

## SolarTech Power Solutions

# Reversible power generation in solar power stations



## Overview

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This paper presents a reliable thermal design for a Thermoelectric Generator (TEG) with a heat sink integrated with Thermal Energy Storage (TES) unit for solar reversible power generation of thermoelectr.

Are reversible power-to-gas systems possible?

Prospects for reversible Power-to-Gas. Recent technological progress in reversible PtG systems suggests further improvements in terms of declining system prices and increasing conversion efficiencies<sup>40 – 42</sup>.

What are reversible PTG systems?

Reversible PtG systems can be designed in a modular manner, for instance, by combining a one-directional electrolyzer for hydrogen production with a one-directional fuel cell or gas turbine for power generation<sup>15,16</sup>.

Are regenerative fuel cells reversible?

In contrast, we refer to a unitized regenerative fuel cell based on, for instance, a SOFC<sup>10,27</sup> or a proton exchange membrane (PEM)<sup>22,28</sup> technology as an integrated reversible PtG system. Such systems can carry out both production processes on the same equipment, yet they can only run in at most one direction at any point in time.

Will regenerative SoC fuel cell conversion rates increase by 2030?

The conversion rate of the regenerative SOFC fuel cell is expected to increase linearly to on average 0.024 kg/kWh for hydrogen generation and 21.67 kWh/kg for power generation by 2030<sup>20,38</sup>. Our calculations are based on the current distribution of power prices to isolate the effects of falling system prices and improved conversion rates.

What is reversible pump turbine?

The reversible pump turbine, as the core component of pumped storage technology, is often transformed under different operating load conditions according to the different needs of the power station [4, 5]. The pump as a

turbine in practice often causes high amplitude pressure pulsations due to the complexity of its internal circulation . .

Can a PTG system convert hydrogen back to electricity?

Conversely, PtG systems that are also capable of operating in the reverse direction can convert hydrogen back to electricity during periods of limited power supply and correspondingly high power prices<sup>8,9</sup>.

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