



Challenges for Rooftop Solar Deployment in a Small Island Country - Maldives

Dr. Ali Azwar

Deputy Managing Director

State Electric Company Ltd (STELCO)



AGENDA

- BACKGROUND
- CHALLENGES
 1. Geographic and Climatic Constraints
 2. Infrastructure Limitations
 3. Economic and Financial Barriers
 4. Social and Cultural Considerations
- OPPORTUNITIES AND POTENTIAL SOLUTIONS

BACKGROUND



Country Overview:

1,192	Tropical islands
190	Inhabited islands
174	Tourist Resorts
Population:	521,000
Land Area:	300 km ² (less than 1% of the EEZ)
Economy:	Tourism-driven, fishing, agriculture
Electricity Access:	100%
Main Utility Providers:	State Electric Company Ltd (STELCO) Fenaka Corporation

Country	Land Area (sq km) ¹	Population ²	GDP per capita (current US\$) ³
Afghanistan	652,230	42,240,000	352
Bangladesh	130,170	172,954,000	2,529
Bhutan	38,140	787,000	3,704
India	2,973,190	1,428,628,000	2,484
Maldives	300	521,000	12,667
Nepal	143,350	30,897,000	1,324
Pakistan	770,880	240,486,000	1,407
Sri Lanka	61,860	22,037,000	3,828

Land Mass & Population of Maldives

- The Maldives, with a land area of only **300 square kilometers**, accommodates a population of approximately **521,000 residents**, resulting in one of the highest population densities globally.
- This significant disparity between land mass and population highlights the unique challenges the country faces in terms of urban planning, resource management, and environmental sustainability.

¹ <https://data.worldbank.org/indicator/AG.LND.TOTL.K2?locations=8S> (2021)

² <https://data.worldbank.org/indicator/SP.POP.TOTL?locations=8S> (2023)

³ <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=8S> (2023)

Total Installed Capacity : 614 MW



Industrial
20 MW



Resorts
210 MW

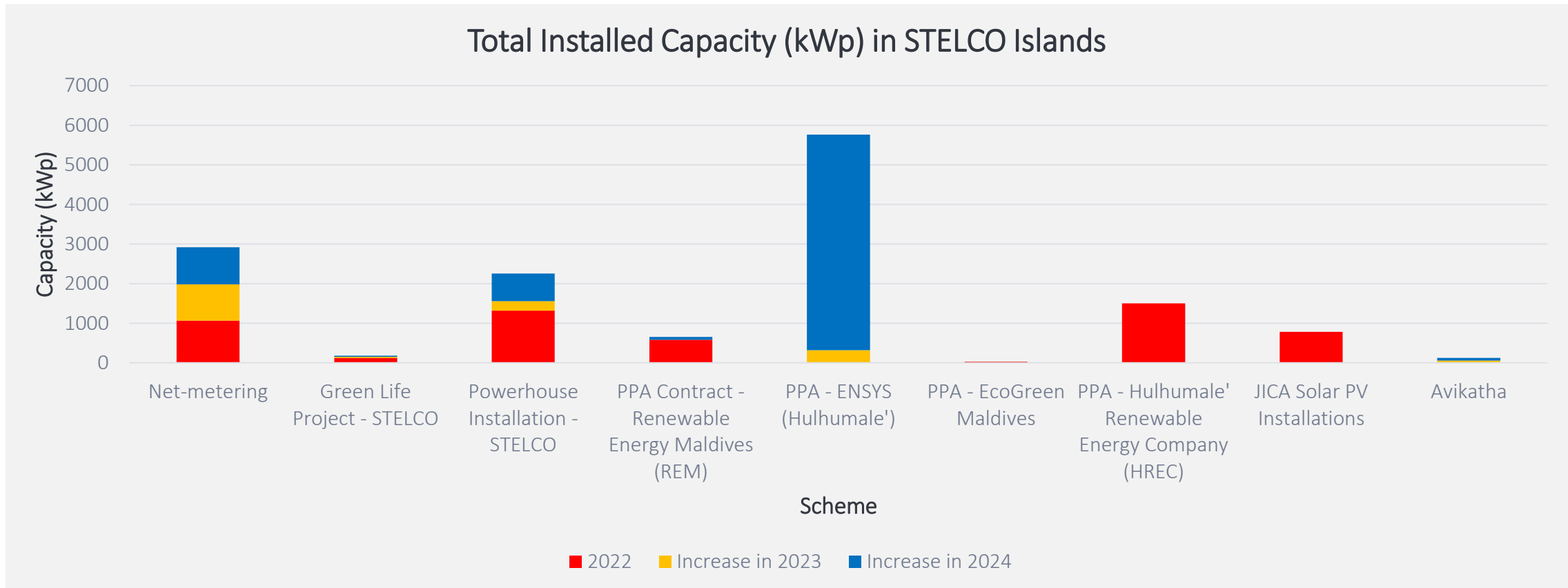


Inhabited
319 MW

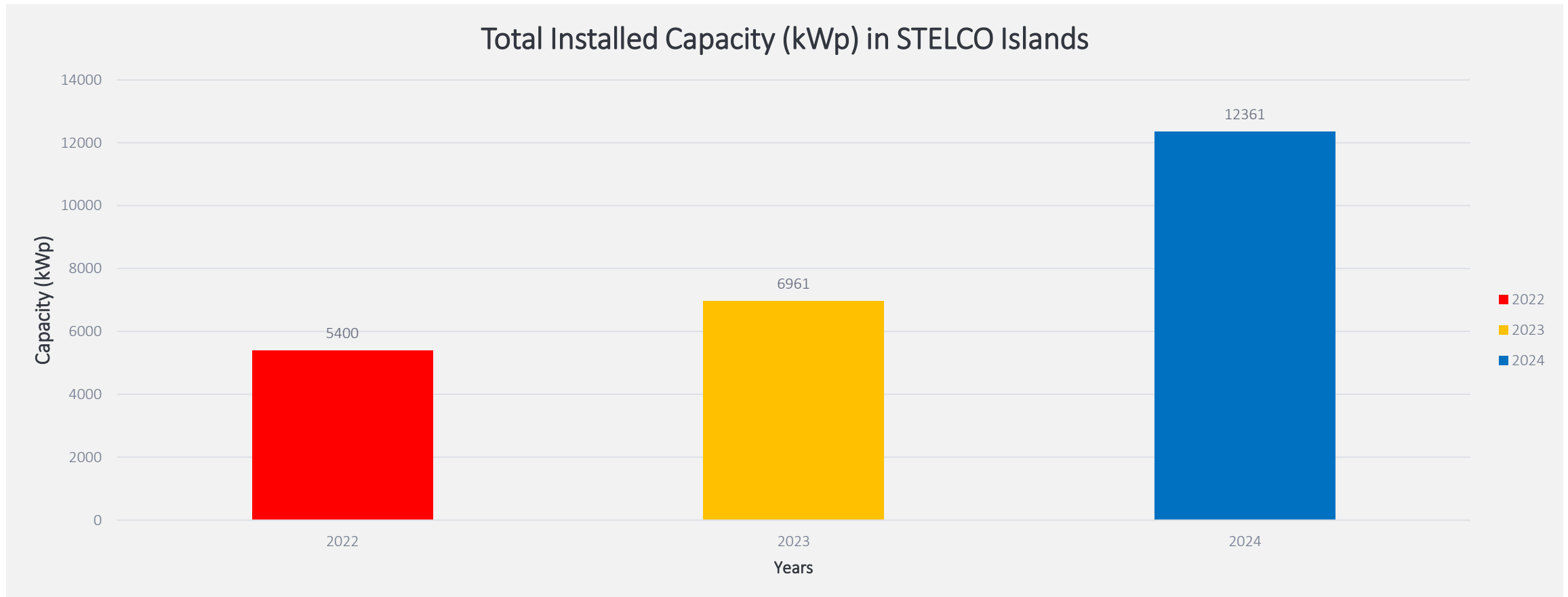


Renewable
65 MW

Total Solar Installed Capacity (kWp) in STELCO Islands - Scheme



Total Solar Installed Capacity (kWp) in STELCO Islands





Challenges

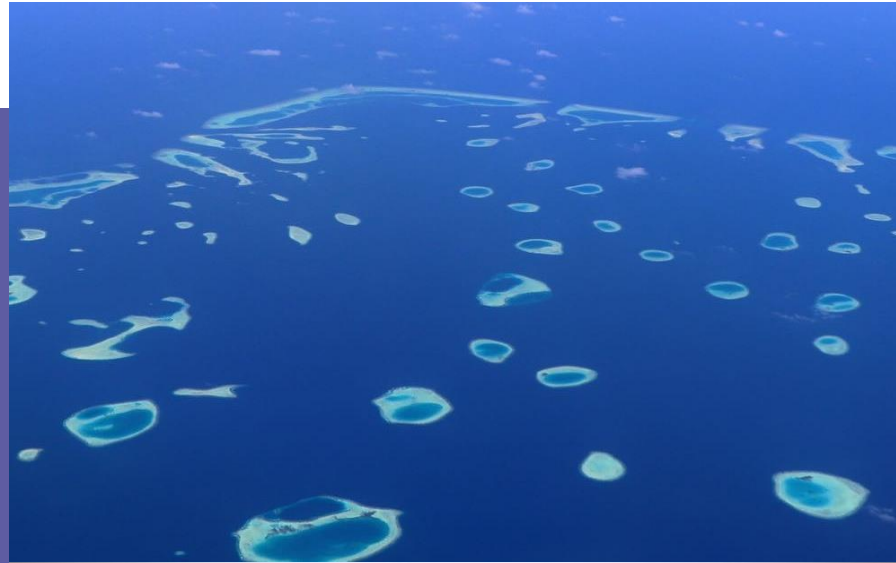


- This presentation will explore the challenges specific to rooftop solar deployment in small islands of the Maldives, focusing on the following aspects:
 - Geographic and Climatic Constraints
 - Infrastructure Limitations
 - Economic and Financial Barriers
 - Social and Cultural Considerations

Geographic and climate constraints

Geographic Isolation:

- **Scattered islands:** The Maldives consists of over 1,000 islands, making logistics and transport of solar equipment challenging.
- **Limited inter-island connectivity:** Infrastructure for transporting equipment is often expensive and inefficient.



Climate Impact:

- **High humidity and saltwater exposure:** These can accelerate equipment corrosion and reduce the lifespan of solar panels.
- **Rough seas and seasonal harsh weather:** Solar installations must be designed to withstand extreme weather, increasing costs.

Infrastructure Limitations



Limited Roof Space

- **Small land areas:** Many buildings on these islands are small, offering limited rooftop space for solar panels.
- **Non-ideal roofs:** Some roofs may not be structurally sound or appropriately angled for solar panel installations.
- **Limited Sun Intensity:** Reduced sunlight intensity due to lower roof height and shading from surrounding trees.



Electrical Grid Compatibility

- **Weak grid infrastructure:** Local grids in small islands may not have the capacity to handle solar power fluctuations.
- **Grid instability:** Intermittent solar power generation can create challenges for balancing supply and demand on small grids.
- **Energy Storage Costs:** Batteries and other storage solutions are vital for ensuring a reliable supply of electricity from solar energy, but these are often expensive and difficult to source for small islands.

Economic and Financial Barriers



High Initial Costs

- **Expensive imports:** Solar panels and other equipment must be imported, raising overall costs.
- **High installation costs:** Initial investment for the system is expensive, and labor along with specialized expertise can be costly in remote locations.



Limited Access to Financing

- **Lack of financing options:** Small island communities have limited access to loans or subsidies to support solar adoption.

Social and Cultural Considerations



Lack of Awareness

- **Limited knowledge:** Many communities lack a full understanding of the benefits and potential savings of solar energy.
- **Skepticism towards the technology:** Concerns about potential failure or the belief that solar technology is unreliable.



Community Acceptance

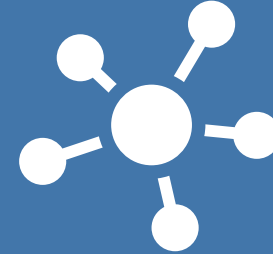
- **Aesthetic concerns:** Some perceive solar panels as an eyesore in resorts that prioritize the natural beauty of their environment.

Opportunities and Potential Solutions



Government Support
and Incentive

Technological
Innovations



Community
Engagement and
Education

Regional Cooperation





Thank you