



Christoph Pfeifer, Austrian commercial counsellor, honours Dr. Muhammad Wakil Shahzad, winner of the Energy Globe Award Saudi Arabia.

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## Academic awarded prestigious environmental prize for sustainable clean water project

**A project which uses solar energy to turn sea water into clean, safe drinking water has been recognised for its contribution to future sustainability with a world-renowned Energy Globe Award.**

Desalination processes are widely used in most Middle East countries, where there is limited rainfall, to remove salt from sea water to produce safe

drinking water.

Over the last decade, Northumbria Senior Lecturer [Dr Muhammad Wakil Shahzad](#) has developed an innovative desalination process which results in almost double the water production and lower environmental emissions compared to conventional desalination techniques. His hybrid solar desalination solution, known as [the MEDAD cycle](#), is powered by solar energy and cuts CO2 emissions by half compared to conventional methods.

In the most recent development of this work, Dr Shahzad has made this process even more sustainable by proposing a pioneering solar thermal energy storage battery to overcome the intermittent nature of solar energy availability.

The efficiency of conventional battery storage is very low due to this involving converting energy from one form to another. Direct thermal storage and utilisation is, on the other hand, significantly more efficient, as the energy is stored and used in the same form, without having to be converted.

Dr Shahzad's solar thermal energy battery stores heat during the day and emits it at night at 100-120 degrees Celsius using improved thermochemical material. Dry magnesium oxide reacts with water to become hydrated magnesium hydroxide. The hydration process at night and dehydration process during the day with solar energy can produce sufficient heat energy to operate the desalination cycle 24 hours a day.

Storing and utilising solar heat in this way for round-the-clock operation minimises carbon and marine pollution, making Dr Shahzad's proposed solar thermal energy storage driven hybrid desalination cycle the most practical and feasible solution for future sustainability.

Dr Shazad's latest project was awarded the Energy Globe Award (Saudi Arabia) 2021. The award has been given annually in nations around the world since 2000 to showcase solutions that will protect the environment while promoting productive collaboration between the business community and consumers.

According to the United Nations, billions of people worldwide still live without safely managed drinking-water, sanitation and hygiene services. Dr

Shahzad's technologies are considered as game-changing towards achieving sustainable water supplies and will help to progress the UN's Sustainable Development Goal (6) of clean water and sanitation for all.

Speaking about the award-winning project, he said: "The proposed process will desalinate sea water using 100% solar energy, reducing the load on the electricity grid and cutting carbon emissions to achieve net zero targets. It will also help to produce water for remote off-grid communities to fulfil their daily demand.

"In the first phase of the project, the hybrid cycle successfully demonstrated that it could more than double water production. In this second phase, operation with solar thermal batteries for 24 hours operation has been conceptualized and tested at prototype scale. We are planning to demonstrate at pilot scale for commercialization. We believe that hybrid cycle with solar thermal batteries will be the most sustainable solution to achieve SDG6."

Along with Advantage Austria, the Energy Globe Award is sponsored by the UNIDO, the Global Chamber Platform, Austria's Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology, Amiblu and the Club of Rome.

"I would like to thank Professor Kim Choon Ng and other team members for this award. I also would like to thank KAUST and Northumbria University for their research support," added Dr Shahzad.

Dr Shahzad began working on the MEDAD cycle project in 2010 while carrying out his PhD at the National University of Singapore. An initial pilot was launched in 2013, with a second taking place in 2015 in collaboration with the King Abdullah University of Science and Technology (KAUST) in Saudi Arabia. Dr Shahzad joined Northumbria's Department of Mechanical and Construction Engineering in 2019 and has continued to develop his research in this area. His research has already been recognised with various awards, including:

- The Sustainability Medal MEED Projects Awards (2020)
- National Energy Globe Award, Saudi Arabia (2020)
- National Sustainability Medal Award, Saudi Arabia (2020)
- Global Innovation Award in Water, Dubai (2020)

- National Energy Globe Award, Saudi Arabia (2019)
- Excellence and Leadership in Water Award, Malaysia (2019)
- IDA Environmental & Sustainability Award, Dubai (2019)
- GE-ARAMCO Global Water Challenge Award (2015)

[Find out more about Northumbria University's Department of Mechanical and Construction Engineering.](#)

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