example, the need for fuel as a steam power led to the Industrial Revolution (IR), which eventually formed geopolitics in the 19th century. *In addition to* coal, oil and natural gas also cause global geopolitical constellation. There are abundant oil reserves in the Middle East, for instance, that spark a civil war. Iraq, Iran, Syria, Nigeria, South Sudan, Ukraine, the East China Sea, and the South China Sea are examples of territorial

disputes due to geopolitical energy conflicts. Since then, control of production as well as oil and gas trading have become a significant feature of power politics of the 20th century.

The latest geopolitical issue related to the energy sector in the world is US-China trade war and Iranian oil. The trade war escalation between the US and China has given rise to the volatility of oil and coal price in the world. In particular, there are prospects for two possible game-changing events in the oil markets. First, Iran has more opportunities to sell more of its oil to the China and possibly other countries. As we previously know, US has explicitly sanctioned Iran for its nuclear development program. This trade war potentially opens these opportunities. Second, Iran oil production is currently increasing and thus, causes oversupply problems and disrupt the global oil market price.

Many countries in the world have energy dependency and import from energy-producing countries. Indonesia is one of the oil importer countries for the needs of the national energy supply. Energy surplus countries like the Middle East have a crucial role in the world energy supply chain. Therefore, geopolitical stability in the regions of energy-producing countries is essential for the continuity of the energy supply of consumer countries. If there are wars and geopolitical instability in the area of energy-producing countries, it will cause global energy scarcity.

Indonesia has a border area that has significant energy reserves. Of course, there are also threats of competition with other countries which have led to regional and regional geopolitical instability in Southeast Asia. Indonesia's D-Alpha Natuna block which has around 46 TCF gas reserves directly borders Malaysia, Vietnam and the South China Sea. As for the Masela Block, which has 10.7 TCF gas reserves, is located on the Indonesian and Australian sea border. Meanwhile, the Ambalat Block owned by Indonesia, which was once claimed by Malaysia, had 1.4 TCF gas reserves. All of these are regional energy geopolitical issues in Indonesia.

Besides the issue of geopolitics, the global energy sector is closely related to environmental problems. All energy sources, particularly fossil energy, have some impacts on our environment. Environmental and energy issues are often discussed in various global forums. The majority of energy consumption in the world today still uses fossil energy, which harms carbon emissions. Total final energy consumption in the

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world in 2016 is 6,369,013 ktoe for fossil energy and only about 1,094,505 ktoe for renewable energy.

Based on the Paris Agreement, the EU's nationally determined contribution (NDC) is to reduce greenhouse gas emissions by at least 40% in 2030. For the energy sector, the target is at least 32% share for renewable energy and 32.5% improvement in energy efficiency. With this agreement, participating countries, including Indonesia, must reduce the use of fossil energy and start implementing new and renewable energy. Indonesia, itself has a national energy policy which sets a target of renewable energy use of 23% by 2025.

The insight story of the energy transition is the rise of renewable energy. However, this is not necessarily just an environmental issue because renewable energy is low or zero emissions. Renewable energy is the future and different from fossil fuels. Based on the IRENA study in 2019, renewable energies have geopolitical consequences. Renewable energy resources are available in most countries and this reduces the role of some of the most abundant fossil energy-producing states. Hence, given that the oil and gas sector has a multiplier effect on the growth of national economy, the renewable energies development will indirectly affect the economy of the oil and gas producing countries. Environmental issues are indirectly related to the geopolitical aspects of the energy sector. Acceptability and affordability of clean energy technology are influenced by social and political conditions of the country. In the 21st century, energy transformation and the environmental issue will be the significant elements that reshape the geopolitics. In addition, other factors, such as trends in demography, inequality, urbanization, technology, environmental, security, sustainability and domestic politics, also play key roles.

Sources:

- ✓ IRENA. 2019. A New World the Geopolitics of the Energy Transformation. Abu Dhabi. UEA.
- ✓ Official Journal of The Contemporary Science Association. 2009. Geopolitics, History, and International Relations. Volume 1(2). Addleton Academic Publisher. New York.
- ✓ Mc Kinsey. 2019. Global Energy Perspective 2019: Preference Case. New York. US.
- ✓ Spencer, D. S. (1988). A short history of geopolitics. *Journal of Geography*, 87(2), 42-47. Retrieved at: <https://www.tandfonline.com/doi/abs/10.1080/00221348.808979512?journalCode=rjog20>
- ✓ <https://energypost.eu/twenty-first-century-energy-wars-oil-gas-fuelling-global-conflicts/>
- ✓ <https://medium.com/@kajian.strategi.energi/pulau-natuna-menyimpan-cadangan-gas-alam-terbesar-di-dunia-ecddd7938951>
- ✓ <https://www.cnnindonesia.com/nasional/20150617140454-20-60584/sejarah-panjang-kemelut-indonesia-malaysia-di-ambalat>

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Optimal Integration of Renewable Energy in Power System

By : The Purnomo Yusgiantoro Center Research Team



The demand for renewable energy increases with the growing awareness of climate change and sustainable future. The environmental impact and the decline of fossil energy drive the contribution of renewable energy supply. IEA predicted renewable energy share will account for 12.4% of global energy demand. The electricity sector is the most growing sector for RE with 70% of the global electricity growth comes from renewable energy (IEA, 2018). RE opens an opportunity for remote area electrification which may push the economic activity and productivity in such area. Hence, the integration of RE in electricity sector aligns with the goal of SDG7 to provide affordable and clean energy to the people.

Indonesia has the various potential of renewable energy source for power generation, but the percentage of the utilization is low. Indonesia's geographical condition provides the country with geothermal, hydro, solar, and wind energy potential. However, the share of renewable in power generation is only 11%, compared to 62% of coal generation (PT PLN (Persero), 2019). The current progress shows how challenging to achieve the

government target of 23% renewable share in 2025. Until 2018, Indonesia's renewable power generation dominated by hydropower. Despite the newly operated largest wind turbine in ASEAN, Sidrap wind generator, the penetration of wind power is still low. The same condition occurs with solar PV generation notwithstanding the huge solar potential from the country's tropical climate.

The renewable integration is challenged by technical, policy, and economic issues. Hydropower integration to the grid has been well established for decades, while solar PV and wind integration's significant integration can only be seen in the last decade. The different nature of PV and wind to the conventional generators require a new understanding of their impact on the grid. The renewable energy sources require to be deployed on an optimum location, to get the optimum sunlight or wind for instance. Moreover, the variable or intermittent characteristic of wind and solar PV needs a different technical approach for their integration. The input power from variable energy source varies to nature. On the other side, the demand also varies time to time. Providing spinning reserves is an alternative to complement the drop of renewable generation such as in low wind or low sunlight condition. Another alternative is to integrate energy storages to the grid, be it consumer-scale or grid-scale storage, to maintain grid stability or variability. Other alternatives, such as demand-side management, smart grid, FACTS, may also be utilized to increase power system flexibility.

The policy is one enabler for the growth of RE penetration to the power system. The data of REN21 shows that the number of countries implementing RE policy increased drastically between 2004 to 2017 with three times increase in the power sector (REN21, 2018). The data shows the increase of policy maker's awareness of Renewable Energy integration to power system. The suitable policy option differs from one country to other country depends on countries' characteristic, economic, and RE resource. Developed countries put more attention on the distributed and variable RE power, prosumer interaction with grid, thermal and transportation electrification. Meanwhile, developing countries focus on increasing energy access and rural electrification with RE source. The range of policy varies from setting the RE share target, pricing mechanism, technical regulation, and financial incentives. Some countries also implement rationalization of fossil subsidy and carbon pricing mechanism to complement the RE policy. Thus, formulating a set of supportive policy is the policy maker's homework to accelerate RE integration to power system beside the implementation of technology solution.

The integration of RE also faces economic and financial challenges (Seetharaman, 2019). RE investment deals with competition from fossil fuel, especially in a developing country. Coal is still the dominant fuel for power generation in Indonesia due its cheap and abundance resource. RE's high

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initial cost is another challenge faced by the investor. Another challenge is the existence of fossil fuel subsidies or incentive policy. Those policies make the playing field even harder for RE generation. In addition, pricing mechanism is also vital to attracting more investment in RE development. Different pricing mechanisms are implemented globally including RE portfolio standards, feed-in-tariff, feed-in-premium, and auctions. Feed-in-tariff/premium has the most country-adopter globally. Meanwhile, the number of auction adopter is growing year by year due to its flexibility of adoption and its ability to capture the decrease of RE price (IRENA, IEA and REN21, 2018). Those economic and financial barriers need to be addressed. The pricing mechanism implementation should be formulated to push the growth of RE. The government should have a supportive, stable, and well-aligned policy to attract more investors. The availability of financial institution for RE is also helpful to grow the RE investment.

The research interest on optimal integration of RE in the system is growing. The topic will be discussed deeply in **the International Energy Conference (IEC)** on 13 November 2019 held by **Purnomo Yusgiantoro Center (PYC)**. The conference serves as a platform for the researchers, universities, industries, government, and public to discuss and exchange ideas about the energy issues.

References

IEA. (2018). Market Report Series: Renewables 2018. IEA.

IRENA, IEA and REN21. (2018). Renewable Energy Policies in a Time of Transition. IRENA, OECD/IEA and REN21.

PT PLN (Persero). (2019). RUPTL PLN 2019-2028. Jakarta: PT PLN (Persero).

REN21. (2018). Renewables 2018: Global Status Report. Paris: REN21 Secretariat.

Seetharaman, K. M. (2019). Breaking barriers in deployment of renewable energy. Heliyon.

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Energy Accessibility for Sustainable Development

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Energy is a basic need of every human being. Nowadays, energy has an important role in supporting the development of a country, especially in the economic sector. The availability, accessibility, acceptability, and affordability of energy should be prioritized by developing energy infrastructure as well as supporting policies. The Government of Indonesia (GOI) has been working on providing essential energy, such as transportation fuel and electricity for the people.

The effort for providing affordable fuel is represented by the implementation of one price policy (BBM Satu Harga). This program aims to ensure the availability and accessibility of inexpensive energy for Indonesian, especially in the outermost, frontier and least developed regions (3T). Currently, the state-owned energy company (Pertamina) has completed the construction of 161 one price fuel gas station, three months ahead of the predetermined schedule. There are 156 locations, with 96.9% of them are located outside Java Island. The sites covered by this one price program were Papua (33 locations), Maluku (17), Nusa Tenggara (25), Sulawesi (18), Kalimantan (35), Sumatera (28), and Java – Bali (5) (Harsono, 2019).

At the same time, GOI through state-owned electricity company (PLN), has always been updating the master plan of electrifying Indonesia through the electricity procurement plan (RUPTL) to achieve 100% of the electrification ratio in 2020. In 2019, PLN stated that the electrification ratio had reached 98.81% (MEMR, 2019), still below the target of 99.99%. Although currently most of the provinces already have 99% of electricity ratio, there are still some provinces with lower percentage of such as Nusa Tenggara Timur with only 72% of electrification ratio.

The purpose of one price policy is to deliver energy equity for Indonesian and make the price at the same rate for the whole country. This policy also projected to reduce transportation or distribution costs of local goods, which ultimately lower the goods price and increase competitiveness. Both one price policy and electrification ratio expected to be able to drive up productivity in the remote regions, increase people's income and accelerate economic growth.

A report from Stern, Burkes, and Bruns (2018) also suggested that the accessibility of energy will eventually impact the energy use, which tends to go hand-in-hand with Gross Domestic Product (GDP). Furthermore, several theories also indicate that electricity access is likely to be an important enabler of economic growth. The result from several case studies, including developed and developing countries, showed that, on average, a 1% increase in GDP per capita is associated with a 1.3% increase in electricity use per capita. In addition, economic and energy experts also believe that energy development is more affecting economic growth in lower-income countries rather than higher-income countries.

Based on the Indonesia case, it is clear that policy is one of the strongest tools to attain energy access for people and, eventually, a sustainable development. Developing energy policies with careful consideration is important to support the energy sector as investors would prefer to invest in a country with a stable policy and less regulatory barriers. The policies should include clear tariff regulation and incentive as well as focusing on building human capacity, catalyzing finance, building market, and workforce capacity to enable flexible business models (Walters, Esterly, Cox, Reber, & Rai, 2015).

All in all, to achieve better and sustainable energy access, a combination of a well-prepared policy and extensive energy infrastructures are required. For one price policy, the economic aspect of Pertamina as the provider should be considered, so both equity and healthy state-owned company finance can be accomplished. As for electricity in the 3T regions, there is a need to improve the electrification duration and capacity; thus,

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the electricity can be used to enhance people's productivity and not only aimed for lighting purposes. Additionally, there are options for increasing the electrification ratio and quality, for instance, extending the PLN grid or developing a renewable energy generation. The development of renewable energy generation should be prioritized as it could help Indonesia to reach 23% renewable energy in energy mix 2025 and line with SDG 7 target of affordable and clean energy.

In order to understand more about this issue, The Purnomo Yusgiantoro Center (PYC) will address this topic at PYC International Energy Conference 2019 on 13 November 2019. This event aims to increase awareness of Indonesian, especially students on various energy issues in Indonesia, and to support Indonesia's pledge on the Paris Climate Agreement and in pursuing SDG 7.

References

Harsono, N. (2019, October 3). The Jakarta Post. Retrieved from <https://www.thejakartapost.com/news/2019/10/03/pertamina-expands-single-fuel-price-program-to-161-locations.html>

MEMR. (2019). Up-date Informasi Sub Sektor Ketenagalistrikan. Jakarta: Ministry of Energy and Mineral Resources.

Stern, D. I., Burkes, P. J., & Bruns, S. B. (2018). Energy and Economic Growth (EEG) State of Knowledge Paper The Impact of Electricity on Economic Development : A Macroeconomic Perspective David I. Stern, Paul J. Burke, and Stephan B. Bruns EEG State-of-Knowledge Paper Series Oxford Policy Management. International Review of Environmental and Resource Economics, 12(1), 85–127. <https://doi.org/http://dx.doi.org/10.1561/101.00000101>

Walters, T., Esterly, S., Cox, S., Reber, T., & Rai, N. (2015). Policies To Spur Energy Access : Volume 1 Expanding Access To Electricity Policies To Spur Energy Access : Volume 1. 1(September).