

GE
Intelligent Platforms

renewable energy solutions



imagination at work

Optimizing renewable energy production

Many of today's global energy-generating capacity relies on GE Intelligent Platforms' advanced technology solutions and industry expertise to help them build and sustain a competitive advantage.

With increasing global demand for more cost-effective, cleaner sources of energy, OEMs and energy operators must uncover additional efficiencies to gain a competitive edge. It's imperative to drive improved energy production and reduce costs while addressing standards for regulatory security compliance. Achieving this high level of performance requires leveraging real-time intelligence across your energy installations for efficient operational response.

GE Intelligent Platforms understands your needs, and we've successfully partnered with OEMs and energy operators globally to meet these challenges head on. Our advanced automation solutions convert your critical data into knowledge—enabling you to control, manage and optimize your renewable energy assets in a secure, scalable and integrated environment.

Expertise, experience and commitment

As part of GE, we have more than 100 years of experience in energy and remote management technologies—enabling you to leverage powerful innovations and global expertise from across the company. You can also take advantage of these benefits:

Product breadth

Our suite of products encompasses HMI/SCADA, data collection, controllers, process systems and production management to

help you transform your energy operations into a truly information-based business. Built on an open and layered platform, our products are modular, configurable and scalable—addressing today's needs and those of tomorrow.

Reliability

Setting the standard for reliability worldwide, our Mean Time Between Failure (MTBF) figures are measured in decades, and we calculate them using real-world returns for an accurate and realistic indication of reliability. Our use of proven methodologies such as Six Sigma and Lean techniques has resulted in highly reliable hardware such as our PACSystems*.

Global customer support

Starting from the moment we are engaged with your project to its successful completion and launch, we never forget that uptime is directly correlated to your profits. With a global presence, we can provide you with local and prompt support to minimize downtime.

Trusted GE brand

As a GE company, we are bound to the same ideals that have made GE one of the most trusted names in the world.

Ecomagination

Building on our culture of innovation, GE launched "ecomagination," our companywide commitment to introduce new technologies that help customers meet pressing environmental challenges. We are committed to doubling our research investment in cleaner technologies to \$1.5 billion annually by 2010, up from \$700 million in 2004.

Scalable, centralized and secure

To help operators manage and optimize remote assets, our Proficiency-based SCADA solutions can manage multiple assets from a centralized location.

Based on years of proven experience of remotely managing a fleet of GE Turbines, GE has developed robust solutions that get the required information to the right people at the right time for intelligent decision making—delivering the information you need for your tactical operations, financial operations, and critical analysis and optimization.

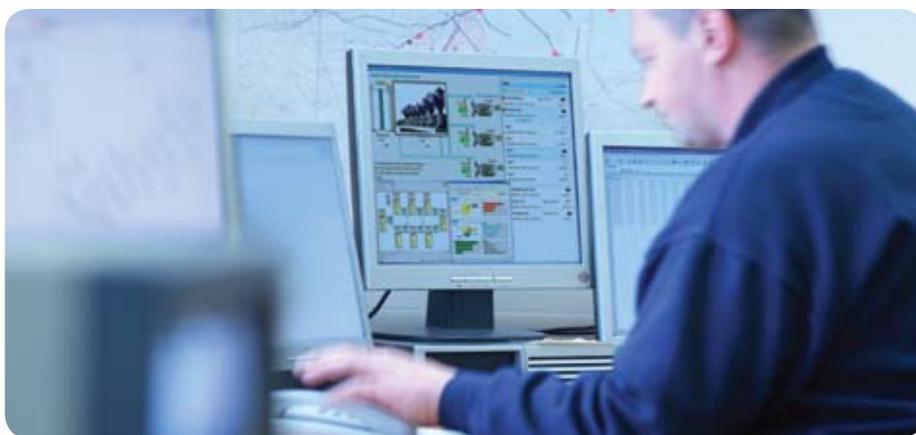
Tactical operations encompass the typical traditional SCADA functions: presentation of key parameters, trending of key parameters, alarm and diagnostic information, operations of set points and exception management.

Financial operations enable information integration with financial and billing systems. Information such as grid delivery, grid quality, non-revenue energy and non-productive asset time can be transferred to systems like SAP—enabling greater insight on performance.

For **analysis and asset optimization**, we offer production intelligence through advanced multi-variable analysis, long-term multiple asset comparisons and auto-optimization algorithms, in addition to standard interfaces for maintenance packages—providing improved performance visibility.

On Site Monitoring (OSM)

Local on the asset, for example a wind farm, we offer a PC-based or controller-based OSM solution that delivers:



- Connectivity to the different information sources of the asset, for example a weather station
- Secure connectivity to a centralized SCADA system, allowing tactical operations
- Historical information collecting, storing and forwarding to the centralized SCADA node
- Optional local operations

Depending on the size of the asset, you can implement an OSM in a simple or redundant configuration.

Centralized SCADA system

Our centralized SCADA system communicates to all assets and contains real-time and historical data, and manages all user and security rights. Local or remote users can access the system in a controlled manner for maximum protection and efficiency.

Secure communications and advanced analytics

You can rely on our OSM and centralized SCADA system solutions, which leverage secure, encrypted communications and help comply with NERC (North America Electricity Reliability Corporation) regulations for both energy generation and energy transmission and distribution.

Furthermore, you can perform real-time and historical ad-hoc analysis because our solutions deliver normalized, consistent and meaningful context across your plant and throughout your enterprise—enabling the intelligence needed for improved throughput, quality, performance and profitability.

Our focused areas of expertise

Tap into proven solutions that help streamline your energy operations and enable improved control, management and optimization of your renewable energy assets.

Wind power

With the fast-growing demand for wind energy and the increased use of wind turbines in environmentally challenged locations, it is critical to implement solutions that offer reliable and secure monitoring and operating of assets. Our range of solutions meets requirements for the control of wind turbines, including pitch control and operational management, both tower or nacelle based.

Low-end controller for wind turbines below 1 MW. Providing an optimum between cost and versatility, GE's VersaMax[®] Modular controller in combination with QuickPanel[®] offers a local HMI to operate the windmill locally as well as the capability for remote monitoring and operations. With a built-in historian and OPC connection, information can be seamlessly transferred to a centralized SCADA system.

Mid-range controller for wind turbines between 1 MW-5 MW. With GE's PACSystems controller, you can leverage advanced control capability for pitch, generator and auxiliary control. Due to its large memory capacity (64 MB), one controller can act as the central wind farm master and ensure all communication to a centralized SCADA system. Different interface standard possibilities such as Profibus, DeviceNet and Modbus TCP/IP, enable easy integration with other devices like weather stations.

→ For harsh environments such as offshore applications, GE provides I/O and control solutions with G3 corrosion protection, 5G vibrations and 30G shock specification, plus a temperature range of -40 to +70 degrees Celsius.

Helping you manage cleaner, more reliable and efficient energy sources, our solutions provide the building blocks for infinitely scalable and diversely configurable solutions that seamlessly integrate your data—from a single asset to the entire fleet.



Biomass - Biogas

For biomass, we offer reliable and cost-effective solutions for boiler systems up to 2 MW through complete waste incineration plants up to 1 GW. For smaller biomass boiler systems, our Versamax[®] controller combines ease of use with incredible processing power that allows advanced control algorithms and integration into a centralized SCADA system. For larger biomass energy plants, our Proficy Process Systems provides a single integrated solution for the fluidized bed boiler, steam turbine and auxiliary control.

For capturing and converting biogas energy, Proficy Process Systems is a scalable solution for biogas energy applications between 1–10 MW, providing easy integration of a biogas power plant control system with the treatment facility control system, especially for anaerobic water treatment plants.

Solar

High accuracy, minimal maintenance and long life expectations are key for solar tracking systems used in both Photovoltaic and Concentrated Solar Power (CSP) installations. Based on our highly reliable FANUC servo system technology, our motion controller, PACMotion[®], accurately follows the sun solution with no need for re-calibration for both single axis and dual axis systems.

The absolute encoder is built into the servo motor, and the drive system is connected using fiber optic with a maximum distance of 400 meters from the controller unit. The use of advanced servo motors, which are IP-67 rated, ensures accurate positioning and eliminates the need of additional brakes.

Tidal

Our experience in marine and offshore applications helps suppliers of tidal and

wave installations deliver highly reliable automation solutions—a key factor why suppliers turn to us.

Our PACSystems is a flexible control solution where the application can be developed using object-oriented programming based on IEC61131-3 languages with the option for function blocks developed in C—allowing for quick and easy migration.



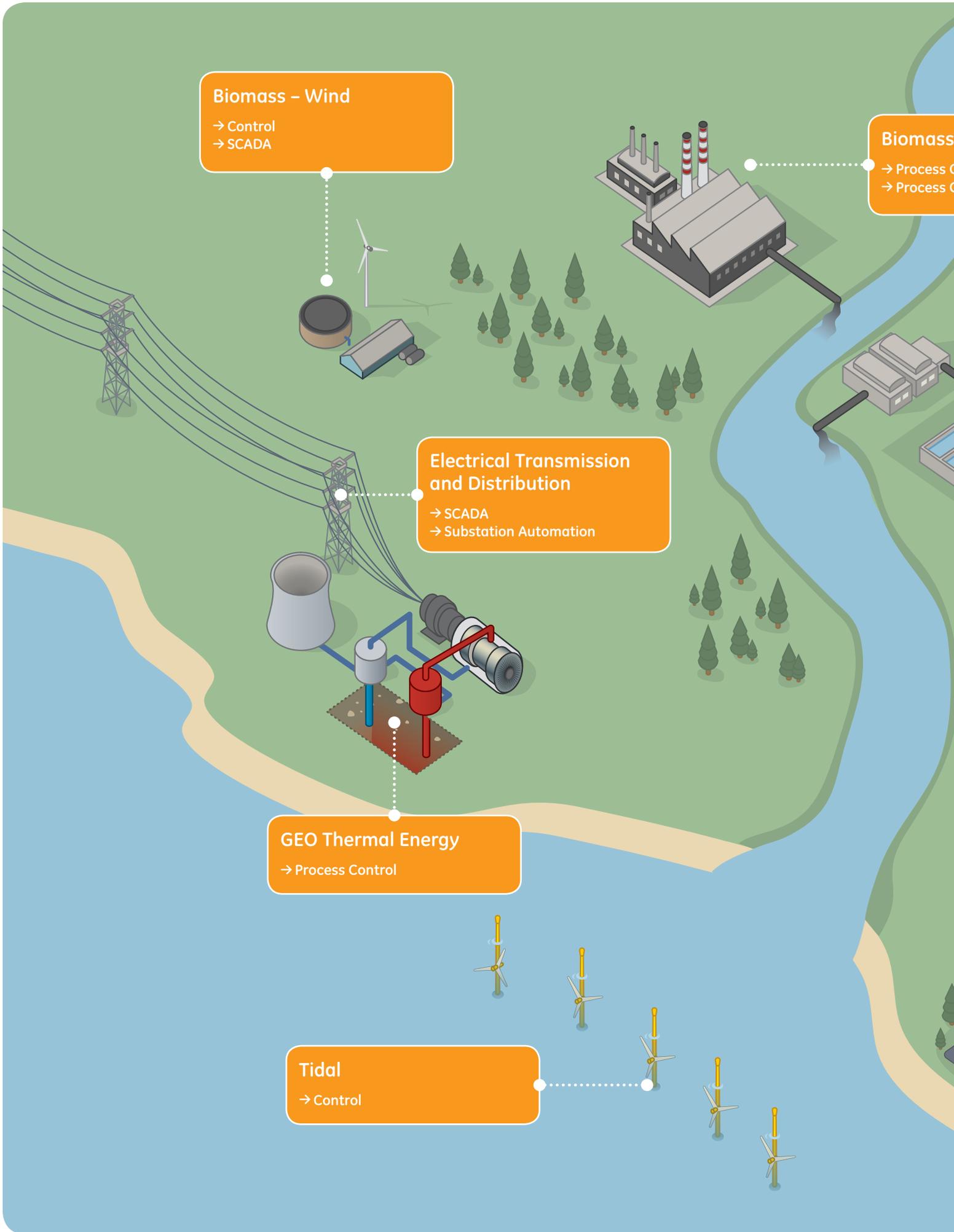
Biomass – Wind
→ Control
→ SCADA

Biomass
→ Process C
→ Process C

Electrical Transmission and Distribution
→ SCADA
→ Substation Automation

GEO Thermal Energy
→ Process Control

Tidal
→ Control



Control
Optimization

Wind Farm

- Control
- SCADA
- Optimization
- Wireless Communication

Biogas

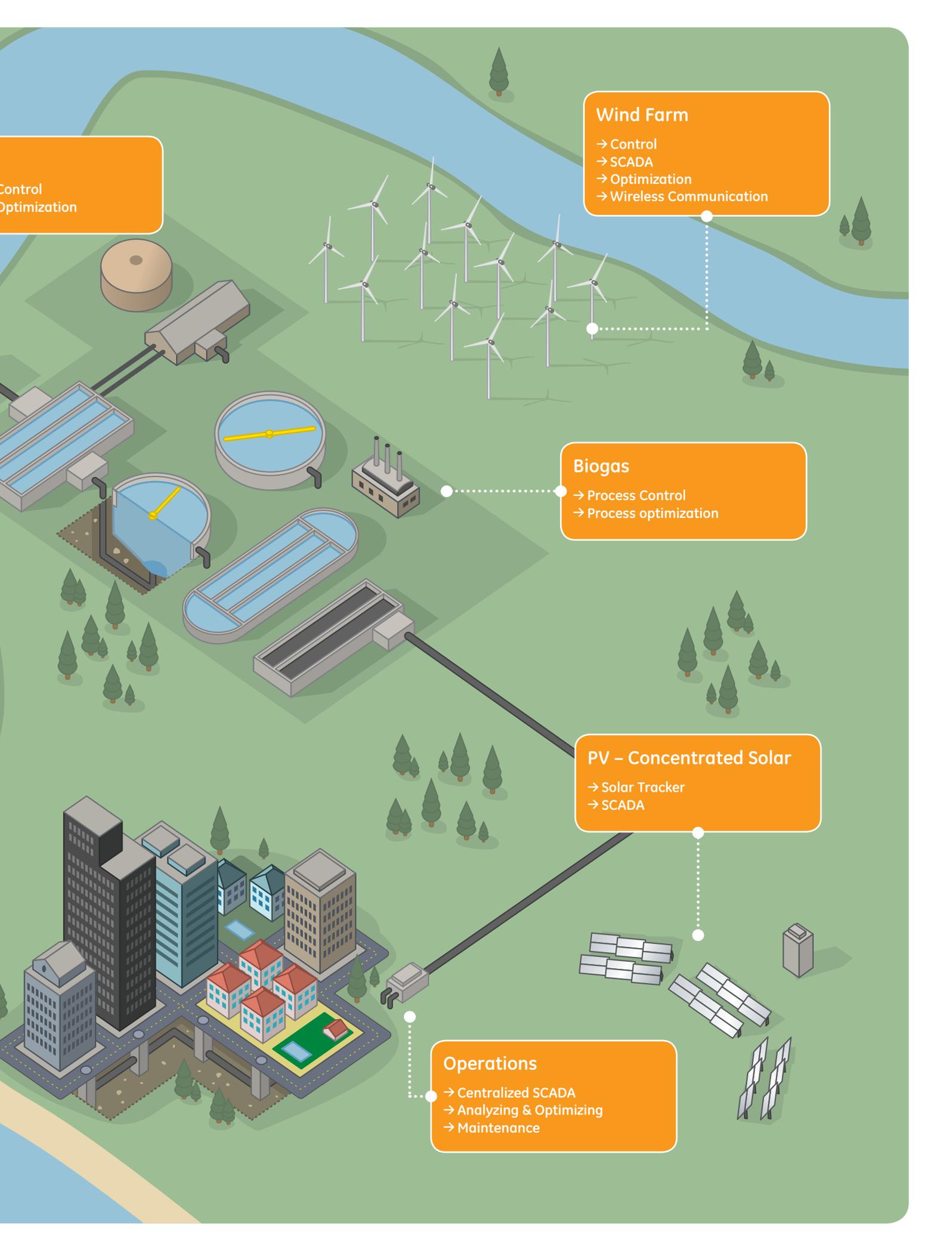
- Process Control
- Process optimization

PV – Concentrated Solar

- Solar Tracker
- SCADA

Operations

- Centralized SCADA
- Analyzing & Optimizing
- Maintenance





GE Intelligent Platforms Contact Information

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Global regional phone numbers are listed by location on our web site at www.ge-ip.com/contact

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