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ABOUT THE MAGAZINE

RISE Magazine is published by Office of the Deputy Vice-Chancellor (Research and Innovation) with aims to highlight a research and innovation on multidisciplinary expert of fields in UiTM. It serves as a platform for researcher to showcase their high quality and impactful findings, activities and innovative solution through publication. Contribution of these ideas come from academicians, researchers, graduates and universities professionals who will enhance the visibility of research and stride to elevate Universiti Teknologi MARA to global standards. This is an effort to promote research as a culture that is accepted by all expertise.

ABOUT UiTM

Universiti Teknologi MARA (UiTM) is a public university based primarily in Shah Alam, Malaysia. It has grown into the largest institution of higher education in Malaysia as measured by physical infrastructure, faculty and staff, and student enrollment. UiTM is the largest public university in Malaysia with numerous campuses throughout all 13 states in Malaysia. There is a mixture of research, coursework and programmes offered to the students. Office of the Deputy Vice-Chancellor (Research and Innovation) or known as TNCPI (*Timbalan Naib Canselor (Penyelidikan dan Inovasi)*) serves as a *Pusat Tanggungjawab* (PTJ) navigate the research and innovation of university in achieving UiTM agenda. TNCPI office strives to mobilize faculty, and campuses to move together and cooperation of researchers to become a leading global university of science, technology, and innovation by 2025.

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FOREWORD

Bismillahirrahmanirrahim.

Alhamdulillah, all praises to Allah SWT and a heartfelt congratulations to the Office of Deputy Vice-Chancellor (Research and Innovation) on the publication of RISE Magazine (October Issue, No. 2) in promoting visibility for UiTM's research and its researchers.

I am thrilled to have witnessed a growing number of article publications and research innovations endeavoured by our fellow researchers. Thank you for all the effort, time, and energy that you have selflessly spent for the university.

The sustainability theme chosen for this edition is wise, apt, and timely. While striving to become a Globally Renowned University (GRU) and attaining Sustainable Development Goals (SDGs), we must ensure that our research activities are in line with the 17 goals set by the United Nations (UN) as well as the university's strategic plan.

UiTM is proud with the progressive development of renewable energy and currently 7 campuses are equipped with solar photovoltaic rooftops. This supports Malaysia's noble cause of becoming a carbon-neutral nation by 2050. Green Retrofit Framework for Sustainable Residential Refurbishment Project was also initiated with

plausible effectiveness to increase the number of green buildings and eventually will help reduce the emission of Green House Gases (GHG).

Our researchers have also begun to use Green Polysaccharides material for wound healing which is greener and environmentally benign. Other noteworthy projects are the use of Resistograph to assess the accuracy of Wood Density (WD) prediction, the application of 3D printing technology in simulating real experiences of halal animal slaughtering, as well as lipid reduction via systematic screening to make our planet more sustainable.

I am delighted with the research ambience that has now become an acceptable culture in UiTM. GRU2025 is definitely achievable with continuous effort and dedication made by members of UiTM as we work towards helping the nation and the world to achieving SDGs by 2030.

Thank you.

PROFESSOR DATUK TS. DR HAJAH ROZIAH MOHD JANOR
Vice-Chancellor
Universiti Teknologi MARA



FOREWORD

Congratulations to the editorial team on the publication of RISE magazine Issue 2, 2022, serving as a platform to showcase our pride in UiTM research and innovations.

We chose *Sustainability* as the theme for this edition. Despite its definition that may be contextual and vary across the field, we can't deny its essence and impacts on our daily life, and that every one of us should gracefully embrace.

Under this umbrella, we have witnessed an array of projects carried out by UiTM researches in various genres of research, driven to help the community in the short and long run. Flipping each page of this magazine and seeing how far we have become as a university sends unflagging goosebumps- signaling how proud I am to be part of this huge family.

Research has no longer been alien to us. We could see that the propagated activities in the quest of finding answers to problems have mushroomed over the years. It has become somewhat the bread and butter of academics other than teaching and learning. Its role has been significantly proven to elevate teaching community to a better level.

TNCPI Office seeks continuous support from every researcher, academician, and administrator to keep your momentum in doing research and innovations. Perhaps, through a stronger research ecosystem, this will help us to become a Globally Renowned University by 2025. We will keep providing supports, rewards and facilities needed in boosting the morale of our researchers.

Lastly, I hope RISE can be the front page of UiTM exhibiting the business that we are doing. Every time you go for a conference or any meeting with potential collaborators, please share RISE with them. We never know how much opportunities that will come knocking our doors just from that gesture.

Thank You.

PROFESSOR TS. DR NORAZAH ABD RAHMAN

Deputy Vice-Chancellor (Research & Innovation)
Universiti Teknologi MARA

MESSAGE FROM THE CHIEF EDITOR

Alhamdulillah

It gives me great pleasure to see RISE issue # II published. We have received a huge number of impactful submissions to be featured as our #KeluargaUiTM's research stories. Despite the difficult circumstances of post-covid19, UiTM researchers are proactive in carrying out research activities and events within their respective capacities.

Allow me to express my heartfelt gratitude to all of the authors of the articles in this magazine. Not to forget all editorial members who worked hard to ensure its publication was on schedule. The publication of this issue would have been far more difficult to achieve without their contributions. In this edition, we feature seven researchers from both science and technology and social sciences disciplines with their views and experiences in sustainability-related research and their efforts for mobilising sustainable development. Also, RISE II presents the achievements of the multidisciplinary domains by distinguished UiTM research groups.



I believe that sustainability should be the nucleus of any research agenda. Prominent researchers around the world are focusing on the call to address global livelihood and wellbeing. Hence, we at UiTM should embed and embrace the principles of Sustainable Development Goals in our research efforts.

To all researchers out there, we hope that the amazing stories in RISE II will rekindle our enthusiasm for research. We sincerely hope to bring you more research news from the #keluargaUiTM in the coming issues. I invite you to discover RISE II and be inspired. Enjoy reading!

ASSOC. PROF. DR MOHD MUZAMIR MAHAT

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Energy Justice in Rural Electrification: A Case Study of Rumah Panjang Tungan Batang Rajang, Kapit Sarawak



To examine this picture, we have adopted a theoretical approach based on the three components of energy justice namely: distributional, recognition and procedural justice. The research team has worked concurrently to address three components of this research - (1) social science research into the energy justice dimensions of rural electrification, (2) the techno-economic analysis of rural electrification business models and (3) the policy implications of these combined findings through stakeholder workshops.

This study reviewed four case studies of micro-grids for off grid rural electrification in four ASEAN countries: Indonesia, Malaysia, the Philippines and Vietnam. Using a mixed methods investigation, researchers identified the techno-economic properties of these systems, the nature of the business models used to deliver them, and how these business models implicate the realisation of fair and equal access to energy in rural communities.

In the Malaysian case study, the SRI has partnered with Sarawak Energy Berhad (SEB) and Tenaga Nasional Berhad Energy Services (TNBES) for a development of an off-grid case study examination in Malaysia. A case study location in Sarawak is a community based solar off-grid system located at Rumah Panjang Tungan Batang Rajang, Kapit. The SRI team had visited the site and conducted an interview with the community of Rumah Panjang on 1 March 2022. The team travelled from Kuala Lumpur to Sibu by aeroplane and then, a 3-hour journey by road from Sibu to Kapit. The Rumah Panjang is accessible via four-wheel drive from Kapit which took us about 1 hour on-road and another 1 hour off-road.

The solar photovoltaic (PV) system at Rumah Panjang Tungan is developed under the Sarawak Alternative Rural Electrification Scheme (SARES). SARES is a fast-track solution to provide remote households with standalone solar or micro hydro systems in partnership with the community. The system cost is borne by the Sarawak Government, while the community owns the system and does not pay for electricity once commissioned.

A research team from Solar Research Institute (SRI), Universiti Teknologi MARA (UiTM) led by Assoc. Prof. Ir Dr Nofri Yenita Dahlan has partnered with researchers from the University of Leeds and University of Sussex, United Kingdom to conduct a research project titled “Facilitating a Just, Fair, and Affordable Energy Transition in the Asia-Pacific”. A total grant of GBP 108,397.00 ~ RM 650,000.00 has been awarded by the British Academy under the Just Transition to Decarbonisation in the Asia-Pacific Programme 2021. The study aims to explore novel models for a just and equitable transition to renewable energy systems in the Asia-Pacific.

Governments of the Asia-Pacific are developing rural electrification programs including renewable ‘micro-grids’ to increase energy access and facilitate the national and regional energy transition away from fossil fuels. These projects often displace an existing off-grid electricity regime based on diesel generators. Consequently, these projects are likely to create both winners and losers in local and national supply chains, and therefore have important implications for a “just transition”. Recent evidence also indicates these renewable micro-grids often face challenges in their financial sustainability, maintenance and governance suggesting a lack of local engagement in the current delivery model and that new business and governance models are needed.



Assoc. Prof. Ir Dr Nofri Yenita Dahlan
Solar Research Institute (SRI)
School of Electrical Engineering

trained to operate, monitor, and maintain the system, as well as manage the 3kWh allocated daily consumption after the project completion and handover. Major technical issues are handled by the SARES team with the cost covered by the Sarawak Government.

In terms of distributional justice (value), the SARES provides a cheaper electricity cost to the community. Previously, they had to pay for USD 30 per household/month for purchasing diesel and other costs of maintenance of the genset. With the solar system, they do not have to travel to Kapit to buy diesel. In term of society or life-style change, the community now can use basic electrical appliances such as washing machines, television and refrigerator. Through the access via electronic media and communication, the community gets exposure to the outside world. The internet accessibility also improves the community and children's education. Nevertheless, a concern expressed by the community leader regarding the society change through electronic media access that may become challenges to their culture and custom.



The 28.13kW standalone solar PV system is supplying electricity to 28 households of Iban community in the Rumah Panjang. The system was commissioned on November 2021 and designed to operate with 60% of the consumption supplied by battery and 40% by the solar PV.

SARES offers a basic level of electricity supply to meet the daily needs of a rural household. The system provides each household with a 3kWh energy every 24 hours. The battery system is reset at 6pm every day to ensure that there is ample (new daily) allocation for use in the evenings. Under well managed and controlled usage conditions, the solar system takes 1 to 2 hours to fully recharge the batteries each day. If weather conditions continue to be bad or cloudy for consecutive days, the battery storage is sufficient to operate for up to 3 days on regular consumption patterns.

The scheme also includes indoor wiring complete with light bulbs (5 units per door) and power socket (4 units per door). An individual smart meter is available for community to monitor their own energy consumption. In the program, the community are

In relation to the procedural justice (process), the involvement of the community was from the very beginning of the project including planning, construction, and management. The SARES team first briefed the community on the project, background, and implementation. The consent and cooperation from the community were obtained during the planning process prior to the installation. After they agreed to the project, the community identified the perfect location to construct the solar and powerhouse and performed a ritual and festival activity to get blessing. During the construction, the community also provided unskilled labour for cleaning the powerhouse area and mobilizing the equipment.

In a nutshell, the community of Rumah Panjang feels blessed with the solar system they received. From the SARES program, they have saved on electricity cost, experienced lifestyle changes and improved knowledge and education. Nevertheless, the society change via exposure through electronic media access may become threats to their culture and custom. In term of procedural aspect, exist a combination of culture (ritual and blessing activity) and technical feasibility in the project implementation. From a bigger supply chain point of view, diesel suppliers and distributors would be the lost out group from this renewable energy rural development as their sales might be affected. Lastly, the community of Rumah Panjang Tungan is hoping in 10 years' time, they will have a grid connected to their village together with the solar PV system. They are also willing to pay to get extra energy supply to their homes.



SAGA INTERNET OF THINGS (IOT) GATEWAY SYSTEM



IOT in Agriculture



IOT in Aquaculture



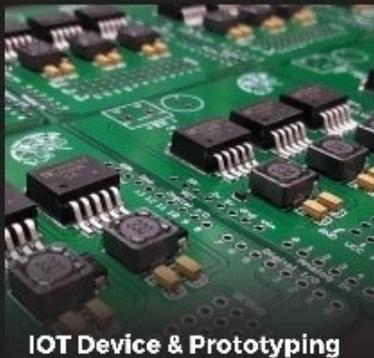
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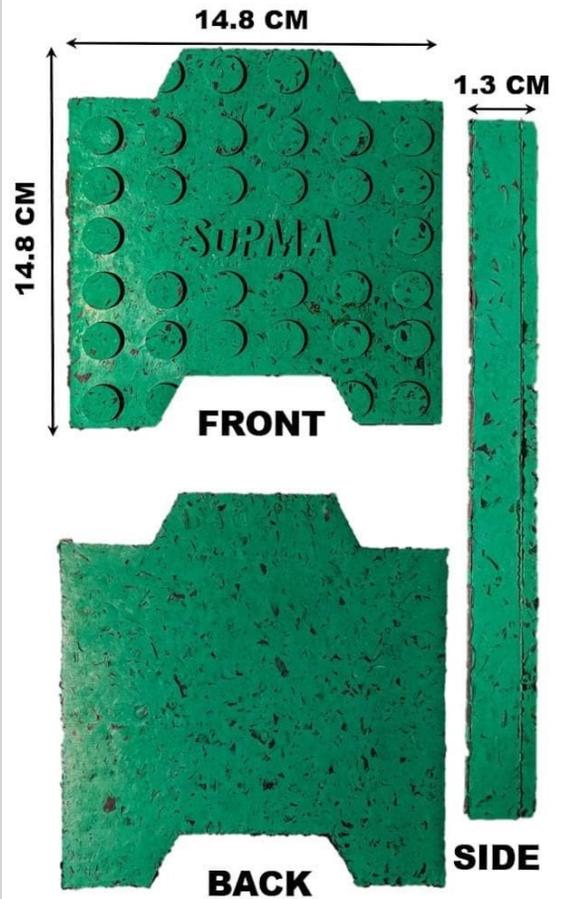
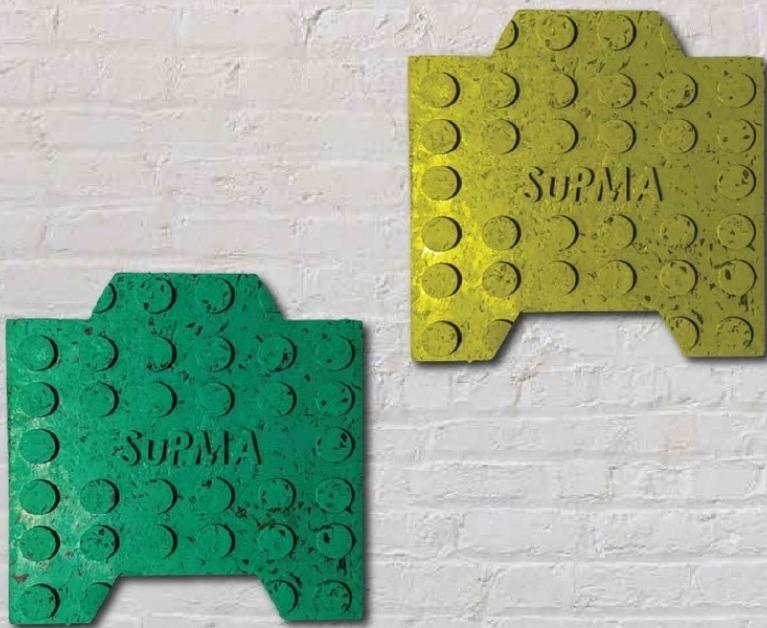
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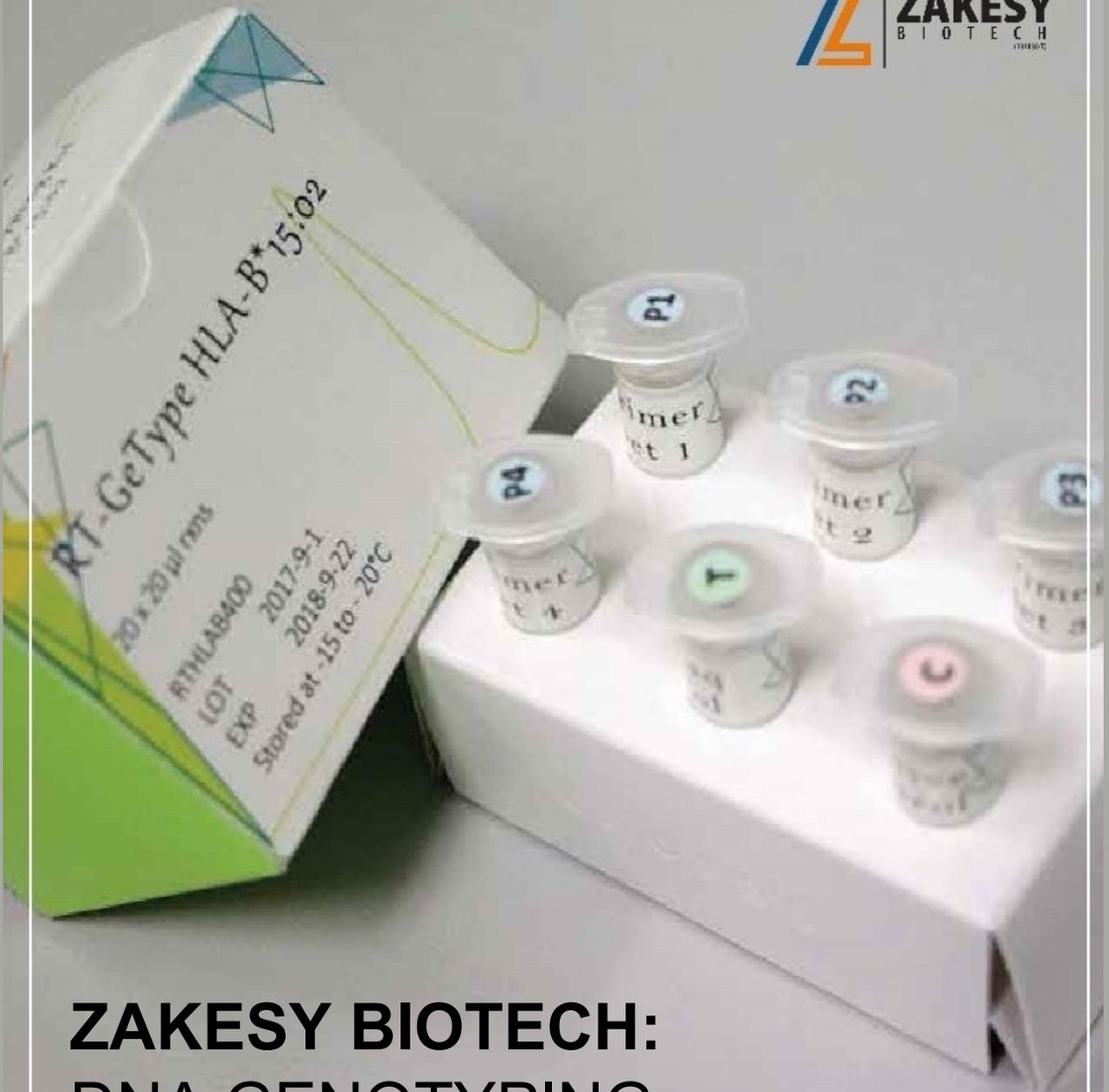
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