

# Buildings with Net Metering and PV Solar or Wind On-Site Generation - Best Practices

## Description

On-site generation can be via PV solar arrays, wind, or other renewables such as biofuels or even hydro. This document refers only to “PV” but the guidance applies equally to other forms of on-site generation. Select which PV scenario is applicable. The Tracking and Cost Avoidance Process is listed generically and then broken down by scenario to better explain our recommended practices. The final step for each scenario is the same and will only be referenced in the scenario steps. A full explanation of the final step is listed in detail below. A list of Definitions can be found at the bottom of the page, if needed.

## Overview of Tracking Process

1. In EnergyCAP, create the accounts and meters, and then select the appropriate bill entry templates.
2. If cost avoidance reporting is used, perform Special Adjustment configuration tasks. These must be updated annually for each NEM meter. See concluding section below for details.
3. Receive monthly bills for the Supplier, Local Distribution Company (LDC), and the Power Purchase Agreement (PPA), and enter to EnergyCAP. (In addition, for some scenarios, until such time as submetering and interval data acquisition directly into EnergyCAP are available (est 4Q15, additional fees will apply), it may be necessary to access a PV submeter data website that contains PV production data and run a report /download of KWH in the same date range as the LDC bill. Eventually the entire end-to-end submeter data acquisition process will be automated.)
4. Proceed with normal monthly reporting tasks (if cost avoidance reporting applies, run the Calculate Savings processor first).

## A Note on Bill Entry Template NAMING CONVENTIONS

For newer templates, the following conventions are used and recommended:

{Distribution}\_{Units of Measure}\_{Template Version}\_{Demand (Y/N)}\_{Rate/Time of Use}\_{Sequence#}

EXAMPLE: FD\_KWH\_A\_Y\_T1\_05

(Full Service Distribution - unit is kilowatt hours - template version is A - includes demand - Rate designation is T1 - Fifth template of this type created)

## Determine which of the four PV scenarios applies to each building.

**Scenario #1:** Net metering by the LDC, without deregulated electric generation Supplier, owned system (no PPA).

**Scenario #2:** Net metering by the LDC, with deregulated electric generation Supplier, owned system (no PPA).

**Scenario #3:** Net metering by the LDC, with deregulated electric generation Supplier, PPA (non-owned system)

**Scenario #4:** Net metering by the LDC, without deregulated electric generation Supplier, PPA (non-owned system)

## Steps by Scenario

**Scenario 1:** Net metering by the LDC, without deregulated electric generation Supplier, owned system (no PPA)

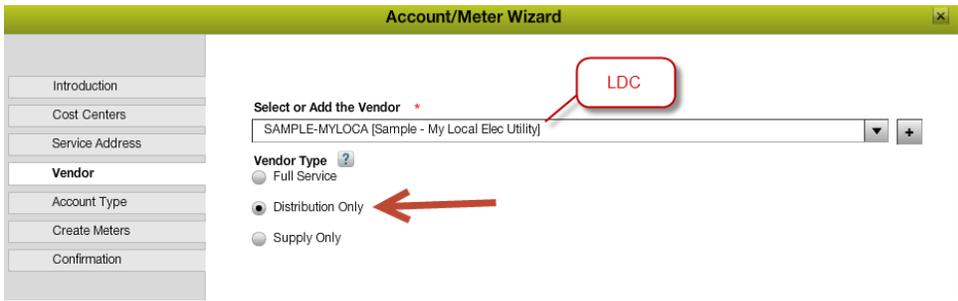
1. Set up one account to represent the monthly LDC bill. The account is ‘full service’ and the vendor is the LDC. Set up one meter to represent the LDC’s NEM meter.

The screenshot shows the 'Account/Meter Wizard' interface. On the left is a navigation menu with options: Introduction, Cost Centers, Service Address, Vendor (selected), Account Type, Create Meters, and Confirmation. The main area is titled 'Select or Add the Vendor \*' and contains a text input field with the value 'SAMPLE-MYLOCA [Sample - My Local Elec Utility]'. A red callout box points to this field with the label 'LDC'. Below the input field, the 'Vendor Type' is set to 'Full Service' (indicated by a selected radio button), with other options being 'Distribution Only' and 'Supply Only'.

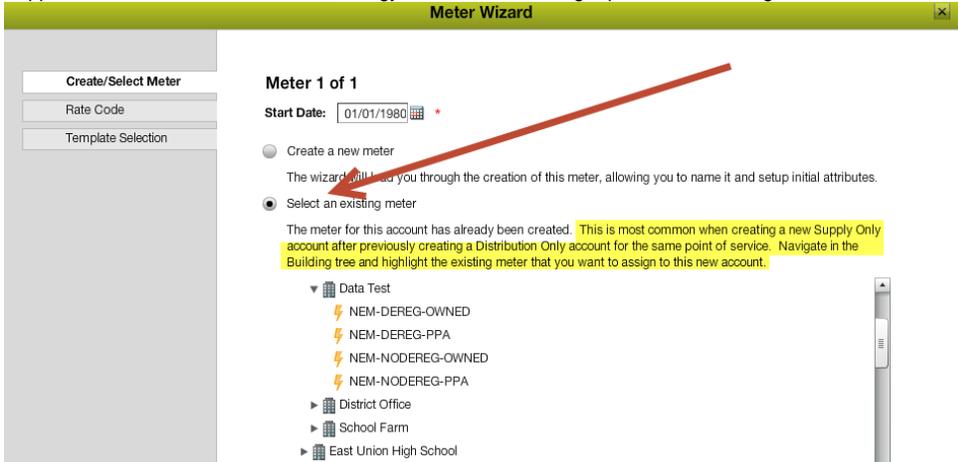
2. Use template FD\_KWH\_A\_Y\_T1\_05, selected from the template library.
3. Complete the Configuration Tasks for Cost Avoidance, if needed ([steps listed below](#))

**Scenario 2:** Net metering by the LDC, with deregulated electric generation Supplier, owned system (no PPA)

1. Set up an account to represent the monthly LDC bill. The first account is ‘distribution only’ and the vendor is the LDC. Set up one meter to represent the LDC’s NEM meter.



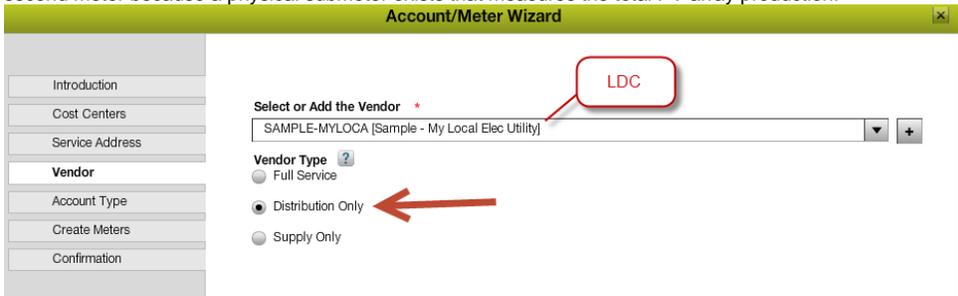
- Use template FD\_KWH\_A\_Y\_T1\_06, selected from the template library.
- Next, set up a second account to represent the monthly dereg Supplier bill. The account is 'Supply only' and the vendor is the Supplier. Do NOT set up a second meter. The Supplier uses the LDC's meter for billing purposes, so attach the LDC meter to the Supplier account. By entering Supplier bills on this second account, EnergyCAP cost accounting reports for this dereg vendor will be accurate.



- Use template S\_KWH\_A\_N\_T1\_01, selected from the template library. This template allows you to track the Supplier bills separately so that reports correctly show the amounts paid to the Supplier. Note that the Electric Supply Usage line item on the template is orange in color. This indicates that the Supplier KWH is tracked as "info only" because it is the same NEM KWH that appears on the LDC bill. By treating it as info only it is not double-counted on usage reports. (You can select a simpler version of this template, S\_KWH\_S\_N\_T1\_01, if you don't want or need the line items for Misc, Adjustments, Taxes and Late Fee.)
- Complete the Configuration Tasks and Cost Avoidance, if needed (steps listed below)

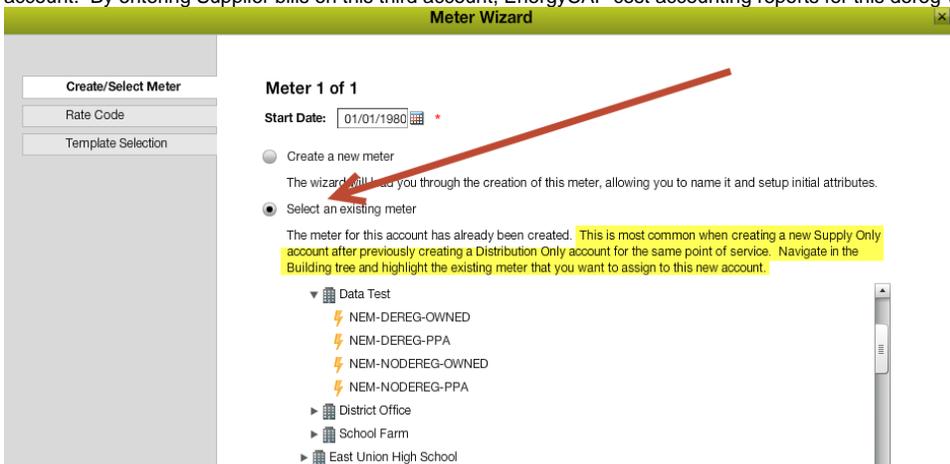
**Scenario 3:** Net metering by the LDC, with deregulated electric generation Supplier, PPA (non-owned system)

- Set up an account to represent the monthly LDC bill. The first account is 'distribution only' and the vendor is the LDC. Set up one meter to represent the LDC's NEM meter.
- Use template FD\_KWH\_A\_Y\_T1\_07, selected from the template library.
- Next, set up a second account to represent the monthly PPA bill. The account is 'Supply only' and the vendor is the PPA vendor. Set up a second meter because a physical submeter exists that measures the total PV array production.



- Use template S\_KWH\_A\_N\_T1\_01, selected from the template library. This template allows you to track the PPA bills separately so that reports correctly show the amounts paid to the PPA. Note that the Electric Supply Usage line item on the template is orange in color. This indicates that the PPA KWH is tracked as "info only" on the PPA bills because it is the same PPA KWH that you will enter on the LDC bill (the second line item on the template shown above). By treating it as info only it is not double-counted on usage reports. (You can select a simpler version of this template, S\_KWH\_S\_N\_T1\_01, if you don't want or need the line items for Misc, Adjustments, Taxes and Late Fee.)

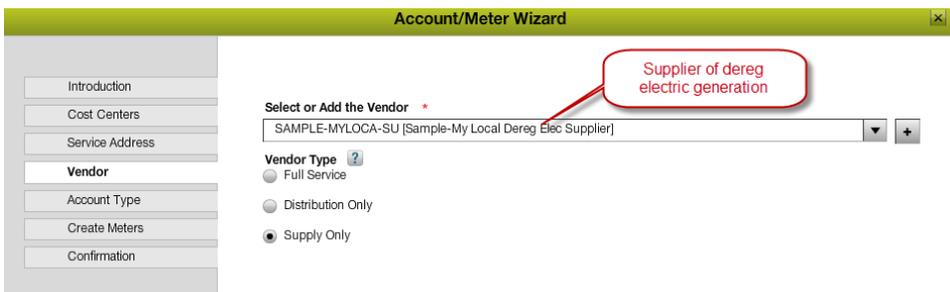
- Next, set up a third account to represent the monthly dereg Supplier bill. The account is 'Supply only' and the vendor is the Supplier. Do NOT set up a third meter. The Supplier uses the LDC's meter for billing purposes, so attach the LDC meter (not the PPA meter) to the Supplier account. By entering Supplier bills on this third account, EnergyCAP cost accounting reports for this dereg vendor will be accurate.



- Use template S\_KWH\_A\_N\_T1\_01, selected from the template library. This template allows you to track the Supplier bills separately so that reports correctly show the amounts paid to the Supplier. Note that the Electric Supply Usage line item on the template is orange in color. This indicates that the Supplier KWH is tracked as "info only" because it is the same NEM KWH that appears on the LDC bill. By treating it as info only it is not double-counted on usage reports. (You can select a simpler version of this template, S\_KWH\_S\_N\_T1\_01, if you don't want or need the line items for Misc, Adjustments, Taxes and Late Fee.)
- Complete the Configuration Tasks for Cost Avoidance, if needed ([steps listed below](#))

**Scenario 4:** Net metering by the LDC, without deregulated electric generation Supplier, PPA (non-owned system)

- Set up one account to represent the monthly LDC bill. The account is 'full service' and the vendor is the LDC. Set up one meter to represent the LDC's NEM meter.
- Use template FD\_KWH\_A\_Y\_T1\_08, selected from the template library.
- Next, set up a second account to represent the monthly PPA bill. The account is 'Supply only' and the vendor is the PPA vendor. Set up a second meter because a physical submeter exists that measures the total PV array production.



- Use template S\_KWH\_A\_N\_T1\_01, selected from the template library. This template allows you to track the PPA bills separately so that reports correctly show the amounts paid to the PPA. Note that the Electric Supply Usage line item on the template is orange in color. This indicates that the PPA KWH is tracked as "info only" on the PPA bills because it is the same PPA KWH that you will enter on the LDC bill (the second line item on the template shown above). By treating it as info only it is not double-counted on usage reports. (You can select a simpler version of this template, S\_KWH\_S\_N\_T1\_01, if you don't want or need the line items for Misc, Adjustments, Taxes and Late Fee.)
- Complete the Configuration Tasks for Cost Avoidance, if needed ([steps listed below](#))

## Configuration Tasks for Cost Avoidance (if Used)

\*Special configuration of cost avoidance is required for NEM and PV

The most important principle of on-site generation is that KWH reductions in the building due to energy management are always valued at the LDC prevailing unit cost. Some people may say that the value of saved KWH is zero because PV electricity is "free," particularly when the system is owned and the cost is considered a sunk cost, but this is not an accurate representation of actual out-of-pocket costs of the building owner.

- The PV system typically cannot be "throttled." That means that 100% of the PV output, as measured by the PV total production submeters, either goes to the building or is "excess" production fed back into the grid.
- PV KWH is always used first. In other words, building loads are met first by PV and second by LDC grid power. You can think of this as the grid supplying the constantly varying demand of the building while the PV provides the base load.
- Accordingly, when a KWH is conserved due to energy management, that KWH reduction is a grid KWH, not a PV KWH. Therefore, since it saved a grid KWH, it should be valued at the prevailing grid unit cost.
- But what about those times of the year and day when PV meets the *entire* building load, such as a sunny Sunday in August when the building is unoccupied? KWH reductions at this time don't reduce grid KWH because none are being consumed. A KWH reduction saves a PV KWH, which means that KWH is fed back to the grid. As discussed in the page 1 definition of NEM, it is "banked" by the LDC and will be withdrawn and used later. When it is withdrawn, perhaps the next day when the building is occupied and it's raining, it replaces the need to buy a new KWH from the grid, so once again its value is the same as the grid's prevailing unit cost.

So the next question is: What is the grid's prevailing KWH average unit cost (AUC)? In non-NEM situations EnergyCAP calculates AUC each month from the LDC bill (plus Supplier bill, if applicable) by dividing total cost by total KWH consumed. This doesn't work with NEM because:

- The average unit cost can't be calculated in a month when the net KWH is negative. This is uncommon but can occur in a summer month when the building has low occupancy.
- Many NEM tariffs provide for an *annual*/true-up. This means that you need an entire year cycle of bills to be able to correctly calculate an AUC.
- It is typical for an LDC bill to have a high KW demand charge because at some point during the month building load was high while PV production was low. It only takes one "bad" 15-minute period out of the 3,000 quarter hours in a month to set a high billed demand. It is very possible for a high demand charge in an otherwise low NEM month to drive the calculated AUC to \$0.50, \$1.00 or even more.

Therefore, AUC can't be reliably calculated on the fly each month. The recommended approach is:

- Use a "proxy" non-NEM building. Using 12 recent months of LDC bills from one or more similar buildings, calculate the annual AUC. This should be agreed upon by all parties and updated annually. This will be used in a special adjustment as described below.
- Alternately, you can contact the LDC and ask what they consider the AUC for this class of service to be. Utility companies frequently are called upon to publish average KWH cost per rate class, so it is likely the information will be readily available, perhaps shown on their website. When using this approach, be sure to add any applicable "non-tariff" charges. The LDC will publish their average tariff costs, but these usually do not include sales tax or state-mandated surcharges

Now that an AUC has been established as the value of avoided KWH usage, the next step is to enter this into EnergyCAP.

1. This must be entered as a special adjustment for every NEM meter.
2. In Buildings & Meters, highlight the meter, then click the Savings tab at top center, then Adjustments, then Add Special Adjustments.
3. Set the Adjustment Category as "Incremental Unit Price".
4. Set the frequency and dates. We recommend that new adjustments be added each year, so set the start and end dates for this adjustment to a one-year period. (It does not have to be a calendar year, it can be any 12-month cycle.) Next year, be *sure* to create a new set of adjustments that start on 1/1/2016; otherwise, cost avoidance will not calculate correctly in 2016. Another note – do not simply edit this adjustment in 2016 by updating the AUC value. If you do so, you will be overwriting the 2015 rate, so if you ever re-process the data in Calculate Savings, cost avoidance will not be correct.
5. Set the adjustment method and the agreed-upon prevailing AUC.

6. You can see the annual adjustment factor for each meter.

Sequence	Start Date	End Date	Occurrence	Cycle Start	Cycle End	Method	Amount	Type	Description
1	01/01/2016	12/31/2016	Continuo...			Cost Avoidance = Avoided use time...	0.15	Incremental Unit Pri...	Set annual AUC

7. Experienced (and authorized) users can simplify the process by using the Setup Manager Import tool. You can create the adjustments in Excel and upload them quickly. The big advantage of this method is that it makes annual updating a snap! Just update the spreadsheet from the prior year (update start/end dates and AUC value) and re-import.
8. If you set up PPA meters in Step #2 (scenario #3 or #4), *turn off* cost avoidance calculations for these meters because the total building cost avoidance is included in the LDC meter. Uncheck the "Include in Cost Avoidance" box.

## Definitions

- LDC – "Local Distribution Company." This is your electric utility company – the grid -- to which your building is connected. SCE, PG&E, APS, SDG&E, FPL, JCP&L, etc.
- Supplier – If and only if you have taken advantage of a deregulated electricity "customer choice" program, the Supplier is the third party to whom you pay for the generation of the electricity delivered to you by the LDC across the grid. The Supplier typically receives the KWH consumption data directly from the LDC; there is no separate Supplier meter. The Supplier normally invoices you using the same start/end meter reads as the LDC.
- PPA – "Power Purchase Agreement." Typically there are two PV ownership scenarios – either you own the system (you have financed it in some way) or you have entered into a long-term agreement with a vendor whereby the vendor has installed the PV at its cost and you have agreed to purchase 100% of the PV output at a stipulated (i.e. pre-determined) cost per KWH. Under a PPA, the invoice from the PPA is essentially a Supplier (see Supplier topic above) bill.
- NEM – "Net Energy Metering." Excess KWH from the PV, when not needed by the building load, feeds "backwards" into the grid. In essence, the grid serves as a KWH "bank." Excess KWH can be banked for free and withdrawn upon demand. The monthly LDC invoice shows the net KWH that passed from grid to building load, which is equal to the total KWH supplied from the grid less the total KWH fed back into the grid from excess PV production. (It is possible for the monthly net to be less than zero, a situation that should be avoided via proper sizing of the PV output.)