ingenero 360AI

gasnetX 360

MODULE OF THE INGENEROX360 AI SUITE

Highest-margin, constraint-feasible operating and commercial plans for gas transmission & delivery networks

PRODUCT OVERVIEW

GasNetX360 is a decision-support application for gas transmission and delivery network operations, combining hydraulic and equipment-performance models with contracts, tariffs and market prices. Minimizing energy is not the same as maximizing profit, a lower-energy plan can forgo a high-value delivery, trigger imbalance penalties, or consume linepack needed before a peak. GasNetX360 finds the highest-margin plan that is still feasible against the network's real hydraulic and equipment limits, configured and commissioned per site by Ingenero engineers.

OBJECTIVE — MAXIMIZE EXPECTED CONTRIBUTION MARGIN OVER THE PLANNING HORIZON

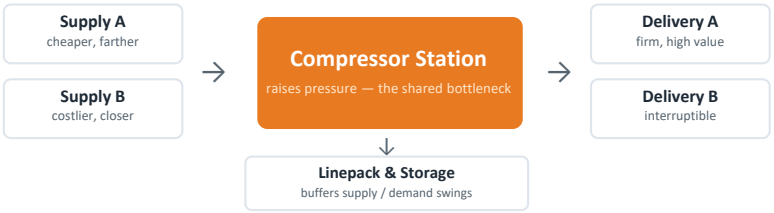
Profit = Delivery revenue + Optionality value − Supply cost − Compression cost − Transportation charges − Penalties − Losses / emissions cost − Reliability cost

SCOPE OF SERVICES — SEVEN PHASES, EACH WITH A SIGNED DELIVERABLE

PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5	PHASE 6	PHASE 7
Discovery & Basis	Data Acquisition & Assessment	Network & Equipment Model	Economic & Contractual Model	Optimization & Scenario Engine	User Application & Recommendations	Pilot, Training & Deployment

01 Network & Equipment Model

Shown: how the optimizer weighs multiple supplies and delivery priorities



The optimizer chooses the source, the compression and which delivery to serve first.

02 Economic & Commercial Model

Shown: today's margin, the GasNetX360 target, and the ceiling

NET CONTRIBUTION MARGIN — TODAY vs THE THEORETICAL CEILING



Ceiling = margin under perfect foresight of demand, prices and equipment, with every physical, contractual and regulatory limit still enforced a benchmark, not a plan.
Debottlenecking (relaxing a binding limit) is valued separately, on top; the split above is quantified per site.

03 Optimization & Scenario Engine

How the optimizer works — from inputs and hard constraints to a ranked, defended plan

APPROACH genuine mathematical optimization — mixed-integer plus nonlinear terms (hydraulics, compression, discrete commercial choices), solved on a rolling horizon.
Machine learning supplies the forecasts and fast network surrogates, not a replacement for the optimizer; the exact formulation, fidelity and solution method are fixed per site in Basis Definition.

INPUTS	network & equipment model · contracts & prices · demand / price forecasts · live SCADA
HARD CONSTRAINTS	Max Allowable Pressure & integrity · compressor envelopes · gas-quality specs · contract & nomination terms · mass balance & reserves
OPTIMIZER DECIDES	physical compressor loads, pressures, routing commercial : nominations, firm vs interruptible, storage, curtailment ; reliability : standby rotation, outage timing, reserves
RESULTS	ranked, quantified recommendations · predicted network state & bottlenecks · margin vs plan & budget · scenario & forecast-error sensitivity

Why GasNetX360, not a rule-based optimizer

Rule-based / energy tools	GasNetX360
Fixed rules, re-tuned by hand	Learns from operating history
Optimizes flow or energy alone	Optimizes margin, not just flow
One best-guess forecast	Scenarios + error sensitivity
Opaque, static output	Explains action, driver & confidence
Re-run by an engineer, ad hoc	Re-runs automatically each cycle

04 Opportunity and Recommended Actions

What a recommendation looks like — ranked, quantified, and traced to the constraint that drove it

MARGIN vs PLAN + illustrative $/day
BINDING NOW Station B MAOP — 87% of limit
PLAN HORIZON rolling 7 days · 1-hour steps

	RANKED ACTION	*EXPECTED VALUE · illustrative*	*VALUE · CONFIDENCE*
1	**Shift 35% of receipt volume Source B → Source A** receipt header · next 8 h · binding: delivered-cost spread		+$4,100/day conf: **High**
2	**Raise Compressor Station 2 discharge setpoint by 30 psi** Station 2 · next 4 h · binding: Station B MAOP headroom		+$1,800/day conf: **Medium**
3	**Build linepack 2% ahead of tomorrow's peak** Zone 3 · overnight · binding: peak-hour delivery limit		+$1,200/day conf: **High**
4	**Trim interruptible nomination on Route 4 by 10 MMscf/d** Route 4 · day-ahead cycle · binding: imbalance tolerance		−$600 penalty avoided conf: **Medium**

Each recommendation carries rationale, constraints considered, and forecast-error sensitivity, plus a full audit trail — advisory only. $ values are illustrative pending a site value study.

05 Platform

Historian & SCADA links
plug-and-play to plant historians and real-time feeds

Simulator & scheduler links
runs alongside hydraulic models, nomination and ETRM systems

Real-time to planning
one engine from live operations to the monthly plan

Gen AI assistant
answers network and margin questions inside the workflow

Role-based dashboards
operations, scheduling and commercial each get their own view

DELIVERY
Configured, validated and commissioned per site by Ingenero engineers.

FLEXIBILITY
Any network topology; natural gas, extendable to NGL / refinery fuel gas.

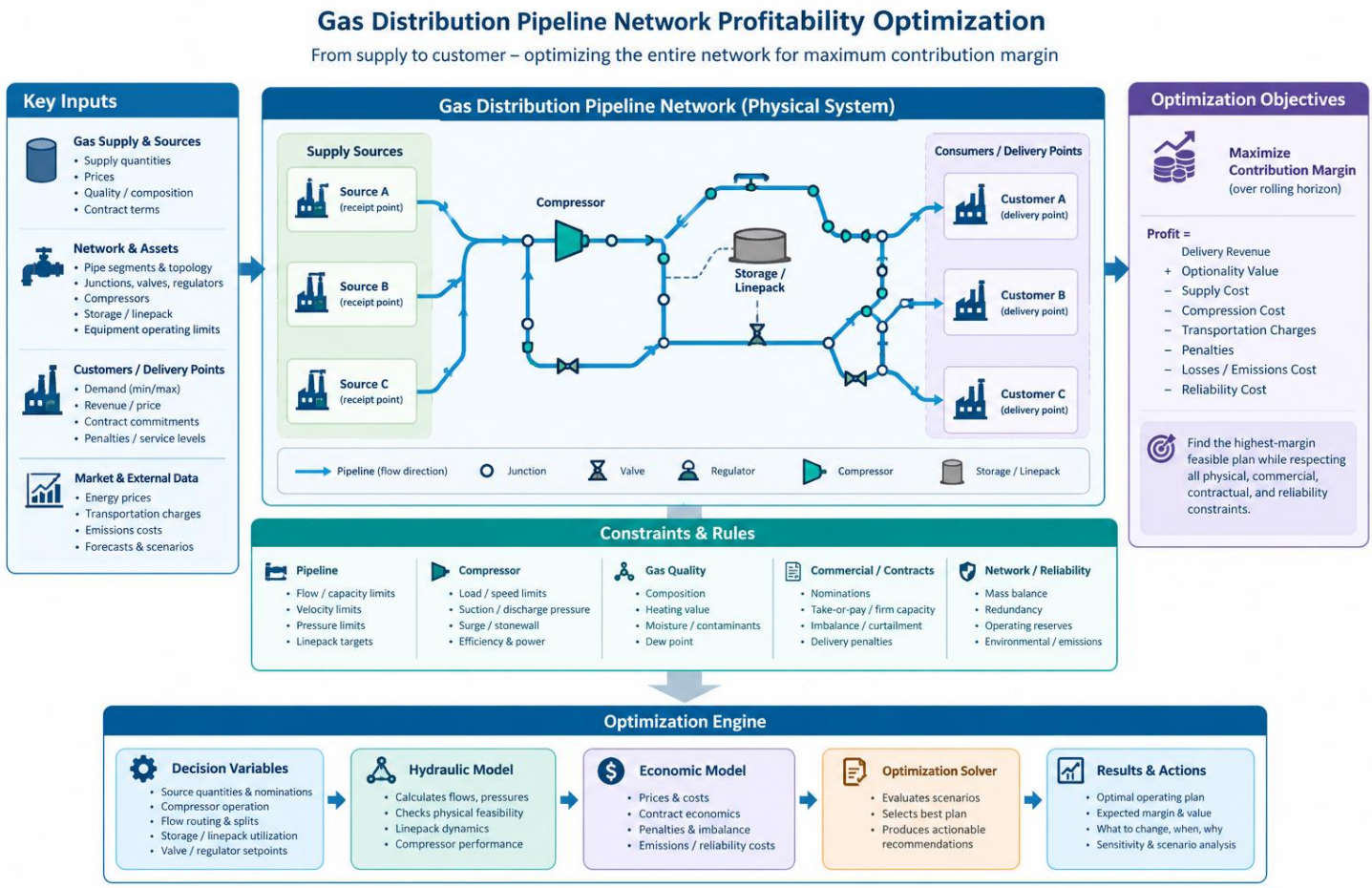
SCALE
Repeat networks reuse the configuration, with minimal rework.

Contact for a value assessment
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The complete picture — network inputs, physical system, constraints and the optimization engine

GASNETX360 — END TO END

From supply to customer — the inputs, the physical network, the constraints and the optimization engine behind every recommendation on page 1.



IMPORTANT

- **Directional, not a specification.** This brochure describes Ingenero's intended approach and an indicative solution for gas transmission and delivery network profitability optimization. It is provided for evaluation and discussion only, and does not form part of any contract, offer or commitment.

- **The delivered product will differ.** The actual scope, optimization formulation, objective function, constraints, planning horizon, time resolution, user workflows, deliverables and schedule are defined jointly during the Discovery & Basis phase and depend on each site's network configuration, equipment, operating practice and commercial arrangements.

- **Dependent on data, systems and access.** Functionality and accuracy depend on the availability, quality and timeliness of operational, equipment, contractual and market data; on the existing SCADA, historian, hydraulic-simulation and scheduling systems and the interfaces that can be built to them; and on the access, permissions, cybersecurity and architecture approvals granted by the customer, together with the availability of subject-matter experts.

- **All figures are illustrative.** Every number, chart, waterfall, mock recommendation and screenshot shown here is a placeholder for layout purposes and is not a prediction, guarantee or typical result. Benefit potential is quantified per site in a value study; realized value depends on implementation, adoption and operating conditions, and no specific saving or margin uplift is warranted.

- **Advisory system.** The initial deployment is decision-support only. GasNetX360 provides recommendations; operations and control-room staff retain full authority for every decision. Closed-loop control, changes to regulatory control logic and third-party interface development, if required, are separately scoped.

- **Not professional advice.** Nothing here constitutes investment, financial, legal or engineering-certification advice. Commercial terms, pricing and any third-party software licensing are set out separately in the commercial proposal.