170 kWh off-grid energy storage



170 kWh off-grid energy storage

Researchers in Finland have demonstrated the technical feasibility of an off-grid residential PV system combined with short-term battery storage and seasonal hydrogen storage. The proposed model is applicable only to northern climates, as higher levels of solar radiation in southern locations would mean a reduced need for seasonal storage. It was tested in an existing single-family house in Finland with a 21 kW rooftop array and a ground source 6 kW heat pump.

Scientists at the Lappeenranta University of Technology (LUT) in Finland have found that residential off-grid PV solutions are technically feasible in northern climates only if coupled simultaneously with short-term battery storage and seasonal hydrogen storage, and if the household"s peak consumption is not too high.

In the paper Technical feasibility evaluation of a solar PV based off-grid domestic energy system with battery and hydrogen energy storage in northern climates, published in Solar Energy, the research team simulated a model for a similar approach in an existing single-family house in Finland with a 21 kW rooftop array and a ground source 6 kW heat pump for heating that is incorporated in the electricity consumption.

The two-story house is designed as a zero-energy building and has a PV system that is south and east-west oriented. It consists of a 10.4 system with a 9 kVA string inverter facing south and a 10.7 kW array with a 7 kVA inverter facing east-west.

"Undersizing the inverter compared to the PV peak power capacity is economically preferable for installations in northern locations," the scientists said. "The capacity of the PV system is sized to the point where further improvement in self-sufficiency by increasing PV peak power is no longer feasible," they further explained, adding that the home's self-sufficiency was found to be 36.81%, which is in line with values of all northern European countries. The average annual surplus PV power was estimated at around 200%.

In their simulation, the academics used a battery bank for short-term energy storage and for controlling peak demand, and a hydrogen tank linked to a water electrolyzer and fuel cell for seasonal storage. Surplus PV electricity is used primarily for charging the battery and only when the latter is charged is it used to power the electrolyzer. Overdemand, on the other hand, is always met first by the battery itself. "Unnecessary sudden powering on and off of the fuel cell is minimized by limiting its output power based on the battery state of charge," they also specified.

The proposed system could only work by employing a battery with a minimum storage capacity of 20 kWh and a fuel cell and electrolyzer with an installed capacity of at least 4 to 7 kW. "Hydrogen storage capacity of about 170 kg to 190 kg is needed to maintain system operation during the winter months, thus, unless additional compressors are used, a relatively large area in a residential home would be required for

SOLAR PRO.

170 kWh off-grid energy storage

physical storage of hydrogen," the scientists affirmed.

The validity of these findings, the research team went on to say, is limited to northern climates, as higher levels of solar radiation in more southern locations would mean a reduced need for seasonal storage.

*The article was updated on December 21 to specify that the PV system is south and west-east oriented, and not only west-east oriented as we previously reported.

Off grid is more effective with biodigestion. Solar thermal storage as a precursor to heat up compostables create the equivalent of natural gas (bio-gas) and a heat sink for heating your home. De-sour the bio-gas and you have natural gas generator fuel to run your house during hours of your choosing. Therefore solar (pv/thermal) becomes full time power.

Dear Paul Villella, I am planning a new house building in the south of Sweden and looking into sustainable solution. I came across another project description using biomass from compost. Is there such an "off the shelf" solution for this, or it this something that needs to be suited very specifically to a given project?

Nonsense that battery plus hydrogen storage is the "only" off grid solution when generations of humans existed before the grid was invented.Solar plus a localized carbon heat source is reliable and fully capable of supporting northern climate off grid living. You may not like the use of carbon but raping the earth for lithium and other battery components is not remotely renewable.

Contact us for free full report

Web: https://www.hollanddutchtours.nl/contact-us/ Email: energystorage2000@gmail.com WhatsApp: 8613816583346

