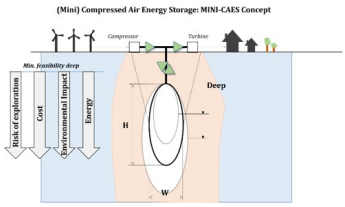
SMILE!

Smart infrastructure for sustainable energy. Development of new infrastructure for energy storage and management, making use of subterranean space.



Contact information

Address: ETSI de Minas y Energía, c/ Ríos Rosas, 21, 28003, Madrid
Phone number: 910676602
Website: minasyenergia.upm.es
Email: mf.ortega@upm.es

Technological Offers type

Technological solutions

Research and innovation areas

- Climate, Energy and Mobility

ODS

Available from: 2020

Where?

Environmental Studies

Keywords: | energy | renewable | storage

Brief description of the solution and the added value it delivers

Over the last few years of research, the research group has developed a product and know-how for marketing a new form of energy infrastructure for storing and managing renewable energy. Novel concepts have been proposed to achieve that: using geological formations suited to that purpose and/or mining infrastructure to store energy.

The advantages offered by this solution are greater storage capacity (more than 20 MW) and lower cost than other types of infrastructure considered. Furthermore, with the second of the options studied, exploration risk is reduced, there is greater adaptation to the client's needs and a use was found for structures that served no purpose.

Description of the technological basis

The promotion of renewable energy represents progress towards reducing the CO_2 emissions produced by the energy sector. However, renewable energy (solar and wind) involves greater uncertainty, on account of the unpredictability of the primary energy used to generate electricity.

We are proposing a concept for storing energy by means of compressed air in the subsurface, which allows the energy to be managed.

The technology we have developed represents a significant step forward by proposing the use of subterranean space. The concept statement allows for the use of mining cavities just below the surface (small-scale compressed air energy storage: CAES) or infrastructure designed specifically for this purpose.

'The intelligent use of subterranean space for this type of infrastructure is cheaper and has less impact on the environment than conventional technologies.'

Business needs / application

Energy

- The sector needs sustainable solutions for electricity generation, taking three key aspects into consideration: the environment, security of supply and competitiveness.
- In pursuit of that goal, it is on the lookout for novel solutions, such as energy storage or the integration/hybridisation of existing energy networks, and other solutions, such as the application of ICT to the sector or distributed generation.
- Renewable energy sources lack security of supply (less than 30% availability), which makes costly backup systems necessary, thereby reducing their competitiveness. The ability to store energy on a significant scale (quantities close to 100 MW) is therefore crucial.

Environment

- The search for sustainable solutions and reducing CO_2 emissions is a challenge for the energy sector.
- European Directives 2003/87/EC and 2009/28/EC limit CO_2 emissions in various sectors, among them the electricity sector.

'Wind and solar energy are, by their very nature, intermittent. Energy storage and management offers this sector a unique solution for getting round that drawback.

Competitive advantages

Geological formations concept:

- Lower cost and exploration risk, as the energy structure is implemented at shallower depths.
- Significant amounts of energy, reaching close to 100 MW of power.

Developing mining infrastructure:

- Minimal exploration risk.
- Greater capacity to locate the infrastructure according to the client’s needs.
- Use is found for unused spaces.

Stage of development

- Concept
- Research
- **Lab prototype**
- Industrial prototype
- Production

Contact

SMILE! contact

Marcelo Fabián Ortega

ETS de Ingenieros de Minas y Energía

mf.ortega@upm.es

UPM contact

Innovation and Entrepreneurship Programmes

Technological Innovation Support Centre (CAIT) – UPM

e: innovacion.tecnologica@upm.es