Czech republic island microgrids

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Currently, there is no infrastructure on the islands; it needs construction from scratch. The goal is to offer an eco-friendly energy supply solution through the utilization of solar power, promising cost-effective operation.

Across the islands, envisioning panels installed on rooftops, facades, implementing tracker installations, and interconnecting the islands to ensure stability.

Dubai boasts excellent conditions for harnessing the power of photovoltaics, offering a more consistent energy supply throughout the day and across the year, with less significant variations compared to regions like Europe.

In this setup, photovoltaics would heavily rely on electrical energy storage devices for both short-term and long-term storage, ensuring energy availability at later times.

Moreover, these storage devices play a crucial role in providing flexibility, maintaining technical parameters of the network (such as frequency, power factor, and voltage on phases), and ensuring a reliable energy supply for local consumption.

The current solution, utilizing diesel generators as sources, is suboptimal due to challenges in fuel transport, maintenance, and their inefficient operation. Their inflexibility, where fuel consumption is not directly proportional to production, further exacerbates the issue.

The primary focus is on implementing photovoltaics to the fullest extent, utilizing tracker systems and bifacial panels to maximize production.

The comprehensive solution and energy security are ensured through short and long-term storage devices, including Li-ion battery systems and hydrogen storage. Li-ion batteries offer excellent flexibility (<200ms), high efficiency (>90%), and sufficient capacity.

Hydrogen serves as a long-term energy storage option with slightly lower usable efficiency, making it suitable for extended energy storage with minimal losses.

The proposed solution is grounded in TCOE (total cost of energy) with the objective of achieving long-term cost optimization. Despite the significant initial investment, leveraging the free photovoltaic source as the sole production device keeps overall energy costs low.

The technologies are engineered to operate for a minimum of 15+ years, ensuring a sustainable technical solution to meet energy requirements. This includes accounting for system degradation, storage capacity, and

losses in the local distribution grid.

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