



## Microgrid Commissioning

### A Unified Process for Client Success

*Our comprehensive commissioning process is carefully designed to ensure our on-site microgrids will operate for optimal performance.*

As the final step of a project's construction phase, equipment start-up is the most active stage in the commissioning process. Turning on engines, energizing switchgear, and delivering heat for the first time is visible to the host client, but successful microgrid commissioning starts well before the first shovel is in the ground or wrench has been turned. It involves verifying that a site's equipment is designed, installed, and operating correctly — and the utility has given permission for the system to operate. During the formal handover of the system from the construction to the operations teams, it is important that the equipment is properly calibrated and configured for optimal performance.

Reaching this point requires a comprehensive approach: one that takes a number of complex factors into account. Our team brings decades of combined experience to the table, including more than 100 MW of distributed generation projects, to ensure our commissioning strategy is successful for our clients.

## The Unison Energy Commissioning Timeline

Clients can expect a commissioning timeline that follows these stages and is purposefully designed to address common pain points.

### *Design and Preconstruction*

Our team develops the project requirements and an initial commissioning plan based on client requirements and feedback. Commissioning expectations are written into the scope of every vendor and contractor we work with to ensure that everyone is on the same page. Our commissioning agents help to organize and carry out testing plans, following the processes laid out by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). This entails developing test procedures, executing functional tests, verifying the results, and updating issue logs — then repeating the process until any performance issues are resolved. It can also involve working with equipment manufacturers and vendors to address atypical requirements for highly specialized equipment, as well as precision factory testing before equipment arrives at the site.

### *Construction and Start-up*

This stage requires rigorous submittal review and construction inspections, as well as pre-functional testing. After the equipment is installed, the next step is start-up, or the process of preparing and operating a piece of equipment for the first time. This is one of the most critical parts of commissioning and includes functional performance tests of components and subsystems, in addition to system acceptance testing.

Construction Inspections	Pre-Functional Testing	Functional Testing
<ul style="list-style-type: none"> <li>✓ Verify all equipment is installed properly according to engineering designs and equipment manufacturer specifications.</li> <li>✓ Confirm proper access and clearances on all equipment.</li> <li>✓ Verify equipment nameplates.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Do end-to-end wiring checks on controls, communications, and other electrical connections.</li> <li>✓ Perform Megger, HiPot testing.</li> <li>✓ Check circuit breaker settings and fuse ratings.</li> <li>✓ Pressure test mechanical systems.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Perform a proper startup of all electrical and mechanical equipment.</li> <li>✓ Check motor rotation on spinning equipment.</li> <li>✓ Test and balance hydronic and HVAC systems.</li> <li>✓ Verify communication between all controls devices and field instrumentation.</li> </ul>
Generator Startup and Tuning	System Performance Tuning and Testing	Utility Witness Testing
<ul style="list-style-type: none"> <li>✓ Prepare engines for startup with fluid fills, spark plug testing, and other serviceable parts.</li> <li>✓ Ensure PV &amp; Energy Storage inverters energized with voltage/polarity checks.</li> <li>✓ Perform OEM startup checklist.</li> <li>✓ Coordinate with OEM to perform startup and performance testing.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Operate microgrid in all electrical functional modes, including grid parallel, grid independent (island), black start, and return to parallel.</li> <li>✓ Test heat recovery (steam, hot water and/or chilled water) controls per site-specific sequence of operations, including unoccupied, occupied, alarm, and freeze protection.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Coordinate with local utilities to perform appropriate safety and compliance testing required to operate microgrids based on local and international standards, including grid synchronous, anti-islanding, reverse power testing, direct transfer trip, and SCADA.</li> </ul>

## Review

Once all systems have cleared system acceptance testing, our team runs through a final commissioning punch list closeout. Our comprehensive debriefing process emphasizes lessons learned during commissioning, which informs how we manage and maintain the microgrid equipment going forward. We also provide client training on system operation.

## Ongoing Monitoring

We back up our initial process with continuous commissioning, using remote data collection and analysis to confirm the performance of our systems. The initial review period may track daily or hourly data, while monthly data reviews confirm systems meet expectations on a long-term scale. Our team has developed systems and controls that can be configured to each site, allowing us to collect more data points and more accurate data to improve system performance.

## Unison Energy's Unified Approach

To ensure that this timeline unfolds successfully, we assemble a unified team that includes representatives from the host client, the engineer of record, trade contractors, equipment manufacturers, and our O&M technicians and in-house certified commissioning agents, who supervise the process from initial site walk to system turnover. Combined heat and power (CHP) microgrids are dynamic and complex, involving multiple power and thermal systems that must be coordinated, balanced, managed, and maintained. For this reason, the same team handles both construction and commissioning, ensuring an open flow of communication between the system's designers, builders, and operators, and contributing to a more successful project.

## A Turnkey Solution

From our initial conversations, through design, construction, and ongoing operations, Unison Energy offers a turnkey solution that takes the hassle off your plate while ensuring we meet our customers' needs and expectations. The commissioning process is no different. From start to finish, we aim to solve common commissioning challenges thanks to our proactive, comprehensive approach. And because we continue to own, operate, and maintain the microgrid systems on behalf of our customers, we are incentivized to optimize how they operate — which means you get a microgrid that maximizes benefits for your facility.

To learn more about Unison Energy's comprehensive approach to microgrid design, build, commissioning, and operations, visit our website at [www.unisonenergy.com](http://www.unisonenergy.com) or contact us at [sales@unisonenergy.com](mailto:sales@unisonenergy.com).