ECO2CELL



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ECO2CELL Cube

Container-based CO_2 conversion as a pilot-scale testing and validation platform

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CO_2 utilization at pilot scale

The ECO2CELL Cube takes patented technology to pilot scale, enabling electrochemical CO_2 conversion under near-industrial conditions.

Evaluating CO_2 as a feedstock

The ECO2CELL Cube enables companies to investigate reaction conditions, explore product pathways, and assess process interfaces in a controlled pilot environment. The results provide valuable insights for further technology development and industrial scale-up.

From CO_2 stream to product

Based on GKT's patented ECO2CELL technology, the electrochemical process converts captured CO_2 using water and electricity, without requiring an external hydrogen supply. Key parameters, including catalyst, electrode material, current density, and electrolyte, influence the resulting product composition. Potential products include carbon monoxide, syngas, ethylene, and formic acid. The quantities produced depend on the specific test conditions.

How the Cube works

At the heart of the system is a three-chamber electrolysis cell. The anode, cathode and gas chambers are connected to three controlled circuits. An ion-exchange membrane separates the anode and cathode; the supplied CO_2 reacts at the gas-diffusion electrode. Compressed CO_2 passes through a pressure reducer and then enters either the gas chamber or the catholyte circuit via a static mixer. Oxygen forms on the anode side. Gaseous products are analyzed, while liquid products are sampled separately. Pumps and heat exchangers support controlled operation.

Targeted testing

Pilot-scale trials focus on catalyst performance, operating parameter optimization, and product stream analysis. They also allow the potential for recycling unconverted components to be assessed, along with specific requirements for CO_2 feed streams and downstream processing.

System overview

- Container-based pilot and validation platform
- Two 20-foot containers
- Required floor space: 2 × 14 m²
- CO_2 as feed gas

Discover more about CO_2 valorization

Testing and validation capabilities

- Catalyst performance
- Product pathways and formation
- Reaction and process parameters
- CO_2 conversion efficiency
- Process stability and heat removal
- Gas and liquid phase behavior
- Industrial process interfaces

The centerpiece of the ECO2CELL Cube – the electrolysis cell.





One container houses the electrolysis system and its associated components.

Inside the ECO2CELL Cube

Configuration, operation and key technical data of the ECO2CELL Cube.

Two containers, one pilot plant

The ECO2CELL Cube combines electrolysis technology and analytical facilities in a two-container setup. One container houses the electrolysis system and its associated components, while the other provides space for operation, monitoring, and analysis.

Currently located at GKT's Attnang-Puchheim site, the pilot plant can also be considered for testing at industrial sites, subject to project-specific technical requirements, including transport, installation, and integration with the CO_2 source.

Safety and control

Key operating parameters, including temperature, pressure, flow rates, pH, conductivity, current, and voltage, are continuously monitored. Gas detection, ventilation, containment trays, and defined protective measures ensure controlled and safe operation.

From testing to industrial application

The ECO2CELL Cube provides a platform for evaluating CO_2 conversion processes during integrated operation. Potential applications include industries with captured CO_2 streams, such as cement, steel, biogas, and petrochemicals. Feed gas suitability and integration requirements are assessed individually for each application.

Discover the ECO2CELL Cube

Key technical data

Installed electrolysis power	5 kW
Design electrolysis power	up to 15 kW
CO_2 conversion capacity	up to 5.34 kg/h*
Operating pressure	up to 10 bar(g)
Circuit temperatures	5–80 °C

* At the 15 kW design capacity; this is not the performance of the currently installed 5 kW electrolyzer.



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GKT is a globally operating system partner for thermal separation and environmental technologies – built on nearly 90 years of metalworking expertise and today defined by deeply rooted process engineering competence. In an industry where resources, circularity, energy, and CO_2 determine competitiveness, we make challenges technologically manageable and economically effective.

Our approach:
We Engineer Green Key Technologies.

We develop and implement key industrial technologies – from falling-film, thin-film, and short-path evaporators to distillation and drying, as well as CO_2 valorization, waste heat recovery, and IIoT-enabled process optimization.

As part of the Dr. Aichhorn Group, we validate processes in our own technical center under real operating conditions and scale them up to turnkey EPC facilities.

For our customers, this means maximum efficiency, reduced energy consumption, lower CO_2 emissions, and stronger economic viability – proven worldwide through numerous successfully executed projects.

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