

# Compressed Air Energy Storage: Solving Many Challenges for Net Zero Grids

IChemE Clean Energy Webinar 23<sup>rd</sup> June 2020 9.00 GMT

**Synopsis.** The phasing out of nuclear power plants and the expansion of solar and wind energy mean that electricity production is becoming more volatile. New storage systems are needed to ensure that electricity is available as and when it is required.

A promising technology for this purpose is adiabatic compressed air energy storage. It uses excess electricity from solar and wind energy systems to compress ambient air and store it in an underground cavity. When it is required, the compressed air is expanded again, driving a turbine and generating electricity once more. As the heat which was generated during compression is used for this process, the efficiency level stands at 65 % to 75 %, similar to that achieved by pumped-storage systems. The environmental compatibility of compressed air energy storage (CAES), in terms of the potential for emitting greenhouse gases and the damage inflicted on ecosystems, is also comparable to that of pumped-storage systems and well below battery solutions. Adiabatic CAES therefore represents an efficient, environmentally friendly and technically feasible storage solution.

In this webinar we will discuss the lessons learned from the pilot plant and the path to commercialization.

**Synopsis.** This presentation will give an overview of the electricity grid's needs during the energy transition, the principal technologies available to it, and the limitations and best uses for each.

Grid challenges include balancing the intermittency of renewable generation, supporting periods of low demand and high renewable output, and providing grid stability (e.g. inertia) and black start capabilities. The technologies surveyed are interconnectors, batteries, demand side response and various types of large-scale long-duration storage. It will then outline Storelectric's world-leading Compressed Air Energy Storage technologies, though not in technical detail for IP reasons.

This is an abridged version of a 2-hour lecture given recently to two university engineering departments, which provided both staff and students (under- and post-graduate) with a degree of context and familiarity with the main issues that they had lacked.



**Dr. Giw Zanganeh** is the co-founder of ALACAES SA, a highly innovative technology provider company for thermal and electrical energy storage systems. Under his supervision, ALACAES successfully built and tested the world-wide first advanced adiabatic compressed air energy storage (AA-CAES) pilot plant in Loderio, Switzerland, that eliminates any greenhouse gas emissions and achieves an efficiency of over 75% thanks to the incorporated proprietary thermal energy storage technology. Giw obtained his BSc, MSc, and PhD in mechanical engineering from ETH Zurich. His ideas and patents lead to several cross-institutional R&D projects and academic-industrial partnerships worth over €3m.



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**Mark Howitt** is Chief Technical Officer of Storelectric, a founding director. He leads Storelectric's technical and operations, minimising technological risk, maximising efficiency and environmental friendliness, and speed to market. He focuses on technologically simple solutions using proven technologies wherever possible.

His degree was in Physics with Electronics. He has 12 years' management and innovation consultancy experience world-wide. In a rail multinational, Mark developed 3 profitable and successful businesses: in commercialising a non-destructive technology he had innovated, in logistics and in equipment overhaul. In electronics manufacturing, he developed and introduced to the markets 5 product ranges and helped 2 businesses grow strategically.

Registration for the Webinar available at IChemE Clean Energy Website:

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Instructions on how to access the webinar will be sent to all registrants.

The webinar is free of charge.