

SOLUTION MINING RESEARCH INSTITUTE

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December 06, 2012

SMRI Request for Proposals RFP 2012-2

Renewable Energy Storage in Salt Caverns

Background

Countries with more mature energy systems are today developing energy plans to increase substantially the part of “sustainable energy” sources, often over 20%. A major challenge will be the management of electricity, as the major sources of renewable energy, wind and solar, produce electric power for which demand occurs at different times or seasons than the power is produced, thus requiring storage. Additionally the production often occurs far from energy consumption areas.

These future energy systems will depend on large scale storage technologies for electric power which are feasible from the technical, economic, social and environmental points of view. In this context, the SMRI believes that salt caverns can play an important role, namely through the further development and adaptation of salt cavern storage technologies which already exist for natural gas, for compressed air, and for hydrogen.

SMRI’s objective is therefore to finance or co-finance researches to promote the development of high-performance salt caverns for the storage of renewable energies, to improve the competitiveness of salt cavern technologies in the field of renewable energy management.

Examples for applications of salt cavern technology to be used for large scale renewable energy storage are:

- Compressed air energy storage (CAES), both diabatic and adiabatic,
- Hydrogen storage,
- Pumped hydro storage.

Scope of Work

For this RFP, SMRI has a different approach from its normal procedure, where it usually provides potential RFP respondents with well-defined scopes of work. Instead, SMRI is in this RFP only indicating some potential areas of research, and will allow respondents to identify, define and submit research projects of potential interest in promoting salt cavern storage for the developing renewable energy industry. For example:

- Even if cavern storage facilities basically offer good conditions for large scale storage of hydrogen, this technology serves today essentially the chemical industry. Several aspects of this technology will need to be re-considered for a more widespread use of salt caverns for high pressure hydrogen storage. One major issue will be safety aspects in view of growing public opposition to gas storage projects in Europe. Potential research themes here are, for example,; identifying the differences between natural gas storage, (where the industry has substantial experience), and hydrogen storage where the industry has much less experience, hydrogen flow mechanisms in rock-salt or at cement contacts, development of reliable tightness tests, ...
- There are two operating salt cavern CAES facilities in the world today. Experts expect CAES caverns to have an increasing role in meeting future renewable energy storage needs, and factors such as its low environmental impact and high reliability being considered as major advantages. Potential research areas for CAES are for example: improvement of large diameter drilling techniques, reduction of corrosion problems due to the high air speeds, reduction of salt particles impacts on the gas turbines, introduction of wet air in thermodynamics tools, introduction of rapid, high frequency cycling scenarios in rock mechanics tools ...
- In the past, several schemes for subsurface pumped hydro storage using salt caverns have been published, e.g. patents of Shell in the Netherlands. Today there is an increasing interest in these various technologies. So far it is not clear to the industry which of the schemes will have the largest potential for realisation.

Proposal Instructions

Respondents to this RFP should provide a reasonably brief proposal (less than 5 pages) describing the proposed effort, a specific discussion of the research technical approach, the project schedule, the project cost, and the respondent's qualifications for executing the effort.

Proposals should include an option for presenting semi-annual progress reports and final project results to the SMRI membership at future SMRI meetings. Proposals should clearly state the cost and schedule for performing the proposed work, and a separate cost for the presentations noted.

Proposals should be submitted in electronic form via email to Gérard Durup (gerardd@solutionmining.org), SMRI Research Coordinator, by March 31, 2013. Any questions relating to the RFP should be directed in writing to the Research Coordinator. The SMRI will review all proposals and determine those proposal(s) worthy of funding. SMRI has

the right to select or reject any or all proposals. Please state if SMRI may make your proposal available to our members and/or the public.

Contract Award

The SMRI expects to award one or more fixed price contracts for this effort at the latest at its 2013 fall meeting in Avignon, France, if an acceptable proposal(s) is submitted. The contract(s) will require submittal of a draft report at a date to be specified in the proposal. The SMRI will provide comments on the draft report within four weeks and a final report responding to the review comments will be due within four weeks following receipt of the SMRI comments on the draft report.

The SMRI will pay for the contracted effort, only following acceptance of the final report.