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University of San Francisco

Southeast Asia & The Hidden Green Revolution
A Study on Foreign Direct Investment in Eco-investments in ASEAN

An honors thesis submitted in partial satisfaction
Of the requirements for the distinction of
Honors
In the International Studies Department
In the College of Arts and Sciences
By

Ravi Chailertborisuth

December 2022

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Before I present my honors thesis paper, I'd like to make a few acknowledgements to the people and experiences that helped shape the paper. This journey began during the month of June of 2022, and even though this segment of the journey is over, I choose to continue with the research that formed my thesis. I'd like to thank the team at AWR Lloyd and the CEO of the firm Alexander Wood. I would like to thank my friends who supported me along the way. Lastly, I'd like to thank my parents who were there from the start of this journey (my life journey as well) and continue to support & believe in me.

Abstract

The year 1966 saw the founding of ASEAN, the Association for Southeast Asian Nations. The five founding member nations were: Indonesia, Malaysia, Philippines, Singapore, and Thailand. Over time, this group of nations grew to include nations such as: Laos, Cambodia, Vietnam, Brunei, and Myanmar. The IGO (inter-governmental organization) aims to foster “*economic, social, cultural, technical, educational and other fields*” (ASEAN). The IGO is successful, allowing capital to flow cross-borders with more ease, and encourage economic corporation across all nations. Since then, this group of 10 nations have continued to gain in economic and political power and have been confronted by various threats. One of the threats to these nations is our ever-warming planet and *climate change*. How these nations tackle climate change and grow economically is what will be explored in this piece. Furthermore, how each nation attempts to attract foreign investment in growing their renewable energy capacity will also be looked into. Furthermore, what will be examined is how each nation attracts FDI through their respective stock exchanges . In addition, how investors value renewable energy industry in comparison with oil & gas will also be assessed and analyzed in illustrating optimism and pessimism for ASEAN. International investors (from within ASEAN and the greater world) will play a more significant role in building wealth within the region through spurring new industries, increasing renewable energy capacity, and in tackling global warming.

Keywords: *ASEAN, Singapore, Thailand, Philippines, Market Capitalization, Stock Exchange, EV/EBITDA, P/E Ratio, Oil & Gas, Renewables, World Economic Forum, United Nations, United States Department of Trade, Thai Board of Investment, SGX, PSE, SET, Solar, Wind, Biomass, Hydroelectricity, Fossil Fuels*

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INTRODUCTION

Southeast Asia – in particularly the Association for Southeast Asian Nations (ASEAN) is a group of countries that has seen rapid economic growth. In the 1980s and 1990s, this group of nations experienced annualized growth rates of more than 5% year on year, versus 2% growth of the global economy. ASEAN was an association founded in the 1950s and 60s with a few countries, this slowly grew to expand to a list of 10 diverse countries with rich history, culture, and resources. The nations within ASEAN contain: Thailand, Singapore, Philippines, Vietnam, Cambodia, Myanmar, Laos, Indonesia, Brunei, and Malaysia. These countries have a collective GDP of US\$ 3.1Tn, and according to the World Economic Forum makes them “*the 5th largest economy on the planet*” (World Economic Forum (WEF)). ASEAN also accounts for over 10% of the world’s population. In 1966, the GDP per capita of ASEAN was US\$122. In 2016, this value was recorded at US\$4021 – multiplying by over 33x over the span of 50 years. This shows that ASEAN has grown to become significant force in the globe’s economy. Today, these nations have become the center point and focus for foreign direct Investment inflows. According to the United Nations Conference on Trade and Development “*FDI flows to developing countries in Asia increased by 4% to US\$535Bn in 2020*” (United Nations Conference on Trade and Development). This illustrates ASEAN’s resilience during a period of uncertainty, and indicates optimism from international investors. My paper built off research using a mix of primary and secondary sources through databases, news on ever changing government policy, and building on my experience interning at AWR Lloyd – a leading consulting and M&A firm specializing in sustainability across South-East Asia. My internship spanned between June to August 2022 where I was located at their Bangkok, Thailand offices. The research question I set to answer is: To What Extent Does Foreign Direct Investment in renewable energy companies and other periphery industries contribute to economic and environmental impact? My findings saw that

FDI can have an impact to some degree on renewable energy development, as it varies depending on government policy. The three countries I used as case studies were: Singapore, Thailand, and the Philippines. These three nations are at different stages in economic development, and have varying government policies. I believe that these countries would be an appropriate to represent ASEAN. These group of countries were picked due to a mix of time constraints to conduct this research project, data availability, and also industry experience in understanding these markets from my internship.

Literature Review

According to Alexander Wood, CEO of AWR Lloyd, a consulting firm based in Bangkok, Thailand, investment in renewables can increase infrastructure development in ASEAN. The reason why this holds true is because they require large amount of capital expenditures to upgrade or replace existing non-renewable assets. For example, when setting up a new renewable energy asset, the entire supply chain (from energy production to consumption) needs to be built and to withstand demand. Renewable energy supply chain can consist of the energy producer (solar or wind farms), energy storage systems (large scale batteries to store energy), and downstream applications (such as EV chargers, and ways to adapt the grid or consumers) (Wood). Furthermore, the implementation of solar rooftops on houses has enabled the concept of peer-to-peer (P2P) energy trading to take effect. P2P energy trading allows consumers to sell excess electricity back to the grid, or choose from where they purchase electricity. This has transitioned consumers into prosumers. The democratization of energy can help speed up renewable energy adoption. The paper *Decentralized P2P Electricity Trading Model for Thailand* authored by Pinyo A., finds that energy trading has outperformed traditional grid system in terms of efficiency (Pinyo A.). Furthermore, it was also discovered that users who participated in decentralized energy (P2P) (or the prosumer model) benefitted as they spent less on electricity bill (Pinyo A.). In relation to the big picture, the model can allow for the nation to adopt renewable energy at more speed as consumers are incentivized to upgrade their systems to benefit from cheaper costs of electricity and the ability to become a prosumer. This relates back to the interview with Alexander Wood as it encourages the development for companies to design and develop products around the prosumer model.

The role of the private sector is significant as they enable goods and services to be delivered to customers. The private sector which consists of: PE (Private Equity), Public Asset Management, Small-Medium-Enterprises, Startups, Conglomerates plays an incredibly important role in stimulating the economy. There are two distinct differences that needs to be clarified within the 'Private Sector', this is: investors and businesses. Investors can come in the form of Private Equity, Bank Investors, and other public asset management investors (investors that deal with the stock market and equities) (LARTA INSTITUTE) (Velesco Industries). Businesses (SME's or Conglomerates) are the target for investors, and are at the forefront for delivering value to customers (the population) and within themselves as they hire job seekers within a nation (Du). These businesses catalyze government policy to take advantage of deregulation and to grow their client base. Businesses and Investors are where FDI inflows are deployed. This can have a cascading effect on how a country develops over time.

On a macro level, renewables are becoming especially prevalent in the ASEAN region. The reason for this is due to the region's significance in the global economy and growth rate. ASEAN collectively hold 0.6Bn of the globe's population (accounting for 8% of the globe's total). According to the IMF, in 2020 the GDP of ASEAN was reported to be US\$3.1 Tn (International Monetary Fund (IMF)), this makes the group of nations the "5th largest economy in the world" (World Economic Forum (WEF)). The region consists of a diverse group of nations with high populations that are rapidly ascending in wealth. In 1966, at the average GDP per capita in ASEAN was US\$122, in 2016, this number reached US\$4021 (ASEAN). This shows that ASEAN is a major force in the globe's economy. The nations in ASEAN produce an array of goods and services that are needed to the world. The key industries that are driving growth are: *"electronics, information and communications technology, textiles and apparel, and medical*

devices” ASEAN’s rapid growth rate is further exacerbated as investors seek to move operations to outside of China, providing ASEAN a robust foundation to deliver value at a global level. According to the World Economic Forum, in 2020 FDI accounted for 13.7% of global FDI, rising by 1.8% compared to the year before.

Amongst the drivers of development in ASEAN, governments are placing great emphasis on directing foreign direct investments into renewable energy projects and products. ASEAN nations are providing tax breaks amongst other incentives to help boost renewable energy development. The paper *Does Foreign Direct Investment Influence Renewable Energy Consumption? Empirical Evidence from South Asian Countries* (Xueqing K.) found that renewable energy growth is directly influenced by FDI in the region. Renewable energy investments account for a large proportion of foreign direct investment in South Asian Nations. The paper looked into how investment in infrastructure contributed to economic growth in the example of China. This research question also helps us understand how ASEAN nations can evolve over time. In Xin Du’s paper, FDI can help communities participate in value creation as spillover effects from an international corporation can include: *“diffusion and penetration of knowledge among enterprises and accelerating the dissemination and utilization of knowledge, and this externality can increase the motivation of enterprises to invest in informatization, thus accordingly raising the level of enterprise informatization”* Du, page 3 (Du). This shows that corporations can help share intangible power from technology sharing to bringing the foreign markets to local industry. This can be exacerbated when international firms specializing in tech (IoT (internet of things), semiconductors, and communication technology). Empirical and theoretical studies have shown that investments in these industries have “significant roles in promoting economic growth” Du, page 3 (Du). Furthermore, this is backed up by the paper’s

testing economic quality and investment in infrastructure, according to the research, it was found that “*The economic growth quality index increases by 0.012% for 1% in new infrastructure investment intensity, other things being equal*” Du, page 15 (Du). The paper’s hypothesis of economic growth being impacted by new infrastructure investment stands true, especially in the case of China’s economic growth. Between 1990 to 2022, China experienced a compounded annual growth rate of approximately 12% per year (IMF). From this, I can conclude that in China’s case, economic growth was fueled by infrastructure development, bringing value to the rest of the population of China. For the example of ASEAN, the total population in the region approximates to less than half of China (but still significant at approximately 600 million inhabitants). This can provide investors with a reason to inject into fast growing ASEAN owned businesses, due to the value delivered to the populations within the region. This could have huge ripple effects in strengthening the economies of these nations.

Governments can help make it easier for private companies conduct business transactions through law and policy. As ASEAN nations aim to invest in renewables, governments are trying to do as much as possible to ensure rapid transition and catalyze on the high growth rates of renewables market. For example, the Philippines is rapidly trying to attract FDI to facilitate the transition into renewables. However, it faces issues in its own law that restrict foreign companies from owning natural resources to real estate. The source *Constitutional limit hinders FDI’s in Renewable Energy* discusses how the Philippines explores the roadblocks it faces in working around its constitution to ensure that foreign firms can do businesses in the country. Given these examples, I looked into how governments were channeling foreign direct investment, and what restrictions they were placing. In examining this, I looked at a research paper released by RODL & Partner, a consulting company with over 107 offices worldwide. The paper titled *Pooling*

Forces; M&A in ASEAN discusses the governmental policies that are enabling foreign direct investment (RODL & Partner). The report dives into detail showing the similarities and differences between the countries in ASEAN, what policies have been enacted by their government, and what spillover effects it has on the nation (RODL & Partner). For example, in Indonesia, President Joko Widodo passed regulation reform “*targeting legal complexities and bureaucratic hurdles, which showed some positive impact on the M&A market in ASEAN*” (RODL & Partner). This aligns with what Alexander Wood, CEO of AWR Lloyd had said in the interview regarding deregulation allowing countries to experience rapid economic growth (Wood). Furthermore, this also aligns with the source *Constitutional limit hinders FDIs in Renewable Energy, Valesco M* (Velasco). The paper looks into the example of Philippines where the nation faces a crisis where it cannot attract necessary FDI due to limits in the constitution preventing companies specializing in renewable energy from being able to own real estate and property. *Velasco M.* quotes: “*Up to today, natural resources – such as geothermal – will have to be utilized and explored only by corporations from the Philippines... There are limits in terms of how much foreign ownership in renewable energy projects is allowed*” (Velasco). This further emphasizes and shows to what extent foreign direct investment can occur, as nations struggle with outdated constitutions and aiming to become the powerhouse.

The RODL & Partner paper brings into light the incentives that governments use to pull FDI and foreign corporations into their nation. In the example of Indonesia, “foreign investment in Indonesia is generally regulated under specific investment laws and regulations” RODL & Partner (RODL & Partner). In addition, the paper outlines risks that could foreign business owners could face within Indonesia such as “*inconsistencies between national and provincial regulations, as well as variant interpretations of regulatory requirements, which have been*

mostly addressed in 2020...However, these challenges will continue to exist at least until the implementing regulations of the omnibus law are issued” RODL & Partner page 9. Additionally, in the example of Malaysia, the nation compares to being more liberal than Indonesia as according to the RODL & Partner, “Foreign direct investment legislation is generally considered liberal in Malaysia as compared to other countries in South Asia” RODL & Partner page 13) (RODL & Partner). Though by contrast, the nation of Myanmar stands at a different level in terms of government law and FDI. The government mainly restricts foreign entities from owning real estate, and “as long as foreign investors take up no more than 35% of shares, a company will still be considered a local company” RODL & Partner, page 17 (RODL & Partner). Furthermore, unlike nations such as: Malaysia and Indonesia, Myanmar has certain stability risks associated such as: “internal conflicts at the borders of the country” RODL & Partner, page 18. Though, despite this, the country has attracted some investment in the areas of infrastructure and electricity supply. This is an important piece to understand as renewable energy investment comes in the form of infrastructure development and electricity supply. Though, renewable energy assets are extremely asset heavy – often requiring large amounts of property, plant, and equipment to build solar or wind farms (Corporate Finance Institute). In addition, the stipulation requiring foreign companies to take only a minority share in local operations (at 35%) could hamper the ability for the foreign company to be fully vested in the nation, and less likely to make an impact onto the supply chain.

Renewable energy allow nations to operate while minimizing impact onto the environment. According to Hayat K., a case study *Dynamic Interrelationship of Environmental Factors and Foreign Direct Investment: Dynamic Panel Data Analysis and New Evidence from the Globe* found that renewable energy consumption can reduce carbon emissions. Furthermore,

it was found from another study by Strielkowski W., that in India, renewable energy has helped address energy security issues, and increased its citizen's access to cooking and affordable electricity (Strielkowski W). This can have a number of effects as access to electricity increases, the standard of living can increase for its people and the general population. In addition, this has spillover effects as according to the paper India has capacity to attract more investment to meet its needs (Strielkowski W).

This ties back into the interview with Alexander Wood, CEO of AWR Lloyd as it shows that foreign direct capital can be directed towards renewable energy, and therefore further shows that FDI plays a role in renewable energy development. Furthermore, according to the paper, renewables can overall have a lower impact on the environment and ecosystems (Strielkowski W). This also depends on the type of renewable energy as there are positives and negatives to both. This paper shows that solar and wind energy require large areas which can destroy biodiversity and displace animals (Strielkowski W). The author emphasizes that renewables can help “minimize pollution” and can ‘reduce dependence’ on certain natural resources. The themes of foreign direct investment, environmental impact, and renewables was further explored in the source: *Dynamic Interrelationship of Environmental Factors and Foreign Direct Investment: Dynamic Panel Data Analysis and New Evidence from the Globe* by Hayat K. outlines the impact of government policy regarding renewables and private sector's solutions in these spaces in regard to the environment. According to Hayat K. from the 190 countries surveyed found that renewable energy can reduce carbon emissions and can benefit the country that implements them. According to the paper, it was found that Foreign direct investment can have a positive impact on renewable energy consumption and reduces Carbon emissions. This paper however concluded that Foreign Direct Investment can drastically slowdown economic growth.

Contrastingly, in the example of China, a paper found that renewable energy sector is expected to benefit from foreign direct investment Xiaobo Wei (Wei). A reason that could come from this is that China's case study combines the right combination of: economies of scale and government push that allows renewable energy projects to be benefitted by foreign direct investment, and for renewable energy projects to have enough of an impact (and scale) to become profitable.

Methods

To answer the research question, I will have to first look into what are the flows that occur to firstly let foreign direct investment into a nation, and the way that it is deployed. The key to remember in this scenario is that foreign direct investment occurs in the primarily because: businesses are seeing successes and are growing steadily, this triggers international

investors to take notice, which acts as a catalyst to further enhance growth. The government policies can dictate to what extent foreign direct investment can be deployed, and what assets can be owned by foreign investors. This will be measured by looking into government policy in ASEAN, Stock Exchange Index breakdown, growth of publicly listed companies (PLC) in the renewable energy, information & technology, Electrical Vehicles.

The data for this information will come from my direct knowledge and experiences working as an intern from June-August 2022 at a leading consulting company: AWR Lloyd specializing in energy transition, infrastructure, corporate finance, and M&A across southeast Asia. First-hand data comes from an interview I conducted with Mr. Alexander Wood, CEO of AWR Lloyd on August 12th 2022. Secondary data will come from a mix of academic research papers from the University of San Francisco's online databases. Furthermore, this will also include other databases such as: Statista, and other corporate and market data. A key piece of data to analyze publicly listed companies is from Tradingview.com which collects data from ICE Data Services as a plugin. These were picked due to their affordable pricing, and to give accurate information. The variables that will be collected from these sources include market capitalization, revenues, & P/E (price-to-earnings) ratio (a valuation method). If appropriate, EV/EBITDA ratio (earnings before interest taxes depreciation & amortization) will also be used.

As mentioned in the introduction and literature review, government policy can play a role in dictating how easy or difficult FDI can be injected into a nation. There is a large disparity in the way that ASEAN nations interact with each other. In understanding and seeing this difficulty, newspapers, research reports, and corporate papers will mostly be used to understand government policies. Corporate research papers will be useful as they look at government policy through the perspective of investors (as these papers are serve investors looking into these

regions). This should give an indicator to seeing how liberal or conservative the government is at letting in foreign direct investment into their nations. ASEAN is comprised of very different nations with varying levels of GDP, economic development, and goals. The government policies should be put into perspective to what extent these governments are letting in or restricting FDI, and will be compared with how the economies have developed in ASEAN. In addition, my personal internship experience serves as the backbone and direction of where to find research as my work consisted of looking into renewable energy growth in ASEAN, and understanding how companies are building their competitive advantage (and innovating). The breakdown of each nation's stock exchange provides insight into what PLC's are in each nation, the general breakdown of industries listed on the exchanges, which gives further clarity on to what industries are receiving the most exposure from investors. Stock exchanges are a vital part of this paper (and the economies of these nations) as they provide investors (from across the globe) access to partake in value creation and ownership of companies. Looking into the stock exchanges should also give access to understanding of where ownership originates from, and what investor's vested in. The stock exchanges also provide insight into the drivers of value creation of the country that these companies operate from. These are very important as when a company is "Publicly Listed" it also infers that the shares of the company are more easily accessible to both institutional investors and retail ones. This can have knock on effects to helping with brand image, and ability for the company to gain international recognition (as it receives coverage from equity analysts from financial institutions).

The types of companies that will be looked into for this paper are ones that operate in: Alternative power generation, Oil refining & marketing. These are the sectors provided by the data source: Tradingview. These are the breakdown of companies within each sector:

Sector	Company type
Alternative Power Generation	Solar, Wind, Hydroelectric companies
Oil Refining & Marketing	Oil & Gas companies engaging in upstream and downstream areas of the supply chain
Automobiles	EV automobile companies

Figure 1 (above): Breakdown of explored sections

These industries will be looked and compared between each other and in comparison, to the entire stock exchange. The purpose of this is also to ask the question of: Are these companies transitioning towards carbon neutral or not? Who are their shareholders? These questions aim to help better understand how companies are engaging in energy transition (or not), how do investors value these companies (through market capitalization, and looking into the price-to-earnings ratio). Furthermore, by comparing these sectors with the rest of the publicly listed companies in each nation's respective stock exchange allows us to also understand the scale of these companies and could show how much these companies contribute to the overall economy. As mentioned previously, publicly listed companies are a relatively easy way for foreign capital to enter into another nation and allow foreigners to participate in capital generation. The last question of understanding where shareholders originate from enables us to make identify how much global exposure these companies get, and could also allow us to understand how liberal or conservative the security & exchange commission in each nation is in allowing foreign investors. This is especially important as it indicates how each respective nation is open or closed off to international capital, and allows us to formulate another hypothesis about the private market and to what extent does foreign investment impacts the private market. This all aligns in answering the main research question of: To what extent does foreign direct investment impact green energy investments in ASEAN. If public companies within a stock exchange do not have foreign

investors, it begs the question of whether private market has received foreign investment, and if they have not, then it can show that it can also disprove the research question. If findings show the opposite, then it goes towards aiding and supporting the research question.

The market capitalization of the industry will also be looked into as it shows the market-value and significance of these companies. The EV/EBITDA is a simple yet effective tool to measure the relative valuation of the company. Companies with high EV/EBITDA multiple could indicate that investors are optimistic about the company's growth rate and efficiency, a low EV/EBITDA could show less optimism in the company's ability to grow EBITDA (Murry). The same similar goes for P/E ratio. High P/E ratio companies are ones that investors are more optimistic about in generating growth in earnings per share, while low P/E ratio companies are generally ones that optimistic in terms of earnings growth (Murry). This is important as these industries are cyclical depending on economic condition and adoption where during a high adoption and high economic growth environment, the EV/EBITDA and P/E ratios can become increased. This shows that investors are more optimistic about buying shares and believe that the earnings or EBITDA values are reached (Murry). By contrast, in low economic growth environments, these multiples decline as investors are less inclined about their high EBITDA or earnings growth can be achieved. The next 10-20 years are interesting as currently (writing this paper in 2022), interest rates have hit an all-time high with sky-high inflation (with continental Europe hitting above 5% exc. Russia). Additionally, asset prices have collapsed due to a strengthening dollar. For the renewable energy industry this is a time where investors are less inclined to bet on new and unproven industries, yet governments across the globe are trying to promote the adoption of renewable energy and other "green-technology products". This is the significance of this paper in particular, especially in ASEAN where renewable energy industry is

very new. The price-to-earnings ratio can show a similar value to the EV/EBITDA where is shows how optimistic or how pessimistic investors are for a company (for example, high P/E ratio companies are ones that investors are more optimistic about in terms of performance, and low P/E ratios are companies where investors could be less optimistic about performance) (Murry).

Another macro level area that I will be looking into is each nation's installed capacity of renewable energy. There are a variety of factors that go towards influencing what renewable energy assets a nation. A nation may choose to specialize in a specific renewable through choice, or by force due to lack of other resources. For example, land-locked nations may only be limited to land-locked renewable energy generation sources, or countries that are small in area (Singapore) may be limited to specific smaller-scale renewable energy generation methods. The methods at which each nation can generate energy through renewables will be investigated in further, including understanding drivers of renewable energy capacity growth, and how they contribute towards meeting climate goals that the nation set out to achieve. The data for this will be collected from the International Energy Agency (IEA). The data from the IEA includes forecasts for renewable energy from both member and association countries. The member nations include high-income countries in the global-north and in Asia (Japan and South Korea). Association countries are developing middle-income to other high income countries such as Thailand and the Philippines. The aim of the IEA is for *"member countries of the IEA seek to create conditions in which their economies energy sectors can make the fullest contribution to sustainable economic development and to the well-being of their people & environment"* (Energy Information Administration).

LIMITATIONS

This paper was written between the months of August – November 2022. Though I covered many perspectives, and concluded that renewable energy and the green revolution is impacted by foreign direct investment, more work is still needed to show how else this could diffuse to the rest of the market. Due to time constraints, this area was not fully covered. Though given the ability to have more time, I would look through this area and analyze it deeper. Furthermore, the dataset provided was limited to Factset through ‘Tradingview’, and it meant that I could only derive current data from each of the stock exchanges. Given more resources and time, I would have compared the breakdown of these exchanges over a period of 10 years, in hopes to understand what the key leading drivers were for each respective economies. My internship experience at AWR Lloyd allowed me to push the limits and understanding of this dynamic region and be able to properly answer this research question. Furthermore, the dataset that I had access to did not include all the ‘stocks’ listed on the SGX exchange (as it excluded mutual funds and other exchange financial securities). Therefore, the comparisons that were made were in direct comparison with the total number of equities.

FINDINGS: FDI CAN HAVE AN IMPACT ON DEVELOPMENT

From the data collected, news sources, and data set from public companies. Our findings show that foreign direct investment can have an impact on increasing renewable energy capacity. However, the situation is more complex than simply black or white; the renewable energy space is constantly shifting and moving. To go forward, it can be said that: Foreign direct investment can have an impact on increasing renewable energy capacity, however, currently each nation is at different stages of development and therefore the impacts of foreign direct investment has

varying degrees of penetration. The nations I focused on to represent ASEAN are Singapore, Thailand, and Philippines. I found my answer by looking into government policy, sector breakdown of publicly listed companies, and impacts of current projects on the economy and environment. Alexander Wood, CEO of AWR Lloyd also said that FDI can have an impact on stimulating development of the local infrastructure that pertains towards renewable energy and products. For example, these could be industries such as the renewable energy sector itself, but also electronics, manufacturing, and companies that relate to the internet of things. Furthermore, this would have positive impacts on the country as the people would acquire the skillsets from foreign companies and would help the nation hit emissions targets much more quickly.

MACRO: EACH NATION IS AT VARYING LEVELS OF OPENNESS TO FDI

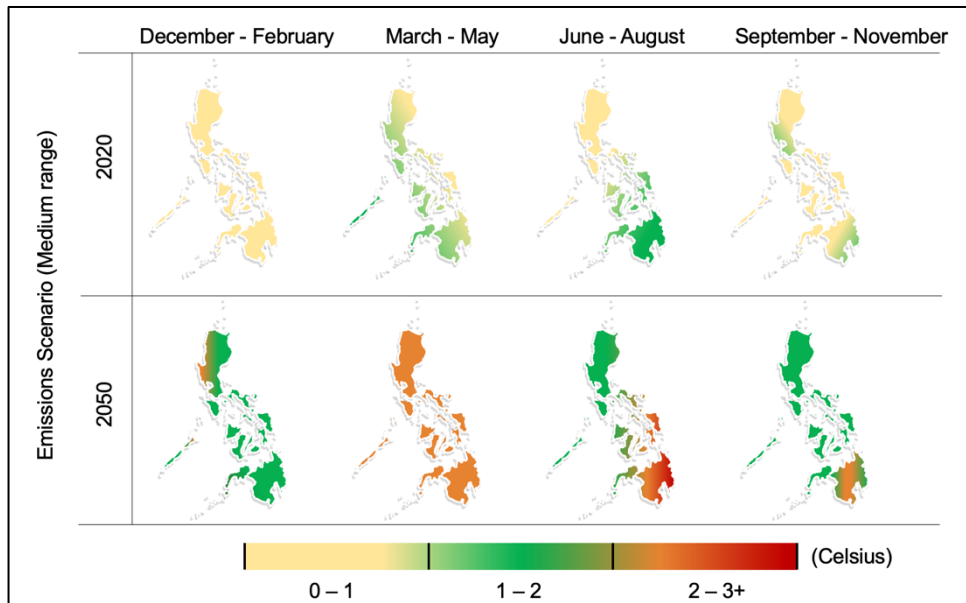
On a macro point of view, each nation has varying levels of economic power, influence, and policies. Singapore is the most liberal for foreign direct investment, with individuals being able to own assets that are both private and publicly listed on stock exchanges. This is reflective on the varying foreign companies that have listed on the Singaporean stock exchange, for example, Chinese EV car company: NIO has triple listed on the Hong Kong exchange, New York Stock Exchange, and the Singaporean Stock Exchange. Furthermore, newspaper ASIAN POWER released a piece during the summer of 2022 *“Singapore is the 3rd most attractive*

market for energy sector FDI” (ASIAN POWER). Think Tank: Foresight Economics (FE) emphasized that Singapore’s ranking reflects its *“openness and political stability”*.

This has a broad range of positive impacts which will be discussed further. Thailand trails Singapore in this area, however, the SEC of Thailand has created a roadmap to encourage green investing in Thailand in accordance with the Paris Climate Agreement (Climate Bonds Initiative). The country still does not allow foreign owners own majority stakes in Thai companies, or even for that matter, foreigners to own traditional shares of companies listed on the stock exchange. The work around that the SEC has provided is allowing foreigners to own non-voting shares of listed companies through Non-Voting Depository Receipt (NVDR). Foreigners have taken stakes in renewable energy companies which will be discussed further in the paper. The Philippines on the other hand has very recently allowed foreigners to own natural resources as recent as October 4th 2022 when the Philippine’s Department of Justice (DoJ) announced that: *“Foreigners can own 100% of renewable or “green” energy projects in the Philippines”* (Barona). This goes to show the Philippine’s adamant stance on attracting FDI for green energy projects and encouraging capital from international markets.

GOVERNMENT TREATIES & POLICIES: A MACRO LOOK INTO PH, TH, AND SG

Each respective government has been proactive in reducing emissions through the use of treaties, bilateral and multilateral agreements. The reason why these nations are also proactive in the move to curbing the impacts of climate change is to reduce the impacts. For example, the Philippines is “vulnerable to the impacts of climate change, and has already experienced



noticeable adverse effects in recent years” (Climate Change Commission). The government passed the act “Climate Change Act (Republic Act 9729)” (Climate Change Commission). The act

Illustration 1 (above): Philippines emissions scenario comparison between 2020 & 2050 forecast. Source: (Climate Change Commission)

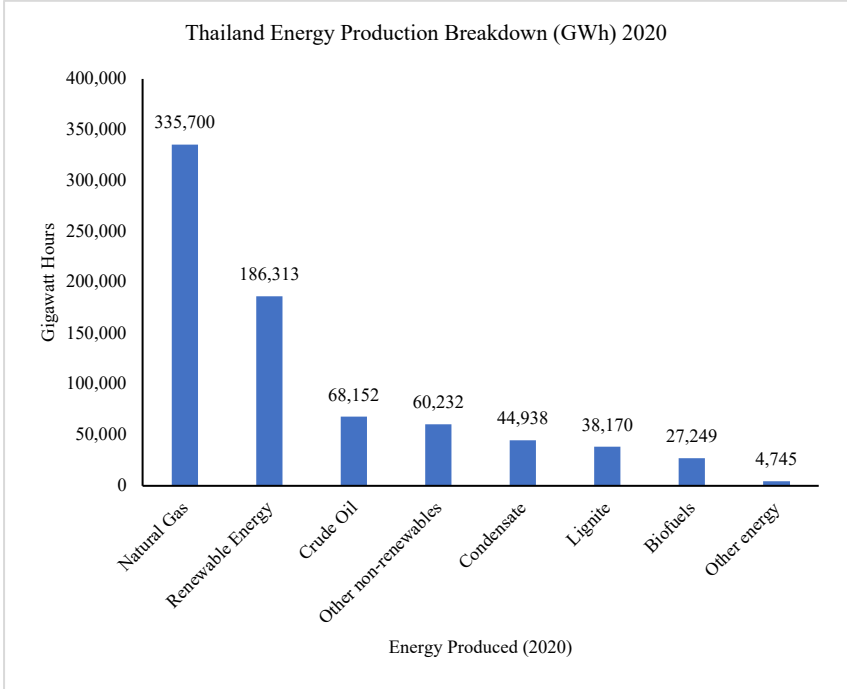
aims to formulate a strategy (both locally and internationally) curb the impacts of climate change. The impacts that the Philippines sees from climate change include the intensity of typhoons increasing in frequency and strength (Climate Change Commission). The map below shows the projected increase in temperature by region within the Philippines. The past projections for 2020 showed marginal increase in temperature (between 0 – 2 degrees Celsius increase), however, by 2050 this value could increase by 2 – 3 C+ with the hottest month being between March – May. The impacts of this could be catastrophic for the country as heat waves grip the nation which could cause crops to fail, and exacerbate droughts and make certain parts of the nation uninhabitable. However, this does not mean for the country to immediately cut back

on oil & gas production as these industries serve the people. The key is to make a smooth transition towards carbon neutral future. This applies to all the nations presented today, changing too fast could create unnecessary strain on each nation's electrical grid system, and implementing technology too hastily could have dire consequences for the infrastructure. Therefore, a smooth yet proactive transition is what is needed in this situation. Furthermore, there have been bilateral agreements been made between developed nations and developing nations. On June 4th 2022, it was reported that the Philippines received US\$ 809 m from the Asian Development Bank (ADB) and the French government (Rosales). The Philippine's goal is to reduce green house gas emissions by 75% by 2030.

Singapore has been proactive in combatting climate change through treaties and conventions that they have ratified. The country ratified the UN Framework on Climate Change (UNFCCC) in 1997, the UNFCCC sets *"framework for governments to cooperate to address climate change"* (National Climate Change Secretariat Singapore). Furthermore, the country aimed to *"achieve net zero emissions by or around mid-century. The government will consult closely with industry and citizen stakeholder groups to firm up and finalize Singapore's plan"* (National Climate Change Secretariat Singapore). By 2030, the nation will aim to reduce its emissions to 60MtCo2e. The country's goal for meeting their long-term goal heavily relies on the industry players and how incentivized they are in meeting carbon neutral goals. The key also depends on profitability of these companies.

Thailand has been party to the Paris climate agreement since 2016 and the Kyoto protocol in 2002 (ratified). The objective for the agreement is to hit net zero – which Thailand aims to achieve by 2065 (Thailand Government). The goal of the country is to derive 50% of its electricity from renewable sources, this involves investing heavily in the nation’s infrastructure.

Furthermore, the way the nation could So this is through “*decarbonization, deregulation and*



electrification such as grid modernization, energy storage systems, net metering market, and EV infrastructure.” (Thailand

Government), page 2. As of 2020, the breakdown of the nation’s energy production are as follows. The nation’s renewable energy capacity

Illustration 2 (above): Thailand Energy Production Breakdown, Source: Thai Government (Thailand Government)

follows second from

Natural gas – however, overall by comparison to non-renewables – the majority of the nation’s electricity is derived from non-renewable sources (LNG, Coal, and Crude Oil). Approximately 24% of Thailand’s energy is produced from renewables versus 65% from non-renewables (Thailand Government). With Thailand trying to hit net-zero (to improve air quality and reducing pollution), would require divestment from oil & gas and into renewables. Furthermore, it shows that the Kingdom of Thailand has a lot of investing to do in this field to build up its renewable energy capacity.

CASE STUDY: PHILIPPINES

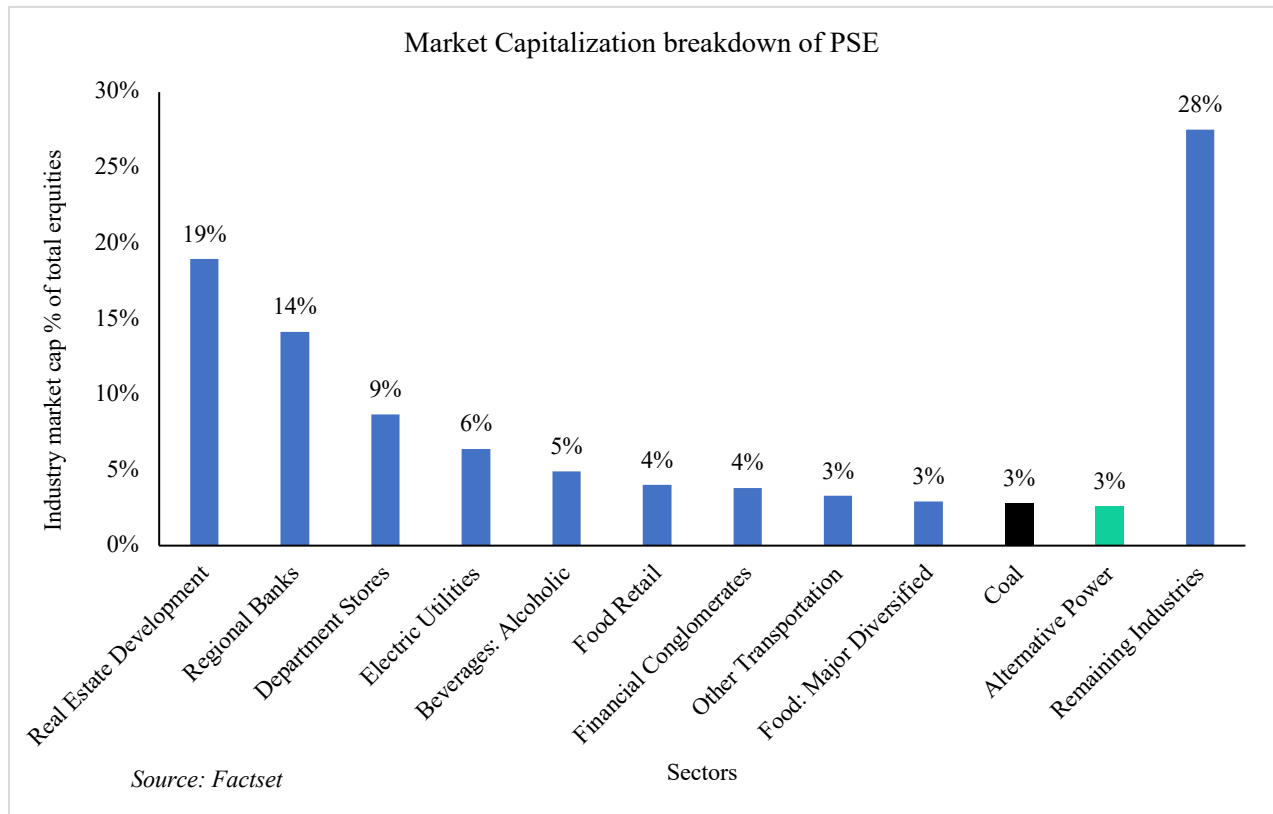


Illustration 3 (above): Market Capitalization breakdown of the PSE by total equities, Source: Factset (Factset)

As of 2021 the Philippines had a gross-domestic-product output of US\$394 Bn and a GDP per capita of US\$ 3,549. The nation is rich with natural resources such as oil and other fossil fuels that have driven the economy thus far, and has not received FDI in the area of renewable energies. The reason for this is because the government (up until September 2022) has been strict with allowing foreigners to own natural resources. The graph below lists the top 10 largest sectors & alternative energy in the Philippines stock exchange. Most of investor's capital is in real-estate developing companies, finance, and other sectors. However, the key point to observe is that Coal sector represents 3% of the total market capitalization of the industry and alternative

energy directly behind that. This illustrates that the alternative power generation industry is one that investors have placed significant capital into.

Furthermore, I found that Oil & Gas companies contribute to over 26% of equities listed on the PSE exchange,

alternative power

generation also

contributes to a

significant proportion

of the listed equities at

4% (Factset). A reason

for the Oil & Gas

sector's market cap and

revenue difference

could show that

investors are

pessimistic in the

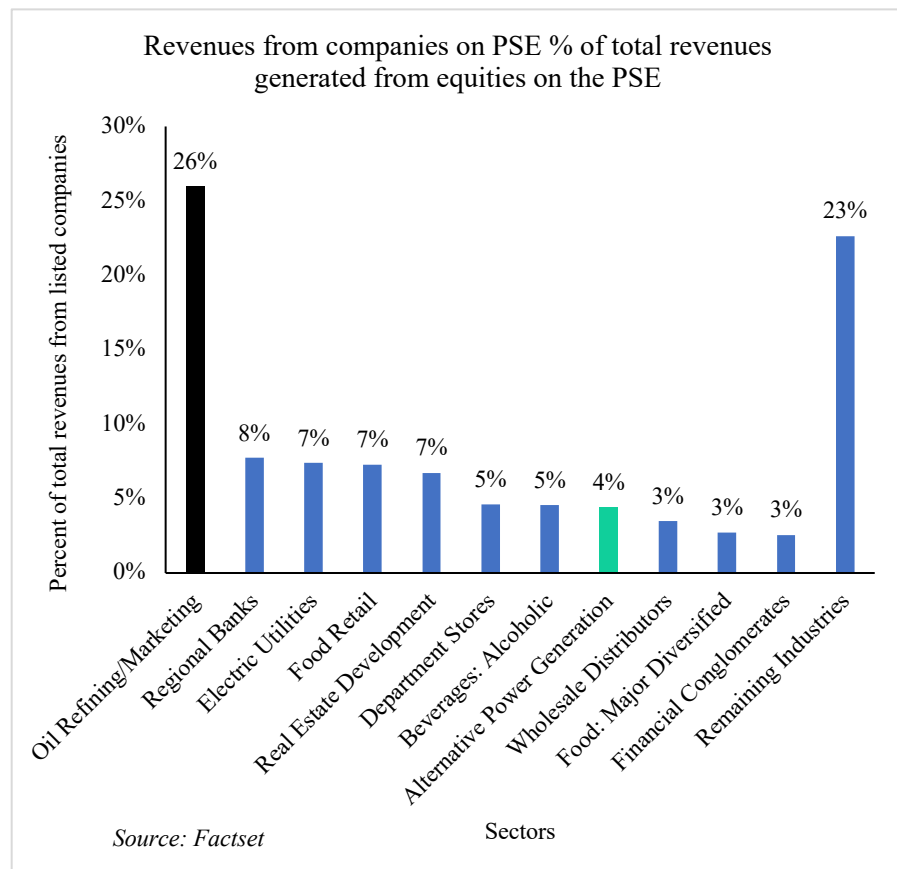


Illustration 4 (above): Revenues from the PSE breakdown, Source: Factset

sector overall, and to that end, investors still expect alternative power companies to outperform

over the long period of time. Most of the shareholders of alternative power companies are all

local. Philippines has attracted international investors, for example Panasonic Philippines is

listed on the Philippine's exchange, its major shareholder is Panasonic Corporation from Japan

which owns 80% of the company (Panasonic Philippines). This could be a further reflection of

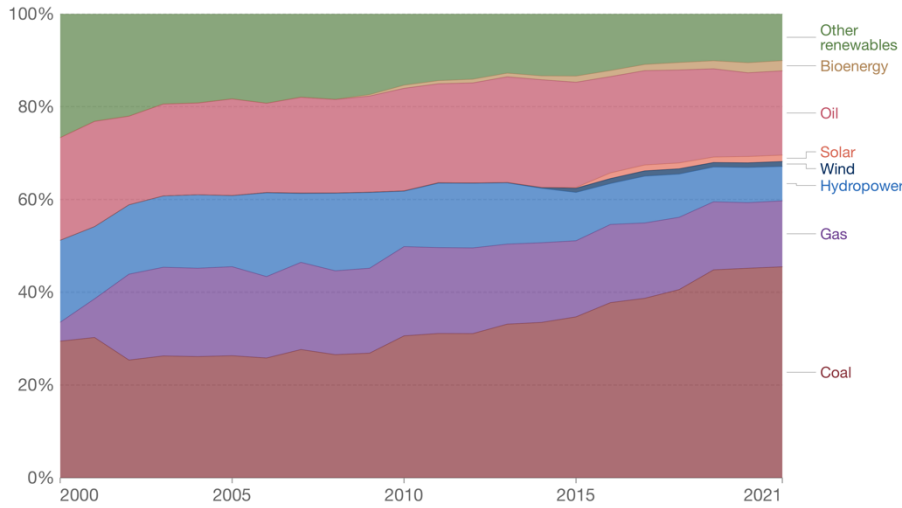
the government's policy against disallowing foreigners from owning companies that operate in

natural resources. According to the Philippines Statistic Authority, foreign direct investment still only includes investments in: Manufacturing of ICT (internet communications technologies and equipment) in addition to engaging in trading these products (Philippines Statistics Authority).

Due to the Philippine's DoJ's (Department of Justice) change in allowing FDI in energy, it could push the country's renewable energy capacity upwards, and also allow foreign firms to provide their skills and expertise to these companies. The conclusion from this that can be made is: Foreign Investors haven't fully paid attention to the corporations in the Philippines that engage with energy generation and alternative energy production. The government in October 2022 made the change to allow foreigners to own natural resources. There are other publicly listed companies that have majority foreign owners, for example: Panasonic Philippines (whose majority owner is Panasonic Corporation from Japan) is the major shareholder of the company, owning 80% of the company. This shows that there are certain industries that have been the forefront of receiving foreign direct investment, and ones (such as with energy) have not.

According to the Philippines Statistic Authority, foreign direct investment still only includes investments in: Manufacturing of ICT (internet communications technologies and equipment) in addition to engaging in trading these products (Philippines Statistics Authority).

Electricity production by source, Philippines



Source: Our World in Data based on BP Statistical Review of World Energy (2022); Ember's Global and European Electricity Reviews (2022)
 Note: 'Other renewables' includes waste, geothermal, wave and tidal.
 OurWorldInData.org/energy · CC BY

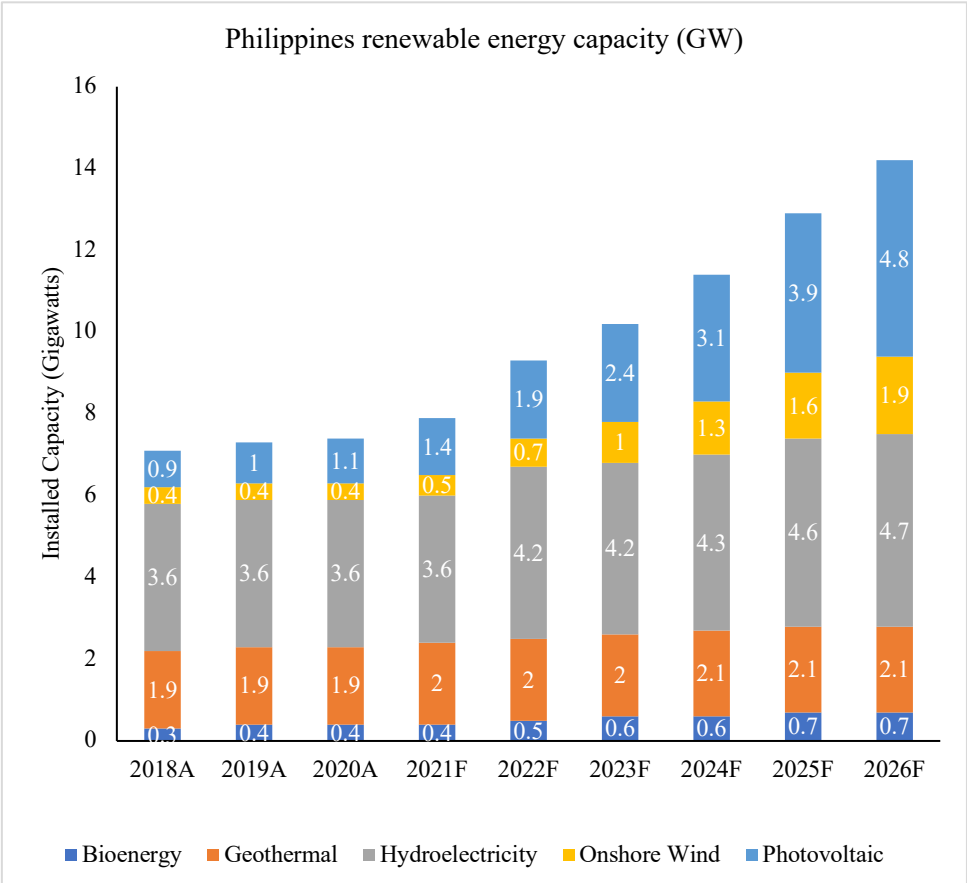
The graph on the left shows the Philippines energy capacity breakdown by source. Alarmingly, the country has had a very high reliance (and growing reliance on Coal amongst other non-renewables) as

Illustration 5 (above): Electricity production by source from Philippines, Source: OurWorldInData (OurWorldInData) a source for electricity

(Ritchie). At the same time, Renewable energy accounts for approximately 20% of all energy production, which also makes it one of the highest compared to Thailand and Singapore, furthermore, in looking at revenues generated from alternative energies, the sector still accounts for a recognizable output. However, non-renewables such as Oil and Coal are still major industries (more so oil when looking at public markets).

PHILIPPINES RENEWABLE ENERGY CAPACITY BREAKDOWN

The graph below shows Philippine’s renewable energy capacity since 2018. Renewable energy is expected to grow by 12% year on year from 2021-2026. Between 2015-2018, the sector grew annually by 4%. This growth rate could be from a variety of factors from government stance favoring renewable energy, and democratizing ownership of natural resources towards foreign owned companies. This could have an array of cascading effects as we could expect significantly



more FDI in this sector in both public and private markets. I believe that what could occur is local firms and foreign firms could create joint-ventures, and lead to both the public and private markets receiving capital.

Illustration 6 (above): Philippines installed energy capacity (GW), source: IEA (IEA Dataset)

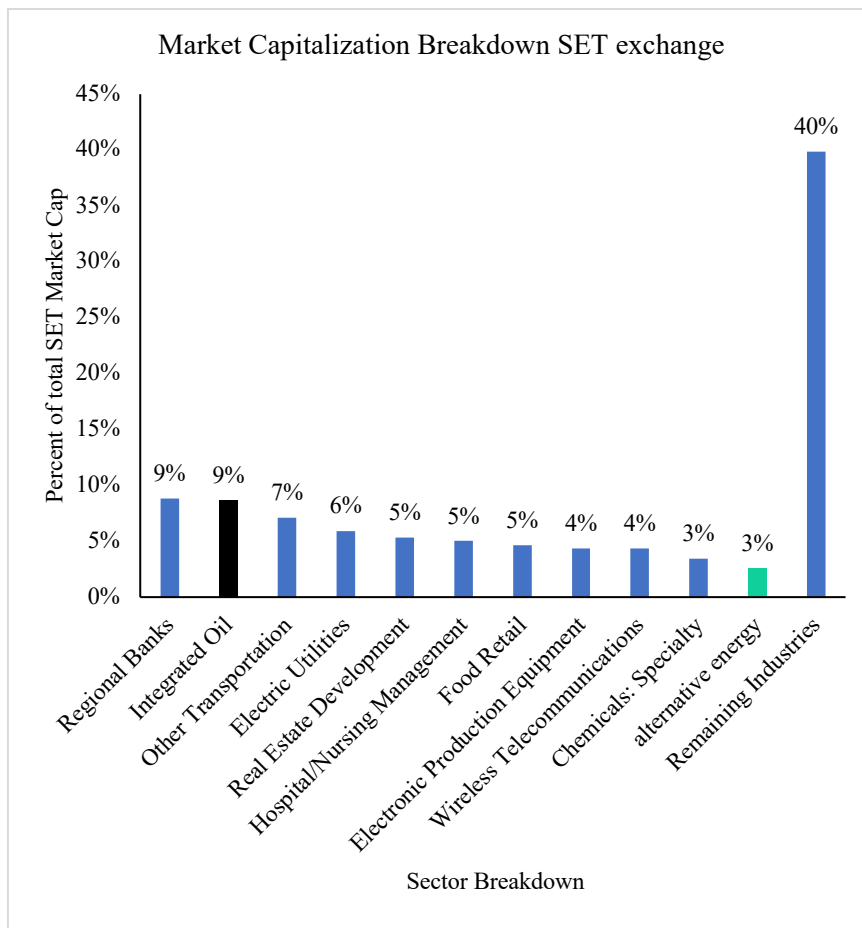
The Philippines

aims for carbon neutrality by 2050, a push towards renewables is one that the government is aiming to use to get the goal. Between 2012-2021, 30% of all energy capacity comes from renewables in the Philippines (IEA Dataset). However, Oil & Gas being accounts for 45% of the total energy output of the nation (Energy Information Administration). This value could drop as the nation increases renewable energy capacity.

The Philippines would be in a position of greater energy security as it relies less on Oil & Gas which is subject to geo-political risk. The increase in renewable energy and foreign direct investment could also liberalize electricity consumption in the nation. This would be in the form of upgrading the existing infrastructure to increase electricity access throughout the nation. Furthermore, Filipino households would transform from consumers to prosumers. A prosumer is when a household (in this example) produces enough electricity where one can sell their energy back to the grid (Yosiyana). This is something that could happen to the Philippines as other more developed economies have projects like this such as Australia and Malaysia. A major tangible impact of reducing reliance on non-renewables is reducing pollution. By 2030, the Philippines aims to cut its greenhouse emissions by 75% (Reuters). For the country to reach its target, enabling foreigners to own natural resources would greatly allow the nation to achieve its targets. Foreign direct investment could increase greatly in the sector over the coming years thanks to the democratization of the industry from the government.

CASE STUDY: THAILAND

Thailand sits in between Singapore and the Philippines. The government has more relaxed policy when it comes to foreign companies owning companies. This is reflective in the additional stock types that companies offer. Non-Thai citizens can participate in the stock exchange, and companies through buying: Non-Voting shares of companies. The government still has tight restrictions on foreign ownership, non-Thai citizens can only take a minority stake in companies (whether that be public or privately listed companies). My internship experience was focused more towards the Thai market, and in doing so I am more familiar with the



pathways of Thai companies

and specialty. There a

number of Thai companies

engaged with renewable

power generation such as

(but not limited to): Banpu

Power PCL, Energy

Absolute, Gunkul

Engineering, Gulf Energy.

These three companies

collectively represent 3% of

the total equities in the index

(Factset). The graph shows

the top 10 industries within

the nation. However, these companies represent 0.31% of the total revenues from the entire

exchange (Factset). The graph below shows that majority of revenues produced in the market is

Illustration 7 (above): Market Capitalization Breakdown of Thai equities, Source: Factset (Factset)

attributed to Oil & Gas companies (Factset). These companies are classified as Oil & Gas because majority of their holdings still contain oil. This shows that there is a large difference between market valuations and revenue generation. This further could show that investors are optimistic about these companies being market leaders. This holds true when seeing their P/E ratios where alternative energy companies trade at P/E of 12x versus Oil & Gas of 9x (Factset). This is a stark comparison to the Market's P/E Ratio of 21x (Factset). I believe that this could be true because these companies are newer, and perhaps investors are less likely to pay more for earnings. However, when comparison to Oil & Gas, Investors could be more pessimistic about the future earnings growth of these companies through the way that they trade. In terms of shareholders, these companies attract a mix of local and foreign investors. For example, Banpu Power's shareholders are Credit Suisse and BNP Paribas, both major financial institutions (BanpuPower). This shows that there is international recognition for these companies, and international investors can participate in earnings of these companies through the share holds from these banks. Furthermore, when looking into Gunkul

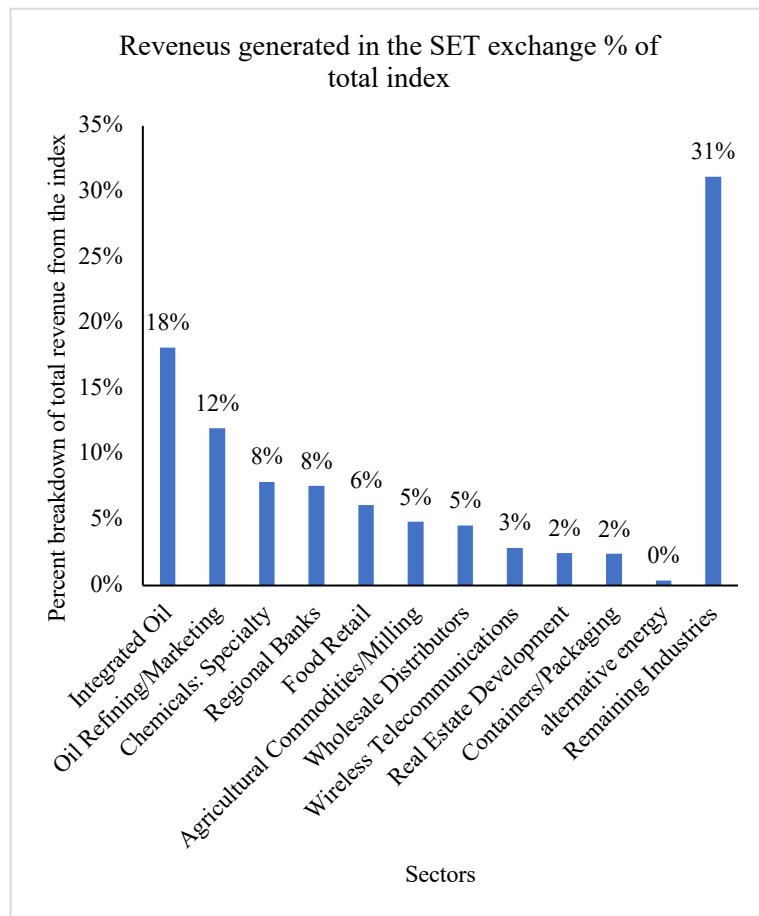


Illustration 8 (above) Revenues generated in the SET exchange as a % of all equities in the index, Source: Factset

Engineering, its shareholders are from Hong Kong (UOB) and Southeast Asia (class C) a subsidiary of Chase Bank (JP Morgan Chase) (GunkulEngineering). This further shows that companies here that are involved with renewable energy have more international recognition.

Thailand is more reliant on non-renewables (accounting for 85% of total electricity production source), however, approximately ~20% comes from renewable energy (Ritchie). The

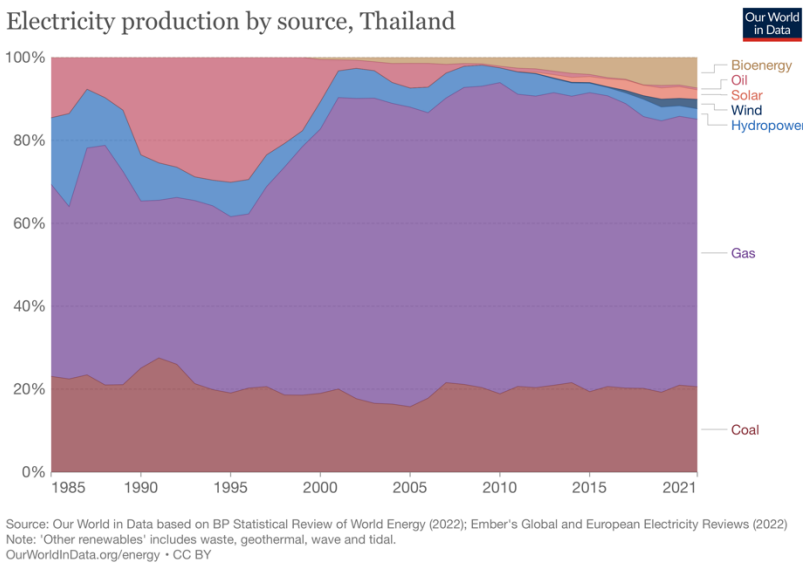


Illustration 9 (above): Electricity production by source from Thailand, Source: OurWorldInData (OurWorldInData)

country's main exports according to the IEA are hydrocarbons (oil & gas). Over the years, coal has continued to maintain a constant percentage of electricity production, while Oil & Gas have continued to dominate the country's energy use. Renewables such as solar, wind, hydro, and bio energy

continue to gain momentum, however, currently account for a small amount for electricity output.

Upon closer look into the country’s renewable energy capacity, alternative energy growth between 2015-2020 was 9%, however, growth is projected to slow between 2021-2026 according

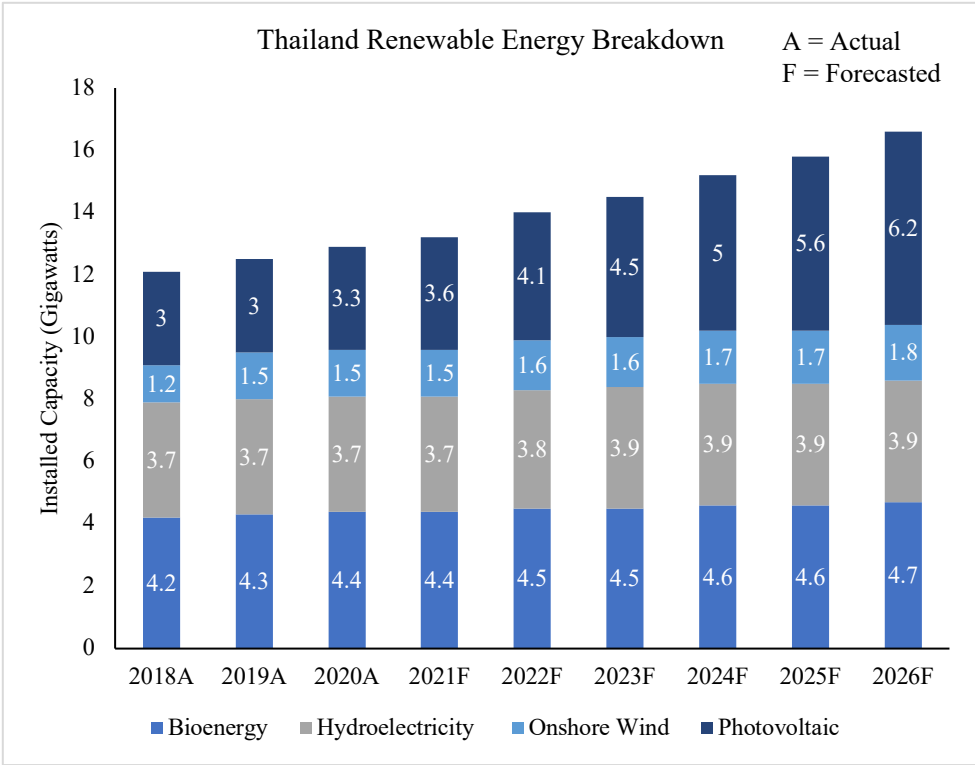


Illustration 10 (above): Thailand renewable energy breakdown capacity by GW, Source: IEA (IEA Dataset)

to the IEA (IEA Dataset). This is a stark contrast to the Philippines whose growth rate will increase in the coming years. For Thailand’s case, renewable energy capacity growth is driven by PV or solar capacity.

Thailand aims to net zero carbon emissions by 2065, and is very much impacted by the impacts of climate change. According to the UN, Thailand is the 9th most vulnerable nation to the impacts of climate change (Royal Thai Embassy, Washington DC). The shift towards renewables is one that would be strategic to enable the nation to be a positive force in reducing greenhouse gasses, and hedge its risk against the impacts of changing climate (Royal Thai Embassy, Washington DC). Foreign Direct Investment is very much encouraged from the Thai government, and unlike the Philippines, the nation has treaties with various countries across the globe for foreigners to own

major shareholdings in Thai companies in the renewables sector. For example, the United States of America and Thailand has the Amity treaty, where both Thai and US companies can engage in business with one another. According to US International Trade Administration, “*the Thai government is actively pursuing foreign direct investment related to clean energy, electric vehicles and related industries*” (US Trade.gov). This further shows the extent that Thailand is willing to attract foreign capital into this industry. Due to Thailand’s much more liberal stance on energy as a whole and by observing the current shareholders of PCL’s, Thailand’s ability to attract FDI for renewable energy development would be significantly higher than compared to the Philippines. Due to this, Thailand would be able to rapidly address some of its more urgent environmental concerns such as air quality and overall reduction of pollution.

THAILAND: CHANGING GOVERNMENT REGULATION

On November 5th 2022 the Bangkok Post published a news article titled: BoI (board of investment) seeks to boost FDI. The BoI’s plan are listed below:

Goal	Description
Promote investment for national development	Grant tax deductions for upstream, high-tech, and targeted industries for a period of 10-13 years
Increase competitiveness	Focus on R&D (Research & Development) and human development
Implement “Retention & Expansion” Program	Encourage companies to keep and expand their production facilities in Thailand
Push ahead with Relocation Program	Invite more overseas firms to relocate their production bases to Thailand

Stimulate Investment to restore economy	Revive investment in large-scale projects
Support smart and sustainability industries	Urge entrepreneurs to adopt automation, digital technology, and eco-friendly operations under tax incentive programs
Strengthen small & medium sized enterprise	Set minimum investment value of THB 500,000 (US\$ 13,300) for projects to be eligible for tax deductions
Invest in targeted areas	Stimulate investment in economic corridors countrywide
Promote investment projects for social & community development	Grant tax deductions for each project that vies at least THB500,000 (US\$13,000) in financial aid to a local administrative body

Figure 2: Thailand Board of Investment Policy, Source: Bangkok post, Board of Investment (Apisitniran)

According to the news source, the BoI aims to attract and support investments in technology, green and smart industries (Apisitniran). Thailand’s national EV policy committee “announced last March it wants EVs to constitute 50% of locally made vehicles by 2030, part of ambitious plan to make Thailand a regional EV production center” (Apisitniran).

This is already being seen in the major FDI inflow from automaker: BYD. BYD (BYDDY) – a major Chinese automobile maker announced that the first factory outside of China is selected to be: Thailand. BYD announced that “signed a contract with WHA Corp. PCL, Thailand’s leading industrial estates, to purchase land to build electric cars in Southeast Asia” (Flannery). The project is worth over US\$490 mm with a total land area of “96 hectares (237 acres) in the eastern province of Rayong” (Flannery). According to INSIDEEVS, “Thailand is described as the largest auto market in ASEAN and auto manufacturing center in Southeast Asia, with strong EV ambitions” (Kane). The factory is expected to output over “150,000 vehicles” annually. Furthermore, these cars will be made in Thailand to be sold within the nation and

exported throughout the rest of the world. This is considered a strategic move from the company as it aims to leverage Thailand to expand globally – the article also pointed out that *“interesting move, especially since so far BYD’s EV sales were highly focused on China”* (Kane).

THE IMPACT OF FDI ON THE NATION: EVs

The result of the investment will be realized over the coming years, job creation can be seen throughout the stages of the factory from construction to production of the cars. A positive outcome would be transference of skill, and increasing standards for suppliers, and can bring economic growth to the entire supply chain involved with the operation of the BYD factory. According to Du, *“diffusion and penetration of knowledge...can increase the motivation of enterprise to invest in information, thus accordingly raising the level of enterprise informatization”* Du, page 3 (Du). In the example of Thailand, this presents an opportunity for the nation to gain momentum in the EV segment and as mentioned earlier other related segments such as semiconductor manufacturing, and rubber production (for tires). Inherently, it could also positively contribute towards the education system. Granted, one factory alone will not bring wonders to the nation, however, it could further generate momentum for other automobile companies to invest in the nation. Furthermore, the skillset from car component suppliers would gain recognition, it could prompt more auto makers to invest, resulting in more suppliers benefitting. In relation to skills, the education system could benefit (especially in STEM) as demand for this increases from the foreign investment in manufacturing. With enough scale and right market conditions, it could also prompt an initial public offering (IPO) of the BYD factory in Thailand, adding towards growth in the company’s exchange, and visibility for international investors.

THAILAND FIRMS & INVESTMENT IN ASEAN

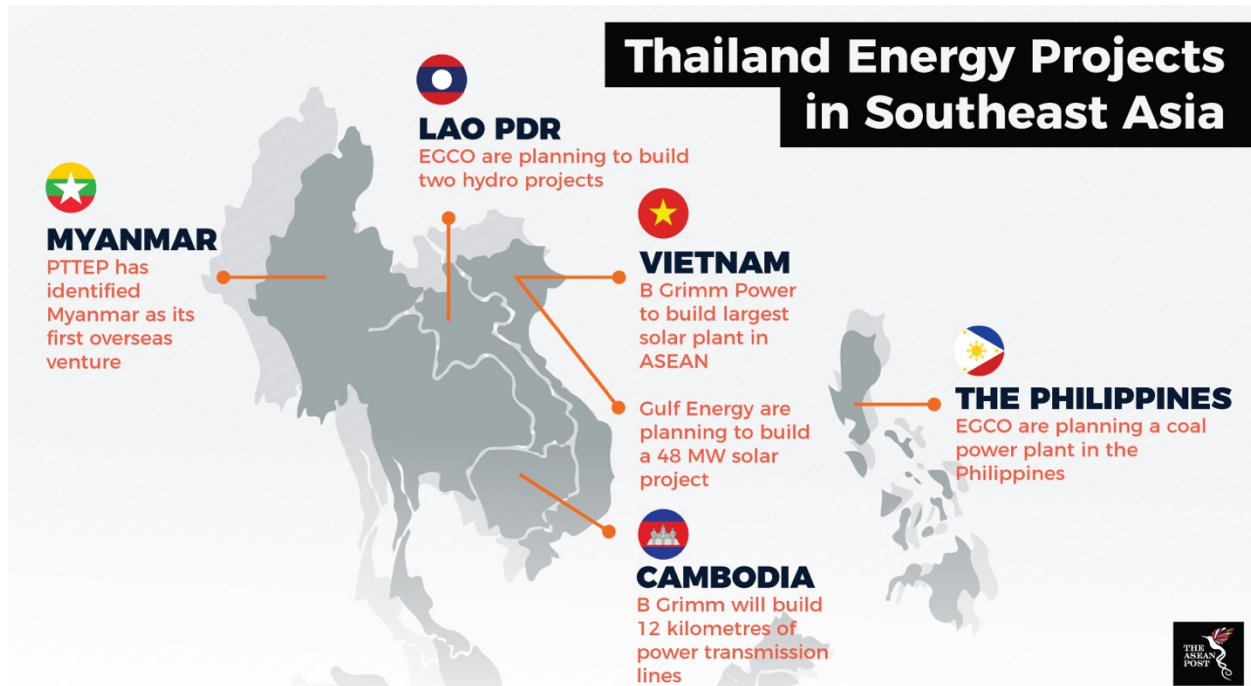


Illustration 11 (above): Energy projects in ASEAN from Thailand, Source: The ASEAN POST (Ariffin)

Foreign direct investment has also been done from Thai firms to the rest of ASEAN. B Grimm, EGCO (Electricity Generating PCL), Gulf Energy, and PTTEP (PTT Exploration & Production) are planning projects across the region. Though of which, B.Grimm, EGCO, and Gulf are engaging with renewable energy project in efforts to diversify their portfolio of energy production.

CASE STUDY: SINGAPORE

From the data set, we have identified that the Singapore Stock Exchange has a market capitalization of US\$440Bn. The distribution of companies (left) show the market valuation of these companies. Renewable energy power generation accounts for approximately 1% of the total index, with the largest company being: Sembcorp Industries which has a market

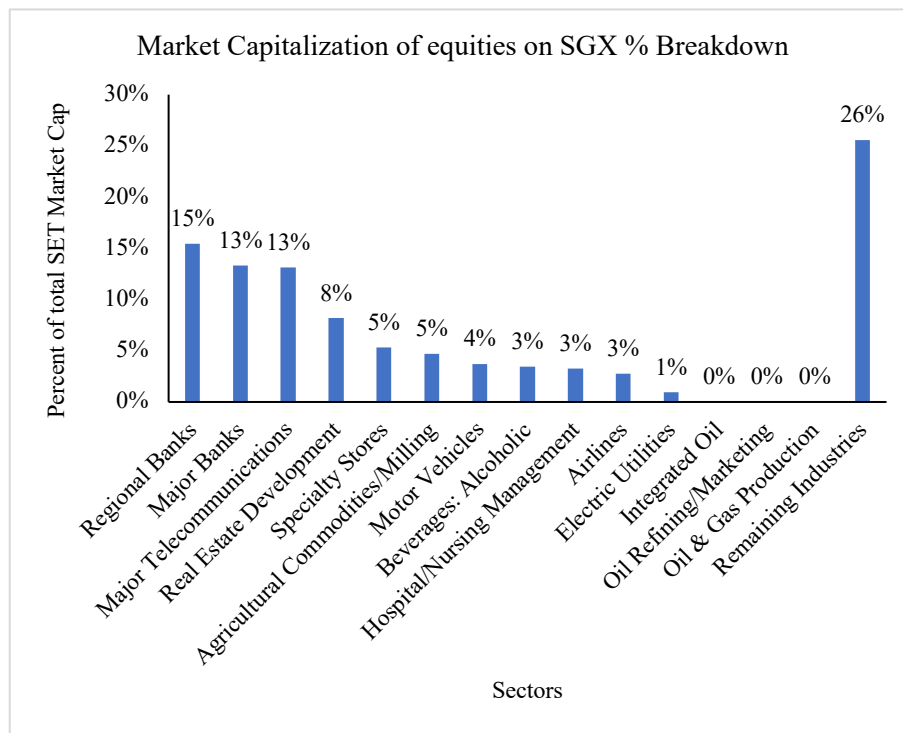


Illustration 12 (above): Market capitalization of all equities on the SGX % breakdown, source: Factset

capitalization of US\$3.6Bn compared to the total equities in the index at US\$440bn which represents 0.8% of all equities (Factset). The country's major industries listed are more towards financial institutions such as

UOB (United Overseas

Bank) or DBS (Developmental Bank of Singapore). These institutions account for a large percent of the market capitalization of the index. In relation to alternative energies, Investor sentiment can be calculated through seeing the P/E ratio (or price-to-earnings ratio). The average P/E ratio of Singaporean companies are 20x, by contrast the alternative energy sector trades at 15x P/E and Oil and Gas trades at 6x (Factset). This could go to show that investors are more focused shorter term on alternative energy sector, and significantly shorter term (and pessimistic) on the Oil & Gas sector. Singapore has very few companies engaged in renewable energy generation that are listed on the stock exchange, the revenue generated from these companies account for

1% of the total revenue generated from the listed companies on the index. This could also show that Foreign Direct Investment (from investors) could be significantly less concentrated in these sectors (as they have little opportunity to invest in these companies). Sembcorp Industries is one of the only companies that has international foreign investors. Their foreign investors include The Vanguard Group, a multi-trillion dollar financial services company; and Norges Bank, the Norwegian Sovereign Wealth Fund (Market Screener). The lack of foreign investors within the industry could reflect that the industry within Singapore is still in early growth phase. The stock exchange listed NIO, the Chinese car manufacturer over the summer of 2022, this could allow foreign investors to participate in NIO from Singapore's exchanges, and leverage the country's existing industries and allow the country to gain more investors (Singapore Stock Exchange). NIO currently lists on the New York Stock Exchange, Hong Kong Exchange. The Singaporean government has laid out plans to greenify the nation for 2030 and 2050, for 2030, the government aims to *"increase solar energy deployment by five-fold to 3GWp"* (Greenplan Singapore). The nation aims to power 16,000 households a day through 200MW energy storage systems to be deployed by 2025. Singapore as a nation has a population of 5.7 million, this allows the country to implement green projects that do not have to be at large scale, and allows the nation to maximize impact with smaller size and footprint.

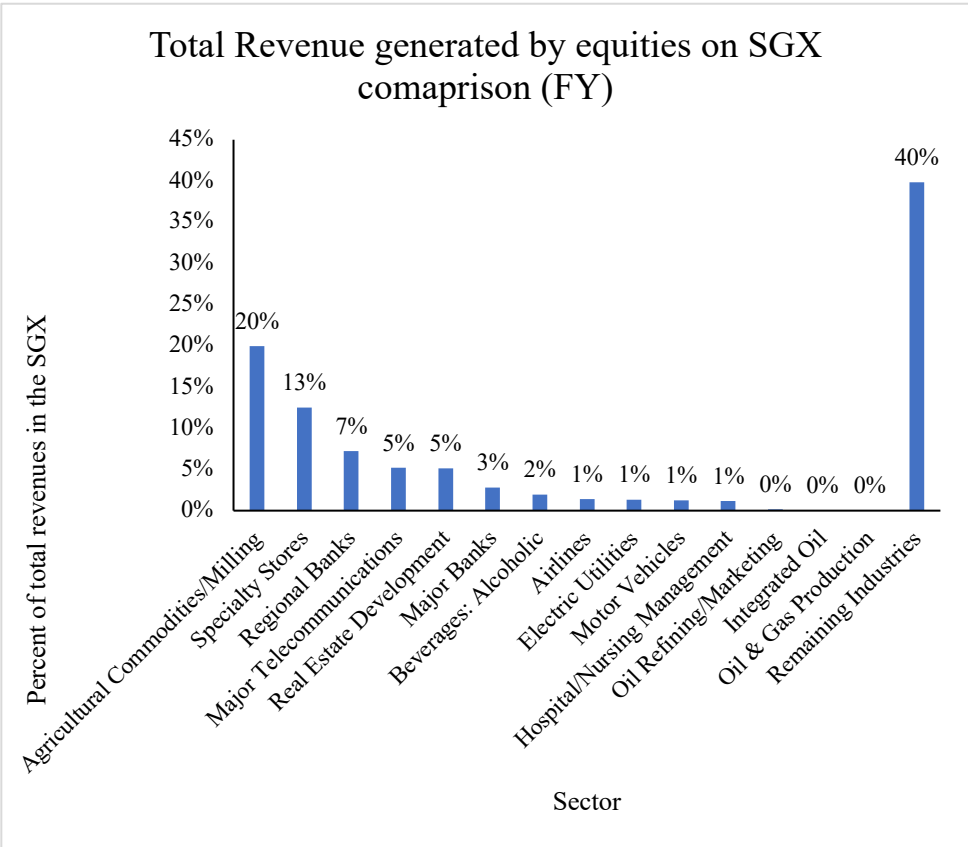
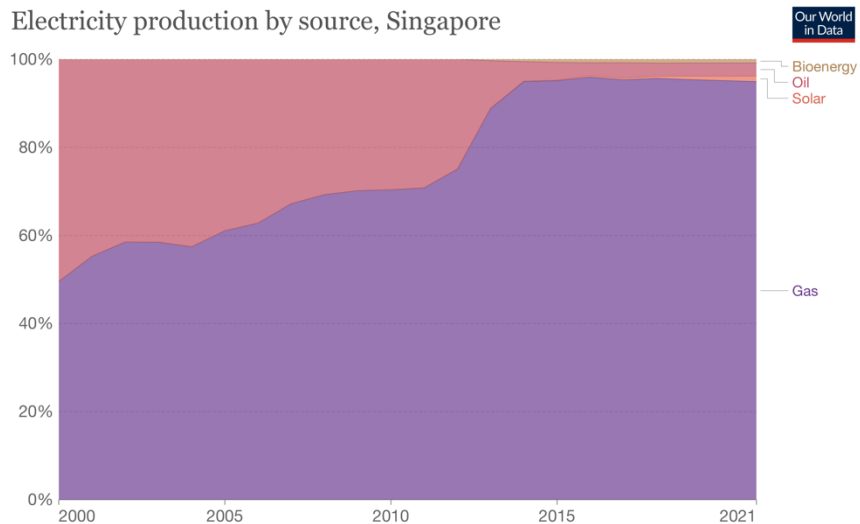


Illustration 13 (above): Total revenue generated by equities on the SGX comparison breakdown, Source: Factset

The graph on the left shows the total revenues generated in the index broken down. What we see in this is that revenues of electric utilities companies (which include Sembcorp the renewable energy company)

represents 1% of the overall revenues generated, and oil & gas continued to be less than 1% (Factset). This is fascinating as it shows that there is actual impact from Singapore’s renewable energy generation company on the nation. Furthermore, this has allowed its shareholders (both local and international) to be able to participate in earnings. This could show that foreign direct investment could have an impact as the very shareholders from Sembcorp are institutions of financial weight. Singapore still imports a large percentage of its oil & gas – particularly from the middle east. The company’s listed on its exchanges that pertain to oil & gas have assets that are far from Singapore’s borders. For example REX International Holdings (SGX:5WH) which is a registered Singaporean company has assets in Oman and Norway (REX International Holdings).

Despite Singapore’s efforts in increasing renewable energy production, the country still heavily relies on oil & gas as a major source of energy. The graph below shows the change in electricity production by source. With Gas accounting for over 90% of total energy capacity and



Source: Our World in Data based on BP Statistical Review of World Energy (2022); Ember’s Global and European Electricity Reviews (2022)
 Note: ‘Other renewables’ includes waste, geothermal, wave and tidal.
 OurWorldInData.org/energy · CC BY

Illustration 14 (above) Singapore Electricity production by source, Source: (OurWorldInData)

renewables (bioenergy and solar) accounting for a fraction of all energy production (Ritchie). The over concentration in oil & gas further illustrates the country’s reliance on fossil fuels. Due to Singapore’s small footprint (in size by comparison to the other two

nations, the impacts of this is on the environment is significantly less), reliance on oil and gas could have negligible impacts onto the climate. Nonetheless, the government has made efforts to increase renewable energy production. Singapore aims to “meet 28% of its peak power demand from solar power by 2030...and achieve to supply 43% of its power demand from solar power at the end of mid-century” (SolarEdition). The country’s main constraints is space, as the nation occupies a small real-estate area (one of the smallest on the planet). This presents a complicated task for architects to “better incorporate solar PV into a building’s design and will serve as an important enabler of zero-energy buildings, super low energy buildings and positive energy buildings, also known as building integrated photovoltaic” (SolarEdition). Furthermore, another

design that is being explored is floating photovoltaic where solar cells will be mounted on a “body of water... a large 60 MW (0.06GW) will also be completed at Tenegeh Reservoir (in Singapore)” (SolarEdition). The nation aims to install up to 2GW by the year 2030.

SINGAPORE’S RENEWABLE ENERGY CAPACITY BREAKDOWN

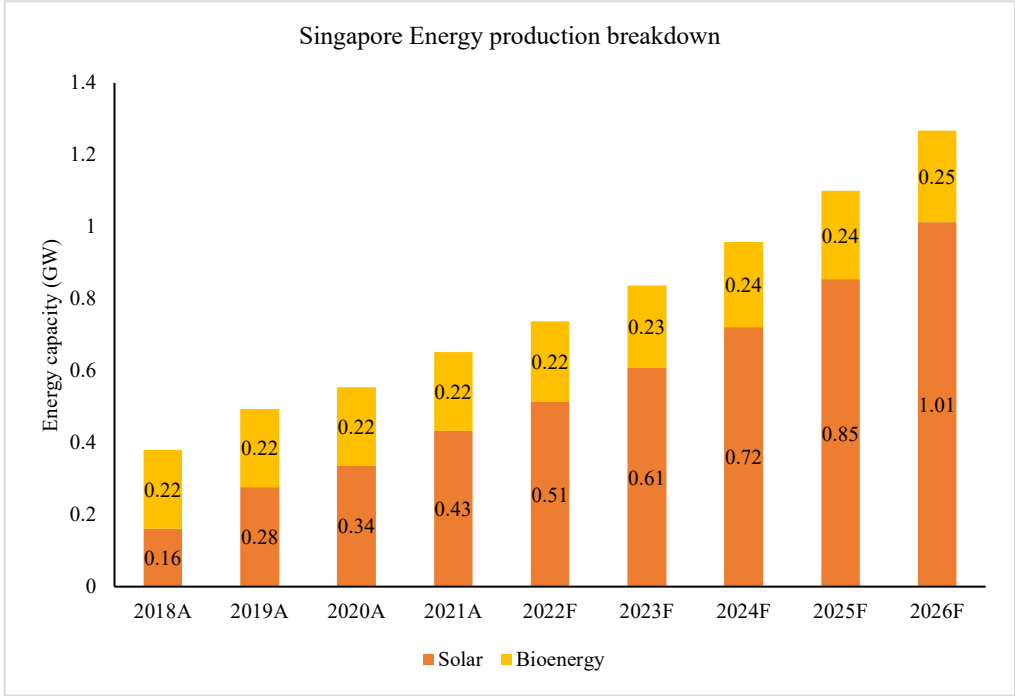


Illustration 15 (above): Singapore Energy Production Breakdown (GW), Source: IEA (IEA Dataset)

Singapore’s focus is on both Solar energy and Bioenergy. Its renewable energy assets are highly concentrated in these segments due to the space

and resources available. The IEA forecasts that Solar Energy could grow over 20% yearly from 2022 to 2026 to rapidly adopt solar (IEA Dataset). I project that the country’s Bioenergy concentration could increase by 3-4% yearly (IEA Dataset). Unlike both Thailand and the Philippines, Singapore is a highly developed nation whereby its transition to renewable energy could enhance the nation’s growth, however, environmental impacts would than the other two nations explored in this paper. In this example, FDI could have some impacts on the industry as capital is injected into the country and the companies within it.

CONCLUSION

In conclusion, my research has shown that foreign direct investment can have an impact on renewable energy development in ASEAN based on the case studies of: Singapore, Thailand, and the Philippines. With that, my research also found that certain nations will be able to catalyze on renewable energy production (at the source) versus others are able to catalyze on more downstream products. For example as mentioned in my research paper, Thailand and the Philippines are rich with natural resources and real-estate area for solar, hydroelectricity, and other large scale renewable energy production factories. By contrast, while Singapore is significantly smaller in size and imports its electricity, it could be able to take advantage of renewable energy tailwinds through the prosumer-model allowing individual homes to transform into mini-solar producers (and residents able to sell excess electricity back to the grid). However, on that, Singapore has companies that are able to support the manufacturing of solar-panels and other technological products through semiconductor manufacturing and semiconductor wafer products. As mentioned earlier in the paper, there are a few companies that are engaged in renewable energy such as Sembcorp. However, other verticals could take further advantage of FDI. Furthermore, my paper shows how the liberal nations are with foreign direct investment and how it translates to how industries have developed, the three nations I have picked for my research reflects the stages that ASEAN is at.

My findings also find that countries that could be high growth for foreign direct investment in renewable energy is the Philippines (or countries like the Philippines in ASEAN). Due to the recent government overruling in allowing foreigners to own natural resources, my hypothesis is that the Philippines will begin attracting foreign investors to take advantage of the country's vast resources, furthermore, this would greatly benefit existing companies within the

Philippines as they would be able to gain foreign investors and exposure from international investors. What also needs to be stressed during this period is also understanding inequality within the Philippines which could be further exacerbated as foreign investors partner with existing companies which would greatly benefit the companies, but the companies need to be exposed to these foreign companies.

Thailand on the other hand would also greatly benefit from FDI – its growth rate from renewable energy from FDI could also be realized, however, it may not be to the same extent as the Philippines due to how Thailand is slightly more developed in terms of allowing foreign investors to own renewable energy assets (or equivalent in ASEAN). Thailand's government is trying to transform Thailand to a higher-income country – reflective in the Governments' Thailand 4.0 policy. For the nation to fully take advantage of solar energy, the country would need to implement the prosumer-model which would help homes in Thailand to produce electricity through solar energy and sell excess energy back to the grid. The nation is reflective of an ASEAN nation that is in the middle of being in the moderate in terms of foreign investors. The nation could still benefit from FDI, however, for FDI to have a greater impact on the nation, liberalizing foreign ownership of Thailand could help the nation with its plan to economically develop.

As a representation of ASEAN, these nations capture a slice of what the dynamic region has to offer, and paints a picture to show the different stages of development that each nation is at in terms of the renewable energy revolution. What needs to be clear throughout this transition process is to not compromise energy security through rapid transition into renewables. What is

needed for all parties (governments included) is to be able to facilitate the change from non-renewables to renewables, but also to recognize that by rushing to improve infrastructure, it could cause drastic impacts such as power-cuts and reduce energy security for the nation. Furthermore, the use of oil & gas and petrochemicals go beyond energy production as they are present in each step of the manufacturing process. Therefore, even though the green revolution is encouraged to the highest level – neglecting non-renewables could jeopardize existing goods and services that are needed for the people.

The verdict: The green revolution is one that is driven by foreign direct investment between each nation through cross-border partnerships (from within ASEAN) and from outside of the region (greater-Asia). I believe that as these nations continue to pursue their goals, it could bring in more capital from overseas, spurring the economies of each respective nation and bringing fortune to some of these countries as they carve out their own competitive advantage.

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