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DEMO NORTH

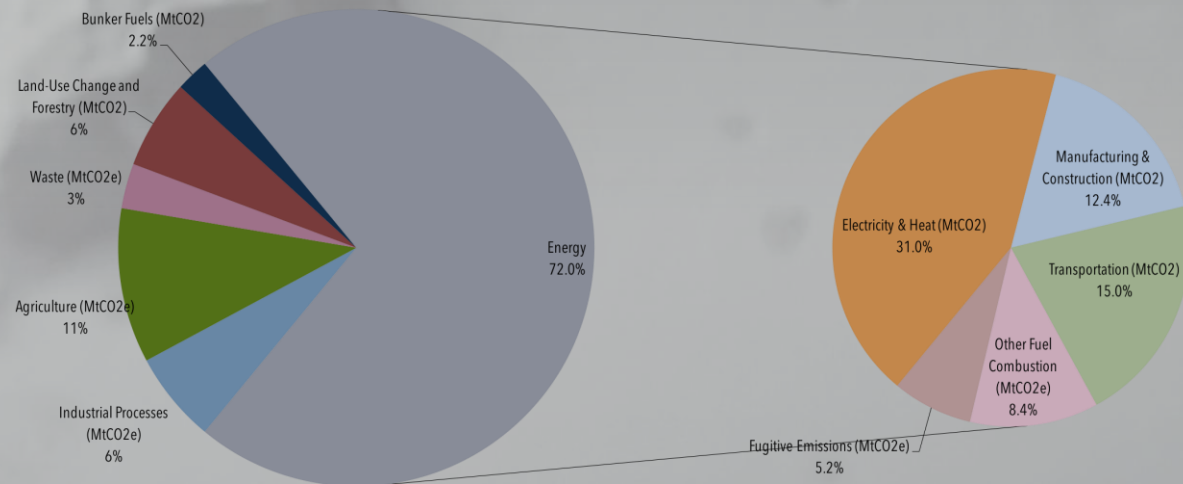
A dark gray background with a subtle topographic map pattern, showing contour lines and terrain features in a lighter shade of gray.

ENORMOUS GLOBAL CHALLENGES

WE HAVE 12 YEARS TO SAVE THE PLANET. LET'S SPEED UP INNOVATION.

UN's climate change body IPCC states that we have 12 years of leeway in reaching out global targets for limiting the global temperature increase to 1.5°C. To get there, we need to implement far-reaching changes in policies, consumer demands and culture. But equally important is that we manage to speed up sustainability innovation. To make this possible, innovators need the right preconditions and partners. **Enter Demo North.**

GREENHOUSE GAS EMISSIONS BY SECTOR - 2013





RESEARCH SAYS NEW TECHNOLOGY NEEDS 20-30 YEARS TO TAKE SHAPE. **WE NEED TO PROVE RESEARCH WRONG.**

The formative phase of technology development – when technological systems begin to be put in place – takes 20-30 years, according to recent research.*

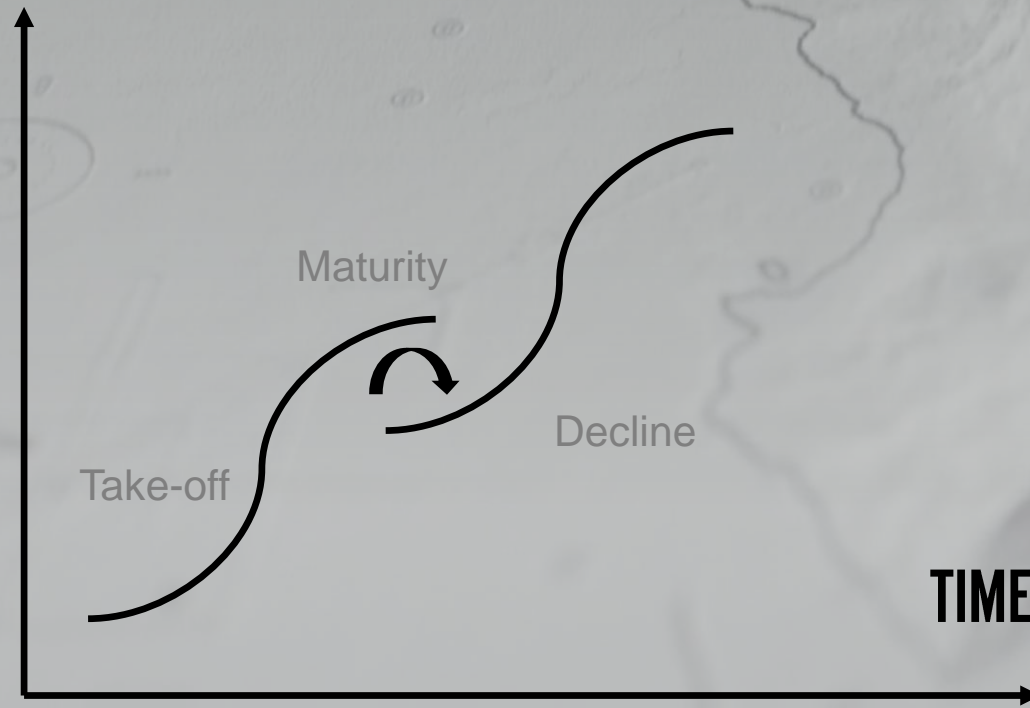
To make the necessary transition towards sustainable energy sources, the car industry has around 10 years to become electrified, data center operations have 10 years to become fossil free, and so forth. We have a pressing need to show that we can be faster than anyone thought possible.

*Source: Bento, N. & Wilson, C. (2016).

MINIMIZING RISK AND INDUSTRIAL SCALE

DEMO NORTHS CONTRIBUTION

PERFORMANCE



Demo North's contribution to faster technological changes lies in speeding up the formative phase – and by that minimizing risks and allowing for industrial scale.

Since the start in 1967 our demos, which began with vehicles and military tests have today grown to include a variety of industries and actors. Demo North's recipe for success is shortening the formative phase.

Nurture sustainable: understanding the formative Phase. E.g. Hybrit

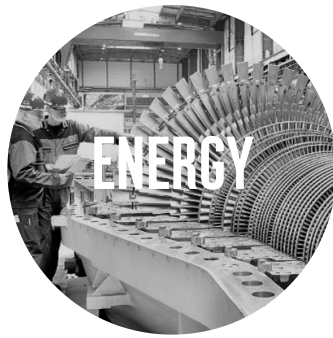
Organize innovation systems. E.g. Bothnia Bio industry Cluster

Resuse! Usage of software development in industrial production. E.g. Facebook

Technology-specific. E.g. Northvolt aligning value chains

Helpful policy. E.g. Wind power farms

INDUSTRY



ASSETS

Cold climate, access to vast lands and 100% renewable energy

Space and aviation tests require large areas, neutrality and technical competence

Large supply of minerals, biomass and green energy has laid the foundation for a substantial material industry

Transition to renewable energy requires tests in customized facilities

One of the worlds first test beds for 5G testbeds and a unique test facility for AI, edge, micro grids, and data centers are located in Northern Sweden

Healthcare and urban planning require a combination of governmental and private actors.

ACTORS



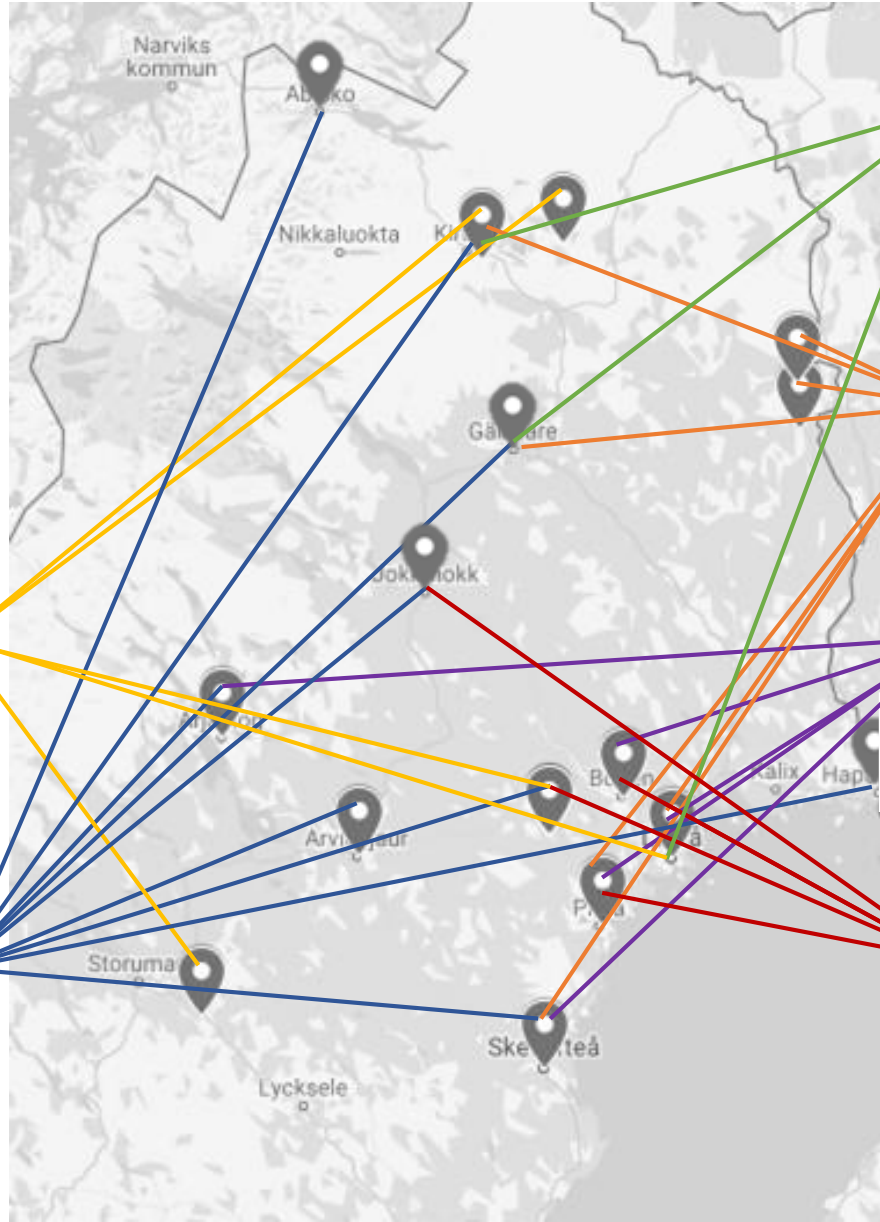
CUSTOMERS



**INNOVATORS THAT ENABLE
TECHNOLOGICAL CHANGE
THROUGH TEST & DEMO**

DEMO NORTH CLUSTER

Different industries have different main needs, even if many of them overlap. There are over 40 demo and test actors in the north, which can be clustered after their industry. Below are some of their most important assets and needs.



Space & Aviation

Natural resources

- Free airspace
- Large land areas
- Secluded environment for secretive tests
- Sparsely populated

Technologically advanced

- Educated labor force
- Research institutes and academia

Vehicles & Transport

Natural resources

- Winter roads & lakes
- Climate controlled halls
- Suitable land
- Secluded environment for secretive tests
- Sparsely populated

Technologically advanced

- Experienced test-pilots
- High-tech data verification systems

Healthcare & Urban planning

Technologically advanced

- Educated labor force
- Urban environments
- Connection to domestic and international networks
- Population to carry out tests on

Materials

Natural resources

- Mineral and ore findings
- Renewable energy

Technologically advanced

- Proximity to relevant industries
- Large industrial customers
- Research institutes & academia

Energy

Natural resources

- Available renewable energy sources
- Fossil free energy sources
- Available residue products for bio-fuel production

Technologically advanced

- Infrastructure
- Research institutes and academia
- Large and medium sized customers
- Test & Demo Bio-refineries

Telecom & IT

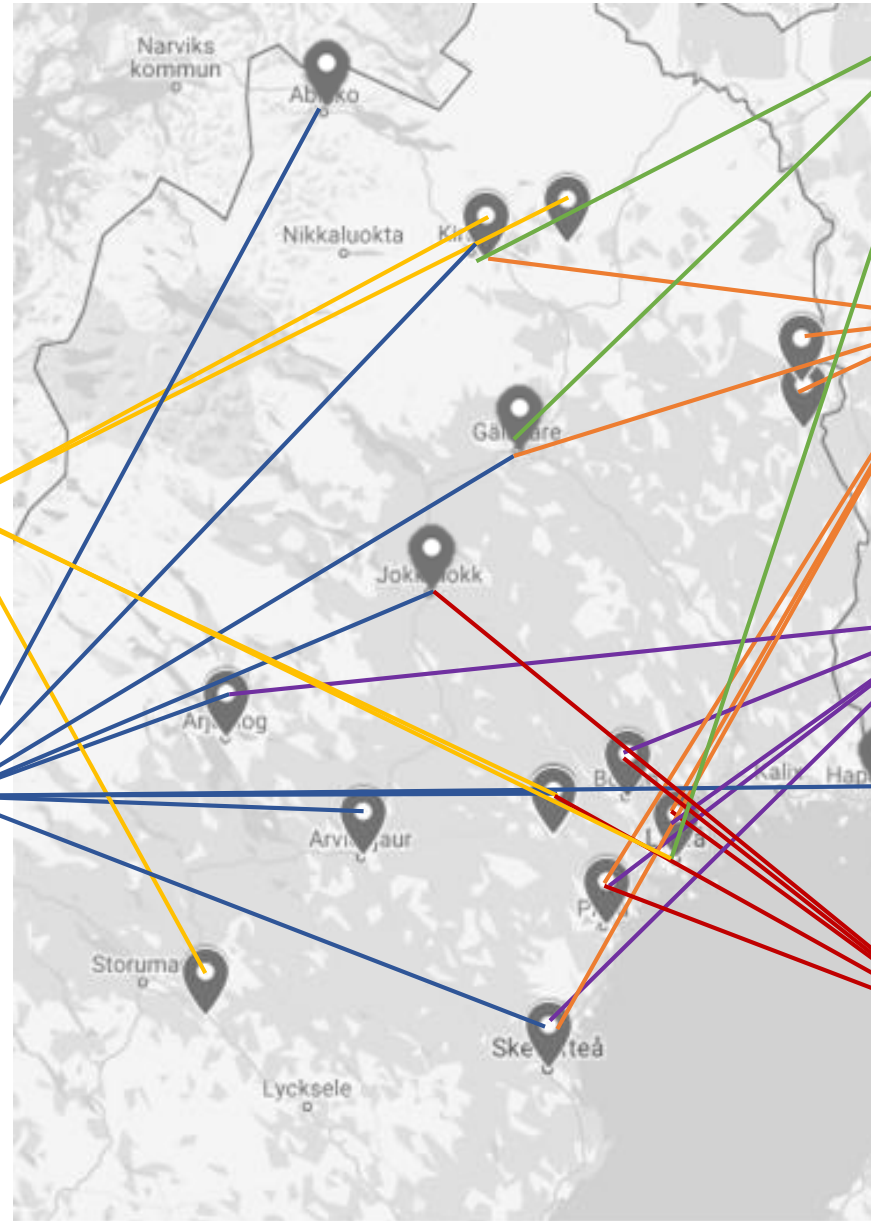
Natural resources

- Access to abundant and renewable energy
- Cold climate
- Mix between sparsely populated and urban environments

Technologically advanced

- Educated labor force
- Research institutes and academia
- Population to carry our tests on
- Urban infrastructure (Hotel, conference centers)

ACTORS IN DEMO NORTH



Space & Aviation

- Kiruna Flygplats Kiruna Facility
- Esrange Kiruna Full service
- Testsite Gunnarn Airport Storuman Facility
- North European Aerospace Test range Vidsele

Vehicles & Transport

- Icemakers Arejplög Full service
- Arctic Falls Älvsbyn Facility
- Arctic Arc Lappland Full service
- Rail test nordic Skellefteå Not active yet
- Swedish Proving Ground Association Olika platser Facility/ Full service
- Malmbanan Abisko Private
- TrV Haparanda – Weigh in motion Haparanda Private

Healthcare & Urban planning

- Testbädd Personcentrerad närsjukvård Co operation in Norrbotten Advisory
- Testbädd Aktivt och hälsosamt åldrande Co operation in Norrbotten Facilitation
- Testbädd Malmfälten Gällivare & Kiruna Full service

Materials

- Arctic Tests Pajala Facility
- Swerim (20-tal olika testbäddar) Luleå Full service
- Prisma - Systemanalys och Processintegration Luleå Full service
- RISE Luleå, Piteå Full service

Energy

- Future Eco Boden Facilitation/ Facility
- Facebook Data Center Luleå Facility
- Energy Technology Center Piteå Full service/ Facility
- Solar Test Bed (Sun Cold) Piteå Experiment
- Vindkraftscentrum Piteå & Arjeplog Full service
- Northvolt Skellefteå Full service

Telecom & IoT

- RISE SICS North Luleå Full service
- Testbädd för digitalisering och IT-infrastruktur Luleå Facility
- Facebook Luleå Facility
- Mobilaris Luleå Full service

ACTORS AND CUSTOMERS IN DEMO NORTH

Space & Aviation

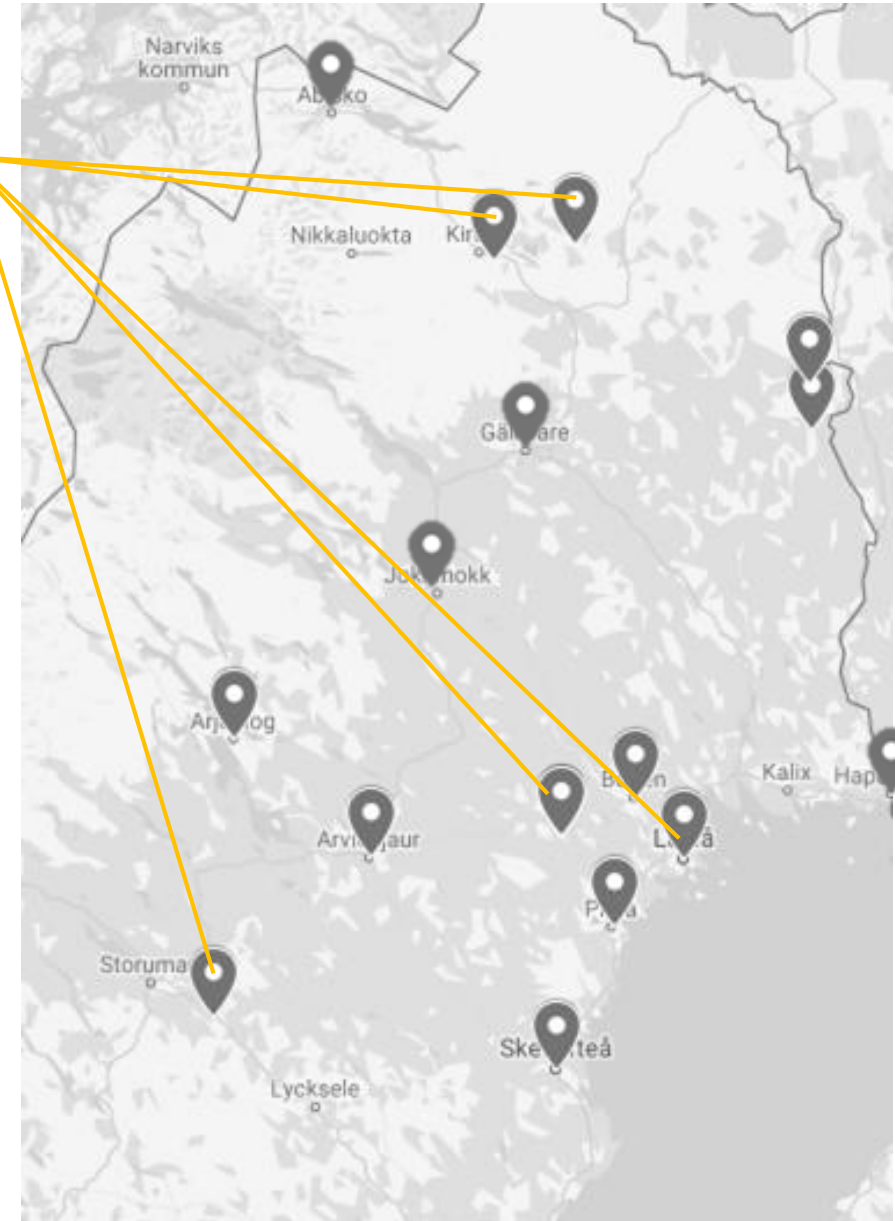
ACTORS



INSTITUTET FÖR RYMDFYSIK
Swedish Institute of Space Physics



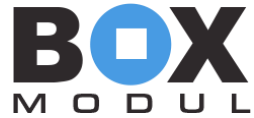
CUSTOMERS



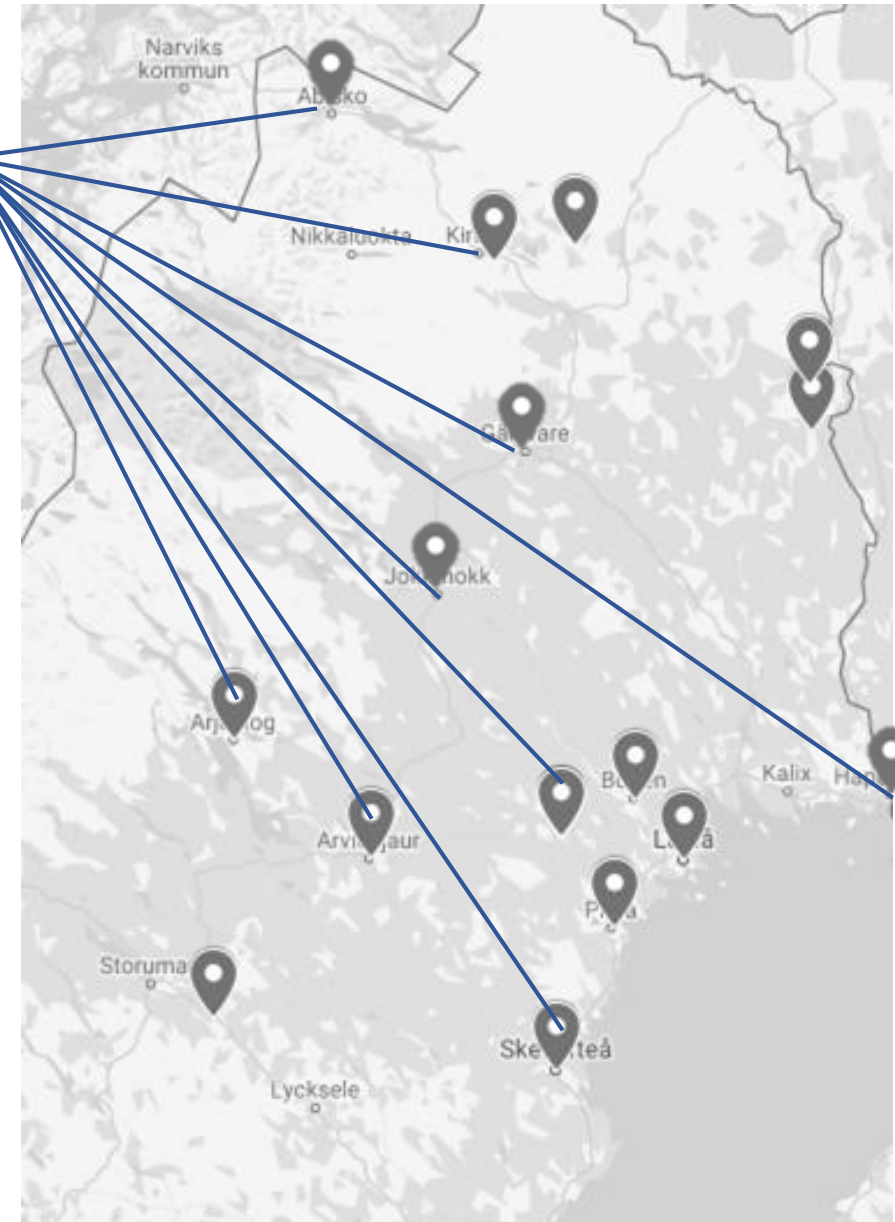
ACTORS AND CUSTOMERS IN DEMO NORTH

Vehicles & Transport

ACTORS



CUSTOMERS



ACTORS AND CUSTOMERS IN DEMO NORTH

Healthcare & Urban planning

ACTORS



CUSTOMERS



ACTORS AND CUSTOMERS IN DEMO NORTH

Mining & Metal

ACTORS



CUSTOMERS



ACTORS AND CUSTOMERS IN DEMO NORTH

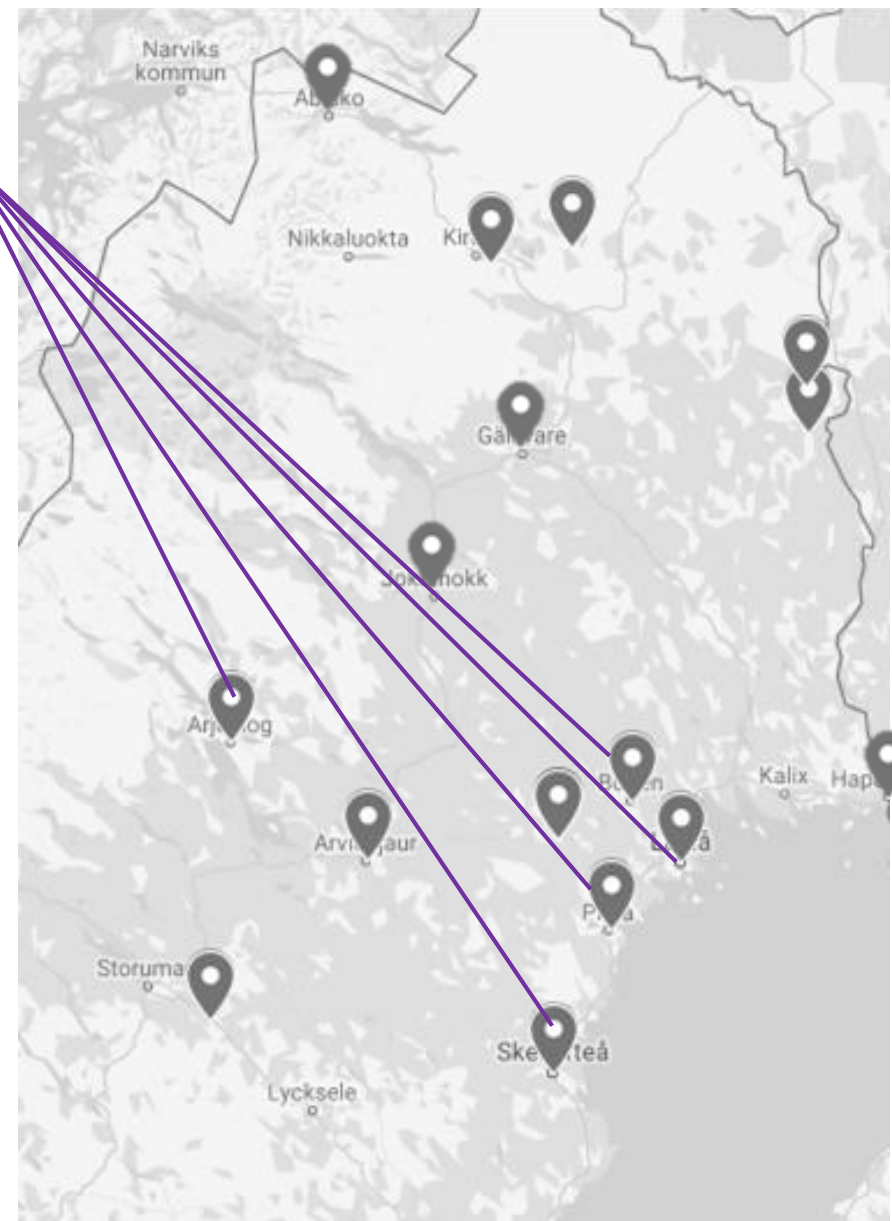
ACTORS



CUSTOMERS



Energy



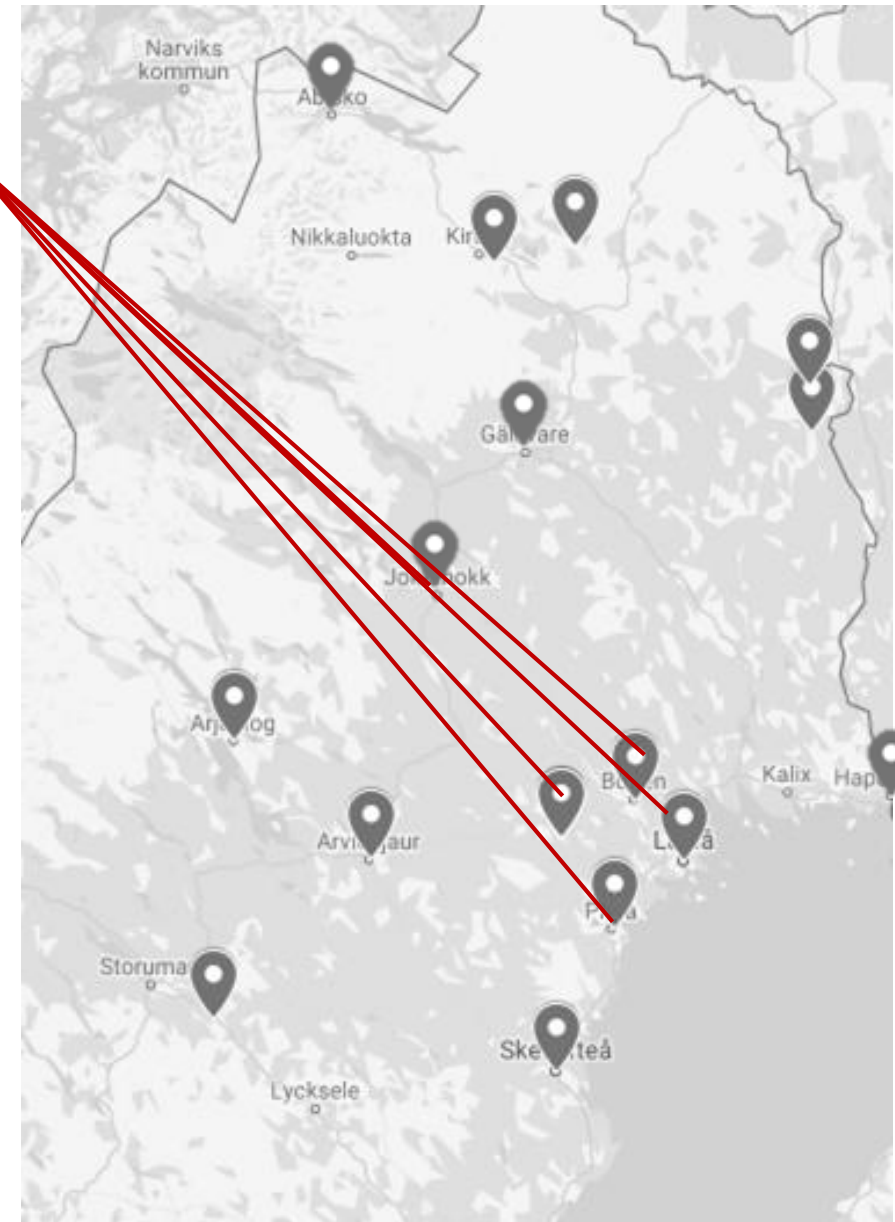
ACTORS AND CUSTOMERS IN DEMO NORTH


Telecom & IT

ACTORS



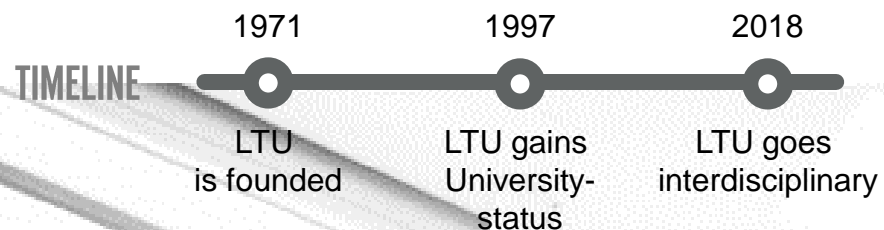
CUSTOMERS



A dark, monochromatic topographic map of a region, likely in the northern part of a country, showing intricate contour lines and geographical features. The map is rendered in shades of dark gray and black, creating a textured, relief-like appearance.

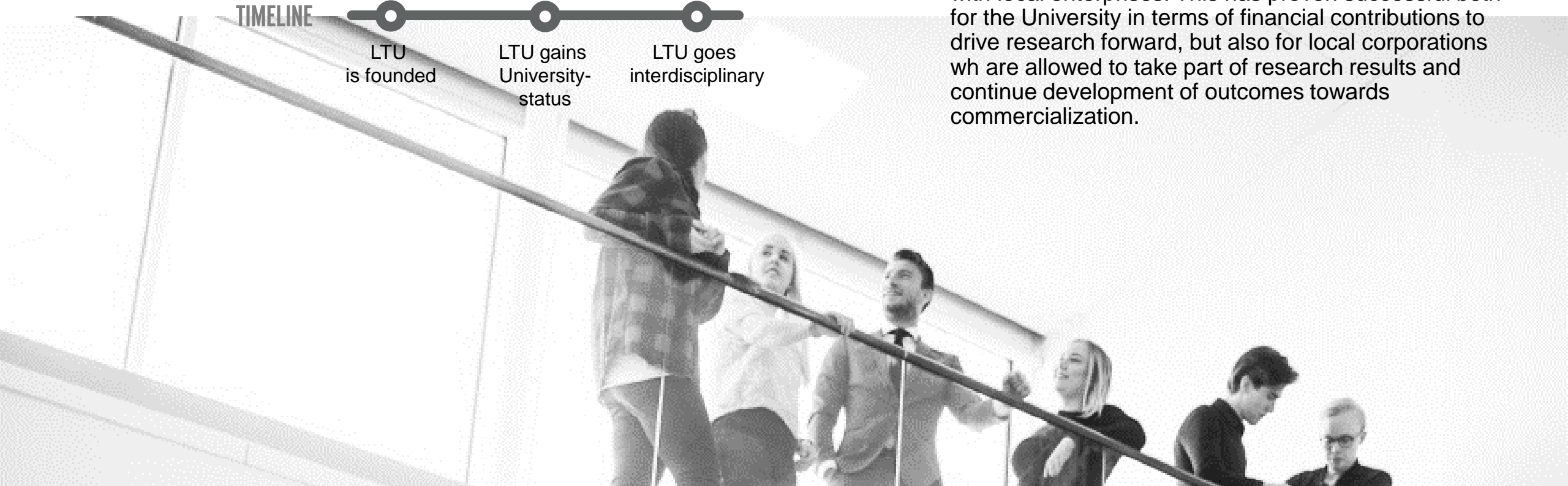
**SOME OF THE INNOVATORS
IN DEMO NORTH**

LTU: FOUNDER OF THE REGIONS KNOWLEDGE



Luleå University of Technology (LTU) was founded in 1971, and has ever since been a major contributor to the regions development, through attracting companies and supplying highly educated labor.

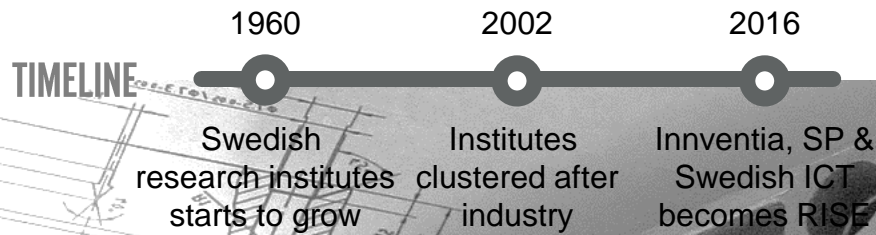
The university is Europe's largest within applied sciences, enabling them to establish collaborations with local enterprises. This has proven successful both for the University in terms of financial contributions to drive research forward, but also for local corporations wh are allowed to take part of research results and continue development of outcomes towards commercialization.



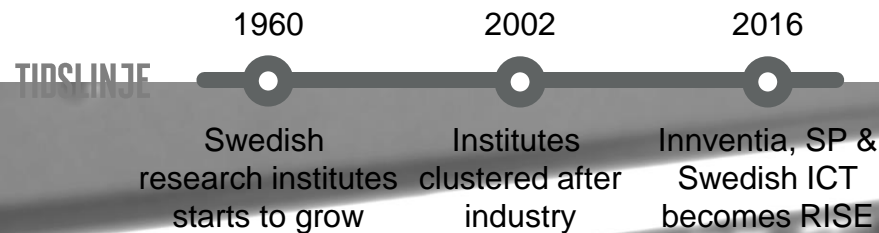
RISE SICOMP: DEVELOPING THE PRODUCTS & COMPONENTS OF TOMORROW

RISE is a collection of Swedish research institutes within a variety of areas. One area of expertise is development and production of components in composite materials through SICOMP. Main focus has been aimed at research and commercialization of materials, processing and production.

RISE SICOMPs materials are used in a variety of industries, including space & aviation, vehicles, marine, and construction. The research institute has lately proven a crucial contributor to other industries in the region, including carbon fiber plastic for the electrification of the global vehicle fleet.



RISE SICS: LEADING RESEARCH & DEVELOPMENT WITHIN ICT



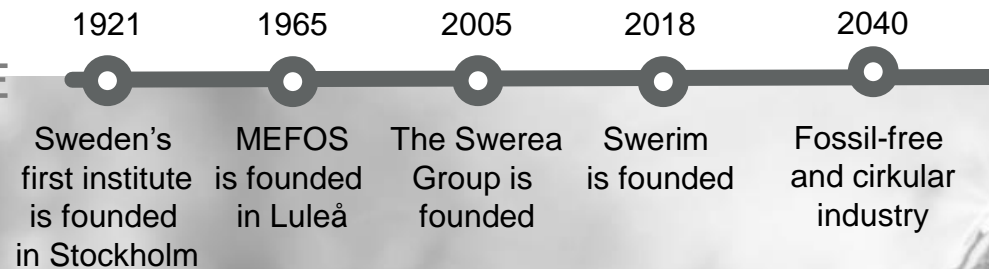
RISE SICS North is part of a collection of Swedish research institutes within a variety of areas known as RISE Research Institutes of Sweden AB.

SICS is specialized in communication and ICT technology, and has long been on the research frontier in areas such as AI, big data, cloud-technology, data processing, datacenters and IoT.

Through providing expertise, knowledge and experimentation opportunities to commercial corporations within the area, SICS North seeks to strengthen their customers' international competitiveness.

SWERIM: CREATING INDUSTRY BENEFIT

TIMELINE



Swerim conducts needs-based industrial research and development concerning metals and their route from raw material to finished product. We wish to strengthen industrial competitiveness by enabling improved product quality, greater resource efficiency and more sustainable manufacturing processes. Our vision is a fossil-free and circular industry.

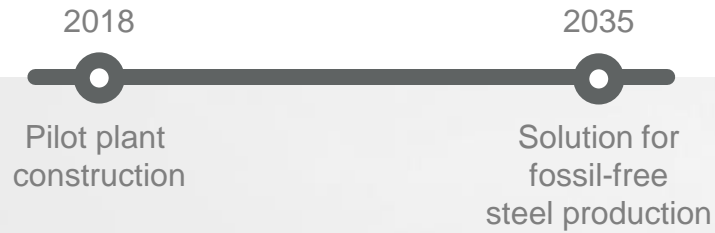
Swerim has unique leading-edge expertise, unique equipment for experimentation and unique test facilities. This means that our research can be applied practically in industry. In Luleå, for example, we have:

- A pilot plant for research in the use of hydrogen in industrial processes.
- Testbed for fluidized-bed technology enabling more efficient extraction of resources from raw materials and recycling of various kinds of waste.

We are driven by a desire to find innovative and applicable solutions. Our personal commitment guarantees benefit for industry.

HYBRIT: TOWARD FOSSIL-FREE STEEL.

TIMELINE



HYBRIT is a joint venture between SSAB, LKAB and Vattenfall, started in 2016.

HYBRIT endeavors to revolutionize steel-making, by replacing coking coal, traditionally needed for ore-based steel making, with hydrogen. The result will be the world's first fossil-free steel-making technology, with virtually no carbon footprint by direct reduction via hydrogen.

During 2018, work started on the construction of a pilot plant for fossil-free steel production in Luleå, Sweden. The goal is to have a solution for fossil-free steel by 2035. If successful, HYBRIT means that together Sweden's CO₂ emissions can be reduced by 10% and Finland's by 7%.

SUNPINE: RENEWABLE DIESEL.



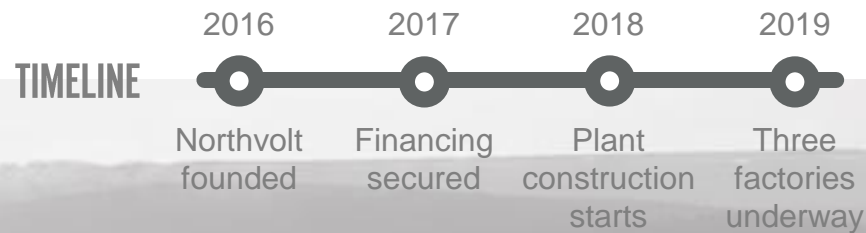
Sunpine are a world leading biorefinery, producing biofuels and other bio-products from residue products from the forestry industry.

Through synergies with the regions forestry, and utilizing the 100% renewable energy of the region, Sunpine are aiming to scaling up production of biofuel in a sustainable way.

By continuously investing in increased capacity, Sunpine seeks to demonstrate to the world that biofuel are scalable and indeed part of the future of sustainable transportation.



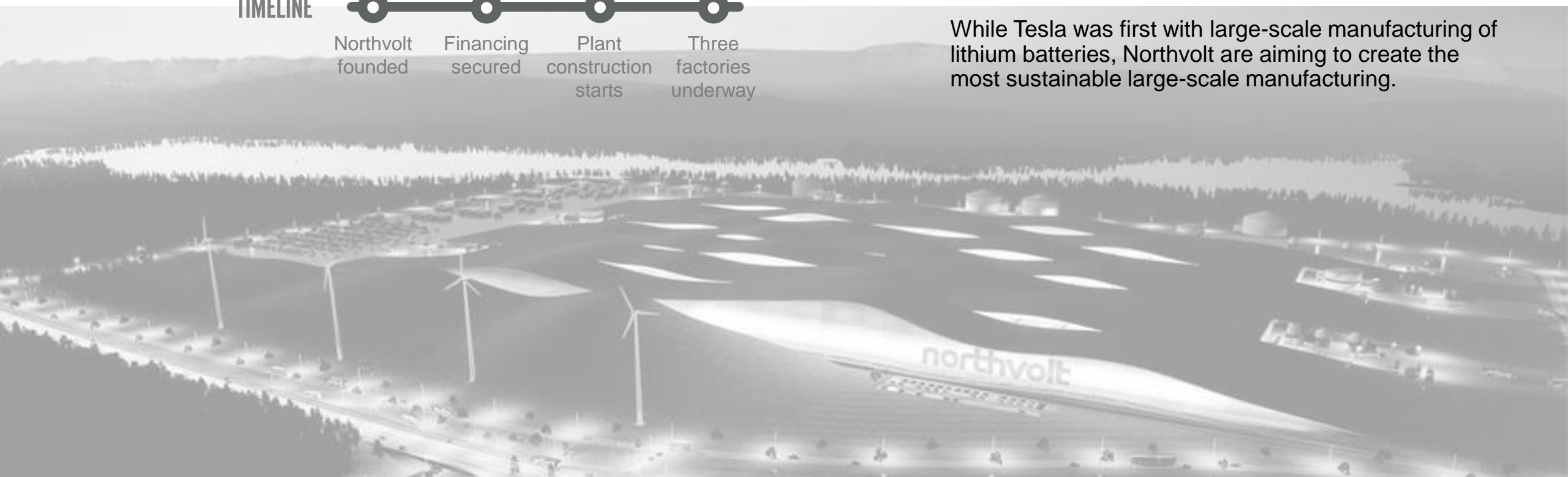
NORTHVOLT: NEXT GEN GREEN BATTERIES.



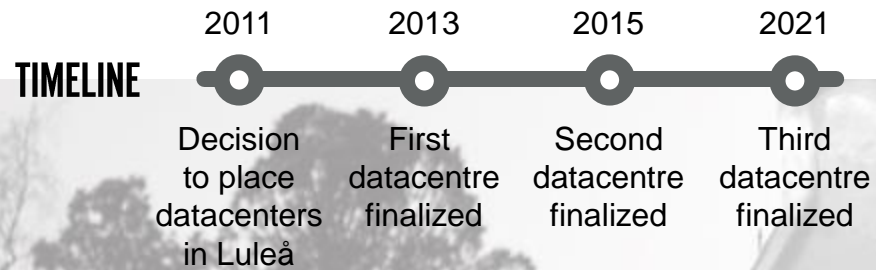
According to the IPCC, to keep global warming below 1.5 degrees, 100 million electric vehicles must be added to our roads globally by 2030. Northvolt, founded in 2016 by Tesla's former VP Peter Carlsson, aims to produce the world's most environmentally friendly batteries.

Their mission is for their batteries to have the smallest possible carbon footprint and to be 100% recycled, in order to facilitate the world's transition to be powered by renewable energy.

While Tesla was first with large-scale manufacturing of lithium batteries, Northvolt are aiming to create the most sustainable large-scale manufacturing.



FACEBOOK: PAVING THE WAY FOR GREEN DATACENTERS.



In 2014, a study revealed that datacenters globally accounts for about 2% of the world's total greenhouse gas emissions. With data-traffic doubling every four years, this is expected to increase to 3.5% globally within a decade, surpassing the emissions from aviation.

In 2011, Facebook made the strategically important decision to locate their new datacenters in the Norrbotten region. Their decision to locate there was built on not only a business case, but also a sustainability case .

Since their establishment in Luleå, Facebook have continuously been using the location as a deployment region for new datacenter technology, with the ambition of making datacenters more sustainable and cost efficient. In doing so, they have started an industry displacement where not only tech giants are pondering over these questions, but also smaller actors.

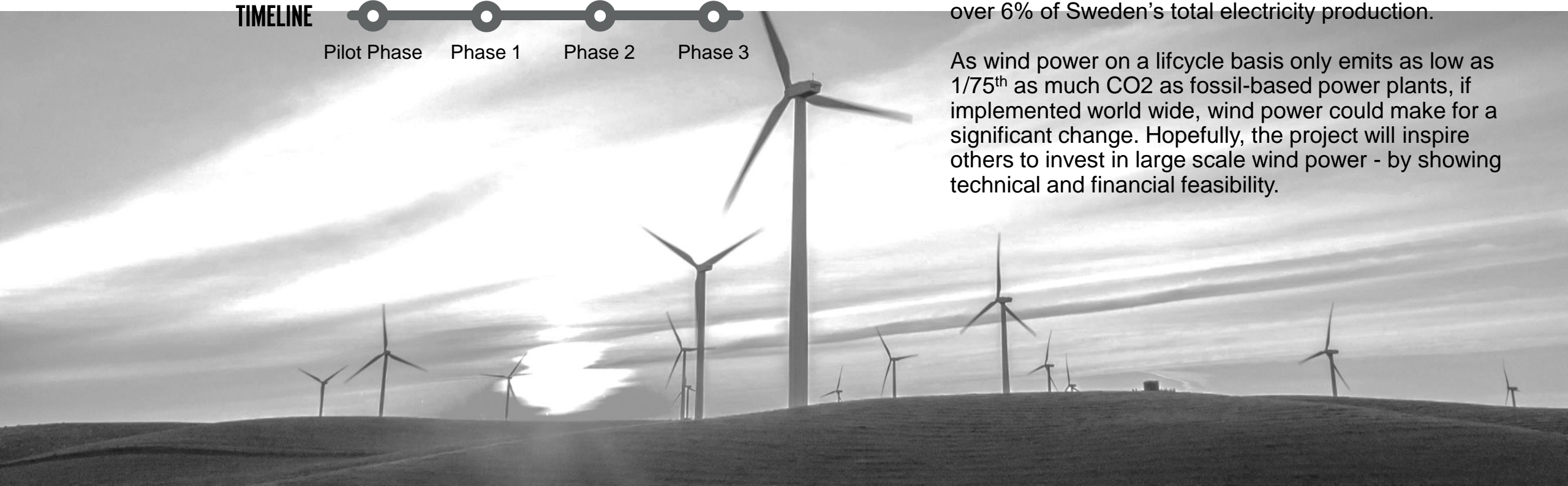
MARKBYGDEN: LARGE SCALE WINDFARM



GE and Enercon are underway to raise a wind power farm in Markbygden, Piteå that will upon completion be one of the largest in Europe.

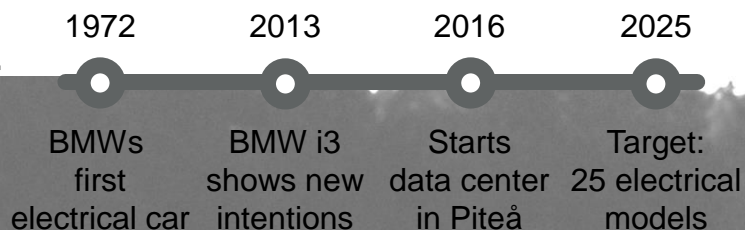
With electricity productions being one of the largest contributing industries to CO2 emissions, shifting the worlds energy supply towards renewable sources would make a significant impact on our carbon footprint. Upon completion Markbygden will supply over 6% of Sweden's total electricity production.

As wind power on a lifecycle basis only emits as low as 1/75th as much CO2 as fossil-based power plants, if implemented world wide, wind power could make for a significant change. Hopefully, the project will inspire others to invest in large scale wind power - by showing technical and financial feasibility.



BMW: ETERNAL STRIVE FOR MORE EFFICIENT CARS

TIMELINE



BMW was an early pioneer with the release of their first electrical car in 1972 in connection with the Olympic games in Munich. Already by then their argument was that exhaust is dangerous to both humans and the environment. Around 2010 BMW started to realize the urgency of climate change, and have since positioned themselves accordingly with the iconic i3 model.

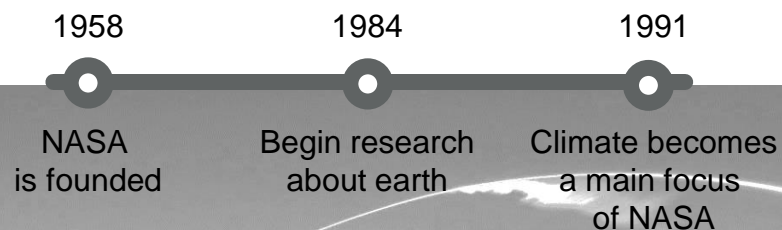
BMW have since 1995 managed to reduce the CO2 emissions from their vehicles with over 40%, by digitalization and using electrical motors. In later days, BMW have also started utilizing the large amounts of data created by cars to increase efficiency. Much of this takes part in BMW's datacenter Fortlax in Piteå.

This is a necessary transition for an industry accounting for almost 10% of global CO2 emissions. BMW are investing hundreds of millions of dollars in R&D to develop electrical vehicles.



NASA: ALWAYS PUSHING THE BOUNDARIES OF HUMANITY

TIMELINE

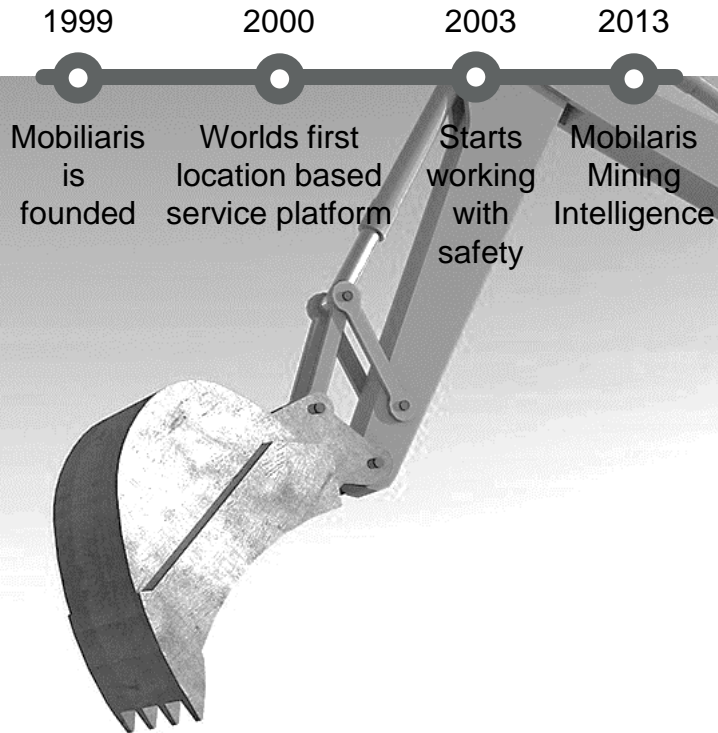


NASA have since its foundation in 1958 constantly been pushing the borders of human knowledge. After having put the first man on the moon, NASA shifted focus in the early 80s towards understanding our own planet. NASA was first to present the pioneering reports that discovered global warming and proved that the climate changes we see are urgent questions.

NASA are today spending a significant portion of their annual budget on trying to get a better understanding of climate change, and how we can counteract them. Through a deeper understanding of the causes of climate change, NASA is a key component in helping everyone around the world to better understand the importance of the climate question – and through their constant innovation, they help us getting closer to a solution.

MOBILARIS: DIGITALIZING INDUSTRY

TIMELINE



Mobilieris was founded in 1999 and did early show their ability to develop, implement and commercialize new innovations when they launched the worlds first location-based service platform one year after their foundation. Ever since, Mobilaris focus have been problems and efficiency losses that can be solved through implementation of digitalization. Their leading offer have been to digitalize corporation faster than their competitors have been able to.

Mobilari's has lately focused on mining and industry, two areas that account for a large share of our global CO2 emissions. In these industries, digitalization has the opportunity to significantly reduce CO2 emissions – why the quick implementation Mobilaris can offer is of great importance.

A dark gray background with a subtle topographic map pattern, showing contour lines and elevation changes across the terrain.

HOW?

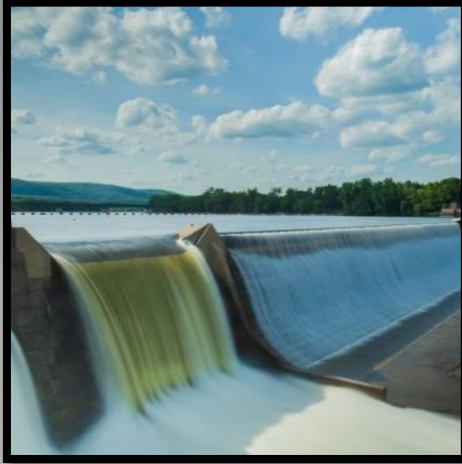
DEMO NORTH'S OFFER

DEMO NORTHS ASSETS



VAST LAND AREAS

The regions vast and to large degree uninhabited areas opens up for demonstration and tests that require a lot of space, or need to be kept away from the publics curious eyes



GREEN ENERGY

With 100% renewable energy in the region, demonstration and test activities can be carried out without environmental impact, and to a great price due to low energy prices.



ARCTIC CLIMATE

To perform demonstration and tests in cold climate is necessary to most innovations and products. The regions climate allows for tests in the cold during large parts of the year.



"NO PROBLEM PEOPLE"

The people in the region have become famous for their solution-oriented style, always managing to work around problems. NASA have called the inhabitants "The no problem people" as a result.



LTU

LTU and local research institutes have proven a great asset for the demonstration and test industry in the region, following its dedication to applied research and contribution to the local labor force with highly educated individuals.

DIFFERENTIATING DEMO NORTH



TEST/DEMO FOR INDUSTRIAL SCALE

"Time-to-market" is of highest importance to most businesses today. After practicing since the 60s in testing new products, the processes have been refined and are today quicker than in most other places around the world.



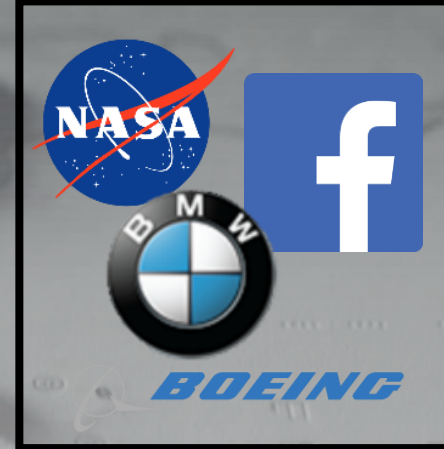
WIDTH AND DEPTH

There is no place in the world that hosts so many areas of demo/test. All this is supported by the society, applied research at the local university & research institutes, and access to renewable energy.



CLEAR BUSINESS CASE

All areas (vehicles, space/aviation, mining/metals, ICT, Urban planning) are expanding with more and more customers and actors each years.



PROVEN TRACK RECORD

That a single region can attract several of the most renowned brands in the world is impressive. That very few are aware of this must change.



JOIN THE JOURNEY

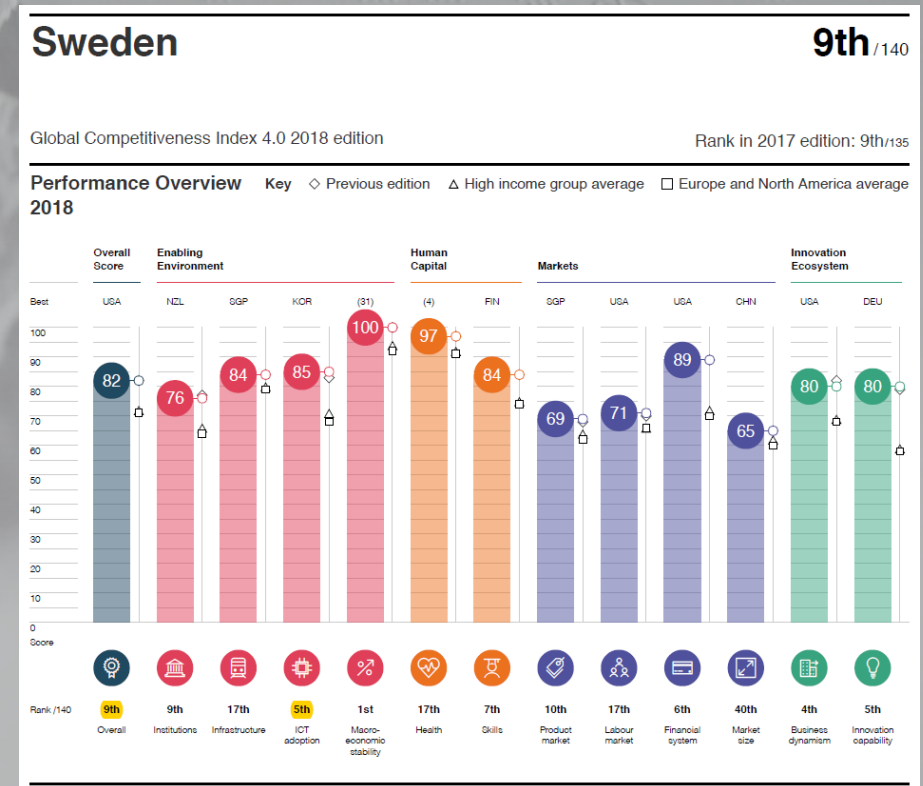
Demo North will have the largest impact on global CO2 emissions in the world – as a result of efforts to reshape entire industries.

SWEDEN – ONE OF THE WORLDS MOST DIGITALLY COMPETITIVE NATIONS

#1 – Digital maturity & Macroeconomic stability

#4 – Business Dynamism

#5 – ICT Adoption



SWEDEN – EUROPE'S MOST INNOVATIVE COUNTRY

Sweden is ranked **#1** on the European Commission's list over Europe's most innovative countries





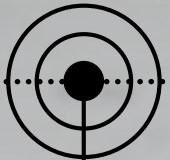
SPACE

SSC / ESRANGE

PIONEERS & MARATHON RUNNERS

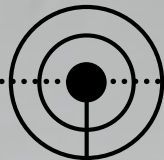
Sweden's first and yet only space-base have since its foundation 1966 paved way for Sweden's place within space and climate research with its tireless efforts. After showing progressivity through earlier co-operations such as NEAT, launches with NASA and JAXA, Esrange have become a center for space research in northern Europe. With the regions technical development other areas are approaching space research, and we are with great expectations looking forward to Esrange's next step...

1966



First launch
from Esrange

1972



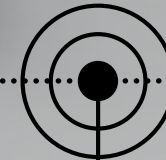
SSC takes over
Esrange

1974



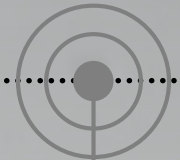
Research with high-
altitude balloons
begins

2000



SSC acquires USN
and begins global
network

2020



Target:
Satellite
launches

A dark, monochromatic topographic map of a region, likely in northern Sweden, serves as the background. The map features intricate contour lines and shaded relief, highlighting the rugged terrain and numerous lakes. The overall tone is dark, with varying shades of grey and black.

LTU AS ENGINE FOR NORTHERN SWEDEN'S DEVELOPMENT

APPLIED RESEARCH WITHIN AI

