Guidance for Private Electric Storage Used as Backup Power for Net Metered Customers

Present Configurations[1]

The following discusses Net Metering and Standby Power Systems. Public Service must comply with the requirements of the State of Colorado and the Colorado Public Utilities Commission ("CPUC"). These requirements result in the services and programs that the Company can offer clarified below. This discussion is intended to help customers understand what storage plus net metering configurations may be approved today under the present requirements for standby power and private electric storage.[2]

The Public Service Net Metering tariff (or Schedule NM), as approved by the CPUC, allows for "a renewable energy resource as defined in §40-2-124(1)(a)(IV), C.R.S. that is located on the premise of an end-use electric consumer located within the Company's service territory and is interconnected on the end-use electric consumer's side of the Company's meter" to supply the customer's load at the same time that the customer's load can be supplied by the utility.[3] This architecture is called: "Operating in Parallel"

§40-2-124(1)(a)(VII), C.R.S. defines "Renewable Energy Resources" as follows: solar, wind, geothermal, biomass, new hydroelectricity with a nameplate rating of thirty megawatts or less, and hydroelectricity in existence on January 1, 2005. Fossil and nuclear fuels and their derivatives are not eligible energy resources.

Currently, electric storage is not expressly defined as a "Renewable Energy Resource", and therefore cannot "operate in parallel" with the Company's system. However, customers are allowed to use private electric storage under the "protected load panel" arrangement. This is possible using a private electric storage architecture that supplies an inverter, which can be used as the backup source to a "protected load panel". The storage device may be charged from the main electric panel but the storage device's charging equipment must not allow any storage device power to be sent back to the main panel (i.e. cannot "operate in parallel").

Under the Net Metering architecture, if the customer's behind the meter self-generation (of Renewable Energy Resources) does not exceed 120% of the customer's average annual electric consumption by the customer's load, then excess energy from the customer's self-generation is allowed to flow into the utility's system when that excess energy is generated. The customer, however, is billed the net sum of the customer's load minus that portion of the customer's load that is supplied by the customer's behind the meter qualifying self-generation. When the customer's self-generation exceeds the customer's load, the net meter will run "backwards" and thus record this as negative customer usage, which is applied as a credit to the customer's future bills.

[1] Non-inclusive of terms reached in the Non-Unanimous Comprehensive Settlement Agreement (Proceeding Nos. 16AL-0048, 16A-0055E, 16A-0139E).

[2] Provided the Settlement Agreement presented to the Commission in footnote 1 is approved, this guidance will change as early as January 1, 2016.

[3] Schedule NM, Sheet No. 92, Definitions.

Customers are allowed to have backup power provided by a source that is not a Renewable Energy Resource to support selected loads if what is called “a protected load panel” is used. This panel is also known as a “backup power panel” or a “standby power panel”. This panel is supplied (receives power) by the main electric panel when the customer’s power is supplied by the utility. When utility power is absent – e.g. due to a weather-related power interruption – the protected load panel has a transfer switch that disconnects the panel from the main electric panel and then connects it to the backup source. This transfer is called an “open transition.” When the utility power source is restored, the protected panel is transferred back to the main electric panel supply. The National Electric Code (NEC), Article 702, Optional Standby Systems, governs the requirements and equipment needed for the protected load panel and transfer switch.

A private storage charger can only convert AC power to DC for charging the storage device. A multi-function inverter that can function as both a storage charger and an inverter to AC for the “protected load panel” is permitted, so long as the inverter cannot send battery power back to the main panel (i.e. cannot “operate in parallel”).

The Retail Distributed Generation that is frequently used with the NM tariff is a photovoltaic array. If the photovoltaic array is operated under Public Service’s NM or PV tariff, each tariff requires a Production Meter be installed on the photovoltaic inverter’s AC output to measure the renewable power generated by the PV array. Under these tariffs, no customer loads may be connected between the PV array’s inverter and the Production Meter. Only minor loads integral to the operation of the inverter may be connected on the inverter side of the Production Meter. If a storage device is installed, the storage device charger must be connected to the electric service on the main electric panel’s side of the Production Meter. This arrangement is to ensure that Solar*Rewards rebates are only paid for the customer’s on-site production per the PV tariff and that the renewable generation net of the energy supplied by Public Service, is measured consistent with Public Service’s NM tariff. See Attachments 10.1C and 10.1D.

Interest has been expressed in using the PV array’s DC side to charge the backup power batteries. This diverts some of the generated renewable power so it does not register on the Production Meter. If a customer takes service under Schedule NM with Renewable Energy Resources, this diversion is not allowed per the tariff as explained above.

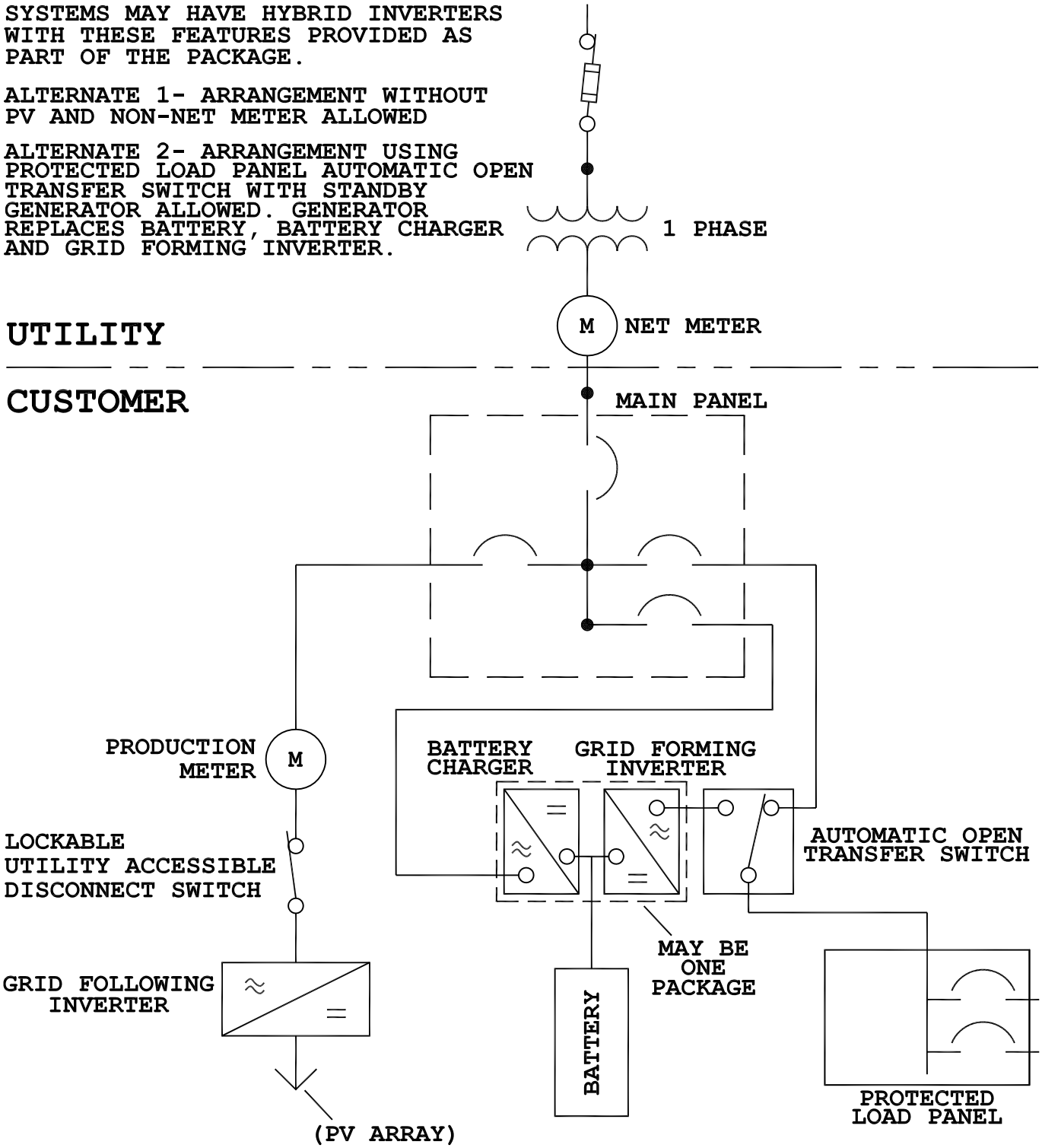
Illustrative diagrams of approved configurations are attached.

ACCEPTABLE CONFIGURATION

FIGURE ILLUSTRATES REQUIRED LOGIC & INTERLOCKS. PACKAGED SYSTEMS MAY HAVE HYBRID INVERTERS WITH THESE FEATURES PROVIDED AS PART OF THE PACKAGE.

ALTERNATE 1- ARRANGEMENT WITHOUT PV AND NON-NET METER ALLOWED

ALTERNATE 2- ARRANGEMENT USING PROTECTED LOAD PANEL AUTOMATIC OPEN TRANSFER SWITCH WITH STANDBY GENERATOR ALLOWED. GENERATOR REPLACES BATTERY, BATTERY CHARGER AND GRID FORMING INVERTER.



AC INVERTER DC

NOTE: NOT ALL NEC OR CUSTOMER EQUIPMENT SHOWN

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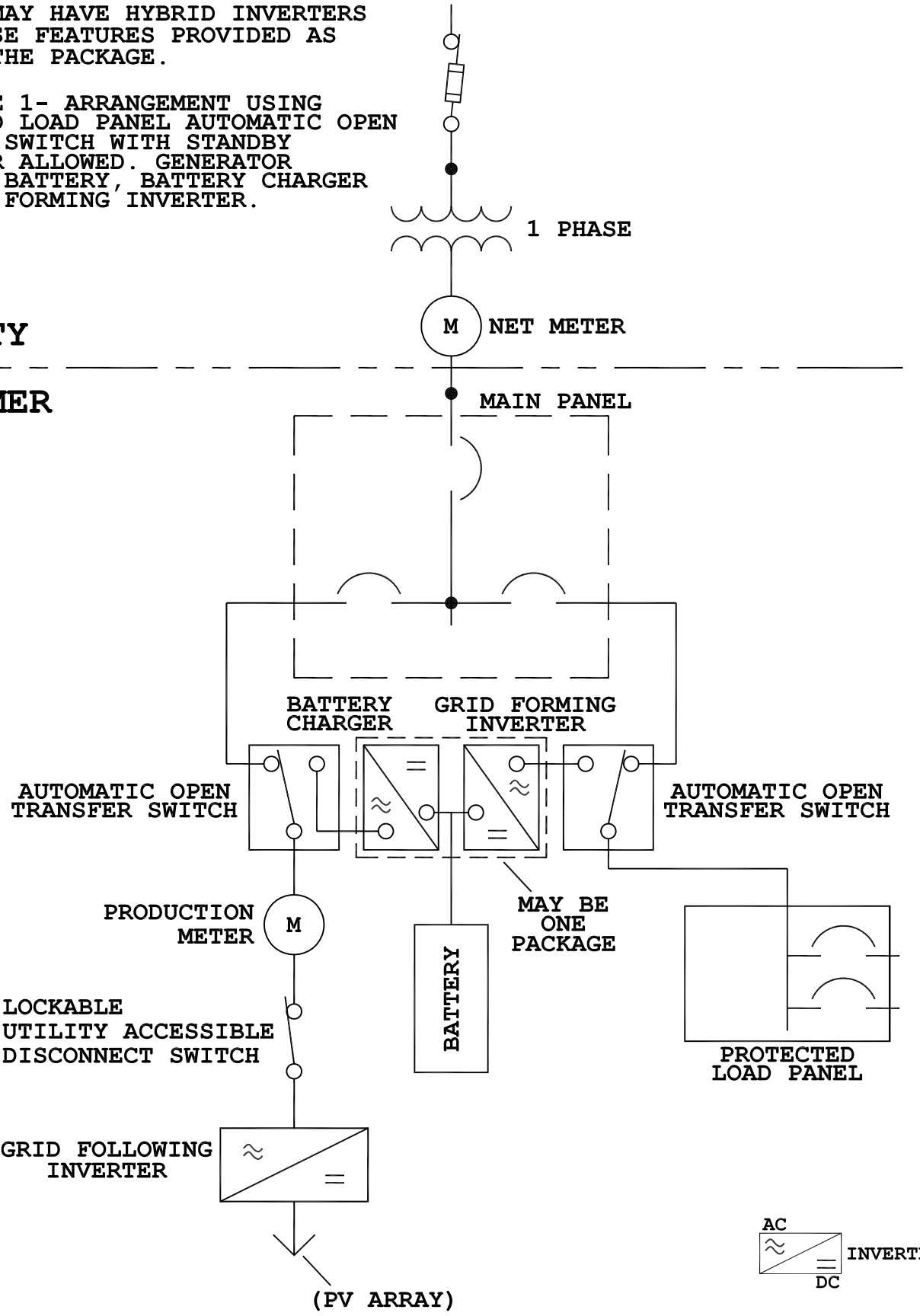
Xcel Energy℠	RESIDENTIAL STANDBY POWER SUPPLY ARRANGEMENT ELECTRIC STORAGE CHARGED FROM MAIN PANEL	FIGURE NO. 10.1C

ACCEPTABLE CONFIGURATION

FIGURE ILLUSTRATES REQUIRED LOGIC & INTERLOCKS. PACKAGED SYSTEMS MAY HAVE HYBRID INVERTERS WITH THESE FEATURES PROVIDED AS PART OF THE PACKAGE.

ALTERNATE 1- ARRANGEMENT USING PROTECTED LOAD PANEL AUTOMATIC OPEN TRANSFER SWITCH WITH STANDBY GENERATOR ALLOWED. GENERATOR REPLACES BATTERY, BATTERY CHARGER AND GRID FORMING INVERTER.



NOTE: NOT ALL NEC OR CUSTOMER EQUIPMENT SHOWN

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Xcel Energy℠	RESIDENTIAL STANDBY POWER SUPPLY ARRANGEMENT ELECTRIC STORAGE CHARGED FROM PV	FIGURE NO. 10.1D