INVESTING IN ROOFTOP SOLAR SYSTEMS IN VIET NAM

Technical and Administrative Guidelines for Commercial and Industrial Projects
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Anybody using these Guidelines is highly encouraged to provide feedback to GIZ on any legal or regulatory changes they may be aware of, as well as the application and interpretation of them. Feedback on the general usefulness of this document is also much appreciated, in order to improve future versions.
INVESTING IN ROOFTOP SOLAR SYSTEMS IN VIETNAM

Technical and Administrative Guidelines for Commercial and Industrial Projects
Acknowledgements

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In June 2020, a consultation and review was conducted on an advanced draft of the Guidelines by representatives from key stakeholder groups of the RTS sector in Viet Nam. The aim of the stakeholder consultation was to validate the usefulness of the Guidelines, as well as to collect additional expert input to further improve the quality and precision of the Guidelines. We would like to thank Viet Nam Electricity (EVN) and especially Mr. Vo Quang Lam, Deputy General Director of EVN, who coordinated among various EVN entities in different company chapters and related Power Companies for an in-depth review of the draft Guidelines and for providing valuable contributions and comments. We would further like to thank the following people and organizations for their valuable comments and inputs during the consultation process:

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- Mr. Pham Nam Phong, Vu Phong Solar
Foreword

Abundant solar resources and the increasing electricity demand of its commercial and industrial sector are the pillars of Viet Nam’s rich potential for Rooftop Solar. With Prime Minister Decision 13/2020/QĐ-TTg, published in April 2020, the Government of Viet Nam not only renewed the country’s first Feed-in-Tariff for solar energy from 2017 but it also set the framework for state-of-the-art investment models for Rooftop Solar such as corporate Power Purchase Agreements, PPAs. With this legal framework that will hopefully be further extended beyond 2020, Viet Nam has the chance to develop its vast Rooftop Solar potential over the coming years and to become one of the leading solar markets in Asia.

Germany has long-standing experience in developing solar energy markets and with leading technology and know-how for Rooftop Solar. More than 1.5 million Rooftop Solar systems have been installed on German roofs over the last decade and supply millions of factories, supermarkets, public buildings and private homes with clean and reliable energy.

With this handbook for investors and Rooftop Solar project developers Germany wants to support Viet Nam in becoming a ‘Rooftop Solar leader’ itself.

These Investment Guidelines were developed as a part of the “PV Rooftop Pilot Project” - a development partnership between the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Syntegra Solar International and Cat Tuong Corporation under the developPPP.de Programme, commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ).

Furthermore, these Guidelines are complemented with a set of four contract templates for investors to be used to implement corporate Power Purchase Agreement, Solar Lease, Rooftop Lease and Operation and Maintenance contractual agreements. The contract templates were developed as part of the joint EU-German Renewable Energy and Energy Efficiency (4E) Project/EU–Viet Nam Energy Facility (EVEF).

Apart from providing these Guidelines and template contracts for Rooftop Solar investors, Germany and the EU are main contributors of the MOIT Rooftop Solar Promotion Programme with further market enabling support activities. Among these activities are the introduction of a Certified Solar Installer training programme in cooperation with the German Technical and Vocational Education and Training Programme (TVET), and the introduction of a Solar Quality Passport for Rooftop Solar systems in cooperation with Viet Nam Electricity (EVN).

I hope these Guidelines will provide valuable know-how and hands-on advice for investors and project developers and with this contribute to the further growth of the Rooftop Solar market in Viet Nam.

Dr. Sebastian Paust,
First Counsellor and Head of Development Cooperation, Embassy of Germany in Viet Nam
# Acronyms

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<th>Description</th>
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<td>AC</td>
<td>Alternating Current</td>
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<tr>
<td>BMZ</td>
<td>Federal Ministry for Economic Cooperation and Development</td>
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<td>CIT</td>
<td>Corporate Income Tax</td>
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<td>COD</td>
<td>Commercial Operation Date</td>
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<td>DC</td>
<td>Direct Current</td>
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<tr>
<td>DOIT</td>
<td>Department of Industry and Trade</td>
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<tr>
<td>DP</td>
<td>Development Partner</td>
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<tr>
<td>EPC</td>
<td>Engineering, Procurement and Construction</td>
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<tr>
<td>EREAV</td>
<td>Energy Regulatory Authority of Viet Nam</td>
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<tr>
<td>EREA</td>
<td>Electricity and Renewable Energy Authority of MOIT</td>
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<tr>
<td>EVEF</td>
<td>EU-Vietnam Energy Facility</td>
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<td>EVN</td>
<td>Viet Nam Electricity</td>
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<tr>
<td>FIT</td>
<td>Feed-in Tariff</td>
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<td>FO</td>
<td>Facility Owner</td>
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<tr>
<td>FS</td>
<td>Feasibility Study</td>
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<tr>
<td>GIZ</td>
<td>Deutsche Gesellschaft für Technische Zusammenarbeit</td>
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<tr>
<td>HCMC</td>
<td>Ho Chi Minh City</td>
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<tr>
<td>H&amp;S</td>
<td>Health and Safety</td>
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<tr>
<td>IEC</td>
<td>International Electrotechnical Commission</td>
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<tr>
<td>IoE</td>
<td>Institute of Energy</td>
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<tr>
<td>kWp</td>
<td>Kilowatt peak</td>
</tr>
<tr>
<td>MoC</td>
<td>Ministry of Construction</td>
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<tr>
<td>MOIT</td>
<td>Ministry of Industry and Trade</td>
</tr>
<tr>
<td>MW(h)</td>
<td>Megawatt (hour)</td>
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<tr>
<td>NREL</td>
<td>National Renewable Energy Laboratory</td>
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<tr>
<td>O&amp;M</td>
<td>Operation and Maintenance</td>
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<td>OEM</td>
<td>Original Equipment Manufacturer</td>
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<td>PC</td>
<td>Power Company</td>
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<td>PDP</td>
<td>Power Development Plan</td>
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<tr>
<td>PM</td>
<td>Prime Minister</td>
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<tr>
<td>Private PPA</td>
<td>Private Power Purchase Agreement</td>
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<tr>
<td>PPA</td>
<td>Power Purchase Agreement</td>
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<tr>
<td>PPP</td>
<td>Public Private Partnership</td>
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<tr>
<td>PV</td>
<td>Photovoltaic</td>
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<tr>
<td>RE</td>
<td>Renewable Energy</td>
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<td>RTS</td>
<td>Rooftop Solar</td>
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<tr>
<td>SOM</td>
<td>Self-Ownership Model</td>
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<tr>
<td>SSC</td>
<td>Solar Service Company</td>
</tr>
<tr>
<td>TOM</td>
<td>Third-Party Ownership Model</td>
</tr>
<tr>
<td>USD</td>
<td>United States Dollars</td>
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<tr>
<td>VEPG</td>
<td>Viet Nam Energy Partnership Group</td>
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<td>VND</td>
<td>Viet Nam Dong</td>
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## Terminology and Definitions

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<td>An Engineering, Procurement and Construction (EPC) company that designs, constructs and installs solar PV systems on behalf of the Facility Owner/Solar Service Company.</td>
</tr>
<tr>
<td><strong>Facility Owner</strong></td>
<td>Owner of the commercial or industrial building or construction work, on which the rooftop solar PV system shall be installed.</td>
</tr>
<tr>
<td><strong>Self-Ownership Model (SOM)</strong></td>
<td>The RTS system is financed and owned by the owner of the facility where the system is installed.</td>
</tr>
<tr>
<td><strong>Solar Service Company (SSC)</strong></td>
<td>A company that invests in the installation of a rooftop solar PV system on the commercial or industrial building of the Facility Owner, in order to produce and sell electricity to the Facility Owner and/or to the Power Company.</td>
</tr>
<tr>
<td><strong>Third-Party Ownership Model (TOM)</strong></td>
<td>The RTS system is owned and operated by a third party – e.g. a Solar Service Company</td>
</tr>
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Introduction
Objective and Scope of the Investment Guidelines

The **Objective** of these **Guidelines** is to provide factual, practical and up-to-date (at time of publication) information to stakeholders interested in developing and/or investing in a **Rooftop Solar (RTS) System in Commercial Buildings or Industrial Facilities**.

The Guidelines cover technical and administrative issues relevant to both grid-connected systems and systems for self-consumption and provide:

- Important information about the RTS market development in Viet Nam, as well as key policy and legal frameworks.
- Guidance on how to choose the most appropriate business model.
- A step-by-step breakdown of the most critical steps of RTS Project Development Process, as well as tools to facilitate the process.
- Practical tips based on the experience of companies in Viet Nam that have developed RTS projects in the past.

**Target Readers**

The Guidelines mainly target **Commercial and Industrial Facility Owners that have an interest in installing an RTS system on their premises** and would like to get reliable and up-to-date information on the most important steps of the process.

The Target Readers also include:

- Project Developers
- EPC Contractors
- Solar Service Companies
- Investors interested in RTS projects

**Structure of the Investment Guidelines**

**Chapter 1** provides a description of the objective and scope of the Investment Guidelines, as well as an overview of how they are structured.

**Chapter 2** provides a description of the context of the RTS market in Viet Nam. It gives an overview of how the government policy for RTS has developed over the last years and makes reference to key policies and regulations governing the market. It, furthermore, provides an overview of RTS potential, key developments in the RTS market and the overall status of RTS project development in Viet Nam. Finally, the RTS Project implemented by Syntegra and Cat Tuong...
is presented as a successful case study – the experience gained, and lessons learned are reflected throughout these Guidelines and are highlighted in several of the practical insight boxes (see Chapter 3).

Chapter 3 provides a comprehensive overview of all relevant steps and processes that need to be completed to successfully implement an RTS project. These are organised along the traditional project development phases (see Figures 6 and 7). Though this document is structured in stages and steps, it is worth noting that RTS project development stages and steps are often intertwined, and activities should be undertaken as much as possible, in parallel to optimise time and resources.

The Guidelines also contain the following three types of special elements:

**Practical Insight Boxes** – these green boxes complement the facts described in each sub-chapter and highlight practical experience and lessons learned from companies that have undertaken an RTS project in Viet Nam.

**Checklists** – the document provides several checklists to help the user of these Guidelines in making sure that critical elements have been properly taken into account throughout the project development process.

**Key References** – in the digital version of this document, the “Reference” can be accessed by clicking on the active link. For the print version, the references can be found in Chapter 4.

Chapter 4 provides full details of key references that can be used by the readers throughout the project development process. These include online links to key policy documents, templates and other useful references.
Investing in Rooftop Solar Systems in Viet Nam

Introduction
2 RTS Market in Viet Nam
The Potential for Rooftop Solar PV in Viet Nam

Viet Nam has a high potential for the development of Rooftop Solar (RTS) Systems. Viet Nam experiences on average 4-5 kWh/m² per day of irradiation in most of its Southern and Central regions - with slightly lower levels in Northern Viet Nam - and average peak irradiation levels of up to 5.5 kWh/m² per day in certain Southern regions (see Figure 1). In terms of actually achievable yields for RTS systems, this solar irradiation corresponds to annual solar power outputs of roughly 900–1,100 kWh per installed kilowatt of system capacity (kWh/kWp) in the North, 1,100–1,400 kWh/kWp in Central Viet Nam and 1,400–1,600 kWh/kWp in the South. These solar irradiation levels are comparable to the rest of the ASEAN region and to those in key mature solar markets of Spain and California.

In comparison, Germany, one of the largest solar rooftop markets in the world with more than 1.5 million Rooftop Solar systems in operation, has average annual system output of 950 kWh/kWp. This shows, that in general, there is no region in Viet Nam that “does not have enough sunlight” for successfully operating a solar PV system. Even in the North, a well-designed and efficiently operated RTS system can effectively reduce the energy demand of a commercial building or industrial facility and generate energy cost savings.

The question of financial viability of an RTS investment depends on several factors in addition to the available solar resource: the electricity demand of the investor or off-taker of the solar power, the tariff per unit of electricity and its expected increase over the investment period, the price for excess solar power exported and sold to the power grid (the Feed-in-Tariff, FIT), the investment costs for the system itself and the cost and quality of operation and maintenance over the life of the RTS system. These aspects must be addressed during the early stages of an RTS project (see Stage 1 - Feasibility).

The overall market potential for RTS in Viet Nam has not yet been assessed in full detail. That being said, there are indications that the potential is significant. Viet Nam has a large number of medium-sized factory buildings being built in industrial parks around the biggest cities; these burgeoning industrial facilities represent significant RTS potential in terms of space for Rooftop Solar systems as well as housing the potential off-takers. Furthermore, the urban centres of the country, such as Ho Chi Minh City, Ha Noi or Da Nang, also show a growing potential for Rooftop Solar with a steadily increasing number of malls, supermarkets, warehouses, office buildings and condominiums. A recent research project of the World Bank estimated the potential for Rooftop Solar in HCMC to be up to 6,400 MW and for Da Nang to be up to 1,100 MW. For whole Viet Nam it can be assumed that the overall RTS potential for the country is several times the combined

Source: ESMAP/World Bank (www.solargis.com) - (edited by GIZ Viet Nam)
With regards to demand for RTS power, the current Viet Nam Power Development Plan for the period 2016-2030 (PDP 7 revised) expects an annual growth of the electricity demand in the country of 8-9% for the period 2021-2025 and, a still remarkable 6-8% for the period 2026-2030. This means that every year thousands of Megawatt of power capacity must be built and connected to the grid to serve this fast-growing electricity need. During this time frame of increasing demand, Viet Nam has committed to international agreements on reducing greenhouse gas emissions to slow down climate change and has introduced a domestic Green Growth strategy to allow for a more sustainable development of its economy. Thus, there is a strong political push for the development of clean power sources in Viet Nam.

In addition, there is a growing interest from consumers to take advantage of the benefits of RTS systems and an emerging private energy services company sector. Commercial and industrial consumers are increasingly looking to cooperate with investors to install RTS systems to make effective use of large unused roof spaces, and to meet corporate targets. Private Power Purchase Agreements (Private PPAs), where a third-party investor builds and operates the RTS system on the roof of a manufacturing facility or commercial building and sells the solar power to the building owner under a long-term contract, have become an attractive solution for companies world-wide, next to other (e.g. lease-based) models (see Step 1.2).

The demand for RTS can be explained by two simple facts: Solar PV technology is cheap and the investment costs for rooftop systems continue to sink. Over the past 10 years, the costs of PV modules, the key element of an RTS system, have decreased by more than 80% and are expected to sink further. Today, RTS systems are fully commercial and becoming a routine business solution for industrial, commercial and household customers in most markets. This is the case in Viet Nam, where the Government has introduced an attractive support framework for investments in Rooftop Solar systems; the RTS market and policy frameworks in Viet Nam are presented in the following Section.

Key Policy and Regulatory Framework for Solar PV in Viet Nam

Viet Nam’s revised Power Development Plan 7 (PDP 7 revised), issued in March 2016, foresees a contribution of renewable energies to the overall electricity mix in the country of 6.5% in 2020 and 10.7% in 2030. For solar power, a corresponding capacity development of 850 MW by 2020, 4,000 MW by 2025 and 12,000 MW by 2030 are expected.

Currently, the Ministry of Industry and Trade of Viet Nam (MOIT) is developing the latest version of this framework, the Power Development Plan 8, which is expected to be approved in early 2021. PDP 8 is expected to include revised, higher targets for solar energy development since Viet Nam has achieved...
early goals, for instance, already reaching the solar energy target for 2025 by the end of 2019.

In order for Viet Nam to meet ambitious and evolving solar targets, and support market development, a number of policy measures have been put in place. The Prime Minister (PM) introduced a Support Mechanism for Solar PV via PM Decision 11/2017/QD-TTg dated 11 April 2017. PM Decision 11/2017 introduced a Feed-In-Tariff (FIT) of VND 2,086/kWh (USD 9.35 cents/kWh) for ground-mounted solar PV power plants and a net metering support scheme with remuneration (net metering credit) at the same tariff for surplus electricity exported to the grid for Rooftop Solar systems. In addition, Circular 16/2017/TT-BCT of MOIT dated 12 September 2017 introduced further detailed regulations, in particular the Standard Power Purchase Agreement (PPA) and specific regulations for net metering.

This landmark regulation triggered investments in over 100 large-scale ground-mounted solar plants with more than 4,500 MWp capacity by the end of 2019; still, the net metering scheme did not have the expected impact due to the persistence of legal uncertainties and taxation-related barriers. Eventually, the government issued legal adjustments with PM Decision 02/2019/QD-TTg dated 8 January 2019 and MOIT Circular 05/2019/TT-BCT dated 11 March 2019 that introduced a classic Feed-in-Tariff mechanism for RTS systems and replaced the net metering mechanism. With this change, the legal uncertainties and taxation issues were resolved and EVN started making monthly payments to RTS system owners, based on the fixed FIT. Investors and market stakeholders in general found trust in the support mechanism and the market has been developing at a steady pace.

With support from the EU-German Energy Programme - through the EU-Viet Nam Energy Facility, EVEF, implemented by GIZ - and other international Development Partners of Viet Nam, MOIT developed the Rooftop Solar (RTS) PV Promotion Program in Viet Nam 2019-2025, which was approved and officially launched by the MOIT Minister on 5 July 2019 (MOIT Decision 2023/QD-BCT). This Program includes mainly non-financial support measures to remove investment and market development barriers and to enable industry and Rooftop Solar sector development in general. It is expected to be a strong driver for new investments, since it is designed to open new business models for the commercial and industrial rooftop segment. The Program has the overall target of facilitating the installation of 100,000 RTS systems (or an equivalent of 1,000 MWp installed RTS capacity) by 2025. The decision to introduce such a support program for RTS development reflects the high priority for Rooftop Solar within the government strategy for renewable energy development. The support of Rooftop Solar development and the implementation of the RTS Promotion Programme is also one of the key priorities of the Viet Nam Energy Partnership Group, VEPG that includes all international Development Partners and MOIT and focusses on supporting Viet Nam on its transition to a more sustainable energy sector based on renewable energies and increased energy efficiency.
After the first FIT for solar energy introduced with PM Decision 11/2017 expired in June 2019, the government adopted a follow-up regulation with an adjusted FIT regulation for both ground-mounted and RTS systems with PM Decision 13/2020/QD-TTg dated 6 April 2020 (see Figure 2). The new FIT regulation, which applies to RTS systems installed before 31 December 2020, keeps the main features of the first FIT regulation with a slightly reduced tariff for solar power exported to the grid of VND 1,943/kWh (USD 8.38 cents/kWh). The most important change compared to the preceding regulation is the clarification of third-party ownership models, including:

- a Private Power Purchase Agreement (Private PPA) where a Solar Service Company installs and operates an RTS system on the rooftop of an industrial or commercial building to sell electricity directly to the owner of the building and with the option to sell excess electricity to EVN.
- a Rooftop Leasing Model where a Solar Service Company leases the rooftop of the owner of a commercial or industrial building to install and operate an RTS system and to sell all of the electricity generated to EVN.

With Decision 13, these investment and business models received legal clarity and validation, next to the more widespread Solar Leasing Model (see Step 1.3 Business Model Selection and Step 2b.2 for more information on possible contract types).

Further details on the implementation of Decision 13 have been published by MOIT in July 2020 with Circular 18/2020/TT-BCT replacing Circular 16/2017 with effect from 31 August 2020. This Circular also includes the new template agreements for utility PPAs in the form of a Standard PPA in its annexes, which is the mandated contract for sale of electricity to EVN. Furthermore, EVN has issued Guiding Letter No. 3725/EVN-KD dated 1 June 2020 on how to implement PM Decision 13.

**Development of the RTS Market in Viet Nam**

Until the beginning of 2019, the Rooftop Solar market in Viet Nam had only seen around 1,800 solar systems with approximately 30 MWp capacity connected to the grid. The new solar FIT regulation that was introduced in April 2017 had not mobilized many investments due to implementation and taxation problems. After the regulatory adjustment of PM Decision 11/2017 in early 2019, investments in Rooftop Solar systems developed strongly (see Figure 3).

During 2019, more than 20,000 Rooftop Solar systems with a capacity of around 360 MWp were installed and connected to the grid. It is worth noting that almost 200 MWp of this capacity was installed in the second half of the year; that was after the solar FIT regulation had officially expired and the Prime Minister Decision to extend the FIT regulation was pending. During this period of policy uncertainty, market stakeholders showed great trust in the government commitment to further support RTS investors. Furthermore, EVN showed an exceptional commitment during this period by connecting.
During 2019, more than 20,000 Rooftop Solar systems with a capacity of around 360 MWp were installed and connected to the grid.

new RTS systems, installing the bi-directional meters at the project sites, recording the solar energy delivered to the national grid and confirming to customers that payments would be made upon government approval of the new FIT regulation.

The robust growth of the RTS market continued in the first months of 2020 until the new FIT regulation was finally published on 6 April 2020 with PM Decision 13/2020.

At the end of August 2020, 48,631 Rooftop Solar systems with a total capacity of 1,168 MWp were installed in Viet Nam (for more information, refer to the VEPG RTS Factsheets).

The market development in 2019 and the first months of 2020 demonstrated the strong demand for Rooftop Solar in the country and the robustness of the market, even during the time when the legal support mechanism was not officially confirmed. With the new FIT regulation in place, market stakeholders expect strong investment in the market through 2020 and beyond.
With this bright future for the RTS market in mind, it is even more important that installations follow high-quality standards and investors and project developers are well informed about the specific procedures and requirements of authorities and EVN for a successful project development and implementation. It is in this context that these Guidelines have been developed to support investors and project developers with key information and useful insights for RTS in Viet Nam.

**Case Study – Cat Tuong and Syntegra Solar RTS Pilot Project**

In October 2018, Syntegra Solar, an international RTS developer, and Cat Tuong, a local market leader in insulation material manufacturing, entered into a strategic partnership with technical assistance from GIZ to develop a high-quality pilot RTS project (“the Project”) at the Cat Tuong factory in Long An province to demonstrate the viability of RTS systems in Viet Nam. Furthermore, the Project aims at improving technical and administrative framework conditions for the replicability of PV rooftop projects across the country.

**Figure 5** provides an overview of the key specifications of the Project.
The pilot RTS – implemented at the Cat Tuong factory inside the Lien Hung industrial zone in Long An – has a power capacity of 856.7 kWp generated by approximately 2,560 PV modules – covering 7,400 m² of roof space.

The main motivation for the owner to invest in solar was the potential to significantly reduce their high energy costs generated by heavy machinery, especially during peak times. Furthermore, this was a recognized opportunity to utilize and draw an economic benefit from their otherwise unused roof spaces. The newly built RTS system is expected to generate around 1,230 MWh of solar electricity every year, covering, on average, around 50% of the annual electricity demand of the factory. Furthermore, the excess solar power that cannot be directly used in the factory (e.g. generated during maintenance and holidays) will not be wasted and can be sold to EVN for an attractive Feed-In Tariff of USD 9.35 cent/kWh. On an annual basis, the PV system is expected to save about USD 102,000 (VND 2.4 billion) from Cat Tuong factory’s annual energy costs and help to reduce of about 1,092 tons of CO₂ emissions annually.

A main challenge during the development of the Cat Tuong RTS Project was extreme weather (high temperature on the roof, rainy season, lightning area) and its impact on installation. All workers followed strict safety instructions and shifts were limited to reduce early morning and late afternoon/evening exposure to weather-related risks. Another challenge was the need to plan the delivery of the RTS system components between Syntegra and Cat Tuong very carefully, as the production at Cat Tuong runs almost around the clock and most of the laydown area is constantly occupied.

Despite these challenges, all the efforts payed off as the construction phase was completed in only 2.5 months and the RTS system was commissioned just in time in June 2019 - before the originally planned commercial operation date (COD).
3 RTS Project Development
Overview of the RTS Project Development Process

The Project Development Process typically consists of 4 major Phases (see Figure 6):

Phase I – Preparation, in which all the necessary studies are conducted to assess the viability of a project and pre-agreements are made between key stakeholders in the project.

Phase II – Planning and Development, in which the project is designed, agreements between key stakeholders are formalised, the project reaches financial closure and construction/installation works are implemented until commissioning of the system is achieved.

Phase III – Operation and Maintenance (O&M), Operation and Maintenance (O&M), in which the project is operated and maintained and generates the intended outputs and revenues during the system life cycle.

Phase IV – Decommissioning, in which the project ceases to operate (typically after the conclusion of the technology’s lifetime) and must be decommissioned, dismantled and any waste material properly disposed of.

In these Guidelines, eight (08) distinct Stages within these four Phases have been identified (see Figure 6). These stages and related critical steps are described in detail in the subsequent Chapter and Sub-Chapters.

Figure 6 – Project Development Phases and Stages in the RTS Investment Guidelines for Viet Nam
Stage 1 - Feasibility

During the Feasibility Stage a number of technical and financial studies are conducted to determine the viability of installing an RTS system at a specific building or facility. Based on the results of the Feasibility Stage, the decision to invest or not in the RTS system is made.

Step 1.1 – Understanding the Basic Concepts and Overall Process of an RTS Project

Before undertaking an RTS project, it is important to understand some basic concepts and to have a broad overview of what the process of developing an RTS project entails.

A Rooftop Solar (RTS) system can be simply defined as a solar PV system with photovoltaic panels mounted on the rooftop of a building or construction work.

In Viet Nam, to qualify and benefit from the RTS regulatory support, a solar installation must meet certain criteria and stay within certain defined thresholds. These criteria are specified in PM Decision 13/2020/QD-TTg and Checklist 1 provides an overview of the most important criteria an RTS system must fulfil to qualify.

All systems that exceed 1MW (whether on a rooftop or on the ground), or otherwise do not meet the above criteria for RTS, are subject to different regulations and are not covered in these Guidelines.

| Checklist 1 – Criteria for RTS Systems in Viet Nam |
|-----------------|-----------------|
| **Criterion**   | **Description**  |
| Capacity        | ✓ The capacity of an RTS system must be ≤ 1MW. |
| Voltage         | ✓ The voltage of an RTS system must be ≤ 35kV |
| Efficiency      | ✓ The solar cells must have an efficiency >16% and the module efficiency must be >15%. |
| Other criteria  | ✓ The RTS system must be installed on a building. The relevant regulations require that the RTS system must be installed on the rooftop of “construction works”. This suggests that an installation on the ground is not possible. Ground-mounted solar projects underlie an entirely different legal and administrative framework. |

RTS systems that fulfil the above criteria and are connected to the grid and sell the electricity (all or partially) to the Power Company (PC) – which is EVN in Viet Nam - benefit from a preferential Feed-in Tariff (FIT). The FIT is defined as the price that the PC pays for every unit (kWh) of electricity fed into the grid by a private producer.

2. It should be noted that the threshold under Decision 13 is 1MW not 1MWp. The MW capacity is based on AC output that the RTS system is capable of delivering, and the MWp capacity is the aggregate peak capacity of all solar modules in the RTS system. However, in practice the PC will also check the MWp capacity and also require this to be equal to or under 1MWp.
Currently, the FIT applicable to RTS systems in Viet Nam amounts to VND 1,943 (USD 8.38 cents) per kWh, based on the exchange rate on 10 March 2020. This FIT level applies and is guaranteed for RTS systems that are installed and connected to the grid before 31 December 2020 and has a validity of up to 20 years thereafter, depending on the duration of the Power Purchase Agreement (PPA), signed between the project owner and the power company, EVN. Step 6.4 provides more details on the PPA.

RTS systems that fulfil the above criteria may now also be used, by law, to sell electricity to private off-takers (instead or in addition to EVN) under a Private PPA. Under a Private PPA, it is common that the private off-taker of the generated electricity produced can obtain a lower electricity tariff than if they would buy the electricity from the grid. This has made third-party ownership an attractive business model for both Solar Service Companies and commercial and industrial building owners. Step 2b.2 provides more details on the Private PPA and other third-party ownership business models.

In addition to the obvious financial benefits from attractive electricity off-take prices, renewable energy (RE) is currently included among the sectors qualifying for preferential investment in Viet Nam and is entitled to certain tax incentives:

- **A Corporate Income Tax (CIT) rate of maximum 10%** instead of the usual 20% for a period of 15 years from the first year of generating revenue. This can be extended by another 15 years upon the approval of the Prime Minister. This tax incentive is applied as follows:

  ◊ Year 1 to 4: CIT rate of 0%
  ◊ Year 5 to 13: CIT rate of 5%
  ◊ Year 14 to 15: CIT rate of 10%
  ◊ Year 16 onwards: CIT rate of 20%

These incentives apply to power generation from renewable power sources and typically allow a company that exclusively engages in owning the RTS for sale of electricity to benefit from the tax incentives. Where companies are engaged in a range of business activities (including non-preferential activities), such companies must use separated accounting to benefit from the tax incentives for renewable power production. It is also worthwhile to note that the tax incentives are linked to the production of electricity, and thus would not apply under the leasing model (where the owner of the RTS only receives leasing income but is not the producer of the electricity generated from the system).

- **Import Duty Exemptions**: RTS projects are exempt from import duties on fixed assets in accordance with regulations on export and import duties (Article 14 of Decree No. 134/2016/ND-CP). Duty exemptions apply for all renewable energy systems and their components when they are purchased to be used by the buyer themselves. This means, these would not apply for systems used under a leasing agreement. These apply as follows:

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**Practical Insight**

By switching to Solar Power, RTS projects generate greenhouse gas reduction (expressed in tonnes of CO₂). These emission reductions can be turned into carbon credits, which can be traded in national or international carbon markets. The carbon footprint of a building is also an important factor considered when the owner wants to obtain a LEED Green Building Certificate.
RTS projects are exempt from import duties on fixed assets in accordance with regulations on export and import duties. (Article 14 of Decree No. 134/2016/ND-CP)

◊ Import duty exemptions are granted for goods imported to form fixed assets of the project (goods imported during the project construction and development stage).

◊ Import duty exemption also applies to materials/supplies and components that can not be manufactured in Viet Nam imported during 5 years from the project commencement date to service the operating purpose of the Project.

◊ To benefit from these exemptions, a detailed master import list needs to be approved by the relevant customs authorities prior to conducting the imports to confirm that the relevant imported items form part of the fixed assets respectively exempted materials above.

◊ Other imported items and materials are subject to regular tariff rates.

Applicable incentives are well summarised in MOF Official Dispatch 1534/BTC-CST. Note that articles 1-4 of this Dispatch are applicable to all RTS systems as defined in Checklist 1 and only article 5 (related to VAT) is applicable to systems <50kW only.

Step 1.2 – Initial Site Assessment

The purpose of the Initial Site Assessment is for the Facility Owner (FO) to have a rough idea of whether the installation of an RTS system is generally, technically feasible on a specific rooftop, before spending any time or money in expert advice.

There is a set of basic technical requirements that need to be met, in order to ensure that an RTS system will perform well. These requirements are standard and include the orientation of the roof towards the sun, the absence of any shadows – e.g. from neighbouring buildings or trees – that can reduce the system’s performance, and other important factors.

Checklist 2 is not exhaustive in every circumstance, but can be useful for this initial evaluation process:

If the FO finds that their rooftop has potential and wants to pursue this opportunity further, a detailed assessment can be done by experts (EPC Contractors or other third parties) to give a precise assertion about the project’s potential. The detailed assessment is described under Step 1.4.

Step 1.3 – Business Model Selection

Two main types of business models are applied in RTS projects, the Self-Ownership Model and the Third-Party Ownership Model.

In the Self-Ownership Model (SOM) (see Figure 7), the RTS system is fully financed, owned and operated by the Facility Owner. The produced electricity is normally used for self-consumption and excess electricity is sold to the local Power Company (PC) or to another off-taker, for example a neighbouring
The purpose of the Initial Site Assessment is for the FO to have a rough idea of whether the installation of an **RTS system is generally, technically feasible** on a specific rooftop, before spending any time or money in expert advice.

### Checklist 2 – Initial Site Assessment

<table>
<thead>
<tr>
<th>Question</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Roof Conditions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Inclination – is the roof's inclination angle lower than 30°?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Orientation – does the roof face south?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Material and Structure – how old is the roof? Is the building’s architecture and material capable of bearing an additional weight of about 20 kg/m²?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Shading – is the roof exposed to shade from neighbouring buildings, trees or other structures?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Does the roof have enough space to accommodate an RTS? How large is the roof (m²)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Electricity Consumption</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. How high is the electricity consumption of the building/facility on average?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. When is the electricity consumption taking place mainly?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Assessment Guidelines**

- **If questions 1. and 2. are answered with “NO”, the output of the system will be affected significantly. It is not recommended to invest without professional advice.**

- **Question 3:** if the roof needs to be replaced within 5-10 years, it should be replaced at the time the RTS system is installed. If the question regarding structure is answered with “NO”, it will be necessary to invest in reinforcing the structure to be able to carry the weight of the RTS installation. In this case, the cost of reinforcing the structure needs to be considered in the overall feasibility assessment.

- **If question 4. is answered with “YES”, it means that the performance (total electric output) of the RTS system might be significantly reduced and an investment is not recommended.**

- **Question 5:** a rough estimation of the achievable electricity output based on the roof size can be made by applying 1kWp = 7-10m².

- The electricity consumption amount and pattern will play a role in choosing the right business model and contract type with a third party, if the facility owner does not plan to operate the RTS system themselves (see **Step 1.3**). E.g. if the current electricity consumption is low, it is possible to use the system to cover the consumption only (small investment). But it is also possible to opt for a bigger system that uses the whole roof space, covers 100% of the FO’s demand and allows the sales of surplus power generated to EVN or other third parties.
In the **Self-Ownership Model (SOM)**, the RTS system is fully financed, owned and operated by the Facility Owner. However, the FO can also choose to sell all of the electricity to the PC and/or a neighbouring facility. The advantage of this model is that the FO has full control over the installations and the system’s performance. On the other hand, the FO must also make the full investment and is solely liable for maintenance and repairs.

In the **Third-Party Ownership Model (TOM)** (see Figure 8), the RTS system is fully financed, owned and operated by a Solar Service Company (SSC). The Facility Owner and the SSC sign an agreement laying out the terms of the partnership. In Viet Nam, the legal basis allows three (3) main types of agreements: 1) a Solar Lease, 2) a Rooftop Lease or 3) a Private Power Purchase Agreement (Private PPA). More details on these types on agreements can be found under **Step 2b.2**.

Practical Insight
Syntegra has implemented a project based on the Third-Party-Ownership model, and a lease component has also been included. In this 460kWp project, developed at VSIP1 Industrial Zone in Binh Duong Province, the system was financed and is owned and operated by Syntegra. The Facility Owner purchases the electricity from Syntegra for a price/kWh at least 5% lower than the grid. In addition, the FO pays a monthly system renting fee based on the energy saving efficiency of the solar power system.
The advantage of the TOM model is that the FO does not have to invest in the RTS system and can get electricity at a price lower than the market retail price and/or the FO can earn additional revenue for simply leasing out its otherwise unused rooftop space to the SSC. Mostly, the FO has limited-to-no responsibility for operating and maintaining (O&M) the system.

In order to be able to choose which model is the most suitable for a particular FO, the FO will usually look at the cost-benefit analysis of each model.

Ideally, the FO will contact both an EPC Contractor and a Solar Service Company to conduct a site assessment (Step 1.4) (and a feasibility study (Step 1.5), if required) and provide offers, which can then be compared to choose the best option. Based on this, the FO will determine whether to self-invest (SOM) or whether to proceed with the TOM.

Relevant contractual arrangements under the SOM are described in Section Stage 2a – Contracting under the SOM. Relevant contractual arrangements under the TOM are described in Section Stage 2b – Contracting under the TOM.

**Step 1.4 – Detailed Site Assessment**

Depending on the chosen business model, the Detailed Site Assessment is carried out by either an EPC contractor (for SOM) or by the Solar Service Company (for TOM).

The Detailed Site Assessment provides the necessary data to be able to design the RTS system, calculate the budget for the project and develop the financial model of the project.

Under the Self-Ownership Model, the FO must contact EPC contractors in the market to visit the facility and carry out the assessment (and feasibility study, if required), which will allow the EPC contractor to prepare a financial offer and the FO to choose the best offer available.

Under the Third-Party Ownership Model, if the FO does not already have an agreement with a specific SSC, the same process can be followed, i.e. several SSCs can be invited to make a site assessment and submit an offer to the FO.

During the Detailed Site Assessment, further information is required for the design & engineering, as well as for the future construction and installation of the RTS systems, the following will need to be collected and evaluated:

- Engineering details, such as roof details, types & material of roof skin, roof substructure, roof height, roof access way, location of inverters, AC and DC wire connections and requirements, distribution box requirements, potential interference with production or transportation infrastructure at the site, etc. It is recommended to prepare and provide drawings & sketches of the existing building/roof to the contractor.
• Requirements of the FO for the RTS system (e.g. self-consumption system, energy storage, etc.)

• Grid connection and energy costs
  ◦ Grid operator
  ◦ Grid connection point: locations of main distribution panel, capacitor, rated voltage & frequency, existing transformer etc.

• Detailed consumption profile (daily, weekly, monthly, yearly). Here the FO can provide screen-shots or copies of bills. Other details related to the construction planning, such as access roads to the site, laydown area, business type of the factory, working hours, etc.

**Step 1.5 – Feasibility Study**

Conducting a feasibility study is **not a mandatory step for RTS systems under Vietnamese law**. However, the FS is critical for decision-making and can help the FO determine the size of the RTS system which impacts investment decisions and business model choice. Specifically, the feasibility study will inform the selection of main components, types of PV modules & inverters used, options for mounting structures and enable an estimate of energy yield & system performance. The FO may choose to carry out a feasibility study, usually done by a specialised firm or with support from an EPC contractor, as it can give an indication and more detailed overview of the costs and benefits of an RTS project.

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**Checklist 3 – Recommended Technical Quality Standards for PV Systems**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Assessment</th>
</tr>
</thead>
</table>
| **Modules**     | ✓ IEC 61215: Crystalline silicon (c-Si) terrestrial PV modules - design qualification and type approval  
                  ✓ IEC 61646: Thin-film terrestrial PV modules - Design qualification and type approval  
                  ✓ IEC 61730: PV module safety qualification  
                  ✓ IEC60364-4-41: Protection against electric shock  
                  ✓ IEC 61701: Resistance to salt mist and corrosion (required for module being installed near coast or maritime applications)  
                  ✓ IEC 61853-1: PV module performance testing and energy rating |
| **Mounting system** | ✓ Mounting systems should be designed specifically for the site with structural design calculations providing verification of the site-specific design and structural warranty document. |
| **Inverter**    | ✓ EN 61000-6: Electromagnetic compatibility (EMC) generic standards  
                  ✓ EN 50178-1997: Electronic equipment for use in power installations  
                  ✓ IEC 62109: Safety of power converters for use in photovoltaic power systems  
                  ✓ IEC 62116: Islanding prevention measures for utility interconnected photovoltaic inverters |
The Feasibility Study (FS) can be prepared based on the results from the Detailed Site Assessment, and typically consists of the following key elements:

- **Technical Design** – The Technical Design must include technical drawing on how the RTS system will be installed on the FO’s premises, as well specific details on the different elements of the system, and the quality standards for equipment and infrastructure.

- **Budget (CAPEX)** – Based on the technical design and the overall proposed capacity of the system, the FS should include a clear budget, specifying all required components for the system and their cost, as well as all required construction works and their estimated cost.

- **Estimation of Operational Costs (OPEX)** – operational costs of the RTS system should be calculated and typically include staff costs for operation and maintenance (O&M) and spare parts.

- **Financial Model** – the financial model makes projections of the project’s financial performance over its foreseen lifetime. It takes into account CAPEX, OPEX, savings on electricity costs, expected revenues (based on expected electricity yields, applicable electricity tariff, etc.), as well as other important factors, such as financing structure (capital – loan structure) and financing costs, depreciation of the RTS system over time, etc. The financial model should provide values for typical financial performance indicators, such as internal rate of return (IRR) and payback time, which e.g. for an RTS system in Southern Viet Nam should be 14% and < 6 years, respectively.
The results of the feasibility study can be useful to assess the quality of EPC contractor and SSC offers (Step 2a.1 and Step 2b.1) and also to inform the structure of the contract between the FO and the SSC (Step 2b.2).

**Stage 2 – Overview of Contracting**

*In the Contracting Stage the Facility Owner signs all contracts required to successfully develop, operate and maintain the RTS system. Which contractual agreements are required depends on which business model the FO has chosen (SOM or TOM) and also the different types of agreements that are possible under each of these two models, depending on who will use the electricity generated by the system and other particulars of the arrangement.*

This section has been split into three sub-Sections. Stage 2a details the contractual agreements typically made under the SOM, while 2b details the contractual agreements typically made under the TOM. Section 2c deals with the Sales of Electricity to the national PC – EVN in Viet Nam – which is possible under both the SOM and the TOM.

**Stage 2a – Contracting under the SOM**

*In the Contracting Stage the Facility Owner chooses the party to develop the RTS system installation on their building/facility. The agreement between a Facility Owner and an EPC Contractor is formalised through the signing of a Contract. Furthermore, the FO may enter into agreements with EVN.*

**Step 2a.1 – Selection of EPC Contractor**

Based on the feasibility studies received, the FO will be able to choose the party best suited to implement the project and then can enter into an EPC agreement with them. **Checklist 4** provides a number of useful criteria that can be used to determine which is the best offer.

**Checklist 4 – Best Offer Assessment for EPC Contracts**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Assessment</th>
</tr>
</thead>
</table>
| Technical Design | ✓ Check that all system elements are included  
✓ Check that all necessary infrastructure works are included  
✓ Check that all relevant quality standards have been addressed |
| Track record | ✓ Number of years of experience and number of projects: the more similar projects an EPC contractor has carried out in the past, the better the chances that they can deliver well on the project.  
✓ Check project references provided (call respective facility owners or visit the sites), whenever possible  
✓ Financial stability/ financial guarantee  
✓ Long standing and good relationship with proposed subcontractors as this translates to lower risks related to project implementation |
### Checklist 4 – Best Offer Assessment for EPC Contracts (cont.)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Assessment</th>
</tr>
</thead>
</table>
| **Payment Schedule** | ✓ An EPC contractor typically requires a down payment of 10-30% upon contract signing  
✓ The payment schedule should be in line with the progress of the RTS system installation  
✓ It may be possible to negotiate a retention of 5-15% during the warranty period, rather than requiring the EPC contractor to provide a defects liability bank guarantee during the warranty period. This retention is only paid to the EPC contractor when the RTS system has shown no defects during the warranty period or defects have been properly repaired by the EPC contractor, as per warranty conditions. The FO typically would not be required to establish an escrow or put in place a bank guarantee to secure payment of the retained amount. |
| **O&M Costs (if included in the scope)** | ✓ If required by the FO, the EPC contractor could also offer O&M services for a pre-determined period of time (as per industry practice, the EPC contractor is usually responsible for O&M for the first 1-2 years, after which the FO takes over the O&M). If so, the O&M fee needs to be included in the EPC contract (as well as the duration of coverage and services included).  
✓ The scope of O&M services should typically include online monitoring of the RTS system together with periodic site inspections to check for faults, to clean the system, and to do repairs/replacements in cases of breakdown or malfunction of the RTS system. |
| **Electricity Output and Price** | ✓ The electricity output should be enough to cover a considerable part of the FO’s electricity consumption and generate significant savings that justify the investment (in case of a self-consumption model).  
✓ The cost per kWh calculated over the project lifetime based on the total investment and operational costs should not exceed the tariff offered by the PC, as it otherwise would not generate any savings to the FO. |
| **Guarantees** | ✓ EPC contractors may offer a Performance Ratio Guarantee with an annual deduction rate to ensure the quality of the system over the project lifetime. |
| **Insurance** | ✓ Responsibility for insurance will vary from project to project. In general, the EPC contractor is in charge of insuring construction works. |
| **Construction and Commissioning Schedule (Project Time-line)** | ✓ For a 1MW RTS system the time for construction and commissioning together typically lasts around 2 months. |
| **Warranty** | ✓ Generally, the guarantees of the manufacturers of the system components apply.  
✓ The FO should require the EPC contractor to present warranty information for all equipment/parts to be used at the design stage. The warranty period for RTS systems are typically around 2 (two) years. However lateral warranty for manufacturing defects of components can be five (5) years. FO shall ensure that the EPC contractor shall pass the module warranty and other equipment warranty from the Original Equipment Manufacturer (OEM) to the FO. |
| **Other Information** | ✓ The FO may require the EPC to provide bank guarantees to guarantee the advance payment and the contract performance of the EPC. |
Step 2a.2 – Contractual Agreement with EPC Contractor

For the SOM, the FO enters into a contract with the EPC contractor chosen in the previous step. The FO can choose to either commission the EPC Contractor for the installation and construction works only (Checklist 5) or to also include an O&M service agreement for a certain time period in the contract (Checklist 6). The FO can also choose to enter into an O&M service agreement with yet another party, e.g. if the EPC Contractor does not offer such services or another service provider is better qualified and/or offers better conditions.

EPC contractors typically provide their contract form to the FO for review and negotiation of the terms of contract. The EPC contract must mirror all the elements listed in Checklist 4, as per the EPC contractor’s offer. Furthermore, the contract should optimally address the issues listed in Checklist 5.

### Checklist 5 – Key Elements of EPC Contracts

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the RTS System, Design and Works</td>
<td>✅ Technical description of the RTS system (specifications and design), attributes of the location, hardware for installation, and associated connections thereto, as per accepted offer.</td>
</tr>
</tbody>
</table>
| Construction and Commissioning Schedule (Project Time-line) | ✅ Breakdown of RTS construction and installation into discrete phases with expected completion deadlines for each phase.  
✅ Definition of penalties, payable for each day past the deadline of every phase of construction to encourage adherence to the construction plan. The maximum amount should typically lie between 8-15% of the contract price.  
✅ Definition of Long Stop Date, beyond which FO can terminate or renegotiate the EPC contract. |
| System Performance Guarantees | ✅ Minimum capacity thresholds expected from the RTS system are defined, based on the consumption needs of the FO and the theoretical capability of the components of the system.  
✅ Expected threshold performance statistics must be met by a certain date or the EPC Contractor must pay a pre-agreed penalty. |
| Quality and Construction Warranties | ✅ The scope and duration of EPC Contractor warranties can range from paying the cost of replacing equipment to merely assisting with the implementation of manufacturer warranties.  
✅ The warranties from the EPC for the installation are typically given for a period from 18-24 months, whilst the manufacturer warranties for the panels, inverter and system parts are given for 5 years. |
## Checklist 5 – Key Elements of EPC Contracts (cont.)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subcontracting</strong></td>
<td>✓ Description of which phases/parts of the constructions/installation shall be subcontracted. All potential sub-contracts must be mentioned in the contract.</td>
</tr>
<tr>
<td></td>
<td>✓ Subcontractors must adhere to the same standards as the EPC Contractor.</td>
</tr>
<tr>
<td></td>
<td>✓ The EPC Contractor should be held responsible for all acts and omissions of subcontractors.</td>
</tr>
<tr>
<td></td>
<td>✓ The FO should secure the assignability of Subcontractor warranties and licenses, provided by the Subcontractors to the EPC under the relevant subcontracts. This is recommended in order to ensure the FO can seek regress for any issues directly from the Subcontractor. If this is not secured, the FO would need to raise these issues with EPC Contractor under the EPC contract for the EPC Contractor to then secure the Subcontractors’ performance of warranty and license obligations under the relevant subcontracts.</td>
</tr>
<tr>
<td><strong>Pricing and Payment Schedule</strong></td>
<td>✓ A breakdown of the prices for each phase of construction and the corresponding due dates for payments.</td>
</tr>
<tr>
<td></td>
<td>✓ The payment schedule must be in line with the construction schedule and can be made contingent on milestones being met.</td>
</tr>
<tr>
<td></td>
<td>✓ Advance payments made to the EPC are usually required to be secured by a bank guarantee. As discussed above, during the warranty period, a retention (in cash or via a warranty security in the form of a bank guarantee) is commonly negotiated.</td>
</tr>
<tr>
<td><strong>Insurance</strong></td>
<td>✓ Responsibilities for insurance coverage of the design and the works and the extent of that coverage will be divided between the FO and the EPC Contractor. These responsibilities will shift depending on the status of the project. The EPC Contractor will typically obtain and maintain all risk insurance, work-man compensation and third-party liability insurance during the installation, construction and commissioning of the RTS system. The FO should request a copy of all these insurances policies.</td>
</tr>
<tr>
<td></td>
<td>✓ The FO will typically obtain and maintain property insurance for the RTS system once ownership and risk in the RTS system has passed to the FO.</td>
</tr>
<tr>
<td></td>
<td>✓ The load bearing capacity of the roof structure is necessary for getting the project insurance.</td>
</tr>
</tbody>
</table>
The contract duration will be either determined by the time estimated to design, install and commission the RTS system (Project Time-line) or can be longer, if the FO chooses to also enter into an O&M agreement with the EPC Contractor (see Checklist 6).

- **Obligations of the FO**
  - The FO must cooperate with the EPC Contractor, facilitate the smooth operation of the construction process and provide reasonable site access to the Contractor without substantial interruption.
  - The FO must hire appropriate staff to carry out the FO’s responsibilities, such as construction oversight or performance testing at various stages of construction, to make decisions and take actions on behalf of the owner on site.

- **Obligations of the EPC Contractor**
  - Obligation of the EPC Contractor to submit engineering and design plans based on the FO’s requirements for the FO’s review prior to beginning construction.
  - The EPC must ensure that the necessary permits and licenses are obtained for the RTS system on behalf of the FO as part of their services. This includes a construction permit, if adjustments/modifications to the building/rooftop need to be made to install the RTS system (see Stage 4).

If both contracting parties are Vietnamese entities, the contract must be governed by Vietnamese law.

It is possible for a non-Vietnamese entity to provide EPC services in Viet Nam and in this case the parties to the contract may agree to apply foreign law and prices can be set in foreign currency (such as Singapore law and USD, respectively). However, for a non-Vietnamese entity to provide EPC services for an RTS system project it must obtain a foreign contractor permit, establish a project management office in Viet Nam, engage Vietnamese contractors to provide services as local partners, and register for tax payments in Viet Nam. These requirements are applied to the non-Vietnamese entity on a “per project basis”. Due to this, it is most common for the EPC Contractor for RTS system projects to be a Vietnamese entity. It is also not uncommon that foreign EPC companies offer supervision and overall management in cooperation with a local EPC partner.
Checklist 6 provides an overview of issues relevant to an O&M service agreement. An O&M service agreement is required whenever the FO does not want to operate and maintain the RTS system - for a certain period of time or for the whole duration of the project - but prefers to contract a third party to do so on their behalf. The third party can either be the EPC Contractor that built the RTS system or it can be another company that specialises on providing such services. For the first year, the EPC Contractor may offer free O&M services. A Template O&M Contract is available for download.

### Checklist 6 - Key Elements of O&M Service Agreements

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scope of Services</strong></td>
<td>✓ Clear description of the specific duties and responsibilities of the O&amp;M service provider, typically broken down into operational services, maintenance services, and cleaning services.</td>
</tr>
<tr>
<td></td>
<td>✓ The minimum frequency of cleaning services (cleaning schedule) can be agreed upfront.</td>
</tr>
<tr>
<td></td>
<td>✓ Services which fall outside of the scope – and their cost - should be explicitly mentioned to ensure problems can be addressed quickly without requiring contracting negotiations during system downtimes.</td>
</tr>
<tr>
<td><strong>System Performance Guarantees</strong></td>
<td>✓ O&amp;M service agreements with the EPC Contractor are more likely to guarantee performance ratios, which are calculated based on theoretical output and actual output of the system.</td>
</tr>
<tr>
<td></td>
<td>✓ O&amp;M service agreements with a third-party are unlikely to explicitly guarantee performance ratios, as there are many factors beyond their control which may impact yield, such as the quality of the EPC contractor’s work.</td>
</tr>
<tr>
<td></td>
<td>✓ Availability guarantees, where the O&amp;M contractor guarantees a set percentage of system uptime per month/year, are more common in O&amp;M service agreements with a third-party O&amp;M, as they focus on making the best use of the system.</td>
</tr>
</tbody>
</table>
### Checklist 6 - Key Elements of O&M Service Agreements (cont.)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spare Parts and Repairs</td>
<td>✓ The responsibility for purchasing, storing, and installing spare parts can be split between the O&amp;M Contractor and the FO.</td>
</tr>
<tr>
<td></td>
<td>✓ The EPC Contractor may turn over spare parts to the FO, who can make them available for use by the O&amp;M Contractor.</td>
</tr>
<tr>
<td></td>
<td>✓ The FO can be made responsible for the costs of all spare parts and repairs not covered by manufacturer warranty.</td>
</tr>
<tr>
<td></td>
<td>✓ The O&amp;M Contractor should regularly report the use of any spare parts and any repairs made.</td>
</tr>
<tr>
<td>Service Fees</td>
<td>✓ Fees charged by the O&amp;M service provider for the services rendered within the scope of services.</td>
</tr>
<tr>
<td></td>
<td>✓ Fees applicable to optional services that fall out of the scope of the O&amp;M service agreement, but the FO might want to make use of eventually.</td>
</tr>
<tr>
<td></td>
<td>✓ Parties may agree to periodically adjust the fee by a set percentage amount to account for inflation and/or foreign exchange rate fluctuations.</td>
</tr>
<tr>
<td>Contract Duration (Term)</td>
<td>✓ The term of the O&amp;M service agreement depends on the preference/intentions of the FO.</td>
</tr>
<tr>
<td></td>
<td>✓ O&amp;M must be planned for the entire lifetime of the system and it is for the FO to decide whether the O&amp;M shall be done partially or fully by a third party or whether they want to take over the O&amp;M responsibility at a certain point in time.</td>
</tr>
<tr>
<td></td>
<td>✓ Renewal and or termination requirements in O&amp;M service contracts should give the FO enough lead time to find a new O&amp;M contractor, if necessary.</td>
</tr>
<tr>
<td>Further Obligations of the O&amp;M Contractor</td>
<td>✓ The O&amp;M Contractor may also provide ongoing assistance with managing the relationship with EVN in cases where excess electricity is being sold to EVN, such as coordinating bi-directional meter readings.</td>
</tr>
<tr>
<td>Further Obligations of the FO</td>
<td>✓ Provide access to rooftop and to water for operation, cleaning and maintenance services.</td>
</tr>
</tbody>
</table>

### Step 2a.3 – Contractual Agreements for the Sale of Electricity

The FO may not require consuming all the electricity generated by the RTS system on-site but choose to sell a portion of the electricity to EVN.

If the FO wants to sell electricity to EVN, they must enter into a Power Purchase Agreement (PPA) with EVN. The process is described in **Stage 2c - Power Purchase Agreement with EVN** and further in **Step 6.2 to Step 6.5**.
Stage 2b - Contracting under the TOM

In the Contracting Stage the Facility Owner chooses the party to develop the RTS system installation on their building/facility. The agreement between a Facility Owner and a Solar Service Provider is formalised through the signing of a contract.

At the outset, the FO will consider whether the FO will consume any electricity generated by the third-party owned RTS, in which case the FO will then consider either a direct PPA or solar leasing model of the RTS system, or whether the FO will simply grant the Solar Service Provider a lease over the FO's rooftop for sale of electricity to the PC, for either a fixed rent or a profit share in the revenues received from EVN. If the FO is uncertain of the benefits of the various options, the FO can also request the Solar Service Provider to offer alternatives for the FO’s consideration.

Step 2b.1 – Selection of the Solar Service Company

Based on the offers received, the FO will be able to choose the most suitable Solar Service Provider (SSC) to partner with. Checklist 7 provides a number of useful criteria that can be used to determine which is the best offer.

Checklist 7 – Best Offer Assessment for SSC

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Design</td>
<td>✓ List of the attributes of the specifications of the system, including capacity, modules, inverters, and expected degradation. The FO should have a clear understanding of what type of system they would require and take into account any future expansion plans.</td>
</tr>
<tr>
<td>Company Profile and Track Record</td>
<td>✓ The more similar systems an SSC is operating successfully, the better the chances that the SSC will deliver the services as per the agreement with the FO.</td>
</tr>
<tr>
<td></td>
<td>✓ Check project references provided (call respective facility owners or visit the sites), whenever possible.</td>
</tr>
<tr>
<td></td>
<td>✓ Assessment of financial capability / credit check of the SSC.</td>
</tr>
<tr>
<td>System Costs</td>
<td>✓ As the SSC is making the investment, the system costs are not really relevant to the FO.</td>
</tr>
<tr>
<td></td>
<td>✓ However, if the FO has a purchasing option or an obligation to buy the system (see below) the cost of the RTS system at the time of transfer should be included.</td>
</tr>
<tr>
<td>O&amp;M Costs</td>
<td>✓ The O&amp;M costs are fully covered by the SSC and typically included in the electricity tariff.</td>
</tr>
<tr>
<td>Electricity Output and/or Price</td>
<td>✓ Electricity output and pricing considerations depend on the type of contractual agreement with the SSC (see Step 2b.2)</td>
</tr>
</tbody>
</table>
Step 2b.2 – Contractual Agreement with the Solar Service Company

A described in Step 1.3, in the TOM the RTS system is owned by the SSC. The FO permits the SSC to install the RTS system on its rooftop space and the FO may also agree to purchase part or all of electricity from the SSC for a negotiated price. Under the TOM, the SSC will provide EPC services and O&M services itself or engage a subcontractor for this purpose. Therefore, the FO will not enter into any EPC contract or O&M service agreement under the TOM.

In Viet Nam, there are three main types of contractual agreements an SSC and the FO could enter into:

- Solar Lease Agreement
- Private Power Purchase Agreement (Private PPA)
- Rooftop Lease Agreement

The Solar Lease Agreement (see Figure 10) has been the most widespread type of agreement in Viet Nam in the past, primarily because a private PPA was not recognised by the legal framework until PM Decision 13/2020 came into effect in April 2020. Under this type of contract, the SSC installs an RTS system on a roof of the FO’s facility. The SSC is the owner of the system and leases it to the FO on an operational basis. Therefore, the FO is considered to be the electricity generator for regulatory purposes. During the lease period, the FO pays the SSC a monthly fee, based on the electricity generated by the RTS system. The FO may enter into a PPA with the PC (EVN) to sell excess electricity that is not consumed (see Step 2b.3). The SSC provides maintenance services and may either include such services under the monthly rental fee; or charge a fixed or variable service fee.

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Checklist 7 – Best Offer Assessment for SSC (cont.)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Assessment</th>
</tr>
</thead>
</table>
| Insurance | ✓ Check that an appropriate insurance coverage will be procured by the SSC.  
✓ Check that the coverage and duration of the policy are in line with the project’s and the FO’s own requirements. |
| Contract Duration (and Transfer of Ownership) | ✓ Typically, the contract duration will be 15 to 20 years. In most cases, the ownership of the RTS system is transferred to the FO at expiry of the full term for a nominal price.  
✓ SSC might include in their offer an option or obligation for the FO to purchase the RTS system after a shorter period (see Checklists 8, 9 and 10). |
At the end of the 15-20-year contract period, the SSC transfers the RTS system to the FO for a nominal price.

It is possible that an RTS system leasing arrangement – if not well structured - could be considered a financial leasing arrangement under Vietnamese law. This would require further licenses and stricter conditions would apply to the SSC, effectively requiring it to be a licensed credit institution. Therefore, it is important that the lease agreement is structured in a way that it does not fall under the definition of a financial leasing arrangement under Vietnamese law. Checklist 8 provides an example of how such an agreement could be structured and an example of a Solar Lease Agreement is available for download.

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the RTS system and the Works</td>
<td>✓ Technical description of the RTS system, attributes of the location, hardware for installation, and associated connections thereto, as per accepted offer.</td>
</tr>
<tr>
<td>System Performance and Yield Guarantees</td>
<td>✓ Yield guarantees may be used to ensure a certain level of output by the RTS system. The FO may require the SSC to pay penalties for the system failing to meet the minimum yield guarantee, or they may have the option of terminating the agreement if the threshold is not met for a certain period of time.</td>
</tr>
</tbody>
</table>
| Duration of the Contract | ✓ 15 - 20 years
✓ To avoid falling under the financial leasing category under Vietnamese law, it is recommended to split the total lease contract into an operational lease period (of e.g. 8 years) and a benefit-sharing period (e.g. remaining 12 years).
✓ During the lease period the FO leases the RTS system from the SSC and purchases the system from the SSC at expiry of the lease period (as discussed below). |
### Checklist 8 – Key Elements of a Solar Lease Agreement (cont.)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of the Contract</td>
<td>✓ During the benefit-sharing period the ownership of the RTS system has passed to the FO and the SSC remains as an O&amp;M service provider sharing in the revenue/savings generated by the RTS system.</td>
</tr>
</tbody>
</table>
| Lease Period Fees                | ✓ The RTS system is leased on an operational basis to the FO and the FO pays a monthly rental fee to the SSC, based on electricity generated by the RTS system (possibly with a discount compared to the tariff of EVN).  
✓ The monthly leasing fee should be structured so that over the lease period the SSC recovers approximately 80% of its investment, as full 100% recovery under a leasing arrangement would conflict with the restrictions on financial leasing.  
✓ If the FO sells electricity to EVN, any sale of surplus electricity to EVN may be passed on to or shared with the SSC under this model to allow for a shorter payback period. Alternatively, the monthly rental fee may be based on a ‘take or pay’ arrangement where the FO’s monthly rental is based on all electricity generated by the RTS system regardless of whether consumed or not, and in such case the FO may solely benefit from the sale of any excess electricity to EVN to offset its monthly rental portion paid against electricity it did not consume.  
✓ If the FO is unable to consume electricity generated (e.g. during periods of suspension of its manufacturing operations) and has not entered into a PPA with EVN, the FO may nevertheless be responsible to pay leasing fees based on the deemed generation capacity of the RTS, if the responsibility for the inability to off-take the system output lies with the FO.  
✓ The parties may agree an additional fixed/variable monthly service fee in consideration of maintenance services performed by the SSC during the leasing phase.                                                                                                       |
| Benefit-Sharing Period Fees      | ✓ The SSC acts as an O&M service provider in this period (as ownership of the RTS system will have passed to the FO) and so will receive monthly service payments from the FO. This could be a fixed service fee or based on electricity generated by the RTS system (possibly with a discount compared to the tariff of EVN as during the lease period).  
✓ Additionally, the SSC may share in any revenue received by the FO under the PPA with EVN for sale of excess electricity if this applies to the particular RTS system.                                                                                   |
## Checklist 8 – Key Elements of a Solar Lease Agreement (cont.)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Assessment</th>
</tr>
</thead>
</table>
| Purchase Option and/or Obligation | ✓ At the end of the agreed lease period the title to the RTS system will pass to the FO.  
✓ The FO would need to purchase the system at a fair market value of the RTS system at the time of sale to avoid triggering financial leasing issues by transfer at nominal price on expiry of the lease.  
✓ Instead of having to pay the purchase price at that time the FO may pay it off in monthly instalments during the benefit-sharing phase. The monthly instalments of the purchase price may be allocated from the monthly maintenance service fee by adjusting the consumption fee rate accordingly.  
✓ Leasing agreements may also include an obligation to purchase the RTS system, in particular, if the FO is in breach of their obligations to the SSC (who is usually unable to reuse the system for a different customer or only at a substantial cost for the relocation and re-specification of the system to a different site. These clauses should be checked carefully to avoid that the FO is suddenly faced with the obligation to take the RTS system off from the SSC at significant cost. |
| Penalties for Breach | ✓ Typically, the SSC will ask for penalties to be applied for late payment of fees by the FO. This may be an interest applied on any late payments and is capped at a maximum of 20% per annum under Vietnamese regulations.  
✓ In addition, as the SSC will make a significant upfront investment for the RTS system based on the understanding it will have a 15 to 20 year contract with the FO, the agreement will likely include penalties payments in case the FO breaches the agreement causing early termination. These may include indemnity for losses incurred by the SSC and possibly forced purchase of the RTS system by the FO at an agreed price.  
✓ As discussed above, the FO may seek to apply penalties on the SSC for failure of the RTS system to meet guaranteed electricity outputs. This is less typically seen, as the fees paid to the SSC are usually linked to the electricity generation of the RTS system meaning the SSC is incentivised to ensure the RTS system generates as much electricity as possible and would already be penalised by receiving reduced fees if it does not. |
The **Private Power Purchase Agreement (Private PPA)** is usually signed when the FO purchases – partly or fully - the electricity generated by the SSC from an RTS system installed on the FO’s rooftop space (see Figure 10). A Private PPA mainly determines the technical requirements for the RTS, the amount and price of the electricity the FO will purchase from the SSC and other common terms as outlined in Checklist 9. There is no mandatory/standard template for a Private PPA, however a Template Private PPA is available for download. If any fraction of the electricity generated shall be sold to the PC, the SSC must organise the grid-connection of the RTS system and a Power Purchase Agreement (PPA) with EVN (see Step 4.2 and Steps 6.2 to 6.5).
### Checklist 9 – Key Elements of a Private PPA where the SSC Sells Electricity to the FO

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the RTS System and the Works</td>
<td>✓ Technical description of the RTS system, attributes of the location, hardware for installation, and associated connections thereto, as per accepted offer.</td>
</tr>
<tr>
<td>System Performance and Yield Guarantees</td>
<td>✓ Yield guarantees (annual) may be used to ensure a certain level of output by the RTS system. The FO may require the SSC to pay penalties for the system failing to meet the minimum yield guarantee, or they may have the option of terminating the agreement if the threshold is not met for a certain period of time.</td>
</tr>
<tr>
<td>Payment Conditions</td>
<td>✓ Payment is based on scheduled readings of the meter installed at the delivery point. &lt;br&gt; ✓ Private PPAs may be based on a take-or-pay clause, which requires the FO to pay for all energy generated by the facility, regardless if the FO does not consume all of the energy generated. The FO could consider pursuing a grid connection to sell unconsumed energy under a PPA with the PC (EVN) – see Stage 2c and Step 6.2 to Step 6.5. &lt;br&gt; ✓ The SSC may require a payment security or an advance deposit in the amount of three to nine months of expected monthly revenues from the sale of electricity, or a bank guarantee or letter of credit instead.</td>
</tr>
<tr>
<td>Duration of the Agreement</td>
<td>✓ The duration of the Private PPA should ideally align with the expected productive lifespan of the RTS system and/or the duration of the lease agreement. Typically, in Viet Nam the term of a Private PPA will be 15 to 20 years. &lt;br&gt; ✓ If the terms are of a length that requires renewal and extension, the notice period for intending to withdraw from the contract should provide adequate notice to both parties to ensure that they can prepare.</td>
</tr>
<tr>
<td>Purchase Option and/or Obligation</td>
<td>✓ At the end of the Private PPA, the FO may have the option to purchase the RTS system from the SSC. The price is usually at nominal value for a transfer of ownership at expiry of a long term Private PPA. &lt;br&gt; ✓ In some cases the FO will have the option to purchase the RTS system after a number of years into the Private PPA and the price in this case would be based on a formula developed to take into account the degradation of the RTS system and other factors, including upfront investment by SSC (generally discount to future cash flow for the remaining period of Private PPA). The FO will be responsible to notify the SSC within an adequate time period if it wishes to exercise its option to purchase the RTS system.</td>
</tr>
</tbody>
</table>
Contracts may also include an obligation to purchase the RTS system in particular, if the FO is in breach of their obligations to the SSC (who is usually unable to reuse the system for a different customer or only at a substantial cost for the relocation and re-specification of the system to a different site). These clauses should be checked carefully to avoid that the FO is suddenly faced with the obligation to take the RTS off from the SSC at significant cost.

The SSC shall ensure that the Purchase Price by FO meets their expected return on investment. One option is to specify, upfront, the purchase price for each year over the duration of the Agreement.

Typically, the SSC will ask for penalties to be applied for late payment of fees by the FO. This may be an interest applied on any late payments and is capped at a maximum of 20% per annum under Vietnamese regulations.

In addition, as the SSC will make a significant upfront investment for the RTS system based on the understanding it will have a 15 to 20 year contract with the FO, the agreement will likely include penalty payments due if and when the FO breaches the agreement causing early termination. These may include indemnity for losses incurred by the SSC and possibly forced purchase of the RTS system by the FO at an agreed price.

The FO may seek to apply penalties on the SSC for failure of the RTS system to meet guaranteed electricity outputs. This is less typically seen as the fees paid to the SSC are usually linked to the electricity generation of the RTS system meaning the SSC is incentivised to ensure the RTS system generates as much electricity as possible and would already be penalised by receiving reduced fees if it does not. It is preferable to state the anticipated generation and guaranteed generation for each to avoid any ambiguity.

The SSC will have a lease of the rooftop or license to occupy as part of the Private PPA arrangement but the FO must cooperate with the SSC and provide reasonable access to the building to the SSC without interruption to enable the SSC to be able to effectively perform the services.

The FO must obtain insurance in respect of the building / rooftop (although the obligation to ensure the system remains with the SSC).
As an alternative to both the Solar Leasing model and the Private PPA model, a **Rooftop Lease Agreement** (see Figure 11) is typically signed when the SSC only leases the rooftop from the FO to install an RTS system but intends to sell all the electricity produced to the Power Company EVN, i.e. the FO does not purchase any electricity from the SSC. The SSC may offer the FO either a profit share from the sales to the PC or a fixed rent per month or per year for the entire term of the agreement. Under this type of contract, the FO may need to provide support to the SSC during the technical testing and the connection to the grid. The main elements of a Rooftop Lease Agreement can be found in Checklist 10 and an example for a **Rooftop Lease Contract** is available for download.

---

**Checklist 9 – Key Elements of a Private PPA where the SSC Sells Electricity to the FO (cont.)**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Assessment</th>
</tr>
</thead>
</table>
| Further Obligations of the SSC | ✓ O&M services will fall upon the SSC.  
✓ The SSC must ensure that the necessary permits and licenses are obtained for the RTS system on behalf of the FO as part of their services. This includes a construction permit, if adjustments/modifications to the building/rooftop need to be made to install the RTS system (see Stage 4).  
✓ The SSC will typically also provide ongoing assistance with dealing with EVN if excess electricity generated by the RTS system is being sold to EVN by the FO, such as coordinating connection to the grid and ongoing bi-directional meter readings.  
✓ The SSC must provide and commit to comply with health, safety and environmental standards given that activities are carried out at height. |
As both contracting parties will typically be Vietnamese entities, all these types of agreements must be governed by Vietnamese law. Foreign companies wishing to act as SSC in Viet Nam, are required by law to be physically present in Viet Nam by establishing a duly licensed Vietnamese entity for this purpose.
Stage 2c - Power Purchase Agreement with EVN

Both under the SOM and the TOM, a Power Purchase Agreement with EVN will be required if any of the generated power is to be fed to the grid.

A Standard PPA for selling electricity to EVN is mandatory as per MOIT Circular 18/2020, that followed PM Decision 13/2020 and replaced MOIT Circular 16/2017. Amendments or supplementation of the Standard PPA will only be possible to a very limited extent.

Signing a PPA with and effectively selling electricity to EVN requires a series of Steps throughout the RTS project development process. Figure 12 provides a holistic overview of the process with EVN.

**Figure 12 – Process to Obtain a PPA and sell Electricity to EVN**

<table>
<thead>
<tr>
<th>Responsible parties</th>
<th>Processing time</th>
<th>Flowcharts</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Project Owners</td>
<td>03 days prior to the tentative installation completion date</td>
<td>Register their needs to install the RTS system</td>
</tr>
<tr>
<td>Subsidiary Power Companies/Units</td>
<td>01 working day</td>
<td>Survey and negotiation of the grid connection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grid connecting conditions is not ensured</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negotiate with the owners to select the appropriate option</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grid connection condition is ensured</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Invest in the project</td>
</tr>
<tr>
<td>The Project Owners</td>
<td>01 working day</td>
<td>Submit the dossiers to request power sales from the RTS system</td>
</tr>
<tr>
<td>Subsidiary Power Companies/Units</td>
<td>01 working day</td>
<td>Check the project technical specifications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not pass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Notify the owners to take remedial actions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pass</td>
</tr>
<tr>
<td>Subsidiary Power Companies/Units</td>
<td>02 working days</td>
<td>Install two-way meters and sign the PPAs with the owners</td>
</tr>
</tbody>
</table>

The Grid Connection Approval by EVN should be optimally procured at an early project development stage, i.e. before starting the construction phase, as described under Step 2c.1 below. Then, during the commissioning of the RTS system, the process for signing the PPA and starting to sell electricity to EVN is concluded, as described in Steps 6.2-6.5.
2c.1 - Grid Connection Approval

If any portion of the electricity produced by the RTS system shall be sold to the PC – whether under the SOM or the TOM Model - it is highly recommended to approach the PC/EVN at an early stage, i.e. before starting the investment-intensive Stage 5 – Procurement, Construction and Installation to obtain Grid Connection Approval, which significantly improves the risk profile of the project and can be beneficial, e.g. in the negotiation of a bank loan (see Step 3.2). Figure 13 provides an overview of the grid connection approval process.

The FO/SSC can submit a “Request for Grid Connection Approval” for the RTS system in question. The request should be sent to the customer service centres of the local Power Companies via phone, email, or Zalo or Chat Box Apps, and should include the following basic information:

- Rooftop solar PV project site(s)
- Planned installed capacity
- EVN customer code (if applicable)
- Under the TOM, the SSC must also submit a copy of the agreement with the FO (Private PPA, Solar Lease Agreement or Rooftop Lease Agreement).

EVN will in turn organise a site inspection to conduct a “Grid Connection Feasibility Survey”. An important precondition for obtaining the Grid Connection Approval is that the design and other relevant aspects of the system comply with grid-connection requirements. The grid connection requirements depend on the intended installed capacity of the RTS system and the conditions and process are set out in Circular 39/2015/TT-BCT, Circular 30/2019/TT-BCT, EVN Guidelines 1532/EVN-KD, and Circular 18/2020/TT-BCT.

The PC must notify the FO/SSC about the outcome of the Grid Connection Feasibility Survey and any other relevant issues in written form. If the grid connection point where the RTS system is supposed to be connected cannot absorb the additional capacity of the RTS system, the Request for Grid Connection may be rejected. If the surveys outcome is satisfactory, the PC/EVN issues a Grid Connection Approval to the FO/SSC. The Grid Connection Approval document may contain additional conditions the system may have to comply with when commissioned, as a result of the feasibility survey.

The grid connection and the signing of the PPA take place at Stage 6 – Commissioning and (Grid) Connection.
Stage 3 - Financing

In the Financing Stage, the Facility Owner determines the best investment structure for financing the RTS system. This Stage is relevant only for the Self-Ownership Model. In the case of a Third-Party Ownership Model, the SCC is in charge of structuring the financing of the project.

Step 3.1 – Development of a Financing Model

A Financial Model is a mathematical model designed to represent the performance of a project or an investment. Building such a model helps to determine the most suitable investment structure, including – for instance – the optimal mix between equity and loans to finance the project.

A Financial Model is a mathematical model designed to represent the performance of a project or an investment. Building such a model helps to determine the most suitable investment structure, including – for instance – the optimal mix between equity and loans to finance the project. Usually, the financial model is part of the feasibility study (see Step 1.5). The financial model will help to determine the best financing structure for the project, including the optimal equity-loan mix. A typical equity-loan ratio lies at 30-70%. When applying for a loan, the bank may require seeing the project's financial model and technical feasibility study.

Step 3.2 – Obtaining a Bank Loan

As RTS systems are usually a relatively small investment, most banks will issue loans not on a project base but rather on a balance sheet base, which includes all of the company’s assets. In this case, the bank providing the loan will accept other collaterals than the RTS system.

A few banks in Viet Nam also provide project-based loans for RTS, where the RTS itself is accepted as collateral. They will typically expect to see the following documents:

- Company Records
  - Legal identity (Business Registration Certificate, Company Charter, Representative, Address)
  - Business records (Financial statements, accounting balance sheet, and some invoices or contract/credit agreements to prove competence)

- RTS System Records
  - Estimated capacity, technical specifications of photovoltaic panels, parameters of AC converters
  - FS or estimated budget breakdown

- Relevant Contracts
  - Construction/EPC contract with the EPC Contractor
  - Grid Connection Approval or PPA (if available)
  - Where applicable: Rooftop Lease, Solar Lease or Private PPA

A number of banks in Viet Nam are willing to offer bank loans to develop RTS projects. The size of the loan offered will differ from bank to bank and interest rates lie between 10-12%. For example, HDBank offers a credit line for up to 70% of the investment cost (using kWp as a basis), with flexible loan terms of up to 120 months (10 years). The bank will typically take security over the RTS system and the cash flow from the EVN PPA.
• Other Documents

◊ If the land use rights, factory or building (where an RTS system is located) has been mortgaged to another bank, a confirmation letter from the respective other bank, confirming that the RTS system is excluded, is required.

Next to commercial banks, some investment funds may also provide funding for RTS projects. In comparison with bank loans, such cooperation agreements with investment funds may be simpler. However, investment funds may be at greater risk and may require higher returns with shorter payback times.

Stage 4 - Permits and Licenses

In this stage, the Project Owner engages with relevant national authorities to obtain permits and licenses necessary to build and operate the RTS system in compliance with regulations.

Step 4.1 Permit and License Requirements

In Viet Nam, the installation and operation of an RTS system requires the following permits:

• Construction and Modification Permit
• Certificate of Eligibility for Fire Prevention and Fire Fighting
• Certificate of Business Registration

Under the SOM, the EPC Contractor is typically in charge of carrying out any structural modifications and supporting the FO in getting the necessary construction permit should this be required. Under the TOM, this responsibility might fall on the FO or on the SSC, depending on the contractual arrangements.

Step 4.2 to Step 4.4. Provide more details on each of the permits listed above.

An RTS system is considered ‘construction works’ under the Law on Construction and a construction permit is required.
Step 4.2 – Construction Permit

An RTS system is considered ‘construction works’ under the Law on Construction and a construction permit is required, as per MOC Circular 15/2016/TT-BXD, unless it falls into one of the cases of exemption under Article 89.2 of the Law on Construction. Whether the permit is required, or the exemption applies must be confirmed by the Provincial Department of Construction or the People’s Committee at district level, who are also responsible for issuing the construction permit.

It is possible that the RTS installation falls into the already existing construction permit issued for the building on which it shall be installed, provided that the already permitted parameters for the building allow it.

If the building requires structural changes, e.g. reinforcement of the roof, a construction modification permit may be required. For FOs that are located in industrial zones, a simplified process may apply and only a notification to the local management board of the industrial zone is then required.

Step 4.3 – Certificate of Eligibility for Fire Prevention and Fire-Fighting

The Certificate of Eligibility for Fire Prevention and Fire-Fighting is a compulsory condition for putting a construction work or building into operation, as stipulated by the Fire Prevention and Fire-Fighting Law, Gov Decree 79/2014/ND-CP and MPS Circular 66/2014/TT-BCA.

For an existing building, the FO still has to submit an application to the Fire Prevention and Fire-fighting Police to have confirmation of eligibility. However, the procedure will be simple if the design of the building is not changed.

In case there is any change in the design (e.g. modifications to the roof to better support the RTS system) of an existing building or if a new building is erected on which an RTS system shall be placed, the FO must submit at the Fire Prevention and Fire-fighting Police a request for appraisal of fire-fighting and prevention eligibility of the design to be issued a Certificate of Eligibility for Fire Prevention and Fire-Fighting.

Step 4.4 - Certificate of Business Registration

The requirements for business registration / enterprise registration certificate are set out in the Law on Enterprises and detailed by the Government Decree 78/2015/ND-CP and MPI Circular 20/2015/TT-BKHD.

Any company intending to build a new facility in their line of business that also intends to install an RTS system to do business in the solar energy sector should specify this business activity when first requesting the Business Registration Certificate.

Existing businesses may not be required to register a new business activity, but it is recommended to check with the relevant local authorities whether an adjustment of the existing business registration certificate should be carried out to include the relevant additional business lines for the proposed new activity in the energy sector.
Stage 5 – Procurement, Construction and Installation

In this Stage, the RTS system components are procured, necessary construction works are carried out and the RTS system is installed on the rooftop of the building/facility. Once the system is in place, a test protocol is performed to determine whether it performs according to expectations. The FO has mainly an observation/supervisory role in this process.

Step 5.1 – Site Preparation

Before the EPC Contractor/SSC can start the construction and installation of the RTS system, the FO must ensure that appropriate access to the premises is granted, as well as to use facilities (e.g. parking, storage, etc.) and utilities (e.g. electricity, water, etc.) as agreed in advance. The FO must ensure that all obstacles at the installation site – on the rooftop and all access points - are cleared before the start of the works. Checklist 11 provides a list of items that should be agreed upon with the EPC Contractor or SSC in advance, before the construction teams arrive at the site.

### Checklist 11 – Site Preparation

<table>
<thead>
<tr>
<th>Item</th>
<th>To be agreed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to the Site</td>
<td>Are there any security/identification procedures that need to be followed?</td>
</tr>
<tr>
<td></td>
<td>(e.g. at the premises such as registration of personnel, issuance of visitor ID, etc.)?</td>
</tr>
<tr>
<td></td>
<td>What are the permitted times to work?</td>
</tr>
<tr>
<td>Use of Electricity</td>
<td>Which access points shall be used for electricity?</td>
</tr>
<tr>
<td></td>
<td>How much consumption is allowed? Will this be unlimited or capped at certain kWh/month?</td>
</tr>
<tr>
<td></td>
<td>Will consumption be charged or be at no cost?</td>
</tr>
<tr>
<td>Use of Water</td>
<td>Which access points shall be used for water?</td>
</tr>
<tr>
<td></td>
<td>How much consumption is allowed? Will this be unlimited or capped at certain m³/month?</td>
</tr>
<tr>
<td></td>
<td>Will consumption be charged or be at no cost?</td>
</tr>
<tr>
<td>Use of Other Facilities</td>
<td>Which areas can be used for loading/unloading?</td>
</tr>
<tr>
<td></td>
<td>Which areas can be used for storing equipment and other material?</td>
</tr>
<tr>
<td></td>
<td>Is temporary office space needed/available?</td>
</tr>
<tr>
<td></td>
<td>Are designated parking space needed/available?</td>
</tr>
<tr>
<td></td>
<td>What sanitary facilities can be accessed by construction workers?</td>
</tr>
<tr>
<td>Health and Safety (H&amp;S) Requirements</td>
<td>Which H&amp;S requirements of the facility must be met by the construction workers (e.g. mandatory use of personal protection equipment, safe behaviour, etc.)?</td>
</tr>
<tr>
<td>Environmental Requirements</td>
<td>Which Environmental requirements of the facility must be met by the construction workers (e.g. wastewater discharge, dust and noise mitigation, etc.)?</td>
</tr>
</tbody>
</table>
Step 5.2 – Procurement, Construction and Installation

For the SOM, the EPC Contractor is responsible for procurement of all components, construction and installation of the RTS system.

For the TOM, the SSC is responsible for the procurement of all components, construction, and installation of the RTS system. Usually, they sub-contract an EPC Contractor to do these activities and in this case the SSC as owner of the RTS system would oversee and supervise the construction work carried out by the EPC Contractor. Therefore, the Facility Owner does not have to actively engage in the construction works.

However, when possible, it is recommended both under the SOM and the TOM model that the FO assigns a staff or contracts a third-party consultant to oversee and supervise the construction. The level of engagement of this resource should be higher under the SOM than under the TOM model, but having a designated resource overseeing the works on behalf of the FO is helpful to ensure that all procured components meet technical requirements and comply with standard or good engineering practices, the installations are done properly, time-lines are kept, and, in general, the coordination between the FO and the EPC/SSC requirements is smooth.

An internal testing on the RTS system is conducted to ensure that all components and the system are in accordance with the original design, can be operated properly and can begin generating electricity under normal operation conditions.
Stage 6 – Commissioning and (Grid) Connection

*In this stage the installed RTS system is tested to determine whether it is functioning and performing as expected and upon satisfactory results it is connected to the grid and put into operation.*

Step 6.1 – Internal Testing

Upon completion of the construction and installation stage, an internal testing on the RTS system is conducted to ensure that all components and the system are in accordance with the original design, can be operated properly and can begin generating electricity under normal operation conditions. It is also to ensure that all further construction / installation works have been properly done. It is recommended that the internal testing is not conducted by the same EPC (sub-) contractor but rather by an external party contracted by the FO/SSC, to ensure that the work delivered by the EPC contractor is of good quality.

**Checklist 12** provides a list of the elements that are typically included in the internal testing protocol.

<table>
<thead>
<tr>
<th>Item</th>
<th>To be agreed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component Testing</td>
<td>✓ Are individual components functioning as expected and according to agreed specifications?</td>
</tr>
</tbody>
</table>
| System Testing                | ✓ Is the system (all components together) functioning as expected and according to agreed specifications?  
|                               | ✓ Does the RTS system meet the performance guarantee levels (if applicable)? |
| Compliance with Standards     | ✓ Do the installations and infrastructure comply with the required quality standard? |
| Safety                        | ✓ Are all safety devices working properly?  
|                               | ✓ Can the RTS system be commissioned in complete safety? |

Under a model that does not foresee any sales of electricity to the PC, the RTS system can begin to operate after the testing procedures have been completed successfully and with satisfactory results (see **Stage 7 – Operation and Maintenance**).

If the FO or SSC plan to sell electricity to the PC (EVN), they must follow a grid-connection procedure before the PPA with EVN can be signed. This procedure is started at **Step 4.2** and continues with **Step 6.2** to **Step 6.5**.
Step 6.2 – Request for Grid Connection

Once the internal testing has been completed successfully and with satisfactory results, the next step is to ensure grid connection of the project and sales of electricity to EVN.

03 days prior to the tentative installation completion date, the project owner shall submit a dossier of proposal for electricity sale to the PC, including:

- An official request letter for electricity sale (see form BM.01 in Figure 14 and the template in EVN Guidelines 1532/EVN-KD)
- A technical dossier: specifications, COs, CQs of solar panels and inverters and minutes of parameter testing in line with the applicable regulations carried out by a competent unit.

Figure 14 – Official Request Letter for Electricity Sale from RTS

If the FO does not engage a competent unit to conduct the parameter testing, EVN unit will conduct these tests (see Step 6.3).

EVN or a qualified entity will review all submitted documents and schedule an on-site inspection, including system parameter testing if the project owner chooses not to engage an agency to conduct this (see Step 6.3).

Step 6.3 – Inspection by EVN

Within 3 days from the receipt of a proposal for electricity sale, the PC in charge shall complete parameter testing. This inspection is done to confirm
that the RTS system meets grid connection requirements, as per the grid connection approval conditions (see Step 4.2). If a parameter test has not been conducted before the request for registration of the grid connection (see Step 6.2), EVN may conduct a parameter test during this inspection. The grid connection requirements depend on the intended installed capacity of the RTS system and the conditions and process are set out in MOIT Circular 39/2015/TT-BCT, MOIT Circular 30/2019/TT-BCT and EVN Guidelines 1532/EVN-KD on implementation guidelines with Rooftop Solar projects, 27 March 2019 and MOIT Circular 18/2020/TT-BCT.

If the RTS system meets the requirements, EVN confirms the agreement to purchase electricity from the RTS system (Step 6.4).

If the RTS system does not meet the required specifications, EVN will issue an official letter to the FO to advise on the remedial actions to take to ensure the RTS system can pass the requirements and electricity can be sold to EVN from the system.

**Step 6.4 – Signing of PPA**

Upon a successful inspection by EVN, the next steps consist of signing the Power Purchase Agreement with EVN (in many cases, the PPA signing can also follow after grid connection and commissioning of the system).

The PPA will include the following key provisions:

- The FIT to be applied for a period of (up to) 20 years from the applicable commercial operation date.
- The formula for calculating the electricity generated and price to be paid to the seller.
- Penalty interest payable by EVN on any late payments at the applicable interest rate of one month as announced by the State Bank of Viet Nam at the time when EVN makes payment.

The PPA follows a predefined template which was officially issued by the Ministry of Industry and Trade in July 2020 and is attached as an annex to MOIT Circular 18/2020 supplementing PM Decision 13/2020.

If all technical requirements are not satisfied, the PC will not enter into a PPA. Remedial actions may be proposed, to allow for submitting a new proposal for electricity sale.

**Step 6.5 - Grid Connection**

After the signing of the PPA, EVN replaces the 1-way meter with a bi-directional meter. The bi-directional meter enables the recording of the amount of electricity fed from the national/EVN grid into the premises of the FO and at the same time measures the amount of electricity from the RTS system fed into the grid (see above comment: in many cases, PPA signing follows grid connection and commissioning).
Stage 7 - Operation and Maintenance

In this stage the installed RTS system is fully operational and generates electricity for self-consumption and/or sales. This stage can last up to 25-30 years until the end of the system’s lifetime. During this stage, regular maintenance needs to be conducted to ensure that the RTS system can operate smoothly for the duration of its lifetime.

Step 7.1 – O&M Provisions and Resources

For the SOM, the EPC Contractor typically offers operation and maintenance services for a predefined period (usually the first 2-3 years) after the system is commissioned.

The scope of the O&M services to be provided by the EPC Contractor are usually agreed upon early on in the project and form part of the contract (see Stage 2 - Contracting). For the duration of the O&M service contract, the FO must ensure that the EPC contractor fulfils their responsibility.

After expiry of the O&M service period with the EPC contractor, the FO may take over O&M services itself or engage a third party to provide O&M services for the RTS system.

If the FO engages a third party to provide the O&M services, this would be under a separate O&M contract with terms as presented in Stage 2 - Contracting. A Template O&M Contract is available for download.

If the FO takes over responsibility for the O&M of the RTS system itself, it must make sure that the necessary resources to carry out all O&M related tasks are in place for smoothly taking over responsibility after the O&M service contract with the EPC Contractor has expired. This can be done either by recruiting specialised staff (such as an external expert or new staff members) or by training existing staff. If the FO plans to assign existing staff to perform O&M of the RTS system, it should optimally appoint the appropriate person early on - i.e. at the time the system is installed - so that person can already start building expertise before taking over the task fully.

Checklist 13 provides a list of topics that should be covered in a professional training for RTS system O&M:

Checklist 13 – Training Topics for RTS System O&M

<table>
<thead>
<tr>
<th>RTS O&amp;M Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Fundamentals of Solar PV Systems</td>
</tr>
<tr>
<td>✓ Overview of the specific RTS systems (i.e. component, rated capacity, and other parameters, review of single line diagram, etc.)</td>
</tr>
<tr>
<td>✓ Safety considerations when working with a PV system (i.e. risk associated with PV system operation, etc.)</td>
</tr>
<tr>
<td>✓ Routine inspections / performance monitoring (i.e. understanding of system parameters, etc.)</td>
</tr>
<tr>
<td>✓ Use of measurement devices (e.g. clamp meter, etc.) or monitoring systems</td>
</tr>
<tr>
<td>✓ Preliminary troubleshooting</td>
</tr>
<tr>
<td>✓ Cleaning of system components</td>
</tr>
<tr>
<td>✓ Warranty details (conditions, duration period, point of contact)</td>
</tr>
</tbody>
</table>
In the case of the TOM, the RTS system is owned and operated by the SSC. Therefore, the FO does not have a direct O&M responsibility.

However, the FO should be able to supervise/assess whether the RTS installations are operated and maintained properly.

**Step 7.2 – Energy Verification and Payment**

The energy verification and payment system to be put in place depends on who sells/purchases the electricity from the FO or the SSC.

When the SSC sells electricity to the FO (whether partially or fully) under a Private PPA, a transparent system and process must be put in place to ensure an appropriate accounting of units of electricity provided and invoiced/paid. The following are some examples of possible methods:

- Cross-checking the amount recorded as generated in the invoice issued by the SSC with the readings of the power meter at the output of the RTS system (installed by the SSC) or from monitoring system.

- Cross-checking the amount recorded as generated in the invoice issued by the SSC with the readings of the power meter installed independently by the facility owner at the input to the main distribution board (please note that the value will not be exact as the power meter installed at the output of the PV system as there might be some line loss. However, value reading from the dedicated meter should be in the same level as the value stated in the bill).

- Comparing the amount recorded as generated in the invoice issued by the SSC with electricity generation from past months (taking into consideration weather condition, operation hours of the facility, etc.). This can give an indicative idea of the accuracy of the invoice if the amount of electricity recorded is more or less equivalent than that of previous months.

The measured electricity transferred to the FO must be officially and clearly invoiced by the SSC and subsequently paid by the FO.

When the SSC or the FO sell the generated power under a **PPA with EVN**, they must follow EVN’s verification and payment methods set out under the PPA as follows:

- Allow the installation of a bi-directional meter – as described under **Step 6.5** - that measures the amount of electricity fed into the premises of the FO by EVN and the amount of electricity fed out of the RTS system into the grid. EVN will invoice separately for amounts consumed from the national grid by the FO’s premises and pay for the amount fed into the national grid.
- Agree on a specific day each month, for EVN to come read the bi-directional meter to subsequently issue a meter reading to the SSC or FO. This happens usually within one business day.

EVN then issues a Confirmation Report on the meter readings (see Figure 15). The SSC or FO then have one business day to raise any issues with the meter reading provided by EVN. If no objection is raised, EVN will proceed to pay for the electricity at the agreed FIT, as per the PPA.

Figure 15 – EVN Confirmation Report on Meter Reading for RTS

| SOCIALIST REPUBLIC OF VIETNAM |
| Independence – Freedom – Happiness |
| CONFIRMATION REPORT |
| ON METER READING, ELECTRICITY OUTPUT DELIVERED AND RECEIVED AND BILL PAYMENT |

<table>
<thead>
<tr>
<th>Month</th>
<th>Meter reading</th>
<th>Output (kWh)</th>
<th>Unit price (VND/kWh)</th>
<th>Total amount (Tax excluded) (VND)</th>
<th>VAT (% VND)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beginning</td>
<td>End</td>
<td>Multiplier</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In words: ........................................................................................................................................................................

| The Seller | The Buyer |

Step 7.3 – Transfer of Ownership

This Step is relevant to the TOM only. If the SSC and the FO have agreed that the RTS system’s ownership shall be transferred from the SSC to the FO after a certain period of time (see Stage 2b), the transfer process should be prepared adequately in advance. Checklist 14 provides some key items that should be taken into account to ensure a smooth transfer of ownership that does not affect the system’s operation and performance:

After the signing of the PPA, EVN replaces the 1-way meter with a bi-directional meter.
### Checklist 14 – Preparation of the Transfer of Ownership

<table>
<thead>
<tr>
<th>Item</th>
<th>To be agreed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment of the RTS System Operator</td>
<td>✓ Decide whether the FO will be in charge of O&amp;M or whether an external party will be recruited (see also Step 7.1)</td>
</tr>
<tr>
<td>Assessment of the RTS System Condition</td>
<td>✓ Conduct an (independent) inspection of the component and system condition and performance to support planning of procurement or replacement of certain components, if necessary.</td>
</tr>
<tr>
<td>Preparation of the Accounting System</td>
<td>✓ Adapt the accounting system of the FO to account for the RTS system as an asset of the company.</td>
</tr>
<tr>
<td>Monitoring System Transfer</td>
<td>✓ Ensure that the monitoring process is clear to FO’s responsible staff and transfer key information, such as access credentials and rights for monitoring software.</td>
</tr>
</tbody>
</table>
| Engineering Documents and O&M Logbook    | ✓ Make sure that the SSC has updated all relevant engineering documents to ensure that changes that have been done to the RTS system over the years (diversions from the original design) are properly reflected.  
   ✓ Ensure that the SSC transfers the O&M Logbook which captures all maintenance work done on the RTS system over the years. |
| Other issues                              | ✓ Additionally, the SSC should confirm that there are no mortgages or other security interests over the RTS system at the time ownership is transferred to the FO. If there are any existing mortgages or other security interests over the system, the SSC must complete steps to have these released and de-registered before transferring ownership. |
Stage 8 – Decommissioning

This stage consists of dismantling and disposal of the RTS system at the end of its lifetime.

As the lifetime of Solar PV systems is between 25-30 years, there is limited experience in Viet Nam (and ever world-wide) with regards to the decommissioning of these systems and no specific polices/regulations and standard processes are yet in place in Viet Nam.

**MOIT Circular 18/2020** replacing **MOIT Circular 16/2017** states that the seller (being the owner of the RTS system) is responsible for clearing, taking down and returning the site as well as handling all material and equipment of solar power structures in line with the law (Article 8), but it does not refer to any specific regulations to be followed other than the applicable laws on environmental protection generally.

At present, only the European Union (EU) has adopted PV-specific waste regulations. Most countries around the world classify PV panels as general or industrial waste. Therefore, until there are specific regulations for Solar PV system (component) disposal, the system owners should follow the national guidelines and requirements for the recycling of electronic waste and general industrial waste. These include:

- **MONRE Circular 36/2015/TT-BTNMT** regulates electronic waste and electronic devices containing hazardous components (excluding printed circuit boards which do not contain any components that exceed the threshold of hazardous waste) are considered as hazardous waste.


A publication by **IRENA (2016)** provides an overview of issues to consider regarding the end of life of photovoltaic panels. Furthermore, PV Cycle, a non-for-profit, member-based organisation offers both collective and tailor-made waste management and legal compliance services for companies and waste holders around the world. Thus, PV component manufacturers, retailers, online shops, or importers of solar electronic products and batteries could contact **PV Cycle** for further information or services.

Most countries around the world classify PV panels as general or industrial waste.
Key References
Policy, Law and Regulation Documents


Templates and Tools


29. Template Rooftop Lease Agreement for 100% Sale to EVN (Roof Lease contract) – http://vepg.vn/rts-investment-guidelines/


Other Useful References

Contributors

These Investment Guidelines were developed as a part of the “PV Rooftop Pilot Project” - a development partnership between the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Syntegra Solar International and Cat Tuong Corporation under develoPPP.de Programme, commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ).

The develoPPP.de programme in Viet Nam aims at fostering the involvement of the private sector in areas where business opportunities and development policy initiatives overlap. To this end, BMZ offers financial and technical support for companies that invest in developing and emerging-market countries. Concretely, Cat Tuong and Syntegra - with technical assistance from GIZ - will install a rooftop solar system at Cat Tuong’s factory in the Mekong Delta’s Long An province. The solar system has a capacity of 850kWp generated by approximately 2,560 PV modules covering 4,400m² of roof space. It is expected to generate 1,230MWh of solar electricity every year, covering around 50% of the factory’s annual average electricity demand. Excess solar power will be exported to the national electricity grid. On an annual basis, the PV system is expected to save the Cat Tuong factory’s energy costs by about USD102,000 and reduce CO₂ emissions by 1,092 tons/year. The project shall serve as a blueprint to demonstrate the technology’s benefits for industrial power consumers, public utilities, and Viet Nam’s energy sector.

develoPPP.de is part of GIZ’s service portfolio with which it offers professional support for companies investing in developing and emerging countries and develops strategies for sustainable business practices. These include developing and piloting business ideas (lab of tomorrow), embedding and scaling up projects in over 2,000 existing GIZ programmes, and implementing projects that are directly commissioned (International Services).

GIZ is a German federal enterprise operating in international cooperation for sustainable development and international education work for over 50 years. GIZ advises the German Government, European Union and United Nations institutions, and businesses and governments of other countries. Together with its partners, GIZ works to develop effective solutions that offer people better prospects and sustainably improve their living conditions. GIZ works in a wide variety of areas, including economic development and employment, energy and the environment, and peace and security.

Syntegra Solar is a specialized consulting and project development firm with a focus on renewable energies, particularly in Photovoltaic (PV) industries. It connects technology, business and financial aspects along the entire value chain, from raw materials to individual users of renewable energies. In this respect, Photovoltaic power plants have become the main field of operation of Syntegra Solar, which currently employs a staff of 17 in different regions around the world creating an annual turnover of more than CHF 3 million. Syntegra Solar focuses especially on medium-sized PV rooftop power systems as one of the most sensible and economic PV applications, where clean power is produced and consumed directly on site.
Cat Tuong Corp is a leading Vietnamese company in manufacturing and distributing insulation materials. With offices and factories in Northern and Southern Vietnam, Cat Tuong provides a wide range of isolation products for residential housing, industrial building, complementing its products with an excellent distribution system as well as architectural consultancy. Founded in 2002, Cat Tuong Corp has been progressively achieving a steady and uninterrupted growth, including a production capacity of 50 million m² per year and a distribution system of 1,500 stores in Vietnam. By following international standards Cat Tuong has been exporting its goods to 12 countries around the world, most of them located in Europe and America. Building on its experience in the field of insulation, Cat Tuong is planning to invest into Solar energy as a second business pillar.

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