

Battery market solutions

Your engineering partner in revolutionizing the full battery life cycle

HATCH



Your challenges, our solutions

In an emerging and complex industry where innovation, speed-to-market, and capital and operational efficiency are critical, the challenge of entering the battery space with agility can be daunting. Whether it's developing new markets and verticals, securing supplies of materials, developing processing capabilities, expanding operations, or transferring manufacturing processes and building new ones, organizations need a partner who can offer ***full engineering services solutions under one roof***.

Hatch understands the entire battery market value chain. We partner with our clients to offer ***full-service engineering expertise*** ranging from the mining and processing of raw materials to the procurement, engineering, and construction management of battery chemical, cell manufacturing, and battery recycling facilities.

With a finite supply of battery materials, we understand that efficient manufacturing and recycling is crucial for sustaining a battery-centric economy. With this in mind, we streamline our interfaces and offer full-service solutions across the entire value chain of several battery technologies—including lithium ion, redox flow batteries, and hydrogen fuel cells.

Battery chemical producers and cell manufacturers typically have to deal with multiple designers and suppliers, leading to a multitude of interfaces to manage, and shortcomings in the quality, cost, and schedule of the project.

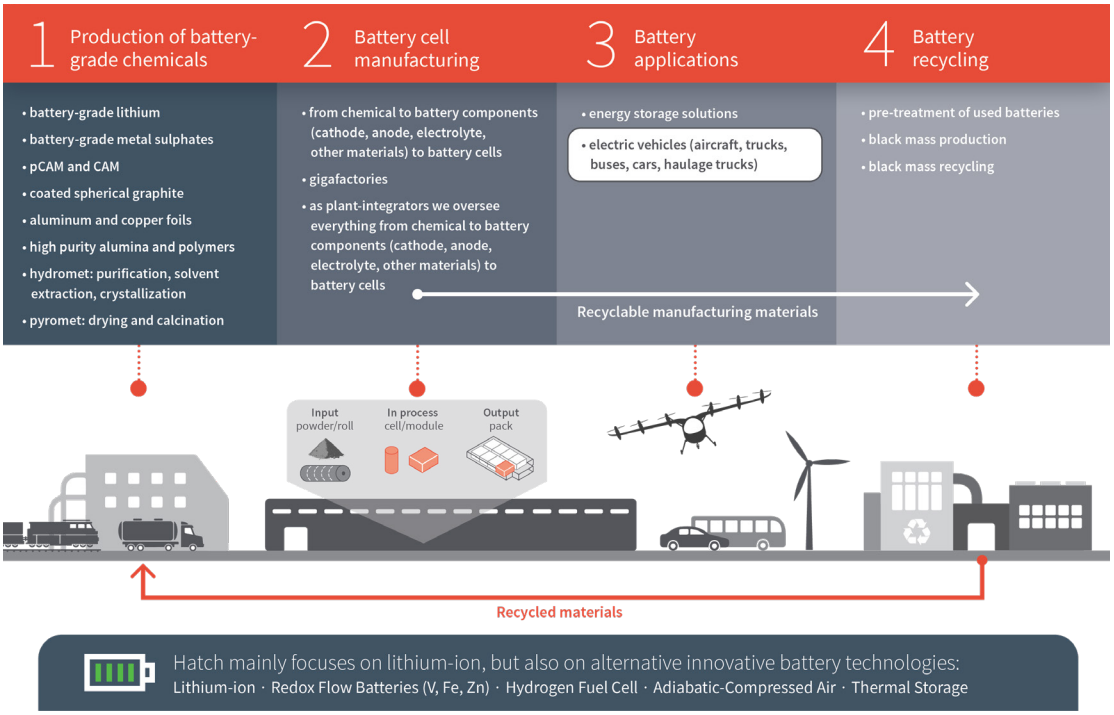
Here's how we can help.

Your engineering partner for the full battery life cycle

As design engineers, we integrate all aspects of the project scope with our innovative solutions. We improve your business case, helping you make informed decisions when engaging in the battery market.

Solutions for every stage of the battery life cycle

Battery market solutions provides a full range of services and expertise from raw materials through manufacturing and applications to recycling and reuse.



Battery minerals mining

The increase in demand for batteries is resulting in the growing need for specific raw materials such as lithium, nickel, cobalt, manganese, aluminum, copper, and graphite. Hatch can leverage decades of experience in the minerals and mining sector, using innovative engineering solutions to improve schedules and costs.

pCAM, CAM, and anode material manufacturing

Hatch has a world-class team of experts—including material scientists—to help both start-ups and mature battery chemical and material producers in commercializing their processes. We help organizations navigate regional codes and regulations, assemble project execution strategies, design wastewater treatment facilities, and provide complete engineering services for both the facility and the battery chemical manufacturing processes.

Battery cell manufacturing and gigafactories

Mature battery cell manufacturers have the challenge of modifying their process design to comply with regional regulations, codes, and standards. In addition, the facility and utility designs must be integrated with the core manufacturing process. Start-ups need support in piloting and scaling up their core manufacturing processes, often involving novel battery technology. Hatch provides all services required to design and implement battery cell manufacturing plants **without the need to subcontract to third parties.**

Battery recycling

Hatch is one of few engineering organizations to have helped both start-ups and mature producers overcome challenges in commercializing their battery recycling processes. Hatch assists clients in evaluating various battery recycling options, coordinating test work, scaling up their processes to commercial capacity, and executing the detailed engineering and construction oversight for their battery recycling projects.



Battery chemicals, battery recycling

Hatch has been at the core of designing several plants in the battery minerals, battery chemicals, and battery recycling spaces.

We are typically engaged early, providing support throughout research and development, evaluation, and comparison. Test work guidance is provided, and once results are aligned with the objective of the project, Hatch specializes in the scale-up to commercial capacity.

Our attention to detail throughout the engineering progression results in a fast ramp-up curve. This is why clients continue to trust us to implement their toughest metallurgical projects, with relationships going back over half a century.

But even the most proven processes come with challenges when we're working with complicated terrains and diverse regions. For example:

- The process may not be optimized for local climatic conditions
- Compliance with regional and national environmental criteria may prompt changes to the core manufacturing process
- Addressing local design codes and standards often impacts vendor-supplied equipment and modules
- Recognition and the fulfillment of laws requires the involvement of licensed professionals
- Construction relies on proper documentation preparation and formatting
- Coordination of vendor-supplied equipment and materials is needed for a well-planned execution phase
- The design of a multitude of interface connections is particularly needed when vendor-supplied equipment may differ from the local standards.

With first-hand experience and the expertise to address these challenges, Hatch manages the detailed engineering design of the facilities and site infrastructure. Our extensive core-process knowledge ensures the process complies with local regulations and that it operates cohesively with the balance of plant.



Battery cell manufacturing and gigafactories

We partner with our clients to manufacture better batteries and gigafactories designed for efficiency, quality, safety, and sustainability.

Hatch has the combination of technical and project delivery capabilities to design and execute a full gigafactory project scope, including the production process and balance of plant, all while respecting our clients' proprietary design aspects.

Gigafactory construction is typically comprised of a multitude of packages, services, and stakeholders. This is a conventional approach that leads to a large number of interfaces that must be managed by the clients under schedule-intensive circumstances. The task is overwhelming, resulting in scheduling delays and quality and cost issues.

As a leader in core process technology, Hatch manages the ***engineering and integration*** of facility, utilities, and the core manufacturing process. We provide all supporting activities including environmental support, scheduling, implementation planning, overall layout development, overall schedule integration, and integrated engineering deliverables.

In short, there is one consistent execution strategy: to improve cost and schedule and deliver better quality and safety outcomes.

We are committed to the long-term success of your business, beyond the facility itself. With comprehensive global offerings, holistic knowledge, and capability across the entire battery value chain, Hatch provides insightful support from conceptual engineering to the timely delivery of sustainable operations.



Services

With 6,500 professional engineers, 400 procurement specialists, and 600 project management staff around the world, Hatch is able to manage over US$50 billion of capital at any given time, ranging from small (US$1 million) to large (+US$6 billion) in size. Coupled with our rich history of successful engagements for highly complex facilities, we can leverage our engineering, procurement, and construction management expertise in the following services:

Engineering, Procurement (EP)

Test work specification and coordination, research oversite, pilot, and demonstration plant designs	Integrated schedule development and project execution strategy
Concept/preliminary design (FEL 1, 2)	Detail design to issue for construction (IFC)
Process optimization, trade-off studies, technology selection studies	Equipment and materials sourcing and procurement
Capacity evaluations	Logistics studies
FEED (FEL 3)	Cost estimation
Civil designs, building designs, process designs	Regionalization of foreign-sourced equipment/ module designs
Mechanical, piping, electrical, instrumentation and controls, and civil/structural design	Construction specifications

Hatch has 350 core construction management staff and 1,600 professionals dedicated to the construction of our projects. In addition, we have over 200 individuals who support commissioning planning, execution, and start-up.

Construction Management (CM)

Site establishment strategy	Construction bid requirements
Constructability studies	Bid review
Construction work packages (CWPs)	Mobilization strategy
Construction execution strategy/plan	General contractor management
Modularization, pre-cast, and pre-assembly opportunities	Progress measurement and earned value analysis
Early works planning	Health and safety management/leadership

We also provide a variety of enhanced services, which gives our clients a comprehensive offering to minimize interface management. In short, Hatch takes care of all aspects of the project beyond engineering and construction management.

Enhanced Services

Equipment/technology design/supply	Material sourcing (IRA)
Advanced simulations	Site selection studies
Equipment and process commissioning	Environmental permitting management
Production readiness	Social and community engagement
Quality systems	Green power solutions (solar, wind, power management)
Safety systems	Labor studies
Digital solutions and smart manufacturing	Climate change and sustainability



Project execution excellence

As engineers for the entire integrated project scope, the successful construction of complex projects require accurate monitoring, forecasting, and management. With new technologies, complex facilities, specialized construction, and large projects, there is pressure for invested capital to generate a quick return.

Project management isn't just about delivering new programs, structures, and operations. It's about finding new ways to improve efficiency, address larger social issues, and balance short-term gains with long-term aspirations.

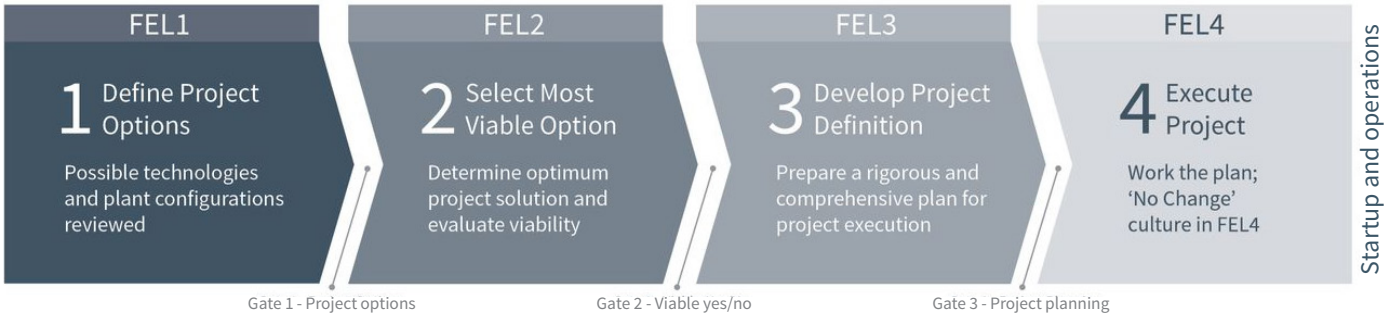
We maintain custom toolsets, systems, and processes to provide full-service capabilities for all aspects of project design and construction delivery, and continually deliver award-winning projects in some of the world's most difficult environments. Our rich experience and successful commercialization of many "never-been-done-before" projects enhance our ability to exceed our clients' project execution expectations in the most cost-effective and sustainable manner.

Project delivery philosophy

At Hatch, we maintain these key principles, values, and outcomes to ensure the success of each of our projects, regardless of scope. These are the "secret ingredients" that contribute to our clients' success:

- Non-negotiable focus on superior client value, quality work, sustainability solutions, and workplace safety.
- Front-end loading (FEL) of project definition and development activities with rigorous gate reviews between phases. This helps clients make informed decisions on their projects from conceptual studies to execution.
- Thorough plant integration, addressing all plant design interfaces and closing gaps to deliver a complete plant design.
- Commissioning and construction-driven projects are founded on engineering excellence.
- Innovation in design and execution meets client business needs.
- Embedded principle of package ownership across functions throughout the package life cycle.
- Consistent project delivery approach, execution, and reporting through all phases.
- Timely and honest communication with stakeholders.
- Enabling operational readiness as part of project delivery and providing ongoing asset life cycle support to client operations.

Front-end loading framework and project life cycle process



We have used a phased approach to execute major projects for over 30 years. Through continuous improvement efforts and consistent refinement of our approach, we have developed a unique project life cycle process, which addresses the four major phases of a project: conceptual study, prefeasibility study, feasibility study, and execution. Each phase of the process incorporates planning and procedures that support our goals of zero harm, quality excellence, and risk reduction. From project inception to construction, we have a comprehensive capability to support our clients.

Expedited project execution

We have developed methods to condense the project development schedule, starting with a FEED phase that combines FEL 1, 2, and some critical FEL 3 activities, which enables project approvals to proceed with FEL 4. In this case, the FEL 4 phase is initiated by completing some outstanding FEL 3 deliverables. This expedited approach can save more than 12 months on a project development schedule.

Project and construction execution planning

Projects need a customized project management strategy built on global expertise and innovative delivery tools, led by the most experienced project managers in the business. As your partner, we apply "outside-the-box" solutions, tools, and processes such as ConstructSim and Lean tools and working methods. We find ways to limit rework in the field and find cost-savings opportunities. We explore new ways to not only improve project-delivery efficiencies, but to recommend and implement the best strategies to set you up for the future.

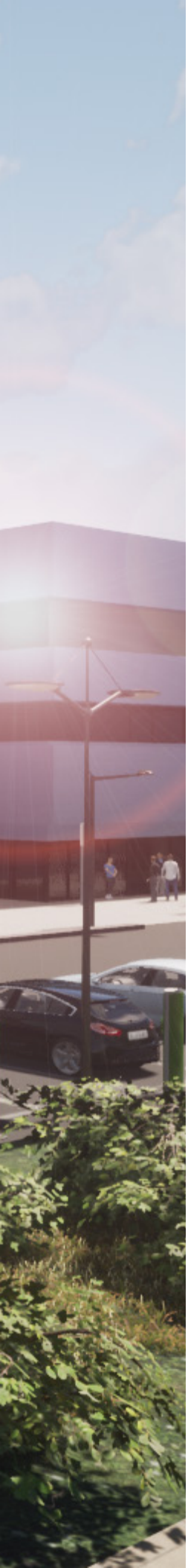
Integrated teams, specialized engineering, and project management solutions

We work closely with our clients to understand the operating challenges they face. Integrated teams propose solutions that take the whole project into consideration from prefeasibility and feasibility studies, design, and construction through to commissioning, ramp-up, and operations. Our proven processes and specialized engineering tools are combined with innovative new technologies to reduce risk and maximize productivity.

Engineering, procurement, and construction management (EPCM) delivery approach

Effective management can be achieved through an EPCM delivery approach in which all the executing services are integrated and provided through a single service provider. Our in-house integrated systems and tools are designed with EPCM delivery in mind, with considerations made for other execution models. They allow for monitoring, reporting, control, and management across the complete spectrum—from a detailed working level to complete roll-up and dashboard reporting.


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Sample Projects

Battery minerals processing
Metal sulphates
Northvolt | Sweden

We have been actively working with Northvolt to establish a cost-effective process to produce battery-grade metal sulfate solutions. This work has been published and a patent filed. The process entails generating a metal sulfate which may be battery-grade or electroplating-grade. Additionally, we have internally developed several improvements to the traditional battery chemical production process, including black mass recycling.

Battery chemical production
pCAM/CAM
Nano One Materials Corp. | Canada

Nano One is ambitiously progressing the development of their OnePot Process following the preliminary investment and partnership a multinational automotive company. The design basis of the OnePot Process enables the production of both NCM (lithium nickel manganese cobalt oxide) and LFP (lithium iron phosphate) cathode-active material chemistries, amongst others. Hatch is Nano One's selected engineering partner for the commercial-scale facility design of their OnePot Process. We have performed commercial scale-up from bench-scale and piloting-scale data, to process optimization, plant layout development, equipment package development, execution planning, and cost estimation.

Battery recycling
Black mass processing
Li-Cycle Holdings Corp. | United States

On behalf of Li-Cycle—a North American leader in lithium-ion battery recycling—Hatch has provided the detailed engineering design, procurement, and construction support of their first commercial hub facility near Rochester, New York. The process receives black mass (cathode and anode materials) and employs hydrometallurgical technologies to produce battery-grade end-products for reuse in lithium-ion battery production. This is the first commercial hub in North America designed to operate at a nameplate capacity of 35,000 tonnes per annum of input dry black mass, which is the equivalent of approximately 90,000 tpa of lithium-ion batteries, helping to support our sustainability goals.

Gigafactories

To enable Hatch's support of the engineering of North America's battery cell manufacturing facilities, we have conducted in-house designs for a gigafactory. We have taken careful consideration of the facility design, traffic and logistics, utilities, and site infrastructure requirements, as well as green power supply options. In addition, Hatch is developing several initiatives related to digital products and solutions, which will evaluate the performance of battery cell manufacturing equipment to improve battery plant yields and machine uptimes.




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About Hatch

Whatever our clients envision, our engineers can design and build. With over six decades of business and technical experience in the mining, energy, and infrastructure sectors, we know your business and understand that your challenges are changing rapidly.

We respond quickly with solutions that are smarter, more efficient, and innovative. We draw upon our 9,000 staff with experience in over 150 countries to challenge the status quo and create positive change for our clients, our employees, and the communities we serve.

hatch.com

We can provide a full range of services across the battery value chain. Contact us to find out more.

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