WSSET
World Society of Sustainable Energy Technologies

NEWSLETTER

Volume 15, Issue 2, June 2023

Inside this issue

Call for Papers: SET2023 | Nottingham | UK

SET2023, the 20th SET conference, will be held in Nottingham on the **15-17 August 2023**. Topics will range within the broad scope of Energy Technology and Renewables, e.g. Energy Storage and Conversion; Low Carbon Buildings, Architecture and Sustainable Cities; and Policies and Management. Abstracts and completed manuscripts can be submitted on EasyChair.

The deadline for Abstracts has just been extended so there is still time to get your submissions in: https://set2023.org/submission/. **SET2023 also welcomes non-presenting delegates so you do not need to submit an abstract to attend.** Register now to secure your place at SET2023: https://set2023.org/registration/

Deadline Date	Action
Friday 30 June 2023	Abstract Submission
Monday 17 July 2023	Full Manuscript Submission
Monday 31 July 2023	Submission of Revised Accepted Papers
Monday 1 August 2023	Registration and payment

Getting to Nottingham

Nottingham is less than 15 miles (24 km) from the international East Midlands Airport near Castle Donington. Skylink buses run regularly from the airport to Nottingham, 24 hours a day, 7 days a week, passing Beeston and the University of Nottingham on the way.

Nottingham railway station provides access to trains operated by CrossCountry, East Midlands Railway and Northern. A tram stop is situated at the station providing access to the tram network, which also stop at the University of Nottingham. All trams are fully accessible.

Nottingham lies 17 miles (27 km) east of the M1 motorway, which connects London to Leeds and was the first inter-urban motorway to be completed in the UK. More information about transport and accommodation is available on the SET2023 website: https://set2023.org/venue/.

Venue

SET2023 will be held in the Monica Partridge Building (pictured above, also known as the Teaching and Learning Building), built for flexible and collaborative learning, this is one of the newest buildings on campus. With its top-lit atrium and dramatic full-height glazed stairs, it provides exceptional views of the campus landscape, drawing in natural light.

Located centrally on campus, the building is within easy walking distance of Halls of Residence and the Orchard Hotel with the adjacent Millennium Garden providing a tranquil space for relaxation and reflection for any delegate to enjoy.

With a plethora of meeting spaces and a 306-seat tiered Auditorium, the Teaching and Learning Building is a large light filled space, ideal for meetings, drinks receptions and exhibition space. https://set2023.org/venue/

Volume 15, Issue 2, June 2023

A novel PCM cooling system for building applications

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In Malaysia, cooling is crucial not only to provide human comfort but also to address heat-stressed related issues of its citizens such as physiological stress, intensified illness, and an increased risk of death from exposure to excess heat. Future economic growth relies on providing sustainable long-term affordable energy, focusing on low-carbon accessible technologies. Malaysia has one of the highest potentials for solar uptake as it is strategically located near the equator, with the estimated potential for solar generation reaching up to 6500 MW.

To better utilise abundant solar energy resources and alleviate living issues in Malaysia, a novel solar PV power cooling system has been proposed, aiming to enhance energy efficiency by combining a radiant cooling ceiling with a PV-driven vapour-compression system. This will be achieved by storing phase change material (PCM) in a water tank, which will be connected to both the DC compression system and the radiant ceiling. This arrangement will optimize the overall performance of the system, as depicted in Figure 1.

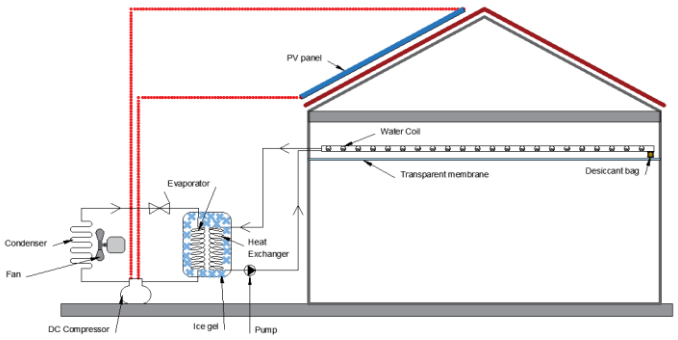

Figure 1: Schematic of the solar power cooling system

The vapour compression unit will function as a conventional cooling/refrigerator unit, utilizing compact and efficient heat exchangers and a compressor unit. The compressor will drive the refrigerant through the cycle, with the low-pressure vapour exiting the evaporator and being directed to the compressor, which then generates high-pressure superheated vapour. The vapour will be condensed to a liquid state in the condenser and directed to the expansion valve, creating low-pressure, low-temperature refrigerant. The heat exchanger will evaporate the refrigerant, facilitating heat exchange between the fluid medium and refrigerant. The chilled fluid will be circulated through the evaporator unit, and the liquid will be pumped through the water storage tank. The water tank will comprise two closed loops, with one loop connected to the refrigerant and the second loop connected to the radiant ceiling.

Integrating a second loop in refrigeration systems serves to improve energy storage and enhance cooling power, thereby reducing the workload on the primary refrigeration system, particularly during periods of high demand.

The experimental set-up consisted of a mini-DC refrigeration (model FSCH019Z12B), a water tank containing PCM material, a circulation pump connected to the chiller unit, and a second pump connected to the radiant ceiling as presented in Figure 2.

Figure 2: Laboratory equipment, radiant ceiling, water tank and DC-Vapour compressor

During the charging process, the objective is to achieve cooling by utilizing both latent and sensible heat. The cooling process is considered complete once the PCM temperature reaches 1.9°C for the PCM tank or the outlet water temperature directed towards the radiant ceiling reaches 1.9°C. The analysis of this stage is crucial to ensure the successful application of the system and will provide the necessary information about the time required for the material to charge and the energy consumption needed to cool 100 litres of the ice gel.

Figure 3 illustrates the experimental assessment conducted to investigate the cooling capacity of the DC-vapour compressor for the purpose of cooling the ice gel PCM. The study aimed to investigate the average temperature difference between the environmental chamber and the testing box, which was found to be 10°C. Notably, the maximum temperature difference recorded after 21 hours of testing was 13°C. Additionally, the temperature difference between the radiant ceiling and the box temperature was observed to be 3°C. Throughout the course of the experimental evaluation, the temperature decreased consistently.

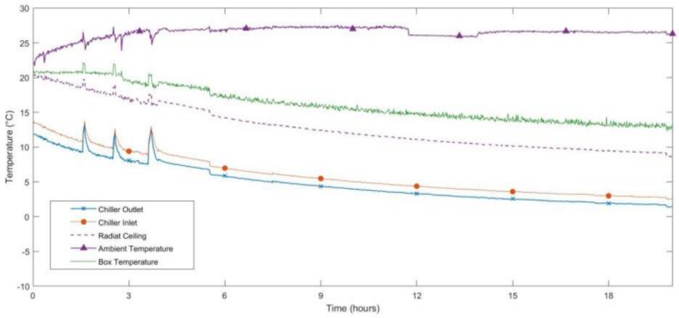

Figure 3: DC-vapour compressor cools the ice gel PCM

Although the system is capable of effectively lowering the ambient temperature, the process may be subject to significant time delays before the PCM reaches its freezing point.

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Cont. This delay can be attributed to multiple factors, such as the high ambient temperature, the size of the DC-vapour compressor, and the capacity of the PCM water tank. As shown in Figure 4, stable conditions were observed in the system, with a temperature difference of 1.9°C between the radiant ceiling and the testing box, and a temperature difference of 6.3°C between the testing box and the environmental chamber.

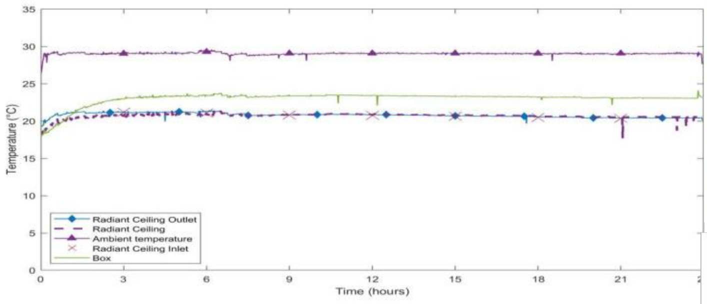

Figure 4. Radiant ceiling operational temperature

The experimental data indicated that the DC-vapour compressor effectively cooled the PCM water tank, with the supply of cold water to the radiant ceiling resulting in a temperature difference of up to 13°C compared to the ambient temperature of 30°C. This significant temperature difference highlights the potential for energy savings in relation to the ambient temperature.

Furthermore, the solar energy research institute (SERI) at Universiti Kebangsaan Malaysia (UKM) served as the site for the field measurement, as illustrated in Figure 5. This location is of great significance to the study because it provides an opportunity to explore the cooling effectiveness of the system in an actual tropical climate, where the demand for cooling is especially high. As depicted in the graph, the performance of the DC-Vapour compressor is reliant on the power generated by the PV panel.

At peak solar irradiance, the temperature of the evaporator, which is subsequently stored in the PCM cooling storage, can drop to as low as -20°C. Consequently, the results of this research hold considerable implications for the people of Malaysia.

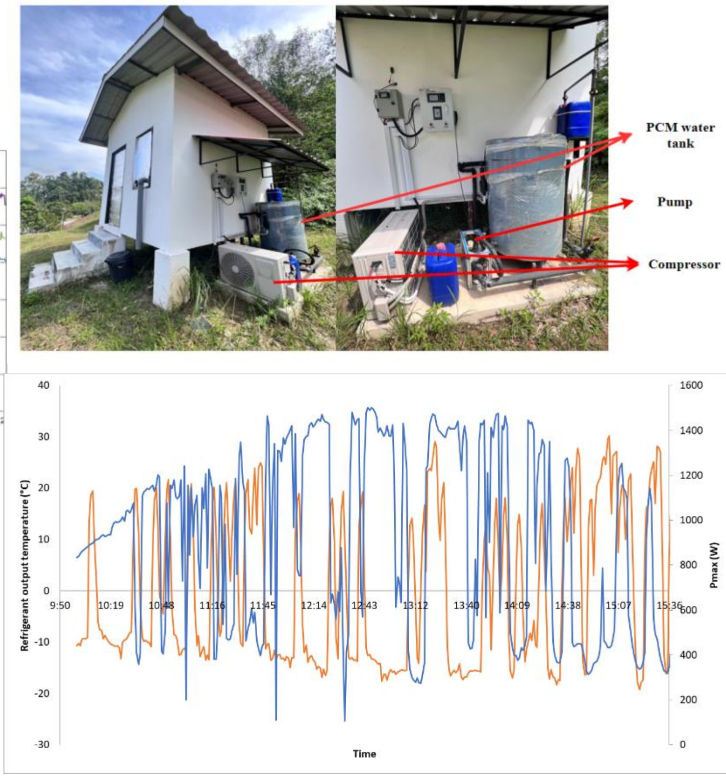

Figure 5: Field measurement at Solar Energy Research Institute, Universiti Kebangsaan Malaysia.

Acknowledgement

We express our sincere gratitude to the Royal Society (Grant Number: ICA\R1\201236) for providing the financial support that facilitated this research. Additionally, we acknowledge the collaboration and support of Universiti Kebangsaan Malaysia (Grant Number: RS 2020-006) in conducting this project.

Fatigue and wake distribution prediction of wind turbines under yaw control in wind farms

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Yaw control is one of the most promising active wake control strategies to maximize the total power generation of wind farms. Meanwhile, structural performance needs to be considered in yaw misalignment in case the adverse structural performance offsets the benefit of yaw control in power enhancement. In this study, numerous high-fidelity aeroelastic simulations were conducted to figure out the fatigue loads of wind turbines under yaw control. Then, a machine learning-based prediction method was proposed to accurately estimate the fatigue loads and power of wind turbines under yaw control.

As the inflow conditions, including wind speed, turbulence, and wind direction, change constantly, a cost-efficient and accurate analytical yaw wake model is expected to determine the optimal yaw angle of each wind turbine (WT) during yaw optimization. Therefore, a 3D yaw wake model was proposed to accurately predict the wake deflection caused by yaw operations and yawed wake distribution and then validated by wind tunnel experiments.

Support Vector Regression (SVR), as an extension of support vector machine (SVM), was specifically developed by Drucker et al. [1] for regression. The algorithm determines the trade-off between the fitting error minimization and the smoothness of the estimated function. As shown in Figure 1, the modelling process in this study can be divided into the following steps: (1) Build up the database and clarify the features and targets; (2) Randomly split the dataset into the training set and test set; (3) Standardize the dimension features; (4) Tune the hyper-parameters of SVR; (5) Train the SVR model with the tuned optimal parameters, make predictions and evaluate the results. *Cont.*

Volume 15, Issue 2, June 2023

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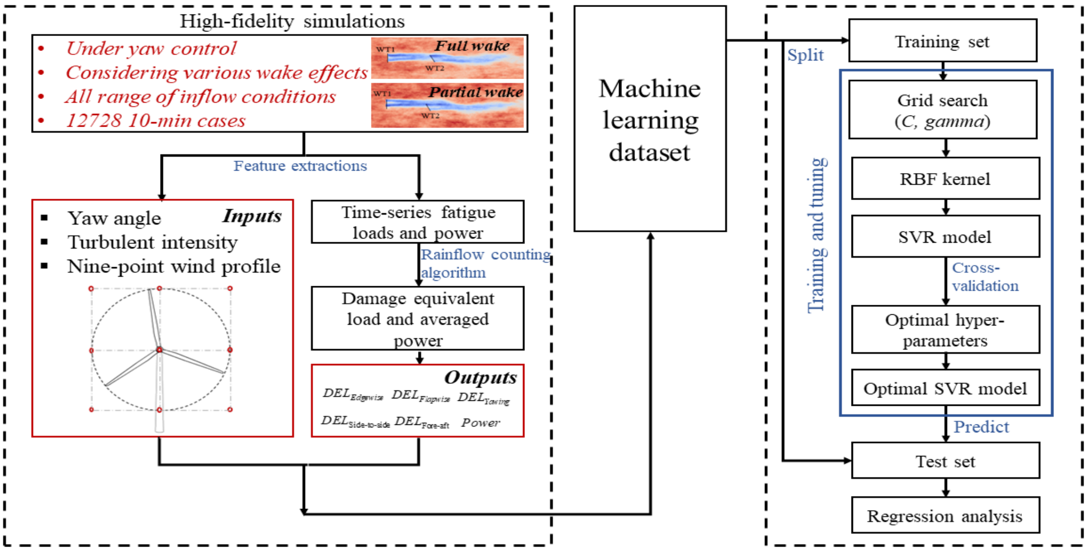

Figure 1: The framework of the proposed prediction method

As a common practice in machine learning, the back-propagation neural network (BPNN) was also tuned for comparison. As demonstrated in Table 1, the SVR model outperformed the BPNN model in all five fatigue loads and power prediction with less discrete error, which proved its robustness.

Table 1: Prediction performance comparison for SVR and BPNN.

ML method	SVR			BP-NN		
	R^2	MAPE	NRMSE	R^2	MAPE	NRMSE
$DEL_{Edgewise}$	0.996	0.4%	0.008	0.981	1.0%	0.017
$DEL_{Flapwise}$	0.996	3.3%	0.010	0.993	5.3%	0.014
DEL_{Yawing}	0.999	1.5%	0.004	0.997	5.2%	0.010
$DEL_{Side\text{-}to\text{-}side}$	0.982	7.4%	0.022	0.979	9.0%	0.023
$DEL_{Fore\text{-}aft}$	0.997	2.9%	0.010	0.996	3.9%	0.011
Power	0.999	0.7%	0.008	0.998	13.0%	0.018

An analytical yaw wake model will be derived based on the previously developed three-dimensional elliptical Gaussian shape wake model (3DEG model) [2] for normal wake prediction to integrate the effects of yaw misalignment on wake development. The proposed model will be accurate, computationally efficient, and easy to use with explicit expression. The yaw wake model under uniform inflow can be expressed as:

$$U(x,y,z)=u_0\left(1-\left(1-\sqrt{1-\frac{C_T r_0^2\cos^2\gamma}{2\sigma(x)_y\sigma(x)_z}}\right)e^{-\left(\frac{(y-\delta_y)^2}{2\sigma(x)_y^2}+\frac{(z-h_0)^2}{2\sigma(x)_z^2}\right)}\right)$$

Then, the expression of wake deflection in far wake region can be given as:

$$\frac{\delta_y(x)}{D}=\frac{r_0\sin\gamma\sqrt{C_T\cos\gamma}}{11.24k}\ln\left|\frac{\left(\sigma_0/D+0.356r_0\sqrt{C_T\cos\gamma}\right)\left(\sigma/D-0.356r_0\sqrt{C_T\cos\gamma}\right)}{\left(\sigma_0/D-0.356r_0\sqrt{C_T\cos\gamma}\right)\left(\sigma/D+0.356r_0\sqrt{C_T\cos\gamma}\right)}\right|+\frac{\delta_{y0}}{D}$$

In order to further validate the proposed yaw wake model, the authors conducted a series of wind tunnel experiments in a low-speed closed-loop wind tunnel at the Department of Civil Engineering, The University of Hong Kong.

As shown in Figure 2, a high-power particle image velocimetry (PIV) system from Dantec was employed to measure the wake flow field in the target field of view (FOV), which was a two-dimensional plane containing the two components (2D2C) of the wind speed.

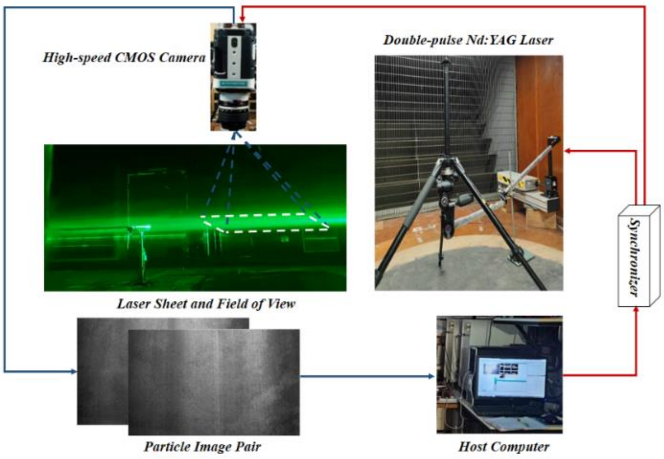

Figure 2: PIV setup and measurements

Figure 3 displays the measured streamwise wind speed at hub height and the model validation with two comparable models. The results showed that the overall performance of the proposed model was favourable, although the predicted wake distribution tended to slightly overestimate the lateral wake recovery at some spanwise positions and the maximal wake deficit with gentle yaw operation. As for the predicted wake width, it was close to the measured value at unyawed and small yaw angle but showed significant deviation at 20° yaw angle.

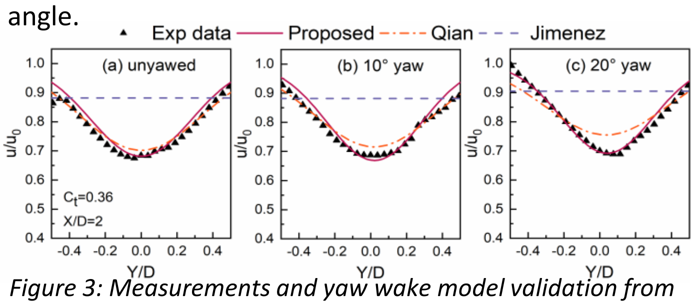

Figure 3: Measurements and yaw wake model validation from wind tunnel tests at X/D=2.

References:

[1] Drucker H, Burges CJC, Kaufman L, Smola A, Vapnik V. Support vector regression machines. Adv Neural Inf Process Syst 1997;9:155–61.

[2] He R, Yang H, Sun H, Gao X. A novel three-dimensional wake model based on anisotropic Gaussian distribution for wind turbine wakes. Appl Energy 2021;296:117059.

Volume 15, Issue 2, June 2023

Partial cascade organic-steam Rankine cycle for concentrated solar power generation

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The main advantages of the concentrated solar power (CSP) generation technology over other renewable technologies, such as photovoltaic or wind power generation, are large-scale and cost-effective long term heat storage and the potential for hybridization. State-of-the-art CSP systems use subcritical steam Rankine cycle (SRC) for heat-to-power conversion because of the significant technical challenges of supercritical cycles, including increased leakage losses due to a reduced volume flow rate and a narrower steam blade path at the turbine inlet, stricter requirements for the material selection, design and operation of the turbomachinery and heat exchangers, slower frequency response, and higher equipment cost by thicker pipe walls and turbine casings. For a typical subcritical SRC integrated with either thermal oils, water or molten salts heat storage, the evaporation temperature of water in the cycle is about 250-337°C with an operating pressure of 4 -14 MPa and a cycle efficiency of 30-42%. The operating pressure is a compromise between the average water/steam temperature in the heating process and turbine losses. A pressure higher than 14 MPa can cause a greater loss and a lower cycle efficiency. Despite an available heat source temperature of 565°C for current CSP plants, water has a relatively low evaporation temperature and large latent heat for evaporation (e.g.,1140 kJ/kg at 330°C). Its thermodynamic properties have restricted the subcritical SRC efficiency. Fluids that offer higher evaporation temperatures are needed for more efficient CSP generation.

To overcome the limitation in water evaporation temperature, a partial cascade organic-steam Rankine cycle was proposed for the CSP application, as shown in Figure1 [1]. The ORC used a biphenyl-diphenyl oxide (BDO) mixture as working fluid and the heat source was molten salts.

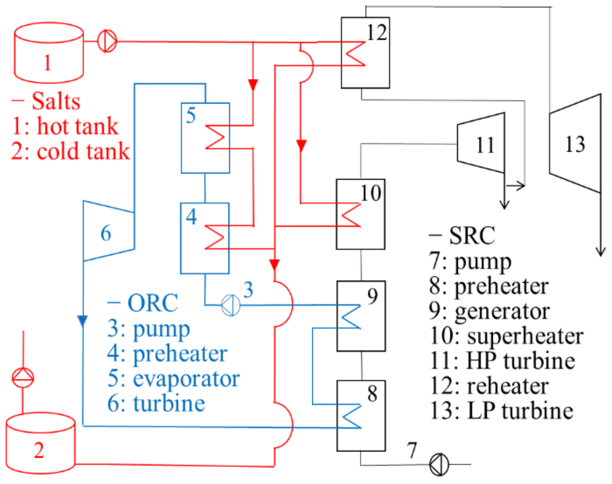

Figure 1: A simplified schematic diagram of the CSP

The BDO mixture evaporated in the evaporator (5) and expanded in the turbine (6). It then went through the SRC preheater (8) and steam generator (9). The condensed fluid was pressurized by the pump (3) and circulated. Water in the SRC was preheated and vaporized by the BDO mixture while superheated in (10) and reheated in (12) by molten salts. Figure 2 illustrates the temperature-entropy diagram of the ORC-SRC. The eutectic mixture, consisting of 26.5% biphenyl and 73.5% diphenyl oxide, had significant potential in high-temperature ORC applications. It could work in liquid, binary phase, or vapour state at a temperature of up to 400°C.

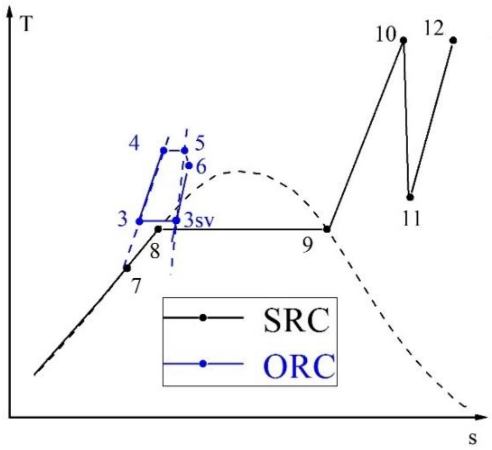

Figure 2: Temperature-entropy diagram

The proposed cascade ORC-SRC was more efficient than a single SRC. The reason, given the heat input (Q) of the SRC and net power output (W_{ORC}) of the top ORC, was that the heat input to the cascade cycle (ORC-SRC) was about ($Q+W_{ORC}$) due to the adiabatic pressurization and expansion processes. Compared with the SRC, the ORC-SRC had an additional heat input which was almost the same as the increment in power output (W_{ORC}).

It also had the potential to be more economic than an SRC. The cascade cycle could be deemed to be two cycles in parallel to model the efficiency, cost, heat input, and power output: one was a traditional SRC with a heat input of Q and power output of about 0.42Q; the other was an 'added ORC' with a heat input of W_{ORC} and power output of W_{ORC}. The latter was more efficient (with an equivalent efficiency of about 100%). The ORC did not have a higher capital cost than an SRC at the same power output, as the BDO mixture was a dry working fluid operating at a pressure of about 1 MPa and did not need a superheater or reheater prior to expansion [2]. Preliminary quantitative results on the cost-benefit of the proposed ORC-SRC have been achieved [3]. Given a 50MW SRC, the top ORC is about 10MW with an additional investment of 6 million USD. The equivalent payback period for the ORC employment would be less than 4 years.

REFERENCES:

[1] J Li, G Pei, J Ji, D Gao. A novel concentrated solar tower power generation system using a biphenyl-diphenyl oxide (BDO) mixture, Patent No.CN202210185891.7
[2] X Ren, J Li, G Pei, P Li, L Gong. Parametric and economic analysis of high-temperature cascade organic Rankine cycle with a biphenyl and diphenyl oxide mixture. Energy Conv. Manag., 2023
[3] P Li, T Qian, J Li, H Lin, Y Wang, G Pei, D Jie, D Liu, Thermo-economic analysis of a novel partial cascade organic-steam Rankine cycle, Energy Conv. Manag., 2023

Volume 15, Issue 2, June 2023

A novel PV/T-TREC solar-harvesting system for high-efficient power generation

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Green-Energy-related issues have always attracted global attention. Albeit recently, photovoltaic technology outperforms other methods when commercially used for renewable and sustainable power generation, the conversion efficiency is still modest resulting from rising temperature and narrow solar spectrum utilization. To bring it to a widespread application with lower cost and higher efficiency, a novel hybrid power generation system integrated the photovoltaic/ thermal (PV/T) with thermally regenerative electrochemical cycle (TREC) was developed to utilize the full-spectrum solar energy. That is, the overall electrical efficiency can be enhanced by converting the low-grade heat from the thermal energy of PV/T into electricity via TREC (Figure 1). TREC is a new cutting-edge technology for low-grade heat-to-electricity conversion which has been demonstrated to hold a high-performance energy conversion efficiency beyond 30% versus the Carnot efficiency limit under low-grade temperature windows.

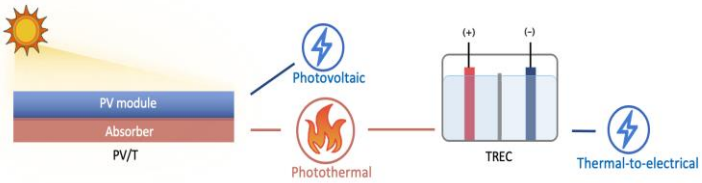


Figure 1: Conceptual idea of hybrid PV/T-TREC system for enhanced power generation from solar energy.

The novel PV/T-TREC system consists of the PV/T subsystem with glass cover, air gap, PV panel, absorber, tube, insulation, heat storage tank with heat transfer fluid, and the TREC subsystem with current collector, catholyte, membrane, anolyte, as shown in Figure 2.

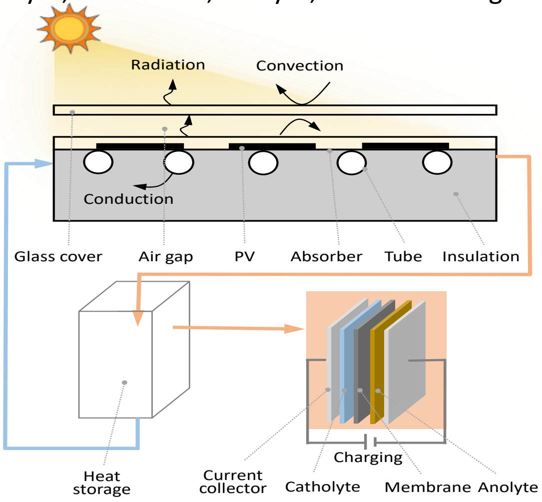


Figure 2: Schematic of PV/T-TREC configuration.

Three-dimensional transient numerical models corresponding to the hybrid system were developed using MATLAB software and were validated/refined by experimental works (Figure 3).

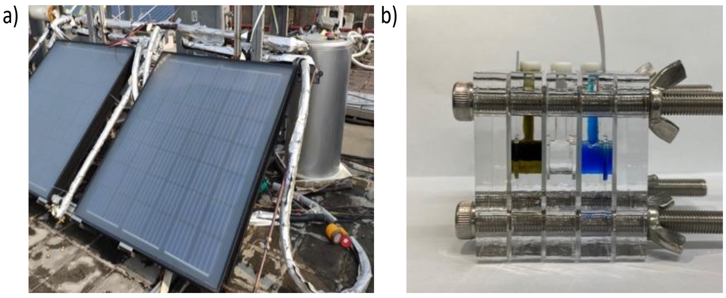


Figure 3: Experimental works of a) PV/T, and b) TREC.

To demonstrate the feasibility and superiority of the reported hybrid system, the annual performance of the novel PV/T-TREC system, pristine PV/T and PV systems employed in four typical climate areas of London, Singapore, Xining, and Phoenix was simulated and analysed (Figure 4). In all typical climate areas, the proposed hybrid PV/T-TREC system presented a superior solar-to-electrical performance to the PV/T and PV systems.

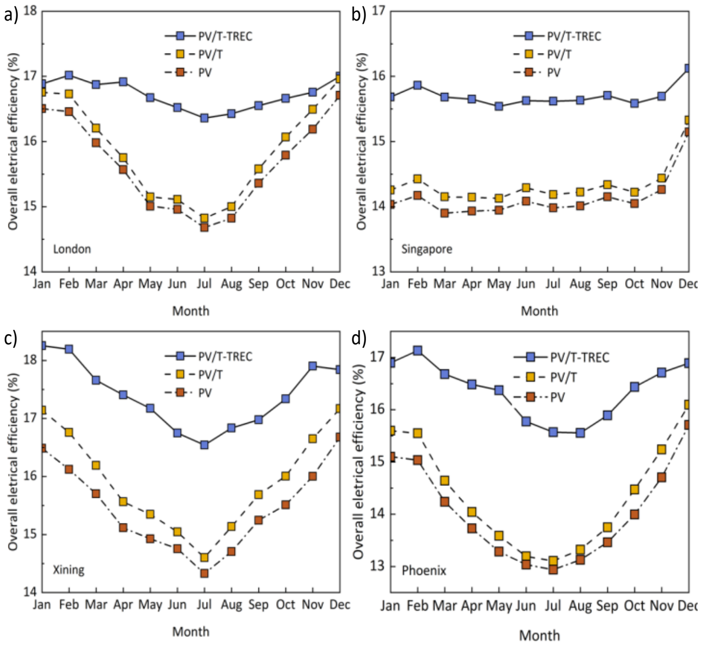


Figure 4: Superiority of the reported PV/T-TREC system of annual performance in four typical climate areas of a) London, b) Singapore, c) Xining, and d) Phoenix.

The annual average increases in efficiency were 0.84%, 1.36%, 1.47%, and 1.98% compared to pristine PV/T system in London, Singapore, Xining, and Phoenix, respectively. It offered significant compensation for the PV efficiency degradation in the summertime. The scenario with higher solar radiation therefore fostered the advantages of the hybrid system for higher-efficient power generation.

Feasibility of deep geothermal heat network: the case of a university campus

T.G. Karayiannis, G.J. Rodgers, J. Tyackeke

Brunel University London

The Department for Business, Energy & Industrial Strategy – Heat Network Delivery Unit - is funding a techno-economic feasibility study assessing the energy demand of existing buildings of Brunel University London and the possibility of replacing gas-burning boilers by geothermal energy.

The continuing use of fossil fuels with the catastrophic effects on the environment is unacceptable and organizations and governments worldwide are actively supporting the growth of renewable energy sources. However, increasing the use of renewables may potentially introduce energy balance problems thus causing issues to the transmission system operators and energy installers. Broad deployment of intermittent energy sources, such as solar or wind, would require additional support to the electrical grid and its components to ensure that balance is kept, and the frequency is maintained within a permitted interval. Therefore, it is important to ensure that the capacity of intermittent energy sources will grow rather organically so that the transmission systems can accommodate such changes and the transformation of the energy system at large will be smooth and without interruptions. Geothermal energy is a high capacity factor source that helps avoid these problems, while at the same time providing a dependable baseload energy capability.

Figure 1: Brunel Campus site identified for the feasibility study

Engineering advances in drilling technology, the availability of oil-gas abandoned wells plus the use of existing infrastructure, high thermal efficiency, as well as less ecological effects and smaller area footprint (m2/energy produced) compared to other renewable sources such as photovoltaics and wind respectively make generation of thermal energy and possibly electrical power from low-to-intermediate temperature locations a cost-competitive reality for the UK and across the world.

The project led by Professors T.G. Karayiannis and G.J. Rodgers with support from Dr J. Tyacke will be carried out in collaboration with Ceraphi Energy Ltd. Ceraphi Energy has as its core mission to deliver an impactful change to carbon reduction and contribute to the energy transition through innovative geothermal energy solutions. In particular, the feasibility study will evaluate the potential of using deep geothermal energy to decarbonise Brunel University's existing heat network across a range of university buildings throughout the campus (Figure 1). The study will commence with an evaluation of the annual consumption and peak heat demand. Following that, the main aim of the project will be the determination of the geothermal resource size required to meet the energy demand and will include heat and fluid flow modelling, geological assessment, site availability and identification, limitations and risk, determination of the CO_2 emissions of the proposed renewable heat source and the carbon savings compared to current natural gas provision over the expected project lifetime. The study will also extend to the heat distribution network analysis, the development of a techno-economic cash flow model based on technical design and operation over a 25–40 year lifecycle. For this purpose, CeraPhi Energy have developed a mono-bore technology that de-risks deep geo-thermal projects by removing the need to find a suitable deep aquifer or permeable formation (Figure 2). The aforementioned technologies could be applied rapidly to other potential sites and adapted to site-specific needs, through-out the UK and internationally.

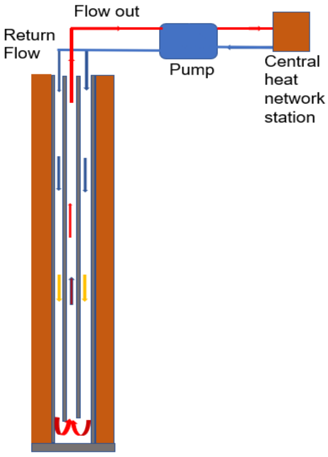
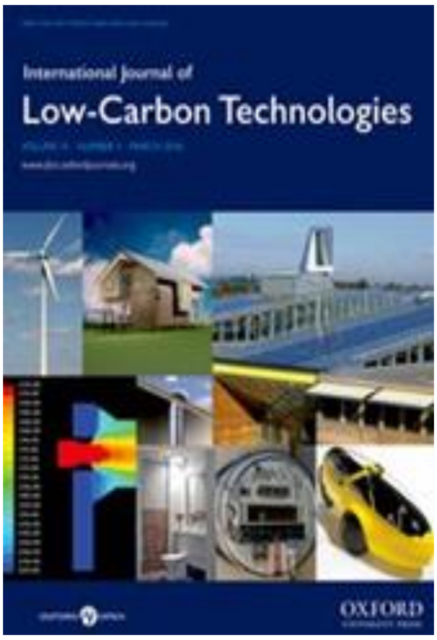


Figure 2: monobore technology developed by CeraPhi Energy

Terry Payne Sponsorship

We would like to extend our great thanks to Professor Terry Payne for sponsoring the attendance of 15 PhD and Research students by paying their registration fees. It was a great success with 35 applications and we look forward to welcoming them to SET2023.

Volume 15, Issue 2, June 2023



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Volume 15, Issue 2, June 2023

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Contributing to WSSET newsletters and e-bulletins

All WSSET members are kindly invited to submit articles for publication in future WSSET newsletters. Articles can be on a range of topics surrounding the word of sustainable energy technologies. With nearly 2000 members, the WSSET newsletter provides a great opportunity to publicise new ideas, technologies or products – all free of charge!

Articles should be no more than 400-500 words and one or two photographs would be very much appreciated. Submissions should be emailed to secretary@wsset.org

Furthermore please contact secretary@wsset.org regarding any conferences, seminars or symposiums relating to topics of sustainable energy technologies that you wish to be advertised in the newsletter.

Once again, thank you for your continued support to WSSET.