WSSET-NEWSLETTER

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Newsletter
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WSSET World Society of Sustainable Energy Technologies NEWSLETTER

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Latest News from WSSET – SET 2012

Message from the Chairman

Everyone agrees the development of sustainable energy technologies is vital to achieving environmentally benign solutions for the current and future energy demands of our planet. It is with this aim the series of International Conferences on Sustainable Energy Technologies was first launched in 2002 in Porto, Portugal. As an International Advisory Committee member and long standing participant of these conferences, it gives me great pleasure to organize and chair the next SET conference to be held in Canada. I wish to announce that the 11th SET conference will be held in Vancouver, Canada on September 2-5, 2012. Delegates will experience the stunning natural beauty of Vancouver and as a preview, I encourage you to visit the website www.whyvancouver.com. I am sure you will be convinced we have chosen a wonderful venue for next year's event. The conference will include special luncheons, a banquet, reception and other enjoyable social events. Participants will have ample opportunity to interact and make this an historic gathering.

SET-2012 will include plenary sessions, keynote lectures, and several specialized sessions on a variety of topics related to sustainable energy technologies. Participants from industry are encouraged to attend and exhibit their products. I hope that the conference will lead to effective and fruitful communication between academic, government and industrial communities. I am sure you will find the next SET conference both enjoyable and technically enlightening, as well as an opportunity to experience one of the most scenic cities in North America.

I look forward to having the opportunity to welcome you all to SET 2012 in Vancouver on September 2-5, 2012 (www.setconference.org).

Cordially,
I. Dincer

Professor Ibrahim Dincer
Conference Chairman
Source : www.setconference.org

"SET-2011 provided a unique opportunity to become familiar with the most recent advancements in sustainable energy technologies, as well as looked at "bold" and "unthinkable" ideas on a sound scientific-technical basis. On behalf of the organizers of SET-2012, I would like to invite everyone who is interested in the concepts of energy, the researchers, scientists, academicians and industry for their contributions to SET-2012."

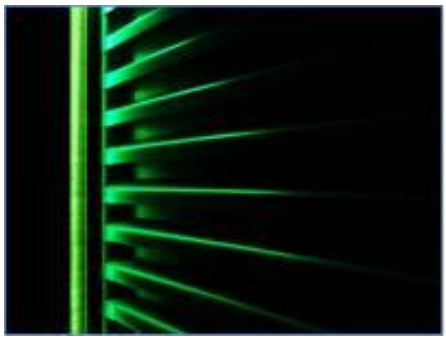
Professor Saffa Riffat
President of WSSET

Technologies and products

MONODRAUGHT WINDCATCHER X-AIRA NEW GENERATION OF WINDCATCHER
A NEW STANDARD IN NATURAL VENTILATION

The Monodraught WINDCATCHER X-Air natural ventilation system is the result of four years intensive research and development, the system bristles with innovation and a number of patented technologies.

Moulded using recyclable materials with excellent structural and UV stability, WINDCATCHER X-Air's defining features include distinctive styling and patented LED architectural lighting.

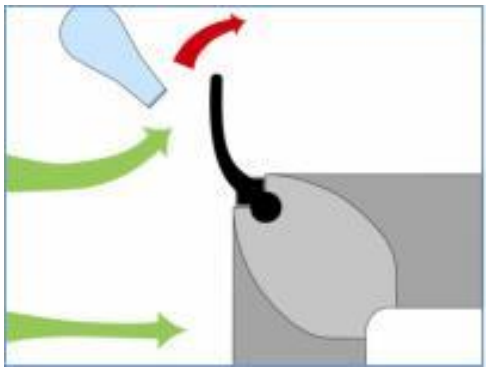


The WINDCATCHER® X-Air incorporates an architectural lighting system powered by a 10Watt photovoltaic panel mounted within the cap of the system. A solar panel collects solar energy throughout the day, even during overcast skies, charging an internal Lithium ION battery. The system automatically illuminates at low light, so the WINDCATCHER X-Air can provide soft architectural lighting with no user input.

The patented 'X factor' corner design increases performance but also allows excess wind to bypass the system to reduce load on the unit in high winds. Each of the patented corner fins accommodates a unique architectural lighting feature, which allows a range of optional colour preferences to be specified. This gives WINDCATCHER X-Air a unique presence on the roof of a building – day and night – and allows architects and design & build contractors to create distinctive building profiles that have the potential to become attractive features of the modern urban landscape.

WINDCATCHER X-Air features include: a new aerodynamic design that delivers a greater ventilation rate per system; ACTIVLOUVRE® modulating aerofoil louvre technology to provide greater ventilation control; integral solar-powered architectural lighting; mass production methods that provide a more advanced product and reduce overall costs; manufacture from fully recyclable materials; and a composite upstand that reduces on-site requirements, and provides greater air tightness and higher insulation values.

The addition of the ACTIVLOUVRE technology provides greater ventilation control and ultimate weather ingress protection. Its modulating louvres can be raised and lowered to vary the free area of the opening according to the control strategy.



The greatest air flow rates are achieved when the ACTIVLOUVRE system is fully open but, with the ability to vary its position to control the ventilation rate, the louvres can be closed to prevent the ingress of heavy rain and snow.

WINDCATCHER and ACTIVLOUVRE are registered trademarks owned by Monodraught Limited. **END**

A Donation of Time & Energy to WSSET

WSSET looks for self-motivated individuals with passion and enthusiasm for low carbon technologies and low cost alternative technologies for sustainable development and understanding for the sustainable energy technologies. In return we commit to providing a fun, engaging, diverse, challenging and supportive volunteer environment.

Please contact the secretary at Zeny.Amante-Roberts@nottingham.ac.uk

Research and Development Project

A novel horizontal ground heat exchanger

Coupling ground heat exchangers (GHEs) to heat pumps (HPs) for heating and cooling grants significant energy savings compared to air heat systems, due to the source better thermal properties, its higher daily thermal stability, and its more favorable temperature patterns. Normally, a ground source heat pump (GSHP) employs a closed geothermal loop, which links the evaporator/condenser of a reversible HP to the GHE during the winter/summer time for heating/cooling.

Two different solutions are possible for a GHE: the vertical one and the horizontal one. In the horizontal technology, the exchangers are buried in a shallow trench few meters deep in soil, in opposite to the vertical solution, where the exchangers are put in boreholes drilled down to hundred meters. For the horizontal one, the main handicaps are the low energy performance and the wide installation area required. Nevertheless, this solution is easy to carry out and upkeep, more compliant with environmental regulations, and does not interfere with deep aquifers. Moreover, the proximity to the soil surface lessens overheating/overcooling effects, at least in mild climate.

To improve the energy performance of horizontal solution, a flat panel was conceived as novel shape for GHE, taking into account that the surface is the most important key in heat exchange. Two prototypes were built and positioned horizontally and edgeways at shallow depth (-1.80 m) into an experimental field at the Department of Architecture of Ferrara (Italy). Each one is 3 meters long and 1 meter high, and made in polypropylene sheets 4 mm thick and 20 mm spaced. The panels were backfilled with sieved soil; over them, a drainage system was laid to wet the soil, because the groundwater level is 5 meters deep. Forty meters of 20 mm diameter high density polyethylene pipe, a hydraulic pump, a 300 l tank, and three groups of valves form the hydraulic loop. The cooling mode was made adopting an electrical resistance (1.5 kW) controlled by a time thermostat keeps the water at fixed temperature (< 45°C).

For having the temperature in the soil and in the closed loop, seventy digital thermal sensors are employed in the monitoring system to acquire in real time the temperature; the sensors reach up to 5 m deep in soil, and a density of 1 sensor per 12 m^3 in the soil surrounding the exchangers.

The plant was partially started up on March 2011, switching on only one exchanger for a whole month; then, several operations were made till September 2011, changing the flow rate (1.2÷6.5 kg/minute), the inlet temperature (29÷38 °C), and the timing of the switch on/off. The exchangers showed a minimum specific power of 30÷40 W/m^2, an average of 60÷80 W/m^2, and a maximum of 120÷140 W/m^2. Since the exchangers are 1 meter high, the former power represents also the specific power per unit trench, clearly very high in comparison with the performance of slinky coils (30÷40 W/m^2). A further interesting behaviour was the easiness in the recovery of more favourable temperatures, when the plan was switched off during the night. After six months of operation mode, the soil temperature raised +2 °C at 3.5 meters far from the exchangers, and 1.5 meters deep in soil, in comparison with the initial value, showing a high performance in soil involving. The plan will be test in heating mode, during the next winter.

The prototype is patent pending.

Michele Bottarelli, University of Ferrara (Italy)

END

Development of an R134a based Organic Rankine Cycle

Professor Ibrahim Dincer's group (includes Dr. Calin Zamfirescu and Mr. Shaikh Hoque) has accomplished the development of a new R134a based Organic Rankine Cycle type heat engine with an expander as converted from a Bitzer scroll compressor. A photo of this system is shown in Figure 1. This is one of the systems considered and built under a project on "development of novel heat engines for residential applications" as supervised by Professor Dincer. The heat engines operate using low-temperature heat sources (90-140°C). The test bench unit is a closed loop configuration, comprising an expander, an air cooled condenser, a compressor, an evaporator, a shell and tube heat exchanger, and auxiliary components. The compressor is a reciprocating type for refrigeration application, capable of operating with high pressure ratio and high discharge pressure. Such provisions are taken to have wide flexibility in adjusting the operating parameters during experiments. The heater is a radiant electric heater composed of six heating elements connected in parallel to operate individually through switches. The heater is designed to operate manually to adjust the fluid temperature within the limit

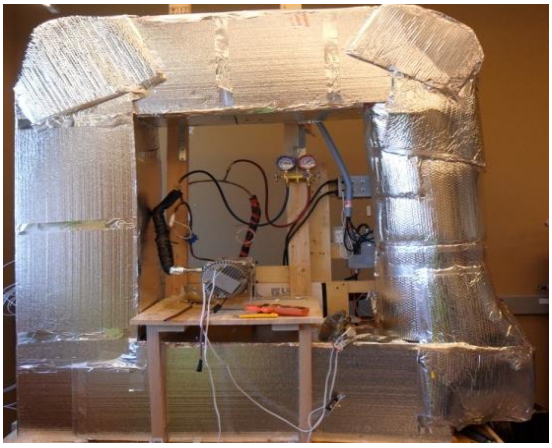


Figure 1: Heat engine test bench front view

up to 300 °C. The logic behind this is to simulate the low temperature heat sources that can be obtained from renewable or waste heat sources. The optimized closed-loop air duct is designed and constructed to fit the blower used to circulate the heated air within the duct; the heater is designed to provide heat energy in the ORC cycle; and the evaporator to transfer heat into the ORC working fluid. The evaporated gas from the evaporator goes to the expander to rotate the expander and generate electric power. There is one by-pass line in the liquid side. The liquid side throttle valve is installed to manipulate flow rate through heater and expander. A number of thermocouples and thermo-resistance probes and a liquid flow meter are installed within the system. A fluid filter dryer is also placed within the system to arrest any solid material incidentally present during the test bench construction. A heat exchanger is also installed in the test bench to sub-cool the working fluid before the liquid flow meter. A data acquisition system is used to record the temperature and flow meter reading during operation. Power generation under various conditions is investigated to determine the optimum performance parameters for the heat engine. A maximum heat output of 1.6 kW was obtained. The isentropic efficiency of the expander was found to be over 40% and reached 80% for the improved expansion conditions. For the boiler, the overall heat transfer coefficient multiplied with the heat transfer area was around 150 W/K. The energy efficiency of the experimental ORC was around 3% for hot air as the low temperature heat source at about 105°C where exergy efficiency reaches 22%, respectively.

Professor Ibrahim Dincer
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Sponsor a Student

Thank you for supporting African students attending a Master in sustainable energy technologies and related subjects at the Department of Architecture and the Built Environment, University of Nottingham, UK. In order to improve access to training and build local capacity for response to energy emergencies in Africa, we are now offering the **WSSET Africa Scholarship** (WAS). We are particularly keen to promote local participation. Your donation will make a difference! For details please visit: http://wssethopegroup.blogspot.com/

Christmas Wishes from the President

As I come to the close of my fourth year as your president, I look back at what we have achieved together with a renewed sense of appreciation for your service to our society. It has been my pleasure working with you this year, and I look forward to actively working with you next year. Our board of directors will also be more visible as they expand their role as advocates and ambassadors for the Society. I encourage you to take advantage of their knowledge and experience as a valuable resource to the society. I take this opportunity to wish you all ***a Merry Christmas*** *and a very* ***Happy New Year.*** *I hope 2012 will be a good year for all of you!*

Best wishes

Professor Saffa Riffat
President of WSSET

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