

October 6, 2015

Subject: Requirements to Interconnect Distributed Energy Resources

Thank you for your interest in interconnecting a distributed energy resource (DER) to Rocky Mountain Power's distribution system. As consumer interest continues to grow and in an effort to ensure customer satisfaction, we are writing to remind you of the technical requirements for interconnecting to our system.

If you wish to interconnect a DER system to a Rocky Mountain Power distribution network, you must ensure your project does not compromise the safety, reliability and operability of the electric grid and does not place other customers' equipment at risk. This may increase project costs beyond your original scope and expectations, but these are important steps to ensure your usage of the interconnected electric system doesn't negatively impact other customers served.

A few of the technical requirements for interconnection of DER to the electric grid are:

- Your generation system must be effectively grounded. Most utility distribution systems in North America, including most of our utility distribution lines, are multi-grounded systems. This means there is a separation of your grounding system and our grounding system in the event of faults on either utility or customer generation equipment. Effectively grounded generation sources are required on multi-grounded systems in order to prevent dangerous over voltages during short circuit events, which serves to protect both customer and utility equipment.
- You will be required to provide an "anti-islanding" scheme. Islanding is a condition in which a portion of Rocky Mountain Power's system can stay energized and operate by itself even when our sources are de-energized. If warranted, you will be required to pay for protection against islanding.
- Your DER facility must include a UL listed AC disconnect switch that provides a visible break, is lockable in the open position, and is located between the production meter and the sub-panel or other connection to the generating facility. Your disconnect switch must be accessible to Rocky Mountain Power personnel at any time of the day. Specific requirements may vary by state and system size.
- The protection system at your generation site must meet the latest IEEE 1547 standard. For non-net-metered generation, it must also meet PacifiCorp's Policy 138, found at rockymountainpower.net/policy138. If your protection system does not meet the necessary standards, you will be responsible for purchasing and installing additional protection equipment.

A full scope of the interconnection requirements for your installation will be sent to you after your interconnection request is received. Please provide your application to Rocky Mountain Power prior to any installation activity to ensure inclusion of the full scope of requirements in your detailed designs.

Thank you for your attention to these technical requirements necessary to maintain the safety and reliability of the distribution system. For more information, please visit **rockymountainpower.net/netmetering**.

Sincerely,

A handwritten signature in black ink, appearing to read "Erik Anderson", with a long, sweeping underline.

Erik Anderson
Net Metering Manager

Frequently Asked Questions:

Effective Grounding for Distributed Energy Resources

What is effective grounding?

Effective grounding is defined by the National Electrical Safety Code (NESC) as “Bonded to an effectively grounded neutral conductor or to a grounding system designed to minimize hazard to personnel and having resistances to ground low enough to permit prompt operation of circuit protective devices.”

This method of grounding ensures the safe, reliable and effective operation of Rocky Mountain Power’s electric system.

Why does Rocky Mountain Power require effective grounding from distributed energy resources (DER) customers?

Rocky Mountain Power is committed to operating its electric grid in a safe and reliable manner. Ungrounded systems are susceptible to elevated voltage levels, especially during phase-to-ground short circuit events, which can lead to equipment failure and prevent the safe and reliable operation of the system.

Rocky Mountain Power’s distribution system is effectively grounded, as is the majority of the systems across North America. During fault conditions, an effectively grounded system in addition to neutral overcurrent protection helps prevent overvoltage issues by maintaining voltage levels within acceptable levels as published by the American National Standards Institute (ANSI). This method ensures that generators, consumers and company equipment are protected from impacts caused due to short circuit events. Other methods can also ensure coordination between the system’s protective equipment and the generator’s equipment however they are generally more expensive alternatives for the customer. As a result, Rocky Mountain Power suggests effective grounding measures as the lower cost option to ensure proper system coordination.

Does Rocky Mountain Power have a policy that defines the “effective grounding” requirements?

Rocky Mountain Power requires interconnection customers to follow the effective grounding requirements described in the Protection & Control section of its [Distributed Energy Resources Interconnection Policy 138](#). For net-metering customers, the company requires customers to follow requirements outlined in the brochure [“Connecting to Rocky Mountain Power’s electrical system”](#).

What standards are used by Rocky Mountain Power to impose effective grounding requirements?

In addition to company-specific requirements, Rocky Mountain Power follows IEEE 1547, UL 1741, and ANSI C84.1 as well as other national, state and local jurisdiction rules.



Let's turn the answers on.

Frequently Asked Questions:

Effective Grounding for Distributed Energy Resources

Are there any exceptions for Rocky Mountain Power's effective grounding requirement?

With approval from Rocky Mountain Power, effective grounding may not be required when particular criteria are met, which would preclude the possibility of temporary overvoltages. Based on IEEE 1547 guidelines in addition to Rocky Mountain Power's policy, some criteria include:

- The DER is connected on a single-phase distribution transformer, and is connected line-to-neutral,
- The DER is connected using a three-phase, three-wire configuration,
- When the DER peak power on the primary distribution system aggregates to less than 10% of the local system's minimum load (for solar interconnections, minimum *daytime* load), then the load will likely be sufficiently large to limit temporary overvoltages,
- Installation or existence of certain transformer configurations might be exempted based on interconnection study results as determined by Rocky Mountain Power's Protection & Control group.

What amount of generation requires effective grounding?

Although more common on larger generation interconnections, effective grounding can be required even on DER systems less than 25 kilowatts. Individual circuits behind a protective device on a distribution line can have very low minimum loads, thus necessitating effective grounding regardless of the size of the interconnected DER.

Can you give a simple example of how this works when an application is processed?

A simple example is a distribution circuit that has a peak load of 8,000 kVA and a daytime light load of 1,500 kVA. In this case, the limit of distributed solar generation that can be installed without effective grounding is 150 kVA (10% of light load). If 140 kVA of solar generation already exists and a customer applies for 10 kVA of solar generation, that applicant will need to have effectively grounded generation.

How can an applicant or developer possibly know whether or not the light load threshold is going to be exceeded when submitting an application?

The applicant will not be able to determine whether the light load threshold is already exceeded or will be exceeded with a given application. Applications are addressed in a queue (first in, first out). It is conceivable that a 20 kVA application could be approved without effective grounding immediately before a 10 kVA application is reviewed and found to require effective grounding (or other improvements). Rocky Mountain Power uses the queue to ensure fair treatment of all applications.

Will smart inverters eliminate the effective grounding requirement?

Currently UL 1741 and IEEE 1547 are in the process of developing safety and testing procedures for inverters with advanced functionalities (also called "smart inverters") wherein the generators can limit the interactions between the generator and any system short circuit events. As the technology advances, changes to requirements are likely to occur. However, due to the standards (as well as the technology) being in a developmental stage, Rocky Mountain Power is not in a position to comment on effective grounding requirements for smart inverters.

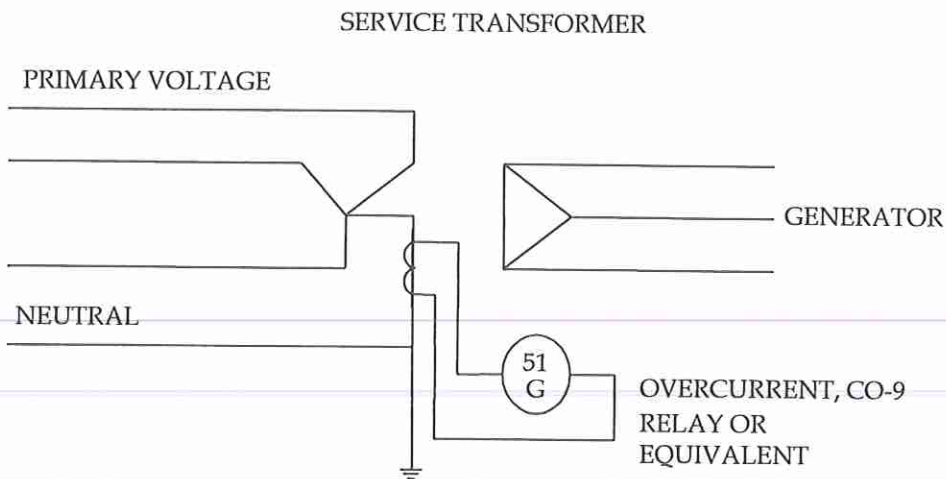


Let's turn the answers on.

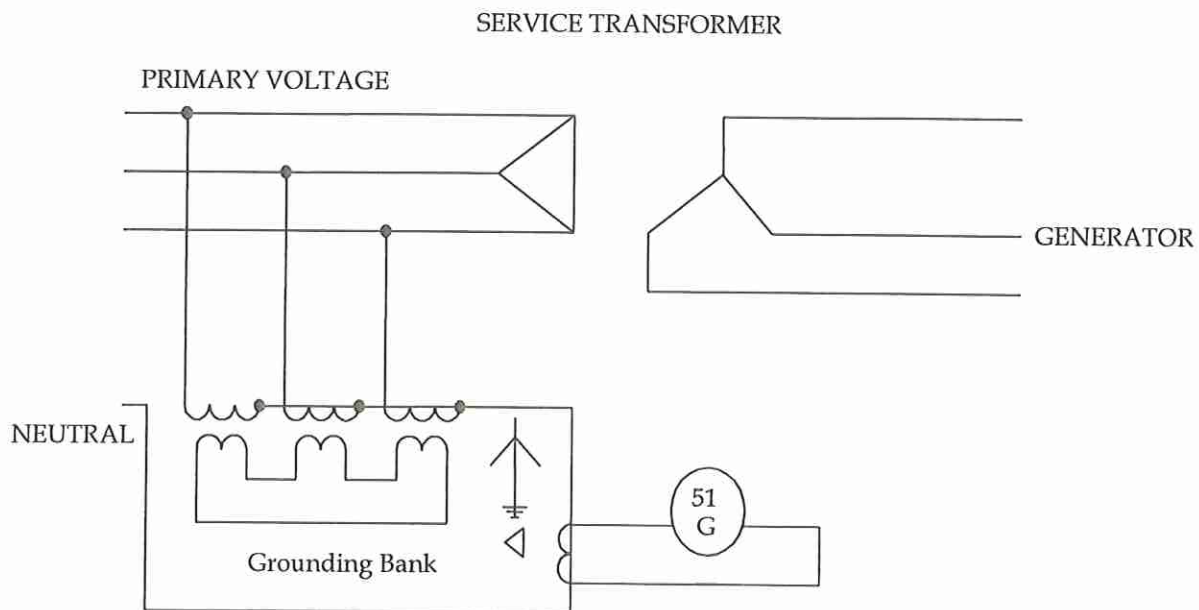
Frequently Asked Questions: Effective Grounding for Distributed Energy Resources

Examples of effectively grounded systems

The system directly below illustrates a distribution system with the service transformer connected wye on the primary voltage side.



The system below illustrates a distribution system with the service transformer connected delta on the primary voltage side.



Let's turn the answers on.

Solar Installer Checklist

1. Ensure that installer is able to conform to Rocky Mountain Power Policy 138, IEEE 1547 and UL 1741.
2. Ensure that customer of installer or installer has completed a Net Metering Application/Agreement, which is available at rockymountainpower.net/netmetering.

If you have any questions, call us toll free at 1-888-221-7070.

3. Have the customer of installer or installer submit an application and application fee, if required for your state. Rocky Mountain Power will review it and let the installer and/or the customer know if there are issues needing further study. The review period typically takes 30 business days.
4. After submitting and receiving a Confirmation of Receipt from Rocky Mountain Power, the installer submits for and obtains the necessary permits from local city, county or municipal jurisdiction where the solar system will be installed.
5. The customer and/or installer will receive approval from Rocky Mountain Power via email.
6. Install the project and have it inspected by the local authorities (city or county electrical inspector or other authority for your area).
7. The installer or customer of the installer submits an approved electrical inspection form from the local authority to Rocky Mountain Power.
8. Rocky Mountain Power will install a net meter within 10 days of receipt of the approved inspection.
9. Start generating electricity!



Rocky Mountain Power

Developer checklist

- Initiate a request by calling Rocky Mountain Power's Builder's Hotline at **1-800-469-3981**. All activities associated with your project will be tracked with the work request number provided. It will be helpful to have a copy of the Electric Service Requirements guidelines. They are available at www.rockymountainpower.net/esr.
- After you have obtained your work request number, you will be contacted within two business days by a Rocky Mountain Power service coordinator. The coordinator will set an appointment with you to meet with the assigned estimator and discuss your project.
- When you meet with estimator, please have the following items; or be prepared to review the process and timing for ensuring delivery of these items to the estimator:
 - Completed customer information sheet (form attached) if a commercial development. **Note:** loads in excess of 1 MW diversified may require a system impact study.
 - Completed street lighting installation/change request form signed by city or county representative (form attached). This form is required if the city/county will be responsible for monthly street light billings.
 - Copy of **approved** plat. (Once approved plat is presented, estimator will "stamp" the plat. The stamp shall indicate the plat contains public utility easements, but does not warrant their precise location).
- Email a copy of the AutoCAD file of your plat map to your assigned estimator. Once your e-mail is forwarded to our mapping department, it will be posted on our mapping system within 10 business days.
- Once the necessary information is received, the estimator will begin the development design process. When your design is completed, you will receive a contract for your signature and for payment of fees. You must submit a signed contract and any required fees within 90 days of the date on the contract or your project may be closed. If it becomes necessary to update, change or redesign your project, you will be responsible for all associated fees.
- Materials are ordered upon receipt of signed contracts and any required payment. Lead times for some materials may be as long as 12 weeks.
- Once material is received you will be contacted by a Rocky Mountain Power representative who will inspect your job site for readiness. The representative will work with you to determine when Rocky Mountain Power crews will commence work. Plat must be recorded with the approved Public Utility Easement (PUE), or a blanket easement recorded for the development prior to scheduling work on your construction site.
- Rocky Mountain Power will begin work on your construction site when it is 100% ready for full construction as designed.

If you have any questions, please contact the estimator assigned to your project.



Let's turn the answers on.

Key points to remember

- City or County may (or may not) require developer to obtain a “will-serve” letter from Rocky Mountain Power. If required, the letter will be provided by the assigned estimator upon developer’s request.
- City or County may (or may not) require “high-level” electric infrastructure conceptual design prior to approving the development plat. In other words, they may not be satisfied that the plat merely identifies a public utility easement space. If “high-level” conceptual design is required prior to city/county plat approval, please work with the assigned estimator to incorporate design into the development plat. **Note: this preliminary conceptual design process is not normal Rocky Mountain Power procedure, and preliminary design costs will be included in the final project costs. A conceptual design on a plat will be stamped:**

Conceptual Design Only

This conceptual design is intended only to communicate preliminary routes for conductor and preliminary physical locations of facilities and equipment for customer review. Design comments or conceptual approval of this design must be returned before final design work will proceed. Construction, including any excavation and/or placement of conduit(s) and vault(s) may not proceed until an agreement has been signed and any advances due have been paid. Further, Construction may not proceed until after meeting with a Rocky Mountain Power inspector. If conduit(s) and vault(s) are placed prior to the above requirements being met, they may not be accepted and, if not accepted, will require reinstallation at customer expense. If no change or comments are needed for this design, please sign below and return to the Rocky Mountain Power estimator; otherwise, please contact the estimator.

Design is only valid for 90 days.

Date Issued: _____

Customer's Conceptual Approval: _____

Title: _____

Customer Approval Date: _____

- Ensure transformer pads and meter locations meet Electric Service Requirements guidelines.
- Install trenches and road crossings that match job design and are at proper depths.
- Ensure conduit is not plugged or broken and does not have too many bends.
- Install schedule 40, gray conduit with pull rope capable of 500-pound test.
- Clearly mark property lines.
- Ensure that conduit sweeps for surface-mounted equipment are at the required distance from back of the curb.
- Install correct elbows on conduit sweeps (see Electric Service Requirements page 33).
- Establish final grade with curb and gutter so that surface-mounted equipment is installed at proper heights and trenches at proper depths.

Rocky Mountain Power Developer Guide

Project process flow

| Step | Who | Activity/Process |
|------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Developer | Developer submits conceptual development to city/county. |
| 2 | City/county | City/county engineer or planner discusses with developer land use requirements, zoning and infrastructure needs. City/county engineer or planner refers developer to utilities to obtain service letter. |
| 3 | RMP | Rocky Mountain Power estimator confirms that power can be provided to the location and mails service letter. Note: if load in excess of 1 MW then a System Impact Study (SIS) may be required. |
| 4 | Developer | Developer initiates request for electricity service by calling Rocky Mountain Power's Builder's Hotline at 1-800-469-3981 to get a work request number. Service must be requested in the name of the entity that Rocky Mountain Power will be working with throughout the project. |
| 5 | RMP | Rocky Mountain Power service coordinator will contact the developer within two business days of the request to set an appointment with a Rocky Mountain Power estimator. |
| 6 | Developer/RMP | Developer provides Rocky Mountain Power estimator with load size, site plans and other information about the development project (a completed customer information sheet). Estimator provides developer with electric service requirements manual. |
| 7 | Developer/RMP | Developer obtains necessary signatures on plat. RMP signs/stamps plat acknowledging existence of utility easements. Note - See example of "stamp" on next page. |
| 8 | City/county | City/county reviews preliminary plat design and approves for planning and zoning commission agendas. |
| 9 | Developer | Developer takes signed plat and preliminary plat design to city/county for planning commission meeting and approval. |
| 10 | City/county | Planning and zoning commission issues ruling with any conditions required. |
| 11 | RMP | RMP estimator creates final electric infrastructure design and final cost estimate for plan as approved. |
| 12 | RMP | RMP issues contract to developer. |
| 13 | Developer | Developer signs and returns the contract to Rocky Mountain Power with required fees. |
| 14 | Developer | Developer provides RMP with recorded plat or blanket easement. |
| 15 | RMP | RMP orders material. Lead time for some material may be as long as 12 weeks. |
| 16 | Developer | Developer installs trenching, conduit and road crossings based on RMP standards and design. |
| 17 | RMP | RMP inspects trenching and conduit. |
| 18 | Developer | Developer makes corrections based on inspection. |
| 19 | RMP | RMP schedules and performs work. |
| 20 | RMP | RMP does final inspection. |
| 21 | Developer | Developer records plat. |

Note from Step 7:

1. Pursuant to Utah Code Ann. § 54-3-27 this plat conveys to the owner(s) or operators of utility facilities a public utility easement along with all the rights and duties described therein.
2. Pursuant to Utah Code Ann § 17-27a-603(4)(c)(ii) Rocky Mountain Power accepts delivery of the PUE as described in this plat and approves this plat solely for the purpose of confirming that the plat contains public utility easements and approximates the location of the public utility easements, but does not warrant their precise location. Rocky Mountain Power may require other easements in order to serve this development. This approval does not affect any right that Rocky Mountain Power has under:
 - (1) a recorded easement or right-of-way
 - (2) the law applicable to prescriptive rights
 - (3) Title 54, Chapter 8a, Damage to Underground Utility Facilities or
 - (4) any other provision of law