

Syncat: Driving innovation in gas conversion and sustainable fuels

Enabling innovation in research and industrial applications, the Syncat Facility can operate continuously with autonomous capabilities producing industrially relevant data.

Gas conversion facility

Designed and built by CSIRO, the Syncat Facility features two high-throughput gas processing rigs, supported by:

- Autonomous control system: enables continuous autonomous operation over extended periods.
- Supervisory control and data acquisition (SCADA): enhances system flexibility and manages over 800 input-output elements.
- Analytical capabilities: provides comprehensive gas analysis and liquid product assessment.
- Integrated safety systems: includes gas detection sensors, remote alerts and emergency shutdown (ESD) actions.
- Afterburner plant room: houses an industrial incinerator for safe off-gas disposal.

Core research and industry applications

The Syncat Facility offers large-scale capabilities with high flexibility, enabling in-depth investigations into reaction dynamics and process optimisation. It also supports the application of standard industrial engineering procedures while advancing cutting-edge research.

Equipped with essential gas-handling infrastructure, Syncat provides an integrated platform for gas processing and conversion studies, including:

- Aviation e-fuels and e-diesel
- Fischer-Tropsch (FT, FT-SPK) processes
- E-methane production
- CO₂ conversion to Methanol and Olefins
- Gas-phase upgrading and separation technologies.



One of Syncat's gas processing rigs. Banner image (top): Syncat is exploring CO₂ conversion into high-value products such as aviation e-fuel and e-diesel.

Process optimising and risk-reduction with High-Precision Data Acquisition (SCADA)

The SCADA system controls facility and rig operations while enabling real-time data acquisition and logging. These capabilities are critical for improving process efficiency, enhance predictability, and de-risking scale-up. These advanced capabilities support:

- Acquisition of critical process data: supports the development and refinement of mathematical models (kinetic, process, heat, and mass transfer), improving the accuracy of scale-up predictions.
- **Real-time monitoring of process parameters:** continuous tracking of pressure, temperature, and flow allows accurate mass balancing of reagents and products, ensuring stable and optimised operations.
- **High-frequency sampling:** generates robust datasets that enable advanced analysis and optimisation of industrial processes, reducing development time and cost.



SCADA manages a large number of input-output elements and real-time acquisition of process parameters.



Syncat enables investigation of a wide range of operating conditions and long-term testing of processes.

Benefits of partnering with us

- Access to cutting-edge research: collaborate with leading researchers and gain insights into the latest technological advancements.
- Generation of industry-relevant data: continuous operation over extended periods delivers the high-quality data needed to refine and optimise technologies.
- **Customised solutions:** tailored research and experimental programs designed to address specific industry challenges.
- Enhanced efficiency and sustainability: optimise processes for greater efficiency, cost-effectiveness, and sustainability.
- **Reduced risk and faster innovation:** leverage state-of-the-art infrastructure to accelerate R&D and reduce development risks.
- Industry connections: engage with a strong network of industry leaders, research institutions and other government agencies and drive collaborative innovation.



Syncat delivers cutting-edge research and industry-relevant data, helping industries refine and optimise their technologies.

Our partners

The CSIRO Syncat Facility draws on a range of capabilities from various CSIRO research units.

We have strong networks with research organisations in Australia and around the world, and work closely with industry, defence, government and academia.

As Australia's national science agency, CSIRO is solving the greatest challenges through innovative science and technology. CSIRO. Creating a better future for everyone.

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