Klimatorium
The International Climate Centre of Denmark

Annual Report 2022

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KLIMATORIUM.DK/EN/

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INTRODUCTION

As an organisation, Klimatorium is now in year four. The house was completed in 2020, and we have really moved forward in the past year and have been consolidated as an organisation. New employees have joined us, more projects have been added and our events have been very popular.

After the country opened up from covid-19, we have met an increasing number of visitors and as many as 25,000 visited Klimatorium from April 2022 - December 2022. We are very proud of that.

At the Klimatorium, we are seeing a huge interest in our work and our knowledge - both locally and nationally, but also internationally. The city of Nelson in New Zealand is on the way to building their own version of Klimatorium, and so is the Netherlands. Several foreign actors are looking for inspiration in our climate solutions and want to collaborate, and the same is true within Denmark's own framework.

There is so much going on at the Klimatorium that it can be hard to grasp. An annual report like this one can be a good tool to dig a little deeper and understand our priorities.

With the latest IPPC report, it is very clear that climate change will characterise Denmark with heavy rainfall in summer and significantly more humid winters. Water will play more and more of a challenge and put our drainage systems, cities and agriculture under increased pressure. In Klimatorium, we are trying to pick up this ball and devise new ways to make the water industry more climate resilient. And last but not least, see water as a resource. As part of the Business Lighthouse for Water Technology, we now have the opportunity to push Denmark on its way by finding new solutions and making Denmark a world leader in the water sector.

The green transition, CO2 reduction, pollutants, Power-to-X, climate fatigue, biodiversity crisis are all keywords for us at the Klimatorium, which we try to address in our projects and communication activities. Klimatorium is getting on people's lips. Now is the time for us to get into people's heads - with knowledge, innovation and intelligent solutions

God reading

Sincerely yours

Lars Nørgård Holmegaard, Director of Klimatorium

Jørgen Nørby Chairman of the Board of Klimatorium

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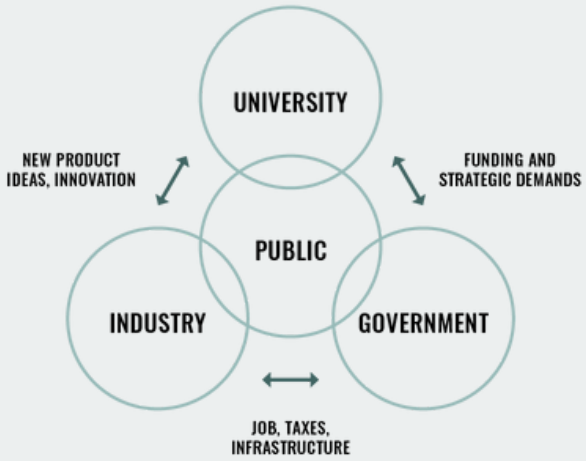
ABOUT KLIMATORIUM

In 2022, a lot has happened in the organisation of Klimatorium. We have evolved from an almost pure entrepreneurship to an operational business with a solid team of qualified employees. In addition, new board members joined us, as well as a number of new companies who joined as corporate members.

KLIMATORIUMS MISSION

The mission of the Klimatorium is through collaboration with the public, knowledge institutions, private companies and civil society, to develop new solutions to current and future challenges in the areas of: Coastal Climate Challenges, Green Energy, Circular Economy, Water and Environment. Solutions that can be applied and disseminated locally, regionally, nationally and internationally.



Quadruple Helix-model

Klimatorium creates projects that strengthen the green transition and adapt society to the current climate challenges. This is done on the basis of the UN's Sustainable Development Goals - and by establishing Quadruple Helix collaborations - for the benefit of both the local area and the world's climate!

The Klimatorium also works to spread understanding of the state of the climate today - and how we are working to address these challenges.

MEMBERS IN THE KLIMATORIUM

NCC Industry
Wintec ApS
Geopartner
Landinspektører A/S
Geo
Plastix
Lemvig Biogas
Lemvig Varmeværk

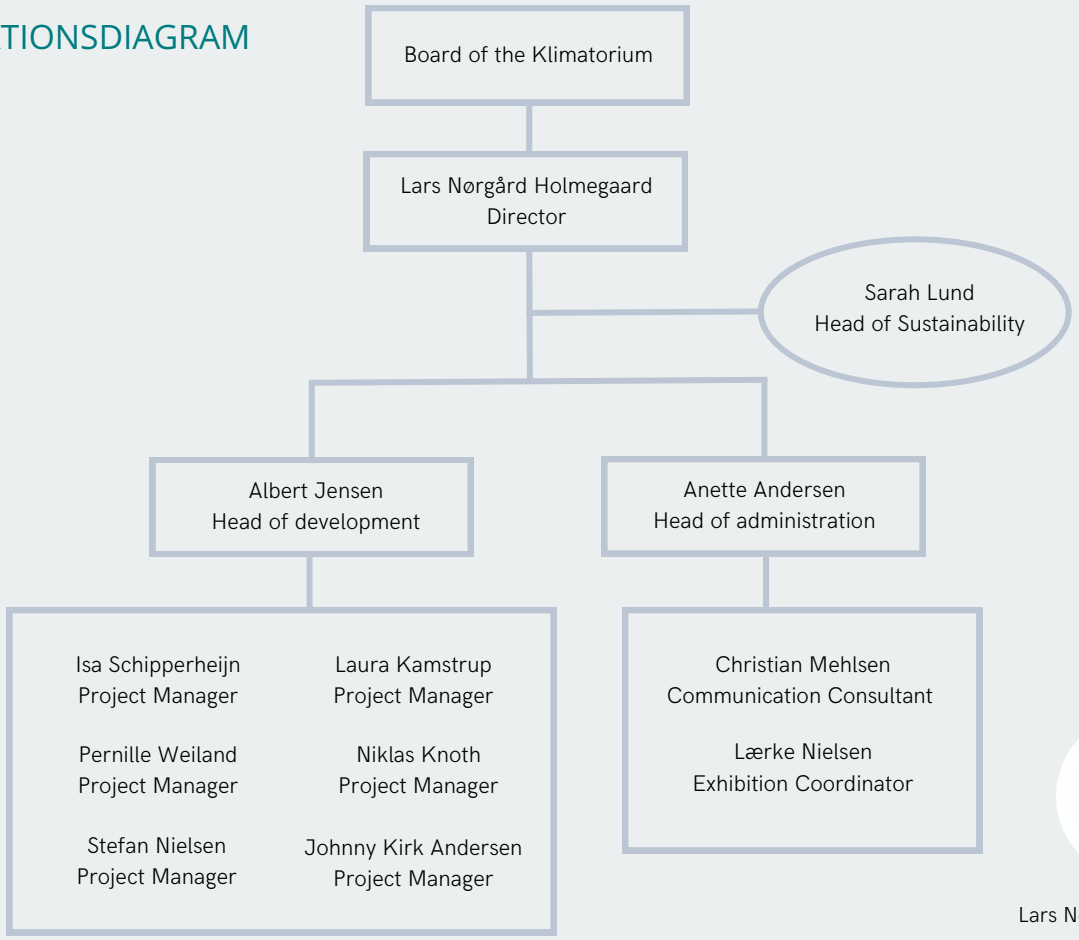
IBF A/S
Jysk Energi A/S
Kaj Bech A/S
Århus Universitet
Via University College
Aalborg Universitet
DTU
Lemvig Gymnasium

Lemvig Vand
Lemvig Kommune
Niras
OK Nygaard A/S
Dannozzle
Lemvig Provsti
PileByg A/S
Skovgaard Energy

NoDig Infra
Arkil Miljøteknik
Fjordland
Region Midtjylland
Kynde og Toft
Midtjyske Jernbaner
Krüger

+ 176 private persons

ORGANISATIONSDIAGRAM



Lars Nørgård Holmegaard
Director

Albert Jensen
Head of Development

Sarah Lund
Head of Sustainability

Isa Schipperheijn
Project Manager

Johnny Kirk Andersen
Project Manager

KLIMATORIUM ER VOKSET I 2022 OG HAR BUDT SYV NYE VELKOMMEN

Stefan Nielsen
Project Manager

Christian Mehlsen
Communication
Consultant

Anette Andersen
Head of Administration

Pernille Weiland
Project Manager

Laura Kamstrup
Project Manager

Lærke Nielsen
Exhibition Coordinator

Niklas Knoth
Project Manager

BOARD OF DIRECTORS

Klimatorium has a new board after this year's general meeting on 22 February 2022.

The Chairman of the Board, Mr Jørgen Nørby, will continue as Chairman, and the ViceChairman will remain Mayor Erik Flyvholm of Lemvig Municipality.

However, Mr Anders Kühnau, Chairman of the Regional Council of the Central Denmark Region and Chairman of Danish Regions, will join the board. Deputy Mayor Lone Pilgård of Lemvig Municipality will also join the board.

The other members of the board are Steffen Damsgaard, chairman of Lemvig Vand, Lotte Thøgersen from VIA University College and Kurt Nielsen from Aarhus University.

Jørgen Nørby
Chairman of the Board

Erik Flyvholm
Vice-Chairman
Mayor of Lemvig Municipality

Anders Kühnau
Board Member,
Regional Chairman,
Central Denmark Region

Lone Pilgård
Board Member,
Deputy Mayor of
Lemvig Municipality

Lotte Thøgersen
Board Member
Associate Dean,
VIA University College

Steffen Damsgaard
Damsgaard
Board Member,
Chairman of the Board of Lemvig Vand

Kurt Nielsen
Board Member
Aarhus University

DEN EUROPÆISKE UNION
Den Europæiske Socialfond

DEN EUROPÆISKE UNION
Den Europæiske Fond
for Regionaludvikling

Finansieret som et led i EU's reaktion
på COVID-19-pandemien

Vi investerer i din fremtid

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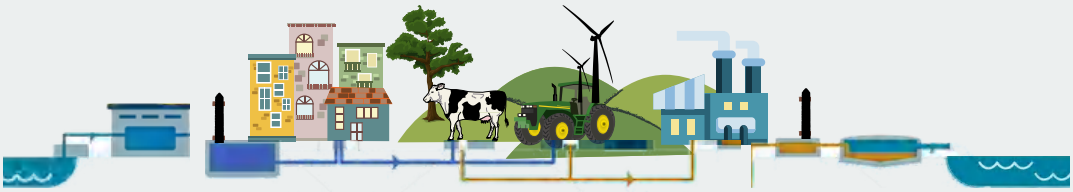
KLIMATORIUMS LIGHTHOUSE PROJECT



WATER TREATMENT PLANT CITIES, AGRICULTURE AND INDUSTRIES WASTE WATER TREATMENT PLANT

In August 2022, Klimatorium - as part of the Business Lighthouse for Water Technology - started our new lighthouse project "Water outside the fence". The goal is to support the development of new water technologies that will solve challenges locally, nationally and globally, and will generate interest from abroad and increase exports.

The lighthouse project will test and develop technologies and solutions in collaboration with SMEs, utilities, citizens and knowledge institutions. Together, we will help the water industry to become more holistic and sustainable, gearing the sector to meet the challenges it faces now and in the future.

The Klimatorium lighthouse project focuses on water management in cities, agriculture and industries - instead of primarily managing water at wastewater treatment plants. We must create a circular water economy and create a paradigm shift in the way we handle water.

There are many things to do. We need to get better at detecting pollutants through sensors in the pipework. We need to find technologies to clean and slow down water in a decentralised way. And we need to find new ways to move and use the 'extra water' that comes with climate change.

	Paradigm 1 - "Water must be directed away"	**Paradigm 2 - "Water must be treated"**	**Paradigm 3 - "Water must be slowed down and moved"**
WHAT	Sewerage for water drainage	Treatment plant and separate sewage system	Circular water management
WHERE	The wastewater ran untreated into rivers, streams, lakes and harbors or wherever else it could be disposed of	Centralization of wastewater and rainwater to clean before discharge.	Decentralization - the focus is shifted to water outside the fence, e.g. LAR solutions, sensors. secondary water and GIS.
WHEN	Originated from around the 1850s	Occurred from 1900-1990	Originated from the 2010s.
HOW	Mechanical	Biological and chemical	Data and digitalisation
WHY	Avoid dangerous diseases and odors	Avoid polluting nature and ensure clean water	Climate change, harmful substances and sustainability goals
WHO	Craftsmen	Supply technicians	Green water workers

ERHVERVSFYRTÅRN
VANDTEKNOLOGI

The lighthouse project in Klimatorium is part of the Business Lighthouse for Water Technology. Here +86 actors are working to develop new sustainable and efficient water technology solutions that will make Denmark a world leader in water.

COMMON 2030 OBJECTIVES

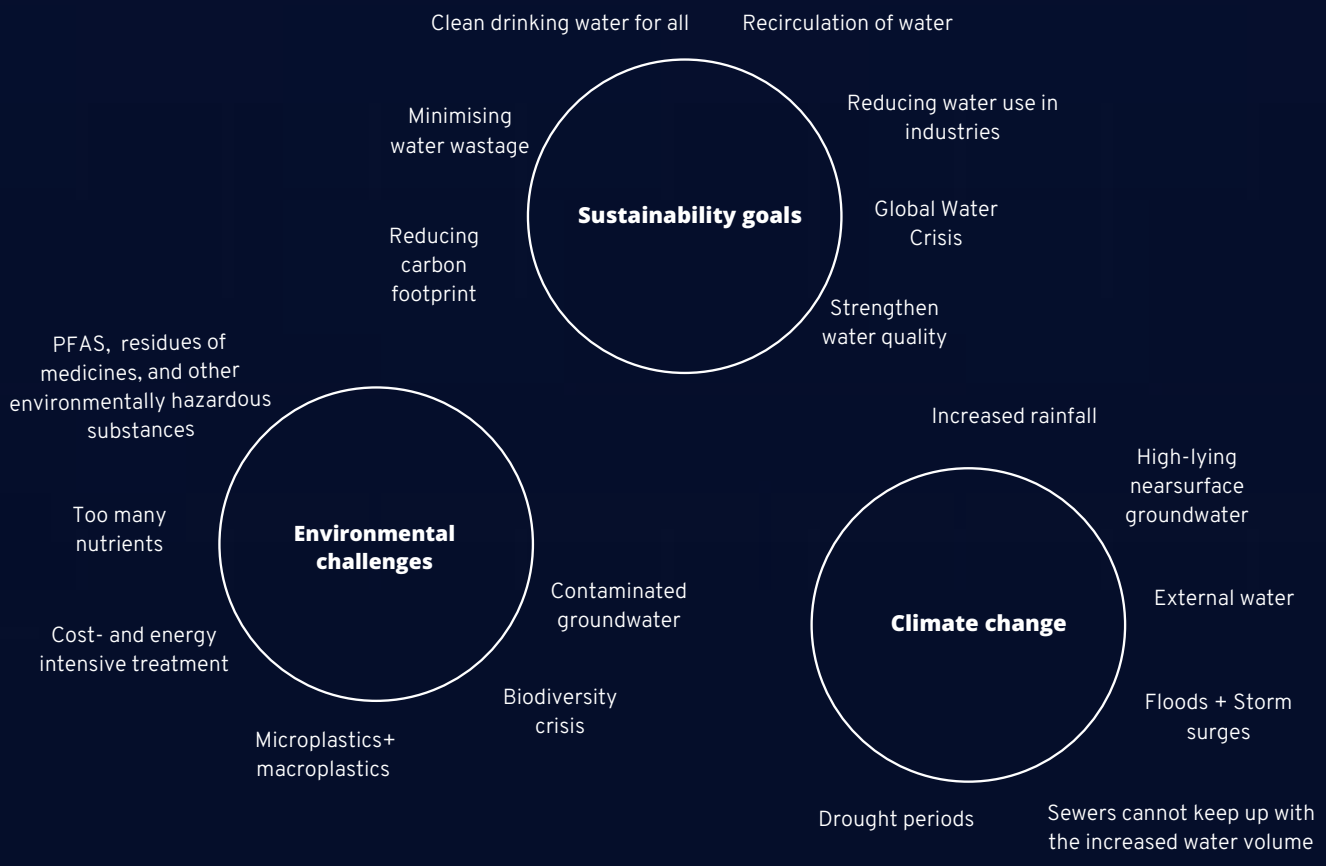
1 DOUBLE WATER TECHNOLOGY EXPORTS FROM €20 BILLION DKK TO €40 BILLION DKK

2 SECURE 5000 NEW JOBS IN THE WATER SECTOR

3 CONTRIBUTE TO A SUSTAINABLE AND CARBONNEUTRAL WATER SECTOR

Challenges for the water sector - requiring new solutions!

The water sector and utilities in Denmark and abroad are facing three current challenges (climate change, environmental challenges and sustainability goals) that require a paradigm shift in the way we manage water. Get an overview of some of these.



KLIMATORIUM WORKS ON 14 SUB-PROJECTS IN THE LIGHTHOUSE PROJECT

= NUMBER OF NEW JOBS THAT THE SUB-PROJECTS EXPECT TO CREATE BY 2030

GREEN TRANSITION +900

SECONDARY WATER

Identification of alternative water resources for Power-to-X plants with a focus on problem water as a resource

+600

PLASTIC RECYCLING

Developing recycled plastic products in the utilities sector + establishing partnerships across this

+300

RESEARCH +200

NEAR-SURFACE GROUNDWATER

Mapping of near-surface groundwater in pilot area

DATA +175

MERKUR

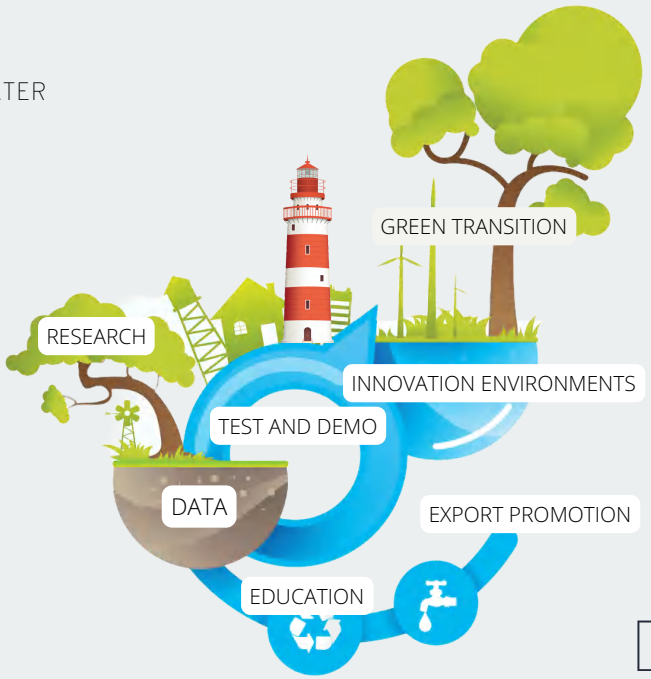
Further develop digital platform for water treatment data

+75

GIS

Bringing together geographic information (GIS) data in a publicly accessible platform.

+100



TEST AND DEMO +375

LARGE SCALE TEST

Establish test and demo facilities (in rain, data, low-cost sensors, equipment of the future) in the supply area for the benefit of SMEs

+200

HØFDE 42

Deploy newly developed treatment technologies for wastewater treatment plants in connection with the clean-up of Høfde 42

+50

THE MOBILE WATER PLANT

To create testing and demonstration facilities for the production of clean drinking water

+100

CLEAN DRINKING WATER

Establishing new testing methods and technologies for clean drinking water - in a living lab mindset.

+25

INNOVATION ENVIRONMENTS +150

C2C AFTERLIFE

Preparation of four concept descriptions based on the outcomes of the Coast2Coast Climate Challenge, which Small and medium-sized enterprises (SMEs) and start-ups can use for a business concept.

+50

ENTREPRENEUR ECOSYSTEM

Etablering af fysiske omgivelser i og omkring Klimatorium til iværksættere indenfor klima og vandteknologi.

+100

EDUCATION +100

THE GREEN WATER WORKER

Train people in the water sector to manage water in the open countryside differently and in a circular way.

+75

AU SUMMER SCHOOL

Create an educational environment in the Region in the field of water and climate.

+25

EXPORT PROMOTION +500

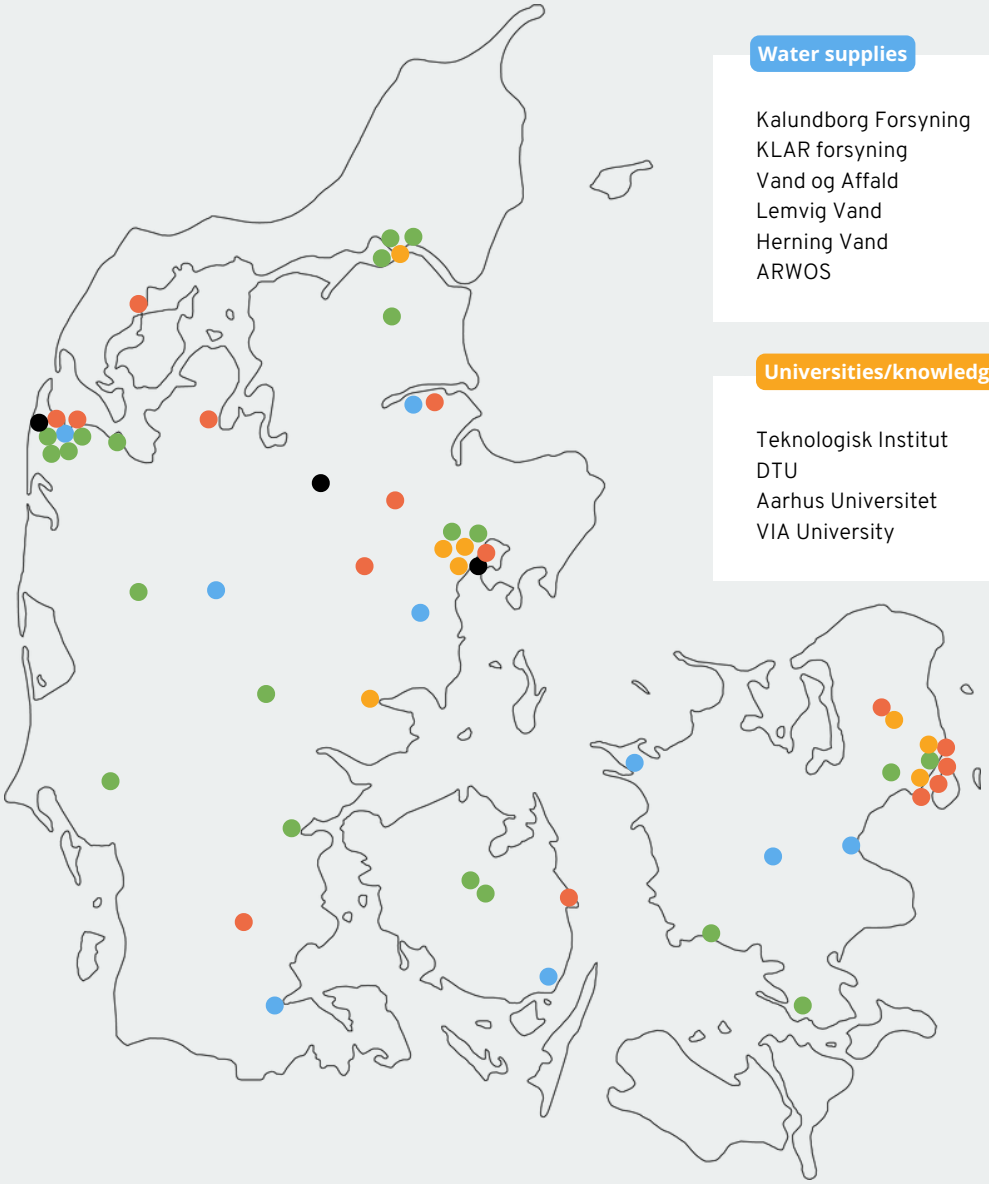
INTERNATIONAL COMMUNITY

To export Klimatorium ideas and products abroad.

THE SUB-PROJECTS WILL STRENGTHEN:

CLIMATE WATER MANAGEMENT	TREATMENT OF POLLUTANTS	USE PROBLEM WATER FOR POWER-TO-X	INCREASED DATA FROM THE GRID	PLASTICS RECYCLING IN THE WATER SECTOR	TESTING WATER TECHNOLOGY FOR SMES

PARTNERS IN OUR 14 SUBPROJECTS



Participants in the Lighthouse Project

- Water supplies
- Universities/knowledge partners
- SMEs
- Larger organisations and companies
- State, regions and municipalities

Water supplies

Kalundborg Forsyning
KLAR forsyning
Vand og Affald
Lemvig Vand
Herning Vand
ARWOS
Vestforsyning
Mariagerfjord Vand
Ringsted Forsyning
Svendborg Vand og Affald
Skanderborg Forsyning
Tønder Forsyning

Universities/knowledge partners

Teknologisk Institut
DTU
Aarhus Universitet
VIA University
Aalborg Universitet
SEGES Innovation
GEUS
DMI

Larger organisations and companies

NIRAS
Arkil
Fortum
Grundfos
DI
Krüger
Aage Vestergaard Larsen
Fjordland
Watervalley DK
State of Green
Ferskvandscentret
Clean

SMEs

Lauridsen A/S
PLASTIX
Skovgaard Energy
MJ Plast
WatsonC
Dannozle
Wintec
Danova
Geopartner
Mattle
Sulfilogger
PJB Miljø
Stokholm Maskinfabrik
Smartbrønd ApS
Sejersen Konkurrencekraft
T&W EI-service
Geopartner Inspection
Nørgaards Fliser

+ 14 partners in the pipeline

State, regions and municipalities

Region Midtjylland
Skive Kommune
Aarhus Kommune
Lemvig Kommune
Danmarks Miljøportal

+ 1 partners in the pipeline

Secondary water project partner meeting

Rainwater meters being placed in the ground to test and demonstrate new water technology

Plastic recycling in the water sector aims to sequester CO2 via used fishing nets, among other things.

Secondary water - From problem water to resource

The project will deliver problem water for Power-to-X power plants

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Klimatorium – Danmarks internationale klimacenter · SKOVGAARD ENERGY · VIA University College · VESTFORSYNING · AARHUS UNIVERSITY · LEMVIG VAND · KRÜGER · Mariagerfjord Vand a|s · KALUNDBORG FORSYNING · SEGES · Ringsted Forsyning

NEAR-SURFACE GROUNDWATER

Groundwater is a growing problem in Lemvig Municipality, both in urban and rural areas. In several places, drainage water is continuously pumped away to lower the perched groundwater and avoid flooding. Both the utility company and private pumping companies pump out large amounts of water every year. The amount of groundwater at ground level is highly dependent on the amount of precipitation, and the water source is therefore not stable - it changes throughout the year.

RAINWATER

Rainwater from paved areas is collected separately in Lemvig Municipality and can therefore be utilised as a resource for PtX. However, the quantities are modest compared to the need. We are still analysing the quality of the rainwater in the project, as it may be a good source to use for PtX in other places in Denmark/the world where paved areas are larger.

WASTE WATER

Every year, Lemvig municipality discharges about 2,4 mill. m³ of treated wastewater to the Limfjord. This is also a potential water source for PtX. The source is more stable, as there is a fairly continuous flow of wastewater. However, the volumes are smaller and the water quality is different.

SELECTION OF WATER TYPE | **LEGISLATION**

LOCATION/TRANSPORT

The project looks at the water sources in terms of volume and quality, but also in terms of location, as transporting water is of course not free. We would also like to collect the water locally, and address it where it causes problems and/or is already being handled/transported.

WATER PURIFICATION

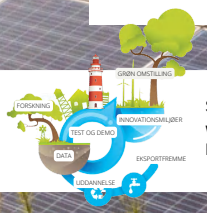
Ultra-pure water is needed for the electrolysis process that converts water into hydrogen and oxygen in PtX. The water has to go through several purification steps to reach a quality that can be used in the sensitive electrolysis equipment. This requires energy, and the quality of the "raw water" is therefore not negligible. Furthermore, the quality of the raw water also determines how much of the water is turned into wastewater. Here, the use of rainwater/terrain groundwater could have an advantage as it is often more ion-poor than e.g. groundwater and salt water.

RESERVOIR

Security of supply for PtX plants is very important, so if, for example, groundwater close to the ground could be used for PtX, it is important to equalise the natural variation in the amount of water available. In this context, it may be possible to create reservoirs that are filled when precipitation and the near-surface groundwater are at their highest. You could also consider having several water sources in the PtX plant

POWER TO X

Approximately 0.2 m3 of ultrapure water per MWh is used for hydrogen production by electrolysis. This places high demands on water volume and water purification. The location of PtX plants is generally planned according to where the power is available, but water resources are not always taken into account. The project would like to raise awareness of this



Secondary Water - From problem water to resource is part of the Klimatorium lighthouse project

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Large scale testing and demonstration facilities for SMEs in water technology

In Lemvigs fully separated sewered supply area

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ECONOMIC PARTNERS

Klimatorium – Danmarks internationale klimacenter · DTU · LEMVIG VAND · wintec · midt regionmidtjylland

VIA University College · Hargaards Fliser · GRUNDFOS · dannozzle · T&W El-Service ApS

OTHER CO-OPERATION PARTNERS

SMES

SMARTBRØND · DANOVA · Mattle · SulfiLogger · GEOPARTNER INSPECTIONS

RAINWATER QUALITY

Lemvig

- Measuring and purification equipment is set up in connection with a well in a rainwater outlet.
- Testing and demonstrating water technologies that work with rainwater harvesting.

INTELLIGENT USE OF RAINWATER

Lemvig

- Testing and demo of sustainable drainage systems and nature based solutions in the city.
- Space to experiment with rainwater harvesting + quality.

WASTEWATER MEASUREMENTS IN THE DISTRIBUTION NETWORK

Ramme, Nissum og Bækmarksbro

- Easy access and installation of equipment to measure the wastewater - long before it reaches the treatment plant.
- Measure wastewater, environmental impact, quality, extraneous water and undesirable elements in wastewater.

Lemvig · Nissum · Ramme · Bækmarksb

GRID DATA

Across the supply area

- Around 20 radar reflectors will be installed in Lemvig Municipality
- 10 boreholes will be drilled for the installation of groundwater loggers and water quality meters.

RAIN LIVING LAB

Bækmarksbro

- Test and demo field for rain
- 40 rain gauges + one SVK precipitation gauge setup
- Test new methods to measure precipitation and cloudbursts.

Test and demo is part of the Klimatorium lighthouse project

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Plastic recycling in the water sector

Old fish nets are converted into new products throughout the supply network.

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Plastic recycling in the water sector draws lessons from a previous project with Lemvig Vand as project manager, where PE gravity pipes have been produced out of recycled plastic. .

PLASTIX

Plastix buys the discarded fishing nets from the harbours and transforms them into plastic granules that can be used in the production chain to manufacture the "new" products.

BERGSTRØM PLASTTEKNIK

Produces the welding wire and makes plates to be used in several stages of the production of the recycled plastic products.

PLASTICS RECYCLING IN THE WATER SECTOR

Flanges | Well cover

MJ PLAST

MJ Plast is responsible for welding and thus assembling the products made by the other manufacturers.

STOKHOLM MACHINE FACTORY

This company is responsible for milling specialised parts for the manhole covers, which can then be welded on by MJ Plast.

LAURIDSEN A/S

The company will be responsible for the moulding of the flanges.

By 2030, the project will make all plastic products in the utilities sector from recycled plastic, supporting the vision of a carbon-neutral water sector by 2030

UTILITIES ARE CO-CREATORS

In this project, great emphasis is placed on having an ongoing dialogue with utilities about the "new" products, so that we can keep the development going and create solutions that utilities demand. Quality and quality assurance are seen as crucial here, as utilities urgently need products that can measure up - and preferably do better than their existing solutions, which are mainly made of 'virgin plastic'.

A REDUCED CLIMATE FOOTPRINT

Plastic is a frequently used material for products in the supply network, where 75% of supply assets are outside the fence. The climate footprint of plastic products is reduced by 90% by using old fishing nets instead of crude oil for new plastics.

HIGH EXPORT POTENTIAL

The export potential for recycled plastics in the water sector is seen as high, as the need to expand and repair supplies will not diminish over this decade. The project is estimated to create 300 new jobs by 2030.

Plastic recycling in the water sector is part of the Klimatorium's lighthouse project

QUALITY ASSURANCE AND STANDARDISATION

The Danish Technological Institute and TEPPFA are involved in quality assurance and exploring opportunities for standardisation so that upscaling is possible after August 2023.

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LIGHTHOUSE WATER TECH - FROM PHASE 1 TO PHASE 2 (AUGUST 2023)

In its first year, the Lighthouse for Water Technology is off to a good start. A host of financial and participating partners from all over the country are linked to the projects. Collaborations are well underway. And we are on the way to the finish line.

Now, in Phase 2, it's time for the projects to roll out and create a queue of further interested SMEs, water utilities, researchers and larger organisations that want to get involved. It's time to draw the lines between projects, find common messages and common ground, and deliver results that will make other countries look towards Denmark.

Participants in the writing group for the new application round for the Lighthouse for Water Technology:

- Albert Jensen from Klimatorium
- Malene Thune and Anna Maria Sønderholm from Erhvervshus Midtjylland
- Jesper B. Christensen from Water Valley Denmark
- Thomas Mikkelsen from CLEAN

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OTHER PROJECTS IN KLIMATORIUM

COAST TO COAST CLIMATE CHALLENGE

With the Coast to Coast Climate Challenge (C2C CC) reaching the end of its life as a project network in 2022, a conference was held in the autumn to showcase results and talk about how we can now think about new projects.

The Coast to Coast Climate Challenge has existed since 1 January 2017 and is led by the Central Denmark Region with the aim of creating a more climate resilient region. The project network consists of cooperation across sectors and partners - and has, among other things, helped to realise the possibility of establishing the Klimatorium - Denmark's International Climate Centre.

After more than five years, C2C CC has created new approaches and knowledge on climate change adaptation and has led to a total of 24 sub-projects in the Central Denmark Region. Now, the project's solutions and results will be evaluated, embedded, scaled up and lead to new projects that can help protect Denmark - and Europe - from climate change in the coming years.

We at Klimatorium hope that the partnership will continue in a new form, and we at Klimatorium will continue to play a central role in communicating climate projects across the region.

RECYCLED PLASTIC SUPPLY PIPES IN LEMVIG

In March 2022, a test area was inaugurated in a residential neighbourhood in Lemvig Municipality, where 15 plots have been developed. This is a kind of Living Lab in the new development, where wastewater pipes that were previously made of newly produced clean plastic are now made with green recycled plastic. In addition to sustainable wastewater pipes, the plastic part of the district heating pipes in the area is also made of recycled plastic. This is 100 per cent recycled plastic.

The organisations behind the project include Klimatorium, the water industry association DANVA, Lemvig Vand A/S, the Danish Technological Institute, NPG Danmark, Wavin Group, Uponor, Emtelle, Plastix A/S and Aage Vestergaard Larsen. Furthermore, four water supplies particpated in the project.

THE SMART WELL

The smart well project consists of designing a new well with an in-built reflector to monitor the well's own movements and to receive satellite data at the same time. In addition, a sensor will be installed in the well to measure various physical and chemical parameters. This is to know substance concentrations and water volumes as early as possible through monitoring and early warning, so that it will be possible to control treatment processes or capture any contaminants before they reach the treatment plant.

Partners in the project are Lemvig Vand A/S, Klimatorium A/S, Geopartner Inspections A/S, Sulfilogger A/S, Wasys, Aalborg University (AAU), Technical University of Denmark (DTU).

An essential element of the development project is the dissemination of ideas and results. Klimatorium, located in Lemvig, will support the project partners with this - both in international collaborations with New Zealand and at national climate conferences. Klimatorium will exhibit a demo version of the well and use it actively in dissemination.

Evaluation of the project:

The project has demonstrated that it is possible and that there are perspectives in producing an intelligent well that can provide data to future utility companies that are challenged by environmental and climate challenges. The smart well can measure both water volumes and substance concentrations as important input for how treatment plants and the drainage system should be operated in relation to a greater future load. The application of IoT technology has a great potential in creating a distributed cost-effective and mobile measurement system for wastewater systems in general

PHD PROJECT: CLEAN-UP IN CLIMATE PATHWAYS

In a Coast2Coast project, a number of partners have created the CLIMATE ROAD. The CLIMATE ROAD is a new type of road that handles large amounts of water. Water is drained away faster and does not flood sewers and ditches as it seeps through the permeable road surface into the road box. The water also generates energy to heat buildings.

As a follow-up to the project on the CLIMATE ROAD, Klimatorium has had a PhD project affiliated, which is carried out by Lasse Abraham Rasmussen. Here, road dust from Climate Roads is investigated and how a possible purification can be done to reduce pollution from road water.

The importance of cleaning up climate roads is emphasised in a research article by Professor Jes Vollertsen, Associate Professor Asbjørn Haaning Nielsen and Professor Emeritus Thorkild Hvitved-Jacobsen from the Department of Civil Engineering, Aalborg University:

"Road water is polluted by substances that the water has picked up along its path. The amount of substance depends on a number of factors, and therefore road water pollution varies greatly from place to place as well as from rainfall to rainfall. A number of the substances present in road water are potentially harmful to the environment and may therefore require treatment before discharge"

THE GREEN JUTLAND CORRIDOR (BEGINS 2023)

The Jutland Corridor is the geographical transport network connecting Southern Norway, Western Sweden and Jutland with Central Europe by road, rail and sea. The large daily transport of goods and passengers generates growth and development, but also creates a need for sustainable solutions that ensure the reduction of CO2 and emissions. Development of the Jutland Corridor can be achieved through cross-border cooperation and coordination, synergy between freight and passenger transport and a focus on sustainable solutions. The Jutland Corridor has become part of the EU's TEN-T main corridor network for road and rail, ScanMed. This status should be utilised to develop the efficiency, sustainability and visibility of the corridor.

The partnership consists of public and private stakeholders from authorities, ports, transport and energy operators. Dialogue with actors in the environment is crucial to the project. Therefore, emphasis is placed on contact and events with companies, shipping companies, harbours, etc. also outside the partner circle.

NATURE BASED SOLUTIONS FOR ATLANTIC REGIONAL CLIMATE RESILIENCE (BEGINS 2023)

NBRACER is a 2-year EU project with 30 partners across Europe with a financial framework of 131 Million DKK, starting in October 2023.

The impacts of climate change on people, the planet and prosperity are becoming increasingly intense. Many regions and communities are struggling to avoid losses and need to step up efforts to increase their climate resilience. The ongoing degradation of natural capital leads to growing costs, increased vulnerability and reduced ecosystem stability. Therefore, these new approaches to addressing global climate challenges must work across sectors and disciplines, conduct experiments, and engage local communities. NBRACER addresses this challenge with an innovative and practical approach to accelerate the transition of climate adaptation and thus create resilient regions that are safe, green, strong and clean nature-based solutions.

The project will transform the approach to climate change adaptation and support the process of involving civil society in climate change adaptation efforts.

The work packages under Klimatorium are based on the challenges Lemvig Vand faces with extraneous water in the wastewater system. The nature-based solutions will be implemented in Lemvig Vand's supply area, where a direct link will be created with the other regions in the partner circle. The solutions from the partners in the project are expected to be disseminated through Klimatorium. The project focuses on new and known water technology solutions for handling and purification of rain and wastewater, which challenge the water systems and require new approaches to climate adaptation.


Klimaterium

5

NATIONAL CLIMATE SUMMIT

Climate Summit 2022 theme: Earth in Balance From consumer society to regenerative society - from challenge to opportunity

he world's 7.8 billion people annually use far more resources than the Earth can replenish in a year. The Global Footprint Network states that in 2021, Earth Overshoot Day fell on 29 July. The year before, it was almost a month later!

To reverse this trend, we need to radically change the way we live. We need to think differently, reorganize resource consumption, production, waste management and recycling. We need to get used to a new reality with increased focus on climate adaptation and limited resources. To achieve balance, we need to give more back to the Earth than we take. These are other words for the regenerative approach. It has become clear that energy policy is also security policy, which has created a momentum to accelerate the green transition in Europe.

This year's Climate Summit focused on the necessary transition and how we can contribute to creating a better planet. The focus was on showing approaches and concrete examples that can inspire and show the way - this is needed in Denmark and globally!

But can these ideas be realised in larger contexts? 456 people came to the Klimatorium to learn together - and around 1.600 watched via live streaming.

KEY NOTE SPEAKER: ANDREW SIMMS

We were lucky enough to have one of the biggest names on the international sustainable transition scene, Andrew Simms, as our Key Note Speaker. Andrew Simms is co-director of the think tank "The New Weather Institute" and one of the people behind 'The Green New Deal'. Andrew Simms spoke about creating rapid change in systems that are out of balance - without losing balance. Making big changes, especially if they are to happen at the speed we need today, requires both systemic and behavioural change. How can we help promote systemic and behavioural change? This is what Andrew Simms' opening session at this year's conference helped us to understand.

KEY NOTE SPEAKER: SEBASTIAN MERNILD

Dr Scient. Sebastian H. Mernild is Pro-Rector and Professor of Climate Change and Glaciology. Since 2020, he has been Pro-Rector at the University of Southern Denmark (SDU). As Mr Mernild told the Climate Summit, we have a global challenge - also when it comes to mitigating CO2 emissions to the atmosphere. The gap between what we are doing and what we should do to "Keeping 1.5 alive" is large and has never been larger. As things stand today, the globally implemented policies are expected to lead to a mean temperature increase of 3.2 degrees centigrade by 2100. With the announced policies, which have not yet been realised, the temperature increase will be at least 2.8 degrees. Something needs to happen, but what is needed?

KEY NOTE SPEAKER: JENNY ELISSEN

Jenny is a creative and innovative strategist. She spent the first 20 years of her career in marketing and communications and new business development. She was Strategy Director and part of the management team at Oglivie One Worldwide, became a partner in the Company Group in the Netherlands, where she founded and developed several businesses. The group was sold to TBWA (Omnicom) and she became Managing Director of TBWA Netherlands. She left in December 2003 to seek new sources of inspiration. She has written two books on system change.

As Jenny said, the past no longer holds any guarantees for the future. What we learnt, how we made decisions and the way we looked at reality could have served us, but is now challenging us. When existing systems fail, we need to create new ones. How do we approach this new reality? How do we accelerate and create world-changing organisations?

DAY 1

The first day of the National Climate Summit featured four tracks: Water Technology, Climate Adaptation, CO2 Reduction and Circular Economy. The four tracks were divided into four rooms, where the topics were thoroughly reviewed and debated at a high professional level. Hanne Roed from the Central Denmark Region, Erik Flyvholm, Mayor of Lemvig Municipality, and Jørgen Nørby, Chairman of the Climate Centre, hosted the event. Nina Bendixen and Kristian Ring-Hansen Holt steered everyone through a fantastic day.

DAY 2

The National Climate Summit continued on day 2 with a political focus. Based on the conference recommendations, a number of politicians discussed how to ensure that the necessary actions and changes to achieve an Earth in balance are initiated. Who is responsible for what actions? What changes can we bring about in the industry ourselves? Which ones should we communicate to others, such as our national politicians?

Political panel: Karsten Filsø (SF), Stine Isaksen (mediator and editor), Steffen Damsgaard (Rural Community Council), Simon Weber (Youth Climate Council), Preben Friis-Hauge (Liberal Party), Katrine Olldag (Radikale Venstre), Bent Graversen (Liberal Party), Tyra Møll-Holst (Youth Climate Council), Orla Østerby (nonattached).

CHILDREN'S CLIMATE MEETING

The Children's Climate Meeting is Klimatorium's recurring climate event for primary and secondary schools. But it is also an engaging and practical teaching programme about climate change, climate solutions and innovation. Throughout the programme, student involvement and co-creation are paramount.

A PARTY FOR CLIMATE SOLUTIONS

On 19 August 2022, Klimatorium invited to a climate party from 8.30-13.00. Sofie Østergaard hosted a fast-paced day focusing on climate and good ideas. Among other things, the students tested their knowledge in the big live quiz on climate and climate solutions. Climate mediator Nina Bendixen made us all smarter about climate and climate change, and we stepped up the pace with music from the stage. We also presented the many exciting climate solutions developed by pupils from all over the country and awarded prizes for the very best ideas.

The expectation was that over 3,000 would participate virtually, but we ended up with about 13,000 participants from school classes all over Denmark! WOW we just say! And THANK YOU to both teachers and students who have put in a lot of work prior to the climate meeting.

COVERAGE OF THE CHILDREN'S CLIMATE MEETING

Sarah Lund, Head of Sustainability, Klimatorium, was on the tv-progamme Go Morgen Danmark TV2 in Tivoli the day after the Children's Climate Meeting. Here she had some of the talented children with her.

In addition, the Children's Climate Meeting reached out to:

- TV2 NYHEDERNE
- Forsiden af Børneavisen
- TV 2 NEWS
- DR Nyheder
- TV MIDTVEST
- More niche and local media.

... AND THEN THERE WAS THE STORY OF THE ROUND PIZZA BOX

The prize for the most creative solution went to Iben, Klara, Nicoline and Frida-Marie from Lemtorpskolen in Lemvig. Together they had come up with the idea of creating a round pizza box to save cardboard. A subsequent clip on Facebook from the Children's Climate Meeting, where TV MIDTVEST zoomed in on the round pizza box, went viral and received over 625,000 views and almost 1,000 comments in just a few days.

The Facebook clip was spotted by entrepreneur Erkan Berk. He thought the round pizza tray was such a good idea that he seized the idea. Two months later, he came to Lemtorp School with a prototype ready to go into production. As he told us, he already had a pre-order of 45,000 boxes. For every pizza box he now sells, he donates a small amount to the class fund.

YOUTH CLIMATE CONFERENCE

A conference by young people for young people!

- A collaboration between Denmark and New Zealand
- Around 1000 participants from all over the world
- The conference took place on 19 August 2022
- The conference is developed in collaboration with the Academy for Talented Youth

08:00 CET / 06:00 pm NZ
Welcome
By Klimatorium and Wakatū

08:03 CET / 06:03 pm NZ
Karakia / Indigenous Maori Blessing
To invoke guidance and protection
By Ihaka Griffin Matthews

08:08 CET / 06:08 pm NZ
Online activity. By Rohan O'Niell-Stevens, councilor and Mayoral candidate for Whakatū Nelson

08:15 CET / 06:15 pm NZ
Introduction to Klimatorium & Wakatū
Why is dialogue with Youth important? And how can we collaboratively work on climate solutions?
By Klimatorium and Wakatū

08:25 CET / 06:25 pm NZ
A reflection on Klimatorium and the role Youth play. By Rohan O'Niell-Stevens, councilor and Mayoral candidate for Whakatū Nelson

08:30 CET / 06:30 pm NZ
Key Note: "Indigenous perspective"
Our connectedness to the world and how our decisionscan impact or change the world (Grow tender shoot to meet the needs of your world) By Heni Unwin E tipu, Maori researcher for Marine Technologies, Cawthron Institute

08:45 CET / 06:45 pm NZ: Questions

08:55 CET / 06:55 pm NZ
Speaker: "Forecasting & data - a world full of data"
We've got vast amounts of data and knowledge about the risks and challenges we are facing. How can we use this better? By Mark Payne, DMI Climate Atlas (Denmark) & Tim Naish, professor in Earth Sciences, Antartic Research Centre, Victoria University

09:15 CET / 07:15 pm NZ: Questions

09:25 CET / 07:25 pm NZ
Speaker: "Liveable cities"
What role will the emerging area of technology called "Digital Twin Cities" and other technologies like AI and AR/VR play in enabling our climate response in the future?
By Husain and Dipesh, leading technology futurists at Datacom

09:40 CET / 07:40 pm NZ: Questions

09:50 CET / 07:50 pm NZ: Closing & surprise. By Klimatorium and Wakatū

10:00 CET / 08:00 pm NZ: Thank You

WILL WE SEE YOU IN AUGUST AGAIN?

Register for the Children's Climate Meeting 2023, National Climate Summit 2023 or Youth Climate Conference 2023 at www.klimatorium.dk


OCEAN PLASTIC.

6

EXHIBITION

The Klimatorium's 'Climate without borders' exhibition offers over 30 experiences. The starting point is the Coast to Coast Climate Challenge climate adaptation project. The exhibition is peppered with gimmicks such as walking through a rainstorm without getting wet, seeing how mercury reacts, experiencing what heavy storms feel like, and using your mobile phone to experience storm surges and see through roads to understand the boundless flow of water.

Tourists, schools, associations, business groups, politicians and university students flocked to the Klimatorium in 2022 to explore possible climate solutions and see first-class architecture.

The Klimatorium's exhibition "Climate without borders" has emerged from the large-scale climate adaptation project Coast to Coast Climate Challenge to profile and publicise C2C projects and direct visitors to visit projects - across the entire Central Denmark Region. The exhibition was ready at the end of 2020. Covid-19 gave a difficult start, but after corona restrictions were lifted, expectations for the exhibition have been exceeded, with a target of 10,000 visitors per year. From April 2022 to December 2022, there have been around 25,000 visitors. It is expected that this will result in approximately 40,000 visitors in one year.

A little sampling has shown that the Klimatorium has had visitors from all over the world. In particular, many Germans visit the Klimatorium, but many other foreigners on holiday in the area also find the Klimatorium an obvious attraction. The aim from the outset was to use good architecture to attract attention, and it is clear that this has meant that the building has already attracted a great deal of international attention. For example, the architecture and design magazine Dezeen, with millions of readers worldwide, has given the Klimatorium a glowing review. The Plant has also described and pictured the Klimatorium over several pages in its magazine, which is sold in over 40 countries. Previously, coverage in one of the world's most recognised lifestyle and architecture magazines, Wall Paper, has also resonated. And last but not least, Klimatorium has entered the scene by winning the first prize from World Architect News in the category "Civic - Community and Tourist Hubs and Event Spaces 2021".

DANES HAVE WELCOMED THE CLIMATE CENTRE

The majority of visitors to the Klimatorium are Danes, and the Klimatorium is experienced here as a local tourist attraction, whether you live in the Lemvig area or want to go on a day trip out into the country.

The flow of Danish visitors is seen to have received an extra boost in 2022 after the DR1 programme "Gintberg on the Edge" visited Klimatorium. But also the Children's Climate Meeting and all the publicity that this event created is also seen to have increased interest in visiting Klimatorium.

If you look at Danes, as well as foreign visitors, you see visits from a very broad target group. Families, older people and young people all want to spend time in the Klimatorium. Families particularly enjoy the child-friendly activities in the Klimatorium and the playground outside. The fact that the exhibition is free of charge is a big plus for them.

The older target group benefits from the optimism that the exhibition creates. Many mention that they have an epiphany that climate problems can actually be turned into climate solutions. And many are seen to come out with a hope and an appetite to learn more about what they can do themselves

GUIDED TOURS

Many visitors choose to see the Klimatorium on their own, which is free of charge. Others purchase a guided tour for groups, for which a fee is charged. The guided tours provide a more in-depth insight into the projects from the Coast to Coast Climate Challenge and what the Klimatorium is working on to solve climate challenges. What the individual tour should highlight in particular is agreed in advance, and which professional specialist will take the tour is matched with the target group.

In 2022, there have been tours for many different actors: Associations, old school classes, public organizations, business groups, companies and higher education, who are either on a trip in the Lemvig area or come directly to Lemvig to visit Klimatorium. In addition, this year there has again been a large influx of students and teachers from primary school classes, continuation schools, special schools and high school classes who can get a free tour of Klimatorium

THE FUTURE

It is important that Klimatorium works continuously with the exhibition so that visitors want to come by again and create an exhibition that speaks to both children and adults. New experiences must therefore be created that can both make people wiser about climate challenges and show new interesting projects in Denmark, e.g. successful examples of climate adaptation, water solutions and green transition.

Based on the Klimatorium's participation in the Industrial Lighthouse for Water Technology, a number of new perspectives will be brought to the exhibition in 2023, including a focus on problem water in cities and fields, preserving clean water in society, the future of Power-to-X, and how water technology and data can make the water cycle more intelligent.

Reviews on Google

4,6 ★★★★½ 51 anmeldelser

Anmeldelserne er ikke bekræftet. ⓘ

★★★★★ for 3 måneder siden

En dejlig sted med børn

★★★★★ for 9 måneder siden

Fint sted absolut et besøg værd 👍

★★★★★ for 7 måneder siden

Flot modtagelse, fine forhold for besøgende, og kørestolsbrugere. Meget informative projekter, i forhold til Vendensmålene samt lokale emner.
Spændende udfordringer til børn.

★★★★★ for 3 måneder siden

(Oversat af Google) Meget godt sted! Her formidles videnskab. Udendørsområdet (vandlegeplads) er også meget rart for børn. Tak for kaffen og theen også!

(Original tekst)
Sehr toller Ort! Hier wird Wissenschaft vermittelt. Auch für Kinder ist besonders die Außenanlage (Wasserspielplatz) sehr schön. Danke auch für Kaffee & Tee!

★★★★★ for ét år siden

Super lærerigt, sjovt og spændende. Kan varmt anbefales.

★★★★★ for 8 måneder siden

Great place, very modern architecture and cool didactics!

★★★★☆ for 10 måneder siden

Helt specielt sted. Super fin mini udstilling og så arbejder de for den bedste sag - klima

★★★★★ for 8 måneder siden

Fantastisk sted og rigtig fin autocamper parkering og gratis overnatning med strøm og bad

★★★★★ for 4 måneder siden

Havde fornøjelsen af at besøge klimatoriet og deres autocamperplads. Begge dele i særklasse! Gode sanitære faciliteter, kaffe/the og vand til fri afbenyttelse i åbningstiden og selvfølgelig en dejlig beliggenhed i en fantastisk by!

★★★★☆ for ét år siden

Helt klart en oplevelse der kan anbefales. Husk at bestille en guidet tur først. Så kan man senere fordybe sig i detaljer, hvis man lyster. Stedet er gratis at besøge. Med de ønskede tiltag vil jeg tro de får 5 stjerner næste gang, for jeg har tænkt mig at komme igen

★★★★★ for 3 måneder siden

Virkelig en oplevelse

★★★★★ for 5 måneder siden

Flot byggeri og fuld af nyttig viden

★★★★★ for 3 måneder siden

Dejligt sted med masser af informationer

★★★★☆ for 11 måneder siden

Oplysende og spændende grønt tiltag.

★★★★★ for ét år siden

Meget interessant rundvisning.

★★★★★ for 7 måneder siden

Utrolig flot sted, venlig personale

★★★★★ for 3 måneder siden

(Oversat af Google) Meget flot anlagt og spændende for alle aldre

(Original tekst)
Sehr schön angelegt und spannend für jedes Alter


BUS
BUS

7

KLIMATORIUMS ACTIVITIES

1. During 2022, the Klimatorium has been represented as speakers in a number of events

2. During 2022, the Klimatorium has been visited by a number of prominent actors

3. During 2022, the Klimatorium has hosted a number of exciting events

Food Tech 2022 - Debate on sustainable water management

Klimatorium has participated in the following events:

New European Bauhaus

Klimatorium had a stand at the Gare Maritime in Brussels as one of the 40 European projects selected for the New European Bauhaus, organised in March.

Klimatorium was the only actor selected for Denmark.

The Klimatorium stand showcased selected projects such as the satellite reflector, the smart well and pipes made from recycled fishing nets, as well as the UN Sustainable Development Goals, PLASTIX, several videos and pictures of the Klimatorium building. Project Manager Isa Schipperheijn and Camera and Communication Assistant Johannes Berthelsen were present in Brussels.

A video of about 30 minutes has been developed and was broadcast in the loop on Thursday 8 June between 9:00-13:00. The programme was available across Europe and was watched by around 1 million people.

As part of the New European Bauhaus, Klimatorium met a number of exciting organisations. About 1000 visited the stand and about 150 people showed interest in cooperation or wanted material from the stand.

The School of Architecture in Milan loved the concept of the Klimatorium and is interested in building something similar for the climate in Milan. They came back to the stand 3 times - each time with a new chief.

EU advisor Elena Nielsen made a proposal to link Klimatorium to the European School Class every 3 months.

Klimatorium was connected to EU Project - "Waste Water as a resource needs Danish Utility"

Climatorum was invited to participate in a new EU LIFE application, which can provide us with partial funding for the restoration of the Mountain Railway.

IWA 2022

There was talk of PtX and water management when Lars Nørgård Holmegaard, director of Klimatorium, gave two presentations at the international water conference IWA 2022, which was held this year in Copenhagen. First of the day, Lars presented a scientific paper on PtX and water management prepared together with Aalborg University and Skovgaard Energy. Later in the day, Lars was invited to talk about it again - this time at the Confederation of Danish Industry's stand in the Bella Centre, which ran a smaller stage and a live stream.

Key messages from Lars Holmegaard were that it is important that we consider water as a factor when developing PtX plants - because they require incredibly large amounts of water. As Lars suggested, the excess groundwater should be used to provide the amount of water that a PtX plant needs. When we think PtX, we want to protect the drinking water and should instead use the high groundwater. Especially because groundwater is becoming a bigger and bigger challenge to manage with climate change.

PtX and Water Management

L. Holmegaard*, *P. A. Hau**, M. Lehmann*** & L. Bernitt****

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Abstract: Rising precipitation, ground water and seepage constitute increasing problems to farmers, residential areas, industry and utilities. However, the rising Power to X (PtX) industry needs industrial scale amounts of water free of salts. Or as free of salts as possible. High quality water from the deep aquifers may be of less quality than the large volumes of surface water and seepage handled in sewer network and ponds. Before extracting new volumes of potable water to PtX, volumes and quality of surface water should be carefully considered. The PtX volumes are so large that they call for both energy and water management.

Keywords: PtX, water quality, management

Background and introduction

Power to X (PtX) has been embraced internationally in general and in Denmark in particular as one of the most promising ways to realize necessary ambitions to achieve carbon neutrality by 2050. On the one hand, the technology can substitute heavy fuels used in sea and air transport; and on the other, the technology can play a part in storing energy from fluctuating, renewable sources (KEFM 2021). So, what is not to like?

In embracing the new technology and new ideas, the major focus has been on access to electricity from renewable sources. Secondary, also the use of excess heat generated in the electrolysis processes should be considered (IDA 2020, ENS 2021). However, very little to no focus has been on one of the major components in PtX, namely access to large amounts of water of best available quality. Apparently, this resource has been taken for granted.

Water requirements for the PtX industry

Feedstocks for any PtX products will be both power and water. Water is used for hydrogen production via electrolysis of water. The water quality required for feeding an electrolyzer is ultra-pure demineralized water (DMW). DMW can be produced from any water source with existing water purification technologies. The production cost of ultra-pure DMW will increase with increasing salinity. This is why the use of surface water is so interesting. The retention water from the production of ultra-pure DMW may be reduced to 10 % when using surface water of sufficient quality, compared to 30% when using potable water.

The best location for a PtX plant will be where there is abundant renewable power and water resources. Such a location is found in Lemvig, Denmark, where three new world scale marine wind parks are under development along with solar (PV) parks. In parallel to this abundance of renewable energy, Lemvig Vand and consumers are struggling with increasing amounts of surface water.

As a rule of thumb the water consumption in PtX plants for hydrogen or ammonia is 0.2 t/h water/MW. So, for the first PtX demonstration plant of 10 MW in Lemvig, the water

Find the article on www.klimatorium.dk/om-klimatorium/publikationer or scan the QR code

Folkemødet on Bornholm

Klimatorium and Lemvig Municipality participated in this year's Folkemøde on Bornholm in the tent of the Danish Association of Local Authorities on Friday 17 June at 09.00.

The theme was: Climate challenges - rising sea levels as a resource?

Issue for debate: The research community has answers to many of the world's climate problems, but much knowledge is not being translated into action. So how can climate challenges be turned into opportunities?

You could hear the politician, the business owner, the researcher and the citizen's ideas for solutions.

The Klimatorium simultaneously presented two challenges in the areas of rising groundwater and recyclable plastics in supply pipes. The different representatives created a dialogue about possible solutions and were presented with different dilemmas during the programme. For example, legislation and technology, and how to involve civil society.

Participants to the event:

- Lars Nørgård Holmegaard, Director of Klimatorium,
- Steffen Damsgaard, Joint Council of Rural Areas,
- Erik Flyvholm (V), Mayor of Lemvig Municipality,
- Tom Heron, Director Niras,
- Morten Slotved (C), Mayor of Hørsholm Municipality
- Kurt Nielsen, Vice Dean Aarhus University
- Simon Weber Marcussen, Youth Climate Council

Food Tech 2022

Klimatorium has this year develop the programme for the Water Stage at FoodTech 1- 3 November in MCH Messecenter Herning.

At Water Stage, we have brought together a number of experts who are passionate about sustainable water management and water use in the food industry.

On Tuesday, the focus was on 'Overall trends in the water industry; challenges and solutions for sustainable water management in the food industry', which included a presentation by Tom Heron, Director of NIRAS.

On Wednesday, the topic was 'How developments in new water technology can promote sustainable water management and water use in the food industry', where it was possible, for example, to learn more about how the Carlsberg Group is working to reduce its water consumption.

Thursday saw a diverse programme under the heading 'International perspective on sustainable water management in the food industry and focus on innovative solutions through cross-sectoral collaboration' - where representatives from Ramboll and CLEAN, among others, shared their knowledge and experience.

Seminar on PtX

On 11 October 2022, we held a seminar in Copenhagen together with Skovgaard Energy, Lemvig Municipality, the Danish Environmental Protection Agency and Poul Schmith/Chamber Lawyer, where we presented the experiences from the Power-to-X project REDDAP (Renewable Dynamic Distributed Ammonia Plant).

With a production of 5,000 tonnes of green ammonia per year, the plant, developed in collaboration with Vestas, Topsoe and the Energy Technology Development and Demonstration Programme (EUDP), will be the world's first dynamic PtX plant to convert electricity from wind turbines and solar panels into hydrogen and then ammonia.

At the seminar, Skovgaard Energy, Lemvig Municipality, Klimatorium and the Danish Environmental Protection Agency shared their project-specific experiences, especially regarding the planning and permits required for the construction of the PtX plant, and how developers and authorities can contribute to a good process for the construction of future PtX plants

Depopulation and local ties

Sarah Lund from Klimatorium was invited to present Klimatorium at the European workshop "No place like home? Depopulation and local ties", organised by Population Europe, a network of 36 European population research centres. The workshop aimed to bring together leading community representatives and eminent experts to engage in an exchange on common population issues.

One of the key questions was to discuss how cities can ensure future identity in a world that is becoming more demographically cohesive. How there is an interest in seeking the local and going back to one's roots and how to attract young people to smaller cities.

In her presentation, Sarah Lund talked about the Klimatorium. The audience shared great respect and interest in how to get finances to build such a house as Klimatorium and the trust that has been given to the project to create a life without long business plans behind it. In addition, interest was shown in the exciting field that exists between universities and an organisation like Klimatorium, and how they have applied together in project applications.

During 2022, the Klimatorium has has been visited by a number of prominent actors

Visit from Texas

20 directors and employees from water utilities in the US state of Texas visited Klimatorium to see examples of water technology and green water solutions from Denmark that can also create efficiency improvements.

The visit was organised via a charm offensive in the USA in mid-2021, where the Danish Consul General in Texas for the Danish water and environment team in the USA, Morten Sium Lynge, had gathered a number of good examples and best practices from Denmark. The water sector worldwide is huge, and in Texas alone there are several thousand small and large water companies.

Visit from Estonia

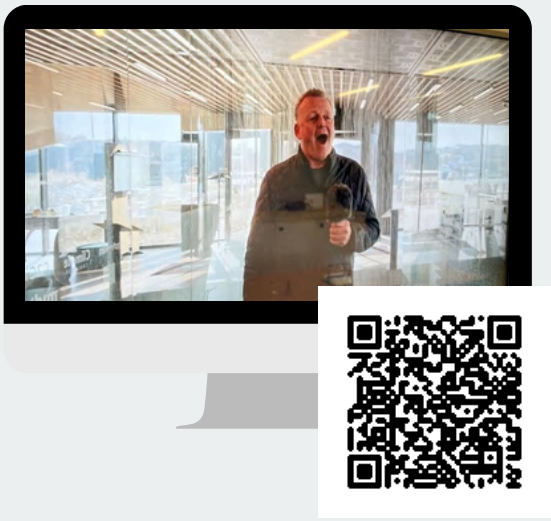
The Estonian Ministry of Environment visited Klimatorium in connection with an inspiration trip to Denmark. As a ministry, they were particularly interested in how we in Klimatorium and the Coast to Coast projects ran a LIFE IP funding model from the EU, and how we had succeeded in realising the projects. On the inspiration trip, they spent a total of three days in the Central Denmark Region. The trip ended with a meeting at the Danish Environmental Protection Agency in Odense.

Visit from the Liberal Party

Member of Parliament Thomas Danielsen and Regional Council Chairman Stephanie Lose visited Klimatorium together with a journalist from Politiken. The two politicians from Venstre were on a tour with the newspaper in western Jutland - a tour that resulted in an article in the newspaper. In Klimatorium we had a good talk about the climate. In particular, we talked about the opportunities that lie in a place like Klimatorium and the activities that are here, both in climate adaptation and Lighthouse for Water Technology, but also sustainable transition and new green energy.

Danish Water Conference

An important day for Klimatorium was in November, when we were visited by a delegation of 91 delegates from IWA 2022 Copenhagen, where a large part came from abroad to learn more about Klimatorium and our efforts.



Visit of Jan Gintberg

Jan Gintberg was in Lemvig in connection with the TV programme 'Gintberg on the Edge'. Here he visited, among other things, Klimatorium. In the programme (from 25:14) Jan Gintberg was given a guided tour of our climate exhibition, where he tried to go through our water installation CLIMATE CHALLENGE and saw products made from recycled plastic. As Gintberg exclaims at the beginning of the programme, he has not heard of Klimatorium. But we are glad that he now got to know us.

Visit from Audi

German Audi spotted the Klimatorium in 2022 and in September sent an entire delegation from Germany to take photoshoots of new hybrid cars next to the Klimatorium. While Audi tried to capture the perfect image outside, 100 Danish architects and engineers sat inside - to learn more about the Klimatorium and experience the architecture of the building.

"It's nice to see big players like Audi coming to little Lemvig and wanting to connect to our town, climate centre and climate brand' - Lars Nørgård Holmegaard

Others who have searched for inspiration in Klimatorium:

- Vejle Municipality
- Climate and Environment Department, Aalborg Municipality
- Urban Design Architects, Stockholm
- Connie Hedegaard
- Erhvervshus Fyn
- YMCA
- Aalborg Water Supply
- Merrild Studios
- And more..

During 2022, the Klimatorium has hosted a number of exciting events

European summit for the The Danish Coastal Authority

The Klimatorium hosted a European summit at the Coastal Directorate, where leading experts from Europe came to discuss coastal protection and climate.

DMI's 150th anniversary

The Danish Meteorological Institute held its 150th anniversary in the Klimatorium with presentations, talks and debates. More than 70 people turned up for the event - and a live stream was running. There was a good atmosphere, and many questions were asked from the audience about everything from global climate change to local consequences in Lemvig and the surrounding area.

The event featured presentations from Adrian Lema, Head of Department at DMI, Professor Eigil Kaas, DMI, Ida Margrethe Ringgaard, oceanographer and climate researcher, DMI and Claus Borg, Director of Technical & Environment in Lemvig Municipality. Meteorologist and climate communicator Jesper Theilgaard was the moderator of the evening - Bent B. Graversen, Chairman of the Committee for Regional Development, Region Midt welcomed and said goodbye

Theme day for the Regional Council

The Regional Council of the Central Denmark Region organised a theme day in Lemvig, starting with the town's new health centre. This was followed by a discussion on PFAS pollution, citizen involvement and education programmes outside the major cities. Most of the day took place at the Klimatorium, where Chairman Jørgen Nørby and Director Lars Nørgård Holmegaard also had the opportunity to show around and talk about the ideas behind Denmark's international climate centre.

Business conference on cyber security

The cyber threat is topical due to the world situation right now. Lemvig Municipality therefore had cyber security as the theme of the spring Business Conference, which was held in Klimatorium. There was ample opportunity to network across industries for the local business community - and time to look around in Klimatorium's exhibition "Climate Without Borders".

Get climate ready course

Lemvig Municipality held five modules in autumn 2022 in the Klimatorium to make companies climate ready.

Participating companies were:

- Lemvig Biogas
- Midtjyske Jernbaner A/S
- Nordic Marine Oil
- Rosenberg Madsen A/S
- Nørgaards Fliser
- Thyborøn Skibssmedie
- Jyllandsakvariet
- Lemvig Varmeværk a.m.b.a.
- Ib G. Jensen A/S
- Stokholms Maskinfabrik
- Nordic Marine Oil
- Daqua Limtræ
- Restaurant og cafe Luna
- Slagter Mortensen
- Lemvig Vand
- Roesgaard Byg A/S
- Beierholm
- Gudum Murer.
- BB Entreprenør
- Lemvig Gymnasium


Vandopland
Sparkær
Mønsted
Ravnstrup
Skelhøje
Frederiks

7

INITIATIVES TO KIDS, YOUTH AND STUDENTS

Scouts learnt about climate

10,000 scouts attended this year's national camp with a lot of Danish but also international FDFers. This year they learned about climate change.

Klimatorium has provided quizzes and videos for the national camp - because the climate crisis needs to be made tangible.

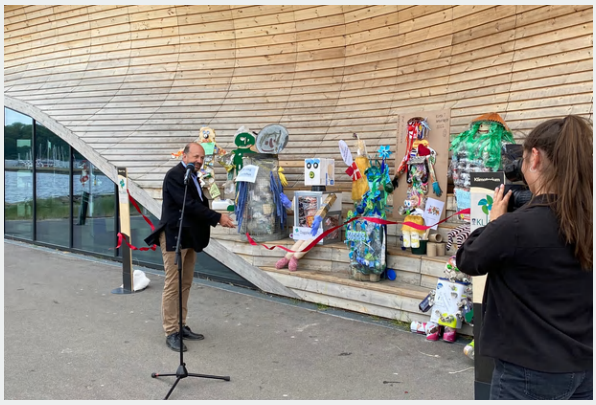
- How do we feel climate change?
- What can I do myself?

Climate event for 0-6 year olds

More than 500 young children focused on the climate on Tuesday 21 June with a green parade through the town of Lemvig. The parade was a collaboration between Lemvig Municipality, Klimatorium, municipal and private 0-6 year institutions and private childminders in Lemvig Municipality, Tante Andante and Lemvig Music School. The programme included a concert by Tante Andante, and institutions were invited to make musical instruments from recycled waste.

The exhibition at the Klimatorium consisted of one-metre-high garbage men made by children from recycled waste. The exhibition was on display all weekend outside the Klimatorium. Later, the rubbish collectors were exhibited in Aunt Andante's house.

Mr Lars Holmegaard, Director of Climacterium, was present and gave a speech to the children.



Co-operation with Nørre Nissum

From 2022-2025, the HF programme in Nørre Nissum, in collaboration with the Klimatorium, wants to teach young people to analyse climate challenges and sustainability, and how to work innovatively, relevantly and interdisciplinary to solve these challenges in natural science, engineering, teacher training and social science studies.

The project has several embedded purposes. Among other things, to create a professional circular didactics between the Klimatorium, HF education / boarding school, teacher training and the climate and supply engineering programme (VIA) through a number of teaching courses. The goal is to contribute to more young people choosing STEM programmes in the climate area and experiencing the courses as career learning.

IBO programme for Staby Efterskole

Should we have Power-to-X plants out at sea? This was one of the ideas that the three students from Staby Efterskole brewed on when they were on a company visit to Klimatorium in connection with their innovation bridge building assignment (IBO), where the students at the efterskole had to work with the UN's Global Goals. The three students had chosen to work with SDG 13 (Climate Action) and had contacted Klimatorium to hear if we had any problems that they could solve. We did.

It was not only the three students who visited the Klimatorium. Two other groups from the school had also chosen Klimatorium to work with SDG 14 (Life in the Ocean) and SDG 6 (Clean Water).

Peace day

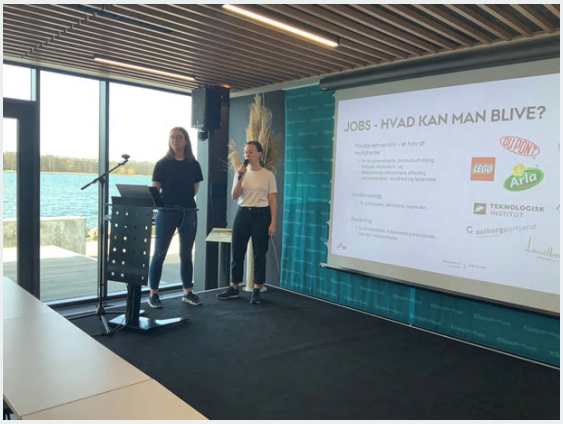
At Klimatorium, we are delighted to have been part of Peace Day 2022, where young people gathered at Youth Island, a former sea fortress outside Copenhagen. The aim was to identify our future through a series of workshops.

The burning question was "What is the future?" - plural, as our future is different.

We worked in different ways: using body language in communication, how to perform and interact with the audience, and cooking with local and seasonal ingredients.

Focus on climate and quantum mechanics

As part of the close collaboration between Denmark's climate high school in Lemvig - Lemvig Gymnasium - and Klimatorium, a day was organised in collaboration with Aarhus University. 70 chemistry students participated, and there were presentations on quantum mechanics and climate change, and on the transition to green energy as one of the biggest challenges of our generation. An exciting day was spiced up with presentations from chemistry students focusing on both study time and job opportunities after graduation.



Future days

Future Days is a collaboration between Klimatorium and Studenterhus Aarhus / ESN Aarhus, focusing on the climate challenges we face every day.

On 21-24 March, inspiration was provided for good climate solutions such as green cooking with CO2 reduction, Power To X, extreme rain, the opportunity to swap used clothes and much more. All this is accommodated in the form of story slams, presentations, debates, workshops, concerts Monday-Wednesday in Studenterhus Aarhus, while the trip for the students on Thursday went to Klimatorium. At the Klimatorium, it was possible to see the area and try out the storm and rain simulator, and see the elements of the climate in the exhibition "Climate without borders".

Study programmes for Aalborg University

Aalborg University came to Klimatorium in week 41 (10-14 October) with 15 students and two teachers from the MSc in Environmental Science programme.

The students, who were generally foreigners from all over the world, learnt about climate science, climate adaptation projects in Lemvig Municipality, the GIS tool SCALGO and the Danish Climate Atlas. They were also presented with an assignment that they would later present at the study programme.

The students stayed in a hotel in Lemvig and also had time for excursions to Thyborøn, Høfde 42 and Bovbjerg Lighthouse.

Hack for Earth

Sarah Lund, Sustainability Manager from Klimatorium, participated as a mentor in Hack for Earth. Young people from 124 countries were represented and the number of competing teams totalled 1850. The global hackathon was organised in collaboration with the UNFCCC, UNEP, UNICEF, SIDA, the World Bank and several other organisations.

There were seven challenges for teams to compete in:

1. Transport
2. Agriculture
3. Biodiversity
4. Smart cities
5. Energy
6. Natural resource management
7. Sustainable digital solutions.

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ANNUAL ACCOUNTS

	2022	2021	2020
Membership fees	**988**	**893**	**525**
Total funds and grants	**6.608**	**4.136**	**5.582**
Net turnover	**7.596**	**5.029**	**6.107**
Operating costs	6.263	4.067	5.404
Administration costs	595	926	641
Total costs	**6.858**	**4.993**	**6.045**
Result before financial items	**738**	**36**	**62**
Financial items	11	15	18
Profit for the year before tax	**727**	**21**	**44**
Income tax expense	19	15	0
Profit for the year after tax	**708**	**6**	**44**
Liquid funds	1.048	1.387	3.025
Equity	732	24	18
Short-term debt	1.384	1.847	3.918
Balance sheet	**2.116**	**1.847**	**3.936**

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CONCLUSION

The year 2022 has been an eventful year for Klimatorium, and eyes are now focused on 2023. The course is still the same. We must continue to build bridges across society - between universities, the public, businesses and citizens - and be a driving force for developing innovative solutions that put Denmark on the world map.

As part of the Lighthouse for Water Technology, we have been given a unique opportunity to really make a difference in transforming the water sector to think more sustainably, environmentally orientated and meet tomorrow's climate challenges. At the same time, we will be able to help the future Danish production of green hydrogen by finding the right water solutions for PTX plants.

In 2023, several projects are ready to be launched. Klimatorium will, among other things, play an important role in creating the Green Jutland Corridor and begin important work on naturebased solutions (NBRACER). In addition, in the coming year we will start a project on climate accounts, where we, together with Aarhus University, will help companies understand their CO2 emissions and strengthen business clusters so that complementary green solutions can be explored together. Because the future is green - for both large and small businesses.

The Klimatorium is seen by some as an educational centre. And to a large extent we are. But it is projects that are our DNA. And that is a direction we must continue to develop in 2023.

A torium denotes a place where something specific is gathered, stored or takes place. The Klimatorium has certainly become such a place for both climate adaptation and green transition, and we now have a house buzzing with life. Even though Lemvig may seem far away. This is where things happen. Not only at national level, but also as an international hub.

Klimatorium has in the period 2019-22 been on the Finance Act with a total grant of DKK 12 million. The Finance Act has now expired at the turn of the year, and we hope to receive a grant again in 2023, as it increases our opportunities to strengthen our goal of communicating climate challenges to children and young people.

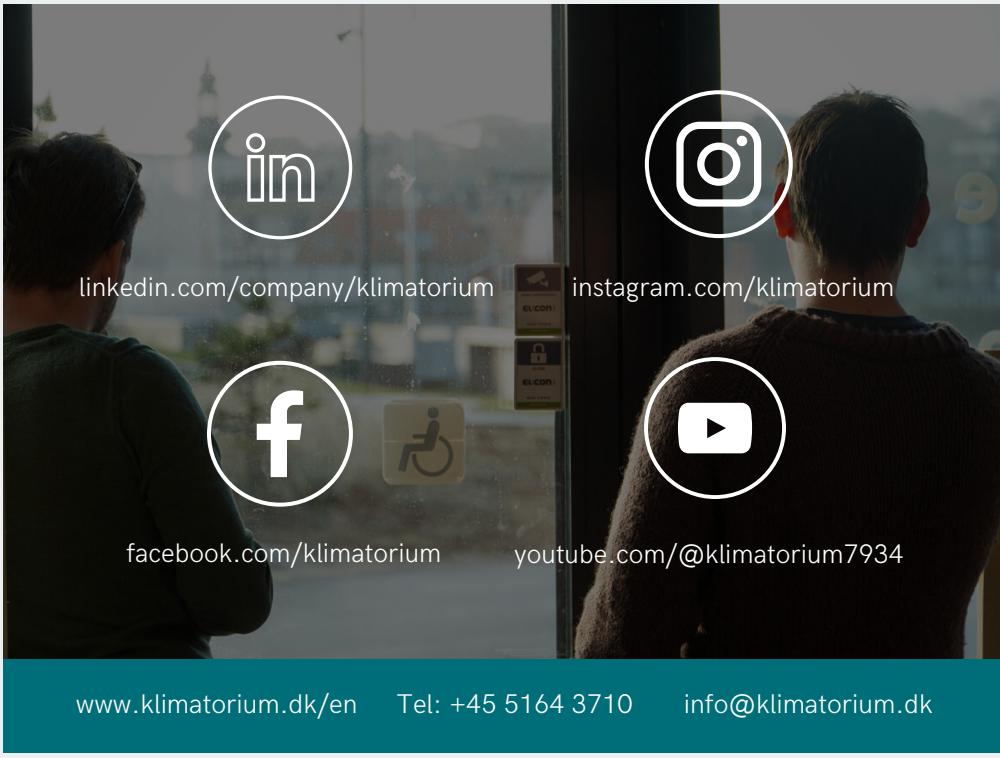
And we have big ambitions in the Klimatorium. We will develop our exhibition to make it even more information-rich, interactive and attractive to visit. We must strengthen our climate events so that even more people want to participate and take home useful knowledge. We need to strengthen partnerships with primary and secondary schools, colleges and universities. And we need to strengthen our digital presence so that even more people learn about climate solutions.

In the Klimatorium, we have a fantastic building. And in 2023 we will try to make it even more fantastic by working towards a stage 2 for the building - via external funding. From the outset, it has been made architecturally possible to extend the Klimatorium and add even more square metres. With more square metres, we can create even more space for universities and their students and provide our members with more and better facilities for daily use. We can house more green businesses and entrepreneurs. And we will be able to have an auditorium that top climate experts will want to speak from.

Klimatorium is still a new player on the climate scene. But we mean it when we say that we want to be Denmark's International Climate Centre.

Thank you for reading along.

Klimatorium
The International Climate Centre of Denmark



Annual Report 2022

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