

Sustainable Integration of Rooftop Solar Photovoltaic Systems in Sri Lanka: Growth Drivers, Constraints, and Regulatory Priorities

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DOI: <https://doi.org/10.31705/ICEWSE.2026.98>

Abstract

Sri Lanka's rapid expansion of Rooftop Solar Photovoltaic (RTSPV) systems has increased distributed renewable generation and created technical, regulatory, institutional, and consumer-protection challenges. This study examined the adequacy of the existing regulatory framework and compliance with the regulatory tools by stakeholders to support the sustainable integration of rapidly growing RTSPV capacity. An evidence-based case-study approach was adopted using nationwide installed RTSPV capacity data from 2013 to September 2025. The study included a categorical analysis of 113 complaints received by the Public Utilities Commission of Sri Lanka during 2022–2025, 55 complaints reported to the Sri Lanka Sustainable Energy Authority during 2024/2025, and a review of existing regulatory tools. The analysis shows that RTSPV capacity increased from approximately 3 MW across 550 consumers in 2013 to 2,090 MW across 129,302 consumers by September 2025. Capacity more than doubled from 657 MW in 2022 to 1,401 MW in 2024 following the introduction of the Net Plus scheme and an export tariff of LKR 37/kWh, which demonstrated strong responsiveness of the industry to the policy changes. Tariff and grid-clearance issues accounted for 46.0% of PUCSL complaints, while recurring aftersales, warranty, installation-quality, and service-continuity issues were identified in the qualitative review. Policy and technical analysis further identified hosting-capacity constraints, voltage rise, inconsistent inverter settings, limited system visibility, and non-uniform practices as barriers to sustainable growth. The study contributed to identifying the gaps in the existing framework and addressing tariff stability, harmonized interconnection procedures, compliance monitoring, and requirement to strengthen installer accountability and consumer protection.

Keywords: *consumer protection; grid integration; hosting capacity; regulatory framework; rooftop solar photovoltaic; Sri Lanka*