



ANALYSIS ON ROOFTOP SOLAR INTEGRATION AND INDUSTRY GROWTH IN SRI LANKA

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Public Utilities Commission of Sri Lanka

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INTRODUCTION

Rooftop Solar Photovoltaic (RTSPV) Systems have become a central element in Sri Lanka's renewable energy transition, with installed capacity increasing significantly over the last two years. Policy instruments such as net metering, net accounting, and net-plus schemes encouraged widespread participation among residential, commercial, and industrial consumers. However, the rapid growth of the sector has also revealed a number of systemic challenges that affect its long-term sustainability, technical performance, and consumer confidence.

The future sustainability of the rooftop solar sector will depend on strengthening regulatory clarity, improving compliance assurance mechanisms, enhancing the legal authority of relevant institutions, and establishing clear technical and service obligations for both installers and utilities. The adoption of monitoring systems, standardized inverter control settings, hosting capacity assessment methods, and support for battery energy storage will be central to maintaining system reliability and ensuring equitable access to limited distribution network capacity.

This report presents an analysis of these developments, identifies key challenges affecting the sector, and outlines strategic considerations for regulatory, technical, and institutional reforms necessary to support the continued and stable growth of rooftop solar in Sri Lanka.

1. A BRIEF HISTORY OF ROOFTOP PV SYSTEMS IN SRI LANKA

The history of Rooftop Solar Photovoltaic (RTSPV) Systems in Sri Lanka is a story of gradual evolution, driven by policy initiatives, market dynamics, and increasing public engagement with renewable energy. From modest beginnings in rural electrification, rooftop solar has become a significant component of the country's energy transition.

Early-stage RTSPV was connected to the national grid, while Sri Lanka's solar efforts were primarily off-grid, focusing on rural electrification. Various programs have introduced small-scale solar systems in areas not served by the national grid. These early systems helped build basic local technical capacity and public familiarity with solar energy. Sri Lanka's formal entry into grid-connected rooftop solar began in 2008 with the introduction of the **Net Metering Scheme**. This allowed consumers to install rooftop solar systems, use electricity for self-consumption, and Export excess electricity to the national grid, which would be credited for future use.

This credit could be carried forward for up to 10 years, but the scheme did not provide monetary payments for exported electricity. As a result, adoption was initially slow and mostly limited to environmentally motivated households or those with high electricity consumption. A major policy shift came in 2016 with the launch of the Soorya Bala Sangramaya ("Battle for Solar") initiative. This program aimed to mainstream rooftop solar by targeting 200 MW of RTS capacity by 2020, and 1,000 MW by 2025 (later revised to 1,500 MW by 2030 due to early success). Two new schemes were introduced, similar to the Net Metering scheme,

1. **Net Accounting:** Paid consumers for excess energy exported to the grid, at a fixed feed-in tariff for 20 years.
2. **Net Plus:** Allowed full export of generated electricity to the grid, independent of consumption, with payments based on a separate meter.

These schemes catalyzed widespread consumer and investor interest, particularly among commercial and industrial sectors. To support the expansion of rooftop solar, the Public Utilities Commission of Sri Lanka (PUCSL) issued Certificates of Exemption under the Sri Lanka Electricity Act, waiving licensing requirements for small-scale generators under the Net Metering, Net Accounting, and Net Plus schemes. These exemptions, valid for 20 years, made it easier for homeowners and businesses to install RTSPV systems without regulatory complexity.

In 2022, CEB introduced a new scheme called **Net Plus Plus**, with the direction of the Ministry of Power, which allowed.

- Third parties to install RTSPV systems on leased rooftops, and
- Export of electricity beyond the contract demand of the consumer.

This scheme opened doors for investor-owned solar systems and commercial rooftop leasing models. However, by March 2025, the CEB discontinued approval of installations exceeding contract demand due to grid management concerns.

2. CURRENT STATUS OF ROOFTOP SOLAR IN SRI LANKA

2.1 Status of Installed Capacity and Generation

By the **end of September 2025**, Sri Lanka had installed,

- **Over 129,300 rooftop connections**, totaling approximately **2,090 MW** of capacity.
- A diverse mix of systems across Net Metering, Net Accounting, Net Plus, and Net Plus Plus schemes.

Figure 1 depicts the historical growth of Rooftop Solar PV systems in Sri Lanka.

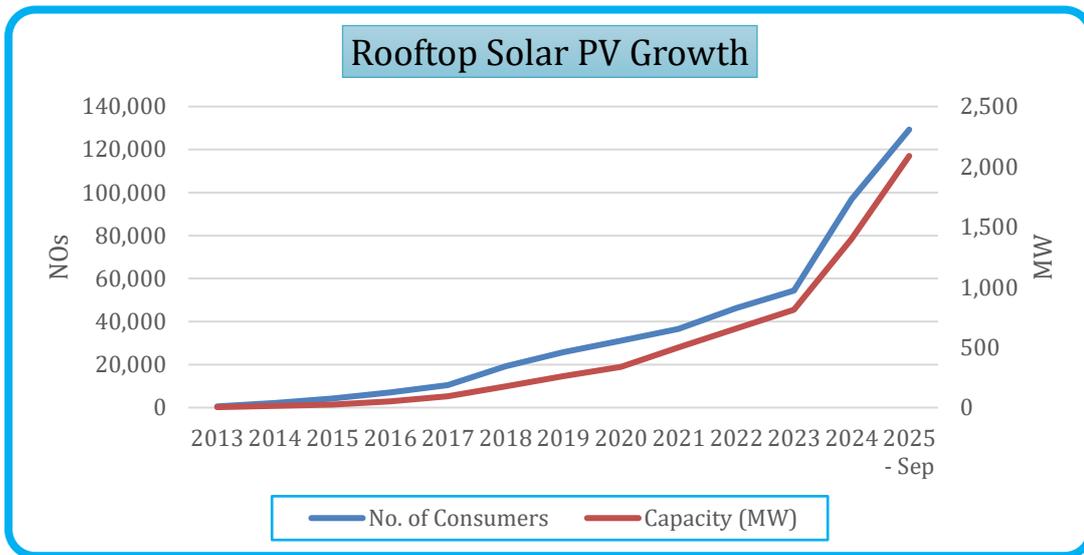


Figure 1 : RTSPV System Growth 2013 - 2025 (September)

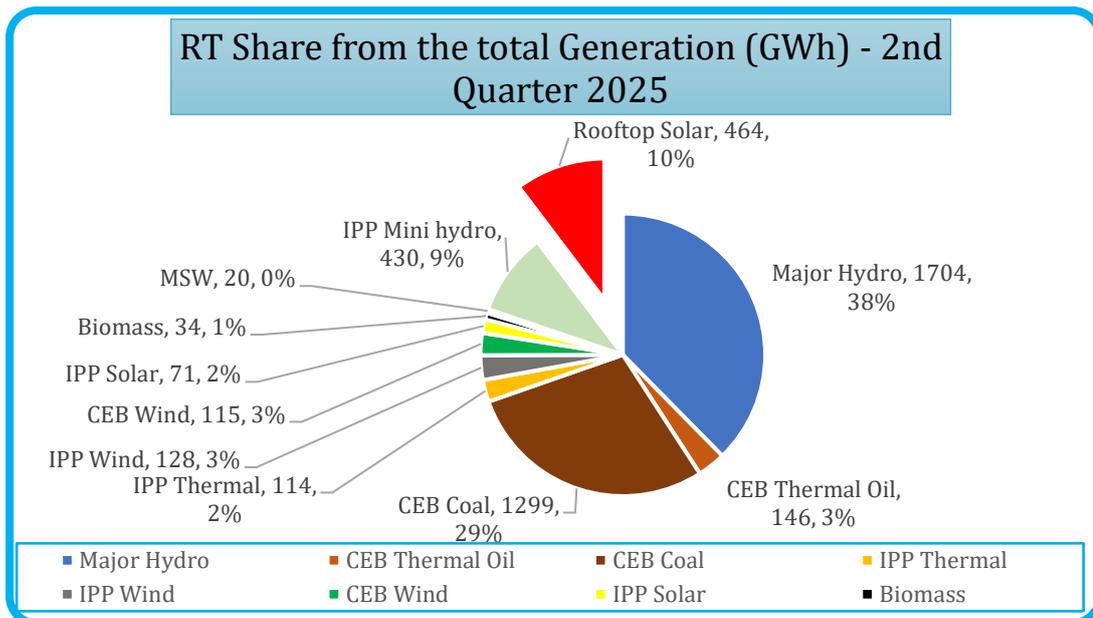


Figure 2 : RT Share from the Total Generation (GWh) - 2nd Quarter 2025

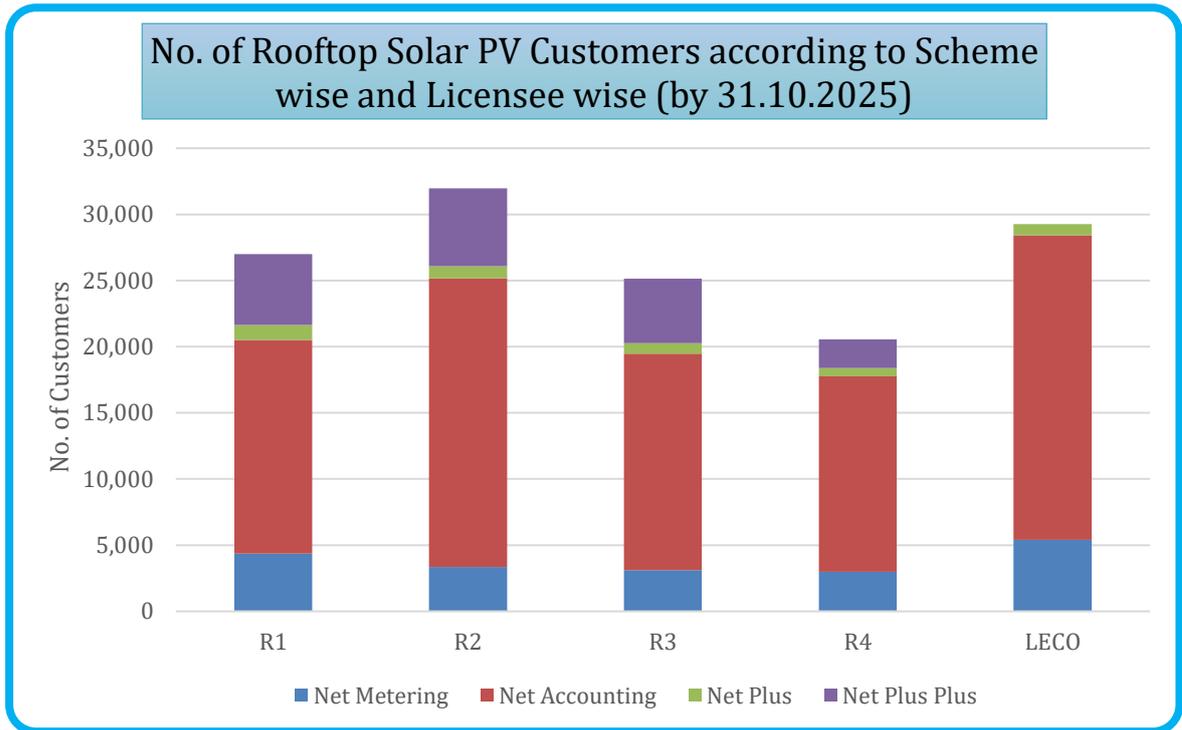


Figure 3 : No. of Rooftop Solar PV Customers according to Scheme-wise and Licensee-wise (by 30.09.2025)

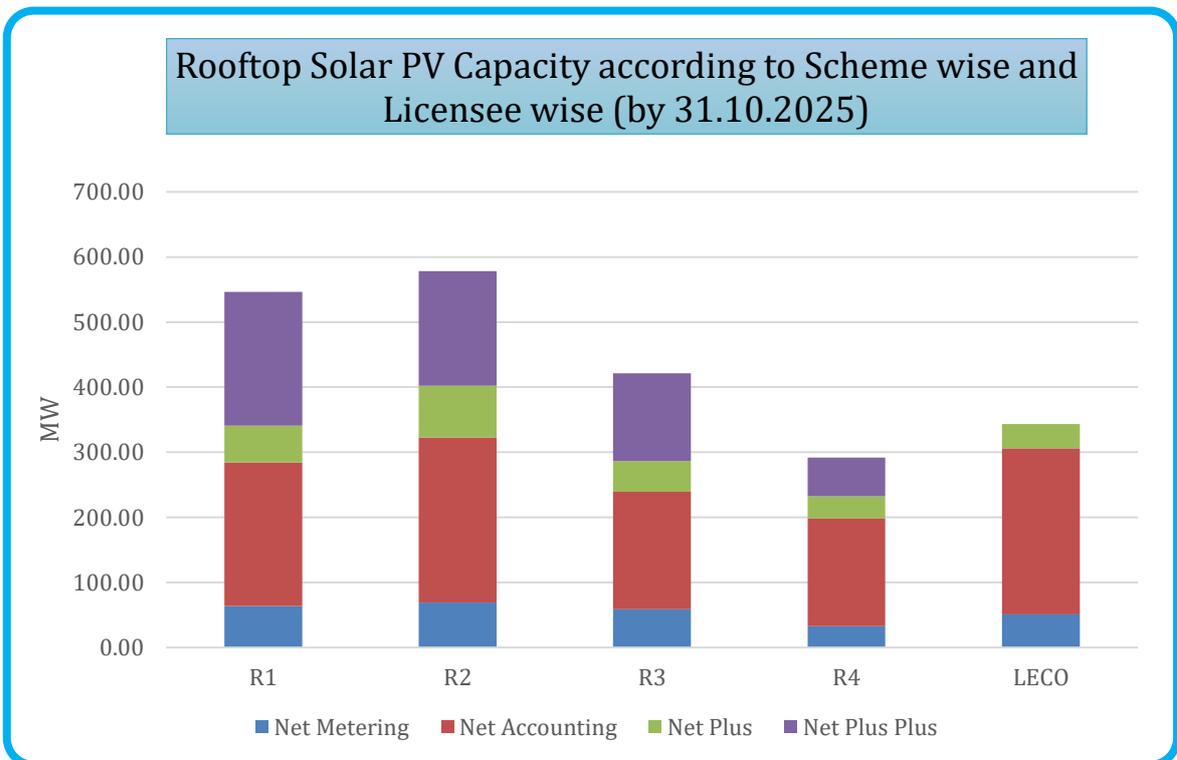


Figure 4: Rooftop Solar PV Capacity according to Scheme-wise and Licensee-wise (by 30.09.2025)

2.2 Existing Legal and Regulatory Framework on Rooftop Solar PV Systems.

The Rooftop Solar PV system installation and connections are governed under different rules and regulations, decisions made by the Cabinet of Ministers from time to time, and internal circulars of utilities. Some of the relevant legal registries are as follows.

- Distribution Code of Sri Lanka – July 2012 (“Distribution Code”)
- Supply Services Codes of the Ceylon Electricity Board and the Lanka Electricity Company.
- Certificate of Exemption from the requirement of obtaining a license for generation (“Certificate of Exemption”) – 14th February 2017 and follow-up versions. (Latest version has been issued in the year 2025)
- Guidelines on Rooftop PV Solar Installations for Solar Service Providers PUCSL
- Guidelines of Rooftop Solar PV installations for Utilities by PUCSL
- Guide for Grid Interconnection of Embedded Generators of Ceylon Electricity Board – December 2000 (“Embedded Generators’ Code”)
- Cabinet Memorandums related to Sooriya Bala Sangramaya and the following tariff decisions.
- Electricity Distribution and Supply License granted to the Distribution Licensees.
- CEB Circular on the implementation of Soorya Bala Sangramaya Program- 28th February 2018 and follow-up circulars.
- LECO Circular on the implementation of Soorya Bala Sangramaya Program – 31st October 2016 follow-up circulars.
- CEB Circular on extending rooftop solar PV installation capacity beyond contract demand dated 04th October 2022

As per the Sri Lanka Electricity Act, No. 20 of 2009 (as amended), the transmission licensee is permitted to purchase electricity only from generation licensees. According to Section 43 of the Act, electricity generated from solar PV installations is purchased by the distribution licensee on behalf of the transmission licensee, and the relevant transactions are recorded in their respective accounts.

The Sri Lanka Sustainable Energy Authority (SEA) is responsible for issuing Energy Permits for renewable energy projects, while the Public Utilities Commission of Sri Lanka (PUCSL) is responsible for issuing Generation Licenses or granting exemptions from the requirement to obtain such licenses. Accordingly, the PUCSL has issued exemptions for rooftop solar generation based on system capacity and quantity. Recently, the PUCSL revised these exemptions by introducing additional conditions to improve safety and compliance.

3. KEY DRIVERS OF RTSPV GROWTH

Subsequently, during the economic crisis in 2022 and 2023, the Ministry introduced the Net Plus Plus scheme, and the tariff paid for exported electricity was increased to LKR 37 per kWh. These two policy changes led to a substantial expansion in the industry, where the total installed rooftop solar capacity increased from 657 MW to 1,401 MW by the end of 2024.

Year	No. of Consumers	Capacity (MW)	Yearly Growth (MW)
2013	550	3	3.35
2014	2,201	13	9.95
2015	4,196	26	12.70
2016	7,108	50	24.42
2017	10,389	94	43.30
2018	19,164	176	82.65
2019	25,712	261	85.00
2020	31,165	338	76.50
2021	36,640	499	161.13
2022	46,203	657	157.97
2023	54,374	812	155.03
2024	96,835	1,401	588.69
Sep-25	129,302	2,090	447.16

Table 1 : Rooftop Solar PV Growth

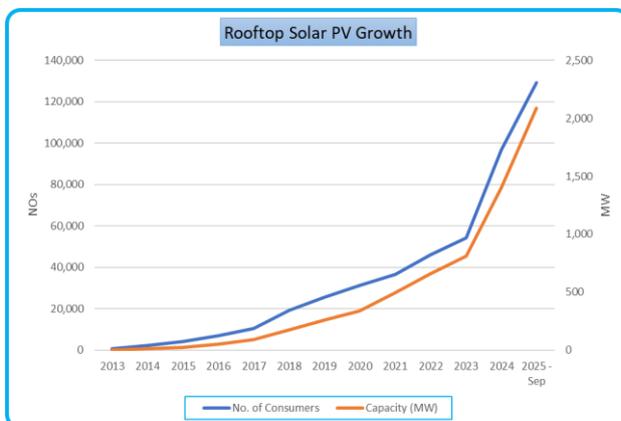


Figure 5: RTSPV Growth

This trend highlights that **high FIT** and **schemes that promote investments** have been the key drivers of rooftop solar adoption in Sri Lanka, enabling prosumers to earn additional income as electricity generators.

4. CHALLENGES IN ROOFTOP SOLAR INTEGRATION

Despite the rapid growth of rooftop solar PV (RTSPV) installations in recent years, it has been observed that grid readiness remains the primary bottleneck for further expansion. A significant portion of new RTS connections has been constrained due to limited hosting capacity in the distribution network. Sri Lanka is also lagging in modern grid management technologies required to integrate and control distributed energy resources (DERs), further limiting the ability of utilities to absorb additional rooftop solar capacity.

A recent stakeholder consultation conducted by the Public Utilities Commission of Sri Lanka (PUCSL) highlighted a range of systemic, institutional, technical, financial, and consumer-related barriers affecting the rooftop solar industry.

1. Policy and Tariff-Related Barriers

- Frequent and retroactive Feed-in Tariff (FiT) revisions undermine investor confidence and financial planning.
- Inadequate tariff structures for rooftop solar and battery energy storage systems (BESS), with no recognized business model for prosumer-led generation or BESS capacity payments.
- Lack of transparency in Net Plus Plus and variable tariff calculations, resulting in inconsistent application across regions.
- Unclear legal basis for certain tariff-setting creates regulatory ambiguity.
- Inconsistent implementation and later discontinuation of Net Plus Plus, leading to uncertainty and uneven treatment of applicants.

2. Institutional and Governance Barriers

- Non-uniform practices between CEB and LECO result in inconsistent connection requirements and approval procedures.
- Limited stakeholder consultation during tariff adjustments and scheme revisions, reducing industry trust and policy acceptance.

3. Technical and Grid Integration Barriers

- Hosting capacity limitations in transformers and feeders, and not originally designed for reverse power flow.
- Insufficient modern grid monitoring (SCADA/DMS visibility) reduces real-time controllability of distributed solar generation.
- Protection coordination challenges, especially where inverter settings are altered or poorly configured.
- Power quality disturbances (harmonics, flicker, voltage fluctuations) arising from non-compliant or low-quality inverters.
- Curtailment of must-run renewable energy plants, occasionally carried out on grounds not clearly supported by operational constraints.
- Limited capability to deploy and manage BESS, due to the absence of operational guidelines and cost recovery mechanisms.
- No energy wheeling framework, restricting optimal siting of solar projects.

4. Financial and Market Barriers

- Frequent changes in policy and tariffs introduce uncertainty for investors and consumers.
- Delays in settlement and payment disputes under certain net accounting arrangements.
- Lack of recognition of RTSPV as a strategic investment sector, limiting opportunities for foreign and private capital.

5. Consumer Complaints and Industry Practices

- Unequal treatment of consumers during connection approval processes.
- Allegations of conflict of interest, where some utility officials may have commercial links to solar businesses.
- Absence of a formal installer grading or certification mechanism, resulting in varying quality and safety standards.
- Widespread consumer misinformation regarding tariffs, inverter settings, and BESS requirements.
- Operational challenges due to forced disconnections, lack of monitoring, environmental degradation of modules, and inadequate maintenance.

6. Professional Conduct and Certification Oversight

- Complaints received through utilities indicate that some installation certifications issued by Chartered Engineers lack adequate technical diligence. Given that Chartered Engineers have a critical role in ensuring the safety and long-term performance of RTSPV systems, strengthening professional accountability and practice standards is essential.

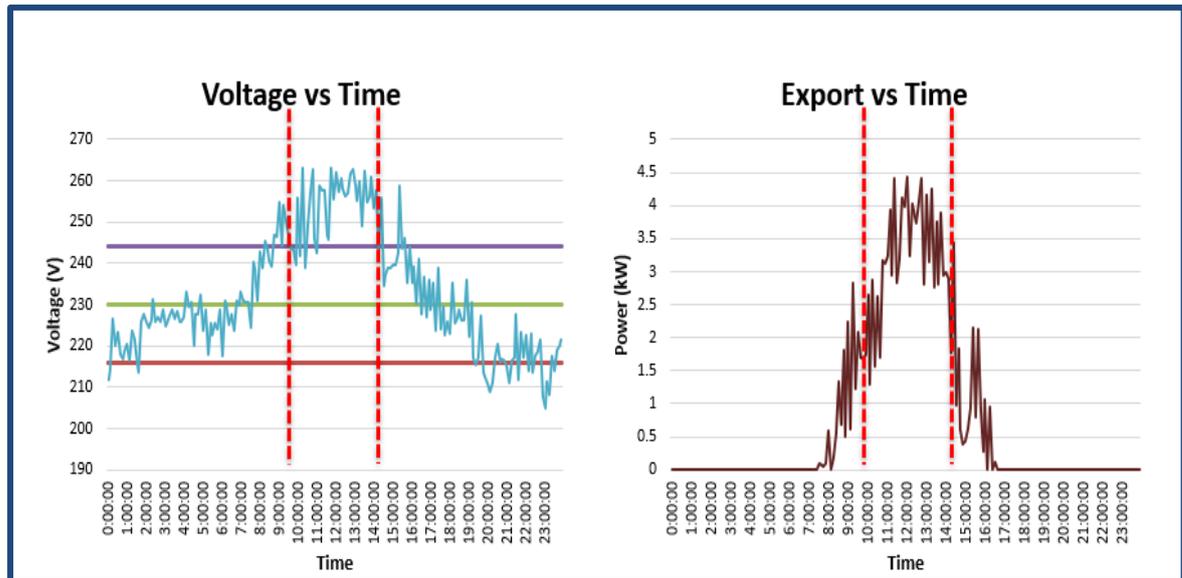
4.1 Rooftop Solar PV and Technical Barriers.

With the rapid expansion of rooftop solar photovoltaic (RTSPV) installations, the hosting capacity of distribution transformers and low-voltage feeders has increasingly become a constraint. Electricity demand growth in Sri Lanka has also remained subdued following the economic crisis, resulting in relatively low daytime loads in many distribution areas. Under these conditions, injection of solar power from RTS systems during peak solar hours contributes to a rise in feeder voltage levels, particularly on low-voltage networks.

A contributing operational factor is that some prosumers or installers configure inverter settings outside the statutory voltage limits (for example, by setting over-voltage trip points higher than the prescribed threshold). Such non-standard settings can delay inverter disconnection, temporarily allowing higher voltage profiles on the network; conversely, poorly set or inconsistent inverter protection settings can also lead to premature tripping. Both practices exacerbate voltage instability: either by permitting sustained overvoltage or by increasing the frequency of inverter trips when inverters disconnect to protect themselves.

In Sri Lanka, the statutory supply voltage standard is 230 V \pm 6% (approximately 216.2 V to 243.8 V). When local voltages exceed the upper limit due to reverse power flow and/or non-compliant inverter settings, inverters reach their overvoltage set-points and disconnect, causing abrupt loss of rooftop PV output — even when behind-the-meter loads are present. This phenomenon is most pronounced during mid-day hours when solar irradiance and PV generation peak while local demand is minimal.

Figure 6: Voltage Variation of a Utility Feeder (Source: LECO)



The utility is currently facing a significant challenge due to the lack of real-time monitoring and visibility of rooftop solar PV (RTSPV) generation at the national system control level. With the rapid increase in installed RTSPV capacity, the national load profile has begun to exhibit a characteristic “duck curve”, where midday demand is substantially reduced due to high solar generation and evening demand ramps sharply.

Under these conditions, the national system controller requires both visibility and controllability of distributed RTSPV systems to ensure stable system operation. The recent nationwide blackout incident further intensified this concern. During that event, the CEB claimed that the high penetration of RTSPV, particularly on a clear, high-generation Sunday with low daytime demand, was a contributing factor to the system imbalance, which cannot sustain small faults happening in the distribution system. While the event does not singularly attribute fault to RTSPV, it highlights the critical need for modern grid monitoring, inverter control functionalities, compliance with grid code, and frequent updates of protection settings and system-level technological upgrades.

Therefore, to progress toward the national target of 70% renewable energy, it is essential to develop and implement advanced monitoring systems, distributed energy resource management systems (DERMS), and smart inverter capabilities,

particularly at the distribution network level, where a large share of new renewable energy capacity is expected to be integrated.

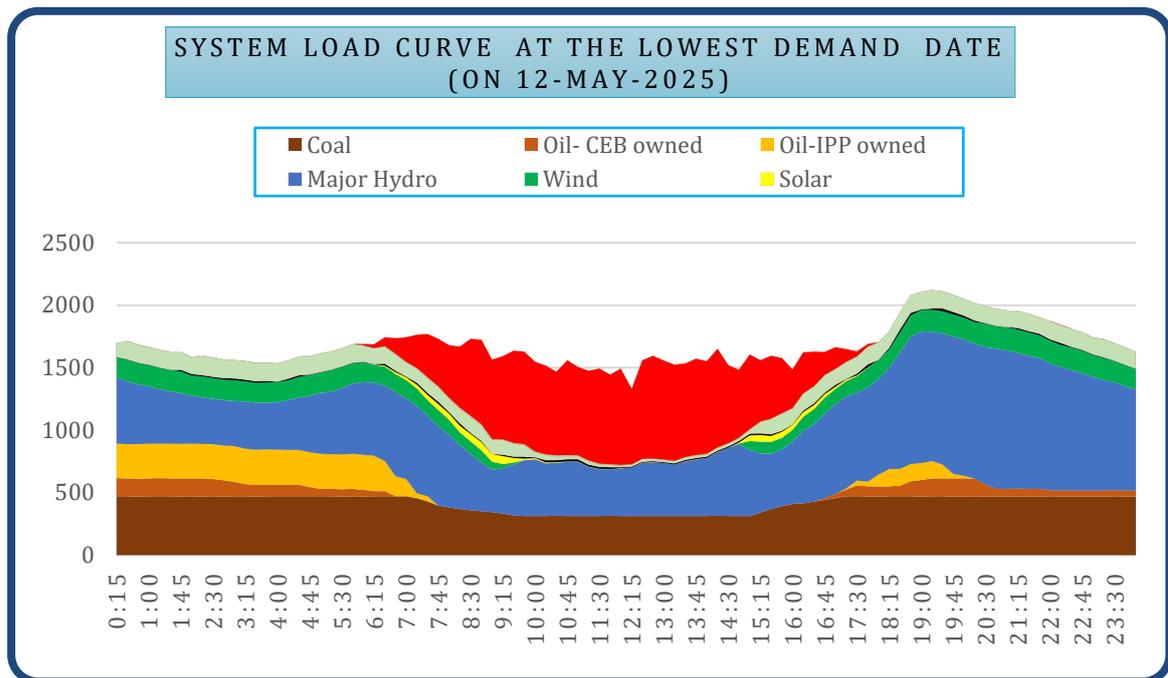


Figure 7: System Load Curve at the Lowest Demand

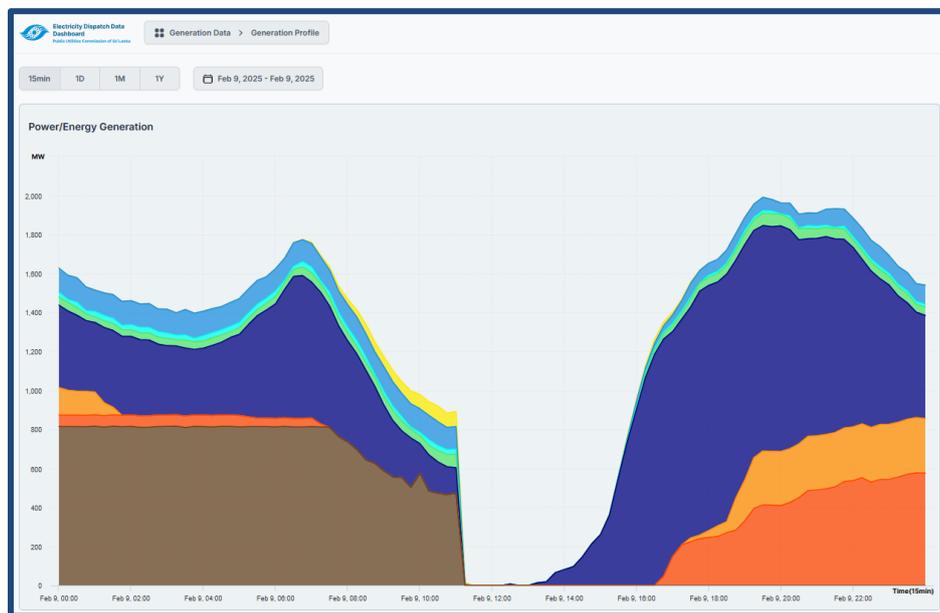


Figure 8: Load Curve of 09-02-2025 blackout

Following the national blackout in February 2025, the distribution utilities introduced updated inverter protection requirements, including Low Voltage Ride-Through (LVRT) and Frequency Ride-Through capabilities, to ensure that rooftop PV systems remain connected and support system stability during transient events. However, current observations indicate that less than 50 percent of the installed rooftop solar capacity has adopted these updated protection settings.

The delay in achieving full compliance can be attributed to several factors. In some cases, **existing inverters do not possess the required ride-through capabilities, or firmware updates are not supported by the manufacturer.** For other systems, the **reconfiguration work has been deprioritized by both prosumers and installers,** particularly where the system is operating without immediate performance issues. Additionally, **regulatory and enforcement measures to ensure adherence to the revised settings have not yet been fully implemented,** and responsibility for ensuring compliance is complicated by the fact that the inverter equipment is privately owned by the prosumer. As a result, the current level of inverter protection compliance remains insufficient to reliably support system stability during grid disturbances.

5. ROOFTOP SOLAR PV INDUSTRY AND UTILITY

In Sri Lanka, there are five distribution licensees, of which four operate under the Ceylon Electricity Board (CEB) and one under the Lanka Electricity Company (LECO). Both utilities manage their operational activities through internal circulars and procedural guidelines. To ensure uniform implementation of rooftop solar PV (RTS PV) integration processes across these entities, the Public Utilities Commission of Sri Lanka (PUCSL) issued a Guideline on Rooftop Solar PV Systems in 2019.

However, with the rapid expansion of the rooftop solar market and frequent tariff and policy revisions, CEB has issued several ad hoc internal circulars to regulate RTS-related operational matters. These circulars have not always been aligned with the PUCSL guideline or consistently applied across all regions. This has resulted in regulatory uncertainty, procedural inconsistency, and reduced predictability for investors and prosumers.

As a consequence, investor confidence in the long-term stability of the RTS sector has weakened, and the number of consumer complaints regarding rooftop solar has increased. Currently, more than 50% of consumer complaints received by PUCSL are related to rooftop solar PV systems. This trend clearly indicates the need for a strengthened, transparent, and uniformly enforced regulatory framework for rooftop solar integration, including standardized procedures for approval, interconnection, technical compliance, and dispute resolution.

Analysis of Consumer Complaints (2022–2025)

A total of **113 complaints** were taken for further analysis across the four years of 2022-2025.

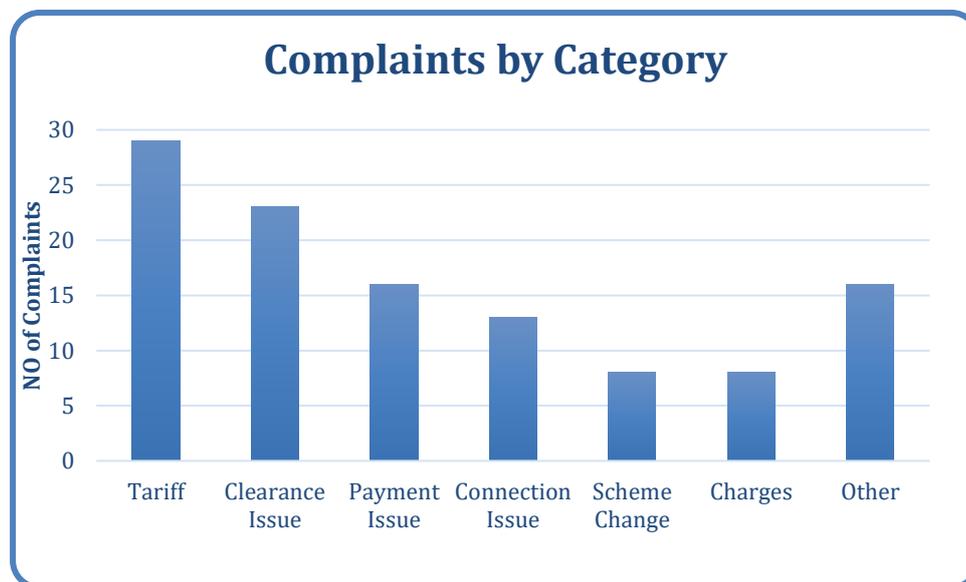


Figure 9: Complaints by Category

Table 2 : Complaints by Category (2022-2025)

Complaint Category	Number of Cases	Key Insight
Tariff	29	Concerns reflect frustration with changing tariff structures (Net+, Net++) and payment formulas.
Clearance Issue	23	Delays or refusal to issue technical feasibility clearance.
Payment Issue	16	Late payment or a mismatch between the inverter and meter readings.
Connection Issue	13	Delays in commissioning and meter installation.
Scheme Change	8	Confusion/impact caused by Net++ suspension or modification.
Other Charges	8	Disputes over assessment, service, or upgrade charges.
Others	16	General RTS concerns (not tied to specific process).

Key Finding: Tariff-related and approval-process issues account for ~62% of all complaints, indicating regulatory and administrative friction rather than purely technical shortcomings.

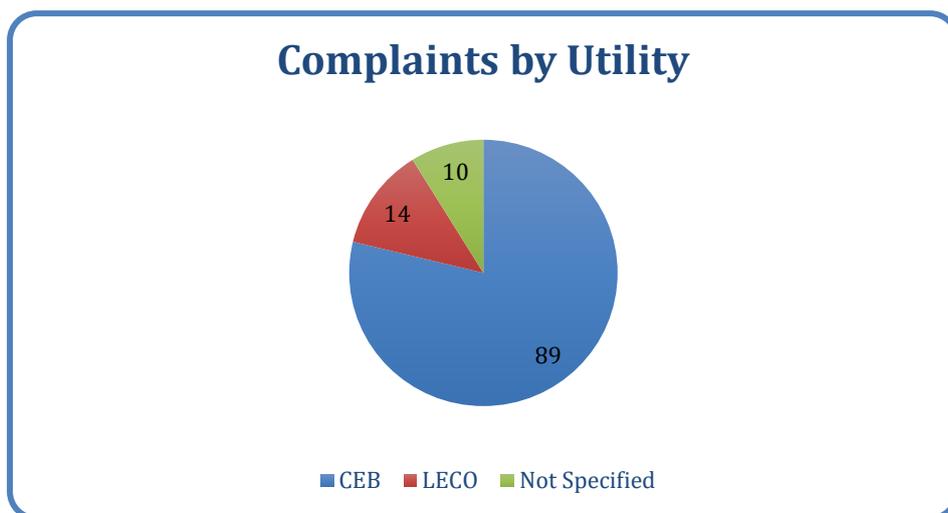


Figure 10: Complaints by Utility

Table 3 : Complaints by Utility (2022-2025)

Utility	Complaints	Interpretation
CEB	89	The majority of complaints originate in CEB-served regions, which reflects a larger customer base + inconsistent implementation of RTS circulars.
LECO	14	Lower complaint volume suggests comparatively smoother operational processes.
Not Specified	10	Requires clarification, likely incomplete reporting fields. General Complaints related to tariff and schemes.

Observation: Higher complaints within CEB-distribution areas align with earlier findings on non-uniform operational practices.

Table 4: Key Summary Insights

Issue Cluster	Sector Impact
Tariff instability	Erodes investor confidence and impacts payback perception.
Clearance + Connection delays	Undermines consumer trust and slows adoption.
Non-uniform utility practices	Creates inequity and procedural uncertainty.
Limited installer accountability	Contributes to quality and safety issues.
Hosting capacity and voltage issues	Reduce system performance and earnings.

6. ROOFTOP SOLAR PV INDUSTRY REGULATION.

Registration and Regulation of Solar PV Service Providers

The Sri Lanka Sustainable Energy Authority (SLSEA) is the institution responsible for the registration and oversight of Solar PV Service Providers (SPVs) operating under the national rooftop solar development initiative, **SOORYA BALA SANGRAMAYA** (Battle for Solar Energy). The program was introduced in 2016 to facilitate widespread adoption of solar energy and achieve national renewable energy capacity targets. As part of this initiative, SLSEA established a formal registration and evaluation framework to ensure that solar service providers meet minimum technical, financial, and operational standards before engaging with consumers.

The registration framework serves to,

- Ensure that companies engaged in RTSPV design, supply, installation, and maintenance possess adequate technical competency and financial stability.
- Protect consumers by promoting quality assurance, safety, and accountable service practices.
- Enable SLSEA to monitor performance, address complaints, and take regulatory action when necessary.

To be listed as a Registered Solar PV Service Provider (RSPVSP), companies must satisfy the eligibility criteria established by SLSEA.

Key requirements include,

- Registration as a Sri Lankan company under the Companies Act No. 7 of 2007.
- Demonstration of minimum financial capacity (LKR 5 million for installers; LKR 10 million for distributors/resellers).
- Maintaining a minimum qualified technical staff.
- At least one engineer, recognized by the Engineering Council of Sri Lanka, with relevant experience.
- At least two technicians with NVQ Level 3 or above or equivalent training, each with a minimum of two years of PV installation/maintenance experience.

Compliance Obligations

- Registered service providers are required to:
- Ensure all installations are carried out according to SLS, PUCSL, CEB, and LECO technical and safety requirements.
- Maintain transparent, accurate communications with customers.
- Ensure proper after-sales support and warranty servicing.
- Uphold professional integrity and avoid misleading representations regarding affiliation with government agencies.

Registration Renewal and Performance Monitoring

SLSEA renews registrations annually based on performance indicators such as,

- Number and quality of installations completed.
- Number of unresolved consumer complaints.
- Compliance with technical and after-sales service standards.
- Continuity of qualified technical staff.
- For renewals beyond the second year, SLSEA may require **independent verification** of previous installations through accredited technical consultants.

Enforcement Actions

- If a registered provider is found to be in breach of terms and conditions, SLSEA may:
 - Issue notice for corrective action.
 - **Suspend registration** temporarily.
 - **Cancel registration** where violations are severe or not rectified within the prescribed period.
- SLSEA's regulatory authority extends to the **removal and restriction of companies** that repeatedly fail to meet customer service, safety, or installation quality expectations.

Despite the existence of the SLSEA registration and oversight framework, the number of consumer complaints reported to both SLSEA and PUCSL has not declined. This suggests that registration alone has not ensured consistent service quality, adherence to technical standards, or accountability among solar service providers.

More than 1,100 solar companies have been registered with SLSEA since the introduction of the rooftop solar initiative. However, by 2025, only around 600 companies are remain actively operating. The remaining companies have become inactive, exited the market, or hold registration without maintaining operational capacity.

A notable concern is the emergence of companies that enter the market during periods of favorable tariff structures or high profit margins and subsequently exit once market conditions become less favorable. Such short-term participation leads to situations where consumers are left without after-sales support, access to warranty claims, or maintenance services once the company has withdrawn from operations.

This situation highlights several structural challenges,

- Market fluctuations, especially tariff and pricing changes, encourage opportunistic entry and rapid exit.
- Annual registration renewal does not sufficiently assess installation quality, customer service performance, or long-term commitment.

- In many cases, consumers are left with incomplete support for periodic servicing, inverter replacement, system optimization, or warranty enforcement.

The rise in complaints related to installation quality, service delays, tariff misunderstandings, and warranty disputes indicates that existing consumer protection measures are not adequate. Many consumers experience delayed resolution, and enforcement actions against companies with poor performance records are limited, as per the comments received through the public consultation held in 2025 by the PUCSL.

The customer complaints reported to the Sri Lanka Sustainable Energy Authority (SLSEA) primarily relate to issues that emerge after the installation of rooftop solar PV systems. The 55 no of complaints received during the year 2024/2025 has been analyzed for this purpose. These include inverter failures, disputes over warranty claims, delays in maintenance services, and system underperformance. In many instances, consumers face prolonged delays in obtaining technical support from service providers, and in some cases, companies become unresponsive after the completion of installation works.

A notable concern observed in the complaint trends is the presence of companies that enter the rooftop solar market during periods of favorable tariff structures or high profit margins and subsequently withdraw once profitability decreases. Such exits leave consumers without after-sales support or access to warranty and maintenance services. Additionally, variations in installation quality, inadequate system monitoring, and a lack of standardized maintenance practices contribute to recurring technical issues.

The complaints recorded by SLSEA illustrate that the majority of concerns are linked to installer performance and after-sales service shortcomings rather than utility-side grid integration issues. The analysis highlights the need for improved industry oversight, performance-based registration renewal, and structured mechanisms to ensure service continuity.

Table 5: Summary of Common Complaint Types Reported to SLSEA

Complaint Category	Description of Issue	Common Consumer Impact	Underlying Causes Observed
Inadequate After-Sales Service	Consumers are unable to obtain maintenance support or troubleshooting assistance	Extended system downtime and reduced energy generation	Lack of service commitment, insufficient technical workforce

Warranty and Equipment Replacement Disputes	Companies are delaying or refusing inverter/module replacement despite warranty claims	Financial loss and reduced confidence in the system investment	Poor warranty management and absence of enforceable obligations
Installation Quality Issues	Improper wiring, incorrect inverter settings, substandard mounting, and protection systems	Safety risks, frequent inverter tripping, and reduced performance	Variability in skill levels,
Company Withdrawal from Market	Companies cease operations after earning short-term profits during favorable tariff periods	Consumers are stranded without service support or warranty access.	Low entry barriers and absence of continuity requirements.
Miscommunication of System Performance	Unrealistic generation expectations communicated during the sales stage	Consumer dissatisfaction and disputes	Lack of standardized performance assessment and disclosure requirements

7. ROOFTOP SOLAR PV REGULATIONS, STANDARDS, AND COMPLIANCE.

The Public Utilities Commission of Sri Lanka issued a guideline for rooftop solar service providers in 2019 to standardize installation practices and ensure safety and performance compliance. These guidelines were aligned with the technical standards established by the Sri Lanka Standards Institution (SLSI) and were intended to create a uniform framework for system design, installation, testing, and commissioning. However, despite the availability of these standards, compliance levels across the industry remain inconsistent. Many installations continue to exhibit deviations from engineering best practices, inadequate protection systems, and improper inverter configuration.

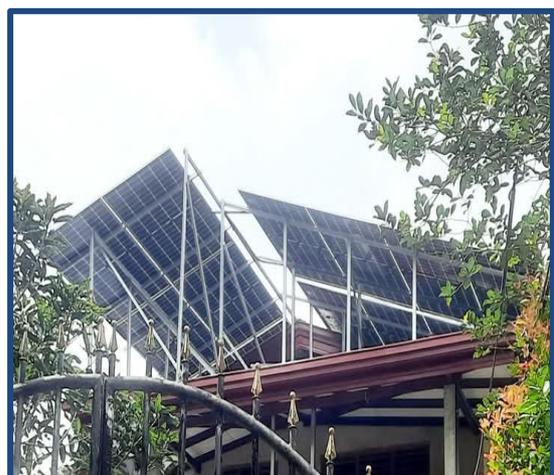
Furthermore, there have been several instances where both prosumers and service providers have misused the opportunities provided under high tariffs and new schemes, particularly the Net Plus Plus scheme. In some cases, installations were carried out with the primary objective of maximizing financial gain rather than ensuring system quality, consumer safety, or grid compatibility. The introduction of such schemes without clearly defined operational boundaries and enforcement mechanisms inadvertently enabled certain market participants to engage in opportunistic and non-compliant practices.

These developments ultimately undermined the stability and credibility of the rooftop solar sector. The resulting increase in irregularities and market distortions contributed to the discontinuation of these new schemes. This outcome discouraged long-term, quality-driven investment and negatively affected the sustainable and orderly growth of the rooftop solar industry in Sri Lanka.

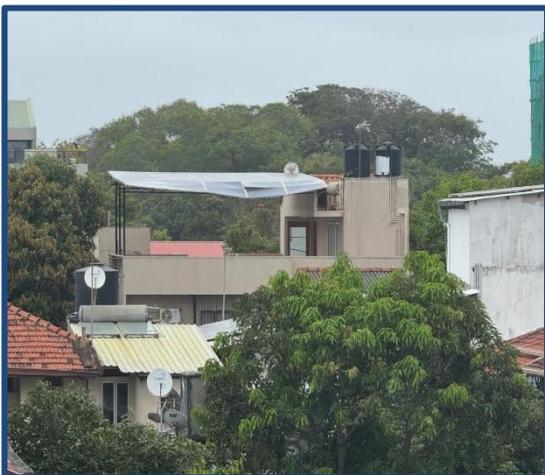
Such installations not only compromise technical quality but also result in the inefficient use of limited distribution network hosting capacity. Rooftop solar capacity on feeders and transformers is a constrained resource, and when this capacity is occupied by installations that are poorly designed or motivated purely by short-term financial gain, it limits the ability of other consumers to access rooftop solar, particularly those with long-term renewable energy and self-consumption objectives.

In addition, systems installed without adherence to technical standards and quality requirements often fail to achieve their expected 20-year operational lifespan. Substandard equipment, poor installation practices, incorrect inverter settings, and a lack of periodic maintenance all contribute to accelerated performance degradation. As a result, the anticipated financial return on investment is not realized, leaving prosumers exposed to higher payback periods and elevated operational risks. Moreover, when installations are driven solely by short-term tariff incentives without considering system durability, lifecycle maintenance, and performance reliability, the risk associated with capital investment increases significantly. Consumers who invest based on expected long-term generation benefits may experience unexpected costs related to inverter replacements, system repairs, or reduced energy yield.

The images of common malpractice and unsafe installation practices, and the damages that occurred due to such installations, are attached below.









Furthermore, the prevalence of substandard installations and inconsistent operational performance has implications for national generation planning. When systems fail to perform as expected due to poor installation practices, inadequate maintenance, or premature component failures, the actual generation output becomes lower than the forecasted values. This discrepancy introduces uncertainty in system planning, reduces the reliability of renewable energy projections, and may require additional short-notice dispatch adjustments from thermal generation resources. Over time, the accumulation of such underperforming systems can undermine confidence in distributed renewable energy forecasts and complicate the achievement of national renewable energy targets.

8. FUTURE OUTLOOK

Globally, rooftop solar is increasingly recognized as a key component of modern electricity systems, supported by structured regulatory frameworks, accredited installer networks, and coordinated approaches to grid integration. Mature markets such as Australia demonstrate that rooftop PV can contribute a substantial share of national electricity demand when supported by clear installation standards, real-time monitoring capability, and widespread adoption of storage to manage mid-day surplus generation. Battery integration, inverter control features, and network visibility tools are becoming essential to maintaining grid stability at high levels of distributed generation.

In Sri Lanka, rooftop solar capacity has expanded rapidly in recent years, driven primarily by tariff-based incentive schemes. However, this growth has also revealed gaps in the practical enforcement of installation standards, after-sales obligations, and compliance monitoring. While PUCSL and SLSEA have established guidelines and company registration frameworks, the mechanisms to verify compliance in the field and ensure continued service responsibility over the system lifetime remain limited. Variations in installation quality, improper inverter settings, weak warranty enforcement, and inconsistent consumer support continue to be reported.

Moving forward, the sector will need to shift from incentive-driven expansion toward a more structured model emphasizing reliability, accountability, and long-term system performance. Strengthening regulatory oversight will require empowering PUCSL, SLSEA, and distribution licensees with clearer legal authority to conduct compliance audits, issue corrective orders, and suspend or remove non-performing service providers. A coordinated institutional approach with defined responsibility boundaries will be necessary to ensure consistent implementation across all regions.

In parallel, the role of distribution licensees will become increasingly important. As rooftop solar penetration grows, utilities must be guided by formalized grid-connection codes and operational guidelines that define the minimum technical and service requirements for connecting rooftop systems. These should include standardized inverter settings, metering configurations, voltage regulation practices, feeder hosting capacity assessment procedures, and time-bound service delivery commitments. Establishing and enforcing such utility-level requirements will help reduce consumer complaints, minimize operational issues such as inverter tripping and voltage rise, and improve the overall quality and performance of rooftop systems.

Furthermore, as distributed generation continues to expand, improving real-time visibility and controllability of rooftop PV systems will be essential for national system stability. The integration of battery storage, advanced inverter functions, and monitoring systems will support this transition by enabling better management of mid-day surplus generation and reducing the operational burden on the national grid.

Overall, the long-term sustainability and growth of rooftop solar in Sri Lanka will depend on aligning regulatory enforcement with technical capability, safeguarding consumer protection, and ensuring fair and efficient use of distribution network hosting capacity. With strengthened compliance processes, utility-level technical guidelines, and consistent market oversight, rooftop solar can continue to contribute meaningfully to the national renewable energy target and to the stability and resilience of the power system.

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