



ECRAN / TAIEX

Expert Training on Risk and Vulnerability Assessment and Adaptation Planning – Energy Planning

Tirana, Albania

How to identify climate vulnerabilities
in the energy planning sector.

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Agenda

- Presentation Göteborg Energi & Celsius (to set the scope)
- Causes and drivers (not Climate primarily)/Identification processes (yesterday and today)
- Is it difficult to identify adaptations challenges
- The Roles of different stakeholders.
- Examples

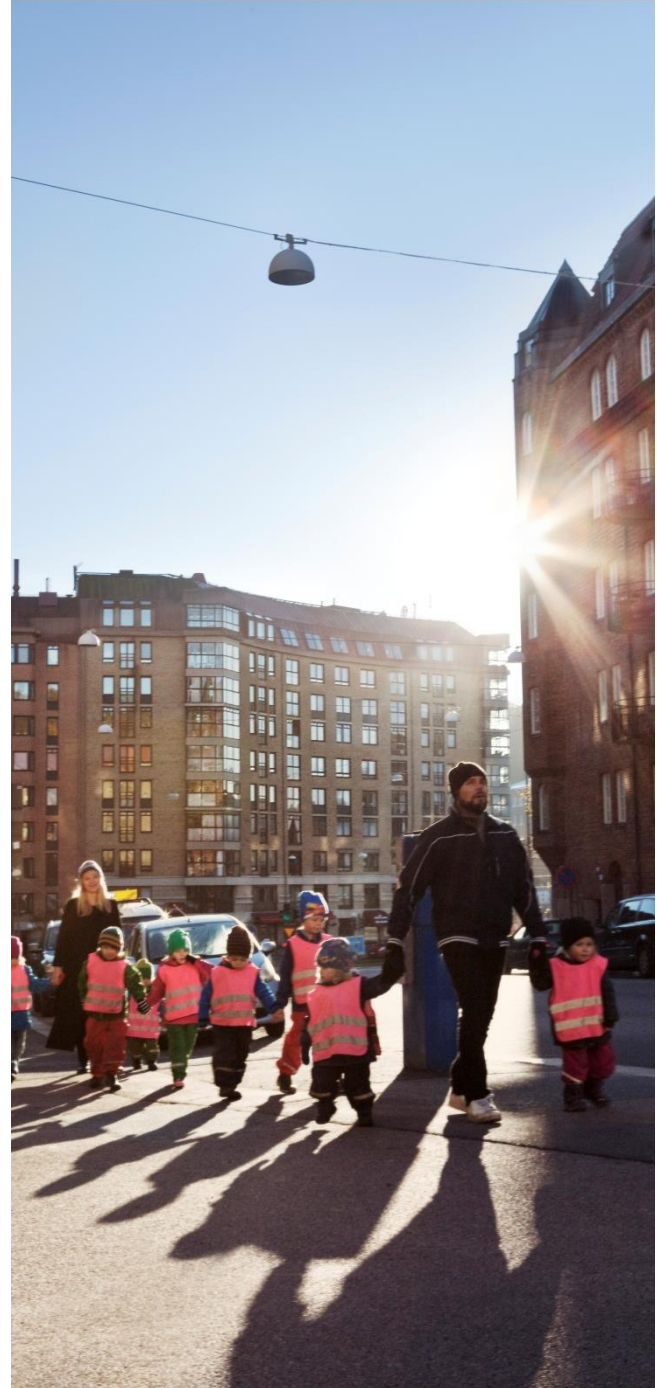


Where is Gothenburg ?



Göteborg Energi Figures 2013

| | |
|--------------|------------------|
| Owner | City of Göteborg |
| Customers | approx 300 000 |
| Employees | aprrrox 1 100 |
| Income | 780 MEUR |
| Earnings | 80 MEUR |
| Investments | 150 MEUR |
| Total assets | 1700 MEUR |



District Heating

- Our district heating system now supplies heating to 90 percent of the apartment blocks in Gothenburg.
- 95 percent of our district heating is obtained from co-generated, recycled and renewable energy sources.
- The remaining heating is produced in plants that primarily burn biofuels. Oil is used when temperatures are very low.
- Sulphur emissions are close to zero and emissions of nitrogen oxides have fallen by around 90 percent since 1985.



A Complete Energy Company

- District heating
- District cooling
- Energy services
- Electricity supply grid
- Electricity trading
- Renewable energy (wind power, biogas)
- Gas trading
- Gas distribution
- Broadband/networks
- Research & Development



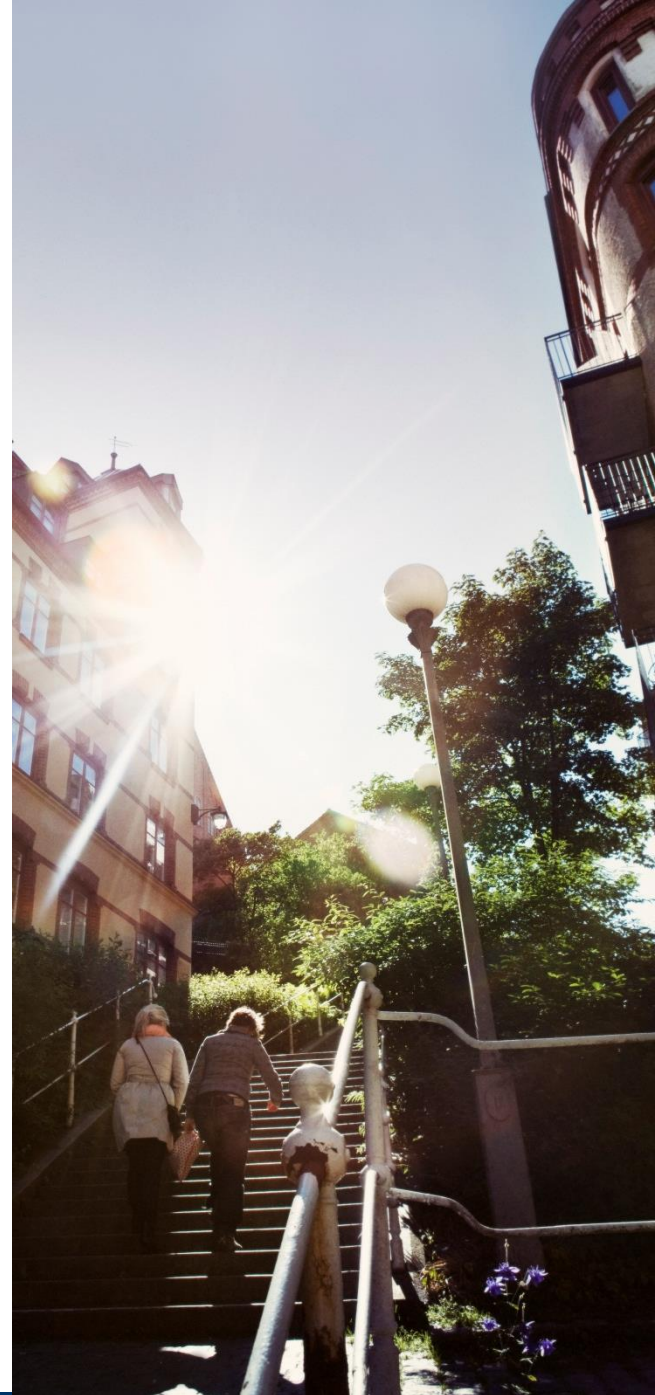
Göteborg Energi

- A TOOL FOR SUSTAINABLE CITY DEVELOPMENT

Owner Directives

”By owning Göteborg Energi, the city wants to integrate and develop the energy operations in the city development and contribute to the development of a sustainable Gothenburg society.

Furthermore, the purpose is to assure security of supply and reasonably priced energy for citizens and companies....”



About the CELSIUS Project

- Gothenburg, London, Genoa, Cologne, Rotterdam
- 20 partner organizations
- April 2013 – Mars 2017
- 10 new demonstrators + 20 existing demonstrators
- 7 replication cities
- 50 new Celsius-cities
- Total budget 26 MEUR (EU contribution 14 MEUR)



New CELSIUS Cities

1

Early communication

- engaging with potential CELSIUS Cities

2

Status of the city

- fill out New CELSIUS city questionnaire

3

Support need identification

- discussion between project and city

4

Letter of Commitment

- the city commits to become a CELSIUS City

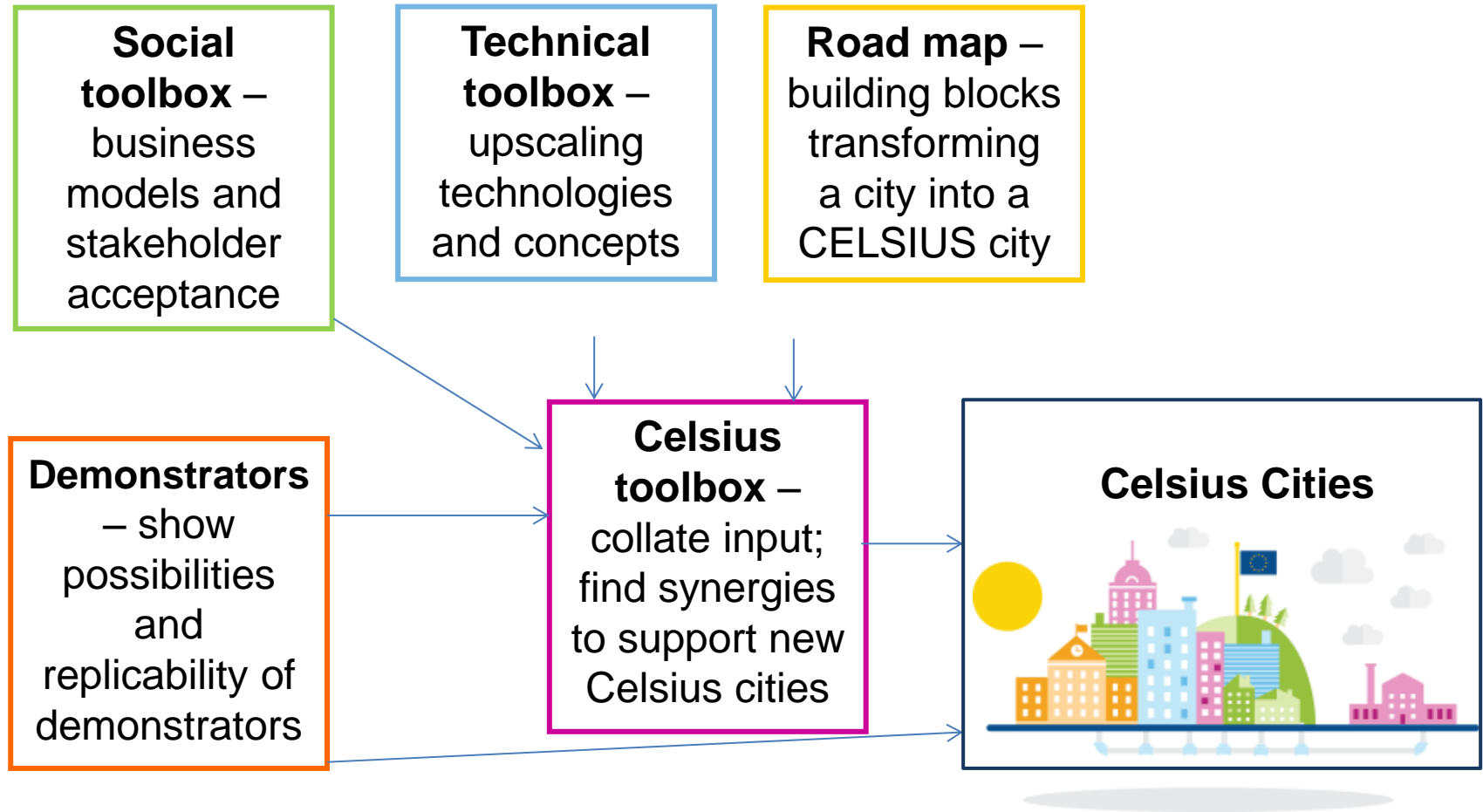
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Offerings

- demonstrators, toolboxes, workshops and expert group



Support to new CELSIUS Cities



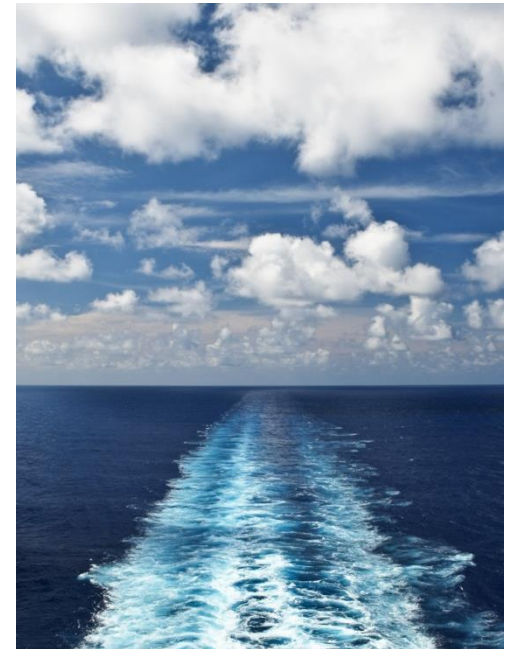
Demonstrator inaugurations



Cologne, October, 2013
District heating from sewage
water



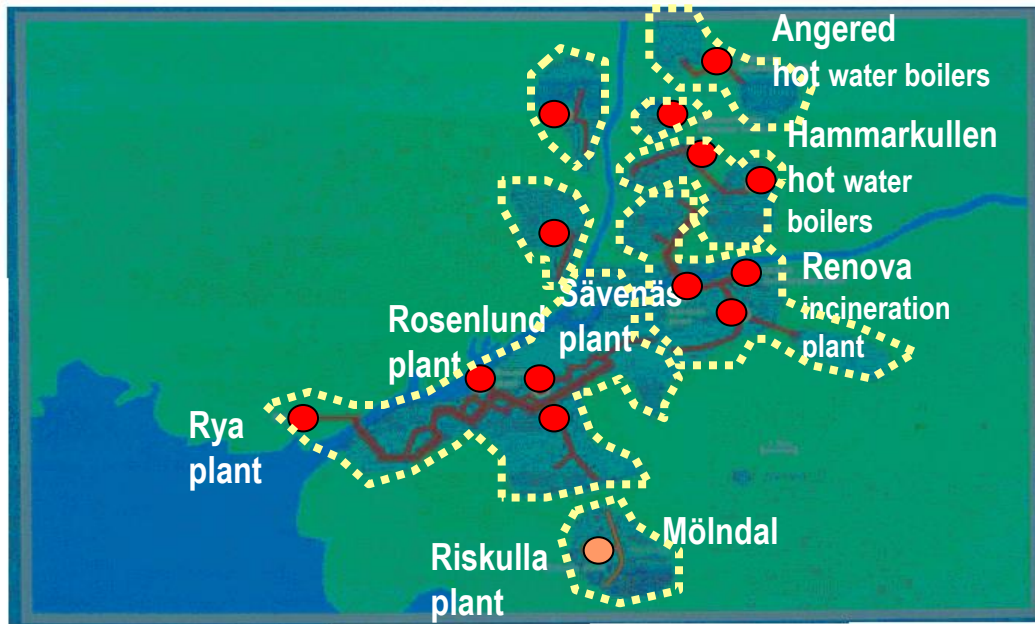
Rotterdam, April, 2014
Heat hub, 300 MWh/50 MW



Gothenburg, December, 2014
District heating to ferry in harbour



The Gothenburg District Heating System around 1980



- High oil prices
- Low electricity prices (abundant nuclear and hydro power)
- No possibility to CHP
- Eight separate district heating systems
- Highly dependent on oil as a fuel

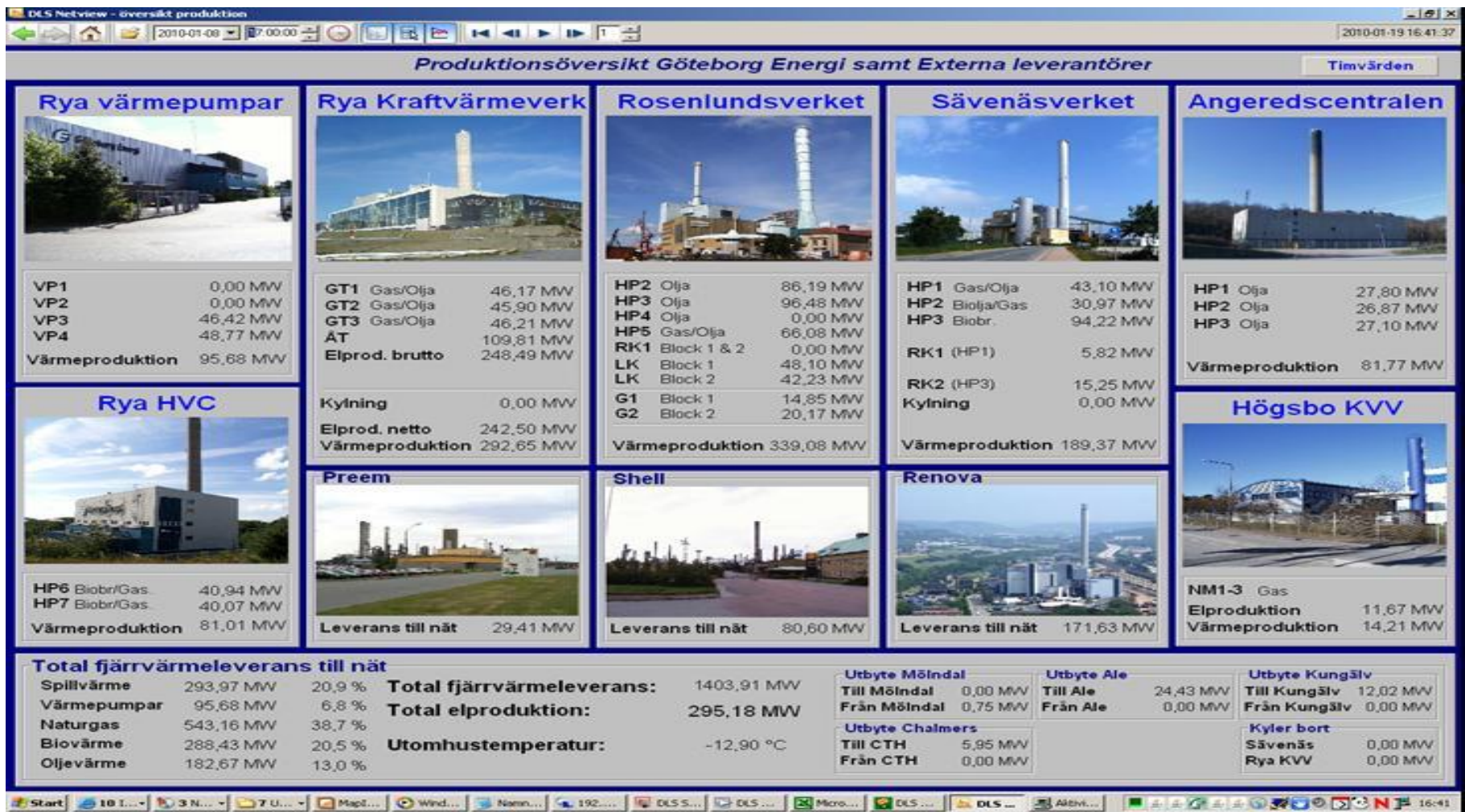


The Gothenburg District Heating System

- One connected system
- 1000 km pipes
- > 50 km North to South



Production Plants



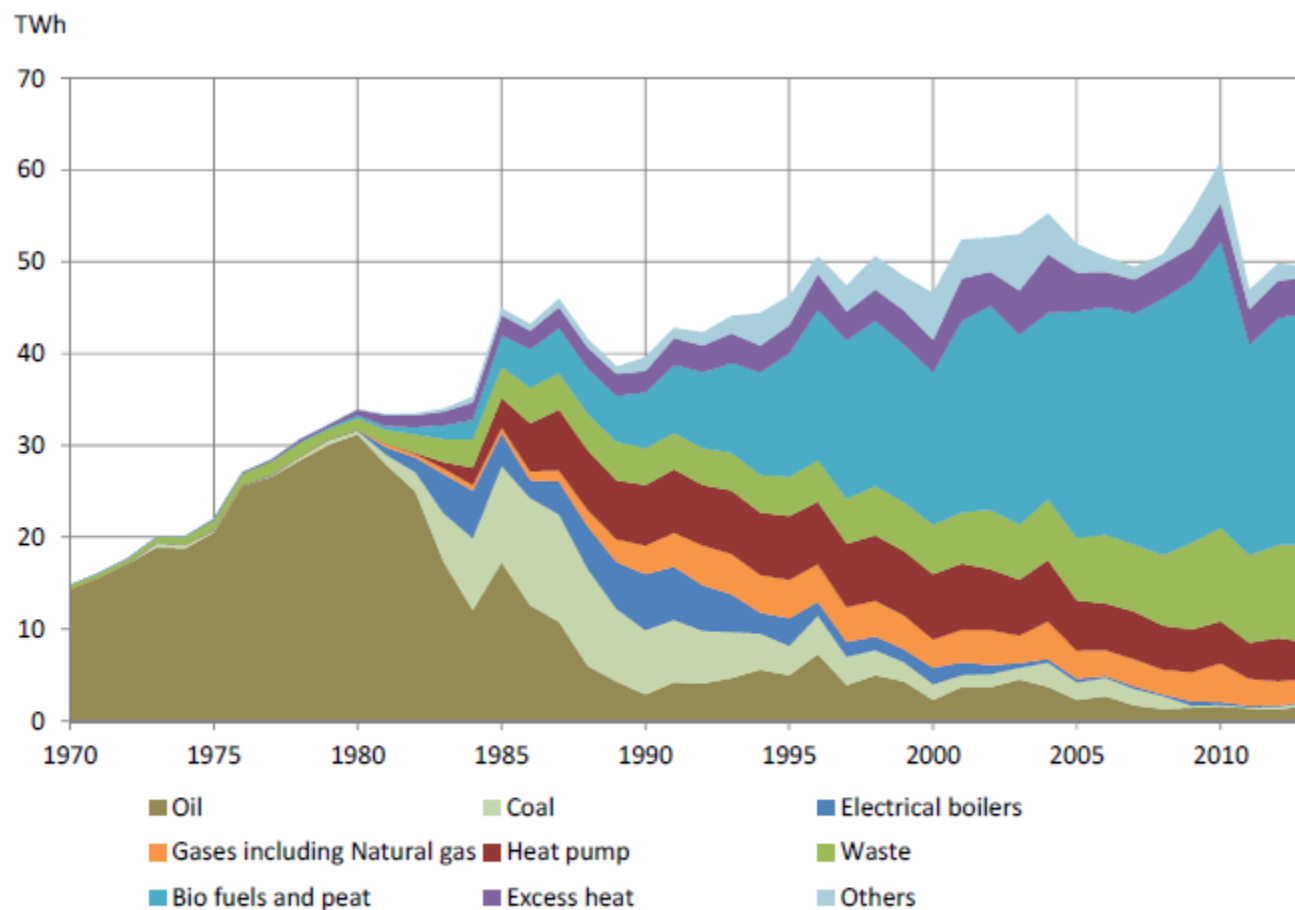


Figure 1. Annual fuel supply to Swedish district heating systems 1970–2013. (Data from [10] and [11])

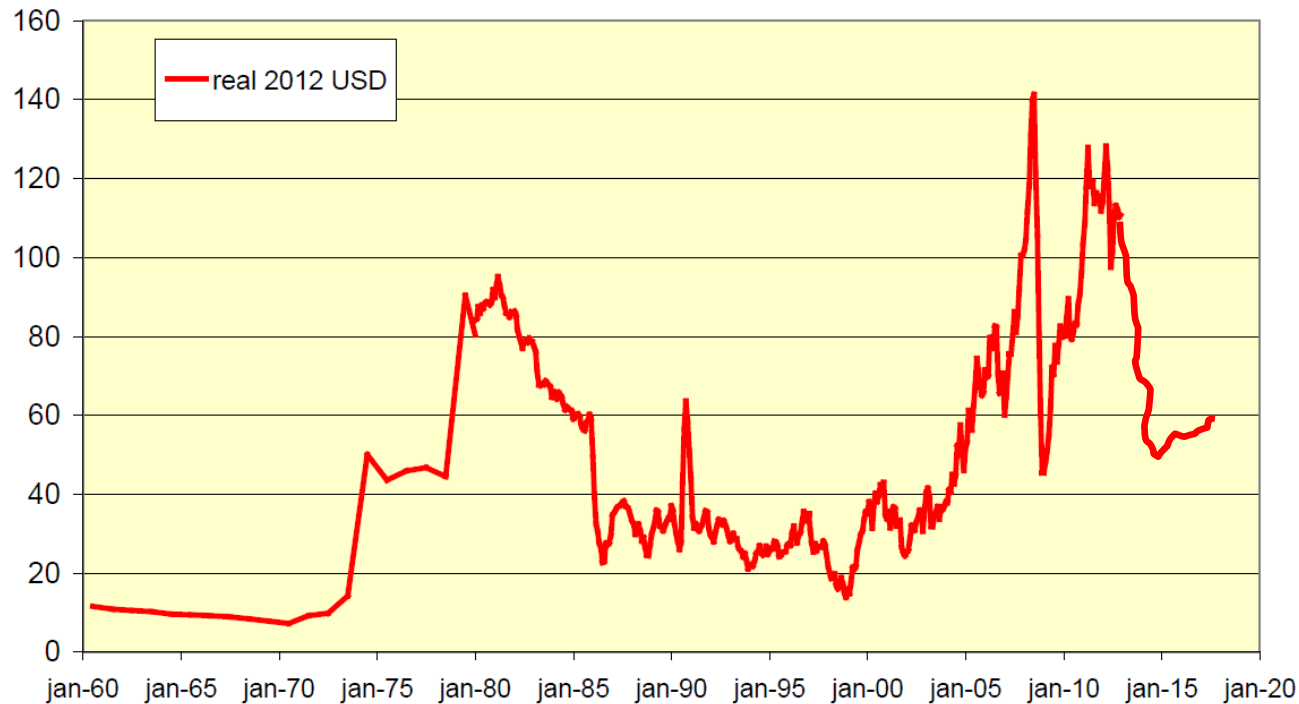


Timing ?

Current energy cost level: Fossil fuels are expensive

USD/barrel

Crude oil, import price to Europe until December 2012

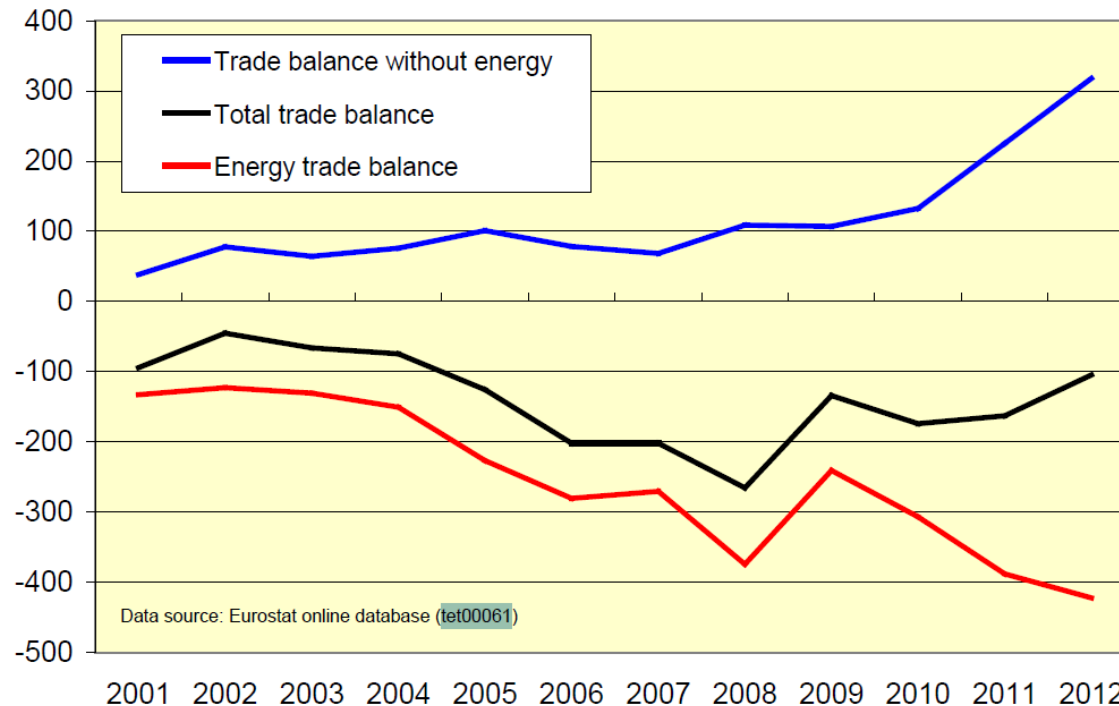


EU share the same pain

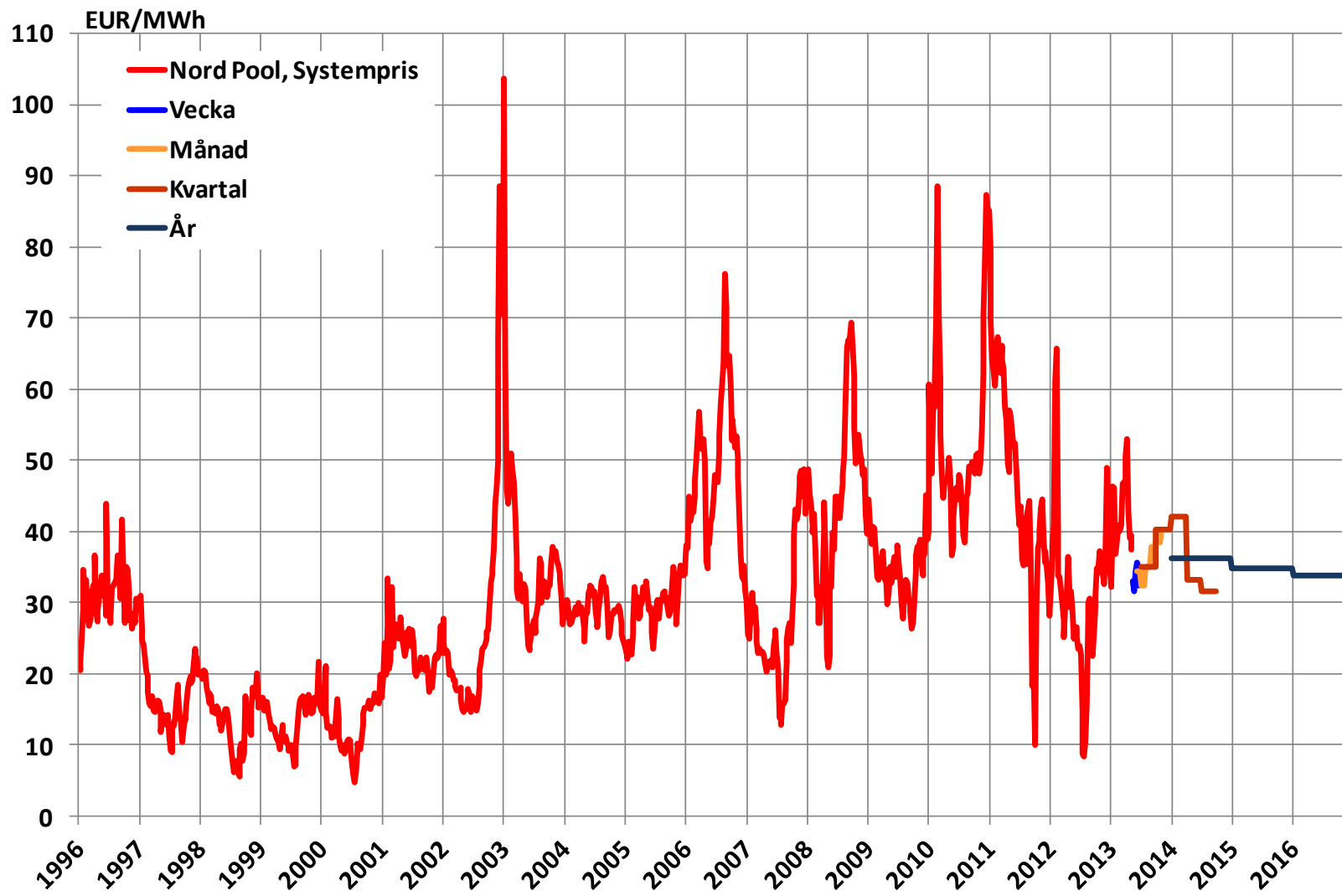
EU27 trade balance: Fossil fuels are expensive

Billion EUR

EU27, Annual trade balance



Electricity prices på Nord Pool Spot



Coastal cities and adaptive responses: Gothenburg

Adaptation measures, such as coastal flood defenses, water management, inland flood protection, as well as adaptive measures for waterways, urban and landscape planning, transport infrastructure.



How to organize the process

- The city is coordinating since 2004 administrations and companies to assess the situation, inform and implement actions. The transport department (State) which is responsible for most tunnels are involved in the collaboration.
- City Planning built a hydro model in order to simulate the effects of different water levels. Based on this, we will be able to prioritize the right actions.
- In 2030-40 requires more extensive protection to be on site and how this city will decide within the coming years.
- Gothenburg participating in the research project on how the city can be built to withstand higher temperatures, including through more greenery in the streets.
- When the city is planning for new construction (in local plans) so it takes into account the rising water levels.



How to organize the process

Nine risk areas of Gothenburg

The City of Gothenburg has a so-called risk and vulnerability analysis (RSA) identified nine risk areas of Gothenburg. The identified risks are:

- Extreme weather conditions.
- Energy, potable water, telecommunications / IT (50 percent energy loss).
- Transportation supply systems (road, rail, sea and air).
- Production, transport and use of hazardous substances (uncontrolled emissions and accidents).
- Large personnel shortfall for example when the pandemic (50 percent absenteeism).
- gang crime, organized crime, threats to staff and elected officials, sabotage and terrorism.
- Information security - it is about that sensitive information is only accessible to authorized and to ensure that information is accurate and available.
- Social imbalance (when the normative framework breach of citizens).
- Unpredictable events.



How to organize the process

The Swedish crisis management system has three basic principles

Responsibility principle

Anyone who has responsibility for a business of everyday life will have it as well during an emergency.

The equality principle

During an emergency, the operations function in a similar way as it does in everyday life - as far as it goes. The operation shall, if possible, be managed in the same place as under normal conditions.

The proximity principle

With the proximity principle means that a crisis should be handled where it occurs, and by those who are most concerned and responsible.



Is it difficult to identify adaptations challenges ?

They have been divided into sectors:

- Electricity

- District Heating and Cooling

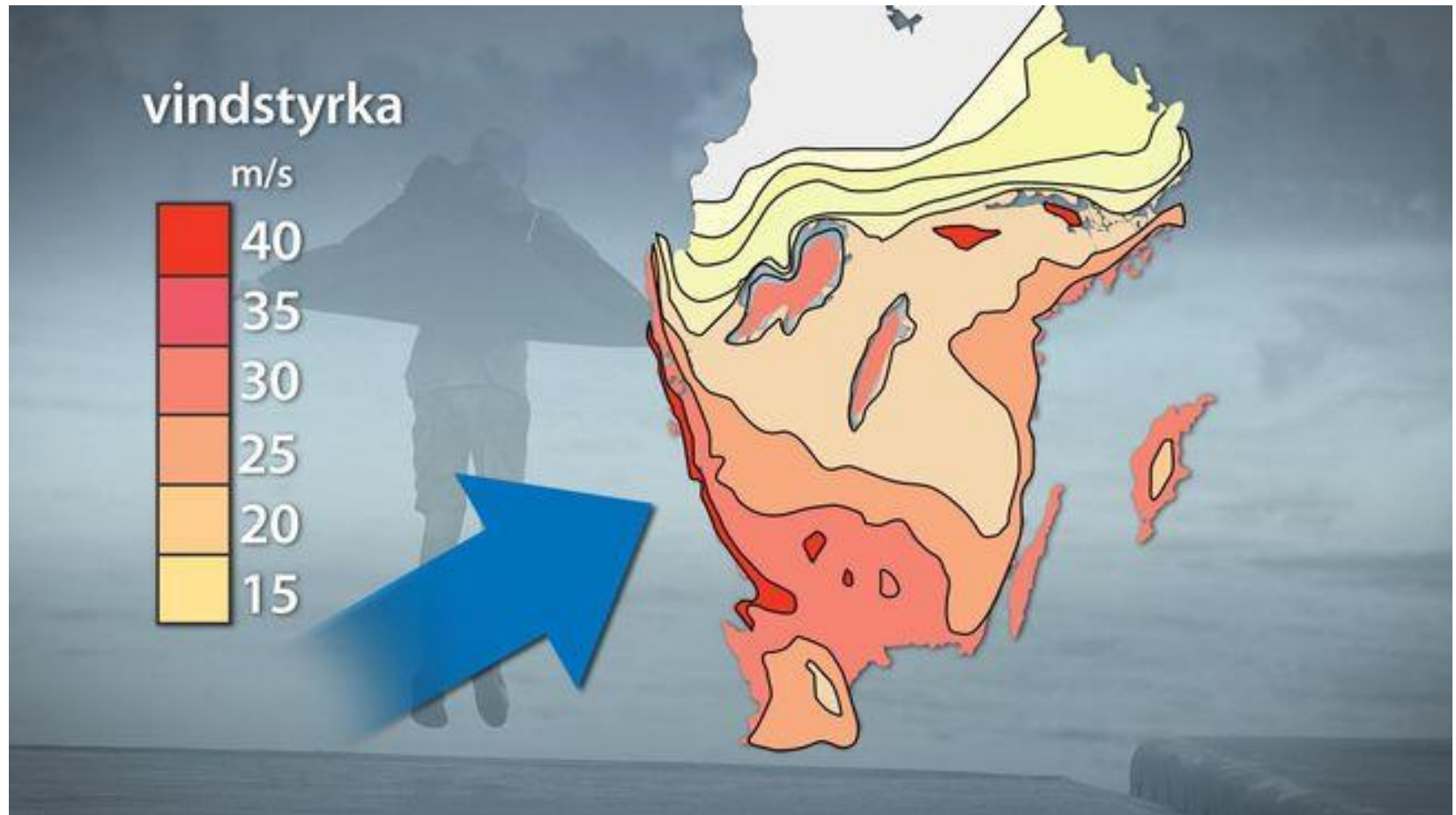
- Gas distribution

- (Opto fiber)



The electricity is produced outside the city.

Some experiences: (2005)



The electricity is produced outside the city.

Some experiences: (2005)



The electricity is produced outside the city.

Some experiences: (2005)



Foto: LENNART REHNMAN



Is it difficult to identify adaptations challenges ?

They have been divided into sectors:

- Electricity (the capability to produce locally (CHP plant ~ 30%)

- District Heating and Cooling (depending on electricity)

- Gas distribution (depending on electricity)

- (Opto fiber)



A tool to visualize and create different scenarios

3D-tool city planner :



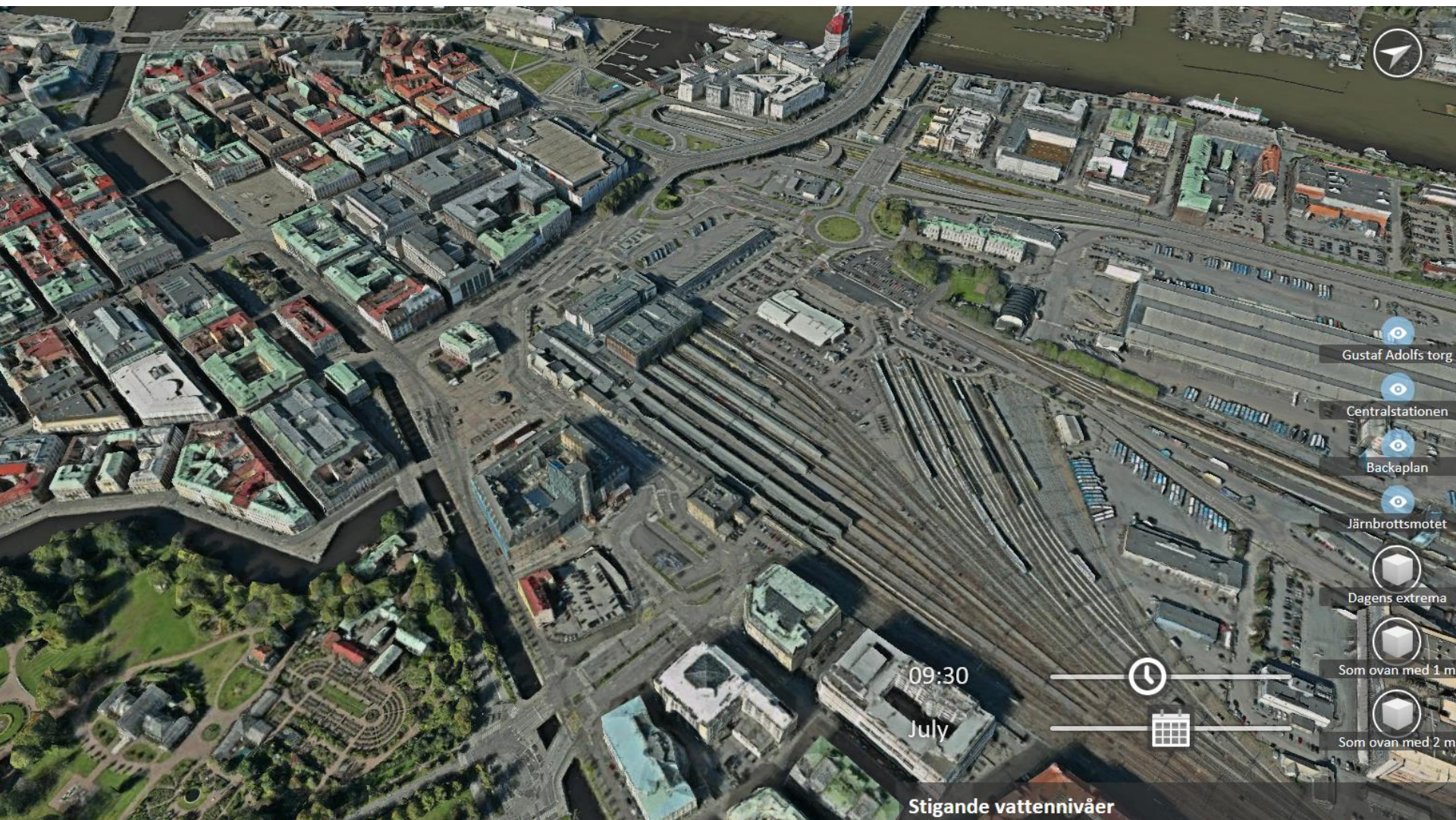
A tool to visualize and create different scenarios



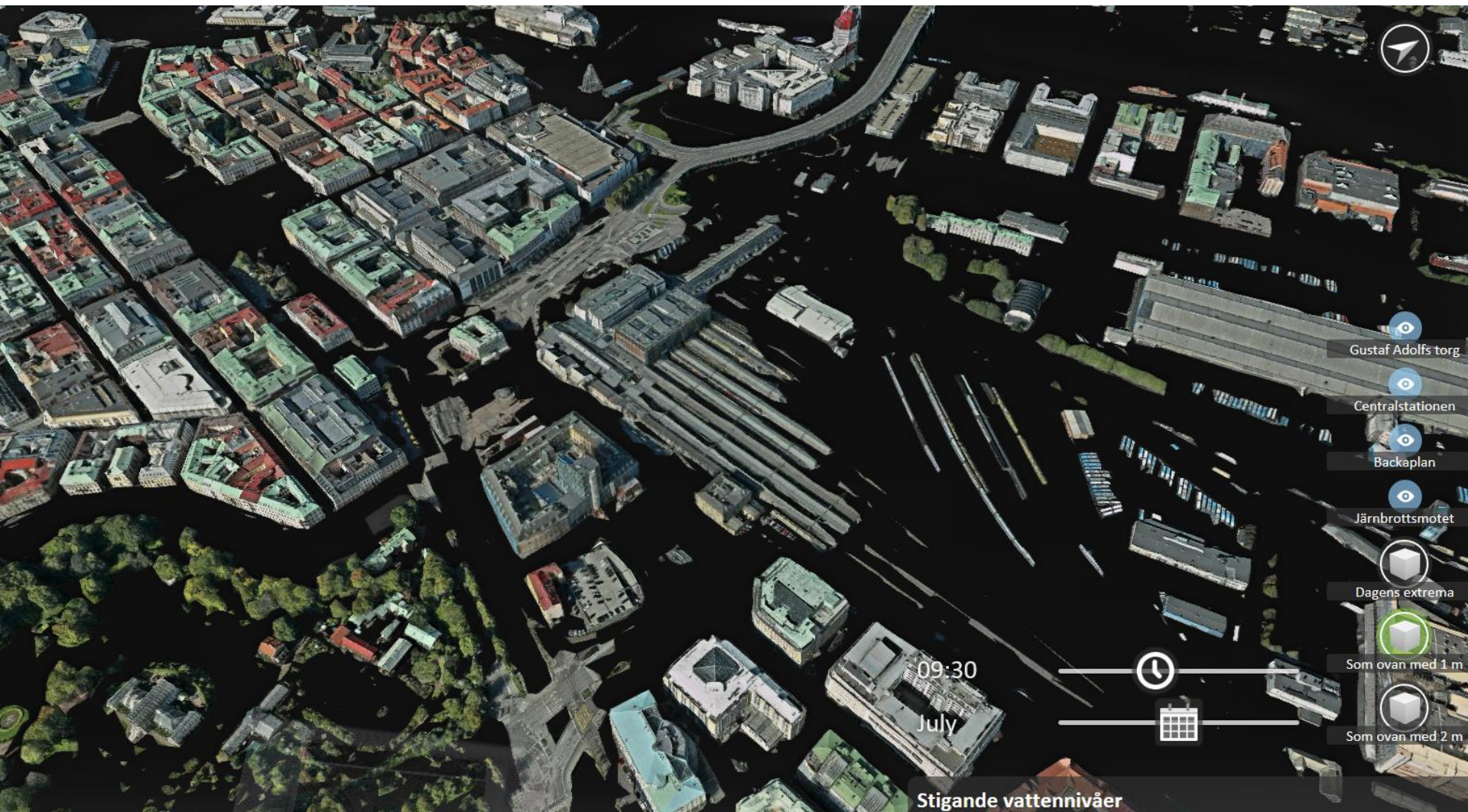
A tool to visualize and create different scenarios



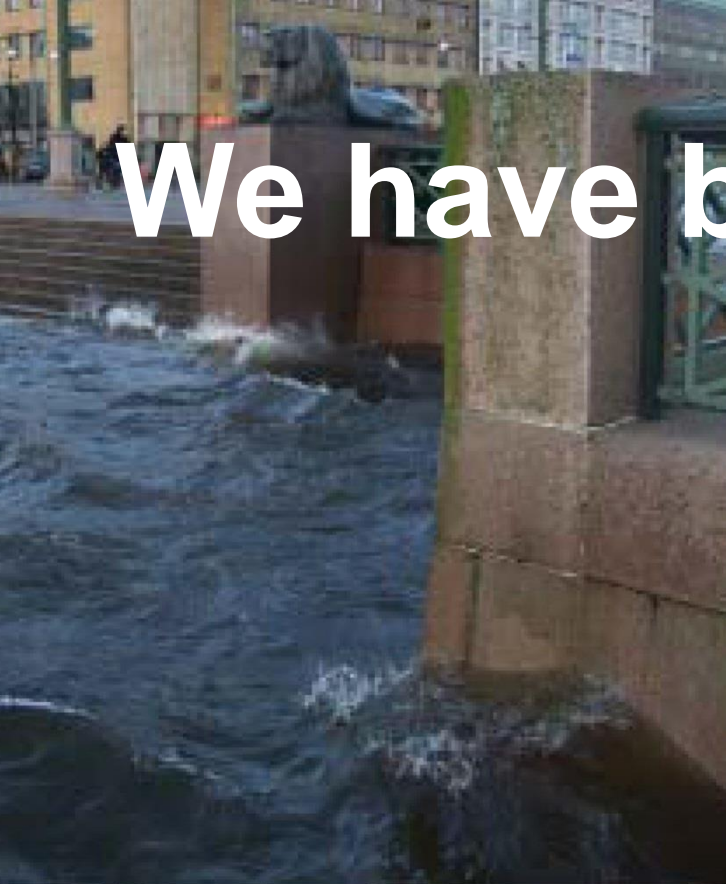
A tool to visualize and create different scenarios



A tool to visualize and create different scenarios



We have been awaken!



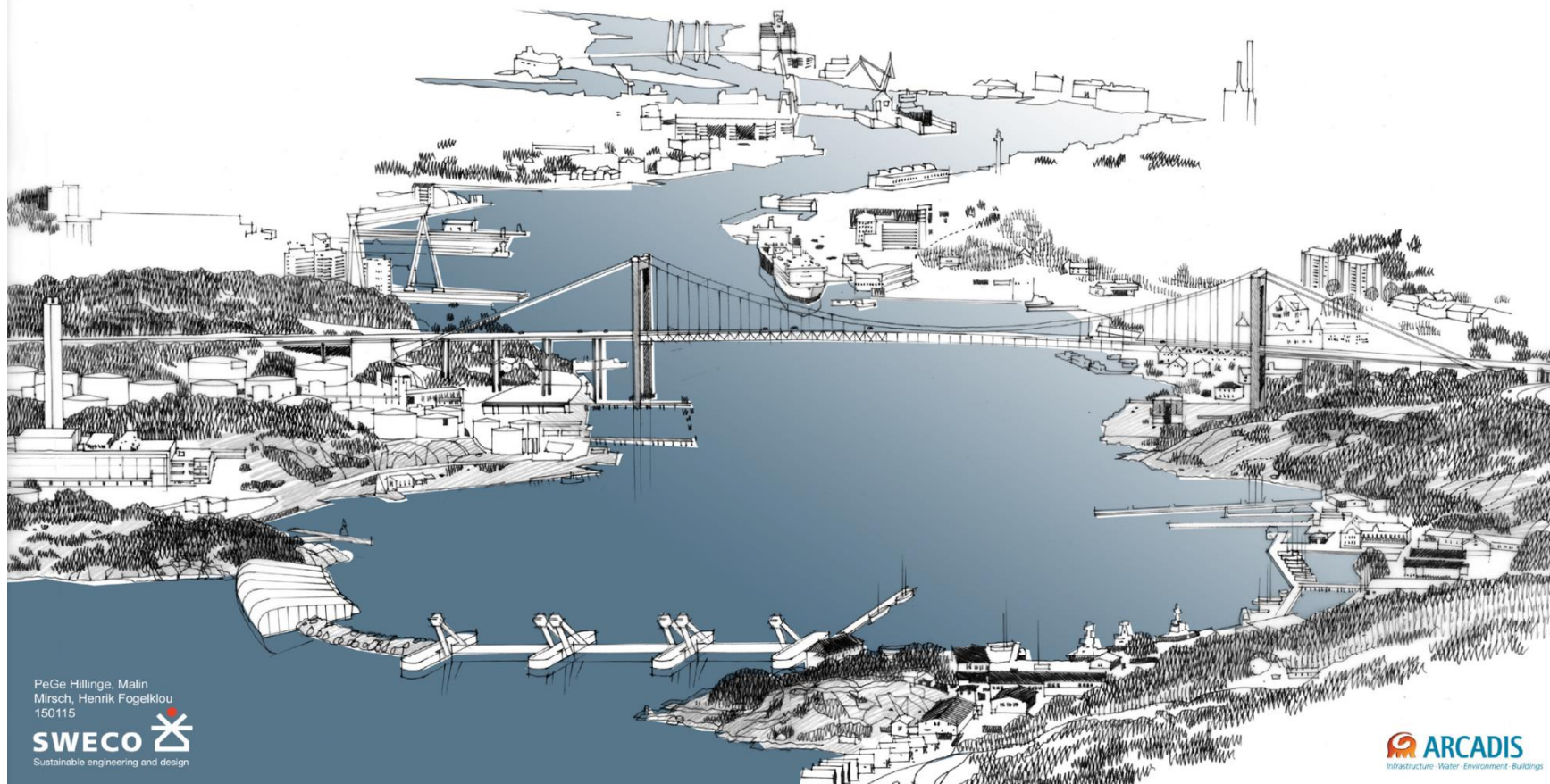
 **Göteborg Energi**


Suggested adaptation measures



STORMBARRIÄR ÄLVSBORGSBRON

ALTERNATIV B, STÄNGD



PeGe Hillinge, Malin
Mirsch, Henrik Fogelklou
150115
SWECO 
Sustainable engineering and design

 **ARCADIS**
Infrastructure Water Environment Buildings

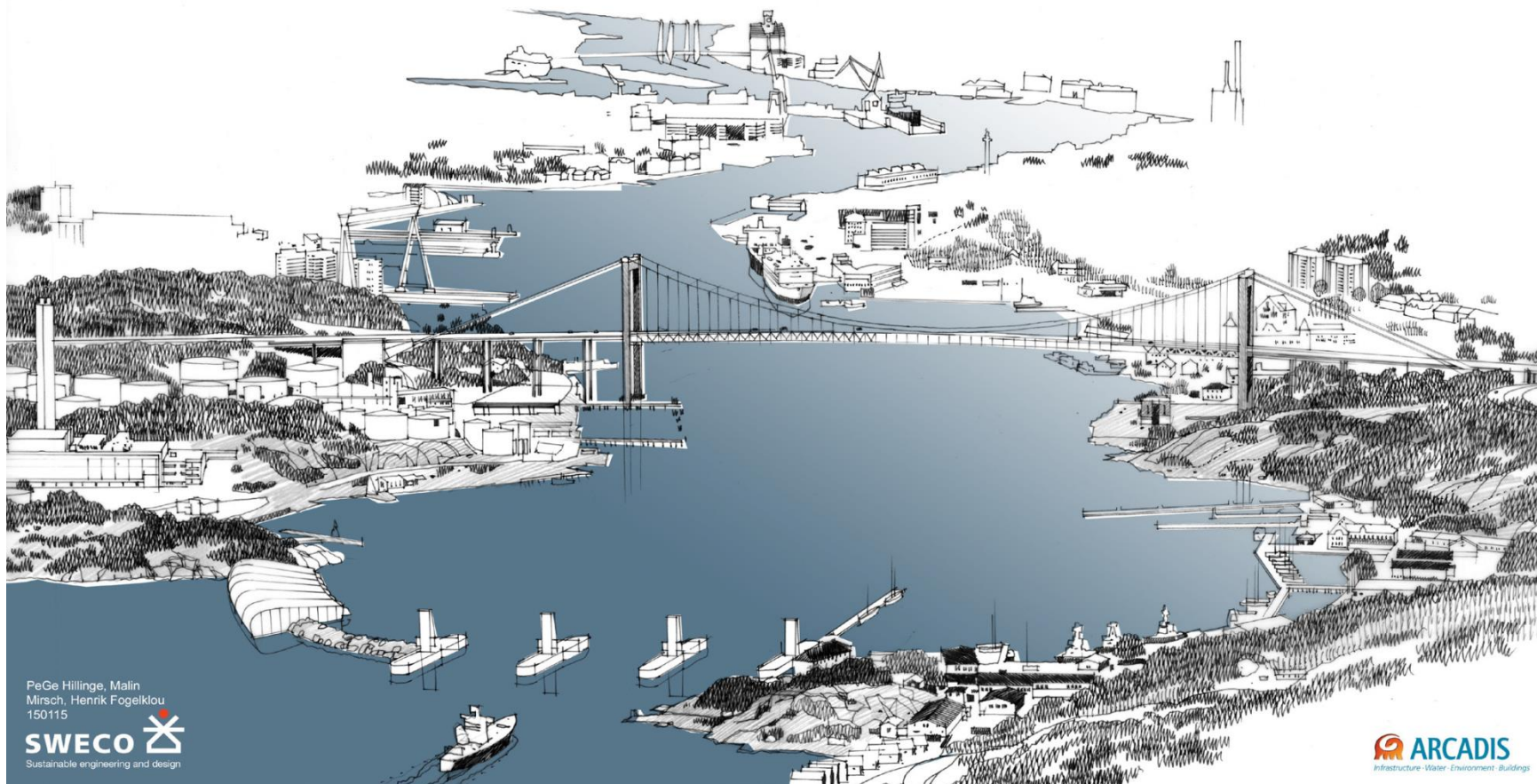


celsius

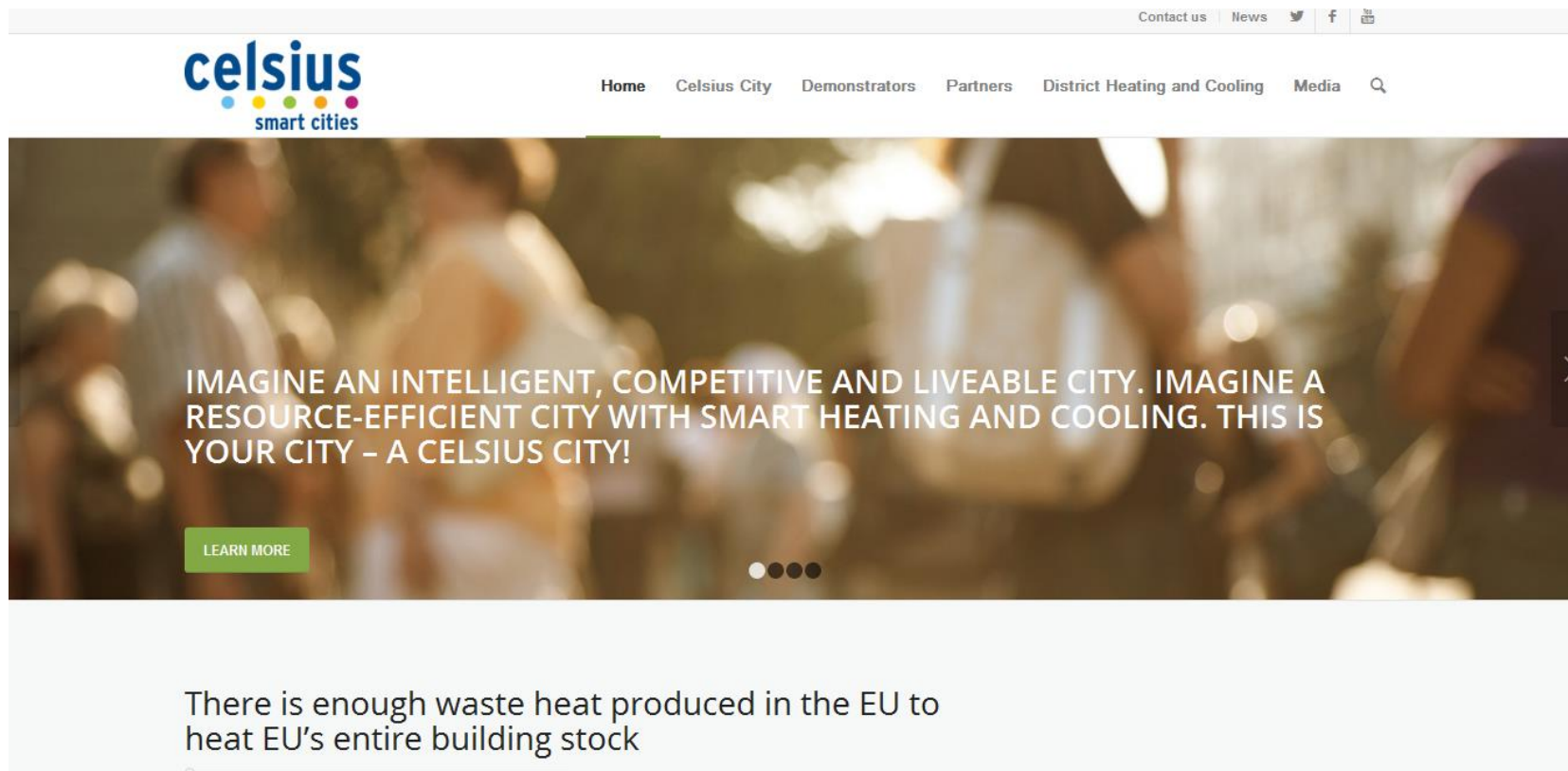
smart cities

STORMBARRIÄR ÄLVSBORGSBRON

ALTERNATIV A, ÖPPEN



Thank you for the attention !



Visit us www.celsiuscity.eu!

