

Robust Remote Power Supply

Authors Jari Kiviaho (1), Jyrki Mikkola (1), Markus Münch (2), Daniele Penchini (3)
Matthias Boltze (4), Michael Spirig (5), Mari Tuomaala (6)

- (1) VTT Technical Research Centre of Finland Ltd; jari.kiviaho@vtt.fi: +358 50 511 6778
- (2) Sunfire GMBH
- (3) SolidPower SpA
- (4) Sunfire Fuel Cells GmbH
- (5) European Fuel Cell Forum AG
- (6) 3E Energy Oy



Introduction

Fuel cells can play a major role in the energy market as a clean, highly efficient and reliable way to produce energy in decentralized and off-grid power generation. Critical applications like oil, gas or safety infrastructure are main markets and thus, main requirements for the systems are In addition, units are low maintenance, long service life of components, capability of remote monitoring and reliable operation as well as compatibility harsh climate conditions both in cold and hot regions.

The RoRePower project aims at strengthening the European SOFC industry's world-leading position for SOFC technology and exploit it in the robust remote power segment. RoRePower project has and will impact the market in many ways:

- The critical aspects related to the remote operation and extreme operating temperature have been considered.
- For strengthening the European value chain, industrial partners agreed on shared BOP components and performed an intensive market research for specific parts as well as shared balance-of-plant (BoP) components for the extended climate requirements.
- RoRePower project has installed over 20 demonstration units so far and will install altogether 45 units during the project.



Sunfire-Remote 400 powered microwave radio station in Alaska

System development and production

Common needs for fuel cell suppliers in the BoP area were identified and addressed in order to reach the ambitious requirements for the units. Components were selected based on a thorough market research and focus was on components for low temperature operations, even at -40 °C.

Project also identified cold start-up device solutions for propane and natural gas.

Demonstrations

So far, RoRePower project has installed over 20 demo units and further 13 units will be installed before end of the year 2022. Data from the demo sites will be gathered and analyzed thoroughly. Analysis of the data from the demo units will include e.g., overall performance level of the systems, degradation of the units and the comparison of performances between systems in different conditions and operating profiles. Thus, robustness of the demonstration units will be evaluated. Intervals for proactive maintenance together with the performance level and degradation of the systems gives a basis for this analysis.



RoRePower demonstration units

In the next phase, the overall suitability of SOFC technology to the off-grid power generation in both oil/gas infrastructure and telecommunication sites will be analyzed. Special attention will be given to the analysis of the system tolerance to harsh climate conditions. The effect of these conditions to the maintenance requirements and system lifetime will be studied. During the project, knowledge on the critical components will be gathered and recommendations for further development will be given. Analysis will also take account the operation and maintenance costs. Comparison to current off-grid power generation solutions will be made and based on the results pathway to the markets in oil/gas infrastructure and telecommunication area will be drawn.

Conclusion

- Robust SOFC systems for harsh climate conditions have been developed, manufactured and are being demonstrated
- Over 20 units have been already installed and altogether 45 units will be demonstrated
- Suitability of SOFC technology to the off-grid power generation in oil/gas infrastructure and telecommunication sites will be analyzed