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The Transformation of Renewable Energy in Indonesia and Thailand: Energy Diversification as an Effort to Achieve the 2030 SDGs

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Abstract

Many countries are transitioning from conventional energy to renewable energy sources. This transformation requires support through socialization and training activities targeting all sectors of society, including educators in schools. The Al-Hidayah Waqaf Foundation in Thailand is an educational institution with educators who have limited knowledge regarding the implementation of renewable energy as part of energy diversification efforts. Collaborative activities were conducted with the Al-Hidayah Waqaf Foundation in Thailand through socialization and training on renewable energy. The outcomes of these activities provided educators with increased knowledge, information, and perspectives on renewable energy.

Keywords: *Energy Diversification, Renewable Energy, Energy Transformation*

INTRODUCTION

Developing countries are currently facing an energy crisis due to the declining availability of fossil energy each year (Lumembang & Hafid, 2023). Uncontrolled population growth is the main factor contributing to this issue. As the population continues to rise annually, the demand for basic necessities such as clothing, food, and shelter increases proportionally (Jaya & Ranatwati, 2022). To meet these growing demands, many developing and some developed countries still rely heavily on fossil energy as their primary energy source. Consequently, a transition to renewable energy as a substitute has become essential to support various activities.

Among developing countries, Indonesia and Thailand share common challenges in Southeast Asia, where rapid population growth remains a pressing concern (Sahban, 2018). Both countries continue to depend on fossil fuels for their energy needs, exacerbating the strain on their resources. However, recognizing the urgency of sustainable practices, both nations are actively transitioning towards renewable energy to address these challenges (Yana et al., 2021).

Renewable energy offers a viable solution to the limitations of conventional energy sources. Derived from nature, renewable energy sources such as solar, water, wind, geothermal, ocean waves, and biomass are not only abundant but also continuously replenishable (Anugraheni, 2024). However, for this transition to succeed, three critical factors must be addressed, one of which is the readiness of human resources (Amalia et al., 2019).

Human resources play a pivotal role in ensuring the success of energy transition efforts in any region. This readiness can be assessed by the public's understanding of efficient electricity usage and their awareness of renewable energy (Apriliyanti & Rizki, 2023). In Indonesia and Thailand, communities still face challenges in implementing proper and efficient electricity usage. These difficulties are mirrored in educational settings, where teachers struggle to integrate renewable energy concepts into the curriculum.

The Al-Hidayah Waqaf Foundation in Thailand highlights this challenge within the education

sector. As an organization focused on education and social initiatives, it has identified that many teachers lack adequate knowledge about SDG concepts, particularly renewable energy, as part of energy diversification. During discussions with the foundation's chairman, Adul Maetam, it was noted that teachers face difficulties in selecting appropriate concepts to help students fully grasp the principles of renewable energy. To address this gap, training programs are essential to equip both teachers and students with the necessary knowledge and skills to foster a deeper understanding of renewable energy.

METHODS

The implementation method was designed in three main stages: preparation, execution, and evaluation, using a participatory collaboration approach between the implementation team and partners. The target audience for this program was Indonesian teachers in Thailand, who actively participated in every stage of the activities.

During the preparation stage, coordination was conducted with the Chairman of the Al-Hidayah Waqaf Foundation to jointly develop the program schedule. Relevant materials on energy diversification aligned with the SDG 2030 targets were prepared, along with various tools and equipment to support the activities.

The execution stage included several key activities, starting with an introductory explanation by the team on the SDG concepts and energy diversification initiatives implemented in Indonesia. Training participants were then invited to engage in discussions, provide arguments regarding the implementation of energy diversification in Thailand, and share suggestions for actions that both governments could take to enhance public understanding of energy diversification and small-scale energy conservation. These activities were delivered in the form of presentations, discussions, and interactive tutorial sessions.

The evaluation stage aimed to measure the program's effectiveness and the participants' level of understanding regarding SDG concepts and energy diversification. Evaluations were conducted using various methods, including interviews, observations, Q&A sessions, and questionnaires to collect accurate data on the program's success.

Overall, this method ensured active involvement from participants and partners while supporting the achievement of the program's goals.

RESULTS AND DISCUSSION

Socialization and Training Stage

The socialization and training activities focused on renewable energy policies to address the scarcity of fossil energy. The materials presented also included innovations in teaching methods that educators could apply, such as utilizing organic waste to produce renewable energy alternatives like briquettes, biogas, bioethanol, and bio-pellets as substitutes for fossil fuels. The training involved demonstrations on processing agricultural waste into charcoal briquettes, followed by participants practicing the process of converting agricultural waste into renewable energy.



Fig. 1. Socialization and Training Activities

After the socialization and training sessions, several participants inquired about the concept of implementing the use of organic waste as renewable energy with their students. Through the material presented, it is hoped that teachers, as facilitators in the field of education, can provide examples of

innovative scientific concepts, particularly in utilizing organic waste generated by the community in daily life.

Evaluation and Follow-Up Stage

The evaluation and follow-up stage was conducted to measure the level of understanding and skills gained by participants after the socialization and training sessions. Participants were given several questions through a questionnaire, and the results are presented in Table 1.

Table 1. Evaluation Results

Questions	Yes	No
This socialization activity is engaging	100%	0%
Utilizing organic waste as renewable energy is an effective solution	100%	0%
Further material on utilizing organic waste as renewable energy for student projects is needed	56%	44%
Will implement the utilization of organic waste as renewable energy in teaching activities	89%	11%

Based on Table 1, all participants acknowledged that processing organic waste into renewable energy is an effective solution to addressing the current energy crisis. As a result, the majority of participants agreed that further material on utilizing organic waste for renewable energy is necessary. They also expressed their intention to apply the knowledge and insights gained from the socialization and training activities on processing organic waste into renewable energy in their teaching practices.

A common form of implementation will involve assigning end-of-semester projects, either individually or in groups, to students. These projects will focus on utilizing organic waste from the surrounding environment to create renewable energy. Following the evaluation, follow-up actions can be taken to address challenges or phenomena encountered during the process.



Fig. 2. Evaluation and Follow-Up Activities

The follow-up activities for this program involved assisting participants in successfully applying the techniques taught and supporting them in developing plans to implement these techniques in school teaching activities. The implementation will utilize project-based learning methods to engage students in applying the knowledge gained.

The socialization and training activities on utilizing organic waste as renewable energy successfully provided participants with new insights, supported by hands-on practices such as making briquettes from agricultural waste. The evaluation revealed positive responses, with 100% of participants finding the activities engaging and the solutions effective in addressing the energy crisis, and 89% expressing their commitment to implementing the concept in teaching. Project-Based Learning (PBL) is planned as the primary method for implementation, with end-of-semester student projects focusing on the use of organic waste for renewable energy. However, 56% of participants suggested the need for additional materials to better support optimal implementation in educational environments.

CONCLUSION

The transition to renewable energy requires the availability of human resources equipped with knowledge on the proper and efficient use of electricity as well as an understanding of renewable energy. Through socialization and training activities, Indonesian teachers in Thailand have gained and expanded their knowledge, insights, and perspectives on renewable energy. Additionally, further studies can explore the development of more structured, localized curricula incorporating renewable energy topics, and pilot programs to implement project-based learning on renewable energy in schools. Collaborations with policymakers and renewable energy experts could also be initiated to ensure the scalability and sustainability of such initiatives.

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