

Fuel cells to connect our smartphones to the outside world

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The potential of hydrogen and fuel cell applications goes way beyond the development of green cars. The FCPOWEREDRBS team is determined to prove this with a Fuel Cell technology to power off-grid telecom stations. They believe not only that this solution is better than standard generators, but also that it provides a significant advantage in terms of 'Total cost of ownership' (TCO).

Did you know that, in 2014 alone, worldwide smartphone usage has grown by 25 %? Or that most of the telecom sites connecting these smartphones to the outside world are off-grid? This increasing pressure on self-powered installations requires continued efforts to come up with ever more innovative, reliable, efficient, cost-effective and sustainable energy generators.

Currently, most sites for which connection to the electricity grid is not an option rely on batteries and diesel generators. However, the FCPOWEREDRBS project has set out to convince telecom operators and local administrations alike that fuel cells represent a real alternative to such standard power sources. To this end, the project—which involves European industries and research centres Dantherm Power AS (Denmark) and MES SA (Switzerland), electrolyser manufacturer GreenHydrogen (Denmark), the University of Rome, the EU's Joint Research Centre and Ericsson—is testing a custom-made [fuel cell](#) solution on various sites across Italy. This specific solution has been engineered by the project team and integrates different energy provider components (fuel cells, photovoltaics and batteries) in the 'most efficient

and reliable way'.

For Giancarlo Tomarchio, coordinator of the project and Customer Project Manager at Ericsson, the ultimate goal of the project is clear: demonstrating the industrial readiness and the market appeal of Fuel Cell technology for off-grid telecom applications. In this exclusive interview with the research*eu results magazine, he tells us how advanced he and his team are with the field trials, and how they intend to demonstrate the advantages of [hydrogen](#) and fuel cells for delivering the expected power supply service.

What are the main objectives of the project?

FCPOWEREDRBS is a demo project within the Fuel Cells and Hydrogen Joint Undertaking Programme. We are conducting a set of field trials that aim to demonstrate the advantages of hydrogen and [fuel cell technology](#) for off-grid telecom applications. These trials consists in replacing the power supply of 15 radio base stations in the live network of selected Italian telecom operators with a new one based on our solution—which integrates different energy provider components (fuel cells, photovoltaics and batteries) with efficiency and reliability in mind.

We are also committed to other initiatives aiming to increase the visibility of the fuel [cell technology](#) and facilitate its penetration in the telecom market.

What is the added value of using hydrogen and fuel cell technology to power telecom stations?

Remotely located 'Radio base stations' (RBS) for Telecom applications are becoming more and more important with the increasing penetration of mobile services. As for many of these stations, the connection to the

electricity grid is not an option, and specific off-grid power generation solutions are required and quite often based on diesel fuel generators. With the solution proposed by our project, the amount of unattended hours can be increased thanks to an efficient usage of the different energy sources and to the storage potential of H₂. For a Telecom operator, this means lower operational costs. In general, we think that it's possible to provide our customers (the Telecom operators) with certain benefits in terms of 'Total cost of ownership' (TCO), something that nowadays is a strong argument for any Energy Manager.

Moreover, the system includes a smart-metering and telecontrol system providing the operator with more details on the energy behaviour of their base station.

What were the main difficulties you faced in the project and how did you resolve them?

Even though this project is a demo, it is a major innovation for the telecom market. In all our activities, we have to challenge ourselves with the need to produce a system that complies with the demanding requirements of the telecom market: durability and reliability 24/7.. Some of the issues we faced are comparable to those occurring when introducing a new product to the market, in this case aggravated by the nature of the fuel in use.

Resorting to H₂ storage in the system implies the adoption of specific processes and procedures in terms of safety. Joint work is needed between the project and the Telecom operators who accepted to host our solution on their sites, in order to customise existing O&M procedures.

When it was time to get the necessary authorisations from the different local administrations in the territories where the sites are located, we

were sometimes faced with inconsistent knowledge of the national regulations, which led to misunderstandings and delays in obtaining permits.

We have adopted all the necessary precautions in order to avoid any loss of power for the radio [station](#), as any interruption to the service would be the worst message to give, if we want to gain customers' trust. Really, our goal is to create long-term trust in fuel cells within the world of telecommunications.

Where do you stand with the on-site demonstrations?

At the moment we have an agreement for installing 10 systems on Telecom Italia's live network, and three on H3G Italia's. We have already installed eight sites—five of which are now up and running—while the other sites are about to be connected. We expect a first annual projection of TCO by the end of 2014. The trial will then continue until next year to reach the 12 months of operation normally needed for the verification.

We are also finalising the agreement for an additional installation of a non-telecom application, but with similar electrical requirements.

Are you happy with the results of the project so far?

The project started at the beginning of 2012 with the initial purpose being to install a system which was a 'simple' integration of a commercial product. In reality, we discovered that, besides the system configuration tuning, some additional developments were needed both in the fuel cell equipment and in the control logic. These activities have been successfully carried out and the lab tests hold much promise. We will spend the next few months continuously monitoring the system

behaviour and optimising the parameters to make the system as efficient as possible.

When do you expect this technology to hit the market?

An exact forecast is always difficult. We definitely think that the solution proposed has high market potential: worldwide, more than 100 000 new cell phone base stations are installed every year. Most of them are installed in emerging and developing countries with a poor grid infrastructure, which means they have batteries and/or a backup power generator installed. The majority of these new base stations could be set up with a fuel cell system for power generation, if the technologies were proven safe and if the systems were available at competitive costs.

The FCPOWEREDRBS project still has some way to go to prove that such benchmarks are being achieved and opening up the way for broader commercialisation.

What are the next steps for the project, and do you have any follow-up plans after its end?

For the project team, it is now time to consolidate the results, optimise the solution and disseminate the results. We have already begun training activities to raise awareness among the telecom engineers about the FC technology, and we will also continue to share the telecom requirements with the FC world.

Should the project become a success story, as we all hope, there will be some further work to do in order to industrialise the [solution](#) so that it can be considered as a real product. The introduction or integration into a larger portfolio is now our dream and final goal.

More information: For further information, please visit
FCPOWEREDRBS: fcpoweredrbs.eu/

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