

# ESTABLISHING A BATTERY FACTORY?

VAASA HAS THE BEST  
ECOSYSTEM FOR A  
FUTURE GREEN  
BATTERY INDUSTRY

**Energy**Vaasa





THE CITY OF VAASA  
HAS AN EXTREMELY  
BUSINESS FRIENDLY  
CULTURE.

PHOTO: ESA SILTAOPPI





# WELCOME NEW COMPANIES

## BIG LEAPS IN DEVELOPMENT ARE NOT NEW IN VAASA

**V**AASA IS KNOWN for its energy cluster and is the most innovative region in Finland. Energy technology and global business are especially strong in our city. Vaasa has an internationally active research and development network and is the leading R&D centre for marine, industry and electrical networks development. But we are expanding our vision of Vaasa much further – we are ready for the next developmental leap.

The car industry is moving heavily towards hybrids and electric vehicles. The way we see it, the next steps will be taken in marine, electrical networks and other industries. One of the most important drivers is climate change and, in Vaasa, we are working

together to minimize CO<sub>2</sub> emissions and taking steps towards a more intelligent and more sustainable future. The companies in Vaasa, such as ABB, Wärtsilä, Danfoss and Yaskawa, are all using batteries and energy storage in their applications. In the coming years also here in the Nordics, we will see a rise in solar panels which will greatly increase battery demand even in households.

We want to welcome all interested parties who want to work with us. And if you are still wondering whether Vaasa would be the right place to invest in, the answer is clear. We are fully prepared to take the next developmental leap towards a more intelligent and sustainable future.

**TOMAS HÄYRY**  
THE MAYOR OF VAASA



OUR LOCAL WORKFORCE HAS INNOVATIVE AND COLLABORATIVE ENERGY TECHNOLOGY DESIGN AND MANUFACTURING SKILLS.



VAASA AIMS TO BE A CARBON NEUTRAL CITY BY 2035.

## Why establish a company in Vaasa?

### ● ENERGY EXPERTISE

Vaasa is home to the biggest energy technology cluster in the Nordic countries.

### ● A GLOBAL PLAYER

Our playground is the whole world – our technologies are present in the electricity grid of every country in the world.

### ● WELL-EDUCATED WORKFORCE

In proportion to its population, Vaasa is Finland's largest city of higher education. Energy education plays a major role in this.

### ● EASY ACCESS

With seamless connections by land, sea and air, Vaasa is an attractive location for doing business.

### ● BUSINESS-FRIENDLY CULTURE

The 7 largest development projects in the region are worth €1 billion, of which the city of Vaasa has invested €150 million.

### ● GREEN ENERGY

Your factory can be powered by 100% renewable energy.

### ● MINERALS

Local supply of key minerals, like lithium and cobalt.

# VAASA IS THE MOST INNOVATIVE ENERGY HUB IN THE WORLD

In Vaasa, we work together. The local universities, energy technology companies and municipalities work together intensively on research, product development, innovation and education. No wonder the Vaasa region is regarded as the most innovative area in Finland. The energy technology industry in Vaasa has a long-established history, which has resulted in a robust form of research competence.

## VAASA IS THE NORDIC HUB FOR ENERGY TECHNOLOGY

**T**HANKS TO ITS energetic pulse, our city is known as EnergyVaasa, the largest energy technology hub in the Nordic countries.

This has made us a world leader within different technologies, such as smart electrical solutions, sustainable energy, flexible power generation and digitalisation – to mention just a few. The considerable number of highly technological companies in the area is a fertile breeding ground for new businesses.

## VAASA HAS THE ECOSYSTEM FOR A GIGAFACTORY

Vaasa is a prime location for battery manufacturing due to its unique combination of natural resources, low-cost green energy, world-class expertise and attractive business environment. The groundwork for your energy storage business has already been made in Vaasa. We offer you exceptional quality of life in the most stable country in the world.

In Vaasa, you don't have to do business alone. The unique form of co-operation between the private, public and academic sectors has made Vaasa the capital of energy technology it is today.

## Comfort and stable living in Vaasa

- **EASY LIVING**  
The coastal city of Vaasa is alive with an energetic pulse and easy living.
- **HIGH STANDARD OF LIVING**  
Vaasa offers high living standards, a good work-life balance and opportunities for the entire family.
- **SAFE AND STABLE CITY**  
Vaasa is a safe and stable city for people and enterprises.
- **CLOSE TO EVERYTHING**  
Everything in Vaasa is within walking or biking distance – here you don't have to sit in traffic jams because you'll be at work in 10-15 minutes.
- **FORESTS AND GREEN AREAS**  
In Vaasa you're always close to nature, as 10% of the city is forest and green areas.
- **UNIQUE ENVIRONMENT**  
The unique natural environment in the Kvarken Archipelago is on the UNESCO World Heritage list and is Finland's only Natural Heritage site.



FINLAND IS THE BEST PLACE TO LIVE.

- NEWSWEEK -

EXPORT  
RATE OVER  
**80%**

SHARED  
R&D PLAT-  
FORMS

**120**  
NATIONALITIES

NUMBER OF EMPLOYEES  
IN ENERGY TECHNOLOGY

**12,000**

**2,000**

EMPLOYEES  
IN R&D FOR  
ENERGY TECH

MORE THAN

**160**

ENERGY  
TECHNOLOGY  
COMPANIES

**LEADER**  
in energy technology  
development

**6**

UNIVERSITIES

**10,000**

OTHER COMPANIES  
IN THE REGION

**13,000**

STUDENTS



# CO-OPERATIVE BUSINESS ENVIRONMENT

” In Vaasa, we have found the world’s best model for co-operation. Companies, sometimes even competing companies, work together to develop Finland. Vaasa is a great example.

Companies, universities, schools, the surrounding society, the City of Vaasa and the people here have always been pulling together to build this co-operation and functional ecosystem.

**JAAKKO ESKOLA**  
PRESIDENT AND CEO,  
WÄRTSILÄ CORPORATION

## ● WÄRTSILÄ

**WÄRTSILÄ IS LEADING** the transition towards a 100% renewable energy future. Wärtsilä hybrid solutions offer technically and environmentally advanced stand-alone energy storage solutions to power markets globally. Wärtsilä energy storage solutions significantly improve efficiency by increasing back up capacity and creating new opportunities in electricity markets.



### **BUSINESS SECTOR**

Decentralised power plants and ship power systems. Service, operations and maintenance.

### **NET SALES (2018)**

EUR 5.2 billion

### **EMPLOYEES**

19,000

### **EXPORTS FROM FINLAND**

EUR 2.1 million

### **MAJOR MARKETS**

Worldwide, in over 80 countries and 200 locations

[WWW.WARTSILA.COM](http://WWW.WARTSILA.COM)



## ● ABB

**ABB IS A PIONEERING** technology leader with a comprehensive offering for digital industries with four customer-focused, globally leading businesses: Electrification, Industrial Automation, Motion, and Robotics & Discrete Automation, supported by its common ABB Ability™ digital platform. ABB supports its customers in the battery business with its world-class industrial automation expertise, integrating robotics, machine and factory automation, electrification and ABB Ability™.

### **BUSINESS SECTOR**

Products, digital solutions and services for the safe, smart and sustainable future of energy, industry, transport and infrastructure.

### **REVENUES (2018)**

\$ 27.7 billion

### **REVENUES OF ABB FINLAND (2018)**

EUR 2.3 billion

### **EMPLOYEES**

147,000

### **MAJOR MARKETS**

Worldwide, in over 100 countries

[WWW.ABB.COM](http://WWW.ABB.COM)

## ● DANFOSS

**DANFOSS AC DRIVES** are part and parcel of all high-power battery systems. They are needed while the systems are being charged, while the power is being consumed, or when power conversion of any kind is required. Danfoss AC drives also contribute to building state-of-the-art hybrid or all-electric solutions based on battery technology.



### **BUSINESS SECTOR**

Power technology, hybridization, electrification, infrastructure, climate, heating and cooling technology, off-highway vehicles.

### **TURNOVER (2018)**

EUR 6.1 billion

### **EMPLOYEES**

28,000

### **EXPORTS FROM FINLAND**

EUR 250 million

### **MAJOR MARKETS**

Worldwide, in more than 100 countries

[WWW.DANFOSS.COM](http://WWW.DANFOSS.COM)



## ● THE SWITCH

Yaskawa Environmental Energy

**WITH 15 GW** of environmental energy technology delivered, The Switch is involved with new battery storage solutions in combination with its power generation for wind, marine and industry applications to help make consistent, high-quality renewable energy readily available. Batteries can be connected to the distributed energy system to balance the supply and demand, thereby ensuring the lowest cost of energy with the best electricity quality.

### **BUSINESS SECTOR**

Megawatt-class advanced electrical drive train technology for wind, marine and turbo/industry applications.

### **NET SALES (2018)**

EUR 87 million

### **EMPLOYEES**

220

### **EXPORTS FROM FINLAND**

EUR 82 million

### **MAJOR MARKETS**

Worldwide; with a focus on Europe, China and Japan

[WWW.THESWITCH.COM](http://WWW.THESWITCH.COM)



# Great need for green batteries in the region.

## Vaasa – the Nordic Energy Capital

- 140 companies in the energy sector.
- > 30% of Finland's energy technology exports.
- 90% of Finland's R&D work within electricity and automation happens in the Vaasa region.
- The annual business turnover of the energy hub is some EUR 5 billion.



THE CITY OF VAASA  
HAS A STRATEGY FOR  
ENERGY EDUCATION.

# THE NORDIC ENERGY CAPITAL

## BUILDING GROWTH AND ECONOMIC WELFARE

**T**HE CITY OF VAASA is among the top cities in its size range in terms of population growth and the growing number of jobs. Vaasa is a versatile industrial city offering great possibilities of development especially for the international production industry.

The region is truly international, and its people have a high educational level. No wonder it is an attractive place for a skilled workforce. The city of Vaasa has a strategy for energy education and 45% of all graduates have academic degrees – there is no doubt that companies will find the best people to work for them.

Education, inventions and great minds are the best ways to move towards a more sustainable tomorrow!



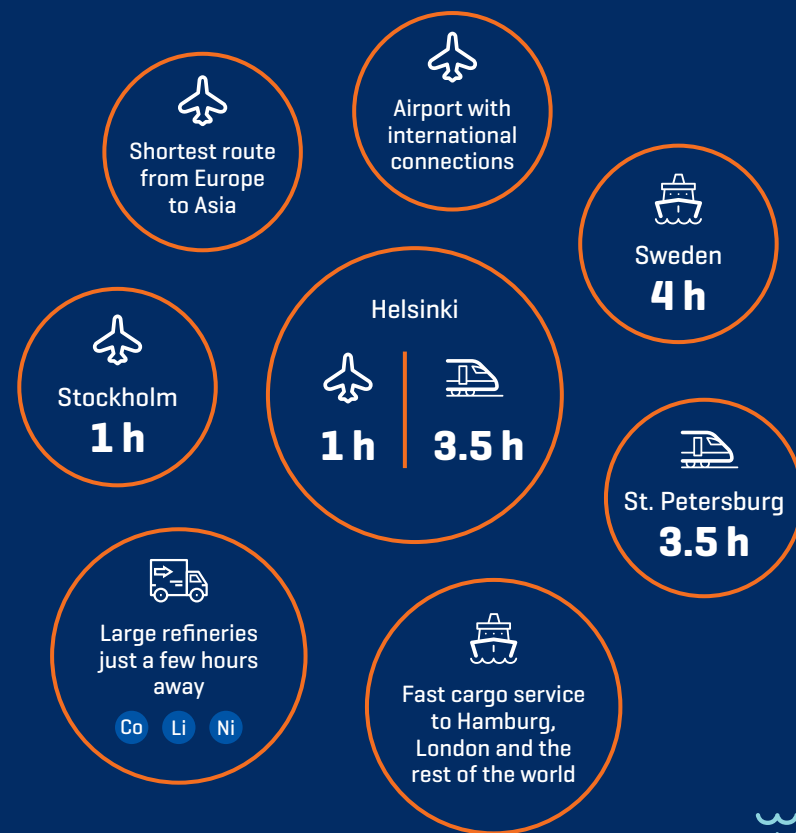
THOUSANDS OF  
UNIVERSITY STUDENTS  
FORM A DRIVING FORCE  
FOR THE VAASA REGION.





# Easy connections to the world from the Vaasa region.

Tailored logistics solutions to suit numerous companies' ways of doing business.



# GIGA-SIZE INDUSTRIAL ZONE IS READY

## FOR LARGE-SCALE BATTERY-RELATED INVESTMENT

” We can offer the location to a battery factory as well as enable the establishment of related functions and other industries in the region.

An environmental impact assessment programme (EIA) has already been completed. The land-use planning and permit process are ready. The roads and total infrastructure will be executed according to your needs.

The GigaVaasa industrial zone is well placed logistically, with good rail and road connections, a short distance to the harbour and an airport on its doorstep. The road and rail connections are part of European networks.

**MARKO KUOKKANEN**  
GIGAVAASA SALES AND  
MARKETING DIRECTOR

### Infrastructure according to your needs

- Electric grid connection 400 kV.
- Industrial scale water infrastructure available.
- District heating.
- Waste heat utilisation.

### Local distances

- **AIRPORT**  
1 km
- **HARBOUR**  
12 km
- **CITY CENTRE**  
10 km
- **RAILWAY**  
on site



The industrial chemical sites are ready.

**48 ha**

**40 ha**

**180 ha**

**50 ha**



# MANUFACTURE YOUR FUTURE GREEN BATTERIES IN VAASA

## LOW COST GREEN ENERGY

**C**OMPANIES IN FINLAND can depend on a highly reliable and cost-effective power supply to run their business with maximum efficiency. Power generation, transmission and distribution systems are highly efficient. Finland has one of the lowest industrial power costs in the EU.

Finland is part of the common Nordic and Baltic energy market. The

electricity trading and large supply keeps the price of electricity at a low level.

In the Vaasa region, you will find strong expertise in decentralised energy production and energy use solutions. Vaasa offers opportunities for the production of emission-free products. There is 100% renewable energy available for the sites: wind power, hydro power and bio power.



THE CHEAPEST  
SUSTAINABLE ENERGY  
IN EUROPE.



FUTURE BATTERIES  
WITH ZERO CARBON  
EMISSIONS.

The Vaasa region is strong on sustainable energy solutions

- **RENEWABLE ENERGY**  
The opportunity to use several sources of renewable energy for electricity and heat.
- **WATER EASILY AVAILABLE**  
Excellent access to process and cooling water with minimal environmental impacts.
- **HEAT AND WATER**  
Near the district heat operator and network and water treatment plant.
- **FUEL AND ELECTRICITY**  
Well-functioning fuel logistics and electricity supply.
- **STEAM SUPPLY**  
Access to steam for drying from the region's power plants.
- **ENERGY EFFICIENCY**  
Good energy efficiency with the use of heat recovery solutions.
- **LOW ENVIRONMENTAL IMPACT**  
Minimised environmental impacts and effective land use for the battery ecosystem.





FINLAND IS THE MOST  
ENVIRONMENTALLY  
FRIENDLY COUNTRY.

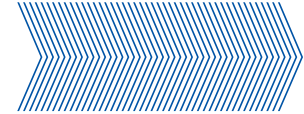
- ENVIRONMENTAL  
PERFORMANCE INDEX -



# COMPETENCIES THROUGHOUT THE BATTERY VALUE CHAIN

FROM RAW MATERIALS TO SECOND-LIFE  
USE AND RECYCLING

01



## ● RAW MATERIALS

**FINLAND OFFERS AN EXCELLENT** platform for lithium-ion battery manufacturing. We are unique in having all the key mineral resources needed in battery manufacturing within our territory:

### **RAW MATERIALS:**

- LITHIUM
- COBALT
- NICKEL
- GRAPHITE

**BATTERY-GRADE LITHIUM CARBONATE** from deposits 140 km from Vaasa, the most significant lithium resources known to exist in Europe.

**TERRAFAME** is a multi-metal company producing nickel, zinc, cobalt and copper and is owned by the Finnish Mineral Group. The consistent quality of Terrafame's nickel product type makes it optimal for streamlined battery production.



02

## REFINING

**EXTENSIVE KNOWLEDGE** and experience in the processing of raw materials.

### BATTERY MATERIAL PRODUCERS AND ACTORS IN FINLAND:

- **TERRAFAME** multi-metal company produces nickel sulfate and cobalt sulfate.
- **FREEPORT COBALT** The world's largest cobalt refinery. Finland is the only major cobalt producer in the EU.
- **KELIBER** produces battery grade lithium hydroxide, which suits EV batteries extremely well.
- **NORILSK NICKEL** produces high-quality nickel chemical and metal products.
- **BASF** will open a precursor cathode active material factory in Finland in 2020.
- **FMG [FINNISH MINERAL GROUP]** aims to build a leading ecosystem for battery production in Europe. Programme and R&D projects related to the Finnish battery and mining cluster. FMG is owned by the Finnish State.

03

## CELL AND PACK

### AN EXCELLENT PLATFORM FOR BATTERY CELL AND PACK MANUFACTURING IN VAASA:

- **EXCELLENT AVAILABILITY** of CO<sub>2</sub>-free power.
- **ONE OF THE LOWEST** energy costs in Europe and the most reliable grid in the EU.
- **STRONG ENGINEERING** competences and good availability of talent.
- **A STRONG ENERGY CLUSTER** and many energy companies – focused on different battery applications.
- **UNIQUE COOPERATION** between companies, universities and public authorities.

**MANY LARGE-SCALE BATTERY** cell manufacturing companies have found the Nordic countries the best place for a giga-size battery factory.

**THE GROUNDWORK** for your energy storage business has already been made in Vaasa – the sites are ready for your use.

04

## DOWNSTREAM APPLICATIONS

### IN VAASA AND FINLAND, WE HAVE SIGNIFICANT INDUSTRY FOR

- **WORK MACHINERY** and electric vehicles
- **ENERGY STORAGE** and future grids
- **MARINE**
- **CONSUMER APPLICATIONS** (EV charging operators).

### THREE CASE EXAMPLES

- **VIRTA** is the forerunner in electric vehicle charging platform technologies. Their solutions have been built to support EV charging infrastructure anywhere in the world.
- **VALMET AUTOMOTIVE** is a provider of automotive engineering, vehicle manufacturing, EV and convertible roof systems. Special areas of expertise are premium cars, EV and convertibles.
- **LOGSET** is a forest machine manufacturer which has built the most productive harvester in the world with hybrid technology.

05

## RECYCLING

**WE HAVE NOTABLE KNOW-HOW** in recycling. In Finland there are plenty of operators and companies specialising in battery material recycling and energy storage for second life use.

**ON REQUEST** of the European Commission, Finland has assumed responsibility for the development of battery recycling in Europe. The BATCircle (Finland-based Circular Ecosystem of Battery Metals) consortium aims at improving the manufacturing processes of the mining industry, metals industry and battery chemicals, and to increase the recycling of lithium-ion batteries. A particularly large amount of unused potential can be found in the recycling of batteries.

### CASE EXAMPLE

- **CRISOLTEQ AND FORTUM** are partnering up to tackle major EV sustainability issues. This joint innovation will increase the recycling rate of EV batteries by over 80%.

# DO YOU WANT TO BE PART OF OUR SUCCESS STORY?

**CONTACT US AT** [WWW.INVESTINVAASA.FI](http://WWW.INVESTINVAASA.FI)

## EnergyVaasa

Investing in Finland is a smart decision. We have an open society, friendly business environment, competitive workforce, reliable infrastructure, excellent location between east and west, and a vibrant startup scene.

design by

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