

UTILITIES

ORACLE UTILITIES DISTRIBUTED GRID MANAGEMENT

KEY FEATURES

- Models all the energy and demand sources within the microgrid in detail
- Manages distributed generation and performs distribution system optimization within the microgrid
- Normally operates under the overarching authority of a centralized advanced distribution management system to enhance the efficiency and reliability of the distribution grid
- Can operate the microgrid as an electrical "island" when isolated from the larger distribution grid
- Integrates with field devices and systems such as generators and load management systems
- Integrates with any SCADA and GIS

KEY BENEFITS

Increases efficiency by:

- Lowering the cost to meet renewable mandates
- Reducing costs of equipment maintenance and replacement by fine-tuning the grid in ways that lower equipment wear and tear
- Monitoring and operating network switches and devices in ways that minimize distribution system losses
- Increasing the granularity of data used to make energy decisions

Improves customer satisfaction by:

- Avoiding outages and reducing outage duration
- Reducing power generation costs through effective integration of local generation and storage

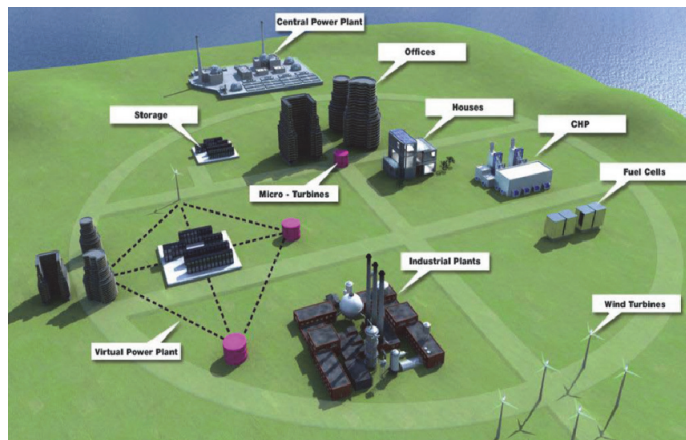
Managing microgrids with Oracle Utilities Distributed Grid Management System helps utilities maximize their use of energy from local renewables and optimize their use of storage. Oracle Utilities Distributed Grid Management System also increases reliability by permitting specific geographic areas to operate independently, unaffected by outages, bottlenecks, faulty equipment, or other constraints. Oracle Utilities Distributed Grid Management System is thus an important tool in helping utilities transition from the centrally controlled grid of today to the smart microgrids of tomorrow, characterized by multiple distributed local energy sources and balanced demand capabilities.

The Changing Utility

Traditionally, distribution utilities have received power from large generators via the high voltage transmission system and delivered it to end use customers.

Today, this situation is changing to accommodate an increasing number of local generation resources, including:

- Local renewable generation—solar panels on rooftops or small wind generators in backyards.
- Customer-owned backup generators that, while primarily intended to supply power during outages, can also input power to the grid.
- Utility-owned storage, primarily in remote areas.



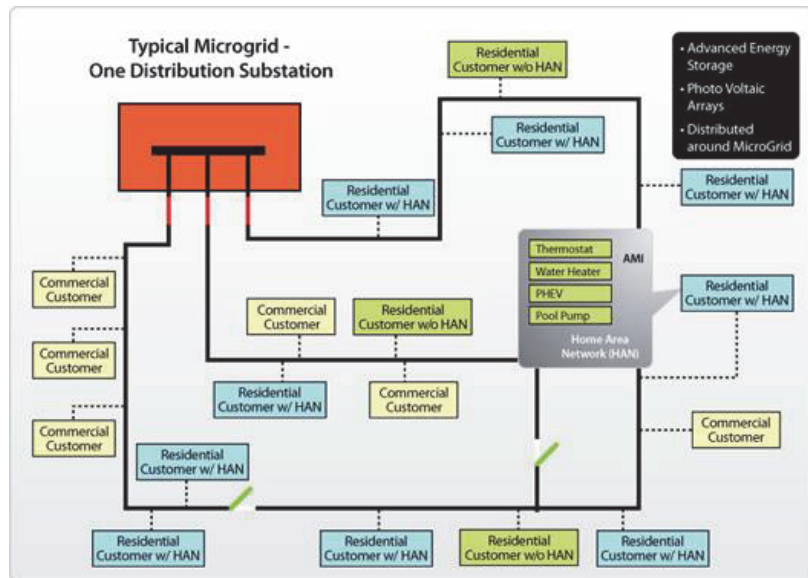
New generation and storage options are increasing the complexity of the utility distribution network.

These emerging resources present utilities with opportunities to reduce the cost of buying power during critical peak periods by using power from local generators. In this way, utilities can offset peak demand or leverage electricity storage devices that were previously charged with lower-cost off-peak energy before purchasing high-priced power on spot markets.

Integrate Renewables

Taking advantage of these opportunities requires utilities to integrate small, often intermittent power sources into a centralized grid. This is never a simple task. However, integration is far easier, if utilities group the power sources into small geographic areas or microgrids, each controlled by Oracle Utilities Distributed Grid Management System, a product that:

- Models in detail all the energy and demand sources as well as the microgrid network model.
- Provides an accurate means of managing and accounting for all energy injected.
- Maps the flows of power across the microgrid.
- Performs real-time and near-term forecasts of microgrid supply and demand.
- Orchestrates the use of storage so that devices:
 - Charge during off-peak periods.
 - Discharge into the grid when power is in short supply and spot prices are at their highest.
- During periods of normal operation, serves as a gatekeeper between the microgrid and the larger distribution grid. This permits the microgrid to draw power from the larger grid when needed and inject power into the larger grid when supply on the microgrid exceeds demand.
- Orchestrates supply and demand balance within the microgrid; and during periods of critical demand, schedules the transfer of maximum amounts of power to the larger distribution grid.
- Operates the microgrid as an autonomous entity when upstream outages isolate the microgrid from the larger distribution grid.



Microgrids operated with Oracle Utilities Distributed Grid Management help utilities maximize the value of storage and generation from local renewable.

Reduction of Generation cost

Oracle Utilities Distributed Grid Management System operates the microgrid in a grid-connected mode, thus enabling and optimizing the scheduling of local generation resources. Thus it helps in

- Reduction of cost through optimal use of available local resources
- Reduction of cost through deferment of building large power plants

RELATED PRODUCTS

- Prepackaged Integration to Oracle Utilities Network Management System
- Oracle Utilities Network Management System or any other advanced distribution management system. These act as an overarching authority to Oracle Utilities Distributed Grid Management to assure on-going operational safety and reliability

Increase Reliability

Oracle Utilities Distributed Grid Management System enhances distribution system reliability by:

- Monitoring current and future operational conditions of all microgrid equipment generating timely and accurate alarms and warnings about potential limit violations. These alarms/warnings are displayed via a graphical user interface that helps system operators take immediate repair or replacement actions that reduce blackout and brownout risks.
- Operating in an island mode, when catastrophic events like storms and hurricanes bog the system down. DGM re-energizes the microgrid from a completely de-energized state and keeps the essential and critical loads running with minimal service disruption and thus enhances the reliability of the distribution system.

Increase Operational Efficiency

Oracle Utilities Distributed Grid Management System helps increase operational efficiency by:

- Determining the optimal operation of voltage regulators, such as transformers and capacitors within the microgrid. The resulting improvement in voltage profile:
 - Increases efficiency by reducing network losses.
 - Lowers equipment maintenance and replacement costs by reducing equipment wear and tear.
- Monitoring the status of network switches and operating them, when necessary, to reduce feeder loading and minimize distribution system losses. Oracle Utilities Distributed Grid Management thus:
 - Limits overload situations, reducing the stress on equipment and increasing equipment life.
 - Helps operate the power system closer to network limits, again increasing equipment life while also reducing power costs.
 - Informs operational decisions that affect guaranteed service contracts and quality-of-service goals, thus increasing customer satisfaction while reducing the risk of contract penalties.

Product Details

Oracle Utilities Distributed Grid Management includes features and options that underpin a wide range of microgrid functions:

Oracle Utilities Distributed Grid Management	
Feature	Function
Microgrid Network Model	• Creates three-phase unbalanced network model representing the distribution circuit(s) along with provision for distributed generation, rooftop solar, energy storage devices, electric vehicle charging profiles, and demand response capability.
Load Forecasting	• Uses real-time loading conditions and day-type load profiles with adjustable scaling to project hourly peaks for the next 48 hours.
Topology Processor	• Processes the three-phase unbalanced distribution network, displaying the network connectivity of the microgrid network.

Power Flow	• Runs cyclical power flow to analyze the current state of the microgrid network. • Calculates the voltages, flows, loads, losses, and limit violations within the microgrid network.
Optimized Resource Scheduling	• Enables optimized usage of distributed generation resources within the microgrid based on load demand, wholesale price of generation and cost & availability of local generation
Island Mode of Operation	• Enhances reliability by continuing to operate in an island mode with minimal service disruption during catastrophic events
Option: Oracle Utilities Distributed Grid Management Voltage Optimization	• Determines optimal tap positions for the load tap changing (LTC) transformers and bank steps for the capacitor banks to minimize system losses and improve the voltage profile. • Determines optimal switching configuration that minimizes losses and optimizes voltages.
Future: Demand Response Interface	• Enhances resource scheduling through the collection and use of demand response data.

The Future of Oracle Utilities Distributed Grid Management:

Charging Electric Vehicles

Oracle Utilities Distributed Generation Management System already offers features that assist in modeling and managing the demand arising from the use of electric vehicles. In the future, Oracle Utilities Distributed Grid Management is also expected to offer features to help utilities determine and implement control strategies that permit them to use electric vehicles as an energy source while simultaneously ensuring that they are recharged on schedule.

Oracle Utilities Distributed Grid Management is also anticipated to offer services that maximize use of locally generated renewable power to recharge electric vehicles.

Optimizing Resources

Today, Oracle Utilities Distributed Grid Management System optimizes the scheduling of local generation resources. This optimization process will be further enhanced, in future, by including load curtailment data available from demand response programs.

Contact Us

For more information about Oracle Utilities Distributed Grid Management, visit oracle.com/goto/utilities or call +1.800.275.4775 to speak to an Oracle representative.



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