



**INTEGRATED POWER
SYSTEMS FOR
UTILITIES AND
POWER PLANTS**



“The C175-16 is extremely efficient in terms of fuel, and all technical parameters are acceptable.

Overall, we are very pleased with its performance. It has replaced the 3516 generator sets well, and is helping us generate revenue.”

– Justin Providence, Mustique Company Technical Manager



EFFICIENT ENERGY FOR ST. VINCENT AND THE GRENADINE ISLANDS

Mustique Company, a utilities and power supply source for St. Vincent and the Grenadine Islands, wanted to update their aging power systems. Loyal Cat clients for more than 40 years, they contacted a Barbados Cat dealer, RIMCO.

A Cat C175-16 generator set was selected for the plant. It would offer improved efficiency and fit facility space, shared with existing Cat 3516 generators. With less installation and fewer accessories, a Cat C175-20 was also installed to match previous power output.

IT'S OUR JOB TO PROTECT YOURS.

From remote islands to densely populated cities, people depend on you to provide electric power to live, work and play. Let the Cat® team help you find a total power solution that delivers the 100 percent uptime utilities and power plants require. That includes backup power to ensure that power is never interrupted for even a second.

We serve hundreds of utility and power companies across the globe but, like fingerprints, no two are the same. From compliance and regulations to powering sophisticated equipment, your unique challenges and every critical item on your checklist drive the design of your power system.

Once we assess your specific situation, we will develop a fully integrated power system – including automatic transfer switch (ATS), uninterruptible power supply (UPS) and switchgear – designed to operate and work seamlessly together. And we will tailor each component to develop a fully optimized system, including attachments and performance options to meet your specific application. That's why utility companies and power plants around the world rely on Cat power systems.

DIESEL GENERATOR SETS

CAT DIESEL GENERATOR SETS
12 TO 17,460 KW / 15 TO 21,825 KVA



ADVANTAGES TO YOU :

- Powered by Cat engines for the reliability you demand
- Wide range of factory-designed options to meet your requirements
- Easy to specify, permit, install and test
- Low life cycle costs
- Excellent transient response and steady state performance
- Emissions compliance with most worldwide regulations
- Single source and turnkey support from the Cat dealer network

To keep homes, businesses and communities functioning properly, you need to be sure your power source is never compromised. We are a leader in the manufacture of diesel and gas generator sets and mission critical applications with more than 450,000 kW installed in utilities and power plants in a single year.

We are also a leader in developing cleaner and more efficient generator sets to meet the increasingly stringent global emission requirements. Our focus on optimized engine performance to achieve lower emission levels has resulted in more cost-effective solutions for you.

Whether you install a Cat generator set for continuous or standby use, your facility will be protected with consistently reliable performance. Our engineering programs demand some of the most stringent testing requirements in the industry, which means that the products are manufactured to run for thousands of hours without overhaul.

Utilities and power plants can reduce operating costs by implementing a combined heat and power (CHP) system. Cat generator sets can simultaneously provide electricity for electrical loads and convert waste heat into a server cooling source via absorption chillers. The result is a power system with energy efficiency up to 90 percent, reduced energy costs, smaller carbon footprint and Energy Efficiency Points toward Leadership in Energy and Environmental Design (LEED) Certification.



RESTORING POWER TO SAMOA

The Satala power plant was destroyed by a tsunami in 2009, eliminating 18 MW of power to the island of American Samoa. A flexible, modular system was needed to provide temporary power until the Satala plant could be rebuilt – and then be redeployed afterward. • Cat dealer Hawthorne Power Systems designed a fully integrated power system including 11 Cat 3516C diesel generator sets. Housed in custom-built, fully stainless steel containers to meet the demands of a tropical location, these Tier 2 generator sets run on ultra low sulfur diesel fuel to reduce emissions. The Cat power system provided reliable, efficient power generation to the Pacific Island residents – a solution that can be confidently replicated for other tropical environments.

GAS GENERATOR SETS

Electric utilities can operate gas engine generators continuously to serve base electrical loads. This is particularly advantageous in the absence of a reliable centralized power plant, or where the economics and availability of natural gas fuel are key drivers.

Gas engine generators are also commonly used to handle peak loads. Spikes in demand for utility grid electric power typically occur in the early morning before the workday, and in the late afternoon after the workday ends. Most people can relate to getting home from work and immediately flipping the light switch, turning up the heat or air conditioning and tuning in to the local news on television. When thousands of people collectively engage in the same behavior, large spikes in power consumption occur for a relatively short period of time. Some utilities choose to enter into long-term power purchase agreements to own a reserve block of power to address these intermittent spikes. However, this approach can lead to unnecessary base load capacity, driving up costs for the utility and its customers.

Caterpillar customers receive expert consultation on how to design, install and maintain power plants intended for utility applications.

CAT GAS GENERATOR SETS 66 TO 6,520 KW



ADVANTAGES TO YOU :

- Reduced energy costs
- Efficient use of resources
- Increased revenue opportunities



BALANCING ENERGY DEMANDS IN UTAH

Heber Valley in Utah experienced rapid growth, and with it came an added need for energy. Power demands are also inconsistent, with seasonal peaks and a higher use of electricity in the evening. Heber Light & Power needed to generate their own cost-effective power to compensate for fluctuating demands – an alternative to purchasing high-priced energy during the spikes. • The utility decided on eight Cat generator sets, ranging from a 650 KW G399 all the way up to three G3520Cs, delivering up to 31 MW of power.

POWER PLANTS

Whether you're powering a factory or an entire community, you need an energy source you can trust, engineered with sustainability in mind. Caterpillar is a leading supplier of medium-speed generators, with more than 140 GW installed worldwide. We're making reliable power possible – across the globe. And we're committed to partnering with you from start to finish to make your project a success.

We have 60 years of experience in engineering power adaptable to your climate, location and workload. If it's interconnected or captive power, simple cycle or combined cycle, or combined heat and power that you need – Caterpillar has it. Our plant outputs range from 10 MW to more than 200 MW, scalable to any job and made to work as hard as you do. We offer flexible fuel options including heavy fuel oil (HFO), crude oil, natural gas, raw vegetables, animal fats, and even dual fuel capabilities, so you can utilize accessible resources.

We offer operation and maintenance agreements that can be tailored to your individual needs. We can also provide excellent training to your staff to help them operate your plant as efficiently as possible.

ADVANTAGES TO YOU :

- Wide range of power capabilities
- Easy to specify, permit, install and test
- Layout options to fit spatial constrictions
- Excellent transient response and steady state performance
- Fuel flexibility
- Low life cycle costs
- Global emissions compliance



IMPROVING ENERGY SUPPLY IN THE DOMINICAN REPUBLIC

Increased demand for reliable electricity coupled with economic growth in the Dominican Republic prompted the development of the Monte Rio power project. The joint venture resulted in the construction of a 100 MW power plant consisting of 13 Cat 9CM43 heavy fuel, oil-fired, reciprocating diesel generator sets. Electricity produced by the Monte Rio power plant is sold to the Dominican Republic's electric power utility grid, providing reliable power to more than 125,000 homes and businesses. The project has successfully reduced blackouts and burnouts, significantly improving the quality of life in the southern part of the Dominican Republic.

INTERNATIONAL POWER PROJECTS (IPP)

International Power Projects, also known as short-term distributed generation projects, represent an effective solution for utility companies and larger scale utility consumers that are experiencing temporary gaps in their power supplies. In most cases, a distributed generation plant is connected to the existing utility grid at voltages ranging from 14 to 225 kV. However, a plant can also operate as its own utility grid when required – in isolated locations, at remote mines or on large construction sites, for example. The contract period for these projects typically ranges from three months to three years.

There are many reasons why this can be an attractive solution for businesses experiencing short- or medium-term power supply gaps. The primary benefit is fast deployment time. Typically, 50- to 100-MW projects can be delivered 120 to 180 days from contract signing. In extreme situations, this timeframe can be dramatically reduced. For example, one of our Global International Power Projects Providers recently delivered 120MW within 40 days of contract signing.

Other benefits of an International Power Project solution include; limited to no long-term system risk, flexible site location, flexible fuel options, flexible interconnect voltage options and ability to deploy large blocks of power without capital expenditure.

Caterpillar is a global leader in the International Power Project business. We stand ready to serve you with an extensive worldwide inventory of diesel and gas powered mobile generators and a vast network of Global International Power Projects Providers. Let us put our global resources and expertise to work on your behalf, helping you overcome temporary power shortages and ensure business continuity.

ADVANTAGES TO YOU :

- Fast deployment of power from 10 MW to 1 GW
- No long-term system risk
- Flexible site location
- Flexible fuel options
- Flexible interconnect voltage options
- No capital expenditure required



SUPPLYING QUICK POWER TO CYPRUS

An explosion at an ammunition plant in Cyprus damaged the country's 640 MW power plant. With rolling blackouts, they were declared to be in a state of emergency and the Electric Authority of Cyprus (EAC) immediately requested bids for 95 MW of power. Forty-two days after a contract was signed, Cyprus had 95 MW of Cat power online. The EAC chose two sites for the distributed generation – 60 MW at Dhekelia and 35 MW at Moni. Both were near existing power stations for easy utility interconnect. Equipment was shipped from several countries and included diesel power modules, 480 V/13.2 kV transformers, 11 kV switchgear and breakers, low-voltage cable, medium-voltage cable, all control cabling, mobile fuel tanks, fuel treatment skids and fuel metering.



UNINTERRUPTIBLE POWER SUPPLY (UPS)

Surges, sags, spikes, failures – your community can't tolerate any of these. The Cat UPS with flywheel or battery (double conversion) energy storage provides immediately available power to ride through disturbances and conditions power from the source.

1) Advantages of the flywheel UPS to you:

- Lower operating/maintenance/replacement costs
- Smallest available footprint
- Complete system capable of operating at 40°C; no need to up-size HVAC systems
- Industry leading Total Cost of Ownership

2) Advantages of the double conversion UPS to you:

- Lower initial capital investment
- Ability to support extended and ride through requirements
- Continuous control of UPS output sine wave
- Up to 94 percent total UPS system efficiency
- Electrical isolation between input and output

PARALLELING SWITCHGEAR

The amount of control you require varies from application to application. That's why, for simple or complex applications, Cat switchgear provides paralleling capability for multiple generator sets, with single or multiple points of utility connection.

3) Advantages to you:

- Available 208 V to 35 kV
- Intuitive and easy-to-use graphical operator interface (minimizing potential for operator errors, and integrating other elements of your Cat system such as generator sets, ATS and UPS)
- Redundant communications bus and distributed control processing ensure the utmost in reliability for electric power applications
- Automated reporting capability, including generation of custom reports and real-time power use effectiveness (PUE)
- Available in a broad array of configurations, including highly customized designs specifically developed to address specific site requirements

AUTOMATIC TRANSFER SWITCH (ATS)

To ensure you have the power you need, a fully integrated system designed to operate together is crucial. And if your first indicator – your ATS – isn't reliable, your entire system can be compromised. Caterpillar offers you a broad range of transfer solutions and ATS products designed for mission critical applications.

These transfer schemes can be arranged to suit any application from simple to highly complex multiple ATS/generator set switchgear systems.

4) Advantages to you:

- Available in sizes from 40 to 5000 amps in 2, 3 and 4 pole configurations
- Contractor and circuit breaker-based solutions for flexible coordination
- Open, closed and delayed transition designs available to meet your specific needs
- Bypass/Isolation type ATS (UL/IEC type)
 - ATS and bypass mechanisms rack in/out with door closed to maximize operator safety
 - Bypass operation accomplished with door closed, again maximizing operator safety
 - Load is not interrupted during bypass operation
 - Interchangeable ATS and bypass mechanisms provide the utmost in redundancy
 - Full automatic mode functionality is maintained with ATS in bypass

PACKAGING SOLUTIONS

No matter how remote your location, a custom package containing Cat electric power equipment can meet your project specific needs in any environment. We have dedicated resources to help provide solutions for your most complex design issues. Caterpillar can provide the flexible resources to design and procure custom parts not available in our standard price list, so that you can meet and exceed your project goals.

5) Advantages to you:

- Accountability for entire package and system integration
- Complete set of documentation from a single provider
- Reduction of inventory carrying costs and labor resources
- Ability to leverage global Cat parts and service network
- Worldwide warranty



YOUR CAT DEALER IS HERE WITH THE ANSWER.

Cat dealers are committed to cost-effective, quality controlled, fast turnaround service. Their service facilities represent a substantial investment in plant, tooling, diagnostic and testing equipment – as well as in people.

Combined, Cat dealers have over 140,000 employees and more than 75 percent are engaged in product support to help customers attain maximum value and reliability from their Cat products.

You can count on technical assistance being just a phone call away 7 days a week, 24 hours a day. Cat dealers are committed to having someone at your facility within two hours of a reported problem. On average, there is a service location within a 35-kilometer (20-mile) radius of every one of our customers' facilities. Cat service, along with unparalleled parts availability, helps us ensure the long-term reliability of your Cat power system.

ADVANCED ELECTRICAL SERVICES

Along with proper configuration and installation of your power system, Cat dealers are also equipped to coordinate your necessary long-term electrical system maintenance, testing, retrofit and engineering service needs such as infrared thermography, circuit breaker testing and arc flash studies. You can depend on us to be your partner for all electrical power servicing needs before, during and after the installation of your electrical system components.

Cat dealers are in full compliance with global and local regulations to minimize the risk for personal injury or product damage. Proper testing and maintenance from your Cat dealer can minimize your exposure to major financial risks, legal risks and regulatory violations caused by unexpected downtime.

ELECTRIC POWER RENTAL FLEET

From planned events to unplanned power outages, having a temporary power plan in place is crucial to ensuring you have power when you need it. Dealers carry a large equipment inventory (including generator sets, temperature control, chillers, load banks, ancillary equipment) and all dealers work together – 1,600 locations strong. That means your dealer is never "rented out." Make one call and your equipment is on the way no matter how many, how soon or for how long. Your dealer does the legwork, backed by the worldwide strength of Caterpillar, to get your equipment delivered, installed, fueled up and ready to run.

Our electric power rental fleets offer experienced technicians and engineers to help support your utility power plant in managing emergency contingency plans.

PEACE OF MIND. EVERY SINGLE DAY.

Your power system simply cannot fail. To ensure that you are able to maintain your system simply and affordably, we offer Extended Service Coverage, Customer Support Agreements and unparalleled parts availability.

EXTENDED SERVICE COVERAGE

Your Extended Service Coverage offers transferable coverage beyond the standard warranty period, for all Cat branded electric power equipment. Extended Service Coverage protects against unexpected repair bills and a hedge against rising parts and labor costs by providing 100 percent parts and labor reimbursement for covered components, less any applicable deductible. The broad range of coverage options, which can be customized to suit your individual needs, combined with simple pricing terms provides confidence and peace of mind toward your power system's performance.

CUSTOMER SUPPORT AGREEMENT

Your Customer Support Agreement is an individualized arrangement between you and your Cat dealer that helps you maintain your products while lowering your cost per unit of production, regardless of the size or age of your product. Agreements are tailored to fit your business needs and can range from simple preventive maintenance kits to sophisticated total cost performance guarantees. No matter which option you choose, you can be assured that your Cat dealer will provide you with the careful planning and ongoing attention that will help you succeed.

PARTS AVAILABILITY

Your Cat dealer is equipped with a parts inventory and access to the global Cat parts network to fulfill 98 percent of parts orders within 24 hours from the time of order. We know that having the right parts on hand is crucial to keep your power system running, so we also provide 24/7 access to information at parts.cat.com. Here, you will find videos, reference material and specs on Cat original, Classic™ and remanufactured parts, as well as information on repair and maintenance parts for your Cat electric power products, all manufactured to original equipment specifications and recommended by Caterpillar.



LEXE0568-00 April 2013

CAT, CATERPILLAR, their respective logos, Classic, "Caterpillar Yellow," the "Power Edge" trade dress, as well as corporate and product identity used herein, are trademarks of Caterpillar and may not be used without permission. © 2013 Caterpillar. All Rights Reserved.



A man with a mustache, wearing a yellow hard hat and dark sunglasses, is looking towards the camera. He is wearing a light blue denim button-down shirt with a logo on the left chest pocket. The background is a complex industrial structure, likely a power plant or substation, with metal beams and electrical components. The image has a yellow horizontal bar at the bottom.

INTEGRATED POWER SYSTEMS FOR UTILITIES AND POWER PLANTS

