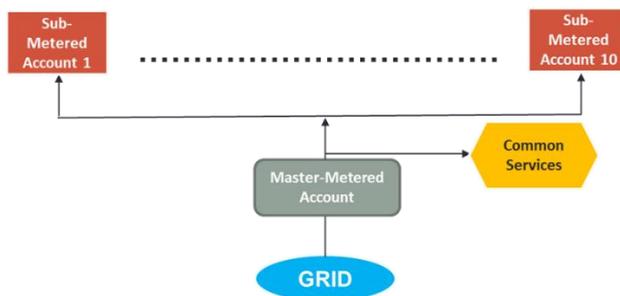


Solar Power – Non-Residential Consumers (Master-Sub Write Up)

Background

- 1 Master-sub scheme is a metering arrangement whereby the common services consumption is a derived figure:
 - Master-meter measures overall electricity consumed by the building (i.e. both the individual units and the common services)
 - Sub-meters measure the usage of subtenant units.
 - Common services consumption is **derived based on the master reading subtracted by the sub-meters reading.**
- 2 The subtenant's account can be non-contestable (NCC) or contestable (CC), but the master account must be NCC. Some example of buildings under the master-sub scheme are condominiums and commercial buildings.



Solar installed on master-sub buildings

- 3 Currently, buildings under master-sub scheme can only install solar PV system on a case-by-case basis due to the existing SP's IT system design for this scheme:
 - Any export of electricity would result in the lowering of the master readings, and therefore result in inaccurate computation of the common services load.
 - Problem would be further exacerbated if there is high level of solar injection, potentially result in negative consumption of the common services load.
 - The contestability status of the subtenants would lead to further complication as consumption of NCC accounts are estimated on alternate months [based on previous months' actual reading].
- 4 As such, solar PV system can only be installed if the buildings meet the following criteria:
 - The **amount of solar generated must not exceed the consumer's consumption¹ at any point in time**, as the current IT system is unable to register any export, and SP will also not make any payments. Solar owner will need to have a PPA with either the master or the subtenants (depending who consumes the solar) if they wish to receive any payment.
 - **SP will also not be changing the master meter to a bi-directional meter.**

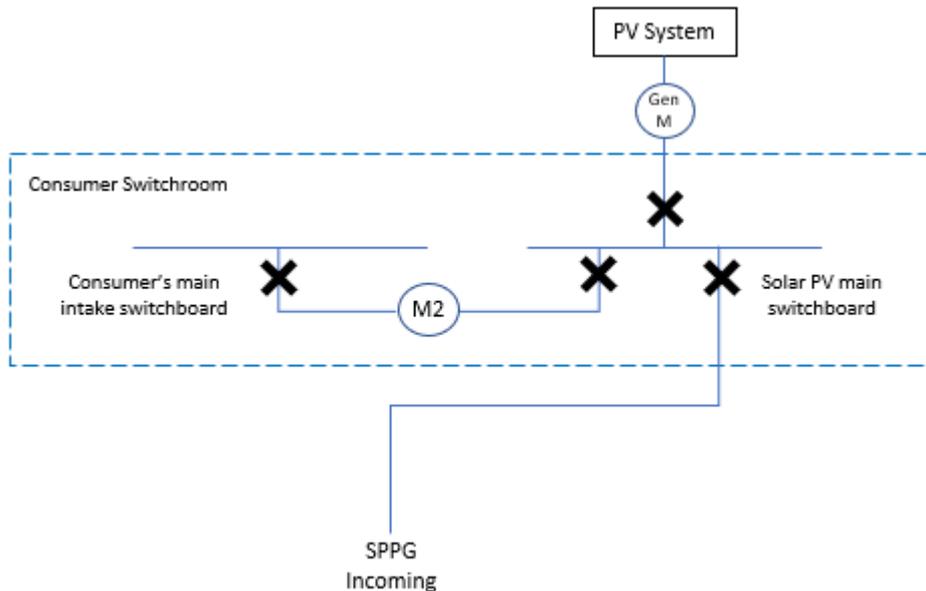
¹ If the subtenant installs solar PV system, the solar generation cannot exceed the subtenant's consumption. If the master installs solar PV system, the solar generation cannot exceed their common services' load.

Alternative solutions to sell-back solar energy

- 5 While EMA and SP are working to allow master-sub buildings to sell-back excess solar generation back to the grid, this can only be implemented in the longer horizon due to the time needed to review and make IT system changes.
- 6 As such, there are potentially two solutions:
 - a) **Connect the solar PV system directly to the SPPG substation:** For this set up, the PV will be connected directly to the grid and be treated as a separate installation from the building. As there may be constraints in the network, there could be a limit to the amount of solar PV system that the network can support. Hence, solar owners are advised to consult SP before making their investment decisions.
 - b) **Connect the solar PV's main switchboard to consumer's main switchboard before connecting to the grid.** For this to be implementable, the solar owner will need to seek permission / agreement from the building owner to install the solar PV's main switchboard in the building's consumer switch room (if there is sufficient space). This is a new solution and details can be found in Annex 1.

Annex 1

Terms and Conditions for Solar PV installations direct connection to grid in existing building electrical installation taking LT supply from SPPG



1. The premise owner remains accountable for the premise's electrical installation (including Solar PV main switchboard and any new solar PV installations in the premises) under the EI licence issued by EMA. The connection agreement between SP and the premise owner will need to be amended to reflect the additional responsibility of the new solar PV installation in the connection agreement.
2. It is building LEW's responsibility to take charge all electrical equipment and accessories in the switchroom including PV switchboard etc, and the owner of the solar PV installation will need to:
 - a. Enter into an agreement with the premise owner given that the Solar PV main switchboard will be installed in the premise owner's switch room and the according space will be utilised for any associated metering equipment as well as the protection devices.
 - b. Install the generation meter at the Solar PV main switchboard and for the meter to comply with technical specifications as specified under the Metering Code.
3. The premise owner and building LEW shall ensure the following safety requirements are adhered to:
 - a. Limit the total PV capacity by the incoming service cable to the Solar PV main switchboard.
The sum of the current for the Solar PV and incoming to consumer's main intake switchboard shall not exceed the current carrying capacity of the cable for which the Solar PV is connected to.
 - b. Ensure both the consumer's main intake switchboard and the Solar PV main switchboard are located inside the same main LT switch room as shown in the above diagram.
 - c. Provide electrical inter-tripping and anti-islanding between consumer's main intake switchboard and Solar PV main switchboard to ensure that the PV system(s) will cease to energise in the event that there is a loss of permanent grid supply to the consumer's main intake switchboard. Ensure clear boundary

and segregation of connections between the building electrical and the solar PV installation(s). The cable from the solar PV system should be housed in a separate trunking to segregate connection between building and the solar PV installation.

- d. The building electrical installation and solar PV installation(s) must have a common earth as per SS638's (Formerly CP5) requirements for LV installations. The earthing for both building electrical installation and PV electrical installation are required to be bonded together if they have erected their own earthing systems.
 - e. Clear labelling / marking must be displayed on consumer's main intake switchboard and Solar PV main switchboard to demarcate PV and LT connection.
This is consistent with current PV submissions where clear labelling/markings must be displayed at both main intake switchboard and Solar PV main switchboard.
 - f. Building's LEW to ensure safety procedures/SOP in place to address the operation of the dual supply intakes and the normal and abnormal operating conditions (i.e. emergency) Ensure the PV installation(s) shall have anti-islanding features to ensure that the PV installation(s) will cease to energise in the event that there is a loss of grid supply and continue to remain de-energised until permanent grid supply is normalised.
 - g. LEW to ensure the supply generated by PV to be connected at the Solar PV main switchboard directly to grid without bypassing the main incoming SPPG meter. This is to ensure that the customer load supply is taken from grid source only. There shall be no connection of any non-approved on-site loads at the Solar PV main switchboard. To avoid such scenarios, the building LEW and PV LEW shall make the following declaration during CS 1 submission.
 - h. LEW to ensure that there is no unauthorised use of energy at Solar PV main switchboard i.e. illegal tapping of supply at PV board.
4. If the load account is closed, the PV installation(s) will need to be deenergized and the generation account(s) would need to be closed. The premise owner or building LEW shall inform EMC on the deregistration of the PV Installation(s). For decommissioning of PV installations only, the LEW is required to submit CS1 application to replace the switchboard so as to regularise the setup.