Distributed Energy Interconnection Checklist

## Tasks for Federal Site Managers and Questions to Ask Their Utility

This interconnection checklist provides federal agencies with a series of tasks and questions to ask their utility, broken out by each interconnection process step. These checklist items are applicable to most types and sizes of distributed energy (DE) projects (regardless of implementation method), but this is not a comprehensive list—additional tasks may be required for a complicated project. Some utilities may require additional steps to complete their interconnection review. Consult your utility early and often and determine the responsible party for each task to ensure that all DE interconnection review steps are met. Many of the items below are often the responsibility of the contractor implementing the DE project.

# Project Planning, Design, and Engineering

Discuss DE project with utility early in the site selection and project development process.

As a starting point, many utilities have interconnection requirements listed on their website. If the site has a prior DE project in place, reviewing any existing interconnection agreements might help early in the discussions with the utility as well. Discussing the project early in the development process is an effective way to better understand the interconnection process, timeline, potential costs, and risks such as high costs and long timelines. Early communication will also make the utility aware of the project, so that they can keep you informed of their interconnection study timelines and any changes to their interconnection requirements and procedures. However, before the contractor is selected, discussions should be general in nature without divulging specific project details, to ensure fair and open competition. More detailed discussions can take place after contractor selection.

Involve agency legal counsel/contracting early in the project.

Discussing the project with agency legal/contracting staff early in the development process can help to identify potential agency contracting challenges (e.g., indemnification clauses, see Interconnection Agreement (ICA) section below for more information). It will also save time in the project schedule by keeping agency legal staff in the loop, so that they are informed about the project when they are called to review the interconnection agreement. In certain cases, the utility may have an interconnection agreement template that agency legal staff can review early on. It may also be necessary to bring in the real estate office if there are any property easements near the proposed DE site and/or other required infrastructure.

Determine whether the DE project will be interconnected behind the meter or in front of the meter.

A behind the meter configuration is much more common, where the DE project will offset onsite consumption with minimal or zero exported electricity. Front of the meter projects typically export all their generation back to the utility and are often subject to much more stringent interconnection and operating requirements due to their larger size. If the project is connected in front of the meter but the electricity will be used to off-set demand, the utility may require the electricity to be sold to them at wholesale, with no offset of the site’s utility cost. Projects under 1 MW are rarely installed in front of the meter, as the costs to complete interconnection studies and meet utility interconnection requirements typically make them uneconomic.

Identify where the project will interconnect, the location of the Point of Common Coupling (POCC), conductor pathways and trenching requirements.

The DE project’s location is a critical driver of interconnection cost. Projects should typically be located relatively close to their POCC (the point of demarcation between the agency’s and utility’s systems). This is where the project will typically connect to the utility’s grid if the project will operate in parallel with the utility’s system. Siting the project near the POCC may not be possible in all cases, so projects that are located further away should consider the path and cost of additional overhead lines, trenching or directional drilling (if outdoors) to connect the project. If the DE project is located on or inside a building, consideration should be given to how the project will connect to the building’s existing electrical panel.

### Consider the anticipated project size (AC capacity, kW) relative to the utility’s interconnection requirements and thresholds. Ensure that all project size limitations are clearly specified in the procurement documents.

The utility may have size thresholds for different levels of interconnection review. Particularly for solar PV (which can be categorized by its DC or AC capacity), it is important to clearly define whether these maximum sizes are determined by the solar PV modules’ nameplate (DC) or inverter size (AC).

Identify project’s potential utility disconnect location.

Consider whether there are utility site access requirements for safety or inspection that need to be considered in the siting of the disconnect location. Discuss with the serving utility to make sure you understand their requirements. Your local fire department may have requirements as well. This may be particularly challenging for secure federal sites, so begin conversations about site access early in the process.

Determine whether there are any technical barriers to electricity export.

Consult with the utility and site facilities/electrical engineering staff to understand existing electricity transmission, substation, on-site distribution system conditions, and loads, as well as whether the proposed DE project would pose any problems. For example, the utility may not allow grid-export for a DE project. If problems are identified, discuss potential solutions and estimated cost.

Confirm whether a new production meter will be required, as well as the ownership, type, and location of any meter(s).

There are many types of meters, and utility DE metering requirements can vary considerably. Ask additional questions about what the utility requires for metering, including: recommended meter products, required meter capabilities and communications requirements (if the utility needs to view metered production remotely). Determine who will pay for and maintain any new required meters (utility, agency, or contractor).

Identify applicable cyber security requirements based on proposed project and the need for control systems, advanced meters/other telemetry requirements, etc.

Your agency will likely have cybersecurity requirements that limit the utility’s connectivity to your site’s networks to remotely monitor the system or access meter data. These requirements should be discussed early on with the utility, as cyber security review and approval processes can involve significant cost and timeline risks. Alternative monitoring systems that do not connect to an agency’s systems, such as cellular based monitoring should be discussed as well. Many agencies are required to obtain Authorization to Operate (ATO), which involves significant time and investment to meet cyber security requirements.

Obtain detailed utility technical requirements and compare (deconflict) with agency requirements as needed.

Some utilities may have specific requirements for the proposed DE system. For example, utilities in California have specific smart inverter requirements for solar PV systems. For planning purposes, utilities sometimes require space, cooling, and power for utility equipment as well.

Before construction, confirm the project design meets all utility interconnection requirements.

Carefully review the interconnection agreement and discuss with the utility to ensure that you have complied with all utility requirements prior construction.

**Site Electric Distribution System**

Discuss project with distribution system owner and identify any potential contractual or other barriers to interconnection. Review utility privatization contract if applicable (Department of Defense).

Some agencies may have a contract with a third-party to own and maintain their site’s electricity distribution system. At Department of Defense (DoD) sites, this can take the form of a Utility Privatization contract. Utility Privatization (UP) traditionally involves a third-party taking ownership and responsibility for the operation and maintenance of an installation’s electrical distribution system. The UP provider can be a site’s serving utility, or another eligible utility that has a long-term contract with the DoD service. The contract should be reviewed to fully understand any restrictions or limitations for DE projects.

If a third-party is responsible for the site’s distribution system, discuss the proposed project with them early on. They may be able to identify locations that would be problematic for interconnection and potential interconnection upgrade costs that could inform the project size and design. The third party distribution system owner should also be a key stakeholder in the DE project’s development and be invited to participate in discussions with the utility that provides power to the site.

Discuss proposed project with facilities staff (from agency or third-party owner) familiar with the site distribution system.

Some topics for discussion with the facilities staff include: distribution study recommendations (if any), POCC, any line capacity limitations, main panel limitations (for building-connected systems), staff expertise and availability for maintenance. Determine who will be responsible for the cost and implementation of site distribution system upgrades (agency or third-party), if applicable.

Conduct site distribution system studies if deemed necessary.

Some studies that may be required, depending on project size, include: load flow study, fault study, coordination study and arc flash hazard study.

# Interconnection Application and Study Process

Clarify roles and responsibilities and ensure close communication between the agency and contractor.

Designate one (or more) agency staff to be responsible for close coordination with the utility throughout the interconnection:

Interconnection application

Responsibility for application, study, and upgrade costs

Study process

Interconnection upgrades, if necessary

If costs are significant, discuss whether the utility can pay these costs upfront and be repaid back through the utility bill over time.

Confirm understanding of the utility’s interconnection process:

Ask the utility if they have a “pre-application” process to obtain preliminary information regarding utility system constraints, study requirements, possible upgrades, and more detailed fee information.

Some utilities offer a pre-application process that agencies could use to gather initial feedback regarding the planned DE project - typically for a smaller fee and with a quicker turnaround time than the full interconnection process. This will help an agency determine if there are any major cost or other barriers associated with the planned project. Request a meeting with the utility’s interconnection staff to discuss pre-application request options and get their input on the best interconnection process for the planned DE project.

Confirm interconnection application, study fees and requirements (inverter specifications, one-line diagrams).

Every utility has a different interconnection process, but most will first require an interconnection application that requires DE system details such as the size, location, and inverter specifications (in the case of solar PV and batteries). Obtain a copy of the interconnection application, and find out when the application can be submitted, as well as what level of project design detail is required for submittal. Additional design documentation such as one-line diagrams and site plans may be required by certain utilities as well. Application fees will typically be required upon application submittal. For larger systems (typically greater than 1 MW), the utility will also require additional, larger payments for system impact studies. Although the interconnection studies will determine the final system upgrade requirements and costs, the utility may be able to give you an initial indication of the system upgrades that may be required as a result of the DE project. If interconnection studies are needed, confirm how long the interconnection study results and requirements are valid, and compare with the project construction schedule. If significant upgrades are required, they can sometimes be incorporated into a connection fee that can be paid over time as an on-bill charge.

Confirm interconnection process timeline.

Discuss the application and interconnection study process with the utility to clearly understand the cost, risk, and timeline involved with any interconnection studies. As projects increase in size, the time and cost required to complete the interconnection application typically increases as well. Be aware that very large projects (greater than 5MW) or projects that are in front of the meter may fall into a cluster-based study approach where applications are put in a queue and reviewed 2-4 times a year, which can add significant delays to project schedules.

Requirements for projects that include batteries or microgrid applications.

Clarify with your utility how existing interconnection standards apply to battery storage systems/microgrids, and whether there is a separate battery interconnection process. Communicate the intended use case for the battery to the utility, particularly if the battery is intended to operate during a utility outage. Coordinate closely with the utility concerning how transitions between utility power and islanded microgrid operation will be achieved to ensure that all utility technical and safety requirements are met.

# Interconnection Agreement (ICA)

Confirm whether the agency or third-party owner is responsible for signing the ICA (in some cases, both may need to sign a tri-party agreement).

Utility requirements regarding who must sign an ICA vary. In some cases, the utility may allow the agency to choose whether the agency or a third-party owner will sign. A tri-party agreement can be beneficial so that both the customer (agency) and third-party owner (with DE project operation responsibility) have a contractual relationship. If the agency needs to sign the ICA, it is very important to have it reviewed by legal/contracting early in the process so that any problematic terms/conditions can be identified and negotiated.

Find out if the utility has a template ICA, whether there is a federal/government-specific version and obtain a copy.

Most utilities have template ICA, although it may vary depending on project size (and possibly type). Inquire whether the utility has already negotiated a revised template with another federal agency. This revised template is less likely to include problematic provisions, although agency legal/contracting review is still necessary as agency policies vary. If there is not a federal ICA, ask whether the utility has negotiated a revised ICA with a state/local government entity or similar party.

Identify utility point(s) of contact for ICA negotiation and identify agency representative that will sign the ICA.

Ask for the utility to designate a point of contact to be involved if the agency is concerned about certain terms/conditions and would like to negotiate alternative language. Also ask how long the approval process is likely to take and whether the public utility commission (or other governing body) must approve changes to the ICA. It is also important to identify the agency staff person that will sign the ICA and ensure that they are part of the review process.

Confirm when the ICA can be signed.

Understanding when the ICA can be signed is important so that the agency can ensure that review and negotiations are complete in time and do not delay the project. In some cases, the utility may allow signature of a “conditional ICA” earlier in the process. If so, make sure that the requirements for final ICA signature are clearly spelled out.

Confirm whether agreements other than the ICA are required (e.g., net metering).

Net metering agreements are often separate from the ICA, so it is important to ask the utility if there are other agreements beyond the ICA that are required. Particularly for DE projects that will reduce a site’s electricity demand significantly, ask the utility whether the DE project might trigger the need for a new standby service agreement.

Ensure that legal and/or contracting staff review the ICA and identify any problematic language for federal agencies.

Three common clauses that cause legal concerns for Federal agencies are indemnification, choice of law, and insurance. Identify proposed ICA edits and propose these changes to the utility, negotiating as necessary. [Contact FEMP](https://www7.eere.energy.gov/femp/assistance/de-assistance) for possible alternative language.

Confirm whether the utility offers a [GSA Areawide Contract](https://www.gsa.gov/real-estate/environmental-programs/energy-water-conservation/areawide-public-utility-contracts/download-contracts-modifications) (AWC).

Find out if the utility has an AWC and if so, which Exhibit can be used for the ICA. Many AWC now have an Exhibit called “Authorization for the Provision of Services Provided Under the Appropriate Regulatory Authority” (typically Exhibit D), that was specifically developed by GSA to facilitate ICA signature by federal agencies. If this exhibit is not available, then usually the “Authorization for Electric Services” (typically Exhibit A) can be used.

Consider the GAO decisions regarding indemnification - [59 Comp. Gen 705 (1980)](https://gcc02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.gao.gov%2Fproducts%2F424775&data=04%7C01%7CDouglas.Gagne%40nrel.gov%7C8deda9248e9c46a1feaa08d8de976c97%7Ca0f29d7e28cd4f5484427885aee7c080%7C0%7C0%7C637504089239793455%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=wz%2FYwqMB0ehsDaI7AC7vgo1pDNL8XiGIEUbSX65BnrM%3D&reserved=0) and [B-197583 (1981)](https://gcc02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.gao.gov%2Fproducts%2F440542&data=04%7C01%7CDouglas.Gagne%40nrel.gov%7C8deda9248e9c46a1feaa08d8de976c97%7Ca0f29d7e28cd4f5484427885aee7c080%7C0%7C0%7C637504089239803415%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=Yos%2FwRjXVScVOV%2F0EaXULJXClQpbRdyA9bnItPAU91g%3D&reserved=0).

GAO has issued several decisions that allow signature of contracts that include indemnification language in limited cases. Agency legal/contracting staff can review these decisions, understand the requirements, and determine whether these decisions can be used to justify ICA signature if needed once all the requirements are met.

# Net Metering, Rate Impacts, and Incentives

Consider rate tariff changes, understand potential standby charges.

New DE projects may trigger a change in a site’s applicable utility rate tariff due to the resulting load reduction. There may also be a requirement for a mandatory enrollment in a DE-specific tariff or time-of-use pricing. Standby charges may apply for certain DE technologies and/or DE projects over a certain size, so that the utility can recover their costs for generation reserves and distribution system capacity.

Identify any applicable rebates and incentives.

Some DE projects may be eligible for rebates and other incentives offered through state, local and/or utility programs. The Database of State Incentives for Renewables & Efficiency ([DSIRE](https://www.dsireusa.org/)), and the serving utility’s website are great starting points when exploring available incentives. Certain technologies may also be eligible for federal incentives, such as the Investment Tax Credit and accelerated depreciation; as well as state/local incentives such as property and/or sales tax exemptions. The DE project must be owned by a taxable business entity that can take advantage of these incentives and pass the incentives on to the federal government through a DE project cost reduction.

Determine if the utility has a net metering policy and if so, identify utility’s maximum allowable project size. Understand how the utility measures project size (kW AC or kW DC).

The utility may have maximum size allowances for net metering eligibility. Particularly for solar PV (which can be categorized by its DC or AC capacity), it is important to clearly define whether these maximum sizes are determined by the solar PV modules’ nameplate (DC) or inverter size (AC).

Understand how your utility compensates net excess generation under a net metering program and the impacts on the DE project’s cost-effectiveness.

If the electricity from a net metered DE project exceeds the site’s load over a certain period (such as a month), this excess electricity may be rolled over to the next month (typically settled on a yearly basis). Otherwise, the site is paid based on a wholesale rate, avoided cost, or in some cases, no compensation at all. If the project does receive compensation for excess generation, you should ask the utility how the agency will be paid (bill credit, check payment) and how often.

Confirm Renewable Energy Certificate (REC) ownership from renewable energy project generation if the project will take advantage of net metering and/or any other utility incentive program.

The DE project may generate RECs, if it is a qualifying renewable energy technology. If so, confirm with the utility whether your agency will own the project, as some utilities take ownership of the RECs associated with any exported electricity (or in some limited cases, they will take ownership of all project RECs under net metering, regardless of the actual amount of exported electricity). The utility may take ownership of the RECs if they provide other incentives such as rebates as well.

Determine whether there are other relevant policies, such as virtual net metering or a feed-in tariff, that are applicable to the project. If so, understand the policy details.

Special policies such as virtual net metering may be beneficial if the agency owns multiple sites in a utility’s service territory and wants a large project at one site to “serve” the other sites. However, these programs are only offered by some utilities, and even if offered, may not apply to the proposed DE project.

# Commissioning, System Acceptance Testing, and Permission to Operate (PTO)

Clarify the agency’s and DE project contractor’s roles and responsibilities in obtaining PTO.

Clarify whether the agency or DE project contractor will submit documentation to obtain written PTO, if required. Establish a schedule for when documents must be provided to the utility and designate an agency or contractor individual to follow-up periodically with the utility to keep the PTO process moving.

Confirm technical and administrative requirements early in the design process for the utility to issue PTO.

Most utilities will post clear instructions about their requirements and timeline for PTO issuance on their website or include these requirements within the interconnection agreement. Discuss this timeline with the utility point of contact and identify potential schedule risks, such as utility backlogs in scheduling witness testing or issuing PTO.

Obtain initial utility approval to test the system prior to commissioning/system acceptance testing and obtain written utility PTO before commencing commercial operations.

Once system construction is complete, be sure to notify the utility and receive approval to energize the system for commissioning and system acceptance testing purposes. After completion of commissioning, testing, and all requirements for PTO have been met, if the utility does not submit a written confirmation of PTO by default, the agency and contractor should request written confirmation of PTO. The system should not be energized until receipt of written PTO (or other confirmation from the utility).

Schedule a witness test as early as possible, if applicable.

Many utilities will require witness testing prior to issuing PTO. A witness test may involve scheduling an inspection of the DE project by the utility engineer to confirm proper system function and the location of key safety equipment and labelling, among other review items. Confirm the utility’s timelines for scheduling of witnessing tests, ask whether the utility may waive its right to a witnessing test, and attempt to schedule this witnessing test as early as possible to avoid delays.