# Site-Level Technology Screening for Onsite Energy

## Background

Site-level screening can help organizations identify the potential value of onsite clean energy technologies and make decisions about which to pursue further. It is a simple approach designed to identify and prioritize technology opportunities quickly. Screening results often lead to more targeted and detailed analyses and can be used to inform investment-grade feasibility assessments or create a request for proposals for project developers.

Before assessing a single site, some organizations start with portfolio screening and prioritization to narrow down site options in a larger portfolio based on the potential for onsite energy. Although looking at the full portfolio can identify site suitability for certain technologies, a site-level screening goes a step further.

Figure 1. Site-level technology screening is a step after portfolio-level and before more advanced feasibility assessment


In addition to identifying cost savings, decision makers should also consider resiliency as well as non-energy (e.g. positive appeal to customers and employees) and non-monetary (e.g. reducing energy-related emissions) benefits when deciding which technologies to pursue, and these advantages can be explored in the site screening process.

Organizations interested in conducting site screenings have several options to get started. The U.S. Department of Energy offers technical assistance to perform site screenings through the Better Climate Challenge and the Onsite Energy Technical Assistance Partnerships, which can help organizations identify a path forward.

## Screening Process

The screening process can follow six steps:

1. **Assemble a project team.** Bring together team members with skill sets that are relevant for screening and later phases of deployment.
2. **Establish clear goals for onsite energy.** Discuss goals with decision makers, including energy savings, cost savings, emissions reduction, resilience, and community impacts.
3. **Collect site and utility data.** Gather data on consumption and cost of electricity and fuel; available space; interconnection limitation, hosting capacity for distributed energy resources; environmental, climate, or socioeconomic indicators for disadvantaged communities; and any other relevant information.
4. **Evaluate technology options.** Eliminate technologies that are a poor fit and then evaluate promising technologies in the screening analysis.
5. **Review the results.** Use quantitative data from calculations or analysis tools along with qualitative criteria to choose technologies to pursue further.
6. **Determine next steps.** Make a plan, including discussions with decision makers.

## 1. Assemble a Project Team

Assembling an effective team for a site-level screening can improve data gathering efficiency and accuracy for evaluating and selecting technologies. Key project team members include the building or plant energy manager, a point of contact for the utility, and someone with understanding of the local community (either internal to the site organization or a direct representative of the community). Lessons learned from the site-level screening analysis will carry over into the next phase of deployment so that the team is more informed when engaging with decision makers at the organization, consultants, developers, and the larger community.

## 2. Establish Clear Goals for Onsite Energy

There are many reasons to pursue onsite energy. Public sector organizations look to onsite clean energy to meet statutory or executive order mandates to use renewable and/or clean energy. Publicly traded, private sector, and nonprofit organizations are increasingly making clean energy commitments to meet customer, investor, employee, and other stakeholder requests, including energy cost savings, improved sustainability, reduced greenhouse gas emissions, and meeting environmental and social governance expectations. Facilities with critical operations are increasingly looking to clean energy technology combinations, like onsite solar power and battery energy storage, to meet resilience expectations that do not rely on fossil fuel-based backup generators. Defining the goals of the site-level screening can help set the bounds of the analysis and shape the resulting recommendations. At this stage, it is also important to identify goals and objectives for community engagement. Working with the local community and members of various workforces to identify technology solutions that are beneficial to all those impacted will result in a more sustainable solution and supportive stakeholders.

Table 1. Site data for onsite energy technology screening and how to obtain or estimate the data

| Site Data | Team Point of Contact | Where To Get the Data | How To Fill Data Gaps |
|---|---|---|---|
| **Utility electric and fuel charges** | Building/plant energy manager | Utility bill, utility website, and/or Utility Rate Database. See these resources on understanding electric and natural gas utility bill rate structures. | If the rate tariff is complicated, monthly energy (dollars per kilowatt-hour [$/kWh]) and demand ($/kW) charges from the bill may suffice. |
| **Electric load** | Building/plant energy manager | Utility website with account | Use a simplified, schedule-based load or a similar reference building profile. |
| **Limitations on exported energy** | Utility | Conversation with utility | Assume the site can export up to peak load. |
| **Heating and cooling loads, age of HVAC equipment** | Building/plant energy manager | Nameplate, HVAC controls, specification or installation documents | Use a simplified, schedule-based load or a similar reference building profile. |
| **Roof and land availability** | Building/plant property owner and/or energy manager | Property documentation, satellite imagery, roof/site walk | Use satellite imagery. |
| **Environmental, climate, or socioeconomic indicators for impacted communities** | Building/plant property owner, energy manager, and community liaison | Publicly available tools that evaluate indicators (e.g., the Council on Environmental Quality's Climate & Economic Justice Screening Tool, U.S. Environmental Protection Agency's Environmental Justice Screening and Mapping Tool, the Centers for Disease Control and Prevention's Environmental Justice Index) | Establish a site impact radius, identify communities within that radius, and evaluate indicators for those communities, including local occupational data for workforce development opportunities. |
| **Federal, state, and local incentives** | Incentives/financing points of contact, accountant | DSIRE<br>Better Buildings Funding and Incentives Hub | Reach out to your regional Onsite Energy TAP for assistance. Connect with peers in the Better Buildings Initiative network to crowdsource ideas and exchange best practices and resources. |

## 3. Collect Site and Utility Data

As a project moves from idea to implementation, data needs to become increasingly granular; quality data forms the basis for effective site-level screening. Table 1 describes important site data to collect, the project team point of contact most likely to have access to the data, where the data can be found, and how to estimate the data if not all the information is obtainable. The building or plant energy manager and utility company are primary sources for most data.

It is also important to use relevant and current data for technology installed costs because that represents one of the biggest barriers to onsite energy deployment. Even for leases and power purchase agreements, which avoid a large upfront capital expenditure, installed costs still drive the contracted cost of energy and duration of the contract. Publicly available data resources may be leveraged to estimate technology costs (e.g., the Annual Technology Baseline, CHP Technology Fact Sheets, etc.), but often, they do not include site-specific considerations and local labor rates. If site-specific factors are known, the technology cost estimates can be adjusted accordingly. Developer quotes are always the most accurate data source, but this screening phase of analysis precedes reaching out to developers.

## 4. Evaluate Technology Options

Technology capacity evaluation may be based on a combination of site load, available space (either roof or land), interconnection capacity and/or export limit (determined by the utility policy and the site's electrical infrastructure constraints), and the net-metering capacity limit (if applicable). Typically, roof and land availability are the limiting factors for technologies such as solar photovoltaic (PV) arrays and distributed wind turbines. In other cases, rules for interconnection or net metering may be the limiting factors. If the site conditions are particularly unsuitable for certain technologies, those can be eliminated from evaluation. For example, if there is no land available onsite, then distributed land-based wind energy is not viable.

Table 2 describes some of the most important site information to screen specific technologies. Although the portfolio screening and prioritization process considers some of this information, the site-level screening goes a step further for the expectation of detailed and accurate information.

Table 2. Technology-specific site information for screening

| Technology | Solar Photovoltaics | Distributed Wind Turbines | Battery Energy Storage Systems | Combined Heat and Power Systems | Heat Pumps |
|---|---|---|---|---|---|
| **Key Site Characteristics** | Unshaded space and roof or land that is suitable and unused | Unused land with no airborne constraints, like nearby airports | Electric rate structure details between demand and energy charges, along with the hourly consumption profile | Space conditioning and process thermal energy consumption data and general alignment between electric and thermal loads | Heating and cooling consumption data and details about the current system, such as supply temperatures and suitability for retrofitting |
| **Interconnection Considerations** | PV and wind turbines can export energy and receive equivalent or close compensation for the price paid through net metering. Without net metering or if export value is low, renewable generation will deliver less revenue unless well aligned with site electrical loads. | | If the value of exported energy is low or restricted, or if electric demand rates are high, there may be more incentive to store PV and wind energy within a battery for onsite use. | The utility's interconnection policy for CHP may have additional hurdles and requirements compared to renewable generation. Look into standby charges and any limitations on exported power. | Because heat pumps increase electrical consumption, interconnection may require grid infrastructure upgrades that could cause delays and incur additional project costs. |

Techno-economic analysis tools can help determine the optimal capacity of each technology using a cost-minimization objective function. These tools can also prioritize goals such as emissions reduction and resiliency requirements. Techno-economic analysis tools are especially valuable for sizing technologies, such as battery storage and combinations of renewable and other clean energy technologies, for which heuristic-based sizing can be difficult. Tools can identify unique synergies of technology combinations for the site's characteristics. Organizations can access publicly available, no-cost tools for evaluating onsite energy technologies or purchase access to commercial tools. Onsite energy cost (including incentives and tax implications), production, and emissions calculations are complex, and leveraging publicly available tools may save time and improve trust in the results. Regardless of tool choice, leveraging the project team's expertise to oversee the analysis process and review results is critical.

In addition to techno-economic analysis, the project team should also prioritize identification and, if possible, quantification of potential community impacts associated with onsite energy technology deployment. Each project offers an opportunity to realize non-energy and non-monetary community benefits and mitigate potentially detrimental community outcomes. Efforts to understand and engage with local communities increase the likelihood of positive community outcomes and can bolster public acceptance and support.

## 5. Review the Results

Site screening exercises can result in a variety of estimates and data points that can assist in deciding whether to take the next step in the implementation process. Useful screening results include descriptive information about which technologies were evaluated and why. Results should also identify technology options worth studying further and why. Key metrics resulting from site screenings include information about potential system size (kilowatts), electricity and fuel costs ($/year), expected operating and maintenance costs ($/year), capital costs ($), simple payback (years), estimated emissions savings (tonnes/year), and others. Metrics that capture potential community impacts (e.g., site-level air pollutants) are also important to consider.

## 6. Determine Next Steps

At the end of a site screening, facilities should have a better sense of what technologies are worth exploring further. If there are many onsite energy technology options that look favorable, the project team may decide to prioritize certain options based on the goals identified earlier in the screening process; this can help streamline subsequent feasibility studies or requests for proposals. A key next step is to engage decision makers within the organization to justify moving forward with the project. Identifying viable financing mechanisms is critical to making that justification. If the organization decides to move forward with the project, continued engagement with the utility and local community will be important to understand and shape project costs, timeline, and overall impact.

### ABOUT THIS SERIES

Over the course of seven sessions, the Onsite Renewable Energy and Storage Working Group convened 20 partners to identify and highlight ongoing issues and opportunities when planning and deploying onsite renewable energy systems and energy storage systems. This fact sheet is part of a series to provide technical recommendations resulting from the discussion among Better Climate Challenge partners, allies, and DOE experts.