Lithium Brine Extraction Platform

Connected Modelling from
Exploration to Real-Time Operations

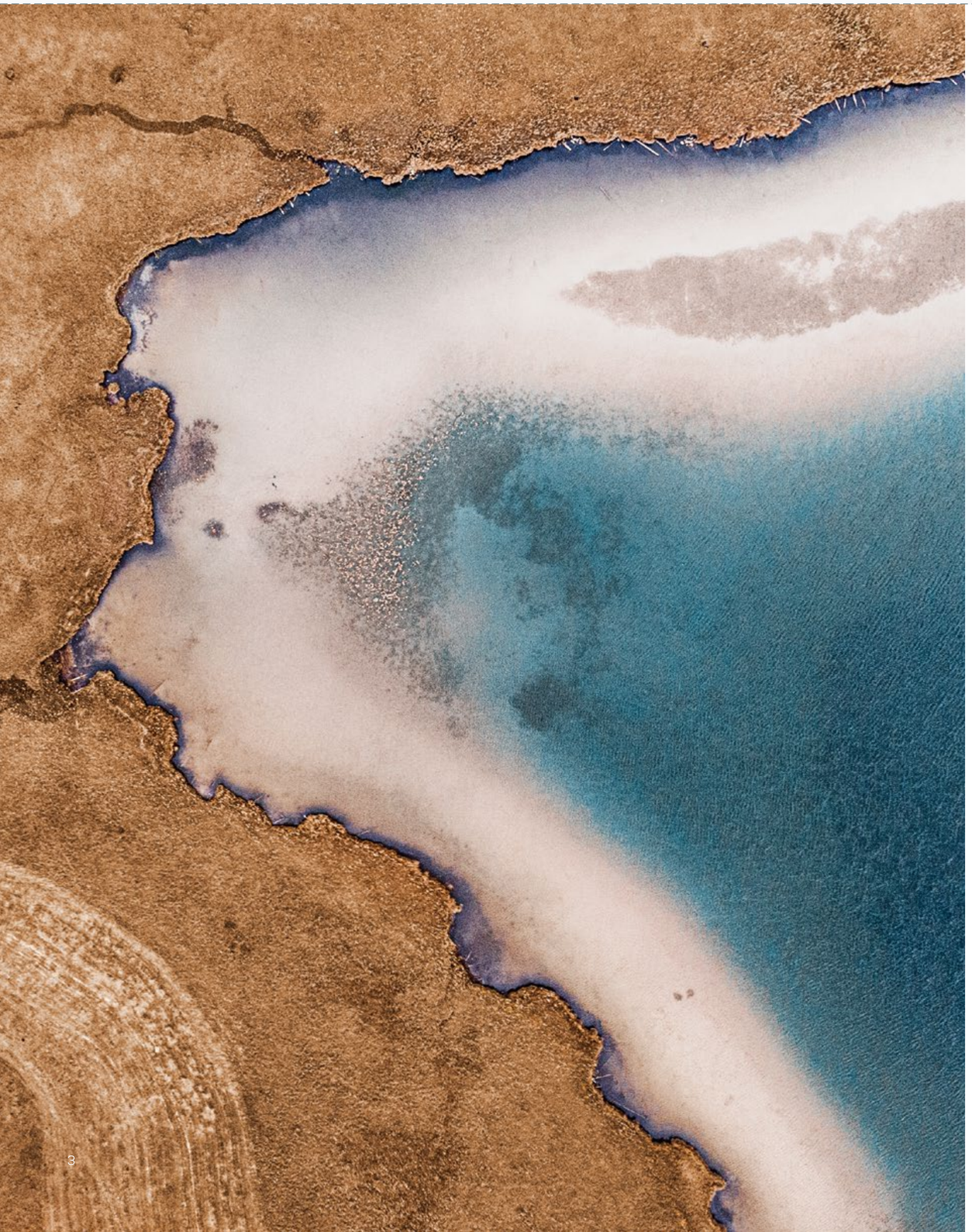
PETEX

SEAMLESS INTELLIGENCE. GLOBAL IMPACT.



One environment for salars and continental brines, geothermal fluids, oilfield brines and other subsurface lithium-bearing fluids – run as a single closed loop.

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One connected environment for lithium brine assets

Lithium brine projects depend on coordinated decisions across exploration, geology, reservoir behaviour, production and reinjection wells, surface infrastructure and process plants.

These areas are frequently assessed in separate applications,making it difficult to understand how a decision in one part of the project affects the complete asset. PETEX connects these systems through physics-based models, visual engineering workflows and our Digital Operations Framework.

From the first exploration well to full-field operations, the same connected environment characterises the resource, forecasts long-term behaviour, designs facilities, automates multidisciplinary studies and supports operating decisions. It is a closed loop, not a hand-off chain: measured operating data returns to the models that produced the plan, and the plan is re-optimised against it.



01 SUBSURFACE

RESOURCE & RESERVOIR

Geology, structure, brine movement, pressure, chemistry and recovery through time.

02 WELLS

PRODUCTION & REINJECTION

Completions, inflow and outflow performance, pumps, lift and energy demand.

03 SURFACE

GATHERING & NETWORK

Pipelines, pumps, manifolds, routing, brine mixing and reinjection constraints.

04 PLANT

PROCESS & EXTRACTION

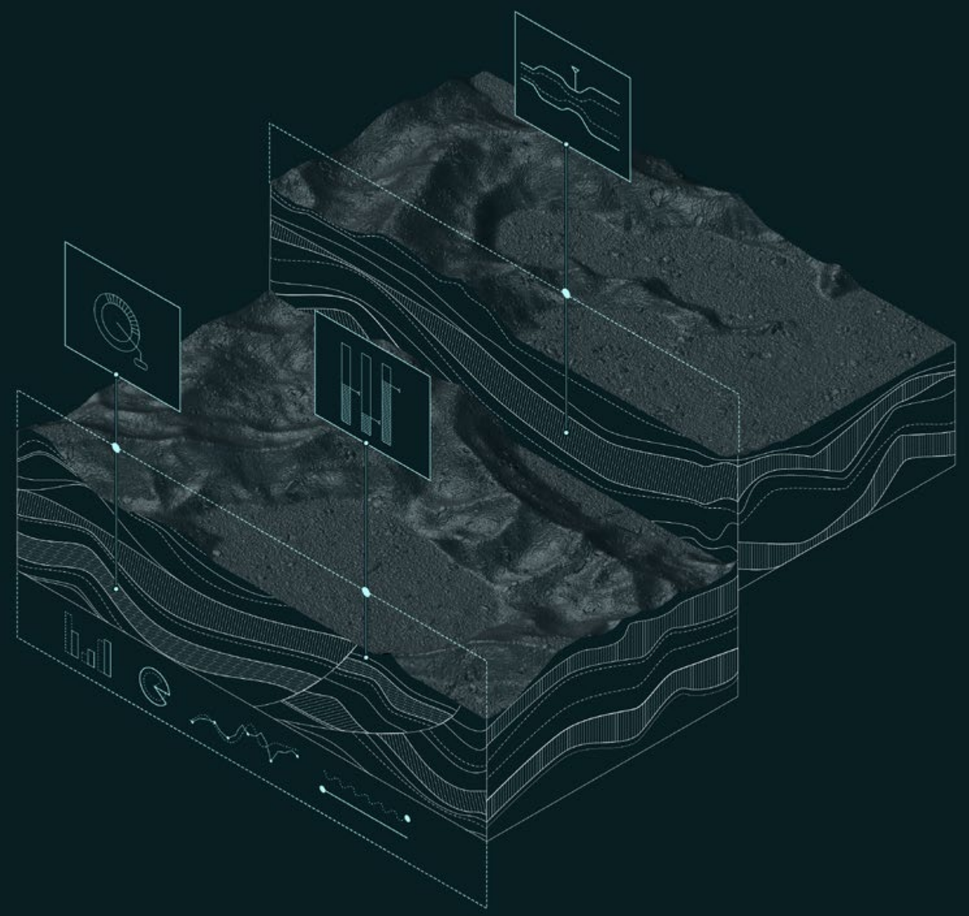
Conditioning, reaction, separation, DLE interfaces, through put and bottle necks.

Visual integration and workflow automation across all four.

Enterprise digital twin, governance and real-time operations.

Geological Intelligence and AI Driven Exploration

Establish the three-dimensional geological and structural framework used throughout the lithium brine modelling workflow.



CAPABILITIES

- Geological, structural and stratigraphic modelling
- Fault, fracture and compartmentalisation analysis
- Potential hydraulic barriers and connections
- Integration of exploration wells and subsurface data
- Geological uncertainty assessment and consistent inputs for dynamic simulation
- Iterative drilling-location selection to improve knowledge, find higher-concentration areas or reduce uncertainty
- Comparison of exploration strategies and allocation of drilling expenditure

01 DRILLING RESULTS

02 UPDATE THE MODEL

03 QUANTIFY UNCERTAINTY

04 IDENTIFY NEXT TARGET

Each well sharpens the next target.

Dynamic Multi-Physics Simulation of Lithium Brine Systems

Model how lithium-bearing fluids and the host system evolve under extraction and reinjection, combining dynamic flow with thermal, chemical and reaction behaviour.

CAPABILITIES

- Brine movement, pressure evolution and hydraulic communication
- Production and reinjection strategies, well interference and breakthrough prediction
- Well-pattern assessment, field-development scenarios and long-term recovery forecasts
- Thermal effects on fluid properties, reactions, wells and plant feed conditions
- Injection chemistry, mineralisation and reaction modelling
- Dissolution and precipitation kinetics; PHREEQC coupling
- Specific reactive surface area, catalyst and species-activity effects
- Target Saturation Index control and three-dimensional reporting
- Forecasting of lithium concentration and fluid composition through time

FLOW

Pressure, communication, breakthrough

THERMAL

Fluid properties, wells, plant feed

CHEMISTRY

Species activity, reactions, kinetics

REACTION

Dissolution, precipitation, mineralisation

WELL BUILDER

Production and reinjection well modelling

CAPABILITIES

- Production and reinjection well models, completions and configurations
- Inflow, outflow and hydraulic performance calculations
- Pump and lift-system evaluation; energy requirements
- Rate forecasting, operating-condition sensitivities and diagnostics

WHERE THE MODEL SITS

Reservoir conditions

Well performance ---------- WELL BUILDER

Surface requirements

Surface Production and Reinjection Network Modelling

Connect wells, pipelines, pumps, manifolds, facilities and reinjection systems within one hydraulic network model.

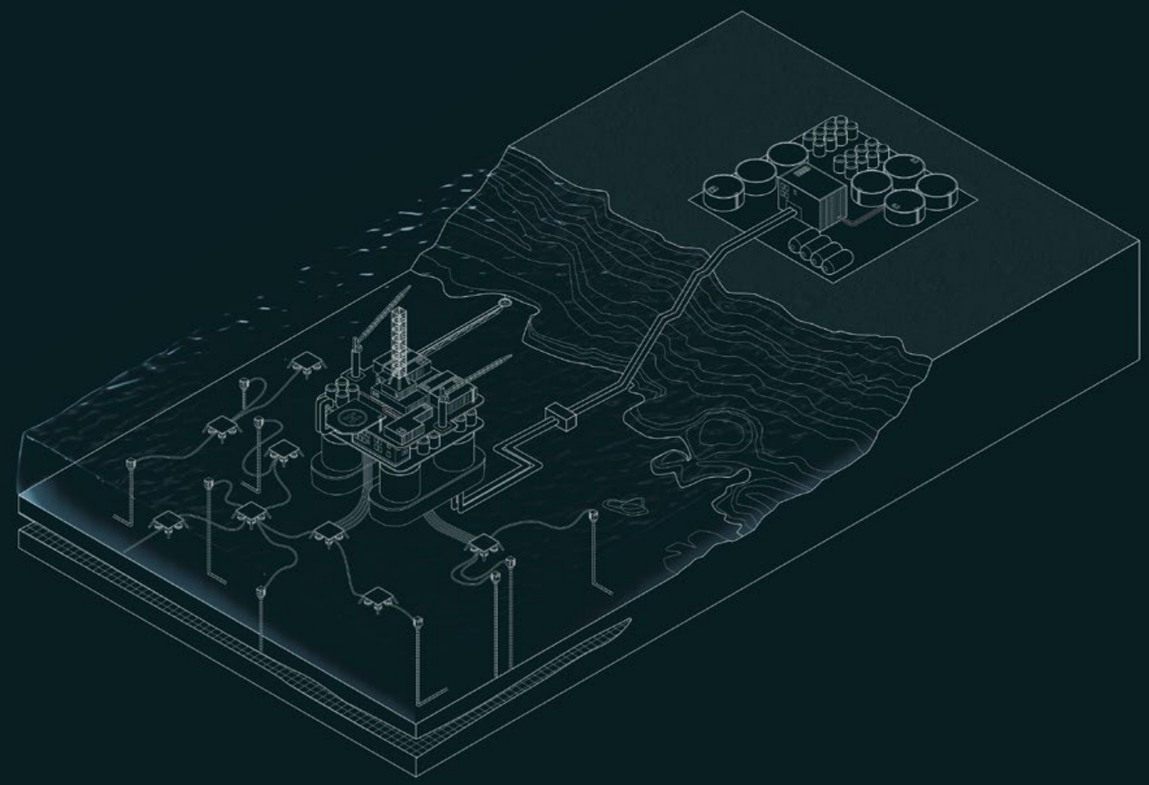
- Gathering and reinjection network simulation
- Pipeline pressure losses, hydraulic balancing and routing
- Pumping-system and energy requirement analysis
- Mixing of brines with different lithium concentrations or compositions
- Surface, facility and reinjection constraint management
- Production and reinjection optimisation
- Network capacity and alternative configuration assessment



Integrated Lithium Process Plant Modelling

Extend the connected asset model into the processing facility, so plant performance is assessed against the brine conditions forecast by the field models.

- Mixers, heaters, stirred tank reactors, filters, separators, pumps, make-up, waste and recycle streams
- Brine preparation, conditioning, heating, cooling, reaction and solid-liquid separation
- Interfaces with Direct Lithium Extraction, concentration and purification stages
- Mass balances, flow distribution and recycle behaviour
- Water, reagent and energy requirement analysis
- Throughput, equipment capacity and bottleneck assessment
- Alternative process configurations and expansion scenarios
- Custom process models integrated through bespoke DLLs



01
FLOW RATE

02
TEMPERATURE

03
LI CONCENTRATION

04
IMPURITIES

Spent brine, recycle and waste streams return to the reinjection network – plant and field solve together.

Visual Integration and Workflow Automation

Connect PETEX applications, third-party tools, data sources and engineering calculations within controlled visual workflows – no bespoke code.

- Native PETEX integration and connection to third-party engineering tools
- Vendor-neutral architecture; visual, no-code configuration
- Automated exchange of model inputs and results
- Multi-model execution and calculation sequencing
- Scenario generation, iterative loops and optimisation orchestration
- Automated reporting; distributed and cluster-based execution
- Integration with hydrogeology, geochemistry, process, laboratory, economic, environmental and operational systems





Enterprise Real-Time Asset Management

Our Digital Operations Framework turns the connected engineering models into a living representation of the asset, combining data, models, workflows, governance and visualisation across engineering, operations and management.

- Common view of geology, reservoir, wells, networks, facilities, operations and economics
- Connection to laboratory information, operational databases, SCADA and historians
- Data acquisition, validation, cleansing, contextualisation, event detection and smart alarming
- Model Catalogue: versioning, validity dates, access control, change tracking and auditability
- Visual workflows for surveillance, diagnostics, validation, forecasting and optimisation
- Measured performance compared against validated physics-based models
- Short- and long-term forecasting of production, reinjection, recovery and plant feed
- Full-asset optimisation across recovery, concentration, reinjection, energy, throughput, water, cost and value
- Configurable dashboards, maps, trends, reports and alarms
- Scalable from one well or process unit to multi-asset portfolios

Capabilities Across the Lithium Brine Lifecycle

01

EXPLORATION AND CHARACTERISATION

- AI-supported drilling campaign optimisation
- Geological and structural modelling
- Progressive reduction of subsurface uncertainty

02

DEVELOPMENT AND DESIGN

- Dynamic recovery and reinjection scenarios
- Integrated well, network and process plant analysis
- Assessment of infrastructure and process constraints

03

OPERATIONS

- Real-time surveillance and contextualised operational data
- Model-based diagnostics, smart alarms and forecasting
- Production, reinjection, network and process optimisation

04

ASSET MANAGEMENT

- Governed data, models and workflows
- Engineering knowledge and repeatable decision processes
- Visibility from individual equipment to complete portfolios

What happened?

Historical and operational data.

What is happening?

Current well, field, network and process performance.

Why is it happening?

Physics-based diagnostics and comparison of measured and modelled behaviour.

What is likely to happen next?

Dynamic forecasting and scenario simulation.

What should be done?

Workflow-driven evaluation, optimisation and operational recommendations.

What is the impact?

Assessment against production, recovery, energy, process, operational and economic objectives.



Connected physics.
Connected workflows.
Connected operations.
Connected value.

PETEX provides an integrated digital environment connecting exploration, geological characterisation, dynamic brine simulation, production and reinjection wells, surface infrastructure, process plants and real-time asset management.

By combining physics-based models, AI supported exploration, third-party integration, visual workflow automation and an enterprise digital twin, the platform supports consistent decisions throughout the complete lithium brine asset lifecycle.

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ENGINEERING SOFTWARE DEVELOPMENT

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