



A Yokogawa Company

Petro-SIM®

Petro-SIM Process Simulator for Modern Refining & Downstream Operations

The unified platform that simplifies complexity across the hydrocarbon value chain

Petro-SIM® is a digital twin process simulation platform purpose-built for the full hydrocarbon value chain — from upstream to LNG, refining, petrochemicals, polymers, renewables, sustainable aviation fuel (SAF), and green hydrogen. It is trusted by operating companies and EPC firms to design, operate, and optimize complex assets with accuracy and confidence.

Built on first-principles models and the capability to incorporate AI/ML-ready hybrid modeling, Petro-SIM powers cloud-based applications that drive performance and sustainability at scale. It helps operators cut Scope 1, 2 and 3 emissions and move closer to autonomous, energy-efficient operations in real time.

As margins tighten and regulations increase, Petro-SIM empowers decision-makers to respond with speed, precision, and confidence. A maintained Petro-SIM powered digital twin has been proven to save refiners 20–30¢ per processed barrel of oil.



200+
process digital twins
have been built off the
Petro-SIM platform

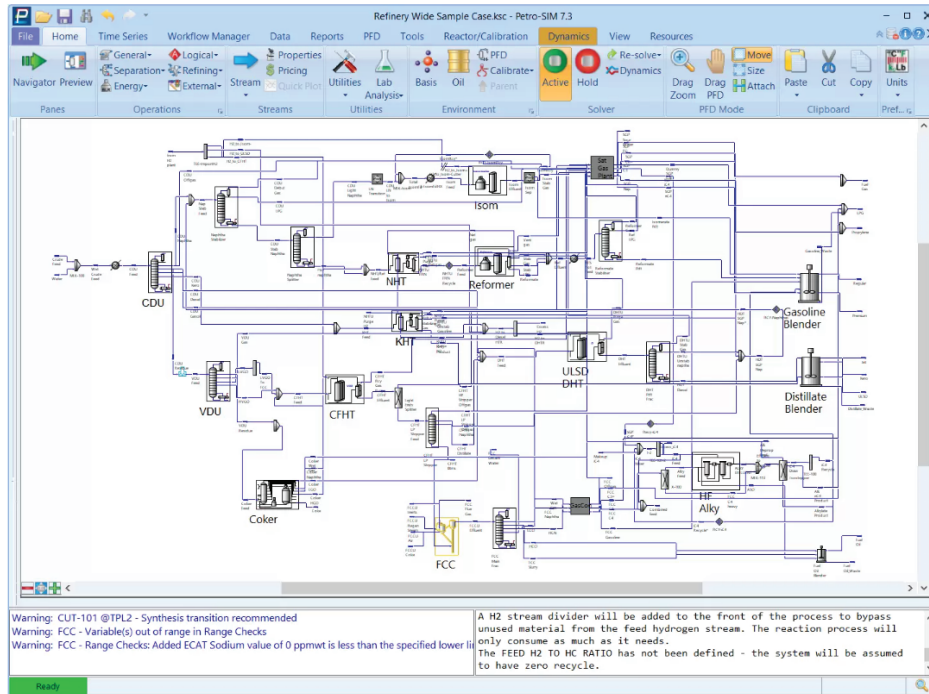
Bringing
DECARBONIZATION
to Life



Bridging Models With Operations

Today's downstream operators walk a tightrope to balance profit, performance, and decarbonization. Variable feedstocks, volatile markets, and vulnerable operations demand more agile, efficient solutions.

Petro-SIM does more than simulate. It unites every process unit and utility across the value chain using rigorous thermodynamics, detailed unit operation models, and powerful built-in utilities. Its comprehensive toolkit streamlines operations, collaboration, and supports measurable sustainability gains with precision and scale.

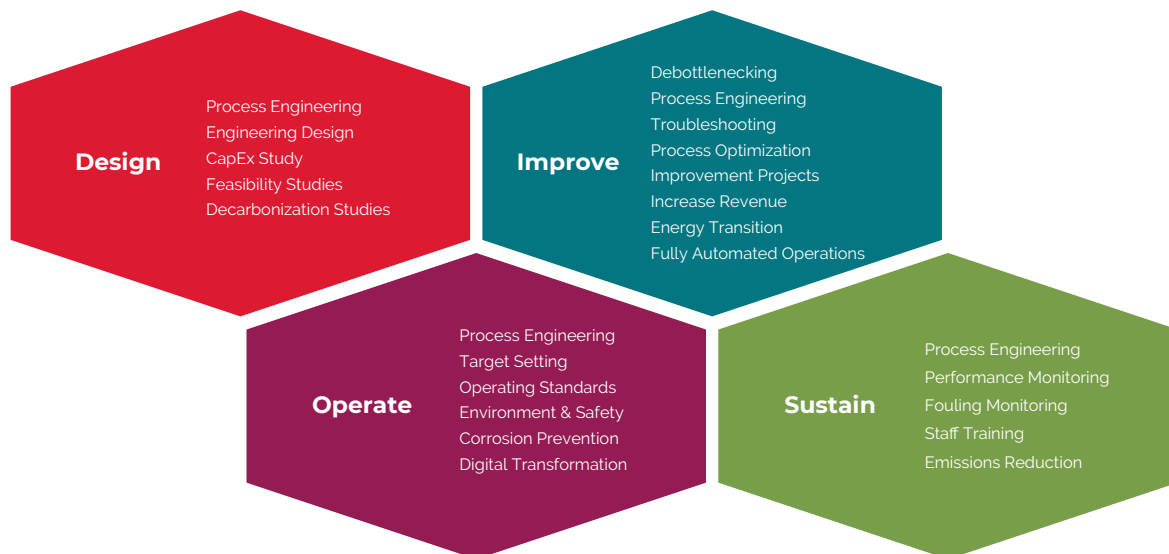


Petro-SIM process digital twin simulation of entire refinery.

Engineering the Future

Design. Operate. Improve. Sustain.

Petro-SIM delivers targeted capabilities to enhance performance across every stage of the plant lifecycle from early design studies to fully automated operations.



Modeling Excellence Across the Value Chain

By connecting real-time plant data with predictive and AI/ML-ready models, Petro-SIM delivers a solid foundation for continuous performance monitoring, automated reporting, and informed decision-making. Targeted capabilities include:



Process Simulation & Process Digital Twin Centralizes validated data in a unified environment that enables real-time insights and automates reporting to create a single source of truth across teams and locations.



Optimization, Energy & Carbon Management Maximizes yield and monitors carbon intensity while reducing energy use and costs across the refining and petrochemical supply chain to support circular economy goals via effective use of resources.



Sustainability – A Pathway to Net Zero Petro-SIM models renewable and low-carbon fuel pathways, including co-processing of low-carbon intensity feedstocks, green hydrogen production, synthetic crude (syncrude) via Fischer-Tropsch technology, and SAF.



Renewables – A Pathway to Net Zero Rigorous kinetic modeling for kerosene and diesel hydrotreating; in renewable mode, supports bio-oil processing to advance refinery decarbonization.



Value Chain Decision Making Leverages real-time digital twin models to enhance decision-making across the entire value chain to improve speed, accuracy, and collaboration.



Ideal For

Petro-SIM is trusted by design engineers, operators, technical teams, and business leaders across the entire oil and gas and petrochemicals value chain.

- **Process Engineers** accurately model, simulate, size and optimize every unit to speed up design, troubleshooting, and debottlenecking.
- **Operations Managers** set performance targets, monitor KPIs in real-time, drive continuous improvement, and minimize downtime.
- **Sustainability & Energy Teams** evaluate decarbonization pathways, model carbon reduction scenarios, track emissions performance, and align operations with net-zero goals.
- **Digital Transformation Leaders** integrate real-time plant data with predictive models to scale digital twin programs and accelerate innovation, while deploying advanced process control and real-time optimization strategies.

Why Petro-SIM

Petro-SIM process digital twins support the industry at every stage of the energy transition—from early-stage modeling to dynamic operations. It empowers engineers, operators, and business leaders to accelerate digitalization, energy transition, and decarbonization. With end-to-end digital twin capability, the platform fuels measurable emissions reduction, energizes margins, and strengthens stakeholder alignment for Bringing Decarbonization to Life®.

Market Problems	Product Features
Integrated Expertise and Digital Twin Foundation	
<p>Extracting the most value from simulation software can be difficult. Without linking models, live plant data, and engineering know-how, insights stay trapped — and performance gains are lost.</p>	<p>Petro-SIM connects engineering models, plant data, and KBC expertise in one place. It turns simulation into value-driven solutions with faster answers, smarter decisions, and measurable improvement across operations.</p>
Renewables and Decarbonization Modeling	
<p>Building a decarbonization plan requires the right tools to model complex paths — from renewables to hydrogen to low-carbon fuels. Without flexible models, identifying what's working or where to invest next can be challenging.</p>	<p>Petro-SIM models renewable and low-carbon pathways such as SAF, HVO production (Fischer-Tropsch synthesis, hydrotreating), and electrolyzers. It helps teams test scenarios, compare options, and plan a clear path to adopt green technologies.</p>
Unified Process and Utility Modeling	
<p>Process and energy models often sit in separate systems. That gap hides the real cost of energy use and slows optimization.</p>	<p>Petro-SIM links process and utility models in one flowsheet. It helps engineers see trade-offs instantly, cut energy waste, and improve overall plant performance.</p>
Automated Digital Twin Workflows	
<p>Spending too much manual time updating, checking, and reporting on models slows collaboration and stalls innovation.</p>	<p>200+ process digital twins have been built off the Petro-SIM platform, allowing for automation of routine unit monitoring and reporting tasks, keeping models up to date and democratising software use through organisations</p>
Cloud-Ready and AI/ML-Enabled Platform	
<p>With the advancement in technology, legacy systems fall behind AI, machine learning, and cloud-based collaboration.</p>	<p>Petro-SIM combines first-principles accuracy and is AI/ML enabled. It scales across the cloud, adapts to new technologies, and keeps operations future-ready.</p>

Contact KBC:



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