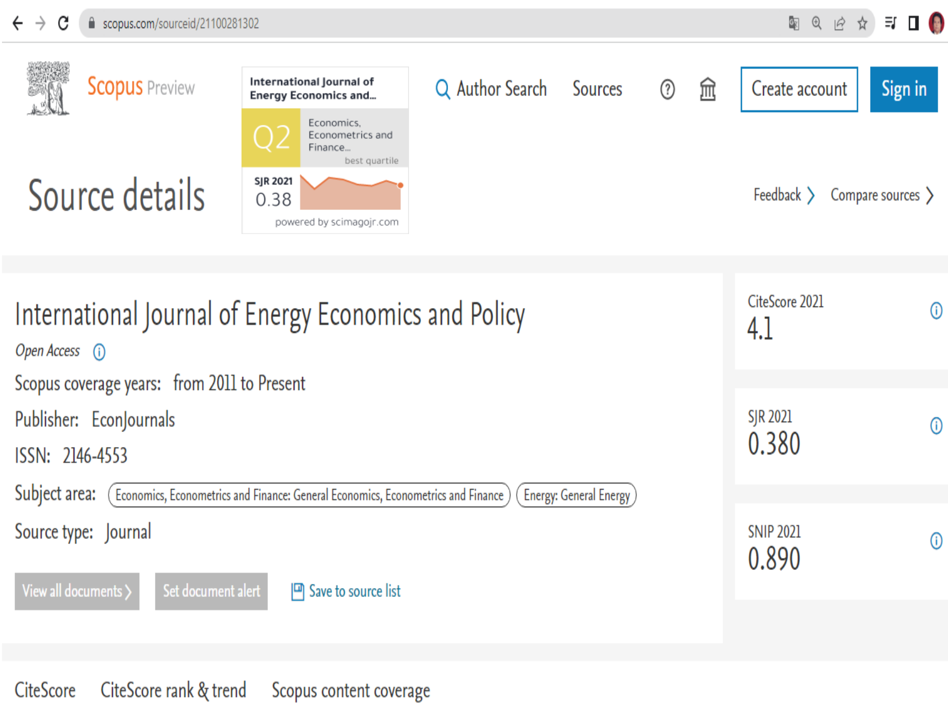
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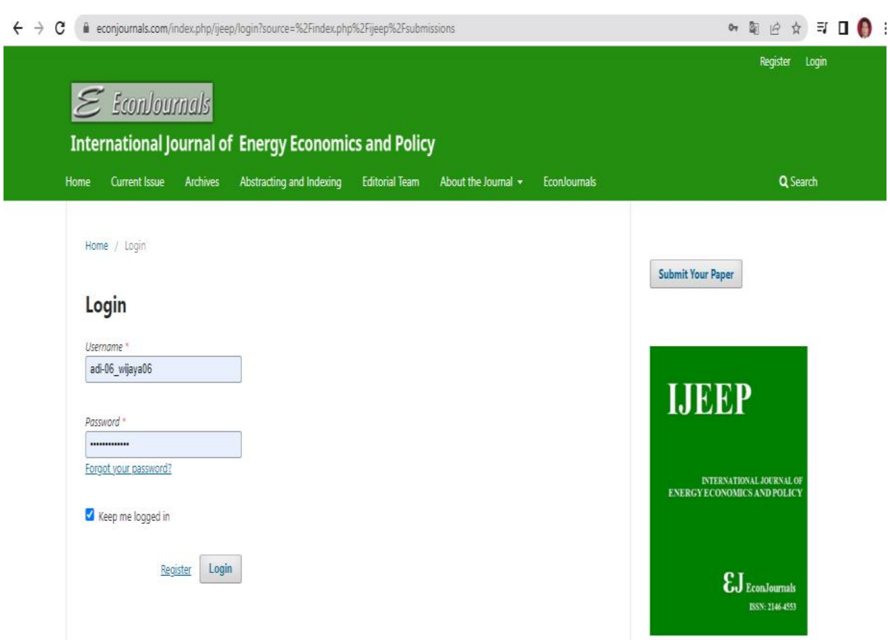
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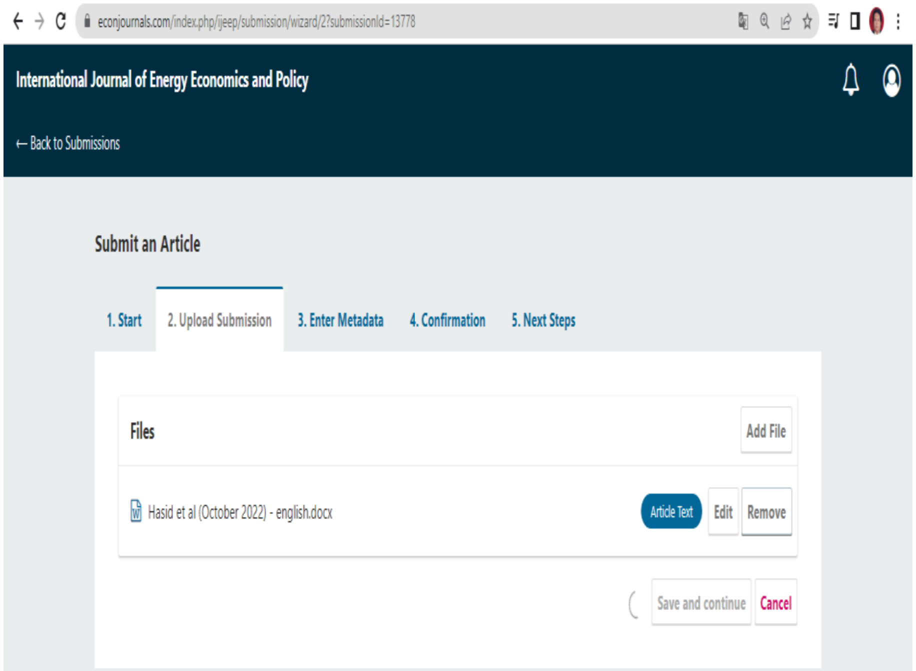
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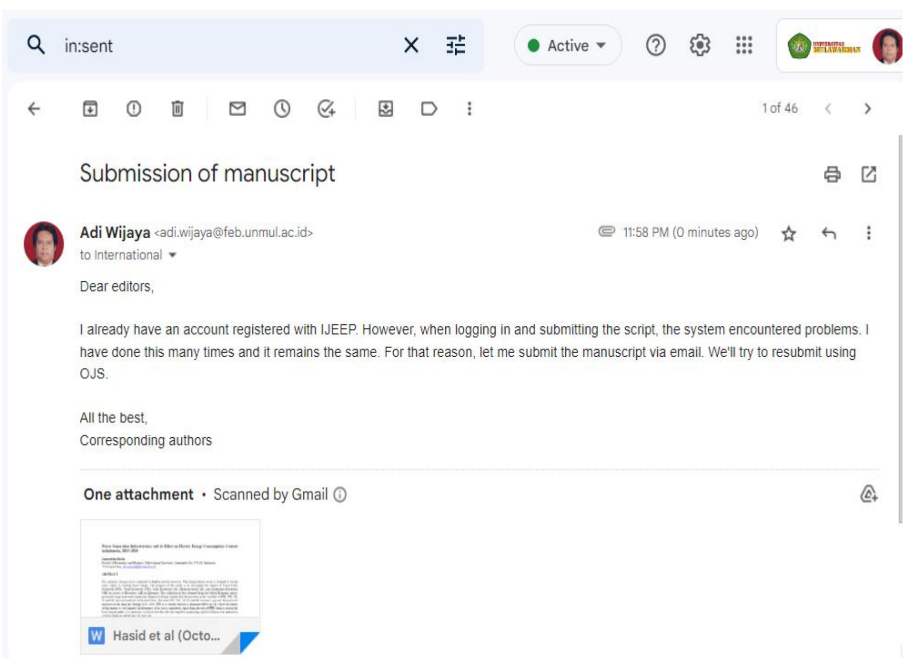
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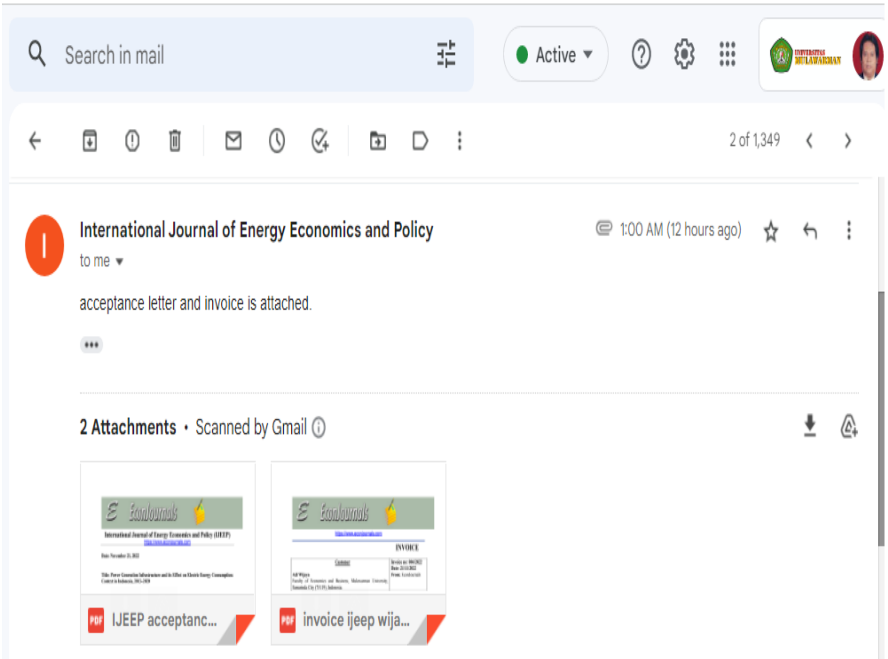
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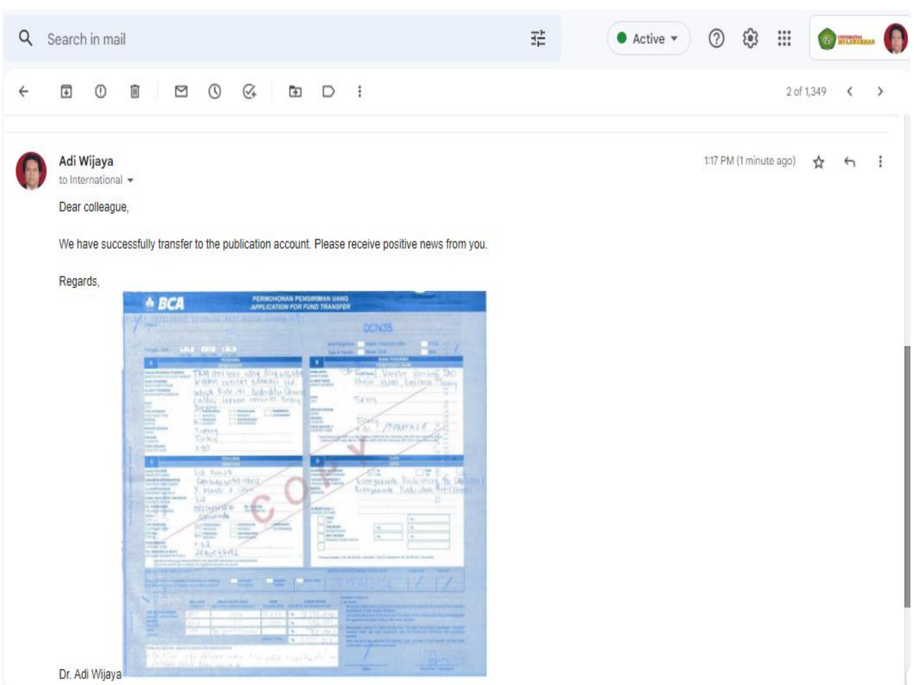
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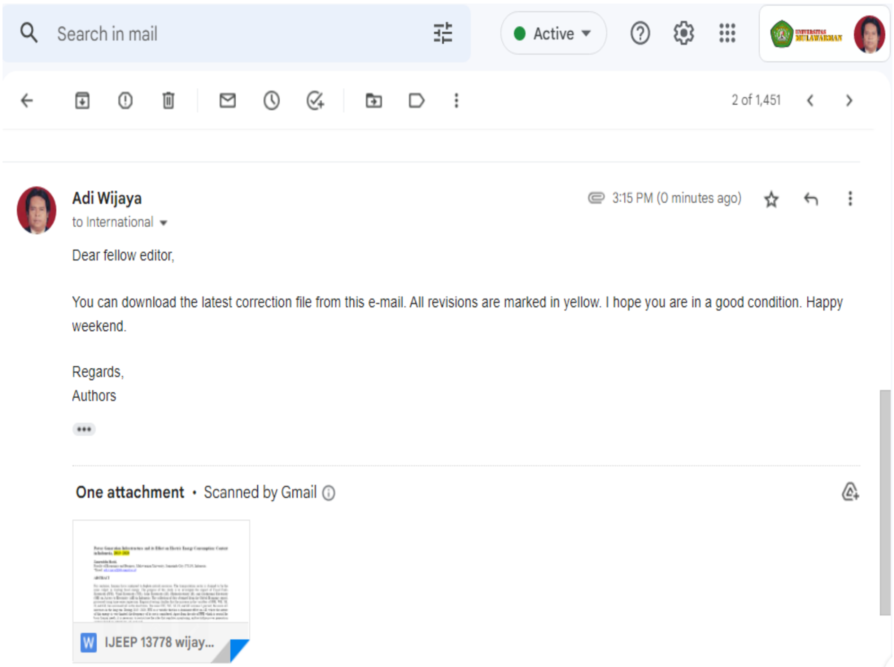

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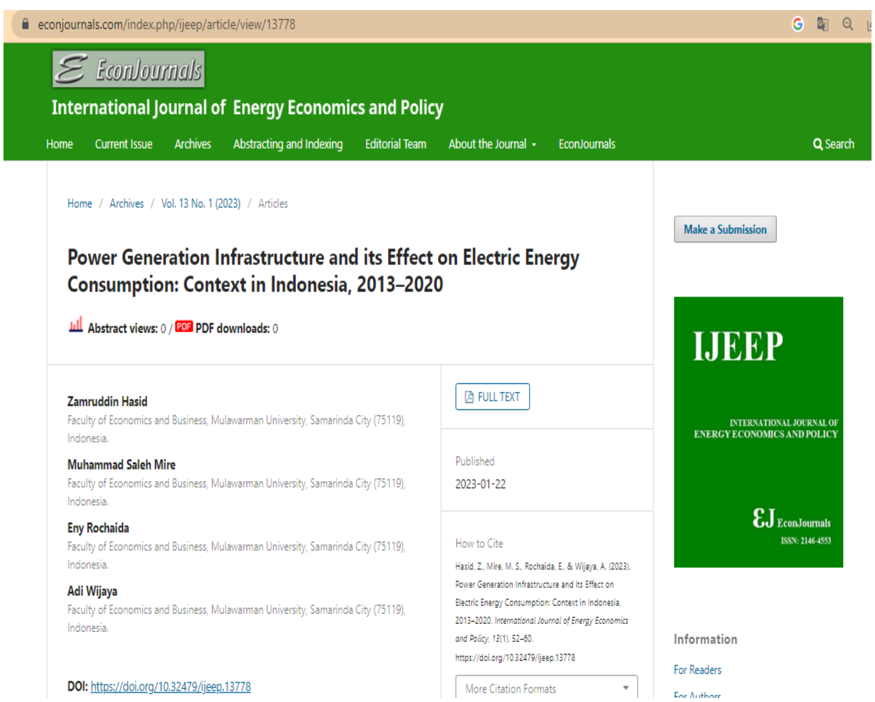

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ABSTRACT

For centuries, humans have continued to deplete natural resources. The transportation sector is claimed to be the main culprit in wasting fossil energy. The purpose of this study is to investigate the impact of Fossil Fuels Electricity (FFE), Wind Electricity (WE), Solar Electricity (SE), Hydroelectricity (H), and Geothermal Electricity (GE) on Access to Electricity (AE) in Indonesia. The collection of data obtained from the Global Economy report, processed using time-series regression. Empirical testing clarifies that the increase in the variables of FFE, WE, SE, H, and GE, has increased AE in the short term. The more FFE, WE, SE, H, and GE increase 1 percent, the more AE increases in the long run. During 2013–2020, FFE as a variable that has a dominant effect on AE, where the nature of this energy is very limited, the frequency of its use is considered. Apart from the role of FFE which is crucial for basic human needs, it is necessary to restructure the rules that regulate, monitoring, and revitalize power generation systems based on natural gas, oil, and coal.

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Keywords: Access to Electricity, Fossil-Based Electricity, Non-Fossil-Electricity, Time–Series Regression, Indonesia
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I. INTRODUCTION

1.1. Background

Until now, humans are still dependent on energy, including electricity (Wijaya et al., 2022). According to Priyagus (2021), in his “Supply Theory” and “Demand Theory”, energy consumption at the global level is increasing, even though there are programs to reduce “carbon emissions”, but this will take a long time. In fact, the level of electricity consumption, which is large from fossils, is increasing. In the case of electricity, this energy is not only sourced from non-renewable natural resources (Hasid et al., 2022), but there are alternative energy sources such as replacing through wind resources (International Energy Agency, 2022), sunlight (Inganäs and Sundström, 2016; Shaikh et al., 2017), hydropower (Moran et al., 2018), and geothermal (Salazar et al., 2017; Suharmanto et al., 2015). Jiuhardi and Michael (2022) prove that the intensity of access to electrical energy in developing countries, such as the example of Indonesia is also increasing from year to year. Ideally, towards "green growth" is a concrete hope for humans, which at least reduces the waste of energy from fossils and empowers energy that is more environmentally friendly (Suparjo et al., 2021).

1.2. Problem statement and research focus

The year 2023 is a big economic challenge, where many nations are trapped by the war between Ukraine vs. Russia which has the potential for parts of the European Union to face an energy crisis (Tollefson, 2022) and winter famine (BBC News, 2022). The reason is, Russia is one of the largest producers of fuel oil (Syaharuddin et al., 2021), while Ukraine is also known as a sunflower oil producing nation (Zavorotniy and Bilyk, 2017) and a fairly high grain exporter to the world (Food and Agriculture Organization, 2022). The diminishing role of energy and food distribution can hamper the wheels of the economy. Not all countries are blessed with abundant natural resources. In fact, some are dwindling due to massive exploitation without thinking about the continuation of the future. Since the last 3 decades, the trend has been to explore natural resources in underdeveloped nations, such as on the African continent (e.g. Allan and Ojeda-García, 2022; Hanson, 2017; Sebudubudu and Mooketsane, 2016).

Energy scarcity and soaring food commodity prices are also used by the open market which suppresses high prices, so that hyperinflation is unstoppable, as in Turkey (Akman, 2022). If you don't immediately build a strategic generator and focus on renewable energy, then the economic recession will worsen the situation, slow down the logistics sector, malnourished humanity, and deprive people of prosperity. A chaotic scene unfolds in the UK (Smith, 2022). Some of the lower-class industrial workers who were fired and many women who did not have jobs turned to sex workers due to high life or financial burdens.

The premise above is an important lesson about supply problems that are getting weaker due to the consequences of war. On the other hand, a series of embargoes against Russia by several countries that are members of the "international trade locomotive", which stimulated the termination of raw materials for energy, actually benefited one of the parties who also held control in the market mechanism. The world is still recovering from the Covid-19 outbreak, but fear arises because of the moment of war. Economic contraction by polemic amid uncertainty certainly raises a solution. Integrated thinking in the context of alternative electrical energy, it is necessary to modernize safe non-fossil sources. In addition, the use of electrical energy sources including: wind power, sunlight, hydropower, and geothermal is not something new. These four components need to be developed and built to prevent the risk of dependence on fossil fuels. In natural characteristics, Indonesia is a producer of natural gas, oil, and coal (Admi et al., 2022; Aprizal et al., 2022; Faisol et al., 2020; Ridena et al., 2021). However, the pattern of wasteful consumption that is not matched by production capacity is relatively unsustainable.

On the principle of innovative independence, the development of electricity-generating machines from the non-fossil sector is supported by the Indonesian government on an expansive basis. Several infrastructures for wind, solar, hydropower, and geothermal power generators have been actualized, although some of them are in the planning and development stages. Referring to the arguments above, the basic research questions are described as follows:

- RQ 1. Does fossil fuels electricity affect access to electricity?
- RQ 2. Does wind electricity affect access to electricity?
- RQ 3. Does solar fuel electricity affect access to electricity?
- RQ 4. Does hydroelectricity affect access to electricity?
- RQ 5. Does geothermal electricity affect access to electricity?

1.3. Existing literature

The grand theory that links fossil-fueled and non-fossil-fueled electricity to electrical energy consumption has been discussed by scholars. The relevance of electricity consumption from fossil generators in Thailand, Malaysia, and Indonesia has been shown to be positively correlated, whereas per capita income increases, it also has implications for energy use in the long term (Ridzuan et al., 2019). Uniquely, electricity consumption shows a positive aggressiveness towards Gross Domestic Product (GDP) per capita in the short term in Pakistan. But, in the long term, GDP per capita has a negative relationship with fossil fuel energy and renewable energy consumption (Rehman et al., 2019). Li and Haneklaus (2021) are concerned in estimating the contemporary dynamics in the rapid consumption of the renewable energy industry mix in China, which actually increases CO_2 emissions per capita. Fundamentally, Hanif (2018) concludes that there is an inverse relationship in the “Environmental Kuznets Curve” hypothesis between carbon emissions and economic growth per capita in Asia Pacific and East Asia.

In reality, Ketterer (2012) and Solarin and Bello (2022), provide insight into the behavior of electricity prices that are influenced by the profitability of intermittent wind power plants. The proportion of use of wind renewable energy sources is still small to meet household needs in Germany. The ability to provide electrical power from andin power in Great Britain is increasing rapidly, especially during winter (Thornton et al., 2017). The process of forming the electricity price market in Sweden, is determined by the volume of the share of wind power production (Hu et al., 2021). Denmark and the Netherlands are among the leaders in processing wind energy which contributes to supplying electricity to apartments in urban and rural areas (e.g. Kamp and Van der Duin, 2011; Schenk et al., 2007; Wolsink, 1987; van Wijk et al., 1992). By 2022, the key to the success of the Netherlands will be the construction of wind turbines with a capacity of up to 8,304 MW, of which 29.6 percent are installed offshore.

Residential solar panel installation network, encouraging more efficient use of electricity. The potential of solar panels is suitable to be adopted to meet the growing demand for electricity services (Beppler et al., 2021). MacKay (2013) explains that the substance of the use of solar energy in the UK is useful in future energy systems. Lu et al. (2021) understand the situation of increasing technical efficiency and decreasing capital costs in China by penetrating solar power as a more compatible electricity supplier.

Bildirici (2016) identified the impact of the development of Hydro Power Plants (PLTA) from high-income nations who are members of the Organization for Economic Co-operation and Development (OECD). The short-term conservation hypothesis acts in the shifting of economic growth to hydroelectric energy consumption in Turkey, USA, France, Mexico, Finland, and Brazil. The urgency of hydropower also reacts to economic growth and accurately reduces environmental pollution (Bildirici, 2015). There is a positive correlation between renewable power generation using solar and hydropower technology and electricity demand in Portugal (Torres et al., 2016).

Energy is the most important element in production inputs. The substitution of an electricity system that uses fossil energy to an increase in Geothermal Power Plants (PLTPB) starts with investment regulations in Indonesia (Aissa and Hartono, 2016). This point is adjusted by policies in 21 geothermal generating countries that utilize natural steam and high-temperature salt water with high non-condensable gas qualifications, which can reduce operating costs (DiPippo, 1991). Dashti and Gholami Korzani (2021) evaluated geothermal generation in 18 operational areas in Iran that have prospects for storing geothermal energy and distributing it to households. In complex terms, there must be complete control over environmental regulations that differ from country to country. Yet, geothermal fluids can be pumped for power generation in collaboration with community monitoring and extractive technology (Rybach, 2003). The performance of this type of geothermal power plant is useful to offset the need for low-cost-based power (El Haj Assad et al., 2017).

Ahmad et al. (2014) simulated the relationship between electricity availability, household access, and human well-being in India. The output of the study confirms that urban households have better access to electricity than rural households. As a result, the limited electricity infrastructure in rural areas has an impact on the inequality of health and education attainment between the two cases. Hesselman (2021) emphasizes energy services for household poverty, which are universally regulated in international law on “human rights”. Further investigation by Oseni (2012) reflects that the quality of energy access to Nigerian households is still minimal. In fact, around 40 percent of the population also does not have access to electricity, so they still rely heavily on traditional energy. Winter et al. (2017) reviews and proposes access to electricity that empowers women in a literature design oriented towards employment and per capita welfare. Then, the distribution of electricity by the incompetent State Electricity Company (PLN) based on homeownership and territorial status, causes inequality in household electricity access in rural areas (Zuhri et al., 2020). Houngbonon et al. (2021) focuses on rural populations in Sub-Saharan Africa who tend to suffer from limited electricity connectivity, which risks disrupting mobile phone subscriptions. In a similar dimension, empowering access to electricity has changed socio-economic conditions in Africa (Andrade-Pacheco et al., 2019). Ohiare (2015) claims that the weakness of electrification plans in rural areas of Nigeria further adds to the expenditure of the population.

1.4. Research framework

This study links the factors that affect Access to Electricity (AE) including: Fossil Fuels Electricity (FFE), Wind Electricity (WE), Solar Electricity (SE), Hydroelectricity (H), and Geothermal Electricity (GE). Two different groups of variables form the foundation of the proposed model. FFE, WE, SE, H, and GE are positioned as independent variables and the dependent variable is represented by AE. In Figure 1, AE represents the level of electricity consumption whose benchmark is percent, while FFE, WE, SE, and H, the indicators are a billion kilowatt-hours (kWh).

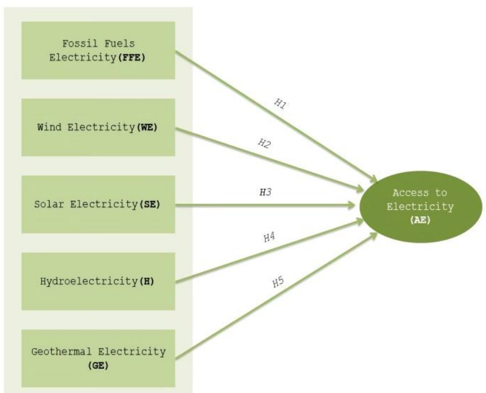

Figure 1: Conceptual framework
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II. METHODS AND ECONOMETRICS

2.1. Database

Firstly, we collect secondary data sourced from the Global Economy (2022). Furthermore, the data are selected and tabulated into a quantitative approach. This method aims to examine causality between variables. Objectivity is addressed to Indonesia, which expresses the observation range for 8 years or 2013–2020. The sample attributes are 48 units.

2.2. Data interpretation

The data processing procedure uses empirical instruments. Time-series regression analysis serves to calculate the data in the construction of the relationship between FFE, WE, SE, H, and GE to AE. In this process, all relationships will indicate paths that are in line with or against the theory. Three general parameters in multiple regression are correlation test, descriptive statistics, and partial–simultaneous regression (e.g. Fitriadi et al., 2022a,b).

2.3. Empirical model

To answer the research questions, the basic statistical equations in the time-series regression technique are designed as follows:

$$\hat{y} = \alpha_0 + \beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5 + \mu$$

Based on the mathematical function above, it is simplified according to the variable components to be as follows:

$$AE = \alpha_0 + \beta_{FFE} + \beta_{WE} + \beta_{SE} + \beta_H + \beta_{GE} + \mu$$

Abbreviations: AE = Access to Electricity, FFE = Fossil Fuels Electricity, WE = Wind Electricity, SE = Solar Electricity, H = Hydroelectricity, GE = Geothermal Electricity, $\hat{y}$ = dependent variable, α_0 = constant value, β = dependent variables, and μ = residue.

III. RESULTS

3.1. Correlation analysis and descriptive statistics

Table 1 combines the output of descriptive statistics and correlation values. As a result, in the Pearson correlation, there is a prominent correlation in the 1 percent probability level between FFE to WE (0.854), SE (0.905), and GE (0.929). In detail, there is also causality between WE to SE (0.963) and GE (0.869) and SE to GE (0.936). At 5 percent determination, four "moderate" correlations explain the relationship between FFE to H (0.758) and AE (0.766), SE to H (0.752), and H to GE (0.745).

Table 1: Descriptive statistics and Pearson correlation (n = 48)

Items	FFE	WE	SE	H	GE	AE	S.D	Mean
FFE	1	.854** (.007)	.905** (.002)	.758* (.029)	.929** (.001)	.766* (.027)	18.24	206.67
WE	.854** (.007)	1	.963** (.000)	.615 (.105)	.869** (.005)	.384 (.347)	.20	.16
SE	.905** (.002)	.963** (.000)	1	.752* (.031)	.936** (.001)	.464 (.247)	.05	.04
H	.758* (.029)	.615 (.105)	.752* (.031)	1	.745* (.034)	.484 (.224)	2.71	17.91
GE	.929** (.001)	.869** (.005)	.936** (.001)	.745* (.034)	1	.545 (.162)	2.32	12.08
AE	.766* (.027)	.384 (.347)	.464 (.247)	.484 (.224)	.545 (.162)	1	1.36	97.39

(*Source:* Own; *ρ <.05 and **ρ <.01).

The mean score in Table 1 also displays the dominance of FFE, which has a Standard Deviation (S.D) score and the highest mean is 18.24 and 206.67. Another striking variable is WE, which has the lowest SD score and mean (0.05 and 0.04).

3.2. Partial and simultaneous regression

In Table 2, examines the effect of the five independent variables (FFE, WE, SE, H, and GE) on the dependent variable (AE). Partially, when FFE and SE are increased by 1 percent, AE is increasingly positive. Yet, the increase in WE, H, and GE, actually reduces or has a negative impact on AE. A significant effect is shown by the long-term relationship of FFE and SE to AE, where there is a probability below 5 percent (ρ = 0.038; ρ = 0.049). Between the two, the variable that has the most dominant influence on AE is FFE. This study also found three variables with insignificant or non-linear effect with AE, including: WE (ρ = 0.289), H (ρ = 0.437), and GE (ρ = 0.288).

Table 2: Result of time–series regression (n = 48)

Items	T-statistics	Coeff. and Sig.	S.E	Remarks
(Constant)	13.185	71.082 (.006)	5.391	Short term linear relationship
FFE	4.969	.171 (.038)	.035	Long term linear relationship
WE	-1.428	-7.713 (.289)	5.400	Long term non–linear relationship
SE	.429	13.206 (.049)	30.754	Long term linear relationship
H	-.963	-.154 (.437)	.160	Long term non–linear relationship
GE	-1.434	-.481 (.288)	.335	Long term non–linear relationship
F-statistics = 7.688			.566	
Sig. = .019				Significantly influential
R Square = .951				"Very strong" determination
R = .975				"High" correlation coefficient

(*Source:* Own).

In short-term causality, the linearity of all variables proved significant (ρ = 0.006). This is in line with the increasing number of FFE, WE, SE, H, and GE, increasing AE simultaneously. The fit of this model is categorized as "very strong", where the score R Square = 0.951. The residual value of 0.049 explains if 4.9 percent of unrelated factors in the model.

IV. DISCUSSION AND CONCLUSION

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The research was motivated to analyze the effect of Fossil Fuels Electricity (FFE), Wind Electricity (WE), Solar Electricity (SE), Hydroelectricity (H), and Geothermal Electricity (GE) on Access to Electricity (AE) with a case study in Indonesia. There are three points of conclusion: (1) FFE, WE, SE, H, and GE have a positive effect on AE in the short term; (2) FFE and SE have a positive effect on AE in the long run; and (3) FFE as the only variable that has the most dominant influence on increasing AE.

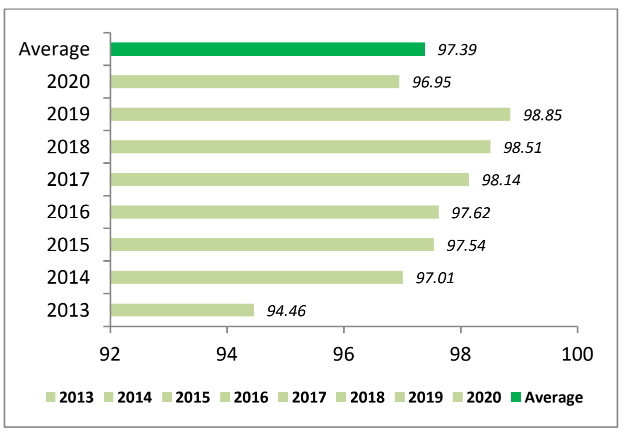

Figure 2: Access to electricity, percent

(*Source:* Own).

Figure 2 describes the level of inclusive AE, which is on average 97.39 percent. Electrification data on residents who have access to electrical energy reflects AE. There was a decline of 2.2 percent from 2019 to 2020. Covid-19 is a phenomenon that has an impact on the welfare of the Indonesian population. The decline in welfare automatically makes household spending patterns change. Generally, residents turn to nutritious food and take medicines during the pandemic era. Spending such as electrical energy are excluded from the priority hierarchy of household needs even though the government enforces "self-quarantine" at home and "mobility restrictions" in public spaces, including schools and campuses that adopt "learning from home" which basically requires electrical energy for internet services (Alavi et al., 2022; Buechler et al., 2022; Jiang et al., 2021; Xu et al., 2021).

Climate change due to global warming is increasingly worrying (Arnell and Reynard, 1996; Solomon et al., 2009; Thompson, 2010). Circulation of climate change is triggered by increasing levels of emissions from human routines, especially the use of energy that is not environmentally friendly, i.e, fossil fuels for the transportation sector (Research Team and Katadata Publication, 2021). Climate Transparency (2020) presented that 27 percent of Indonesia's energy sector emissions are contributed by transportation. Collectively, energy sector emissions account for more than 40 percent of total emissions. This urges the Indonesian government to apply clean energy that is concerned with the transportation sector.

Electricity generated from fossil-fuel power plants, including natural gas, oil and coal in Indonesia in 2013–2020, averaged 206.7 billion kWh. The data from Figure 3 elaborates that there is a significant trend for 8 periods. In the last period, fossil power plants had a capacity of 224.6 billion kWh.

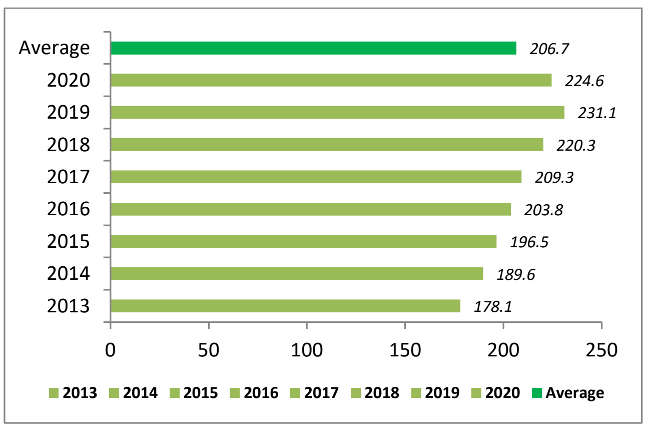

Figure 3: Fossil fuels electricity, billion kWh
(*Source:* Own).

Consumption of electrical energy is related to the progress of a nation's economy and industry. Through the electrification and equity target initiated by PLN, it has continued to be boosted in recent periods. One of the initiatives from the government is the "35,000 MW electricity" program, although some of these projects were delayed due to the increase in electricity subsidies. From an economic perspective, the provision of electricity that covers all areas in Indonesia, as a form of acceleration against backwardness and increasing electricity consumption per capita. In 2017, the structure of electricity consumption per capita increased by 1.7 times (Ministry of Energy and Mineral Resources, 2017). When compared to 2009, the distribution of the electricity network was constrained by the difficult construction and geographical area of the region. At the same time, the World Bank (2017) reports that Indonesia's GDP per capita has increased by 70.63 percent or from 2,254 US$ to 3,846 US$. However, when compared at the ASEAN level, Indonesia's GDP per capita is smaller than Singapore which reached 57,714 US$, Thailand (6,935 US$), and Malaysia (9,951 US$). With this nominal, Indonesia's GDP per capita is slightly better than Vietnam m (2,342 US$).

Dat et al. (2020) and Rizal (2014) assume that the surge in electricity consumption is essential in the national economy while helping Indonesia escape the "middle income trap" (Kohli, 2011; Glawe and Wagner, 2016) Aviliani et al. (2014) argue that for a country in the "middle income trap" phase, electricity consumption should increase 2-3 times. Besides, the BP Statistical Review of World Energy (2018) confirmed that people in developed countries with rich mineral resources consume relatively more energy per capita. The energy in question is renewable energy, hydroelectric, nuclear, coal, natural gas, and petroleum.

The increase in electricity consumption per capita which indicates an improvement in the domestic economy is a "misconception". Esen and Bayrak (2017), Goldemberg et al. (1985), and Howarth et al. (2017) articulating that the growth of energy consumption per capita is not necessarily a rapid industrial cluster. Countries located in the Northern Hemisphere, for example, to cope with extreme climates require a lot of energy. Furthermore, natural resources in abundant nations such as the UAE (Hasan et al., 2019), Qatar (Alashqar et al., 2022; Darwish, 2013), and Kuwait (Al-Badi and AlMubarak, 2019; Alhouli, 2014; Jaffar et al., 2018), making it easier for residents to access electricity easy and cheaply. This is of course very different from developing markets such as Indonesia, where the price of electrical energy is actually expensive, so this problem is called the "curse of natural resources" because of poor management aspects (Hilmawan and Clark, 2019).

As industry develops, it requires greater energy. In the last 2 decades, Frodyma et al. (2020) and Scheel et al. (2020) predicts that developed countries will actually be implementing of "decoupling" which is experimenting with separating economic growth from energy needs. This scenario is an effort to reduce CO_2 in preserving the environment (Guo et al., 2021; Wu et al., 2018). Economic development that was born from manufacturing, agriculture, and urbanization, is now being transformed into services. In other words, the service sector can save energy. To avoid social jealousy, electricity distribution must be holistically integrated.

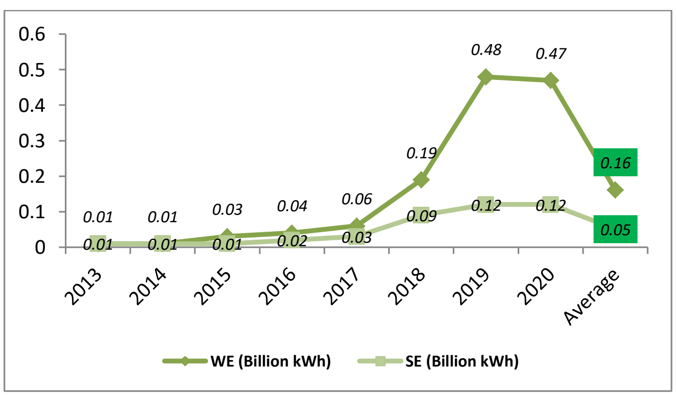

Figure 4: Wind electricity vs. solar electricity, billion kWh
(*Source:* Own).

Referring to Figure 4, there is a gap between the ratio of WE to SE in Indonesia. So far, electricity generated from wind energy generation is relatively prominent compared to electricity generated from solar power generation. The average WE engine produces 0.16 billion kWh. This capacity is slightly above the SE system, which only produces 0.05 kWh. From the last 8 periods, the graph above shows an increasing trend in WE, while the increase in SE is not stable.
The main source of electricity in Indonesia today is coal-fired power plants. Throughout 2009–2017, electricity supply from coal-fired power plants continued to increase to 57.2 percent of the total domestic electricity demand (Pramuji, 2019). The higher the price of oil, the motive for the use of coal is getting bigger. In reality, coal reserves in Indonesia are available until 2050 (Hudaya and Madiutomo, 2019).

To meet energy needs, the government has set a "Domestic Market Obligation" (DMO) of 129 million tons. This figure is lower than the production target of 490 million tons in 2019. A total of 95.7 tons of DMO is allocated for power plants. Yet, Indonesia is projected to lose natural resources in 2036 given that Indonesia's coal reserves are around 9.05 billion tons (Attwood et al., 2017; Dutu, 2016; Hudaya and Madiutomo, 2019). As the population increases, the level of consumption increases. Worse yet, it is estimated that Indonesia's oil reserves will also run out in 2030 (Ngarayana et al., 2021).

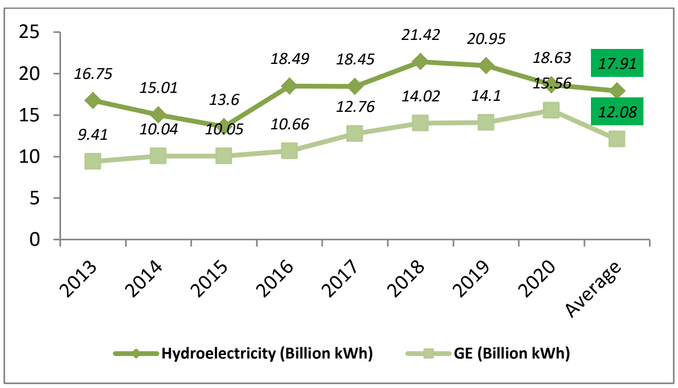

Figure 5: Hydroelectricity vs. geothermal electricity, billion kWh
(*Source:* Own).

There is significant between pumped hydroelectric power generation and geothermal energy generation. The energy produced by hydroelectricity in Indonesia has an average capacity of 17.91 kWh. On the one hand, geothermal only produces electricity reaching 12.08 kWh. Although the number of GE is less than hydroelectricity, during 2013–2020, the capacity ratio is relatively increasing. Hydroelectricity resources that produce electricity briefly declined in 2013 to 2015, then the rest fluctuated (see Figure 5).

To anticipating the degradation of fossil energy sources and reduce pollution, the Indonesian government launched new and renewable energy (EBT) with a diversified mix of 23 percent by 2025 (Tropical Renewable Energy Center, 2020). In pursuing renewable energy, Indonesia's natural conditions are very flexible to harvest energy connected by wind, photovoltaic and solar power. Investment in NRE is quite expensive, especially maintaining environmental standards. Interestingly, Solar Power Plants (PLTS) in the USA prove that the existence of NRE has resulted in a value chain. Sutopo et al. (2014) found that the workforce absorbed in the NRE sector was higher than coal-based power plants. If NRE is successfully maximized, then energy needs will be fulfilled, environmental ecosystems will not be disturbed, and economic growth will be elastic.

There are three contradictory findings in this study, where the power generation sourced from wind, water, and geothermal resources has a negative effect on access to electricity consumption, presenting a practical recommendation. To policymakers, to actively promote an environmentally friendly lifestyle to the wider community. Too to dialogue that can change perceptions and images of electricity resources from wind, water, and geothermal energy, this commitment must be prioritizing the development of power generation infrastructure. Discounts on electricity rates from these three power-generating sources are also part of the right solution.

The comprehensive advice given in the direction of future studies is to invite stakeholders to always be committed to the "EBT" campaign through a series of studies. Thus, it can open new horizons related to "decoupling" that spurs economic growth without depleting fossil energy.

REFERENCES

Admi, R., Saleh, S., Fitrianto, G. (2022). The analysis of coal competitiveness and the factors affecting Indonesia's coal exports to main destination countries (a case of 8 destination countries). Journal of Developing Economies, 7(1), 15–28.

Ahmad, S., Mathai, M.V., Parayil, G. (2014). Household electricity access, availability and human well-being: Evidence from India. Energy Policy, 69, 308–315.

Aissa, N., Hartono, D. (2016). The impact of geothermal energy sector development on electricity sector in Indonesia economy. Buletin Ekonomi Moneter Dan Perbankan, 19(2), 153-176.

Akman, B. (2022). Turkey's inflation exceeds 80% in worst price blowout since 1998. Available on https://www.bloomberg.com/news/articles/2022-09-04/turkish-inflation-is-set-to-peak-above-80-with-more-angst-ahead [October 29, 2022].

Al-Badi, A., AlMubarak, I. (2019). Growing energy demand in the GCC countries. Arab Journal of Basic and Applied Sciences, 26(1), 488–496.

Alashqar, M., Xue, Y., Yang, C., Zhang, X-P. (2022). Comprehensive economic analysis of PV farm – A case study of Alkarsaah PV farm in Qatar. Frontiers in Energy Research, 10, 987773.

Alavi, A., Sadid, M.S., Ahmed, M., Abid, F. (2022). Effect analysis of the COVID-19 pandemic on the electricity consumption of Bangladesh. Heliyon, 8(1), e08737.

Alhouli, O. (2014). Using solar energy in Kuwait to generate electricity instead of natural gas. A report for Master of Science. Department of Electrical and Computer Engineering College of Engineering, Kansas State University, Manhattan.

Allan, J., Ojeda-García, R. (2022) Natural resource exploitation in Western Sahara: New research directions. The Journal of North African Studies, 27(6), 1107–1136.

Andrade-Pacheco, R., Savory, D. J., Midekisa, A., Gething, P. W., Sturrock, H., Bennett, A. (2019). Household electricity access in Africa (2000-2013): Closing information gaps with model-based geostatistics. PloS one, 14(5), e0214635.

Aprizal, M.F., Juanda, B., Ratnawati, A., Muin, A. (2022). Indonesian upstream oil & gas governance for sustainable innovation. Jurnal Manajemen dan Organisasi, 13(1), 48–60.

Arnell, N.W., Reynard, N.S. (1996). The effects of climate change due to global warming on river flows in Great Britain. Journal of Hydrology, 183(3–4), 397–424.

Attwood, C., Bridle, R., Gass, P., Halimanjaya, A.S., Laan, T., Lontoh, L., Sanchez, L., Christensen, L.T. (2017). Financial supports for coal and renewables in Indonesia. GSI Report. International Institute for Sustainable Development, Winnipeg.

Aviliani, A., Siregar, H., Hasanah, H. (2014). Addressing the middle-income trap: Experience of Indonesia. Asian Social Science, 10(7), 163–172.

Beppler, R.C., Matisoff, D.C., Oliver, M.E. (2021). Electricity consumption changes following solar adoption: Testing for a solar rebound. Economic Inquiry, 61(1), 58–81.

Bildirici, M.E. (2015). Hydropower energy consumption, environmental pollution, and economic growth. Journal of Energy and Development, 40(1/2), 189–208.

Bildirici, M.E. (2016). The relationship between hydropower energy consumption and economic growth. Procedia Economics and Finance, 38, 264–270.

Buechler, E., Powell, S., Sun, T., Astier, N., Zanocco, C., Bolorinos, J., Flora, J., Boudet, H., Rajagopal, R. (2022). Global changes in electricity consumption during COVID-19. iScience, 25(1), 103568.

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BBC News. (2022). Ukraine war: EU blames Russia for food crisis prompting walkout. Available on https://www.bbc.com/news/world-europe-61714234 [October 29, 2022].
BP Statistical Review of World Energy. (2018). Statistical review of world energy. Available on https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html [October 30, 2022].
Climate Transparency. (2020). The climate transparency report 2020: Comparing G20 climate action and responses to the Covid-19 crisis. Available on https://www.climate-transparency.org/wp-content/uploads/2020/11/Climate-Transparency-Report-2020.pdf [October 30, 2022].
Darwish, M. (2013). Towards energy conservation in Qatar. Open Journal of Energy Efficiency, 2(4), 176–191.
Dashti, A., Gholami Korzani, M. (2021). Study of geothermal energy potential as a green source of energy with a look at energy consumption in Iran. Geothermal Energy, 9, 28.
Dat, N.D., Hoang, N., Huyen, M.T., Huy, D.T.N., Lan, L.M. (2020). Energy consumption and economic growth in Indonesia. International Journal of Energy Economics and Policy, 10(5), 601–607.
DiPippo, R. (1991). Geothermal energy electricity generation and environmental impact. Energy Policy, 19(8), 798–807.
Dutu, R. (2016). Challenges and policies in Indonesia's energy sector. Energy Policy, 98, 513–519.
Esen, Ö., Bayrak, M. (2017). Does more energy consumption support economic growth in net energy-importing countries?. Journal of Economics, Finance and Administrative Science, 22(42), 75–98.
Faisol, W., Indriastuti, S., Trihartono, A. (2020). Indonesia and OPEC: Why does Indonesia maintain its distance?. IOP Conference Series: Earth and Environmental Science, Vol. 485. Second International Conference on Environmental Geography and Geography Education (ICEGE) 28-29 September 2019, East Java, Indonesia.
Fitriadi, F., Jiuhardi, J., Busari, A., Ulfah, Y., Hakim, Y.P., Kurniawan, E., Darma, D.C. (2022a). Using correlation analysis to examine the impact of Covid-19 pandemics on various socioeconomic aspects: Case study of Indonesia. Geographica Pannonica, 26(2), 128–141.
Fitriadi, F., Jiuhardi, J., Busari, A., Ulfah, Y., Hakim, Y.P., Kurniawan, E., Darma, D.C. (2022b). Using correlation to explore the impact of Coronavirus disease on socioeconomics. Emerging Science Journal, 6(Special Issue COVID-19 Emerging Research), 165–180.
Frodyma, K., Papież, M., Śmiech, S. (2020). Decoupling economic growth from fossil fuel use—Evidence from 141 countries in the 25-year perspective. Energies, 13(24), 6671.
Food and Agriculture Organization of the United Nations. (2022). The importance of Ukraine and the Russian Federation for global agricultural markets and the risks associated with the war in ukraine. Available on https://www.fao.org/3/cb9013en/cb9013en.pdf [October 29, 2022].
Glawe, L., Wagner, H. (2016). The middle-income trap: Definitions, theories and countries concerned—a literature survey. Comparative Economic Studies, 58(4), 507–538.
Global Economy. (2022). Indonesia economic indicators. Available on https://www.theglobaleconomy.com/Indonesia/ [October 27, 2022].
Goldemberg, J., Johansson, T.B., Reddy, A.K.N., Williams, R.H. (1985). Basic needs and much more with one kilowatt per capita.
Guo, J., Li., C-Z., Wei, C. (2021). Decoupling economic and energy growth: Aspiration or reality?. Environmental Research Letters, 16(4), 044017.
El Haj Assad, M., Bani-Hani, E., Khalil, M. (2017). Performance of geothermal power plants (single, dual, and binary) to compensate for LHC-CERN power consumption: Comparative study. Geothermal Energy, 5(1), 17.
Hanif, I. (2018). Impact of fossil fuels energy consumption, energy policies, and urban sprawl on carbon emissions in East Asia and the Pacific: A panel investigation. Energy Strategy Reviews, 21, 16–24.
Hanson, K.T. (2017). Managing Africa's natural resource endowments: New dispensations and good-fit approaches. Journal of Sustainable Development Law and Policy, 8(1), 12 –144.
Hasid, Z., Noor, A., Kurniawan, E. (2022). Ekonomi sumber daya alam dalam lensa pembangunan ekonomi. Surabaya: Cipta Media Nusantara.
Hasan, S., Al Aqeel, T., Adjali, I., Bhatt, Y. (2019). Abu Dhabi electricity sector: Features, challenges and opportunities for market integration. King Abdullah Petroleum Studies and Research Center, Riyadh.
Hesselman, M. (2021). Energy poverty and household access to energy services in international, regional and national law. In: Roggenkamp et al (eds), Energy Law, Climate Change and the Environment. Edward Elgar Publishing, Cheltenham.
Hilmawan, R., Clark, J. (2019). An investigation of the resource curse in Indonesia. Resources Policy, 64, 101483.
Howarth, N., Galeotti, M., Lanza, A., Dubey, K. (2017). Economic development and energy consumption in the GCC: An international sectoral analysis. Energy Transitions, 1, 6.

Houngbonon, G.V., Le Quentrec, E., Rubrichi, S. (2021). Access to electricity and digital inclusion: Evidence from mobile call detail records. Humanities and Social Sciences Communications, 8(1), 170.

Hu, X., Jaraitė, J., Kažukauskas, A. (2021). The effects of wind power on electricity markets: A case study of the Swedish intraday market. Energy Economics, 96, 105159.

Hudaya, G.K., Madiutomo, N. (2019). The availability of Indonesian coal to meet the 2050 demand. Indonesian Mining Journal, 22(2), 107–128.

Inganäs, O., Sundström, V. (2016). Solar energy for electricity and fuels. Ambio, 45(Suppl 1), S15–S23.

International Energy Agency. (2022). Wind electricity. Available on https://www.iea.org/reports/wind-electricity [October 28, 2022].

Jaffar, B., Oreszczyn, T., Raslan, R., Summerfield, A. (2018). Understanding energy demand in Kuwaiti villas: Findings from a quantitative household survey. Energy and Buildings, 165, 379–389.

Jiang, P., Fan, Y.V., Klemeš, J. J. (2021). Impacts of COVID-19 on energy demand and consumption: Challenges, lessons and emerging opportunities. Applied Energy, 285, 116441.

Jiuhardi, J., Michael, M. (2022). Aggressiveness of the electricity sector and implications for energy GDP (comparative test of Indonesia-Malaysia). International Journal of Energy Economics and Policy, 12(3), 323–330.

Kamp, L.M., Van der Duin, P.A. (2011). Analysing the wind turbine innovation systems in The Netherlands and Denmark using the cyclic innovation model. International Journal of Engineering Management and Economics, 2(1), 39–59.

Ketterer, J.C. (2012). The impact of wind power generation on the electricity price in Germany. Ifo Working Paper, No. 143. Ifo Institute - Leibniz Institute for Economic Research at the University of Munich, Munich.

Kharas, H., Kohli, H. (2011). What is the middle income trap, why do countries fall into it, and how can it be avoided? Global Journal of Emerging Market Economies, 3(3), 281–289.

Li, B., Haneklaus, N. (2021). The role of renewable energy, fossil fuel consumption, urbanization and economic growth on CO_2 emissions in China. Energy Reports, 7(7), 783–791.

Lu, Xi., Chen, S., Nielsen, C.P., Zhang, C., Li, J., Xu, H., Wu, Y., Wang, S., Song, F., Wei, C., He, K., McElroy, M.B., Hao, J. (2021). Combined solar power and storage as cost-competitive and grid-compatible supply for China's future carbon-neutral electricity system. Proceedings of the National Academy of Sciences, 118(42), e2103471118.

MacKay, D.J. (2013). Solar energy in the context of energy use, energy transportation and energy storage. Philosophical Transactions. Series A, Mathematical, Physical, and Engineering Sciences, 371(1996), 20110431.

Ministry of Energy and Mineral Resources. (2017). Electricity consumption per capita, 2009–2017. Available on https://www.bps.go.id/dynamictable/2018/05/16%2000:00:00/1303/konsumsi-listrik-per-kapita-2009---2017.html [October 31, 2022].

Moran, E.F., Lopez, M.C., Moore, N., Müller, N., Hyndman, D.W. (2018). Sustainable hydropower in the 21st century. Proceedings of the National Academy of Sciences of the United States of America, 115(47), 11891–11898.

Ngarayana, I.W., Sutanto, J., Murakam, K. (2021). Predicting the future of Indonesia: Energy, economic and sustainable environment development. IOP Conference Series: Earth and Environmental Science, Vol. 753. Medan International Conference on Energy and Sustainability in 27-28th October, 2020, Medan, Indonesia.

Ohiare, S. (2015). Expanding electricity access to all in Nigeria: A spatial planning and cost analysis. Energy, Sustainability and Society, 5(1), 8.

Oseni, M.O. (2021). Households' access to electricity and energy consumption pattern in Nigeria. Renewable and Sustainable Energy Reviews, 16(1), 990–995.

Pramuji, S. (2019). Konsumsi listrik dan pertumbuhan ekonomi. Available on https://lokadata.id/artikel/konsumsi-listrik-dan-pertumbuhan-ekonomi [October 30, 2022].

Priyagus, P. (2021). Does economic growth efficient and environmental safety? The case of transportation sector in Indonesia. International Journal of Energy Economics and Policy,11(6), 365–372.

Rehman, A., Rauf, A., Ahmad, M., Chandio, A.A., Deyuan, Z. (2019). The effect of carbon dioxide emission and the consumption of electrical energy, fossil fuel energy, and renewable energy, on economic performance: evidence from Pakistan. Environmental Science and Pollution Research International, 26(21), 21760–21773.

Research Team and Katadata Publication. (2021). Mengapa perlu transportasi bersih?. Available on https://katadata.co.id/padjar/analisisdata/6078ffd8ddb03/upaya-indonesia-membangun-ekosistem-transportasi-bersih [October 31, 2022].

Ridena, S., Nurarifin, N., Hermawan, W., Komarulzaman, A. (2021). Testing the existence of natural resource curse in Indonesia: The role of financial development. Jurnal Ekonomi & Studi Pembangunan, 22(2), 213–227.

Ridzuan, A.R., Albani, A., Abdul Latiff, A.R., Md Razak, M.I., Murshidi, M.H. (2019). the impact of energy consumption based on fossil fuel and hydroelectricity generation towards pollution in Malaysia, Indonesia and Thailand. International Journal of Energy Economics and Policy, 10(1), 215–227.

Rizal, F. (2014). Electricity and economic growth in Indonesia's Province of Aceh. Aceh International Journal of Social Science, 3(1), 14–25.

Rybach, L. (2003). Geothermal energy: Sustainability and the environment. Geothermics, 32(4–6), 463–470.

Salazar, S.S., Muñoz, Y., Ospino, A. (2017). Analysis of geothermal energy as an alternative source for electricity in Colombia. Geothermal Energy, 5(1), 27.

Scheel, C., Aguiñaga, E., Bello, B. (2020). Decoupling economic development from the consumption of finite resources using circular economy. A model for developing countries. Sustainability, 12(4), 1291.

Schenk, N.J., Moll, H.C., Potting, J., Benders, R.M.J. (2007). Wind energy, electricity, and hydrogen in the Netherlands. Energy, 32(1), 1960–1971.

Sebudubudu, D., Mooketsane, K. (2016). Why Botswana is a deviant case to the natural resource curse. The African Review: A Journal of African Politics, Development and International Affairs, 43(2), 84–96.

Shaikh, M.R.S., Waghmare, S.B., Labade, S.S., Fuke, P.V., Tekale, A. (2017). A review paper on electricity generation from solar energy. International Journal for Research in Applied Science & Engineering Technology, 5(IX), 1884-1889.

Smith, M. (2022). Charting the global economy: UK recession awaits truss successor. Available on https://www.bloomberg.com/news/articles/2022-10-22/charting-the-global-economy-uk-recession-awaits-truss-successor?leadSource=uverify%20wall [October 28, 2022].

Solarin, S. A., Bello, M. O. (2022). Wind energy and sustainable electricity generation: evidence from Germany. Environment, Development and Sustainability, 24(7), 9185–9198.

Solomon, S., Plattner, G-K., Knutti, R., Friedlingstein, P. (2009). Irreversible climate change due to carbon dioxide emissions. Proceedings of the National Academy of Sciences, 106(6), 1704–1709.

Suharmanto, P., Fitria, A.N., Ghaliyah, S. (2015). Indonesian geothermal energy potential as source of alternative energy power plant. KnE Energy, 1(1), 119-124.

Suparjo, S., Darma, S., Kurniadin, N., Kasuma, J., Priyagus, P., Darma, D.C., Haryadi, H. (2021). Indonesia's new SDGs agenda for green growth – Emphasis in the energy sector. International Journal of Energy Economics and Policy, 11(3), 395–402.

Sutopo, W., Maryanie, D.I., Purwanto, A., Nizam, M. (2014). A comparative value chains analysis of solar electricity for energy. Proceedings of the International MultiConference of Engineers and Computer Scientists 2014, Vol II. IMECS 2014, March 12–14, 2014, Hong Kong.

Syaharuddin, Y., Purwadi, P., Sampeliling, A. (2021). Attention of economic growth and oil prices: Evidence from Indonesia. International Journal of Energy Economics and Policy, 11(5), 425–433.

Thompson L.G. (2010). Climate change: The evidence and our options. The Behavior Analyst, 33(2), 153–170.

Thornton, H.E., Scaife, A.A., Hoskins, B.J., Brayshaw, D.J. (2017). The relationship between wind power, electricity demand and winter weather patterns in Great Britain. Environmental Research Letters, 12(6), 064017.

Tollefson J. (2022). What the war in Ukraine means for energy, climate and food. Nature, 604(7905), 232–233.

Tropical Renewable Energy Center. (2020). Renewable energy 23 percent target in 2025, is it still being pursued?. Available on https://trec.eng.ui.ac.id/info/target-23-persen-energi-terbarukan-2025-masihkah-dikejar-2/ [October 30, 2022].

Torres, P.J.F., Ekonomou, L., Karampelas, P. (2016). The correlation between renewable generation and electricity demand: A case study of Portugal. In: Karampelas, P., Ekonomou, L. (eds) Electricity Distribution. Energy Systems. Springer, Berlin, Heidelberg.

van Wijk, A.J.M., Halberg, N., Turkenburg, W.C. (1992). Capacity credit of wind power in the Netherlands. Electric Power Systems Research, 23(3), 189–200.

Wijaya, A., Awaluddin, M., Kurniawan, A.E. (2022). The essence of fuel and energy consumptions to stimulate MSMEs industries and exports: An empirical story for Indonesia. International Journal of Energy Economics and Policy, 12(2), 386–393.

Winther, T., Matinga, M.N., Ulsrud, K., Standal, K. (2017). Women's empowerment through electricity access: scoping study and proposal for a framework of analysis. Journal of Development Effectiveness, 9(3), 389–417.

Wolsink, M. (1987). Wind power for the electricity supply of houses. The Netherlands Journal of Housing and Environmental Research, 2(3), 195–214.

World Bank. (2017). GDP per capita, PPP (constant 2017 international $). Available on https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD [October 30, 2022].

Wu, Y., Zhu, Q., Zhu, B. (2018). Decoupling analysis of world economic growth and CO_2 emissions: A study comparing developed and developing countries. Journal of Cleaner Production, 190, 94–103.
Xu, A.T., Gao, B.W., Li, C.Y., Qian, D.F. (2021). Impact of the COVID-19 pandemic on the reduction of electricity demand and the integration of renewable energy into the power grid. Journal of Renewable and Sustainable Energy, 13(2), 026304.
Zavorotniy, R., Bilyk, O. (2017). Transformation of sunflower oil production in Ukraine due to acute economic crisis. Journal of International Studies, 10(1), 225–236.
Zuhri, K., Anggraeni, L., Irawan, T. (2020). Inequality in Indonesia's electricity access. International Journal of Sciences: Basic and Applied Research, 48(7), 237–249.