

THE SWEDISH BATTERY INDUSTRY OVERVIEW

*Join the green, innovative and
vibrant eco-system in Sweden*



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*Explore Business
and Investment
Opportunities in
Sweden*



This guide provides a concise overview of why businesses and investors should consider entering Sweden’s thriving battery sector. It aims to highlight the advantages and opportunities in Sweden for those looking to establish a presence in the battery industry. By exploring key factors such as research and development capabilities, sustainable practices, a skilled workforce, and a supportive ecosystem, this guide will demonstrate why joining Sweden’s battery industry can be a strategic and lucrative decision. Whether you are seeking information on market potential, innovation, or sustainable solutions, this guide will serve as a valuable resource for understanding the benefits of becoming a part of Sweden’s dynamic battery industry.

SWEDEN'S RESILIENT ECONOMY AND INNOVATION DRIVE SUSTAINABLE GROWTH

Sweden ranks as one of the most competitive, globalised, and innovative countries in the world, with a long industrial heritage that produces notable multinationals and a highly skilled labour force. These global corporations, many of them technology leaders in their fields, thrive today due to their spirit of innovation, rapid adaptation to new technologies, and ability to constantly transform and re-innovate their businesses to stay competitive in an ever-changing world.

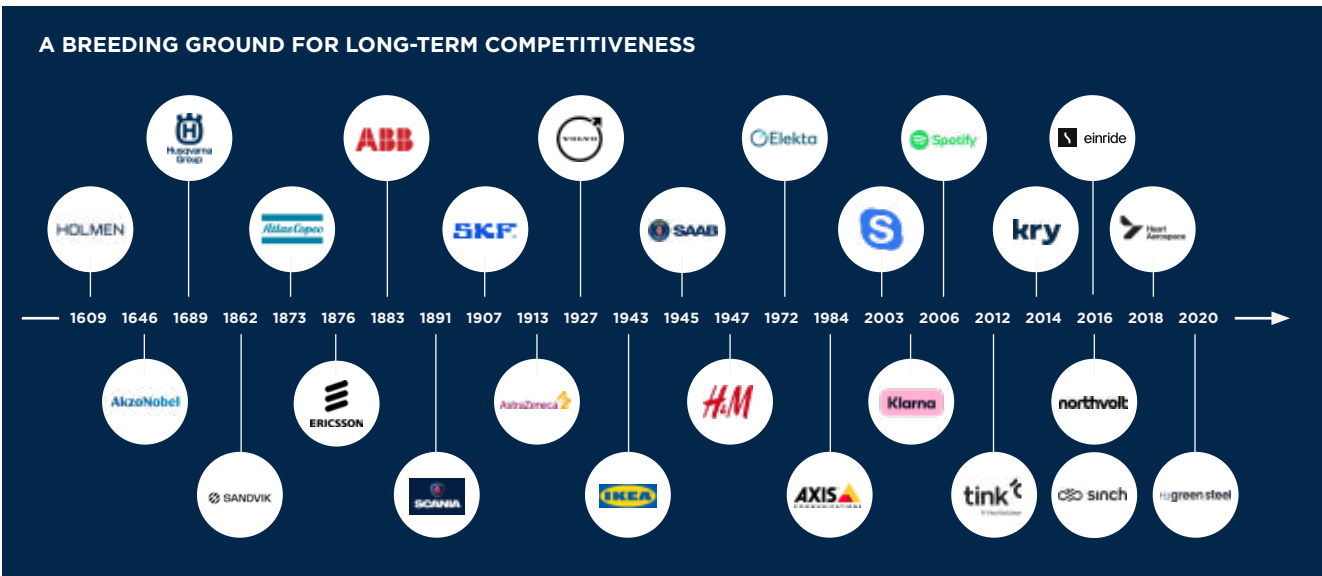
At the same time, Swedish tech companies are growing faster than ever before. Sweden has created 40 unicorns, led by big names such as Polestar, Northvolt, Spotify, and Klarna. These companies thrive in Sweden's leading industry clusters, including transportation, energy, ICT, life sciences, and materials sciences.

Sweden's unique ability to foster collaboration among corporations, academia, government, and civil society, with a quadruple helix perspective, makes it a great breeding ground for global success. Additionally, Sweden is at the forefront of sustainability, providing a robust platform for businesses to thrive in a green, energy-efficient economy. Notably, Sweden offers green electricity at a lower cost than the rest of Europe, further enhancing its appeal for sustainable business operations.

INTERNATIONAL, PREDICTABLE, AND STABLE BUSINESS ENVIRONMENT

Sweden boasts a highly international business environment within a modern, open, and business-friendly society. It maintains a stable and predictable economic and political environment that supports free trade agreements and welcomes international partnerships. The Swedish economy and welfare have thrived on the free flow of global trade, investments, talents, and ideas, with a national mindset geared towards adapting to constant change.

Sweden's foreign direct investment (FDI) stock ratio to gross domestic product (GDP) ranks among the world's highest, reflecting robust international economic engagement. Foreign-owned companies contribute significantly, employing 25 per cent of the total private workforce, underscoring Sweden's attractiveness for foreign direct investment. This endorsement is a testament to Sweden's business-friendly regulations and thriving environment for innovation and growth.



#2

GLOBAL INNOVATION INDEX 2023 - SWEDEN IS RANKED SECOND IN THE WORLD

3.4%

R&D SPENDING RELATIVE TO GDP, HIGHEST IN THE EU (EU AVERAGE 2.2 %)

#1

STARTUP VALUE PER CAPITA IN EUROPE

#2

STOCKHOLM HAS PRODUCED THE SECOND MOST UNICORNS PER CAPITA IN THE WORLD, AFTER SILICON VALLEY



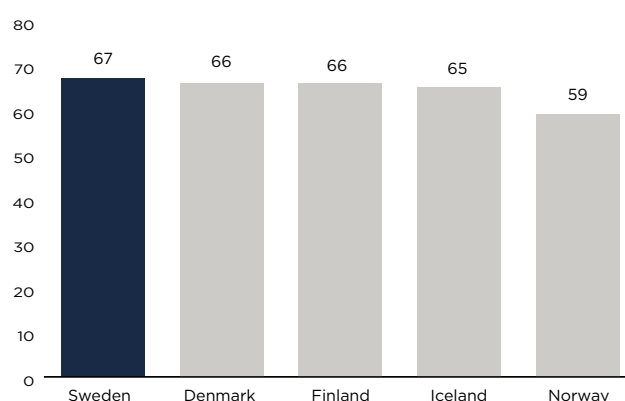
HYBRIT's pilot facility for storage of fossil-free hydrogen, Luleå. HYBRIT is a joint effort between Vattenfall, SSAB and LKAB to develop the first fossil-free steel.

SWEDEN: POWERING INNOVATION AND SUSTAINABILITY

LEADING THE GREEN REVOLUTION

Sweden's commitment to sustainability is evident in its energy infrastructure, where 98 per cent of electricity is sourced from non-fossil fuels. Ranking highly in various global sustainability indices, Sweden has made efforts to extend beyond environmental stewardship to encompass low corruption levels, widespread sustainability awareness, and a societal model that champions fairness, inclusiveness, environmental consciousness, and technological advancement. Sweden is perfectly poised for the battery industry with our industrial heritage, highly skilled and innovative workforce, robust and sustainable technology and businesses, and political stability. Robust European partnerships, cross-organisational collaborations, and a strong emphasis on research and development make it an ideal locale for fostering advancements in battery technology.

2024 EUROPEAN SKILL INDEX (SCORED 0-100)





40%

CHEAPER THAN AVERAGE
EUROPE

64%

EMPLOYEES IN SCIENCE AND
TECHNOLOGY - #2 IN EU

#10

IN WORLD TALENT
RANKING 2023

#1

VALUE-ADD PER
PRODUCTION
WORKER IN EU

ENERGISING THE FUTURE: SWEDEN'S GREEN LEADERSHIP IN BUSINESS

Sweden boasts an exceptionally independent, reliable, and sustainable energy supply at a competitive cost. An impressive 98 per cent of the electricity produced is fossil-free, and the grid's reliability hits nearly perfect marks at 99.99 per cent. With a strong base of hydropower in the north, nuclear power in the south, and growing investments in both onshore and offshore wind power, Sweden is on track to achieve 100 per cent fossil-free energy by 2040.

COST-EFFECTIVE ENERGY FOR COMPETITIVE BUSINESSES

Thanks to its high share of renewable energy, Sweden offers electricity costs 35 per cent lower than the European average, ensuring exceptional affordability. Despite recent price hikes across Europe, Sweden maintains a considerable cost advantage, mainly due to its minimal reliance on imported gas. This not only keeps energy prices stable but also enhances the overall stability of the supply.

DRIVING BUSINESS WITH SUSTAINABILITY

Sustainability isn't just a policy in Sweden; it's a pivotal force in business development. The country is equipped with a robust infrastructure essential for fostering sustainable enterprises:

- Renewable energy sources and green electricity.
- Dedicated innovation centres and test beds for green technology and electrification.
- A collaborative ecosystem involving academia, businesses, and government.

Sustainability lies at the core of Swedish enterprises. Companies aren't merely adopting eco-friendly practices; they are fundamentally built around them.

JOIN SWEDEN IN BUILDING A GREENER FUTURE

Investing in Sweden allows companies to contribute to producing the world's greenest batteries while future-proofing their business models. Embracing sustainability is key to future competitiveness. Together, we can make the green transition a reality.

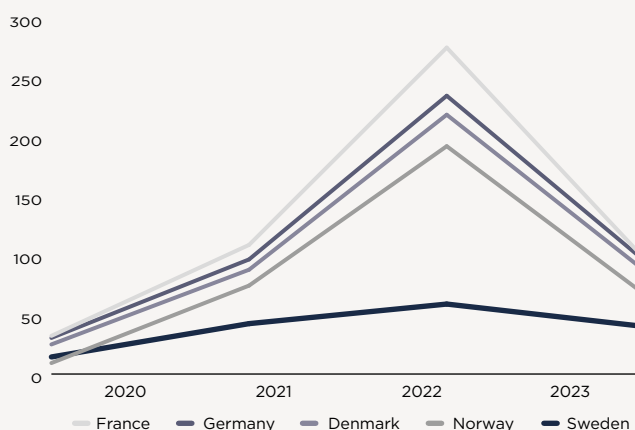
Scania sees that its business is a major contributor to CO₂ emissions and aims to create a sustainable transport system that is inclusive, safe, and decarbonized.

Altris creates batteries made from the world's most abundant and readily available raw materials: salt, wood, iron, and air.

Northvolt's mission is to deliver batteries with a 90 per cent lower carbon footprint compared to those made using coal energy.



YEARLY AVERAGE PRICE IN EUROS PER MEGAWATT-HOUR



Source: Xxxx

Wind turbines on a field in Sweden.
Windpower amounts to 19 % of
Sweden's produced electricity.

98% #2


SHARE OF ELECTRICITY
PRODUCED IN SWEDEN IS
FOSSIL-FREE

MOST SUSTAINABLE COUNTRY
IN THE UN SUSTAINABLE
DEVELOPMENT REPORT 2023

35% 2045

LOWER ENERGY COST THAN
COMPARABLE COUNTRIES

THE SWEDISH GOVERNMENT HAS
DECIDED SWEDEN WILL BECOME
THE FIRST CARBON-NEUTRAL
COUNTRY BY 2045



Aurora borealis, Umeå. In the winter, the northern lights are often visible in northern Sweden.

CHARGING AHEAD: THE NORDICS' QUEST FOR THE WORLD'S GREENEST BATTERY VALUE CHAIN

Are you looking to engage with the leading edge of the European battery industry? Look no further than Sweden and the Nordics. The Nordics are on a mission to become the most sustainable and integrated region in the world by 2030, driven by ambitious climate goals and the ever-increasing demand for electrification.

Sweden is proud to host Europe's first homegrown battery gigafactory, spearheading efforts to forge the world's greenest battery value chain. This is an invitation to join a historic movement to create a new, environmentally conscious, basic industry.

BUILDING ON STRONG FOUNDATIONS

Developing the battery value chain in the Nordic region capitalises on established strengths in the automotive, manufacturing, chemical, electrical, and mining sectors, supported by a world-class,

skilled, and efficient workforce. With the necessary prerequisites and ambition, Sweden is positioned to lead in establishing the most sustainable battery value chain.

The Nordic region is uniquely equipped with all the necessary elements for success in the battery industry. It offers green and affordable energy, abundant critical materials, and a long tradition of industrial innovation. The stable political climates of Sweden, Norway, and Finland, combined with extensive Nordic cooperation, significantly enhance the region's role as a key player in Europe's innovative and competitive landscape.

FROM GROUND TO GRID: THE COMPLETE SWEDISH BATTERY VALUE CHAIN

Sweden's battery value chain encompasses the entire spectrum from mineral extraction and raw materials expertise to battery cell production, application, and reuse. Leveraging its rich industrial heritage, Sweden involves companies of all sizes in the value chain and fosters robust collaborations across academia, public organisations, and investors.

STRATEGICALLY POSITIONED NODES WITHIN SWEDEN

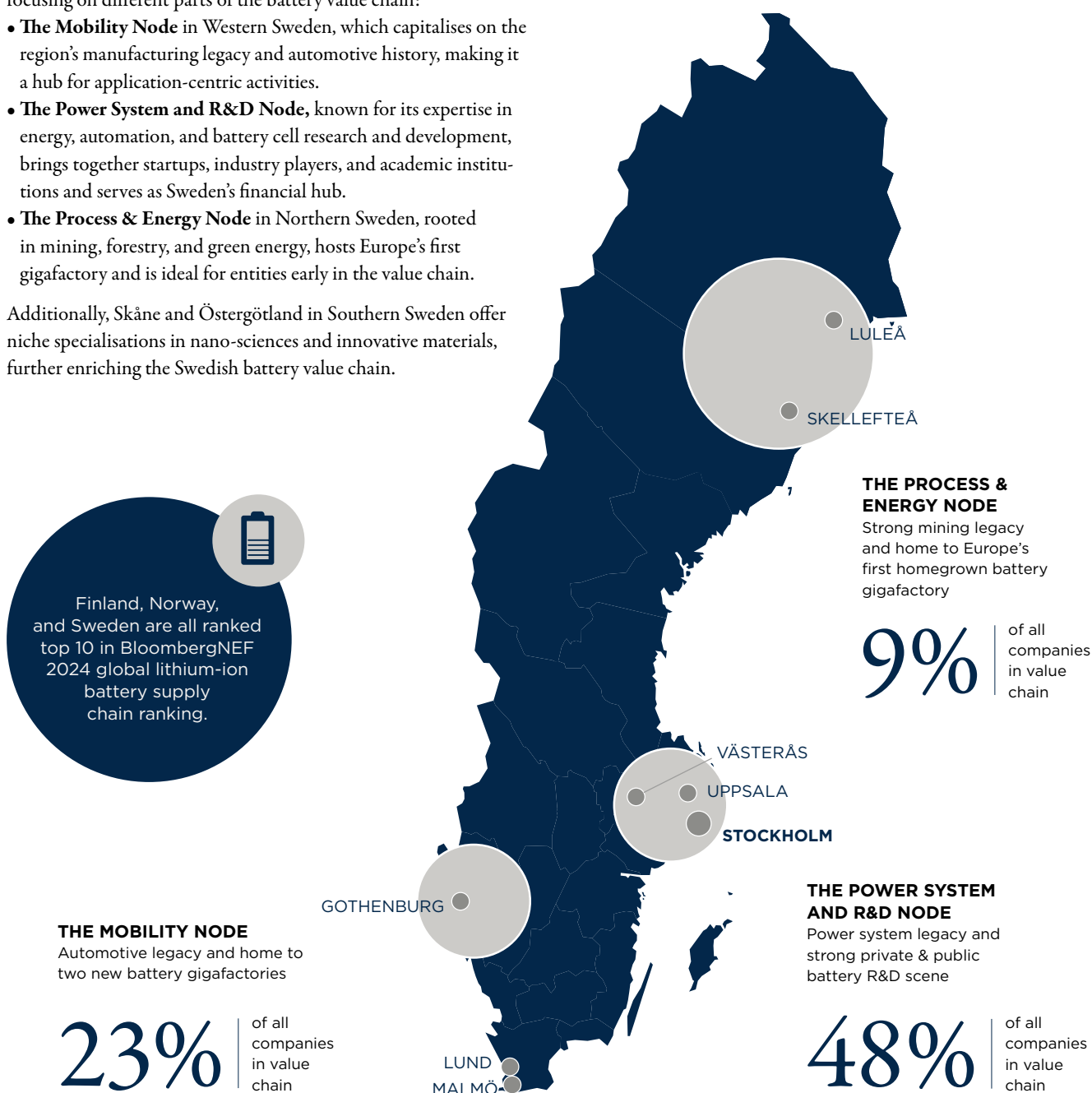
Sweden strategically positions itself with three main nodes, each focusing on different parts of the battery value chain:

- **The Mobility Node** in Western Sweden, which capitalises on the region's manufacturing legacy and automotive history, making it a hub for application-centric activities.
- **The Power System and R&D Node**, known for its expertise in energy, automation, and battery cell research and development, brings together startups, industry players, and academic institutions and serves as Sweden's financial hub.
- **The Process & Energy Node** in Northern Sweden, rooted in mining, forestry, and green energy, hosts Europe's first gigafactory and is ideal for entities early in the value chain.

Additionally, Skåne and Östergötland in Southern Sweden offer niche specialisations in nano-sciences and innovative materials, further enriching the Swedish battery value chain.

SWEDEN: A LAUNCHPAD FOR BATTERY INNOVATIONS

Sweden, a global leader in energy and mobility startups, particularly within the battery sector, offers ample access to financiers and innovation hubs. The country's commitment to collaboration with leading electrification stakeholders fosters optimism and forward-thinking. Sweden provides international companies with a fertile ground to formalise and commercialise their innovations, acting as a springboard to access broader European markets. This opens up a world of possibilities for international companies looking to thrive in Sweden's dynamic business ecosystem.



THE MOBILITY NODE

ACCELERATING THE FUTURE OF MOBILITY AND ELECTRIFICATION



Gothenburg, home to Scandinavia's main port and a cornerstone of the Swedish automotive industry, is rapidly evolving into a focal point for electric mobility and innovation. The city's new battery gigafactory symbolises a significant step towards sustainable manufacturing and electrification, representing a collective commitment to the new era of transportation.

Within the local battery value chain, 23 per cent of companies are actively advancing the electrification agenda. Leveraging Gothenburg's strong manufacturing legacy, these companies are positioning themselves as leaders in modern transport solutions.

A HOTBED FOR INNOVATION AND MANUFACTURING

The Mobility Node, with its 20 per cent share of Sweden's manufacturing workforce and 34 per cent contribution to the country's private R&D efforts, is a stronghold of innovation. Its collaborations with institutions like Chalmers University of Technology underscore the region's strong dedication to pioneering research in the field, instilling confidence in its capabilities.

SEEL SWEDISH ELECTRIC TRANSPORT LABORATORY AB (SEEL)

A collaboration between Chalmers University of Technology and RISE, SEEL focuses on R&D in electromobility. It aims to establish test beds for component and system testing, fostering knowledge sharing and accelerating the development of electrified transport solutions.

NOVO ENERGY AB

This joint venture between Volvo Cars and Northvolt is constructing a Gigafactory in Gothenburg with a capacity of 50 GWh per year, enough to supply batteries for about half a million electric cars annually. With its R&D centre in the city, Novo Energy AB draws on global expertise to significantly contribute to the regional battery value chain.



VOLVO GROUP

Volvo Group is deeply invested in electrification through divisions like Volvo Cars, Volvo Penta, and Volvo Trucks. With a new Gigafactory, Volvo aims to mass-produce battery packs for heavy-duty commercial vehicles, supporting a transition to 100 per cent electric vehicle sales by 2030 for Volvo Cars and 50 per cent for Volvo AB. Volvo's Gigafactory has a projected output of 50 GWh annually by 2030.

THE POWER SYSTEM AND R&D NODE

THE POWERHOUSE OF BATTERY INNOVATION AND ELECTRIFICATION

Situated in the middle of Sweden, the Power System and R&D Node encompasses a region bustling with activity in energy, automation, and battery cell technology. Anchored by Stockholm, Sweden's capital and financial centre and complimented by Uppsala and Västerås – cities renowned for their contributions to European battery research and electrification – the node serves as a pivotal centre for technological advancement.

Hosting a diverse range of companies, representing 48 per cent of Sweden's entire battery value chain, this node is a melting pot of exciting startups, major industry players, and world-class academia and research centres.

LEADING INSTITUTIONS IN BATTERY RESEARCH AND DEVELOPMENT

- **Ångström Advanced Battery Centre:** Based at Uppsala University and led by Professor Kristina Edström, the Ångström Centre is the largest battery research group in the Nordics. It covers extensive ground in rechargeable battery and fuel cell chemistry, including cathode, anode, and electrolyte materials, solidifying its position as a leader in European battery R&D.
- **Northvolt Labs:** Located in Västerås, Northvolt Labs employs a diverse workforce of 1,100 individuals from over 85 countries. This facility is dedicated to advancing current and next-generation battery technologies, thereby significantly boosting the region's innovation capacity. Northvolt Labs also plays a crucial role in closing the loop on battery life through recycling and reuse initiatives.

ELECTRIFICATION AND AUTOMATION IN VÄSTERÅS

Västerås, with its robust industrial heritage, is a growing hub for electrification and automation. Leading companies such as ABB and Hitachi Energy are instrumental in this transformation:

- **ABB:** A pioneer in electrification, motion, automation, and robotics, driving the advancement of industrial and energy solutions.
- **Hitachi Energy:** Focused on evolving the world's energy systems, with electricity as the foundational element.



“Sweden and the Nordics have the greenest and most cost-effective energy, as well as a good manufacturing base.”

LEIA DENG, EUROPEAN KEY ACCOUNT DIRECTOR, SENIOR.

ALTRIS

Altris, emerging from Uppsala University's Ångström Laboratory, is at the forefront of sodium-ion battery technology. They produce cathodes, electrolytes, and battery cells and offer factory blueprints for global distribution. Sodium-ion batteries are a promising alternative amid raw material shortages, featuring abundant, non-toxic, and recyclable materials suitable for Europe's green transition.

ENERPOLY

Enerpoly, founded by Swedish university innovators, pioneers affordable zinc-ion batteries for stationary energy storage. In 2023, they secured EUR 11.1 million to establish EPIC, the world's first mega factory for zinc-ion batteries, bolstering ties with Sweden's top tech universities, KTH Royal Institute of Technology and Uppsala University.

SENIOR

Senior, a leader in separator materials for the lithium-ion battery market, enhances green societies through its Swedish operations. Their new factory serves Nordic customers by providing advanced materials crucial for meeting regional sustainability goals.



Sweden is renowned as a cradle for innovations and entrepreneurs, with startups – both domestic and foreign – thriving in this dynamic environment.

PROCESS AND ENERGY NODE

PIONEERING THE GREEN INDUSTRIAL REVOLUTION

Northern Sweden is emerging as Europe's premier centre for the green industry, offering an optimal environment for sustainable and innovative developments in cell production and recycling. Blessed with abundant renewable resources, the region benefits from extensive hydro and wind power capabilities, resulting in the lowest electricity prices in Sweden. The area has also experienced rapid internationalisation, particularly highlighted by Northvolt's setup, which has brought together battery development and production expertise from over 100 nationalities.

MINING AND RAW MATERIALS: THE FOUNDATION OF THE ECOSYSTEM

Central to Northern Sweden's industrial ecosystem is its traditional mining sector, which makes the region particularly attractive to upstream actors. Home to two-thirds of Sweden's reserves of graphite, lithium, and cobalt, the area also boasts LKAB, a state-owned mining company that produces 80 per cent of Europe's iron ore.

BATTERY PRODUCTION AND INNOVATION

The battery sector in Northern Sweden is bustling:

- **Northvolt Ett:** Europe's first Gigafactory powered entirely by renewable energy, began operations in 2023.
- **Talga:** Europe's first pilot plant for natural graphite anode production is now operational. Utilising local high-grade graphite ore and powered by renewable energy, Talga is gearing up to produce green anode material for European battery manufacturers.

The region also supports multiple testbed environments for electrification, furthering its role as a leader in this field.

DONGJIN

Dongjin Semichem, a leader in the global chemicals market, operates a vast network of R&D centres, factories, and offices worldwide. Since 2020, they have established their first European factory in Skellefteå, Sweden, in collaboration with Northvolt to supply carbon slurry for battery production, reinforcing Northern Sweden's battery value chain.



CLOSING THE LOOP:

RECYCLING AND SUSTAINABILITY

The sustainability of the battery industry is heavily reliant on effective recycling. Northern Sweden, with key players like Northvolt Revolt, Boliden, and Stena Recycling, is leading the way in this crucial initiative, closing the battery lifecycle loop through material and scrap recycling.

STRATEGIC COLLABORATIONS WITH NEIGHBOURING COUNTRIES

Proximity to Norway and Finland enhances Northern Sweden's collaborative opportunities, fostering close relationships and increasing cross-country investments. This geographical advantage supports a complementary value chain that spans across borders, strengthening the region's strategic importance in the European battery sector.



LKAB AND LULEÅ INDUSTRIAL PARK

LKAB is a state-owned mining company in Sweden pioneering sustainable practices with a new circular industrial plant in Luleå, Northern Sweden. This facility uses innovative, fossil-free processes to extract phosphor and rare earth minerals – vital byproducts from iron ore mining. This enhances Europe's self-sufficiency in critical raw materials essential for electric vehicles, wind turbines, and electronics, positioning Northern Sweden as a crucial hub in the green transition.

SHANGHAI PUTAILAI NEW TECHNOLOGY (PTL)

PTL is a world-leading manufacturer of battery materials and machinery. It is planning to establish Europe's largest anode factory in northern Sweden, which will supply Northvolt and other European customers. This move will enhance the Nordic battery ecosystem and boost the region's sustainable competitiveness in the battery industry.



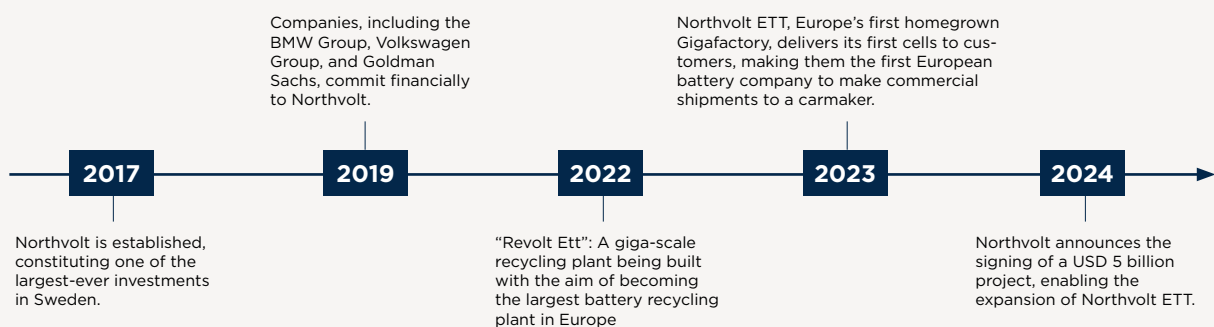
Northvolt Ett, Skellefteå. Northvolt Ett is Europe's first homegrown gigafactory. The factory is being constructed in stages and is expected to be fully developed by 2026.

NORTHVOLT - DESIGN, DEVELOP, AND ASSEMBLE BATTERY CELLS

Northvolt is a Swedish company that is leading in lithium-ion battery development, production, and recycling. Partnering with major investors like Volkswagen, BMW, and Swedish municipalities, Northvolt enhances Sweden's battery value chain by linking with industries involved in applications, battery packs, integration, and raw materials. Northvolt fosters emerging talents through academic partnerships with Luleå University of Technology and Uppsala University, offering electrochemistry, battery construction, mineralogy, extraction processes, and recycling courses.

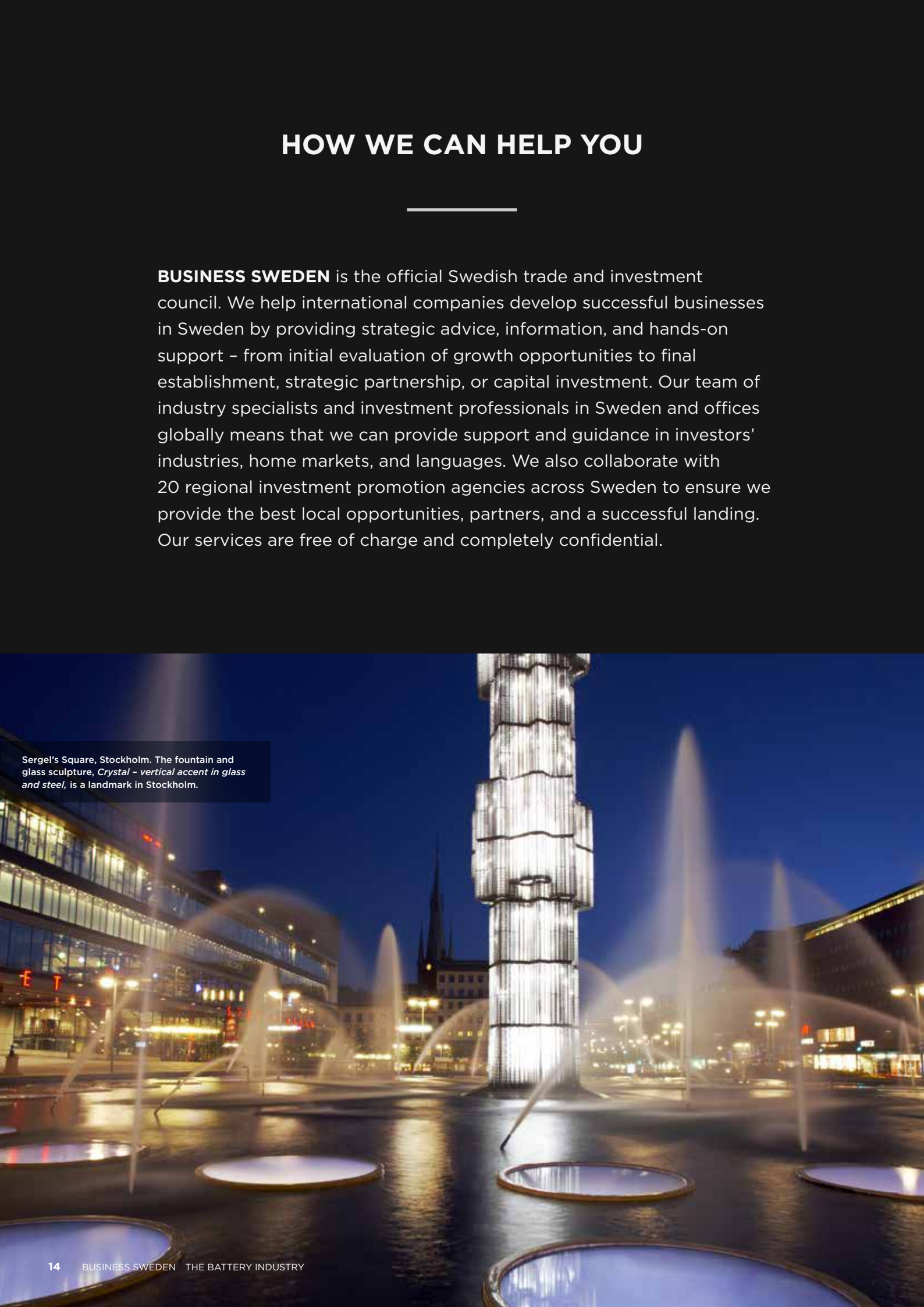
#1

NORTHVOLT ETT IS CONSIDERED TO BE THE WORLD'S GREENEST BATTERY FACTORY



HOW WE CAN HELP YOU

BUSINESS SWEDEN is the official Swedish trade and investment council. We help international companies develop successful businesses in Sweden by providing strategic advice, information, and hands-on support – from initial evaluation of growth opportunities to final establishment, strategic partnership, or capital investment. Our team of industry specialists and investment professionals in Sweden and offices globally means that we can provide support and guidance in investors' industries, home markets, and languages. We also collaborate with 20 regional investment promotion agencies across Sweden to ensure we provide the best local opportunities, partners, and a successful landing. Our services are free of charge and completely confidential.



Sergel's Square, Stockholm. The fountain and glass sculpture, *Crystal* – vertical accent in glass and steel, is a landmark in Stockholm.



Uppsala University, Uppsala. Uppsala University is home to Ångström Advanced Battery Centre and has Northern Europe's first master's programme in battery technology.

MARKET AND INDUSTRY INSIGHTS

To build your business case and prove the value of an establishment or investment, we provide you with customised information and benchmarking services on the Swedish market, business climate, industry sectors, operating costs, legal framework and more.

BUSINESS OPPORTUNITY IDENTIFICATION

Our industry specialists identify and present market and industry opportunities in Sweden based on your sector priorities. We identify growth areas, key industry stakeholders, establishment strategies and next steps.

PARTNER SEARCH AND MATCHMAKING SUPPORT

We act as a link to Swedish companies and introduce you to strategic partnerships, R&D collaborations, and other types of cooperation opportunities.

ESTABLISHMENT SUPPORT

We provide information on how to set up and run a business in Sweden, including rules and regulations, legal entities, employment matters, taxes and more.

ACCESS TO BUSINESS NETWORKS

We introduce you to all necessary service providers, authorities, and organisations.

SITE SELECTION

We coordinate site selection processes based on your requirements to help you find the right location and premises for your facilities. Our regional and local network enables us to conduct site screening throughout Sweden and access detailed data.



*We help Swedish companies grow global sales and
international companies invest and expand in Sweden.*

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