

الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
يُونِيسْكَوِي اِسْلَامِي اِنْتَارَا اِيْجْسِيَا مِلِيْسِيَا

SUSTAINABLE DEVELOPMENT: ISSUES, POLICIES
AND PRACTICES
(UNGS 1201)

TOPIC: GROUP PROJECT
(HYDROELECTRIC AS A MEDIUM OF ELECTRIC
SUPPLY IN IIUM)

NAME	MATRIC NO.
MUHD AZAM BIN ANUAR	2012679
RIFQI SYAZZUAN BIN MOHD REDHUAN	2011635
MUHAMMAD ALI AKBAR BIN AZMI	2017805

INSTRUCTOR: MADAM NOOR AZIAN MOHAMAD ALI

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Project Title

The title of this project is “Hydroelectric As A Medium of Generating Electricity in IIUM”.

1. Background

1.1 Overview

Day by day, year by year, as time continues to grow, technologies in our world continue to evolve. From using fires as a source of light, now we use LED lights, from using pigeons as a form of communication we now use e-mail. Electricity, the pushing force behind almost every aspect of our lives. As we can see, our daily lives are surrounded by electricity; it runs through almost everything around you. It powers this technologically advanced society we live in. that makes our life a lot comfortable and easier. We are so much dependent on electricity. Our life becomes still when the electricity supply shuts off however small the duration is. As we continue our lives being intertwined with the use of electricity, makes it a need in people’s lives and through this we have discovered many different ways of creating it which includes geothermal, solar, coal, hydro and many more.

International Islamic University Malaysia is an education institution where a high amount of electricity is used. Looking at one of IIUM’s campuses, the main campus is headquartered at a 700-acre (2.8 km²) campus at Gombak, Selangor which clearly shows that throughout the 700-acre buildings are there and electricity is needed. Therefore, this project is to provide an electricity supply to the campuses of IIUM starting with the main campus in Gombak. To supply electricity to the campus is through the method of hydroelectric which is producing electricity with the power of hydro (the current & flow of the water). It is seen through this project that we could bring the world to a cleaner environment by obtaining energy without polluting the environment. Through this we are able to achieve some of the goals of Sustainable Development Goals (SDGs) and as IIUM is one of the sustainability institutions in Malaysia, IIUM university management encourages the administrative staff and students of IIUM to participate in the SDGs projects as it shows support to UN and the Government of Malaysia. In striving to set a new pace and culture in *Leading the Way for Rahmatan Lil ‘Alamin* through a sustainable way, the university management introduces ‘Humanising Education to Produce Balanced Staff through *Maqasid Syariah* and Sustainable Development’. This is an opportunity to cooperate with IIUM in achieving success in this

project as this project aims to achieve three goals from the SDGs which are Goal 6 (Clean Water and Sanitation), Goal 7 (Affordable and Clean Energy), Goal 14 (Life Below Water).

1.2 Implementation

As mentioned before, this project aims to implement the medium of hydroelectric as a source of clean, affordable and renewable energy to the community and as a first step for this project to be huge; it is wise to start slowly by targeting to supply IIUM's main campus in Gombak.

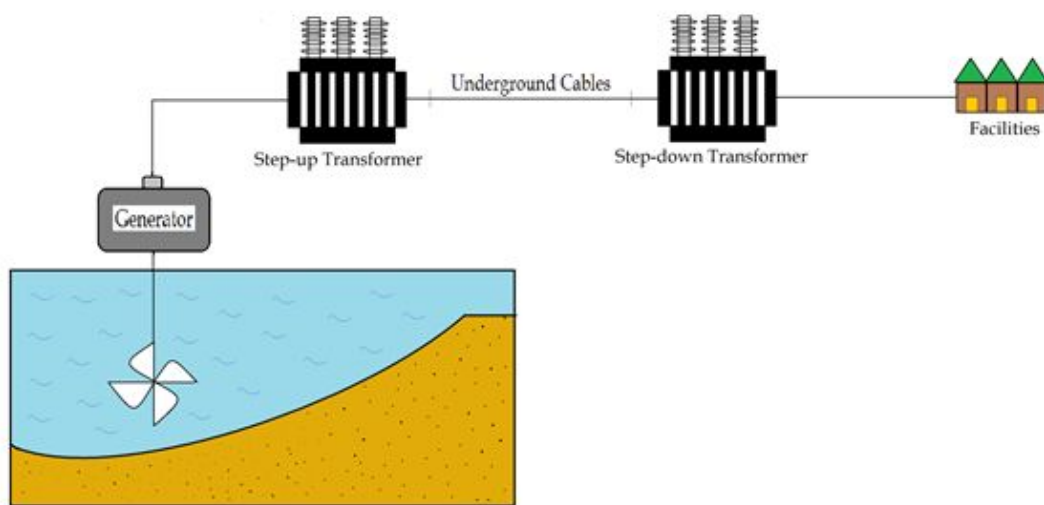


Diagram 1



Diagram 2

Based on diagram 1, the hydroelectric generator will be placed in Gombak River and referring to diagram 2 that serves as a visual example to how the turbine is being placed in the river. The process of creating electricity from hydroelectric works with the current of the river that flows through the turbine which will move and will also supply movement to the generator which will produce electricity. However, the electricity produced is not enough to supply electricity to the facilities, here comes the transformer. A transformer is an electrical device that trades voltage for current in a circuit. They are there to transform high-voltage electricity with a small current and change it into low-voltage electricity with a large current, or vice versa. Looking at Diagram 1 it shows that we have two transformers where one is to heighten the voltage that is called the ‘step-up transformer’ and the ‘step-down transformer’ is to lower the voltage to fit the voltage needed at a facility. By that process, electricity is generated and is transferred to facilities ready to be used.

Another consideration in implementing this project is the location. As mentioned before, the project will take place at Gombak River specifically at Masjid Al-Shariff Simpang 3. The location of the project is a bit far from the campus to be exact around 4.5 KM from IIUM Gombak because to generate electricity the flow of the river must be compatible with how many voltage we want to produce which makes the river beside Masjid Al-Shariff Simpang 3 is chosen as the project location. This also serves an opportunity to supply electricity to the mosque. But, how are we going to supply electricity to the campus if its 4.5 KM apart? The answer is, through underground cables which will make the electricity generated able to reach the targeted location of the supply which is IIUM Gombak. For specific location, refer Diagram 3 and 4.

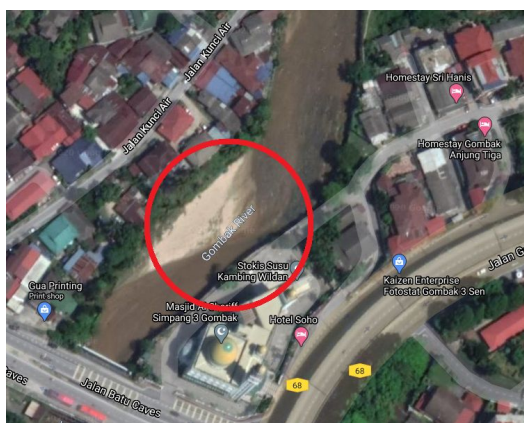


Diagram 3

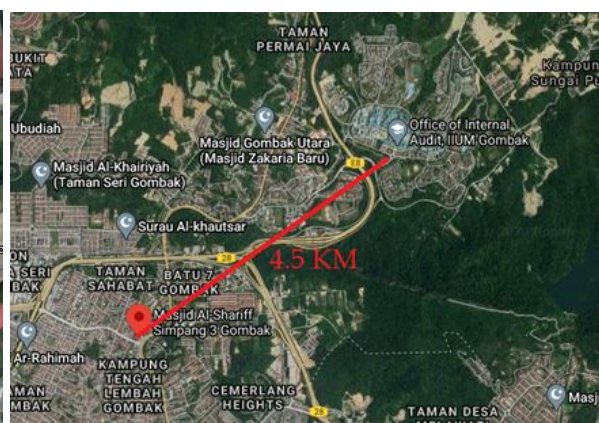


Diagram 4

2. Objectives of the Project

All projects need goals and objectives in order to ensure the success and sustainability of the project. An objective will act as a motivation that will keep you going and surviving. It will also help you to overcome all obstacles and challenges that can be considered as a hindrance in the midst of your journey. The objective also will assist to reflect our real intention of executing a project. These are the reasons why we set up a set of goals and objectives in our proposed project. We want to ensure that we will be consistent with our intention and eventually achieve great outcomes that will bring various benefits to the world and mankind. This action also gives the society an opportunity to oppose and reject if they find that this project is repugnant and inconsistent which will affect their daily life.

The Sustainable Development Goals (SDGs), a worldwide project also has their own goals and objectives. The SDGs are aiming to eradicate poverty, protect the planet, and ensure all people enjoy a life with peace and prosperity. Generally, this Hydroelectric Generator project shares the same goals with the SDGs, but it mainly focuses on the aspects of protecting nature and ensuring the harmonious society life in Gombak as it is the specific location of our project. The general objective of this project is that we want to secure these two elements. Besides, we also want to make this project as an effort to support the SDGs project conducted by the United Nations Conference. We are required to participate in this global effort as we are a responsible citizen.

We also set up a set of personal goals in the implementation of this project. The goals are to educate the society regarding the Sustainable Development Goals (SDGs) project, and to raise awareness about the importance of this project.

Firstly, the personal goal is we want to educate the society regarding the SDGs through the implementation of this hydroelectric project. Education about this matter is important as it will give sufficient and adequate knowledge about how to save nature and society. This information will help to answer all questions and critics arise from the society to the efforts of implementing SDGs. Most of the society nowadays give negative comments not solely because of the disadvantages of the project, but it is caused by their limited knowledge about these goals. Thus, they tend to oppose this kind of project on the ground that it is a high cost project without considering the main functions of this work. Therefore, we intend to propose this project at Gombak in order to change society's perception as we will show them

the way this project will give benefits to mankind and nature. We also want to demonstrate the proper method of utilizing the natural resources granted by Allah S.W.T. This is how the project will help to enhance the knowledge of the society regarding the SDGs.

Next, our personal goal is we want to raise the awareness of society. We need the people to know about the current situation of our nature which can be considered as a critical condition. This situation happened because of the irresponsible human conduct that loves to fulfil their interest only. If we did not take this matter seriously, we will lose our world, which impliedly means that future generations will not be able to enjoy the benefits of this world anymore. We intend to make society realize that they have a responsibility to nature, and they must take action immediately to avoid the situation from becoming worse. The implementation of this project is one of the methods to execute our responsibility to protect and preserve the world. To conclude, we want to ensure the society becomes aware of our current circumstances, and starts to play their roles to save the world.

These explanations illustrate our personal goals which we regard as a mission that we need to accomplish upon implementing this project. However, notwithstanding with the personal goals, we have three main objectives in this project which are to fulfil the goals in SDG 6, SDG 7, and SDG 14.

The first objective of this project is we want to accomplish the goal in SDG 6, “Clear Water and Sanitation”. The target of this goal is to ensure the availability and sustainable management of water and sanitation for all. By 2030, this goal wants to achieve universal and equitable access to safe and affordable drinking water for all, access to equitable and adequate sanitation and hygiene for all, and improve water quality by reducing pollution. It also wants to protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers, and lakes. In our project, we intend to take proper care of Sungai Gombak, one of the well-known rivers in Gombak by utilizing it to generate electrical power to supply to IIUM. In conjunction with that, we will ensure the cleanliness of the river so that it can be the main source for electrical power and water supply. As we know, water is the most essential element in our daily life as we use it regularly to drink, wash, and take a bath. If we can maintain the cleanliness of this river, we can guarantee the safety of the water supply. Hence, society can use it without any issue such as the contaminated water supply. This issue is a threat to the users as it may cause diseases. We want to make Sungai Gombak as a main source for water supply, we will ensure all residents in IIUM get full access to it.

To conclude, the objective of this project is we want to manage Sungai Gombak in a proper way in order to make it as a main source for water supply that is safe and affordable.

Next, we want to fulfil the goal prescribed in SDG 7, “ Affordable and Clean Energy”. This is the second objective of this project. This goal is aiming to ensure access to affordable, reliable, sustainable, and modern energy for all. The targets of this goal are to increase substantially the share of renewable energy in the global mix, and to expand the infrastructure and upgrade technology for supplying modern and sustainable energy services by 2030. In this project, we will build the hydroelectric generator at Sungai Gombak, and it will act as a medium to generate electrical power. Hence, we can supply it to all buildings in IIUM campus. Water is a natural and renewable source, we will use it to produce the electrical power. Our current electrical power supply comes from non-renewable sources which made it less sustainable. As we know, electrical power supply is essential in our daily life as the technology requires electrical power to operate efficiently. There are many technologies and electrical appliances in a university like IIUM. Therefore, we believe that if we still use our current electrical supply, it will cause harm to nature. We need to make a change immediately. This project intends to execute this change by introducing a new electrical power supply generated from renewable sources which is more sustainable, affordable, and reliable.

The other objective of this project is we want to complete the goal stated in SDG 14, which is “ Life Below Water”. This goal is aiming to conserve and sustainably use the oceans, seas, and marine resources for sustainable development. The targets of this goal are to prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution by 2025, and sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts. We intend to take proper care of Sungai Gombak by clearing the pollution made by the irresponsible person and preventing further contamination through the implementation of this Hydroelectric Generator project. As we have learned in “Pulau Sampah” video, we know that people have the tendency to dump their garbage into the sea, lake, or river as for them, it is the easiest way to dispose of waste. This situation also happens in Sungai Gombak. Most of the society do not know about the consequences of this act. Based on the biological fact, the waste, tank leakage, chemical pollution and others will increase the level of Biochemical Oxygen Demand (BOD) in the water. A high level of BOD will affect the marine life as the

aquatic organisms become stressed, suffocate, and die. We do believe that this situation occurred because there is no authority to protect and utilize the river which makes it look useless in the eyes of humans. People will only regard it as a dumping place. Therefore, we proposed this project to overcome this issue. We will be able to show to society that the river is a precious gift from Allah S.W.T, and has its own purposes which may be useful to us. We can prevent the society from continuing their action of polluting the river once we expose the benefits of this river through the implementation of this project. Besides, we will ensure Sungai Gombak is free from any waste to ensure the generating process can be conducted efficiently. When the percentage of pollution is decreasing, the chance for marine life to live happily is increasing.

3. Project Significance

Nowadays technology is modernized, we should take this opportunity with its benefits to be invented and implemented in our lives. Since our IIUM was located with a few rivers around, then an idea came out to use its water flow for making our hydroelectric power supply do its work well. This type of machine will use the non-stop river flows continuously. Hydropower is fueled by water, so it's a clean fuel source, meaning it won't pollute the air like power plants that burn fossil fuels, such as coal or natural gas. Hydroelectric power is a domestic source of energy, allowing each state to produce their own energy without being reliant on international fuel sources. So from that observation, the river must be clean and not be polluted by any rubbish and plastics that will lead to unstable progress to the machine.

The energy generated through hydropower relies on the water cycle, which is driven by the sun, making it a renewable power source, making it a more reliable and affordable source than fossil fuels that are rapidly being depleted. Some hydropower facilities can quickly go from zero power to maximum output. Because hydropower plants can generate power to the grid immediately, they provide essential back-up power during major electricity outages or disruptions.

In addition to a sustainable fuel source, hydropower efforts produce a number of benefits, such as flood control, irrigation, and water supply. Hydroelectricity promotes guaranteed energy and price stability too. River water is a domestic resource which, contrary to fuel or natural gas, is not subject to market fluctuations. In addition to this, it is the only large renewable source of electricity and its cost-benefit ratio, efficiency, flexibility and

reliability assist in optimizing the use of thermal power plants. As we know that IIUM has many rivers like Sungai Pusu, Tasik Mariam, directly continued from Sungai Gombak and so on. So, this idea is highly recommended to be implemented now in order to have clean water supplies and supply electricity not only to IIUM but to the area around.

With an average lifetime of 50 to 100 years, hydroelectric developments are long-term investments that can benefit various generations. They can be easily upgraded to incorporate more recent technologies and have very low operating and maintenance costs. From there, the next and upcoming generations will enjoy these benefits with conditions that must be protected and kept in great maintenance to remain standing in contributing benefits to mankind and especially IIUM's community. Besides that, we also can supply the electricity for the walking street around and lessen the power usage from the main cable in IIUM. The popularity of hydroelectricity has been increasing since the total cost of operation and maintenance is negligible. Also, as they do not have to be purified, most energy suppliers prefer hydroelectric power. In the IIUM context of the area, we need the affordable components and items to build this type of hydropower machine at the same time we can save the cost and keep eco-friendly.

Hydropower is an important renewable energy resource worldwide. However, its development is accompanied with environmental and social drawbacks. Issues of degradation of the environment and climate change can negatively impact hydropower generation. A sustainable hydropower project is possible, but needs proper planning and careful system design to manage the challenges. Well-planned hydropower projects can contribute in supplying sustainable energy. An up-to-date knowledge is necessary for energy planners, investors, and other stakeholders to make informed decisions concerning hydropower projects.

Hydropower projects are unique, in the sense that the installations, though having the same installed capacity, may not be identical because the design of the hydropower plant is site-specific. This uniqueness of hydropower projects makes their classification important especially in matters concerning technology and application. Hydropower projects (or schemes) are usually classified according to size, head, and whether water for power generation is significantly impounded or not. Its classification according to size has led to projects being classified as small-scale and large-scale hydropower systems, based on the level of the installed electricity capacity. because it is also on how big and wide the rivers

area. It can hold that much size of hydropower machine to support large capacity of electricity power generation.

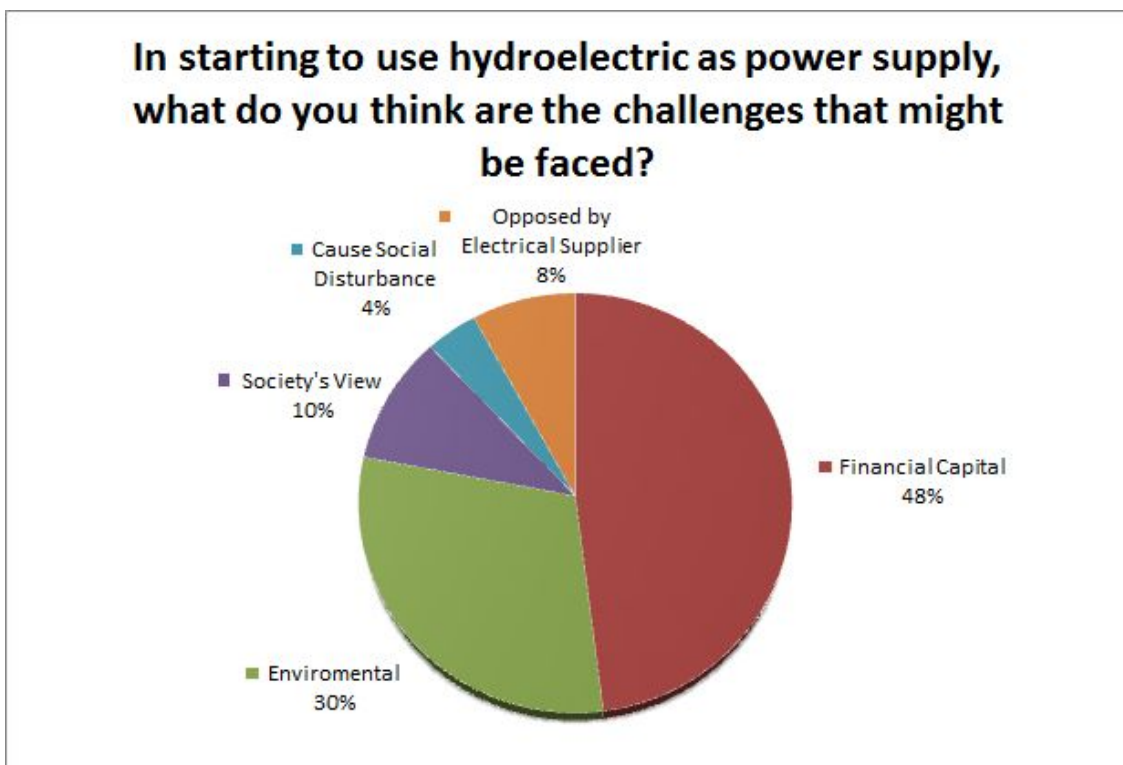
So, as mentioned above, we planned for making the hydropower machine in large scale and capacity of power and looking at people's basic mind on the functionality of hydroelectric which is the wider the river area, the bigger hydropower machine size we can build and more power will be generated. But, Sungai Gombak is not considered as a wide river, so does it generate a lower amount of electricity? Yes, however it is seen that with the power of transformers to elevate or heighten the amount of electricity, the ability to supply electricity on a large scale to the IIUM community is possible. However, hydroelectric facilities can still have a major impact on aquatic ecosystems. For example, though there are a variety of methods to minimize the impact including fish ladders and in-take screens, fish and other organisms can be injured and killed by turbine blades.

Thus, most hydroelectric operators are required to release a minimum amount of water at certain times of year. If not released appropriately, water levels downstream will drop and animal and plant life can be harmed. It is because besides we want to get through the living things habitat, we must manage it wisely and don't too much in control the nature, it does not belong to us as a whole. The living things there need its habitat and we must take care of it. To mitigate these impacts, aerating turbines can be installed to increase dissolved oxygen and multi-level water intakes can help ensure that water released from the reservoir comes from all levels of the reservoir, rather than just the bottom which is the coldest and has the lowest dissolved oxygen.

Once a hydroelectric power plant is built, it does not produce any direct waste and has a substantially lower output level of greenhouse gas emissions compared to fossil fuel-powered energy plants. At present, hydroelectric power accounts for one-sixth of the world's electricity production, with an estimated 31.5 gigawatts (GW) of capacity being put into operation in 2016. As far as our IIUM location is located near the rivers, we think this is the time to make a worthy investment in order to save the money, energy and so on with this kind of hydropower machine project and enhancing people knowledges about importance of Sustainable Development in our life and remains the pureness of nature.

4. Challenges

As we live through our days in life, it is upon one's common knowledge that in life, it is full of obstacles that block the journey of our life and those obstacles serve as challenges in our life. This is relatable with our project that while in succeeding the project it has many challenges that hardens the journey of the project. Here, we have made a survey consisting of 50 students of IIUM from various courses. This survey aims to have knowledge of the students of IIUM; a) whether they are in knowledge of hydroelectric as a medium of generating electricity, b) whether hydroelectricity is relevant nowadays, c) whether hydroelectricity is suggested to be used at IIUM campus, and lastly as the main objective of this survey d) the respondents view for the challenges that might be faced in the project's journey.



4.1 Financial Capital

Referring to the chart provided, it could be clearly seen that over 48% of the respondents believe that financial capital is to be considered as the biggest chunk of block

that becomes a challenge for the project. In succeeding this project it is agreeable to all that it contains a lot of costs which makes the project in need of a lot of funds or capital. Costs that are needed to be considered for this project are 1) cleansing the river cost, 2) building cost, and 3) maintenance cost. In order for the hydroelectric generator to function properly it is important that it needs to avoid anything that can cause damage towards the parts of the hydroelectric generator such as the turbine. Here it is important that the river is cleaned, clear of rubbish that may damage the parts. Secondly, the cost in building or setting the generator includes for any reshaping the river, the parts (turbine, generator, mini dam, power house etc.), the station transformer and also the cost for installing underground cables for the power to reach IIUM Gombak. Lastly, the maintenance cost for any damages that might fall upon the parts of the whole project from the turbine to the wires that connect to IIUM's electricity supply. Therefore, this project requires a significant amount of monetary investment or funds.

4.2 Environmental Concerns

Referring to the chart provided, it could be clearly seen also that over 48% of the respondents believe that Environmental concerns like Unexpected Weather (drought season), the river's tide affects the flow of the river 32.7% is to be considered as the biggest chunk of block that becomes a challenge for the project. In succeeding this project it is agreeable to all that it contains a lot of well-planned strategies to prevent any bad outcomes that will delay the hydropower progress. We must take a look for some challenges that might be our concern when it comes to making these projects stuck or pending. For instance, the weather alternation or natural disasters like flash flood, drought and low tides. These challenges will prevent the hydropower from running well.



4.3 Society's Negative View

One of the challenges that we might face during the implementation of this hydroelectric project, is the negative perceptions and comments from society. We confine the scope of society here to the residents around Sungai Gombak and IIUM only. The perception made by the community is a challenge as they will continuously critic and condemn, which may affect the process and procedure of the implementation of the project. It will be extremely difficult for us to ask for their consent and cooperation. This negative mindset also may lead to any other immoral acts. There is a possibility that a person may trespass the project site, commit vandalism, and continue their usual practice of dumping garbage into the river. This situation is likely to happen as from society's understanding this hydroelectric generator does not produce any benefits, instead, it will only affect their daily business.

Society gives negative perceptions to this project because of their limited knowledge about the Sustainable Development Goals (SDGs) and efforts to achieve those goals. This shortcoming is due to society not given full exposure to this matter, which makes them incapable to differentiate between a sustainable project and a common factory project. They have the opinion that the generator will produce an excessive amount of chemical waste to the atmosphere and river. They want to avoid the incident of Sungai Kim Kim from happening again in Gombak. All of us know that the incident caused harm and injury to the people, especially the students and teachers at the school nearby. Therefore, it is normal for society to be more aware and cautious, especially when dealing with a project that may release harmful substances that will affect their health and well-being. We do understand this circumstance, so we need to prove that this project is different from others. On the other hand, a hydroelectric generator does not exist in Gombak. Hence, it is not something usual in this area, and people cannot accept it easily. This fact makes the issue more challenging as it will be difficult for us to change people's mindset. Normally, a human will only uphold their opinion which they considered as the most accurate opinion, and not open up a space to adapt with any new changes. Based on the psychological fact, this behaviour is known as cognitive dissonance. The definition of this term is the uneasy feeling of holding inconsistent beliefs, and people would rather deny new uncomfortable information than reshape their worldview to accommodate it. To conclude, negative perceptions from society raise a challenge for us to execute this project because it will be tough to convince them regarding the efficiency of our

hydroelectric project. In brief, the challenge here is we need to change people's perspectives to obtain their consent and support.

5. Recommendation

We have encountered several challenges from the survey conducted. Therefore, in this recommendation section, we will propose a set of solutions to overcome those challenges. This step is crucial as we need to solve the issues immediately. If not, it will become a hindrance that may affect the implementation process of this project.

5.1 Solution for the first challenge, Financial Capital

It is mentioned that this project requires a huge amount of financial capital as it has a lot of costs. This is the most acknowledged challenge because without capitals or funds the project could not be operated. As a solution to this challenge, it is believed the best way to tackle this to optimize and maximize the performance of the generator itself. Operational improvements are able to do so, as existing plants are eligible for several operational changes. During these changes or improvements new technologies can be inserted to serve the purpose of optimizing its performance that leads to an efficient spending of funds which also, in sync with the saying 'With High Cost, Comes High Return'.

5.2 Solution for the second challenge, Environmental Concern

So, for these problems' solution might be hard to find because the natural disasters are unpredictable and will happen anytime, but the usual solution is to build the dam at Sungai Gombak to hold back a huge quantity of water to remain flowing in running the hydropower turbine continuously. Overall, when this project runned, all the outcomes can be prevented well when the dam is already built and if the tides become lower, it doesn't seem a problem because the water has been dammed. As mentioned in the significance subtitle of this project, even if we don't have that reservoir and dam, those can be our solution for this problem if it happens suddenly.

5.3 Solution to solve the third challenge, society's view

We also propose a solution to overcome the challenge of society's perception that arises during the process of implementing our project. Based on our recommendation. We intend to organize a campaign to introduce the ideas of Sustainable Development Goals (SDGs) and our hydroelectric generator project. We plan to conduct this program at IIUM, and we will invite the lecturers, students, and residents of Gombak to participate. In this campaign, we will have an open discussion session where the process of exchanging information will occur between society and our group, the project planner. We can answer every question asked by them during this session. We also can provide sufficient and adequate knowledge about our project and its relation to the SDG goals. These steps will help to avoid any misunderstanding and miscommunication. We believe that this campaign can bring a lot of advantages to all parties involved as we can widen our general knowledge of SDGs and we can correct society's negative view of our project.

Nevertheless, it seems impossible to organize a campaign as we are in a pandemic situation where our movement is restricted. We have to abide by the standard operating procedure (SOP) prescribed by the Government of Malaysia. The government prohibits us from organizing a mass gathering, and society is encouraged to avoid crowded places. Therefore, we will change our method, which is by formulating an e-campaign. This program will be conducted virtually. The concept of an e-campaign is just the same as an ordinary campaign, but we make a change to the method of exchanging information from an open discussion to informative videos. We understand that not all people could afford to join a live online session as it will consume a large amount of internet quota. So, we will deliver the project ideas in a video form, and the duration will not exceed 10 minutes as people might get bored if we explain too long. The video will be presented creatively, which means it is not a mere interview or explanation, but it is a presentation that contains some animation, drawings, and mind maps. We want to present the video in a creative way to attract the audience's attention so that they will keep watching the videos and will not miss any important information. The facts also will be written in a simple form and put in a captivating e-poster. We need to avoid writing it in an essay form as people tend to neglect it. Besides, we will also conduct online quizzes and mini-games related to the SDGs and our project in this e-campaign to entertain the participants. They also can learn about the SDGs through entertainment. We opt to utilize all online platforms such as YouTube, Facebook, Instagram,

and Twitter as the communication medium. These are the easiest ways to approach society as most of us nowadays use social media regularly. These are our recommendations to solve the challenge of society's negative perceptions. We believe that we can explain and illustrate the ideas of SDGs, our project, and the importance of it through this campaign. People might get a better understanding and may change their original opinion about our project. We think this is the best way to convince the people and in the meantime, we can solve the issue.

Conclusion

To conclude, with all the information given through this proposal, we propose a sustainable development for a better future. While no power source is perfect, hydropower can provide a good balance of renewable energy that produces reliable power. Here, we are starting for the project to be implemented in the IIUM community to prove that "Hydroelectric As A Medium of Electric Supply" is achievable. We give the overview and background of the project in the beginning part of the proposal where we stated about the ideas of the project, the implementation process, and the specific location of the project. Then, we explain the objectives of the project where we state about our general, personal, and specific objectives. The specific objectives are to achieve the goals prescribed in SDG 6, SDG 7, and SDG 14. We also present about the significance of our project in the next part. This part talked about how the project will benefit society and nature. Our team also conducted a survey to IIUM and Gombak residents in order to identify challenges and issues that will arise during the execution of the project. Last but not least, we propose several methods to counter the issues that we have identified through the survey. This project is not just a mere project, it is a journey in leading to a better future with clean energy by starting to use hydroelectricity.

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