



## Hydrogen - A Competitive Energy Storage Medium To Enable the Large Scale Integration of Renewable Energies

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# Africa's First Wind Hydrogen Energy System

### Overall Objectives

The Pure Energy Centre (UK), Sahara Wind Inc. and Al Akhawayn University in Morocco completed Africa's First Wind Hydrogen System. The system has been installed to enable the storage of excess wind energy. It demonstrates that the intermittency of the wind and excess energy generation can be resolved by using market ready, reliable and mature hydrogen technology. This project has received financial support from the North Atlantic Treaty Organisation NATO under its Science for Peace and Security frameworks.

**Elizabeth Johnson said "Hydrogen will be key to unlock Africa's renewable resources"**

### Technical Barriers

Sahara Wind Inc., has coordinated the installation of a wind farm consisting of three wind turbines at Al Akhawayn University. The installation of the wind turbines was aimed at supplying green energy to the University campus. However, there were times excess energy was generated from the wind turbines. In these cases, the wind turbines needed to be shut down as the local grid network was not able to absorb the excess generation. A hydrogen (H<sub>2</sub>) system was therefore sought to store excess wind energy. H<sub>2</sub> would then be re-used for electrical generation through a fuel cell when no wind was available.

The critical point was to find a good balancing system between the wind generation, the storage system and the fuel cell genera-



Hydrogen equipment within plant room

tion. This work has addressed one of the major technical barriers to the uptake of renewable by using H<sub>2</sub> technologies operating as a smart grid. This allowed maximising the use of the wind turbines by deploying an H<sub>2</sub> infrastructure for balancing the grid.

### Technical accomplishments / results

Africa's First Wind Hydrogen Energy System has been successfully installed and is operating. It includes:

- 3 Wind Turbines
- Electrolyser
- H<sub>2</sub> gas storage
- Fuel cell

### Future Work

The wind and H<sub>2</sub> systems will be used for training, teaching and research in the first stage and thereafter as a base for products development and deployment. The aim is to strengthen the research portfolio of the University and to develop a number of hydrogen applications such as fuel cell vehicles, cooking and heating.

### Conclusions

H<sub>2</sub> energy storage will play a primary role in our future energy hungry society as the increasing uptake of renewable technology will lead to the increase of H<sub>2</sub> technologies deployment at a global level.

### Project Overview

- Khalid Benhamou, Khalid Loudiyi, Elizabeth Johnson, Vincenzo Ortisi, Ross Gazey (RGU/PEC)
- Sahara Wind Inc., Al Akhawayn University, Pure Energy® Centre
- [www.saharawind.com](http://www.saharawind.com) [www.pureenergycentre.com](http://www.pureenergycentre.com) [www.aui.ma](http://www.aui.ma)



K. Benhamou (Sahara Wind Ltd - Left) and K. Loudiyi (Al Akhawayin University) Morocco - right) with the Pure Energy Centre® Electrolyser