Industrial Energy Systems

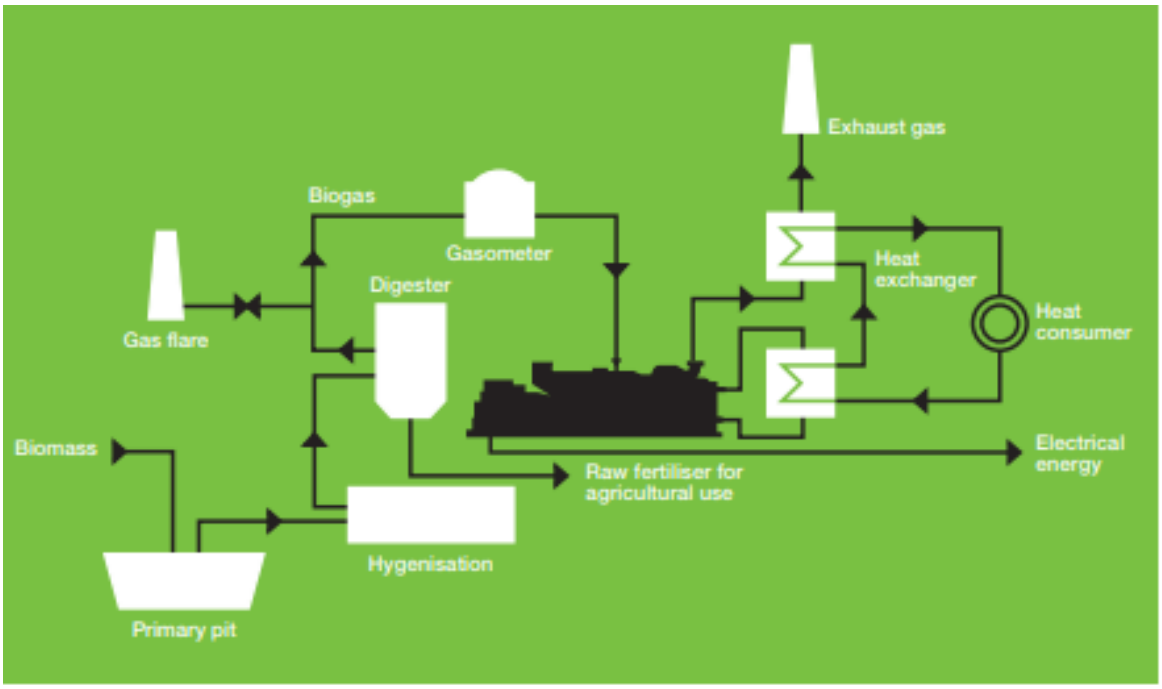
COMPETENCY PAPER

- WASTE BIODIGESTING & BIOMASS
- COMBINED HEAT AND POWER (CHP)
- ONSITE WASTEWATER TREATMENT
- RENEWABLE NATURAL GAS (RNG)
- INDUSTRIAL GRADE PV SOLAR POWER
- MOBILE POWER & STORAGE
- BATTERY ENERGY STORAGE SYSTEMS (BESS)
- EV INFRASTRUCTURE & V2X
- KOHLER BACK-UP GENERATORS
- BEHIND THE METER WIND TURBINES
- EFFICIENT LIGHTING & CONTROLS
- ONSITE GEOTHERMAL ENERGY STORAGE

OUR PRODUCTS & SERVICES

- Biodigesters, RNG, Manure, Wastewater Solutions
- Wastewater Treatment
- Hydrogen Production and Fuel Cell Systems
- Agricultural, Commercial and Municipal Solar Power
- Design Engineering
- Project Engineering
- Smart Ag, Commercial, Industrial Construction
- Geothermal Power and Storage
- CHP – Combined Heat and Power
- Beverage Grade CO2 Production
- Behind the Meter Wind Turbine Power
- Microgrid and Control Systems
- BESS Systems (Battery Energy Storage Systems)
- Broadband Internet and Wireless Communication
- EV Charging Infrastructure
- Kohler Backup Energy Generation
- Municipal and Development Sustainability Plans
- Efficient Lighting, Controls, and Power Shaving
- Consultation and Energy Audit Services
- Technical Asset Management, O & M
- Financial Products and In-House Grant Writing

Biogas from Waste Disposal and treatment of biological waste represent a major challenge for the waste industry. For a wide range of organic substances from agriculture, foodstuff of feed industries, anaerobic digestion is a superior alternative to composting. Biogas – a mixture of both methane and carbon dioxide – is created during anaerobic digestion and serves as a high-energy renewable fuel that can be used as a substitute for fossil fuels. Biogas-fueled gas engines improve waste management while maximizing the use of an economical energy supply.



Biogas Creation

Biogas results from anaerobic fermentation of organic materials. As a metabolic product of the participating methanogens and acidogenic bacteria, the prerequisites for its production are a lack of oxygen, a pH value from 6.5 to 7.5 and a constant temperature of 35-45°C (mesophilic) or 45-55°C (thermophilic). The digestion period or retention period is typically between 10 and 30 days depending upon the type of digestion employed. The anaerobic digestion systems of today operate largely within the mesophilic temperature range

Conversion Steps from Waste to Power

The process of biogas generation is divided into four steps: 1. Preparation of the input waste material – including removal of physical contaminants, particle size reduction & pasteurization 2. Digestion (fermentation), consisting of hydrolysis, acetogenesis, acidogenesis and methanogenesis 3. Conversion of the biogas to renewable electricity and useful heat 4. Post-treatment of the digestate Initially the feedstock to the digesters is received in a primary pit or liquid storage tank. From here it is loaded into the digester by various different means depending upon the constitution of waste materials. In the digestion tanks a series of biological processes are harnessed in order to produce biogas. Hydrolysis is the process where the organic material is solubilized into the digestion liquid. It then undergoes the intermediate steps of acidogenesis and acetogenesis which create the precursor molecules for methanogenesis. Methanogens feed off these precursors and produce methane as a cellular waste product. The biogas containing this biologically-derived methane is contained and captured in a gas storage tank which is located separately to the main digester, or alternatively can form its roof. The gas storage tank acts as a buffer in order to balance fluctuations in the production of gas in the digester.

Why Combined Heat & Power (CHP)?

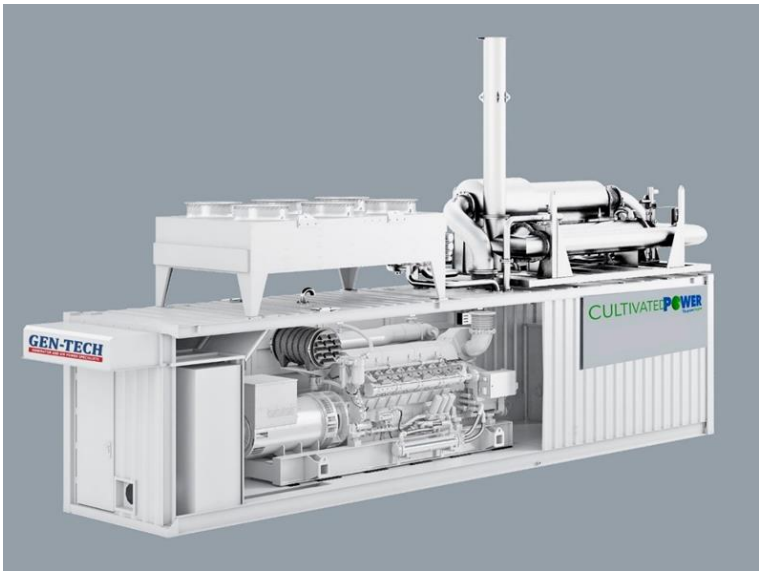
Significantly Reduced Operating Expenses
Natural Gas-Powered Electrical Generation

- Produce Power at an all-in rate less than Utility Power
- 4 – 8 ¢ / kWh
- Wholesale Natural Gas contract allows forward rate lock
- 20 Year Equipment with history of financing and residual values
- Long Term Maintenance Packages

Significantly Reduced Operating Expenses

- **Waste Heat Capture provides Free Thermal Power**

- Exhaust and Radiator capture
- Heating
  - Hot water delivered to air handlers
- Dehumidification
  - Four pipe / thermal dehumidification
  - Hot water re-heat of chilled air
  - Liquid Desiccant
  - Hot water reconstitution
- Cooling
  - Absorptive Chillers
  - Power with Hot water



Speed to Market

- Natural Gas Fuel Efficient Engines are much faster to deploy energy infrastructure than grid-tied electrical power systems which can take up to 3 years to complete for high energy demand such as data centers.
- CHP Engines can be utilized as a resiliency or back-up system if grid-tied at a later time.
- Units are delivered pre-packaged for fast and efficient installation.

WASTE and INDUSTRIAL professionals once accepted the high costs of operating wastewater and bio-waste treatment as a consequence of meeting their discharge permit requirements. As the cost of energy rises and emphasis on renewable energy increases, local authorities and municipalities are seeking solutions that save money and meet renewable requirements. Jenbacher gas engines provide a renewable energy solution through combined heat and power (CHP) technology that results in long-term savings for wastewater treatment plants. Alternatively, biogas upgrading plants can convert biogas to biomethane for injection into the gas grid or for vehicle fuel.

Benefits of CHP for Industrial Applications

- Generation of renewable energy from a waste material through cogeneration / CHP
- Reduction in carbon emissions especially compared to aerobic sewage treatment
- Economical onsite electrical power production and reduced transmission losses
- Production of a low-carbon fertilizer / soil improver
- Cost effective, proven technology

Waste Treatment Energy Costs

Waste treatment processes include energy-intensive operations such as aeration and pumping. As a result, waste and wastewater treatment require significant energy consumption. As electrical prices increase, plant operators are facing higher energy costs in order to meet discharge permit requirements. The second leading expense for WWT (wastewater treatment) owners is the cost of energy, behind only personnel. For farms and operations, who employ anaerobic digestion for biosolids treatment, the process of combusting digester gas to produce electricity and heat through cogeneration/CHP may provide a solution to rising operational costs.

A large proportion of the world's waste systems do not recover value from the biowaste byproducts in the form of electricity and heat. But the renewable energy fuel source derived from waste generated gas can be converted using reciprocating gas engines, to electricity and heat, offsetting as much as two-thirds of your operation's electricity demand and eliminating the need to purchase fossil fuels for operational processes.

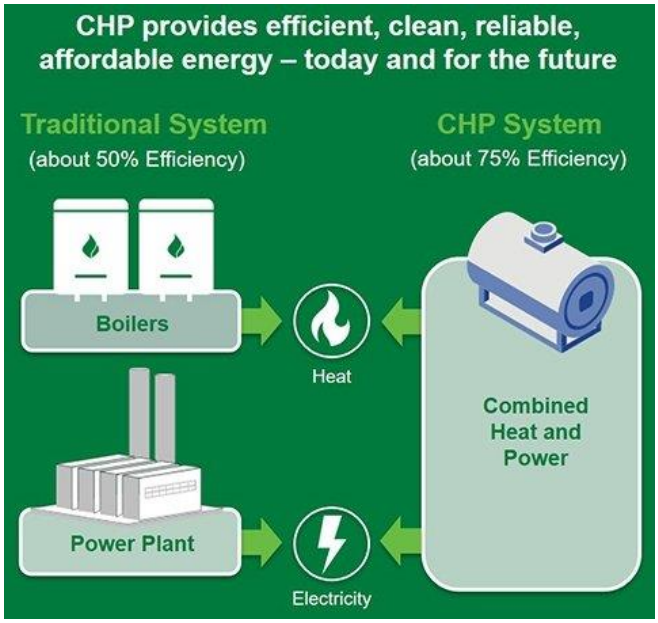
COMBINED HEAT AND POWER (CHP), also known as cogeneration, is:

The concurrent production of electricity or mechanical power and useful thermal energy (heating and/or cooling) from a single source of energy.

A type of distributed generation, which, unlike central station generation, is located at or near the point of consumption.

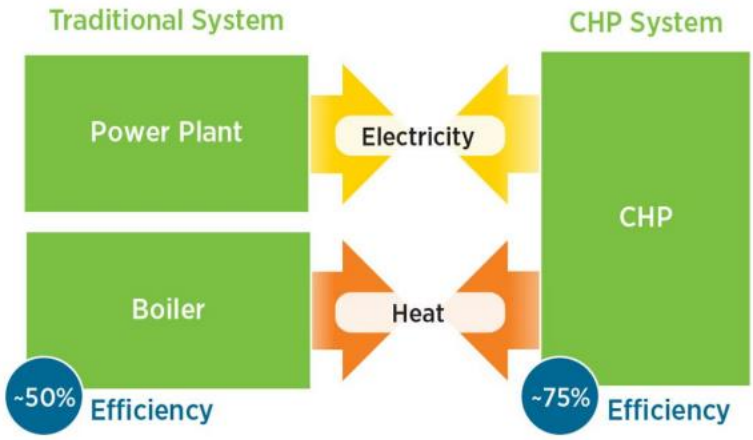
A suite of technologies that can use a variety of fuels to generate electricity or power at the point of use, allowing the heat that would normally be lost in the power generation process to be recovered to provide needed heating and/or cooling.

CHP technology can be deployed quickly, cost-effectively, and with few geographic limitations. CHP can use a variety of fuels, both fossil- and renewable-based. It has been employed for many years, mostly in industrial, large commercial, and institutional applications. CHP may not be widely recognized outside industrial, commercial, institutional, and utility circles, but it has quietly been providing highly efficient electricity and process heat to some of the most vital industries, largest employers, urban centers, and campuses in the United States. It is reasonable to expect CHP applications to operate at 65%–75% efficiency, a large improvement over the national average of about 50% for these services when separately provided.



CHP applications can operate at about 75% efficiency, a significant improvement over the national average of about 50% for these services when provided separate

While CHP has been in use in the United States for more than 100 years, it remains an underutilized resource today. CHP currently represents approximately 8% of U.S. generating capacity4 , compared to over 30% in many other western countries. Its use in the U.S. has been limited, particularly in recent years, by a host of market and non-market barriers. Nevertheless, the outlook for increased CHP use is bright as policymakers at the federal and state level are recognizing the potential benefits and the role that this technology could play in providing clean, reliable, cost-effective energy services to industry and businesses. There are several emerging market drivers contributing to current combined heat and power growth, including:



- **Lower Operating Costs:** Compared to conventional power generation techniques, CHP systems can save money through increased energy efficiency. Higher operating efficiencies enable CHP systems to consume up to 40% less fuel while generating the same amount of power and useful thermal energy as separate heat and power systems. With stable and low-cost natural gas supply forecasts stemming from the development of shale gas production, the economics of CHP have been improving.

- **Environmental Regulations:** Recent environmental regulations have created opportunities for combined heat and power to help meet compliance goals.
- **Resiliency:** In the event of a man-made or natural disaster that causes a grid outage, CHP systems can be configured to be more resilient and reliable than traditional backup generators. During recent storm events such as Hurricane Sandy, CHP systems enabled a number of critical infrastructure facilities to continue their operations when the electric grid went down. Texzon Utilities in association with Clarke Energy will provide guidance and engineering on how CHP can enhance the resiliency of critical facilities, and the best way to size such systems.

- **Policy Support:** A number of federal and state policies and financial incentives have strongly encouraged the market for combined heat and power. At the federal level, currently there is a 30% investment tax credit and MACRS depreciation for CHP along with robust grants to offset costs. Texzon Utilities has incentive and federal grant writers in-house as a value-added service.
- **CHP** can be utilized in a variety of industrial facilities, agriculture, and commercial buildings with coincident power and thermal loads. The majority of existing CHP capacity in the United States is in the industrial sector and is concentrated in five major facility types: chemicals, refining, paper, food, and metals manufacturing.

Combined heat and power (CHP) is an efficient and clean approach to generating electric power and useful thermal energy from a single fuel source. Instead of purchasing electricity from the distribution grid and separately burning fuel in an on-site furnace or boiler to produce thermal energy, an industrial or commercial facility can use combined heat and power to provide both services in one, energy-efficient step. CHP is a clean energy solution that directly addresses a number of national priorities, including improving U.S. competitiveness by:

- Reducing energy operating costs
- increasing energy efficiency
- Reducing greenhouse gas emissions
- Enhancing our energy infrastructure
- Improving energy security and resiliency
- Growing" the U.S. economy

SOLAR ENERGY is the fastest growing and most affordable source of new electricity in America and overseas. As the cost of solar energy systems dropped significantly, more businesses, industry, and municipalities have taken advantage of clean energy.

Photovoltaic (PV) solar energy systems are expected to operate for at least 20 - 30 years. The U.S. Department of Energy (DOE) Solar Energy Technologies Office (SETO) supports Texzon Utilities and our network efforts to extend the useful PV system life to 50 years. How well a system performs during its lifespan directly affects project cash flows, which largely determine the value of those systems. It also affects operation and planning activities for the electric grid.

There are many different applications that provide Texzon the ability to model the operation of PV systems before they are constructed, which helps to reduce financial and reliability risks. These models use meteorological inputs and a mathematical representation of the system to calculate the energy and rate plan that will be generated over any time interval of interest—from minutes to decades.

Texzon Utilities in accordance with the U.S. Department of Energy (DOE) Solar Energy Technologies Office offer three resources to help our clients navigate changes to the federal solar Investment Tax Credit (ITC), which was expanded in 2022 through the passage of the Inflation Reduction Act (IRA). These resources—for businesses, manufacturers, and municipalities—provide thorough overviews of the ITC, Production Tax Credit (PTC), MACRS Depreciation and Advanced Manufacturing Production Tax Credit (MPTC). They demystify the tax code with intuitive explanations and examples, answer frequently asked questions, and explain the process of claiming valued tax credits.

COMMUNITY SCALE SOLAR for agricultural, commercial, and industrial applications have been generating reliable, clean electricity with a stable return on investment for decades. Developing industrial-scale solar power is one of the fastest ways to reduce carbon emissions and put the United States on a path to a clean energy future.

A scalable solar power plant can utilize several solar technologies – primary photovoltaics (PV) or concentrating solar power (CSP). What distinguishes increased grid reliability and industrial-scale solar from distributed generation is both project size and the fact that the electricity is sold to wholesale utility buyers (takers), not end-use consumers.

Industrial-scale solar power provide the benefit of fixed-priced electricity during peak demand periods when electricity from fossil fuels is the most expensive.

Many industrial-scale solar designs can also include energy storage capacity which provides power resiliency.

Traditional Power Plant vs. Virtual Power Plant

As energy markets change, so do our power plants. And while traditional power plants have reigned supreme, this isn't the case anymore. The energy transition is increasing the share of renewable generation in the traditional energy market. Renewables are set to account for 95% of the increase in global power capacity by 2026. To handle this, our energy systems are having to evolve.

HOW DOES SOLAR WORK?

The amount of sunlight that strikes the earth's surface in an hour and a half is enough to manage the entire world's energy consumption for a full year. Solar technologies convert sunlight into electrical energy either through photovoltaic (PV) panels or through mirrors that concentrate solar radiation. This energy can be used to generate electricity or be stored in batteries or thermal storage.

U.S. DEPARTMENT OF ENERGY RESOURCES

Photovoltaic and **concentrating solar-thermal power** technologies, electrical grid **systems integration**, and the non-hardware aspects (**soft costs**) of solar energy. You can also learn more about how to **go solar** and the **solar energy industry**. In addition, you can dive deeper into solar energy and learn more about how Texzon Utilities is driving implementation in these areas.

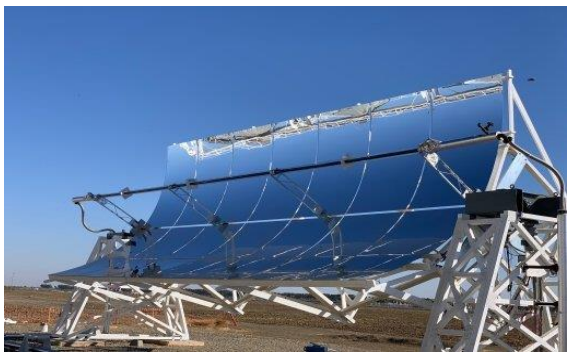
Solar Energy 101

Solar radiation is light – also known as electromagnetic radiation – that is emitted by the sun. While every location on Earth receives some sunlight over a year, the amount of solar radiation that reaches any one spot on the Earth's surface varies. Solar technologies capture this radiation and turn it into useful forms of energy.

Photovoltaics Basics

There are two main types of solar energy technologies—photovoltaics (PV) and concentrating solar-thermal power (CSP).

You're likely most familiar with PV, which is utilized in solar panels. When the sun shines onto a solar panel, energy from the sunlight is absorbed by the PV cells in the panel. This energy creates electrical charges that move in response to an internal electrical field in the cell, causing electricity to flow.



Concentrating Solar-Thermal Power Basics

Concentrating solar-thermal power (CSP) systems use mirrors to reflect and concentrate sunlight onto receivers that collect solar energy and convert it to heat, which can then be used to produce electricity or stored for later use. It is used primarily in very large power plants.

PARKING CANOPIES by Texzon Utilities offer forward-thinking for hospitality and healthcare facilities that enhance customer safety from adverse weather, provides energy for your business, and commitment to sustainability while increasing operational revenue. Texzon designed carports has the experience in manufacturing, installation, and energy efficient lighting systems which results in optimized projects with shorter lead times and less risk. From consulting to engineering to completion, we'll be your partner every step of the way.

RETHINKING PARKING AND SOLAR

Placing solar canopies on parking garages is a growing market trend throughout the U.S. With expert designers, engineers, and a team of knowledgeable project managers, we can help our clients navigate the value and variables that go into constructing solar canopies on garage structures and rooftop applications

OPTIMIZING SPACE AND REDUCING ENERGY COSTS

Power your business while noticeably showing your commitment to sustainability

BESS BASICS: BATTERY ENERGY STORAGE SYSTEMS FOR PV-SOLAR, CHP & WIND TURBINES

Energy storage systems capture surplus energy during times of high production/low demand and store it for use during times of low production/high demand. While not a new technology, energy storage is rapidly gaining traction as a way to provide a stable and consistent supply of renewable energy to the grid.

The energy storage system of most interest to solar PV producers is the battery energy storage system, or BESS. While only 2–3% of energy storage systems in the U.S. are BESS (most are still hydro pumps), there is an increasing move to integrate BESS with renewables.

WHAT IS A BESS AND WHAT ARE ITS KEY CHARACTERISTICS?

Largely, BESS systems use lithium-ion batteries to store electricity. They can be used either as stand-alone or coupled with renewable energy sources.

Main characteristics used by the industry, and which vary with different BESS chemistries are:

- Rated Power Capacity
- Rated Energy Capacity
- Depth of Discharge (DOD)
- Storage Duration
- Cycle Life
- State of Charge (SOC)
- Round-Trip Efficiency
- System Life
- Safety Monitoring and Control

WHAT ARE THE MAJOR PARTS OF A BESS?

A typical BESS includes:

- Battery modules – connected in series and parallel for required capacity.
- Storage enclosure with thermal management.
- Power conversion system (PCS) – All the clusters from the battery system are connected to a common DC bus and further DC bus extended to PCS.
- Battery management system (BMS), which continuously monitors the voltage, temperature, fire warning and state of charge (SOC) of the battery. It regulates the charging and discharging power depending on input signal.
- Energy management system (EMS) – The control logic is executed at EMS. It will provide input signal to PCS for charge/discharge depending on control logic requirement.

A BESS is an energy source, and like any energy source that feeds the grid, it must be managed and controlled. At Texzon Utilities, we provide SCADA and EMS solutions for monitoring and controlling BESS per site requirements.

WHY IS INDUSTRIAL INTEGRATION OF BESS GAINING TRACTION?

BESS systems are gaining traction for both technical and commercial reasons. Technically, they provide immense benefits to the grid:

- Use in emergency response systems or for storm outages
- Frequency regulation
- Grid stability
- Reduction of grid congestion
- Ramp rate control
- Energy arbitrage
- Peak and delivery charge shaving
- Black start – quick energy or stabilizing energy to get the grid started at a good response rate

What's most exciting is the use of BESS in helping the world transition to renewable energy.

Renewables are intermittent in nature—production goes up when the sun is shining, and the wind is blowing but goes down when the day is overcast, or the winds die down. On the current grid, on-demand gas power is still needed to fill in the gaps. As more renewables come online and begin contributing to the grid in order to meet increasing energy demand, energy storage technologies, including BESS, can help ensure a stable, steady supply of energy.

Being able to store excess energy is also a financial benefit to renewable energy producers. Instead of having to curtail production, at the request of the grid or utility, that curtailment can be stored. When production later goes down, that stored energy is available for sale to fill in the gaps.

Another reason for the rise in BESS systems is the affordability of lithium-ion batteries. The prices for this technology are going down and are expected to go even lower. This is moving the needle away from older existing energy storage systems and towards BESS.

Electric Vehicle Infrastructure

Charging equipment for EVs is classified by the rate at which the batteries are charged. Charging times vary based on how depleted the battery is (i.e., state-of-charge), how much energy it holds (i.e., capacity), the type of battery, the vehicle's internal charger capacity, and the type of charging equipment (e.g., charging level, charger power output, and electrical service specifications). The charging time can range from less than 20 minutes using DC fast chargers to 20 hours or more using Level 1 chargers, depending on these and other factors.
When choosing equipment for a specific application, many factors, such as networking, payment capabilities, and operations and maintenance should be considered.

Level 2 Charging

Approximately 25 miles of range per 1 hour of charging†

J1772 connector

J3400 (NACS) connector

AC Level 2 equipment (often referred to simply as Level 2) offers charging through 240 V (typical in residential applications) or 208 V (typical in commercial applications) electrical service. Level 2 equipment is also commonly used for public, and workplace charging and can operate at 40 to 80 amperes (Amp). Most residential Level 2 chargers operate at up to 30 Amps, delivering 7.2 kW of power. These units require a dedicated 40-Amp circuit to comply with the National Electric Code requirements in Article 625.

Level 2 charging equipment uses the same J1772 connector that Level 1 equipment uses. All commercially available EVs in the United States have the ability to charge using Level 1 and Level 2 charging equipment.

Vehicles with a J3400 (also referred to as NACS, or North American Charging Standard) connector (currently only Tesla vehicles) can use the connector for all charging levels, including Tesla's Level 2 Destination Chargers and chargers for home. All Tesla vehicles come with a J1772 adapter, which allows them to use non-Tesla Level 2 charging equipment.

† A Level 2 unit can range from 2.9 to 19.2 kW power output.

DC Fast Charging

Approximately 100 to 200+ miles of range per 30 minutes of charging‡

CCS connector | CHAdeMO connector | J3400 (NACS) connector

Direct Current DC fast charging equipment (typically a three-phase AC input) enables rapid charging along heavy traffic corridors at installed stations. The availability of DC fast charging is expected to increase as a result of federal funding to build a national EV charging network, such as the National Electric Vehicle Infrastructure Formula Program or national Alternative Fuel Corridors grant program. Additionally, DC fast charging is projected to increase due to fleets adopting medium- and heavy-duty EVs (e.g., commercial trucks and vans and transit), as well as the installation of fast charging hubs for transportation network.

There are three types of DC fast charging systems, depending on the type of charge port on the vehicle: SAE Combined Charging System (CCS), CHAdeMO, and J3400.

The **CCS** connector (also known as SAE J1772 combo) lets drivers use the same charge port with AC Level 1, Level 2, and DC fast charging equipment. The only difference is that the DC fast charging connector has two additional bottom pins. Most EV models on the market can charge using the CCS connector.

The **CHAdeMO** connector is another common DC fast connector type among Japanese automakers.

SAE International is standardizing the **J3400** connector based on the design for the NACS connector, which works for all charging levels.

EV Chargers

Texzon network partner, BorgWarner-Rhombus is a leading supplier of EV chargers for Electric and Hybrid battery power applications.

Our portfolio includes a full range of DC Fast chargers, DC stations, hybrid chargers, high-frequency chargers, battery recovery and multi-voltage chargers that provide customers with full-function solutions.

Automotive applications

- DC Fast Charger IPERION-120
- DC Fast Charger Dual-Port 120 kW
- Bidirectional V2G charger
- Bidirectional dispenser

Industrial applications

- DC station
- Hybrid charger
- High-frequency
- Battery discharger
- Multi-voltage charger
- Ferro Resonant charger

DC Fast Charger Solution : Dual-Port 120 kW

Features / Benefits

- Charge Two EVs Simultaneously
- Power Two 60kW Channels or One 120kW Channel with Uni-Directional Only Operation
- 250Vdc to 920Vdc Output Range
- Continuous Operation at Rated Load
- Remote Operation (up to 500 ft)

Downloads

120 Modular DC Fast Charging System Product Sheet

DC Fast Charger IPERION-120

At 120kW power size, IPERION-120, the fast-charging station for automotive applications by BorgWarner, can charge one vehicle at full power, or two vehicles simultaneously at a maximum power of 60kW each.

With an output voltage range from 200Vdc to up to 900Vdc, the DC fast charger enables the charge of any vehicle size and of future generation batteries.

Features / Benefits

- Two completely isolated and independent 60 kW rated (200 A continuous) chargers, that, if needed, can be combined, and parallelized to deliver 120 kW on a single plug (200 A max)
- 94% efficiency, power factor > 0.97
- Compatible with standard charging protocols in Europe and North America (CCS, Chademo and GB/T)
- Output voltage up to 900Vdc
- Operates up to an altitude of 4.000m and between -30°C and +50°C
- Flexibility of configuration
- Long life span (>10 years)
- OCPP 2.0.1
- Ethernet, Wi-Fi, and Bluetooth communications support
- Credit card reader with several payment model options

Downloads

DC Fast Charging Station IPERION-120 Product Sheet
DC Fast Charging Station IPERION-120 Brochure

Bidirectional V2G Charger

Available for either 60kW or 125kWPower with Uni-Directional Only Operation.

- 60kW or 125kW Power with Uni-Directional Only Operation
- 270Vdc to 870Vdc Output Range
- Continuous Operation at Rated Load
- Remote Operation (up to 600 ft) (applies to 60kW variant)
- UL2202 & UL 2231

Downloads

RES-DCVC125-480 EV DC Fast Charging Power Conversion System (PCS) Product Sheet

RES-DCVC60-480 EV DC Fast Charging Power Conversion System (PCS) Product Sheet

Bidirectional Dispenser

- Up to five (5) dispensers per PCS
- 200A maximum rated current with bi-directional operation (V2G capable)
- 270V to 920V output range
- Continuous operation at rated load
- Remote operation (up to 600 ft)
- Floor- or Wall-Mountable

Downloads

RES-D3-CS20 Electric Vehicle DC Fast Charger Dispenser Product Sheet

Pioneering Industrial Vehicle-To-Grid In Electric School Buses

Results From Two Seasons Of V2G Participation

Summary panel In the summers of 2021 & 2022, Highland Electric Fleets & BorgWarner used vehicle-to-grid (V2G) technology to discharge 10+ MWh hours to the Massachusetts grid over 158 hours -- the first-time battery storage from electric school buses (ESBs) was used in a commercial V2G program in the United States. Participation generated $23k in revenue and demonstrates the value ESBs can deliver to support the grid and lower the cost of ownership of an electric bus fleet.

Challenges Facing The Electric Grid

Extreme weather and increasing peak loads are challenging the electric grid's resilience and ability to deliver reliable electricity across North America. Recent events such as Hurricane Ida, the Texas cold snaps in 2021 & 2023, and the extreme heatwave of 2022 underline the need for backup power storage. Power outages during these events revealed the vulnerability of power systems that keep essential services such as schools, nursing homes, and healthcare facilities online. In addition, increasingly extreme temperatures cause spikes in demand, which necessitate firing up inefficient & carbon - intensive fossil fuel Peaker plants. As the grid evolves and a growing number of services and products become electrified, electric grids around North America will require novel solutions to remain reliable and resilient. The potential power available from expanding electric vehicle (EV) fleets can help manage disruptions as they unfold and mitigate the impact of power outages or demand spikes on communities

What Is V2G?

Vehicle-to-grid (V2G) technology allows an EV to both draw energy from the grid (typically during periods of low cost and low demand) and discharge energy back to the grid (during periods of higher cost and high demand). Highland Electric Fleets (Highland) -- in partnership with BorgWarner, Thomas Built Buses, Proterra, and Synop -- is pioneering commercial V2G technology for electric school buses (ESBs), which supports grid stability and reduces the cost of fleet electrification for school districts & fleet operators.

How Can EVs Support The Grid?

V2G transforms EVs, such as electric school buses (ESBs), into mobile batteries that can be used to help stabilize the electric grid. This class of Distributed Energy Resources (DERs) is pivotal to the evolution of the electric grid. Increasing amounts of variable renewable energy can cause fluctuations on the electric grid: energy storage, including from batteries in ESBs and other EVs, plays a critical role in balancing and buffering the intermittency of resources like wind and solar. In addition, utilities can reduce emissions by using electric school buses as DERs when energy demand spikes, rather than firing up conventional fossil fuel resources for short periods of time.

Your electrified fleet can now realize 24/7/365 value in providing safety and power security for your operation in the event of grid failure or natural disaster.

INDUSTRIAL BACKUP POWER GENERATORS

The costs of a power outage to a business can be substantial, including losses in product, revenue, productivity, and customers. With increasing severe weather events and disasters triggering greater numbers of costly power outages, there is a growing interest in generators for reliable backup power. Industries and businesses are either considering installing backup generators or—in the case of facilities such as hospitals and airports that are required to and already have backup power—are considering redundant backup systems for added resilience against grid outages. For decision makers to make informed choices, it is important to understand the cost and reliability associated with various backup system configurations.

Grid-connected generators can create positive economic value and have significantly lower failure rates than backup-only generators. The more regularly a generator is used, the more likely it is to be well-maintained and functioning properly. At the same time, backup generators are not designed for continuous operation, and both diesel and natural gas generators have relatively high operating costs compared to typical grid prices. This makes backup generators best suited for services in which the generator only runs for a limited number of hours. Regions with coincident peak charges, along with regions that have curtailable tariffs and/or emergency standby participation, are well suited to be served by backup generators and can generate significant revenues for backup system operators.

INDUSTRIAL GENSET APPLICATIONS

Texzon Utilities exclusively offers KOHLER backup generators, simply because they're built to meet the heavy demands of agricultural production and changing weather. KOHLER continuously delivers on keeping our producers and farmers profitable.

Typical Industrial Applications Include:

- Manufacturing
- Production Resiliency
- Waste and Water Management
- Healthcare
- Construction
- Data Centers
- Food Processing
- Canning and Packaging
- Infrastructure
- Industrial Development
- Cold Storage
- Hospitality
- Gas and Oil

The standby power generators of today are supplying a wider variety of loads than have been historically seen. Capacitive loads are defying the general assumptions of what a load application looks like and may require new or modified specifications. Larger power networks are involving more voltages throughout the installation, requiring careful consideration of how to manage not only the loads, but also the equipment between the source and loads. With careful planning and consideration of available strategies, capacitive loads and transformer inrush can be successfully managed to keep installations in power.

Behind the Meter Wind Turbine Power for Business by Texzon - EWT

DIRECTWIND range of 225kW to 1MW wind turbines are designed and built to provide the most cost-effective long-term power whether you're developing a new distributed energy site or repowering an existing one. Through a best-in-class combination of direct drive technology and advanced control features, they ensure high yields and reliable performance to maximize your return on investment. We design in-house and continually improve our product, to further enhance performance.

Proven on three continents – both on and off grid – our turbines also feature a grid-friendly output that simplifies integration into weak and micro-grids. Moreover, we offer an extensive range of configurations with tip heights from 61m to 114m to help you get the most out of your site conditions. It's no wonder our wind turbines have been meeting and exceeding our customers' expectations for more than 10 years.

As hundreds of our customers can confirm, our cost-effective yet comprehensive service support is the key to unlocking your turbine's potential. Our service contracts are all encompassing, delivering outstanding customer satisfaction and turbine availability. With our own highly skilled local service teams close to you supported by 24/7 remote monitoring via our state-of-the-art control centers, you can be sure of the fastest response times. And we are committed to continually improving the performance of installed turbines via in-house R&D.

Customized Microgrid Design

In close collaboration with its clients and with a clear understanding of their energy requirements, EWT creates tailored microgrid systems for optimum energy generation, storage, and distribution. EWT's expertise goes beyond wind energy, ensuring precision-engineered solutions for diverse applications, including diesel generators and solar PV.

Comprehensive Integration Services

From conceptualization to implementation, EWT handles the entire integration process. This encompasses sourcing cutting-edge renewable energy technologies, deploying energy storage systems, and seamlessly integrating smart grid components for optimal performance.

Advanced Control and Monitoring

EWT's integrative approach extends beyond installation. EWT provides sophisticated control systems and monitoring platforms, allowing real-time insights into performance of the system. This ensures efficient energy management and quick response to dynamic energy needs.

- Renewable Energy Integration

EWT leverages solar, wind, hydro, and other renewable sources to create hybrid microgrids that reduce reliance on traditional power sources, cutting costs and environmental impact.

- Resilient Power Solutions

EWT's microgrids offer uninterrupted power supply, ensuring resilience against grid failures or natural disasters. System reliability is crucial for critical infrastructure, remote communities, and mission-critical facilities.

- Energy Optimization and Efficiency

Through intelligent energy management systems, EWT optimizes power usage, leading to enhanced efficiency, reduced waste, and substantial cost savings over time.

- Consultation and Maintenance Services

EWT's support does not end with installation of the system. We provide ongoing monitoring, consultancy, and maintenance, ensuring peak performance and adapting systems to evolving energy needs and technological advancements.

INDUSTRIAL EFFICIENT LIGHTING

Texzon and our lighting partnerships have grown to be a national supplier of lighting products and fixtures, serving a broad range of customers from business and industry, agriculture, to schools and government agencies.

Today our Lighting and Energy Services division leverages 100+ years of lighting expertise offering turn-key solutions that are professionally managed from design to installation. We provide a project experience that brings together lighting and lighting control professionals to ensure an outcome that exceeds customer expectations.

We manage all aspects of your lighting project, from facility audit and design to final commissioning and warranty administration. Or, if you choose to do your own installation, we are there to help with product specification and procurement.

Using our multi-state branch locations, we deliver thousands of lighting products to hundreds of state, municipalities, schools, and university facilities throughout the country. With 22 dedicated government account representatives, our local branches are there to provide product expertise, facility energy audits and energy saving product recommendations.

FUTURE OF LEDS

There are many white LED lighting products available on the market, and the number continues to grow, with new generations of devices constantly emerging. While many of these products perform quite well, their energy efficiency and color qualities can vary; but standards, test procedures, and resources such as ENERGY STAR® and the DesignLights Consortium™ Qualified Products List help buyers make informed choices. LED lighting technology now offers the highest luminous efficacies (and efficiencies) of any light-source technology, and affordable pricing have resulted in significant adoption.

ONSITE GEOTHERMAL ENERGY STORAGE

How Does 30 MW Energy Storage (EarthStore Mechanical Storage H2O) Work?

Energy Storage (EarthStore™) Overview

Sage Geosystems' storage solution (called EarthStore™) in association with Texzon Utilities energy is ready to scale now at a lower cost than pumped storage hydropower (PSH) and lithium-ion batteries.

Texzon Utilities can put this energy storage virtually anywhere and it has a meaningfully smaller surface footprint.

- Can provide both short- and long-duration energy storage
- Cheaper than PSH; order of magnitude cheaper than lithium-ion batteries for long-duration applications
- Ability to pair with existing wind and solar projects to create 24/7 baseload power
- Better economics than natural-gas peaking plants
- High flexibility and scalability to meet most energy storage needs

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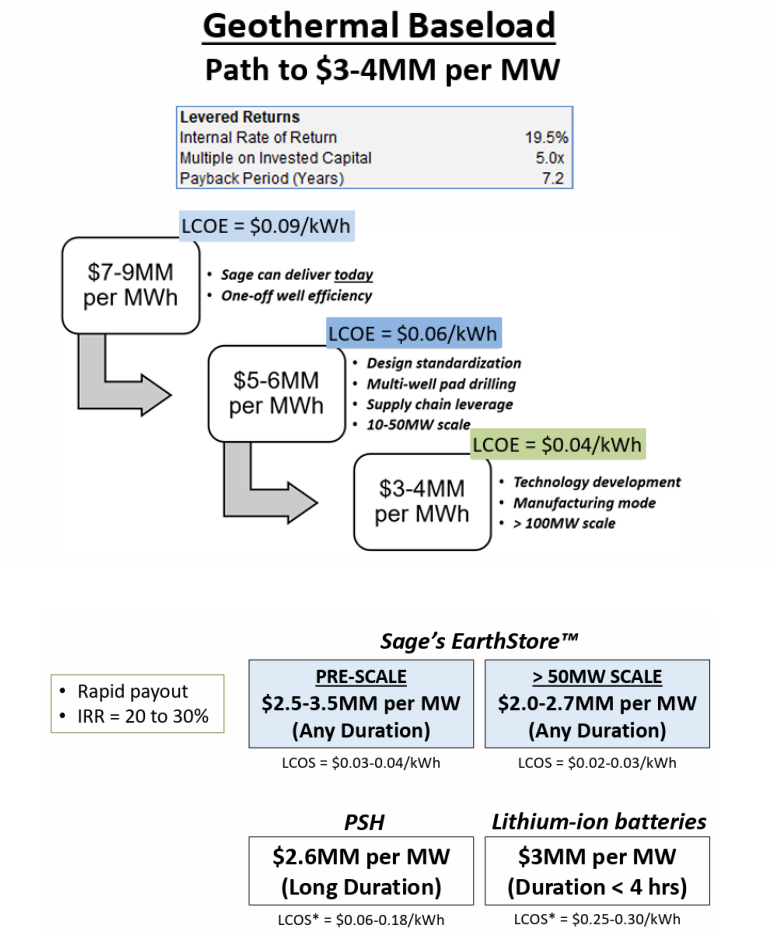

Why Texzon Utilities for Geothermal?

Enhanced Geothermal Systems

(EGS), or human-made geothermal power, holds the potential to power more than 65 million American homes and businesses, and is the next frontier for renewable energy deployment. The DOE Geothermal Technologies Office (GTO) EGS program supports research, development, and demonstration projects that guide enhanced geothermal

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