General

No.	Questions	Proposed Answers
1.	I am a landed property owner and wish to integrate solar PV system to my building, how should I start to do it?	Consumers installing a solar photovoltaics (PV) system should engage a Qualified Person (QP) to ensure appropriate physical installation and compliance with regulations. After the solar PV system has been installed, the consumer should engage a Licensed Electrical Worker to commission and turn on the solar PV system. For more information you may wish to refer to the following resources: Energy Market Authority (EMA)'s Guide to Solar PV SP Group's Guide on Solar Installations BCA, Handbook for Solar PV Systems
2.	I am buying electricity from an Open Electricity Market (OEM) retailer, will my solar PV installation be linked to my contract with my OEM retailer?	No, your solar PV installation is not tied to your OEM retailer contract, and you can install solar at any time regardless of your contract end date.
3.	Who can I reach out to install solar for my building?	You can find a list of solar PV vendors at the National Solar Repository Website. Note that this does not represent Government endorsement of any solar vendor in Singapore.

Cost and Financing Options

No.	Questions	Proposed Answers
4.	How much does it cost to deploy solar for my building, if I decide to go for an ownership mode?	The cost of deploying solar varies depending on the size of the solar PV system, the type of panels used as well as the type of application. The overall upfront cost for a rooftop PV system can range from S$1 to S$1.4/Wp depending on the size of the system. Smaller systems are relatively more expensive than larger systems. For example, a 10 kWp residential rooftop PV system can cost around S$1,540/kWp while a 1,000 kWp industrial rooftop PV system can cost around S$940/kWp. The operation and maintenance costs range between 1 to 1.45% of upfront costs (1% for large rooftop systems compared to 1.45% for smaller systems). For more cost information you can refer to the 2020 "Update to the Solar PV Roadmap for Singapore" report, the National Solar Repository website or reach out directly to solar vendors to compare quotes. While the upfront costs of solar can be significant, these costs can be recovered through electricity generated by the solar PV system over its lifespan. The levelised cost of electricity (LCOE) of solar is a well-established method in energy finance and policy to calculate the cost of solar electricity generation by dividing the entire lifecycle cost of a solar PV system by its cumulative solar electricity generation. Based on estimates from the 2020 "Update to the Solar PV Roadmap for Singapore" report, the LCOE for small scale rooftop solar PV ranges from $0.11/kWh - $0.15/kWh. In comparison, the regulated tariff, which reflects the cost of electricity sold by SP Group is $0.25/kWh for 3Q2021. The Solar Energy Research Institute of Singapore (SERIS) also offers a LCOE calculator that provides an indication of the LCOE of a solar PV investment.
5.	Do I need to own the solar PV system that is installed on my building?	Building owners can choose to own the solar PV system, which is more common amongst landed property owners, An alternative is to explore a 'Solar Leasing' agreement with a solar vendor. Depending on the size of the rooftop, solar PV vendors offer the option of a Solar Power Purchase Agreement (PPA), often referred to as a 'Solar Leasing' agreement. Under such an agreement, the solar PV vendor will own and install the solar PV system on the building at no upfront capital costs to the building owner. In return for availing the space for solar PV deployment, the building owner can enjoy a discounted rate off their existing electricity tariff. Under such an agreement, the solar PV vendor will often

		undertake the operating costs and risks for the solar PV system, as well as monetary benefits from the various solar payment schemes (refer to FAQ 7 for more details).
6.	What is the length of a typical solar PPA under a Solar Leasing Agreement?	A typical solar PPA ranges from 20-25 years.
7.	What are the various payment schemes available to solar consumers to sell back excess solar generated electricity?	If the consumer owns a solar PV system and wishes to sell any excess solar electricity to the grid, depending on their contestability status, they may either a. Register with SP Services (SPS) under the Simplified Credit Treatment (SCT) or Enhanced Central Intermediary Scheme (ECIS) by requesting the LEW to submit the relevant applications to SPS b. Directly register with the Energy Market Company as a Market Participant, or c. Appoint another Market Participant (not applicable to residential consumers) For more information you can refer to the various payment schemes (link here) at the EMA website. Consumers with embedded solar photovoltaic generation can opt for an estimated solar generation output instead of installing the relevant metering arrangement ('M1 Meters') at each generation point. The Solar Generation Profile is approved by the Energy Market Authority and is based on factors such as Singapore's historical average solar irradiance from 7am to 7pm. For more information you can refer to the approved solar generation profile (link here) at the EMA website. This does not apply to building owners who choose to have a solar leasing agreement with an appointed solar vendor (refer to FAQ 5 for more details).

8.	Are there any solar payment plans available?	For small residential solar PV systems, some banks have partnered solar PV vendors to reduce the upfront investment required to start using solar power. You may refer to some of the available solar promotions offered by banks. Please note this is not an exhaustive list as other banks may also provide similar green promotions and does not represent Government endorsement of these companies and promotions. UOB – U Solar Programme DBS – DBS Green Renovation Loan OCBC – OCBC Solar Panel Loan
9.	Is there any grant available for solar deployment on buildings?	With technological advances, the cost of solar panels has decreased over time. The cost of solar energy is now generally cheaper than the retail electricity price and regulated tariff. Hence, the Government does not provide grants or subsidies to further incentivize the adoption of solar energy. You may also wish to visit the BuildSG Transformation Fund webpage which lists the various schemes (apart from those related to energy efficiency financing) managed by BCA at https://www1.bca.gov.sg/buildsg/buildsg-transformation-fund to see if there is any other suitable schemes for your project there.
10.	How long is the payback period for a residential solar PV system, if I decide to go with an ownership model?	The average payback period for a residential solar PV system is about 7 years. However, this largely depends on the size of your solar PV system, which part of the day you use the most electricity and how much electricity you use overall. Households who have a large solar PV system and use a lot of electricity, especially in the daytime, can see payback periods of as short as 4 to 5 years.
11.	How long will a solar PV system last?	Solar PV systems are designed to be extremely durable and last for at least 30 years. Most solar panels have a warranty period of 25 to 30 years, and inverters have a warranty period of 5 to 12 years.
12.	How often must maintenance be done on my solar PV system?	Solar panels are made from durable tempered glass built to withstand adverse weather conditions (last around 25 to 30 years) and generally require very little maintenance. Most solar vendors will provide the maintenance service when you sign a solar PPA/lease with them.

13.	How long is the warranty on my solar PV system?	Both your solar panels and inverters have their own warranties. For PV modules there are two types of warranties: (i) a product warranty, which covers defects on the solar panels. For that, the industry standard is 5-10 years, with selected manufactures offering up to 20 years. (ii) a power output warranty, which covers cases where the power output falls below the guaranteed levels. For that, industry standard is 20-25 years, with selected glass-glass module manufacturers even providing 30 years. Within this period, the under-performing solar panels will be replaced, or the owner gets compensated for the associated losses. On the other hand, solar inverters are more complex and hence have shorter warranty periods of 5 to 12 years. However, as solar inverters are easily accessible, they can be swapped out when required.
14.	Is the warranty tied to the solar panel manufacturer or the solar installers? What happens if my solar installer is no longer in operation?	Warranties on your solar panels and inverters are registered with the manufacturers. However, you can rely on your solar installers to contact the manufacturers and settle any replacements covered by the warranties on your behalf. In the rare occasion where your solar installer is no longer in operation, you may have to contact the manufacturer directly.

Solar Installation Process

No.	Questions	Proposed Answers
15.	How long does it take to complete a residential solar PV installation?	Solar PV system installation for a landed property usually takes 1-2 weeks, which is also dependent on weather conditions.
16.	How long does it take to complete a solar PV system for a commercial/industrial building?	For a commercial/industrial building, the solar PV system installation can take several weeks or even months, depending on the size of the system, accessibility and type of roof.
17.	Is my rooftop suitable for solar PV installation?	Most roofs are suitable for solar PV. However, roofs that are overly sloped or complex (e.g. with many build-ups that could cast shade on the PV system or roof with many small patches rather than one single large roof area) would not be the most ideal for solar PV installations. You can refer to FAQ 3 outlining a list of vendors you can reach out to in assessing the suitability of your rooftop for solar PV installation. To get an impression of what types of PV systems are installed in Singapore, you may also check out some of the existing PV installations on the National Solar Repository website: http://www.solar-repository.sg/pv-systems-pictures
18.	Do I need to make any alterations to my roof before installing solar panels?	Typically, no alterations are required. In cases where the roof has a water proofing layer, it might be worthwhile to first re-do the water proofing, so that the system does not need to be removed at a later stage when the periodic water-proofing is due. A site check will usually be conducted by your solar installer prior to your solar panel installation to determine if any preparatory works are required.
19.	I am not sure if I have asbestos on my roof. Will this affect my solar deployment?	If you intend to install solar panels on your existing building that was constructed before 1 Jan 1991, it is required under the Workplace Safety and Health (Asbestos) Regulations by the Ministry of Manpower (MOM) for an asbestos survey to be conducted by a competent person (i.e., asbestos surveyor) to ascertain the presence of asbestos before starting work. Besides the roof sheets, there are other suspected materials that could contain asbestos which include old waterproofing material laid on roof, mastics, roof gutters, etc. If the survey confirm that asbestos is present in the building, such installation works could disturb the asbestos-containing materials and asbestos fibres can be released. You should engage a MOM's Approved Asbestos Removal Contractor (AARC) to remove the asbestos-containing materials before installing the solar panels on the roof.

		All asbestos-removal work shall only be carried out by AARC. Please refer to MOM's website for the list of AARCs that can be engaged for the removal work (https://www.mom.gov.sg/workplace-safety-and-health/wsh-service-providers/find-approved-service-providers/find-asbestos-removal-contractor#/) and the requirements for asbestos survey and removal (https://www.mom.gov.sg/faq/notify-for-asbestos-work). Contractors for solar panel installation should also refer to WSH Guidelines for Working Safely on Roofs available on Workplace Safety and Health Council's website for more information on the measures to take when working on roof. For the subsequent disposal of asbestos waste, companies are required to engage a NEA's approved asbestos disposal contractors that are approved to dispose of asbestos waste at Semakau Landfill. For more information on the disposal of asbestos waste, please refer to the information found on NEA's website at https://www.nea.gov.sg/our-services/pollution-control/hazardous-waste/asbestos-control.
20	Are there any guidelines to minimise glare to my neighbours arising from my solar panel installations?	While solar PVs are generally designed to absorb light, PV surfaces do still reflect some light and they should be installed in a manner that minimises glare to surrounding buildings. i) Orientation. PV surfaces are typically placed to face the east and west directions. ii) Angle of PVs on rooftops. The tilt of the PV panels should not exceed more than 15 degrees form the horizontal plane to reduce the probability of reflected glare. iii) Colour. Darker colour PVs have lower reflectance value and hence glare. iv) Anti-reflective coating. Application of anti-reflective coating on PVs can reduce reflected glare. Please refer to the Daylight Reflectance Design Guide jointly authored by BCA and NUS for more information (https://go.gov.sg/bca-daylight-reflectance-guide).
21	Are solar trackers used in Singapore's solar installations?	The solar installations in Singapore today generally do not use solar trackers. There are several factors to consider when adopting solar trackers, such as the additional energy generated compared to the incremental costs incurred. As Singapore is located near the equator, the variation in the sun path is relatively small, thus the additional energy generated with the adoption of solar trackers may be quite limited as compared to other locations. Nonetheless, the applicability of solar trackers for each solar project would also depend on the specific project site conditions and business case.