



Power Generation Capacity Town of Richlands, VA

04/15/2023



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Executive Summary

Company History

At Quantum Power, established in 2019, we are more than just a company--we are a family of passionate individuals who are dedicated to creating a brighter, more sustainable future for all. Our main office is located at 119 N. Main St., Mooresville, North Carolina—we are proud North Carolina residents. As the esteemed founders of Quantum Power, Mark Romano, Jay Shott, Joshua Drake, and Benjamin Vanhook are dedicated to driving the energy industry forward by championing innovative and lucrative energy-recovery technologies. We are proud to present a highly skilled team to Richlands, Virginia, including a former NASA engineer who previously contributed to the combustion systems for the Space Shuttle.

In stark contrast to the traditional approach of extracting only reusable materials from manufacturing processes and resorting to landfill disposal for the remainder, our vision encompasses the transformation of postindustrial materials into electricity via a clean combustion process that generates steam to drive a powerful electricity-generating turbine. Our unwavering commitment to success in this endeavor is poised to revolutionize the energy landscape and provide lasting benefits for our clients and the environment.

Over the course of two decades, we have developed a business philosophy that prioritizes treating our customers and partners with the utmost care and respect, akin to that of family members. Our foundation is built on a strong base of industry expertise, as well as the support of well-funded partners who share our vision for a better tomorrow.

Services Provided

Our experts boast over 100 years of combined experience providing combustion, power production, air quality control systems and regulatory compliance to various regions across North Carolina. Quantum Power possesses the resources to meet the requirements stated in the RFP; we are further supported by our expert team's broad experience in the renewable energy sector. We create renewable energy solutions using industrial byproducts that have been converted into an engineered fuel.

At Quantum Power, we specialize in generating renewable energy. We provide reliable and consistent power to communities, businesses, and individuals who depend on a daily supply of electricity to maintain their quality of life. In today's world of digital applications, electronic innovations, and easy access to information, having a steady and secure source of energy is crucial to ensuring economic stability, energy security, and overall well-being.

Quantum Power's commitment to renewable energy not only helps the environment, but also provides a sustainable solution for those who rely on energy to power their daily lives.

Commitment to Environmental Sustainability

At Quantum Power, we are committed to creating sustainable energy solutions that have a positive impact on the environment. We achieve this by utilizing industrial byproducts, which are converted into a

specialty engineered fuel that is then used in a clean combustion thermal process. This innovative process generates steam that drives a turbine, producing the electricity necessary to sustain communities.

We take pride in adhering to strict environmental regulations set by the US Environmental Protection Agency and enforced by State Environmental Protection Agencies. We understand the importance of reducing our carbon footprint and take every measure possible to ensure that our operations have a minimal impact on the environment. We are eager and prepared to bring this same level of environmental consciousness and regulation adherence to Richlands.

As part of our commitment to environmental sustainability, we have implemented state-of-the-art air pollution control devices at our facilities. These devices are designed to meet or exceed regulatory standards and ensure that our operations are in compliance with all environmental regulations. By prioritizing sustainability and environmental responsibility, we are helping to create a cleaner, more sustainable future for generations to come.

We believe that our renewable energy solutions are not only environmentally responsible, but also economically beneficial. By utilizing industrial byproducts as fuel, we are reducing waste and creating a valuable resource that can be used to power communities. Our commitment to sustainability also helps to create economic stability, as sustainable industries are expected to grow and create new job opportunities in the future.

Quantum Power is dedicated to creating innovative, sustainable energy solutions that are both environmentally responsible and economically beneficial. We are committed to meeting or exceeding all environmental regulations and strive to reduce our carbon footprint at every opportunity. By prioritizing sustainability and environmental responsibility, we are helping to create a brighter future for all Richlands citizens and visitors.

In order to provide the same exemplary services for Richlands, Virginia, we propose to do the following:

Methodology

In order to provide the services outlined in this RFP, we will conduct thorough research of the technical requirements of the project, followed by investigation, consultation, and implementation compliance. Our specialists will collaborate closely with the Town to find efficient and successful solutions for Richlands. Below, we have briefly discussed the methodology under which we provide our services:

Monitor Power Output: We currently possess one 3MW generator that will be powered by industrial byproduct that is converted into engineered fuel. This fuel is used in a clean combustion process that creates steam to power electricity generating turbines. This process adheres to strict environmental regulations created by the US Environmental Protection Agency.

In addition to this, the 4.6 MW natural gas fired turbine generator we recommend for this application should be protected by a service agreement that limits the number of major repairs during the life cycle of facility. This limits the number of repairs that need to be done during the transition. Our highly qualified staff is committed to understanding the full capabilities of our technologies.

Our recommended turbine generator is capable of outputting 4.6 MW of power, meeting the power supply needs of the Town of Richlands electric system.

Manual and Remote Starting options: Our state-of-the-art generators have the capability for both manual and remote starting. This provides us with total control of when our generators are powered and of our outputs.

Metering system: Our generators are equipped with a meter that can be linked to other systems, including to the Town of Richlands metering system. This allows our technology and service contract provider, Solar Turbines Inc., to accurately track and report of the power output of the generator. Upon contract award, we will deploy our experienced personnel to assess the needs and requirements of this project, creating a timeline for the process of linking the two systems. This process will

involve creating a system that tracks and monitors power production in real time.

Consistently monitoring outputs allows us to ensure that we are both using power efficiently and proactively preventing outages. This is an integral step in ensuring our communities have reliable access to electricity.

Engine efficiency: Our proposed generator system for the Town of Richlands has an energy efficiency rating of 37.8%, which meets the minimum efficiency rating of 35%. This score ensures that the facilities are optimized for sustainable fuel consumption and provide a more ecologically sustainable solution than fossil fuel-based alternatives.

In addition to the previously outlined strategies, Quantum Power Inc. is fully committed to maintain and support the proposed services to ensure a smooth transition. This will include providing our highly-experienced personnel to provide support during all stages of the implementation.

Key Personnel

Our operations will be led by highly qualified professionals who have strong backgrounds in energy conservation and power production and thus have a deep understanding of renewable energy industry developments. Below you will find a list of our key personnel and stakeholders who will oversee this operation and facilitate our provided support for the Town of Richlands upon contract award.

Quantum Power was founded by a group of highly successful business leaders with a shared passion for sustainable energy production and a commitment to environmental responsibility.

At Quantum Power, our mission is to transform recyclable materials into sustainable energy, thereby reducing the amount of waste in landfills and promoting a cleaner, more sustainable future. Our vision of

environmental responsibility and energy sustainability is underpinned by the expertise and passion of our founders. We are committed to advancing our mission through innovative renewable energy solutions and are excited about the positive impact we can have on the world.

Mark Romano, President, Founder

Led by President Mark, whose extensive experience in energy efficiency and production spans numerous years, the founders have a diverse range of expertise in business, technology, and real estate.

Mark's expertise and passion for energy conservation and power production led him to become a founding member of Quantum Power, Inc. (QPI) in 2020, alongside esteemed investors. With over 20 years of experience in energy operations, Mark's successful background includes founding Fan Man Inc., a leading business specializing in home energy efficiency and solar power generation. Mark's exceptional business experience is bolstered by his degree in business management from East Carolina University. As a seasoned professional in the energy industry, Mark's extensive knowledge and experience make him an invaluable asset to QPI and any other organization seeking a leader in the field of energy conservation and power production. Mark currently oversees and manages all aspects of Quantum Power projects.

Zachary Romano, Executive Vice President

Zack began his career with QPI as a Strategic Consultant, responsible for knowledge consolidation on various energy recovery technologies, renewable energy industry developments, and crypto-currency mining. Zachary holds a bachelor's degree in Business Administration/Management from Marshall University. After graduation, he became Vice President of Sales for a family-owned construction company, Roofing by Romano, where he was instrumental in day-to-day sales, operations, and revenue growth. Zack became General Manager for Heritage Equipment, a commercial truck dealership, where he was responsible for overall dealership operations, development, and implementation.

Joshua Philip Drake, Partner, Founder

Joshua Drake has a decade of experience in investing in energy-recovery technologies. He played a crucial role in helping his family build Franklin-based Drake Software into a top-tier provider of professional tax preparation software.

Joshua has a strong background in management, marketing and investing. He is an ambitious and active professional with a Bachelor of Science degree in Business from Bryan College. From 2002-2005, he was employed as the manager of Franklin Factory (previously Fun Factory in the Smokies – a family entertainment center.) Since 2006 Joshua has held the position of Vice President of Marketing for Drake Software. He served from 2009-2013 as the Vice President of Education for Drake Software

Benjamin Vanhook, Owner/Partner, Founder

Entrepreneur Benjamin, a co-founder of VanDrake Investments, has extensive experience in real estate development and construction. He has also taught and coached high school athletics while building a successful real estate business.

Benjamin is an entrepreneur and an established businessman from Western North Carolina. At the age of 19, he started his first company and aided in its growth until it was sold for a significant profit when he was 22. Benjamin taught math at the high school level, and coached high school athletics for three years while launching a real estate and construction company; these companies continue to thrive in Western North Carolina. In addition to these business ventures, he is the co-founder and head principal of VanDrake Investments, LLC, a diversified company that specializes in real estate development and various investment opportunities. VanDrake Investments has started and invested in several businesses in Franklin, North Carolina, to spark economic growth for the principal's hometown. He graduated with honors in Math Education from Western Carolina University.

Jay Shott, Owner/Partner, Founder

Jay, brings a wealth of experience in real estate development and management through his involvement with Diamondback Property Inc. and its parent company Zip Properties Inc. He is also a principal owner and managing member of several other entities engaged in real estate development and capital lending ventures across multiple states.

Jay Shott is a highly accomplished project manager with a proven track record of delivering complex projects on time and within budget. With over 10 years of experience in project management, Jay has honed his skills in team leadership, risk management, and stakeholder engagement. He possesses a unique ability to balance business objectives with project constraints, resulting in successful outcomes that meet both client and company expectations. Jay has worked with a diverse range of clients across various industries, including healthcare, technology, and finance. His business acumen, coupled with his project management expertise, make him a valuable asset to any organization seeking a results-driven professional.

John Sudnick, Engineer

John boasts over 35 years of experience in combustion, heat transfer, and air pollution control, with a particular focus on coal fired and alternate fuel boilers, thermal and catalytic oxidation systems, and various collection and recovery systems. With a wealth of expertise under his belt, John has successfully designed and overseen a multitude of energy and environmental projects, such as optimizing pulverized coal boiler combustion systems to reduce NOx emissions, designing preliminary fluidized bed alternate fuel boilers, and developing HAP combustion control and NOx reduction systems. Additionally, John has extensive experience across a range of industries, including specialty chemicals, pharmaceuticals, pulp and paper, glass, and metals.

Capability

In addition to our current operation, we are also in the process of erecting an Engineered Fuel Power Plant in Cleveland, NC. This facility will divert 200 tons a day of industrial waste streams from the landfill. These waste streams are then converted into an engineered fuel feedstock, that will then be converted into steam and ultimately electricity. Our proposed facility will use waste streams converted to engineered fuel to meet Cleveland County's [1] [2] demand for a clean and sustainable energy source. In addition to this, the creation of this new facility will create over 25 job opportunities, creating roles for professionals such as technicians, engineers, and power generation specialists. This opportunity allowed us to develop engineering, procurement, and construction skills, which can be transferred to better provide the necessary services for those outlined in the RFP.

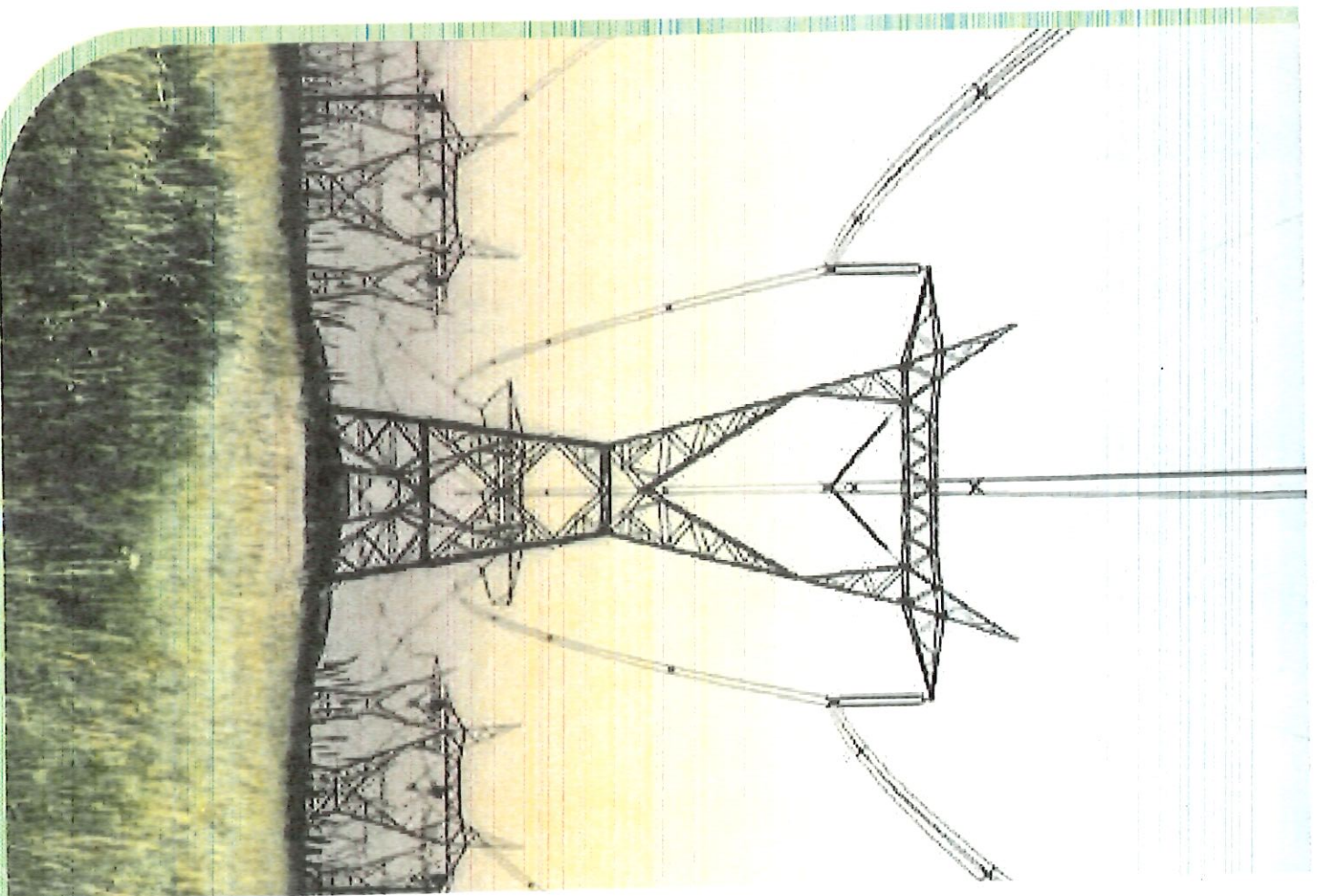
While Quantum Power Inc. has not provided services to federal, state, or local governments, we do have experience providing services to 5 private clients and businesses. We fully believe that our experience providing these services and technologies to our current list of clients can be applied to governmental agencies, if needed. In addition to this, we are fully committed to meeting any necessary qualifications to service governmental entities. We intend to apply the necessary research and attain the required qualifications to support these entities.

Previous Experience

Cryptocurrency mining consumes significant amounts of electricity, making it an energy-intensive operation.

At the Bluestone Location in Tazewell County, we at Quantum Power provided comprehensive EPC (Engineering, Procurement, and Construction) services for a mining operation with a 3MW load. Our team worked closely with AEP to identify the necessary improvements and equipment required for the mining facility, and we successfully purchased and installed all the necessary equipment on time and within budget.

Our ability to collaborate effectively with partners like Bluestone Industrial Park and AEP allowed us to develop and implement innovative strategies for a successful project outcome. We are committed to continuing to provide environmentally conscious solutions for our valued partners.



Technical Solution Overview

Proposed Technical Solution: Solar Mercury 50

The Solar Mercury 50 natural gas-fired turbine and generator is a reliable, efficient, and flexible solution for power generation. Using natural gas as a fuel source makes it an environmentally friendly solution, while its high efficiency and low fuel consumption make it an economically viable option. With a continuous power output of 4.6 MW, the Solar Mercury 50 meets the Town's minimum and maximum continuous power output requirements. This turbine is an ideal solution for medium to large-scale power generation. In addition, its simple design, advanced control system, and high-reliability rate make it a dependable power source that can operate for extended periods without any significant interruptions.

- ✓ The Solar Mercury 50 natural gas-fired turbine and generator is a reliable and efficient solution for power generation. Using natural gas as a fuel source makes this turbine more environmentally friendly than other traditional fuel sources such as coal or oil. Natural gas is a clean-burning fuel which produces fewer emissions than other fossil fuels. In addition, this turbine's high-efficiency rate reduces fuel consumption, making it an economically viable solution for power generation.

- ✓ This system has a simple design that is easy to operate and maintain. It features an advanced control system that allows for easy monitoring and maintenance. In addition, the turbine has a proven track record of reliability, with a high mean time between failures (MTBF) rate. This makes it a dependable power source that

can operate for extended periods without significant interruptions.

- ✓ In addition, the turbine's power output is ongoing, meaning it can operate at a constant power level for an extended period without any significant fluctuations.

The Solar Mercury 50 turbine is a flexible solution for power generation. It can operate at different load levels, making it adaptable to changing energy demands. The turbine's flexibility allows it to respond quickly to changes in power demand, ensuring that power is always available when needed.

Powered by Natural Gas

The Solar Mercury 50 natural gas-fired turbine and generator are powered by natural gas. At the power plant, the natural gas is burned in the turbine's combustion chamber, which creates high-temperature gases that drive the turbine blades. The spinning blades then turn a generator, which produces electricity.

Availability to the Town of Richlands

The Mercury 50 natural gas-fired turbine and generator is a modern power generation system with various advanced features and capabilities. One of the generator's key features is the Solar meter installed as part of the system. This meter is designed to link directly with the metering system of the town of Richlands, providing real-time monitoring and tracking of the generator's output.

Features and Application

The Mercury 50 natural gas-fired turbine and generator is an advanced power generation system designed to meet the minimum efficiency rating of 35%. This means that the generator can convert at least 35% of the fuel's energy into electricity, a high-efficiency level for a generator of this size. The Mercury 50 generator can achieve a minimum efficiency rating of 36%, with a maximum efficiency of up to 40%, depending on the ambient air temperature in the town.

The Mercury 50 generator achieves its high-efficiency rating through several advanced design features. One of the key features is the use of a gas turbine engine, which is known for its high efficiency and low emissions. The gas turbine engine compresses air and mixes it with natural gas, igniting it to create a high-temperature gas stream. This gas stream then turns into a turbine, which drives a generator to produce electricity.

Another critical design feature of the Mercury 50 generator is its advanced heat recovery system. As the gas stream passes through the turbine, it generates a lot of heat. This heat can be captured and used to produce additional electricity, improving the generator's efficiency. The heat recovery system is designed to capture as much of the waste heat as possible and convert it into usable energy.

The ambient air temperature also influences the efficiency of the Mercury 50 generator in the town. The generator is designed to operate at maximum efficiency when the ambient air temperature is cooler, around 40%. In comparison, the efficiency rating drops slightly to a minimum of 36% when the temperature is warmer. This feature ensures that the generator can operate efficiently and reliably, regardless of the ambient air temperature in the town.

In conclusion, the Mercury 50 natural gas-fired turbine and generator is an advanced power generation system designed to meet the minimum efficiency rating of 35%. Through its advanced design features, including the use of a gas turbine engine and heat recovery system, the Mercury 50 can achieve a high level of efficiency, with a minimum

rating of 36% and a maximum rating of up to 40%, depending on the ambient air temperature in the town. In addition, the generator's efficiency ensures that it can operate reliably and efficiently, providing a steady power source for s.

Metering and Output Monitoring

The Solar meter is a sophisticated piece of equipment capable of accurately measuring the amount of electricity the generator produces. This information is transmitted to the Town's metering system, which is analyzed and used to ensure the generator functions correctly. The ability to link with the Town's metering system is a crucial benefit of the Solar Mercury 50 generator. It allows the city to closely monitor the generator's performance and make any necessary adjustments.

One of the advantages of the Solar meter is its accuracy. The meter is calibrated to measure the generator's output with high precision, ensuring that the data transmitted to the town's metering system is reliable and accurate. This is important, as it allows the city to make informed decisions about the generator's operation and ensure it functions efficiently.

Another benefit of the Solar meter is its ability to provide real-time monitoring of the generator's output. This means that the town of Richlands can track the generator's performance in real time, making it easier to identify any issues or problems that may arise. This can help minimize downtime and ensure the generator can operate efficiently.

Project Overview

Siting Requirements

Utilizing existing natural gas infrastructure can provide a number of benefits, including cost savings, improved efficiency, reduced environmental impact, increased reliability, and improved public safety.

Quantum Power understands the importance and benefit of utilizing the existing natural gas infrastructure in Richlands. Utilizing this infrastructure promotes a number of benefits to the Town, including but not limited to:

- ✓ **Cost-effective:** Building new infrastructure can be costly. Utilizing existing natural gas infrastructure can save money, time, and resources, making it a more cost-effective option.
- ✓ **Efficiency:** Existing infrastructure, such as pipelines, can be used to transport natural gas to different areas. This can improve efficiency and reduce the need for additional transportation infrastructure.
- ✓ **Environmental Impact:** Building new infrastructure can have a significant environmental impact. Utilizing existing infrastructure can reduce the amount of land disruption and environmental impact associated with constructing new pipelines or other facilities.
- ✓ **Reliability:** Utilizing existing infrastructure can help ensure the reliability and security of the natural gas supply. Existing pipelines and facilities have already been tested and proven to be effective, making them a reliable option for transporting natural gas.

- ✓ **Public Safety:** Building new infrastructure can raise safety concerns for Richlands. Utilizing existing infrastructure can reduce safety risks associated with constructing new pipelines or other facilities.

Proposed Location

Quantum Power has proposed the location of 2307-2399 Jewel Ridge Road in Richlands, Virginia 24641 at 37.13827° N 81.78595° W. This location will employ an open-source pipeline with the ability to purchase natural gas from multiple providers.

Location Benefits: Open-Source Pipeline

The open-source pipeline is a cost-effective, flexible, and reliable solution for streamlining your development process.

One of the most significant benefits of access to an open-source pipeline is the ability to purchase natural gas from multiple providers. This provides flexibility and ensures that you have access to a reliable supply of natural gas, even during periods of high demand. This feature alone can save the Town significant costs associated with energy procurement and usage.

Location Benefits: Natural Gas Variable and Electrical Connection Variable

Quantum Power's proposed location is optimal for natural gas variable and electrical connection variable.

Our team of experts have identified the proposed location according to the above variables, which will provide a variety of benefits to the Town of Richlands and its residents. An optimized location allows Quantum Power to ensure reliable and consistent access to energy sources. An optimal location can help ensure that there are no interruptions or disruptions in the supply of natural gas or electricity, which is crucial for the many businesses and residential areas in Richlands.

Additionally, having access to both variables can help reduce costs associated with the installation and maintenance of gas and electrical systems. By us locating the connections in an area that is easily accessible and requires minimal excavation or construction, the Town's associated costs will be significantly reduced. An optimal location can also improve safety. Properly located gas and electrical connections can reduce the risk of accidents and other safety hazards, which can be especially important in residential areas or high-traffic commercial areas.

Finally, an optimal location for gas and electrical connections can also help to increase the property value of surrounding buildings or development. Properties that have reliable and convenient access to energy sources are typically more attractive to potential buyers or tenants, which can translate to higher property values and rental rates.

Location Benefits: Minimal Overhead Electrical Infrastructure

The proposed location will require minimal overhead electrical infrastructure to connect to the Town's existing distribution network.

One highly effective solution for the Town, seeking to connect to an existing electrical distribution network, is to choose a location with minimal overhead electrical infrastructure needs. This approach can provide numerous benefits, including significant cost savings and enhanced efficiency in the connection process.

By selecting a location with minimal overhead infrastructure needs, the Town will avoid the costs and challenges associated with installing

and maintaining extensive electrical infrastructure. This can include a wide range of elements, such as:

- ✓ Power poles
- ✓ Transformers
- ✓ Other related components

By minimizing the need for these elements, Quantum Power can keep their overhead costs low and streamline the connection process, allowing them to begin reaping the benefits of their connection more quickly.

Moreover, opting for a minimal overhead infrastructure approach can also help ensure greater reliability and resilience in the electrical system. Overhead infrastructure can be more susceptible to damage from extreme weather events, such as high winds, ice, and heavy snow. By minimizing the amount of overhead infrastructure needed, Quantum Power will help reduce the risk of such damage, thereby enhancing the reliability and resilience of their electrical system.

Minimizing overhead electric infrastructure, Quantum Power's proposed location allows the new generation capacity to be delivered onto the current distribution network. Choosing a location with minimal overhead infrastructure needs can offer a highly effective and efficient solution with the potential for:

- ✓ Significant cost savings
- ✓ Improved reliability
- ✓ Enhanced efficiency

Power Generation Facility

Design Services

Quantum Power understands that the design services to specify all components and ensure proper operation of completed facilities is a critical aspect of this project, and we are confident that we have the expertise and experience to deliver exceptional results.

At our company, we believe that success starts with a comprehensive approach to design services. Our team of experienced engineers and designers will work closely with you to develop a custom solution that meets the specific needs of the Town. We will carefully evaluate all aspects of the project, including the site location, environmental factors, and power requirements to create a design that is both efficient and effective.

Our design services include a thorough review of all components necessary for the successful operation of your natural gas generators and facilities. We will work with leading manufacturers to specify high-quality, durable equipment that will deliver reliable performance for years to come. Additionally, our team will conduct detailed assessments of your site to ensure that all systems are properly installed and integrated to deliver optimal results.

We understand that proper operation of completed facilities is of the utmost importance, and we take this responsibility seriously. Quantum Power will work closely with the town to develop a comprehensive maintenance plan to ensure that your natural gas generators and facilities continue to operate at peak performance throughout their lifespan. Our team will provide ongoing support and maintenance to

help identify and address any issues that may arise, ensuring that your system remains reliable and efficient.

Construction Documents

To ensure comprehensive and effective operation of the generator system, we will include equipment manuals supplied by the manufacturer. These manuals will offer a detailed description of the equipment and its components, including installation and maintenance procedures. We are committed to providing all necessary documentation to ensure proper use and care of the generator system.

Quantum Power has prepared a comprehensive plan to provide all necessary equipment and services to ensure reliable and efficient power generation for the Town of Richlands.

To ensure comprehensive and effective operation of the generator system, we will also include equipment manuals supplied by the manufacturer. These manuals will offer a detailed description of the equipment and its components, including installation and maintenance procedures. We are committed to providing all necessary documentation to ensure proper use and care of the generator system.

A critical component of this plan is the provision of detailed construction documents to support the proposed assets. Our team of experienced engineers and designers will work closely with the Town to ensure that all necessary drawings and specifications are provided in a timely and accurate manner.

Our design services will include the development of a complete set of construction documents, including detailed wiring diagrams and all necessary mechanical and electrical drawings. We will ensure that all interconnections between components are clearly specified and that all relevant codes and standards are adhered to.

We understand the importance of clear and concise documentation in ensuring that the installation and operation of the generators and facilities are successful. Our team will work diligently to ensure that all documents are of the highest quality and meet all necessary regulatory requirements.

In addition to providing the necessary documentation, we will also ensure that our team is available to answer any questions or concerns that may arise during the installation and commissioning process. We understand that effective communication is key to the success of any project and we will work closely with the Town to ensure that all aspects of the project are completed to the Town's satisfaction.

We pride ourselves on our ability to deliver projects on time and on budget, and we are confident that we can provide you with the highest level of service and quality.

Finally, we understand that maintaining the equipment is critical to ensuring that it continues to perform at peak efficiency throughout its life. As such, we offer comprehensive maintenance and support services to help ensure that the Town's investment continues to deliver reliable and efficient power generation for years to come.

Environmental Permits

Quantum Power is pleased to confirm that all necessary environmental permits required for the operation of generator facilities in the state of Virginia is or will be fully prepared and obtained prior to the contract start date. Air permitting requirements are generally based on estimated, uncontrolled emissions from facility operations. Using measured emission values from an evaluation of the Mercury 50 natural gas-fired combustion turbine sponsored by the U.S. Department of Energy (16th Symposium on Industrial Application of Gas Turbines (IAGT), Banff, Alberta, Canada - October 12-14, 2005), uncontrolled emissions are shown to be below levels that require a permit by Virginia Department of Environmental Protection (VA DEP).

However, VA DEP requires a permit application be submitted before they will issue an official permit exemption determination. If VA DEP decides, for any reason, to require an air permit, it will be a minor permit under the New Source Review program based on estimated emissions. Thus, air permitting requirements for the proposed system are not expected to be significant.

Our team of experts is committed to ensuring that all legal and regulatory requirements are met in a timely and efficient manner to ensure a smooth and successful project implementation.

Equipment and Warranty

Quantum Power proposes to the Town of Richlands the Mercury 50. All requested equipment, functions, and applicable features shall be furnished, as specified by the RFP. This includes, but is not limited to, the following:

- ✓ Concrete pad under generators
- ✓ Power wiring
- ✓ Control Wiring
- ✓ An option for one (1) 4000-5000 kVA, generator voltage to 12,470-volt Step-up (GSU) Power Transformer.
- ✓ Instrument Transformers as required
- ✓ Remote communications for connection to current system.
- ✓ 1-year standard warranty on all generating equipment
- ✓ 5-year warranty equivalent of a Long Term Service Agreement
- ✓ All necessary O&M Manuals

Below, we have detailed the additional features and benefits for each machine:

Mercury 50-6400R Generator

The Mercury 50 is a high-performing, industrial-grade turbine that is the perfect solution for the Town's energy needs. Equipped with a powerful, one-shaft design and an axial compressor, our turbine boasts exceptional efficiency and reliability.

What sets our turbine apart is its innovative annular type combustor,

which employs dry, low NOx technology to ensure minimal emissions (only 15 ppm NOx at 15% O₂). This not only ensures compliance with environmental regulations but also offers significant cost savings.

Our Gas Turbine comes as a fully enclosed generator set package, rated for non-hazardous locations and designed to NEC or IEC standards as appropriate. It requires 460V, 3-phase, 60 Hz AC power and includes 120V, 1-phase, 50/60 Hz internal lighting and heater power.

The gas turbine engine is designed for upward-oriented air inlet and axially-oriented exhaust outlet, with a continuous duty, open drip-proof medium voltage generator featuring Class F insulation, B rise. We also include a direct AC start motor system and duplex lube oil filter system for added convenience.

Our Turbotronics control system, based on Allen-Bradley technology, offers advanced features such as Ethernet network interface, touch screen display with engine performance map, and software for heat recovery interface (without diverter valve control). It also includes software for CO₂ system "lockout" for maintenance access to enclosure, backup safety shutdown system, kW control, and kVAR/power factor control.

We pride ourselves on our attention to quality and customer satisfaction. Our Gas Turbine undergoes rigorous factory testing, including dynamic testing, factory vibration testing, and factory emissions testing per Solar's ES 9-97 Observation on a "Non-interference" basis. We also provide quality control documentation (Level 1) to ensure complete transparency.

Included with the Gas Turbine package is field-installed ancillary equipment, such as an updraft air inlet filter, engine air inlet silencer, exhaust stack and silencer, and elbow type enclosure inlet/exhaust ventilation system with silencer. We also include "Off-Skid" components/systems, such as a remote desktop PC/monitor and printer/logger, gas fuel flow meter (for gas-only and dual fuel configurations), AC motor-driven liquid fuel boost pump skid (for liquid fuel configurations), 3-micron duplex filter/coalescer with auto drain (for liquid fuel configurations), CO2 system cabinet, air/oil lube oil cooler, VRLA batteries with 120V DC charging system (back-up post lube), portable engine cleaning cart, miscellaneous, and short-term preservation for shipment.

To help you maintain your Gas Turbine in optimal condition, we provide four paper copies and four CD-ROM copies of Solar's Instruction, Operation and Maintenance manuals, a UV Light and Gas Sensor test kit, and an internal equipment handling system.

The Mercury 50 is the complete package: efficient, reliable, and environmentally friendly. With our advanced Turbotronics control system and comprehensive testing and maintenance support, the Town can be confident in its investment.

Warranty

Solar Turbines Inc., will be maintaining a 1-year standard warranty on all equipment and a 5-year warranty equivalent if a Long Term Service Agreement is purchased, as requested by the Town. Maintaining a warranty on all equipment is critical for ensuring reliable performance and customer satisfaction with natural gas generators. It involves regular maintenance, including scheduled inspections and preventive maintenance measures, to prevent potential equipment failures and ensure optimal performance throughout the warranty period.

Additionally, regular equipment monitoring and reporting can help identify any potential issues before they become significant problems. A comprehensive warranty package can provide peace of mind for customers, knowing that any equipment issues will be covered and resolved in a timely manner, minimizing downtime and reducing costs associated with equipment repairs or replacements.

Customer Support and Training

Customer Support

A comprehensive customer support and service package is crucial for ensuring the long-term reliability and performance of natural gas generators. The proposed service contract with Solar Turbines Inc. will provide the following support to the Town of Richlands:

Technical Support:

Our technical support team will be available to assist with any technical questions or concerns that may arise during installation or operation of the generator. This support will be available by phone or email, with response times guaranteed within 24 hours during regular business hours.

Preventative Maintenance Services:

We will provide comprehensive preventative maintenance services to ensure that your generator is always in optimal condition. Our team will perform regular inspections, lubrication, and other maintenance tasks to prevent unexpected downtime and extend the life of your equipment. These services will be performed on a regular schedule, tailored to the specific needs of your generator and your facility.

Emergency Response Services:

In the event of an emergency, our team will be available 24/7 to provide rapid response services. We understand that unexpected downtime can be costly, so we will do everything we can to minimize downtime and get your generator back up and running as quickly as possible.

Onsite Service and Repair:

If onsite repairs are necessary, our team will dispatch a certified technician to your facility to diagnose and resolve the issue. Our

technicians are highly trained and experienced, with the expertise necessary to resolve any issue that may arise.

Spare Parts:

We will maintain a comprehensive inventory of spare parts to ensure that we can quickly provide any necessary replacements. We will work with you to determine the specific parts that should be kept on hand to minimize downtime and ensure optimal performance.

Training and Education:

Our team will provide comprehensive training and education services to ensure that your staff is fully trained and capable of operating and maintaining the generator. This training will be tailored to the specific needs of your facility, and will include everything from basic operation to advanced troubleshooting techniques.

Warranty:

Our natural gas generators come with a comprehensive warranty to provide you with peace of mind and ensure the long-term reliability of your equipment. We will work with you to ensure that you understand the warranty terms and conditions, and that you have the support you need to take advantage of the warranty in the event that any issues arise.

Remote Monitoring and Control:

Our generators come equipped with advanced remote monitoring and control capabilities, allowing you to monitor and control your generator from anywhere with an internet connection. This technology enables us to diagnose issues remotely and proactively address potential issues before they become problems, minimizing downtime and ensuring optimal performance.

System Pricing

\$7,817,000 Total Contract Amount

25% Deposit Due upon execution of proposal (\$1,954,250)

35% Due 60 days from execution of proposal, all materials have been ordered (\$2,735,950)

25% Due upon readiness to ship all equipment; concrete pad and infrastructure in place (1,954,250)

10% Due upon completion of system install and commissioning (781,700)

5% Hold back due after 30 days of successful operation (\$390,850)

Long Term Service Agreement Options (5-Year Warranty Equivalent)

- Full Service Agreement (FSA).

- This agreement type includes maintenance visits, trouble calls, replenishment of service parts, and engine overhauls.

- This type of agreement is typically more appealing to Power Generation customers because it avoids the necessity for long budget approval processes when work needs to be completed, especially for an overhaul of the engine at roughly 30,000 fired hours.

- FSA Monthly Fee Estimate – \$60,105

or

- The next tier down in service agreements is the Maintenance Service Agreement (MSA).

- This agreement provides the same coverage as the FSA, but the overhaul is handled transactionally when required.

- A typical overhaul for a M50 is roughly \$1.7M, so this budget item would need to go through the end-user's approval process to support the target 30,000 fired hour overhaul cycle.

- MSA Monthly Fee Estimate - \$22,000



Example Pro Forma *

*Operating

Assumptions:

Natural Gas Price
@ \$4.00/MMBTU
Maintenance
Plan Included

Years 1-2 :

2MW @ \$0.14/MMW to End Users
2.6MW @ \$0.55/MMW to End Users

Year 3:

4.6MW @ \$0.14/MMW to End Users

Overview

	12 Months	3 Year Total
Revenue	\$ 3,452,374	\$ 12,159,787
Direct Op. Expenses	\$ (2,081,747)	\$ (6,245,240)
SG&A	\$ (103,500)	\$ (310,500)
Total Operating Expense	\$ (2,185,247)	\$ (6,555,740)
Cost to Produce/MMW	\$ (35.46)	\$ (35.46)
All-in Cost \$/MMW	\$ (58.22)	\$ (58.22)
Operating Income	\$ 1,267,127	\$ 5,604,048
Operating ROI	14.13%	62.50%
Tax	\$ (76,028)	\$ (336,243)
Net After Taxes	\$ 1,191,099	\$ 5,267,805
Net ROI	13.28%	58.75%

Investment

	QPI	Buyer
Cap Ex Costs		\$ (150,000)
Site Acquisition		\$ (1,000,000)
Infrastructure Development		
New Mercury 50 T/G Package	\$ (7,817,000)	
	\$ (7,817,000)	\$ (1,150,000)

12-Month P&L Statement

Month	1	2	3	4	5	6	7	8	9	10	11	12	YTD
Operating Exp.	28	26	28	22	28	27	28	28	27	28	27	28	310
Revenue													
Power Block 1	\$ 194,977	\$ 174,807	\$ 188,254	\$ 188,254	\$ 194,977	\$ 188,254	\$ 194,977	\$ 194,977	\$ 188,254	\$ 194,977	\$ 188,254	\$ 194,977	\$ 2,285,942
Power Block 2	\$ 99,490	\$ 89,198	\$ 96,059	\$ 96,059	\$ 99,490	\$ 96,059	\$ 99,490	\$ 99,490	\$ 96,059	\$ 99,490	\$ 96,059	\$ 99,490	\$ 1,166,431
Power Block 3	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Revenue	\$ 294,467	\$ 264,005	\$ 284,313	\$ 284,313	\$ 294,467	\$ 284,313	\$ 294,467	\$ 294,467	\$ 284,313	\$ 294,467	\$ 284,313	\$ 294,467	\$ 3,452,374
Direct Op Expenses													
Direct Labor	-	-	-	-	-	-	-	-	-	-	-	-	-
Utilities	\$ (113,529)	\$ (101,784)	\$ (109,614)	\$ (109,614)	\$ (113,529)	\$ (109,614)	\$ (113,529)	\$ (113,529)	\$ (109,614)	\$ (113,529)	\$ (109,614)	\$ (113,529)	\$ (1,331,027)
Maintenance	\$ (64,032)	\$ (57,408)	\$ (61,824)	\$ (61,824)	\$ (64,032)	\$ (61,824)	\$ (64,032)	\$ (64,032)	\$ (61,824)	\$ (64,032)	\$ (61,824)	\$ (64,032)	\$ (750,720)
Selling, General, & Administrative	-	-	-	-	-	-	-	-	-	-	-	-	-
Administrative	-	-	-	-	-	-	-	-	-	-	-	-	-
Insurance	\$ (1,667)	\$ (1,667)	\$ (1,667)	\$ (1,667)	\$ (1,667)	\$ (1,667)	\$ (1,667)	\$ (1,667)	\$ (1,667)	\$ (1,667)	\$ (1,667)	\$ (1,667)	\$ (20,000)
Miscellaneous	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxes & Fees	\$ (6,958)	\$ (6,958)	\$ (6,958)	\$ (6,958)	\$ (6,958)	\$ (6,958)	\$ (6,958)	\$ (6,958)	\$ (6,958)	\$ (6,958)	\$ (6,958)	\$ (6,958)	\$ (83,500)
Total Operating Expenses	\$ (186,186)	\$ (167,817)	\$ (180,063)	\$ (180,063)	\$ (186,186)	\$ (180,063)	\$ (186,186)	\$ (186,186)	\$ (180,063)	\$ (186,186)	\$ (180,063)	\$ (186,186)	\$ (2,185,247)
Operating Income	\$ 108,281	\$ 96,188	\$ 104,250	\$ 104,250	\$ 108,281	\$ 104,250	\$ 108,281	\$ 108,281	\$ 104,250	\$ 108,281	\$ 104,250	\$ 108,281	\$ 1,267,127
Taxes	6.0%	\$ (6,497)	\$ (5,771)	\$ (6,255)	\$ (6,255)	\$ (6,497)	\$ (6,497)	\$ (6,497)	\$ (6,255)	\$ (6,497)	\$ (6,255)	\$ (6,497)	\$ (76,028)
Net After Taxes	\$ 101,785	\$ 90,416	\$ 97,995	\$ 97,995	\$ 101,785	\$ 97,995	\$ 101,785	\$ 101,785	\$ 97,995	\$ 101,785	\$ 97,995	\$ 101,785	\$ 1,191,099

3 Year P&L Statement

Years	1	2	3	3YR Totals
Revenue				
Power Block 1	\$ 2,285,942	\$ 2,285,942	\$ 2,285,942	\$ 6,857,827
Power Block 2	\$ 1,166,431	\$ 1,166,431	\$ 2,969,098	\$ 5,301,960
Power Block 3	-	-	-	-
Total Revenue	\$ 3,452,374	\$ 3,452,374	\$ 5,255,040	\$ 12,159,787
Direct Op Expenses				
Direct Labor	-	-	-	-
Utilities	\$ (1,331,027)	\$ (1,331,027)	\$ (1,331,027)	\$ (3,993,080)
Maintenance	\$ (750,720)	\$ (750,720)	\$ (750,720)	\$ (2,252,160)
Selling, General, & Administrative				
Administrative	-	-	-	-
Insurance	\$ (20,000)	\$ (20,000)	\$ (20,000)	\$ (60,000)
Miscellaneous	-	-	-	-
Taxes & Fees	\$ (83,500)	\$ (83,500)	\$ (83,500)	\$ (250,500)
Total Operating Expenses	\$ (2,185,247)	\$ (2,185,247)	\$ (2,185,247)	\$ (6,555,740)
Operating Income	\$ 1,267,127	\$ 1,267,127	\$ 3,069,793	\$ 5,604,048
Taxes	6.0%	\$ (76,028)	\$ (76,028)	\$ (184,188)
Net After Taxes	\$ 1,191,099	\$ 1,191,099	\$ 2,885,606	\$ 5,267,805

Maintenance Requirements

Natural gas-fired turbine generator systems are a type of power generation technology that uses natural gas as a fuel source to power a turbine, which generates electricity. These systems are popular for their efficiency, reliability, and low emissions compared to other power generation technologies.

A natural gas-fired turbine generator system typically consists of a gas turbine, a generator, a control system, and other supporting components. The gas turbine is the heart of the system, which uses natural gas as a fuel source to power a compressor that compresses air, then mixes the compressed air with fuel to create a high-temperature and high-pressure gas stream. The gas stream then drives the turbine, which rotates the generator to produce electricity.

To ensure that a natural gas-fired turbine generator system operates efficiently and reliably, it is essential to perform regular maintenance on all system components. This includes routine maintenance tasks, such as daily inspections, fuel system maintenance, lubrication system maintenance, cooling system maintenance, air filtration system maintenance, combustion chamber inspection, turbine blade inspection, and control system inspection.

Preventive maintenance tasks are also necessary to prevent equipment failure and reduce downtime. These tasks include the inspection of bearings, gears, belts, electrical components, and the control system, cleaning the exhaust system, calibrating instrumentation, and reviewing fuel nozzles, combustion systems, and heat recovery systems.

A control system is also typically included in a natural gas-fired turbine generator system, which enables remote monitoring and control of the generator. This system allows for real-time monitoring of the system's performance and can detect any issues that require attention. If necessary, the control system can also start or stop the generator remotely, which can be helpful for maintenance or in an emergency.

Natural gas-fired turbine generator systems are commonly used for electricity generation due to their reliability, efficiency, and low emissions. However, like any mechanical system, they require regular maintenance to ensure optimal performance and longevity. This section will outline the maintenance requirements for a natural gas-fired turbine generator system with a 4 MW to 5 MW peak production capacity and a control system to monitor and control the generator remotely.

Routine Maintenance

Routine maintenance is essential for adequately functioning a natural gas-fired turbine generator system. This includes the following:

Daily Inspections:

1. Daily inspections should be conducted to check for leaks, unusual vibrations, and unusual sounds. The oil level and coolant level should also be checked daily. Any issues should be reported immediately to the maintenance team. Daily inspections are essential to the maintenance program for a natural gas-fired turbine generator system. By identifying potential problems early, operators can help prevent equipment failure and ensure optimal performance and reliability of the system.
2. Fuel System Maintenance: The fuel system should be checked regularly for leaks and blockages. The fuel filters should be replaced at least once a year or more frequently if necessary. Proper fuel system maintenance ensures a natural gas-fired turbine generator system's safe, efficient, and reliable operation. By regularly checking for leaks and blockages and replacing fuel filters as necessary, operators can help prevent equipment failure and ensure optimal system performance.
3. Lubrication System Maintenance: The lubrication system should be checked regularly for leaks and blockages. The oil filter should be replaced at least once a year or more frequently. The oil should also be changed at least once a year or more often if necessary. Suitable lubrication system maintenance is essential to ensure a natural gas-fired turbine generator system's safe, efficient, and reliable operation. By regularly checking for leaks and blockages, replacing oil filters as necessary, and changing the oil at regular intervals, operators can help prevent equipment failure and ensure optimal system performance.
4. Cooling System Maintenance: The cooling system should be checked regularly for leaks and blockages. The coolant should be changed at least once a year or more frequently if necessary. Appropriate cooling system maintenance is essential to ensure a natural gas-fired turbine generator system's safe, efficient, and reliable operation. By regularly checking for leaks and blockages, changing the coolant at regular intervals, and performing preventive maintenance tasks, operators can help prevent equipment failure and ensure optimal system performance.
5. Air Filtration System Maintenance: The air filtration system should be checked regularly for blockages. If necessary, the air filter should be replaced at least once a year or more frequently. Good air filtration system maintenance ensures a natural gas-fired turbine generator system's safe, efficient, and reliable operation. By regularly checking for blockages, replacing air filters at regular intervals, and performing preventive maintenance tasks, operators can help prevent equipment failure and ensure optimal system performance.
6. Combustion Chamber Inspection: The combustion chamber should be inspected at least once a year to check for damage or wear. Suitable combustion chamber maintenance ensures a natural gas-fired turbine generator system's safe, efficient, and reliable operation. By regularly inspecting the combustion chamber for damage or wear and performing preventive maintenance tasks, operators can help prevent equipment failure and ensure optimal system performance.
7. Turbine Blade Inspection: The turbine blades should be inspected at least once a year to check for damage or wear. Regular turbine blade maintenance ensures a natural gas-fired turbine generator system's safe, efficient, and reliable operation. By regularly inspecting the turbine blades for damage or wear and performing preventive maintenance tasks, operators can help prevent equipment failure and ensure optimal system performance.
8. Control System Inspection: The control system should be inspected regularly to ensure proper operation. Any issues should be reported immediately to the maintenance team. Systematic control system inspections ensure a natural gas-fired turbine generator system's safe, efficient, and reliable operation. By regularly inspecting the control system and promptly reporting any issues to the maintenance team, operators can help prevent equipment failure and ensure optimal system performance.

Preventive Maintenance:

Preventive maintenance is essential to maintaining a natural gas-fired turbine generator system. It involves scheduled maintenance tasks designed to prevent equipment failure and reduce downtime, ultimately ensuring the system operates efficiently and reliably.

Preventive maintenance tasks are scheduled regularly based on manufacturer recommendations, industry standards, and the system's specific needs. These tasks include lubrication, filter replacement, critical component inspection, and sensor and instrument cleaning or calibration.

One of the primary benefits of preventive maintenance is that it can help identify potential issues before they become significant problems. By catching problems early, operators can take corrective action and prevent more severe cases from occurring. This can help reduce downtime and repair costs, as well as extend the life of the equipment.

Preventive maintenance also helps ensure that the equipment is operating at peak efficiency. By keeping the system well-maintained, operators can confirm that it operates at its maximum capacity and that energy is used efficiently.

In addition to these benefits, preventive maintenance can help ensure compliance with regulatory requirements and reduce the risk of accidents or safety incidents. By performing regular maintenance tasks and keeping accurate records, operators can demonstrate that the equipment is being maintained properly and are taking steps to prevent equipment failures and other issues.

Preventive maintenance involves scheduled maintenance tasks to prevent equipment failure and reduce downtime. For example, some of the preventive maintenance tasks for a natural gas-fired turbine generator system include the following:

1. Inspection of Bearings: The bearings should be inspected at least once a year to check for wear and damage. They should also be

lubricated at regular intervals.

2. Inspection of Gears: The gears should be inspected at least once a year to check for wear and damage. They should also be lubricated at regular intervals.

3. Inspection of Belts: The belts should be inspected at least once a year to check for wear and damage. They should also be adjusted and replaced at regular intervals.

4. Inspection of Electrical Components: The electrical components should be inspected regularly for wear and damage. They should also be cleaned and tightened at regular intervals.

5. Inspection of Control System: The control system should be inspected regularly to ensure proper operation. Any issues should be reported immediately to the maintenance team.

6. Cleaning of Exhaust System: The exhaust system should be cleaned regularly to prevent blockages and ensure proper ventilation.

7. Calibration of Instrumentation: The instrumentation should be calibrated regularly to ensure accurate readings.

8. Inspection of Fuel Nozzles: The fuel nozzles should be inspected at least once a year to check for wear and damage. They should also be cleaned and adjusted at regular intervals.

9. Inspection of Combustion System: The combustion system should be inspected at least once a year to check for wear and damage. The burners should also be cleaned and adjusted at regular intervals.

10. Inspection of Heat Recovery System: The heat recovery system should be inspected at least once a year to check for wear and damage. The heat exchangers should also be cleaned at regular intervals.



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