



Technical Brief 2: Modular Design Philosophy

Overview

CarbonCore's modular design strategy is central to its ability to deploy scalable, cost-effective, and rapidly commissioned SAF production facilities. The modular approach reduces engineering and construction risk, shortens timelines, and enables flexible scaling from 10,000 to 40,000 barrels per day (bpd) based on demand, feedstock availability, and offtake development.

1. Modular Deployment Strategy

The facility is engineered around repeatable processing blocks that can be fabricated off-site and delivered for rapid installation. Key modular units include:

- Gasification trains
- Syngas cleanup and conditioning modules
- Fischer-Tropsch synthesis trains (CANS FT)
- Product upgrading skids
- CO₂ capture and water treatment modules

This design philosophy supports phased deployment and regional replication, allowing CarbonCore to scale with market need while managing CAPEX exposure.

2. Strategic and Operational Advantages

Modularity provides:

- Faster project deployment and commissioning
- Improved cost predictability and lower construction risk
- Standardized QA/QC through factory fabrication
- Easier adaptation to new feedstocks or output specifications
- Seamless integration with AI-based process controls for optimization and diagnostics

3. Phased Expansion Model

CarbonCore's development plan begins with a 10,000 bpd SAF output module, with additional trains to be installed over time to achieve 40,000 bpd by Year 5–6. Each module is engineered to operate independently or in tandem, allowing flexibility in capital deployment and operational scaling.

4. AI and Automation Integration

All modular units will be integrated with CarbonCore's AI-based plant operations system. This system enables real-time data acquisition, predictive maintenance, process tuning, and system-wide optimization. Modular AI compatibility ensures that each new unit brought online fits seamlessly into the overarching digital control environment.

Conclusion

Modularity is not only a construction strategy, but a core tenet of CarbonCore's decarbonization philosophy. By deploying incrementally, intelligently, and responsively, CarbonCore ensures capital efficiency, operational agility, and consistent technological evolution across its SAF platform.