



# Eaton helps Skyonic Corporation power sustainable innovation

**Location:**

San Antonio, Texas

**Segment:**

Industrial

**Challenge:**

Global power management and manufacturing expertise for supply chain efficiency and expedited construction of the world's first for-profit carbon mineralization plant

**Solution:**

Turnkey Eaton engineering services, power distribution equipment, lighting and support systems deliver a reliable, robust solution with reduced installation and on-site coordination costs

**Results:**

Minimized start-up time and reduced installation delays expedite construction of the plant, which will annually mitigate nearly 300,000 tons of greenhouse gas emissions

*TTCL recognized the value of Eaton's ability to specify and manufacture a wide range of solutions that would not only meet Skyonic's requirements for electrical safety and reliability, but also speed installation and commissioning to maintain the desired timeline.*

**Background**

Skyonic Corporation is a Texas-based company that specializes in the development of new and retrofit plants that create carbon-negative chemical products by mineralizing industrial emissions.

The company's SkyMine® technology allows a plant to economically transform carbon dioxide (CO<sub>2</sub>) emissions from exhaust streams into solids instead of gas. The resulting solid carbonates and bicarbonates are ideal for safe landfill storage and can be sold to the chemical production industry for use in products such as baking soda, hydrochloric acid and limestone. Additionally, the solid storage of CO<sub>2</sub> means that there is no need for pipeline transport, removing the risk of injection or re-release into the atmosphere.

This innovative sustainable approach has drawn major interest and investment from the Department of Energy and major industrial companies.

Skyonic's first full-scale project integrates SkyMine technology into an existing cement manufacturing facility to capture an estimated 300,000 tons of carbon dioxide or 15 percent of emissions annually. The project is called Capitol SkyMine and marks the first for-profit initiative of its kind in the world. Skyonic

chose Toyo-Thai Corporation Public Company Limited (TTCL) to help lead construction efforts—due to its proven capabilities managing large global projects.

Based in Thailand, TTCL is an engineering procurement and construction (EPC) contractor, providing integrated design and engineering, as well as procurement of equipment and materials, and construction services for turnkey projects, primarily for petrochemical, chemical and petroleum industries.

**Challenge**

To expedite the construction of the Capitol SkyMine, TTCL was responsible for sourcing a reliable power systems expert that could provide end-to-end power management and safety solutions, expert guidance for meeting U.S. standards and certifications and reliable delivery to support Skyonic's aggressive timeline for completion.

Starting up the SkyMine process would require considerable power consumption to feed motors required for operation. Additionally, the system that captures the CO<sub>2</sub> gases necessitated a reliable stream of high-density power. For these reasons, the power system installed at the plant needed to



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be incredibly robust, while also providing the inherent power redundancy needed to withstand unplanned outages and power disruptions.

Further, it was vital that the power distribution equipment was compact enough to fit within the existing cement manufacturing facility—negating the need to invest in a facility expansion.

The plant also required power management and lighting solutions designed to meet both National Electrical Code® (NEC) and International Electrotechnical Commission (IEC) standards for the highest quality, safety and performance in hazardous environments. Because TTCL is based in Thailand, it was important that the primary electrical supplier could provide the experience and expertise needed to achieve the applicable U.S. standards and certifications.

To simplify supply chain management, delivery and on-site coordination, TTCL was looking for a supplier with a broad depth of electrical solutions designed for demanding plant applications. For on the ground support, the primary electrical supplier would also need to provide turnkey assistance with design, construction and maintenance to help Skyonic optimize their investment and reduce risk.

## Solution

Having worked with Eaton on previous global projects, TTCL recognized the value of Eaton's ability to specify and manufacture a wide range of solutions that would not only meet Skyonic's requirements for electrical safety and reliability, but also speed installation and commissioning to maintain the desired timeline.

Working closely with Skyonic and TTCL engineers, Eaton developed an innovative platform that would integrate switchgear, motor control centers, variable frequency drives, battery backup, bus ducts, sub-distribution and lighting controls all within a pre-fabricated enclosure.

The Eaton integrated power assembly, or E-House, was designed for installation outside



of the plant to simplify power deployment. This also eased installation, as the units could be immediately placed on a solid foundation such as a concrete pad, with the only additional requirement being connection of incoming and outgoing loads. To support Skyonic's sustainability goals, the switchgear included in the E-House used environmentally friendly insulation that eliminates the use of sulfur hexafluoride (SF<sub>6</sub>), a harmful greenhouse gas commonly found in switchgear.

Providing additional value, the solution was factory-assembled and tested to reduce startup time and expedite processing of revenue stream. To further speed system testing and commissioning, the integrated solution was engineered to ensure that both customer specifications and applicable building certifications were met for each installation.

Today, Eaton's powerful organization is able to offer customers expanded power management solutions, expertise and project management capabilities. TTCL was able to leverage these strengthened abilities by incorporating pad-mounted transformers from Eaton's Cooper Power Systems business, as well as street and office lighting, and hazardous area lighting from Eaton's Cooper Lighting and Crouse-Hinds businesses, respectively.

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The Eaton transformers were specifically designed to withstand the toughest environmental hazards. To ease compliance, the transformers were also engineered to meet or exceed all applicable American National Standards Institute (ANSI), National Electrical Manufacturers Association (NEMA), IEEE standards, and NEC specifications.

To enhance workplace safety, Eaton's Crouse-Hinds hazardous area lighting solutions were engineered for reliable performance in areas with the presence of flammable vapors or gases and combustible dusts.

Eaton's Electrical Engineering Services and Systems division, one of the largest and most experienced teams of power system engineers in the industry, helped TTCL design, install and commission the solution to keep the project moving forward. The Eaton team will also provide ongoing power coordination studies to help enable reliable, safe operations at the plant.

## Results

By collaborating with Eaton, TTCL was able to simplify its supply chain, while working with experts who understand their business challenges to accelerate the design of the \$117 million Texas-based plant.

Eaton assembled, tested and delivered the integrated power

system in building block fashion to help TTCL could eliminate installation errors and reduce on-site coordination costs—helping provide Skyonic with the most cost-effective solution possible.

### By adopting the range of Eaton electrical solutions, TTCL was able to:

- Simplify supply chain requirements with one supplier capable of providing a wide range of power management and safety solutions
- Lower installation costs
- Minimize start-up time and on-site coordination
- Enhance safety in hazardous environments
- Meet applicable U.S. standards and certifications for personnel and equipment safety

Once fully operational in 2014, the plant is expected to capture 300,000 tons of CO<sub>2</sub> annually through the direct capture of 75,000 tons and additional 225,000 tons that will be offset by the production of green products. Partially enabled by the cost-effectiveness of power system construction, the plant is expected to turn a profit within three years.

To learn more, visit [www.eaton.com](http://www.eaton.com)

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