

The Short Term and Long Term Effects and Implications of Businesses to Switch to Sustainable Energy

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Abstract

The scope of this research takes into account the two angles of short term and long time effects for which industrial businesses switch to renewable energy. The research predominantly uses resources from businesses, public datasets, and news outlets to support its arguments. The two implications that businesses emphasise on in the executive perspective are social and financial implications. It can be concluded from data analysis and business tools that switching to sustainable energy helps the business's social performance in the short and long term. However, it is noted that the effects in the short term are more nuanced in comparison to the latter. Nevertheless, the financial implications in the long run are exponentially more beneficial with limitations such as the type of business and the energy capacity at which that business requires.

Keywords: sustainability, businesses, sustainable energy

1. Introduction and Methodology

The goal of this research is to conduct an investigation to the claim that businesses in the industrial factor in Asia will benefit in the long term by switching to green energy alternatives. The two angles that are used to investigate this claim are the short term and the long term angle. In this research paper, the arguments will be based on company case studies such as Hitachi, Tangchareon Ice Factory, Swire properties, and more external datasets. The concept of this essay is centred around aiding company executives in Asia to be able to make decisions with regards to switching to sustainable energy. This essay aims to take into account the scale of the business which affects their capability, the financial, and social implications of these changes.

This research paper will be an interpretation and analysis of the research papers/report present about the short and long term effects of companies switching to sustainable practices. Primary research on a local nation-wide scale manufacturing company was also conducted to address the perspective of a manufacturing company's executive on making sustainable

choices for their company. Business Management tools such as break-even analysis, profitability ratios, financial ratios, and more will be used to develop the angles of financial and societal implications of these changes.

Business Management tools such as the STEEPLE analysis, triple bottom line, stakeholder analysis, and PEST analysis will be utilised to structure the two arguments. In the case that the tools require primary data, such data will be provided from a local manufacturing company located in Thailand. However, the majority of data analysis will be conducted via case studies through online research. These company case studies can be used to interpret executive decisions, see the results of switching to sustainability for various businesses in regions of Asia.

The company case studies and financial data provided by the company online can be biased due to the company's concern for its reputation and image. Therefore the data provided online can be limited, to not disclose sensitive information, as well as misleading to shape the company image. The primary resource that is supplied by the local ice manufacturing company in Thailand has many

limitations, however it truly shows the detailed steps an executive needs to take in order to pursue a sustainable change for a company. One of the limitations of the source is that the interviews, perspectives can be biased as the information is directly interviewed from an executive who is aware of the intent of the interview. Furthermore, another limitation is that a manufacturing company in Thailand is small scale compared to the vast majority of Asia therefore it is not a good representation of the general trend. However, it does provide for a realistic, accessible, and approachable case study for sustainability.

Hence why the research paper heavily emphasises the usage of multiple secondary resources to form a better understanding and investigation into the topic rather than magnifying a small scale business in comparison to the entirety of the Asian region. These secondary resources are from various countries around Asia such as China, Japan, and Thailand. This is intentional to the research paper as this investigation desires to take into account the entire region of Asia.

The arguments of this essay will be based on two angles. The short term financial and societal implications of switching to sustainable practices and the long term financial and societal implications of switching to sustainable practices.

The arguments are surrounding the claim that manufacturing industries in the regions of Asia can benefit financially and socially from switching to sustainable energy in the long term. However, the limitation of these investments are the short term effects of initial investment cost.

2. Angle 1: Short Term Investment’s Impact

Many manufacturers fear switching to sustainable energy resources as they are afraid of the upfront investment. This investment is paid in percentages over time however if mismanaged, can be detrimental to a company’s cash flow. A case study that can be analysed is a solar panel project proposal from two solar panel companies in Thailand. The proposal is targeted towards TangChareon Ice Factory, a medium to large scale factory in Thailand.

2.1 Lenso Intertrade group Solar Panel Proposal

System size			Energy generation		
Amount of Solar Panels	780.00	Piece	Energy generated per year	650,634.45	kWh/Year
Solar panel energy provided per panel	665.00	W	Energy generated per month	54,219.54	kWh/Month
Space per each solar panel	3.11	sq.m.	Energy generated per day	1,782.56	kWh/Day
Extra space	0.50	sq.m.	Average cost saved per year	3,331,248.40	Baht
Total space for installation	2814	sq.m.	Average cost saved per month	277,604.03	Baht
Sunlight per day (outsourced)	4.12	Hours/day	Average cost saved per day	9,126.71	Baht
Size of total system	518.70	kW	Total energy generated for 25 years	16,265,861.35	kWh
Depreciation of solar panel per year	0.45	%	Price of total system		
Efficiency of panel			Baht per Watt	28.25	Baht/W
			Total cost of investment	14,653,275.00	Baht
			Payback period	4.19	Year
			Average return rate	23.84	%

LENZO Intertrade group Proposal

[1] Translated proposal (Original in appendices)

To break down the proposal to its fundamental aspects, we will be analysing the savings per year, price per watt, rate of return, average rate of return, and solar panel efficiency. According to the proposal presented above, the savings per year totals to 3,331,248.40 Baht (approx. 95178.53 USD), savings per day being 9,126.71 Baht (approx.260 USD). In the proposal the company has given us the calculated average rate of return on investment as well as rate of return. It is mentioned that this investment will take around four years to return the initially invested amount and it has an average rate of return of 23.84%. The total upfront investment is 14,653,275 baht (approx. 418665.02 USD). This total investment will be used to produce 1782.56 kWh/day and 650,634.45 kWh/Year. The average return rate can be calculated using $\frac{(total\ returns - capital\ cost)}{years\ of\ use} / capital\ cost$.

In this case the average return rate is $\frac{((3,331,248.4 \times 25) - 14,653,275) / 25}{3,331,248.4 \times 25} \times 100 = 3\%$. Which is arguably a minimal amount added with the 4 year payback period.

2.1 Solar PV Rooftop Solar Panel Proposal

Item	Description	Qty	Unit Price (Baht)	Total Price (Baht)
A Local Equipment for Solar PV Rooftop (Mat in Thailand)				
1	Photovoltaic (PV)			
	PV Module Mono crystalline 660 W	672 EA	6,800.00	4,435,200.00
	PV MOUNTING STRUCTURE	1 Lot	650,000.00	650,000.00
	Civil works(Hallway,Life Line,Guard rail and Service stair)	1 Lot	400,000.00	400,000.00
2	DC Cable & ACCESSORIES	1 Lot	750,000.00	750,000.00
3	String Inverter (10 years warranty) (CIF by Owner)			
	HUAWEISUN2000-50KTL-M3.50 kW	8 Units	105,800.00	844,800.00
	Inverter Station	1 Lot	75,000.00	75,000.00
4	AC Cable,AC panel,Conduit,Support...etc.	1 Lot	750,000.00	750,000.00
5	Modify Existing MDB	1 Lot	100,000.00	100,000.00
6	Installation (Cost of product transport)	1 Lot	1,250,000.00	1,250,000.00
Electricity Production Control Equipments (2 years warranty)				
7	Grid connection following PEA regulation			
	Reverse Relay Protection & Zero export	1 Set	580,000.00	580,000.00
	Weather station include sensor	1 Set	120,000.00	120,000.00
	Workstation, Master Control, UPS, Monitor Program, HUB Unit & Internet System... Etc.	1 Set	150,000.00	150,000.00
8	ENGINEERING DESIGN	1 Job	25,000.00	25,000.00
10	SUPPORT & ACCESSORIES	1 Job	220,000.00	220,000.00
11	PV cleaning and water pump - Storage Tank , water pipe	1 Lot	75,000.00	75,000.00
12	System warranty 2 years after finished installation - O & M	2 Years	120,000.00	240,000.00
13	Insurance during construction	1 Lot	50,000.00	50,000.00
14	Permit for Solar PV Rooftop	1 Lot	150,000.00	150,000.00
15	Overhead	1 Lot	150,000.00	150,000.00
16	Profit	1 Lot	200,000.00	200,000.00
Total price				11,215,000.00
				(vat 7%) 785,050
				12,000,050.00

Solar PV Rooftop Proposal
[2] Translated proposal (Original in appendices)

This proposal from Solar PV Rooftop Ltd. Company is less detailed than the first one. However, this does provide us insight into the initial upfront investment that the manufacturing company needs to pay if they want to invest in these solar panels. For this proposal, the initial upfront investment is 12,000,060 baht (approx. 342858.87 USD). This proposal does cover the initial investment, as well as the installation fee however does not permit enough data to calculate the average return on investment as well as payback period.

This is a real life example of how investments like solar panels or alternative energy are incredibly costly to the company’s short term cash flow. These costs do not involve the maintenance cost that builds up to the investment over time. It has been researched by the Kasikorn Bank Research Center that one of the businesses that rely on electricity the most are ice factories in Thailand, electricity bills take up around 30% of cost and allocated profits to cover those overhead costs (Kasikorn Bank Research, 2022). However, even with a proposal that produces 1782.56 kiloWatts/hour per day it still does not suffice the energy demands of the manufacturer. In order to actually implement this solar panel system into the company’s power grid, the executives formulated a solution that involves a hybrid system between solar panel and normal electricity to lessen the costs. However, once given the proposals the executives still decided against the investment of solar panels as a.) it does not meet the energy consumption needs of the company to be

efficient and b.) the overhead costs are deemed too high once we also take into account the maintenance costs.

2.2 General demographic, Globalisation trends, Marketing tactics, and Government subsidies

The societal perspectives in Asia play a huge part in making a business decision, especially one that has been previously discussed to cost a huge sum of money. This aspect of the research paper will be discussing the general demographic, globalisation trends, marketing tactics, and government subsidies with regards to making a sustainable change. Firstly, in order to identify the demand and trends within a market it is helpful to look at governmental support. Governmental support and subsidiaries translate to an incentive for businesses to shift to green energy. It also signifies that the market is in high demand socially, hence why the government aims to support the small-medium sized companies financially. To put into perspective the rise in electricity bills across large manufacturing countries in Asia. An article posted on the Bangkok post reads “The Federation of Thai Industries (FTI) calls for industrial power subsidies” (FTI Calls for Industrial Power Subsidies, 2022). This article discusses the “expensive electricity bills” that are threatening to put extra pressure on manufacturers and industrial factories who rely heavily on electricity for their production. This article further pushes the government to support their manufacturers and provide aid with regards to electricity bills. It can be inferred from this article that electricity bills are rising exponentially within Asian countries like Thailand. According to the article the power tariff in 2022 skyrocketed

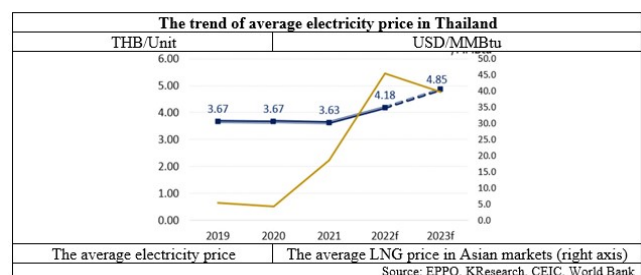


Figure 1. Trend of average electricity price in Thailand
Source: Kbank Research Portal

to a new high of 4.72 baht per kilowatt-hour. With reference to figure 1 (Kasikorn Bank Research, 2022), Kaskikorn’s (Bank of Thailand) research sector has visualised a trend of average electricity price in Thailand that has risen exponentially over the years. This shows the growing demand for electricity which translates to a dependence on more sustainable energy.

This shows how clean energy is in high demand, and clean energy would logically lead to a better economic standpoint. A country that has been investing heavily in this area of sustainable practices is China. According to a market research conducted by BloombergNEF, China spent 545\$ billion in 2022 to invest in solar, and wind energy. To put this into perspective, this is nearly four times the amount of U.S investments. By the year 2023, China is benefitting from these investments which signifies a growth in green trends and sustainable energy (Schonhardt, 2023). A beneficial analysing tactic of global markets is to consider the larger scale’s companies CSR objectives or their efforts to switch to green trends. For instance, Swire Properties (Top 10 Sustainability Case Studies & Success Stories in 2023, n.d.) [5], a construction company that operates in China and Hong Kong, built One Taikoo Place which is a green building that aims to reduce GHG (Greenhouse gas) emissions to align with the company’s sustainability goals. The company reduces electricity consumption by using smart lighting tools that employ the usage of sunshine and motion sensors. As a result, Swire Properties reduced 20%% of their GHG emissions. This company’s executive decision to pursue sustainability goals reflects onto the global trend of businesses switching to sustainable energy (even in hybrid systems). Hybrid systems are commonly used, especially within smaller-medium bracket companies, to mitigate the usage of electricity and more reliance on renewable energy. As interviewed by a company executive being the founder of a manufacturing factory in Thailand, manufacturing factories are in talks about employing hybrid systems. Not only to mitigate electricity bills but to also garner improvements in company image as implementing solar systems into the company's power grid will appeal to the company’s CSR.

The STEEPLE analysis can be used to analyse the external environment, which in this paragraph is the globalisation green trend of manufacturing companies in Asia. In order to make large executive changes or alterations, the STEEPLE analysis allows company executives to research market availability and climate to see if it is suitable for a change.

<p>Social</p> <p>The global trend surrounding sustainable energy is growing rapidly. And global warming is becoming one of the most urgent crises that every country is experiencing first hand. Therefore, any efforts to make the Earth cooler will aid the company’s CSR heavily.</p>	<p>Technological</p> <p>Technological advancements are being made with regards to green energy. Multiple businesses are finding ways to become greener. This drives the technological development process to innovate for the environment rather than for money.</p>
<p>Economical</p> <p>With increasing electricity bills in Asia, as discussed prior, this challenges manufacturers to keep up with the rising initial cost of their main power source. Manufacturers in countries with higher FT and electricity bills may be at an economic disadvantage with manufacturers overseas who have less initial cost, attracting foreign investors and economic growth opportunities.</p>	<p>Environmental</p> <p>The cause of global warming is humans, and for decades we’ve been depleting the Earth of its natural resources. Since environmental changes are happening rapidly, it is only natural if businesses adapt to the changing environment. Instead of depending on fossil fuel electricity for survival, it is wiser to implement a hybrid system to gain energy from a more abundant force.</p>

<p>Political</p> <p>Manufacturing industries are calling for governmental subsidies for electricity bills as it affects the initial cost of production process which in turn increases the overall price of the products. Government plays a huge role in</p>	<p>Legal</p> <p>Not applicable.</p>
<p>Ethical</p> <p>When shifting to a green energy, there is an alternative incentive of reducing costs. There is an ethical consideration that needs to be evaluated about marketing and advertising this executive decision as completely environmentally driven.</p>	

Dependent Variable	Sharpe ratio		Stock return		Volatility	
Panel A						
Parameter	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	0.230	0.293	20.001	0.003	55.478	0.000
Env Imp / Sales 0%	-0.016	0.234	-0.199	0.636	0.318	0.043
ROA	3.534	0.000	101.533	0.000	-11.536	0.000
Leverage	-0.297	0.000	-6.426	0.007	4.450	0.000
CapEx / Sales	-0.167	0.715	5.273	0.750	6.167	0.017
R&D / Sales	0.333	0.223	12.790	0.430	-4.407	0.188
Dividend / Sales	-0.410	0.029	-33.705	0.000	-22.594	0.000
Sales	0.007	0.383	-0.722	0.004	-1.517	0.000
Panel B						
Parameter	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	0.267	0.243	22.607	0.001	51.709	0.000
Env Imp / Op Inc 0%	-0.045	0.000	-0.822	0.004	0.613	0.000
ROA	2.807	0.000	84.292	0.000	0.293	0.902
Leverage	-0.247	0.002	-4.362	0.090	3.830	0.000
CapEx / Sales	-0.579	0.031	-12.900	0.182	5.881	0.027
R&D / Sales	0.780	0.043	16.919	0.184	-5.496	0.199
Dividend / Sales	-0.445	0.026	-35.325	0.000	-22.246	0.000
Sales	0.005	0.581	-0.861	0.001	-1.404	0.000

Source: Harvard Business School Accounting & Management, Table 6

“Table 6 describes OLS models that regress independent variables, log-transformed environmental intensity, dependent variables, Sharpe ratio, stock return, and stock price volatility. Sharpe ratio is defined as stock return over the calendar year divided by stock price volatility over the calendar year. All models also include year, industry, and country fixed effects. Specifications for the environmental intensity calculated using a 0% discount rate are included.” (Freiberg et al., 2020, #)

To summarise the key findings of this data set, companies who are more environmentally driven have lower stock investment returns and higher volatility (unstable market security, unpredictable price movements). Whereas environmentally conscious companies who operate with close navigation to its short term stability have a stronger stock investment return and less volatility. To interpret this data in our context, financial stability is possible in the long term. However, it requires close navigation as well as the company’s focus to not be entirely on the environmental factor in order to preserve longevity.

Ever since mankind has discovered fossil fuels, every energy sector relies on fossil fuel as their main energy resource. However, as time progresses society becomes more reliant on sustainable energy sources. This is due to the fact that fossil fuels are a resource that is becoming scarce. This scarcity in fossil fuels drives the electricity bills and heavily affects manufacturers specifically in Asia in the long term. Hence why, company executives strive to invest in sustainable energy, increasing extra initial cost in the short term, in order to increase company longevity and stabilise the costs of the company. The bottom line is that businesses who are capable of balancing short term profitability with long term sustainability will show more progressive growth in the future.

According to global investments data (Balancing Short-Term Profitability With Long-Term Sustainability in Business Management, 2023), from 2016 to 2018 the growth

3. Angle 2: Long Term Investment’s Impact

As previously discussed in Angle 1, the upfront costs of implementing sustainable energy into a manufacturing business can be incredibly risky and expensive towards the business’s cash flow. A Harvard Research on Environmental Impact was able to provide us insight into the financial projections of various manufacturing companies across the world. This table specifically discusses the returns, risks, and environmental intensity of a company’s sustainability footprint.

in investment for sustainable businesses increased by 34%. This is due to the fact that investors are constantly looking for companies that project longevity (sustainability) and a more abundant energy source would lead to more access to capital. Companies that struggle to start investing in sustainable energy will have to eventually switch to a hybrid system in order to have access to renewable energy. Although it is a large investment upfront, it reduces electricity cost over time. Especially with how quickly electricity bills are rising as shown in figure 1, sustainable energy is a sure path to a more profitable future for the company. According to Pwc Consumer Intelligence Series 2021 June edition, “80% of consumers are more likely to buy from a company that stands up for the environment.” (Customer Attraction for Energy and Utility Companies, n.d.). This shows that an investment in the sustainability sector can increase an audience’s attraction to the business and its products.

However, it is crucial to note that these changes, although popular amongst power house countries, is a struggle for smaller economy countries in Asia. Although the “developed” countries such as China, Hongkong, South Korea and Japan are working hard on investing in sustainable energy and pushing for their manufacturers to do the same. Data from International Energy Agency (Key Findings – Southeast Asia Energy Outlook 2022 – Analysis - IEA, n.d.), suggests that South East Asian countries are still struggling to adapt to the scarcity of energy as they are heavily reliant on fossil fuels and crude oil for energy production.

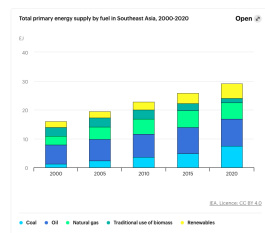


Figure 3. Data for energy consumption of SEA countries

In order to analyse societal trends that lead to longevity for a business, we can use the Triple Bottom Line business management model. The triple bottom line model extends a business’s objective for success to be more than the fundamentals but also focus on the more nuanced topics such as People, Planet, and Profit. A sample of a triple bottom line model being used to supply a business’s executive decision:

Triple Bottom Line Tool

Context: Switching to sustainable energy as a medium sized manufacturer in SEA

People

The general population in the South East Asian countries are well educated and pushes the need for stopping climate change. People especially in the middle class or above are more likely to spend their money on

environmentally friendly products, especially when the price is only slightly more expensive. Especially because global warming is directly affecting the regions in the Equator, increasing the daily temperatures of Thailand, Philippines, Singapore, and more.

Planet

The Earth’s temperature is rising rapidly and new highs are being broken annually. It is a corporation’s duty to ethically consider the consequences of their actions. Industrial factories are responsible for minimising their own GHG waste. For instance, Hitachi company (Japanese technology company) is known for its ability to withstand time and change throughout the decades proving its capability to be a versatile and adaptive business. It is recognized that their survival is mostly credited to their emphasis on research and development to keep the company one step ahead. Hitachi company dedicates their funds to sustainable energy and sustainability as a part of their company CSR. Another instance would be Starbucks implementing the usage of reusable cups or paper cups to reduce waste. These are all examples of how companies and businesses are adapting to aid the warming planet.

Profit

As mentioned before in the paper, businesses usually struggle with balancing short term profitability and long term sustainability. However, once achieved, the company will be able to grow exponentially and attract valuable investors. For manufacturers in SEA, if the company is one with a constant loyal stable base of customers, then it will be easy to sustain a cash flow. This helps with the short term profitability issue.

4. Conclusion

To conclude, investing in sustainable energy can be costly upfront however if the company is able to balance short term profitability and long term sustainability the outcome will be highly beneficial to the company both socially and financially. It can be seen from multiple case studies that financially, companies had to invest large sums of money upfront. Whilst also having to wait out in the long term to get a return on investment. On the financial standpoint, sustainable energy can be a rewarding and beneficial decision in the long run however the benefits are dependent on the type of business and energy capacity it requires. However, on the social perspective, it has been proven to be beneficial in both the short and long term. In the short term the societal perspective is positive towards the company, garnering more attention towards the company. Furthermore, in the long term companies gain more customer loyalty and are able to develop the structure to take into account the ethical implications of switching to sustainable energy.

This research consisted of primary and secondary resources mainly from China (Central Asia), Thailand (Southeast Asia), and Japan (East Asia). However, in order to take into account the short and long term effects in Asian regions it is better if we are able to garner more data from multiple countries in Asia. It would be more useful to have various sources and more financial projections in order to take into account the long term effects more accurately. The limitations of our research consisted of only having access to open source secondary data. This means that our main methodology was primarily data mining which has data range limitations. A dataset that would have allowed us to have a more progressive analysis is a clear company case study that shows the long term financial projection of an asian medium-sized company which invested in a solar panel project. This helps us clearly see the effects of a heavy upfront investment on a company's longevity.

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