Thermal energy storage namibia

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Invader bush reduces the carrying capacity of agricultural land. By utilising harvested bush, a decentralized independent power producer (IPP) model will assist NamPower to strengthen its domestic power mix and assist in further stabilizing the national power grid, while improving the carrying capacity of agricultural land. An independent power producer framework is in place, which supports private ownership of large-scale power plants. NamPower, the main offtaker, is willing to form public private partnerships (PPPs) to generate power using harvested invader bush.

Namibia has a requirement for additional sources of electricity to reduce its dependency on imports. As one of the feasible methods of generation the country is currently implementing and expanding its use of renewable sources of energy. This also envisages wind energy, along Namibia"s coastline. The enterprise model for these ventures is either public private partnerships (PPPs) or privately owned utilities which operate in terms of power purchase agreements with NamPower.

Seawater desalination can be integrated into a solar thermal energy plant using a variety of desalination technologies. Is solar-driven multi-effect distillation a financially feasible solution for water-stressed Namibia?

A research study from Stellenbosch University finds that a 100 MW concentrated solar power (CSP) plant adapted to also "co-generate" water via multi-effect distillation (MED) would potentially be financially viable for Namibia given a world class solar resource at Arandis, where state utility NamPower plans a solar park close to the demand.

Including multi-effect distillation would add relatively little extra cost to that of a standalone CSP plant in Namibia, the authors of a study published at Renewable Energy in January 2018: Integrating desalination with concentrating solar thermal power: A Namibian case study.

The feasibility study for Namibia comes in the context of much CSP+desalination research and development by major CSP research centers globally, including MIT and the Cyprus Institute, which is currently demonstrating a prototype for Mediterranean islands, and CIEMAT and DLR in Spain, which has long led desalination research, with CIEMAT currently leading the SolarPACES Task VI: where it coordinates international researchers, and Germany’s DLR, recently summarizing the range of CSP+desalination technologies being explored.

However, co-generating both electricity and water would have additional benefits over the current grid-powered reverse osmosis plant. One advantage of this proposal is that it simultaneously generates electricity, while the current plant consumes Namibia’s scarce electricity.

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With thermal energy storage the study’s CSP+desalination plant would provide dispatchable solar to supply 15% of Namibia’s peak demand into the evening, giving the small sunny nation greater energy independence from its neighbors, and reducing its carbon footprint, helping it meet its 2030 70% renewable energy target.

With a small population, 2.5 million, Namibia"s peak load was around 656 MW in 2017, of which 347 MW is supplied – albeit seasonally – by local hydro power from the Ruacana Hydropower Scheme.

"In 2017, Namibia imported approximately 60% of its annual electricity from surrounding countries. Most is from South Africa"s power utility, Eskom, and that"s mostly coal," said the research study"s co-author, Ernest Dall.

Dall received a bursary for his Masters in Mechanical Engineering at Stellenbosch in South Africa from NamPower, Namibia"s national electric utility, and is now an engineer in its Power Systems Development division.

"I luckily had the option to choose my research topic and I wanted to do something looking at future issues that do not just affect Namibia, but issues that are global, and that is basically electricity and water scarcity, which if you think about it, go hand-in-hand in desalination," he related.

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Web: https://www.sumthingtasty.co.za/contact-us/
Email: energystorage2000@gmail.com
WhatsApp: 8613816583346