Grøn Vækst i København

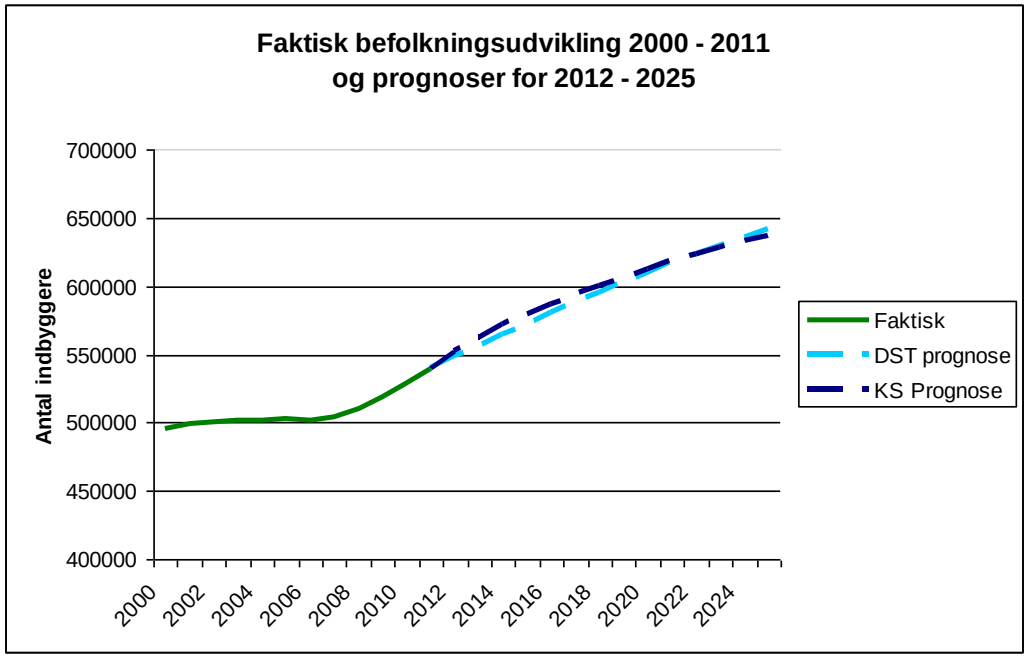
Lars Lindholm
Teamleder
Økonomiforvaltningen
Københavns Kommune

Global Challenges
COPENHAGEN
SOLUTIONS

CLIMATE CAPITAL COPENHAGEN

Copenhagen Carbon Neutral by 2025

Den strategiske udfordring



» Byen vokser med 100.000 indbyggere frem til 2025

» Trafikken vokser med 30% frem mod 2030

» Den økonomiske vækst er højere hos ”konkurrenterne”

»Innovationsraten er for lav

»Ambitiøse klimamål

»Behov for klimatilpasning

Global Challenges
COPENHAGEN
SOLUTIONS

CLIMATE CAPITAL COPENHAGEN

Copenhagen Carbon Neutral by 2025

Vores tilgang

Global Challenges
COPENHAGEN
SOLUTIONS

CLIMATE CAPITAL COPENHAGEN

Copenhagen Carbon Neutral by 2025

Eksempel: Nordhavn Energipartnerskab

» Koordinering af projekter skaber afsæt for innovative løsninger.

» Krav til løsninger:

  » En betydelig CO2 effekt

  » Et betydeligt vækstpotentiale

  » En høj omkostningseffektivitet

  » En betydelig markedsmodenhed på både kort og langt sigt

  » En høj brandingværdi

» Smart Grid + lav temperatur fjernvarme + høj temperatur fjern køling

» Varmelager + elbiler + geothermi + landstrøm

BY&HAVN

københavns E

KLIMA- OG ENERGIMINISTERIET

DONG energy

Global Challenges COPENHAGEN SOLUTIONS

CLIMATE CAPITAL COPENHAGEN

Copenhagen Carbon Neutral by 2025

Eksempel: Nordhavn vandpartnerskab

- Samarbejde om innovative vandløsninger i Nordhavn
  - Håndtering af vejvand
  - Grundvandsbesparende tiltag
  - Online måling af vandkvalitet
  - Håndtering af ekstremregn
- Pilotprojekter, som kan udbredes til resten af Nordhavn
- By & Havn, Københavns Energi, Københavns Kommune
- DHI, DTU, Grontmij, Grundfos, Naturstyrelsen



Klimatilpasning i København

- Planen endeligt vedtaget 25 august 2011
- Identificerer truslerne
- Peger overordnet på løsningsmuligheder
- Fastlægger en overordnet strategi
- Suppleres af konkrete handlingsplaner, fx Skybrudsplan

Global Challenges
COPENHAGEN
SOLUTIONS

CLIMATE CAPITAL COPENHAGEN
Copenhagen Carbon Neutral by 2025

Københavns hovedudfordringer

1. Mere regn - og flere skybrud. Anslået 30% mere nedbør pr. år
2. Stigende vandstand i havene
3. Øget varme (Varmeø-effekt)

Global Challenges
COPENHAGEN
SOLUTIONS

CLIMATE CAPITAL COPENHAGEN

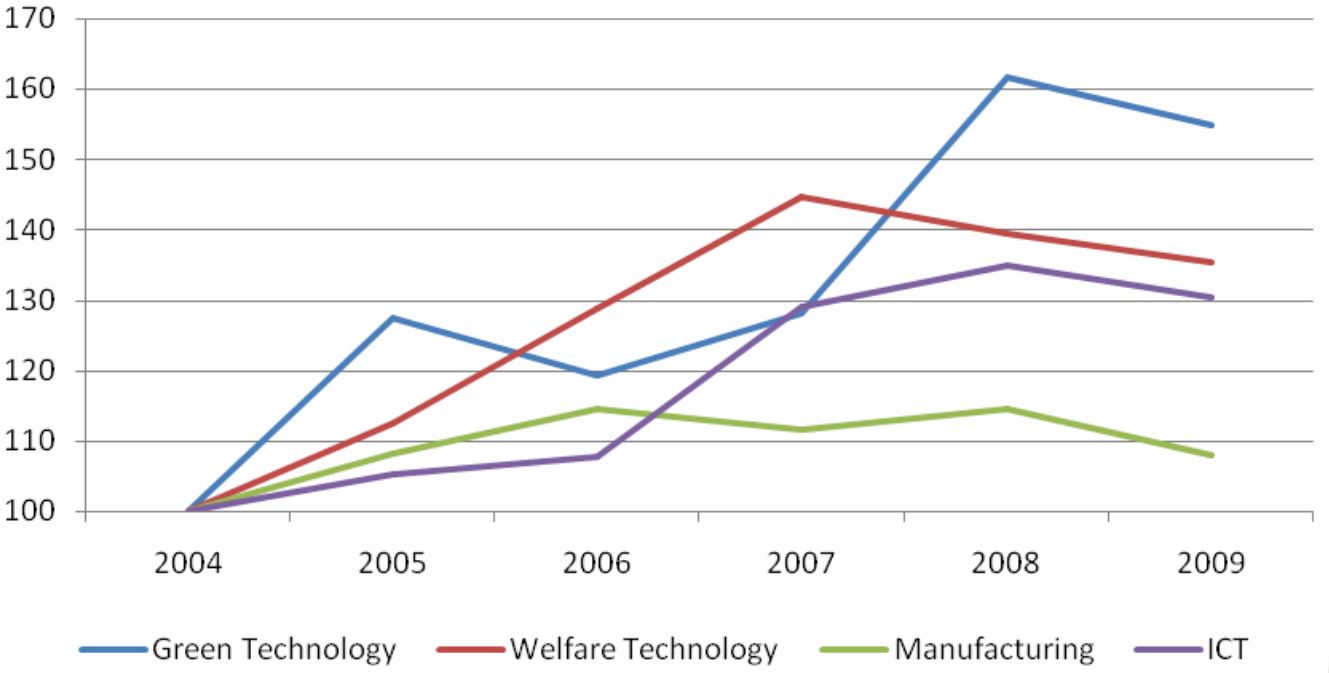
Copenhagen Carbon Neutral by 2025

Klimatilpasning skaber også muligheder

- En grøn by er også en klimasikker by - og en attraktiv bo at leve og arbejde i.
- Derfor er der fokus på løsninger, som vil øge københavnernes livskvalitet
- Klimatilpasning giver muligheder for teknologi og design-innovation - og kan skabe grøn vækst for byen

Cleantech er en driver for vækst

» 55 pct. Vækst i den københavnske cleantech sektor fra 2004 til 2009



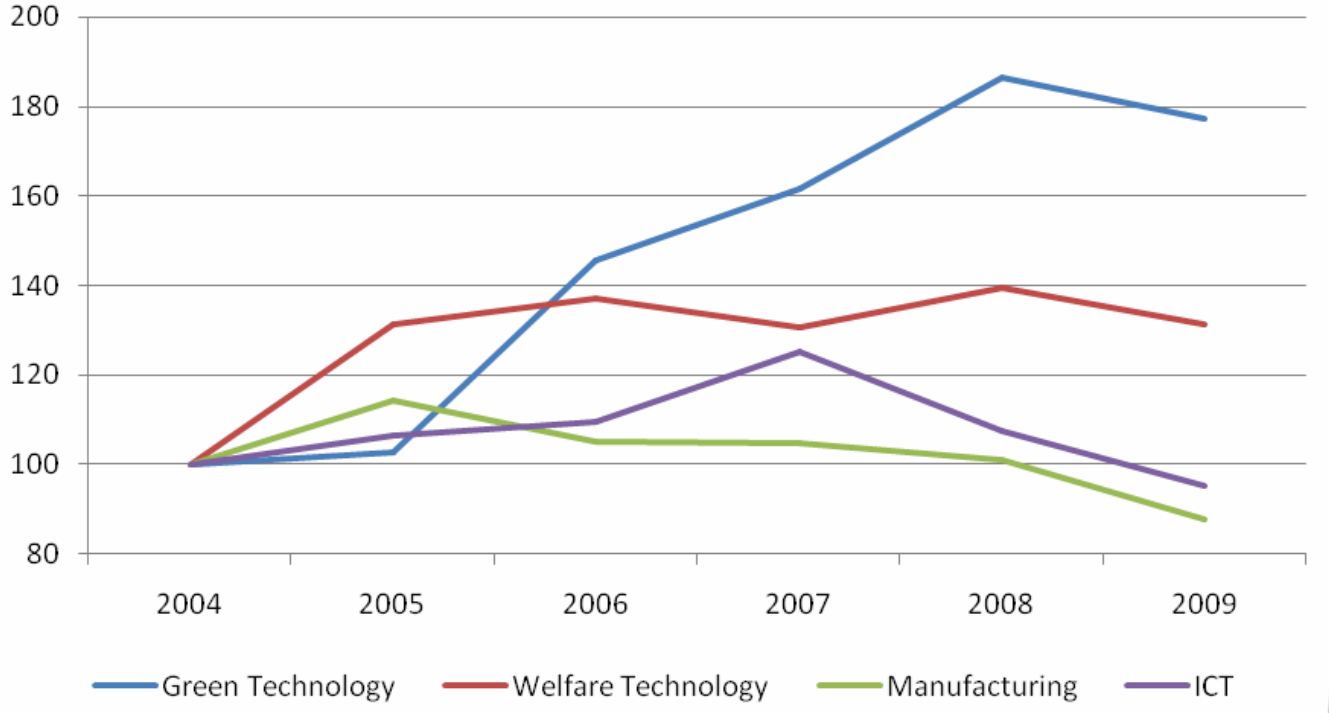
Global Challenges
COPENHAGEN
SOLUTIONS

CLIMATE CAPITAL COPENHAGEN

Copenhagen Carbon Neutral by 2025

… vækst gennem eksport

» Fra 2004-2009 voksede eksporten fra cleantech med 77 pct.



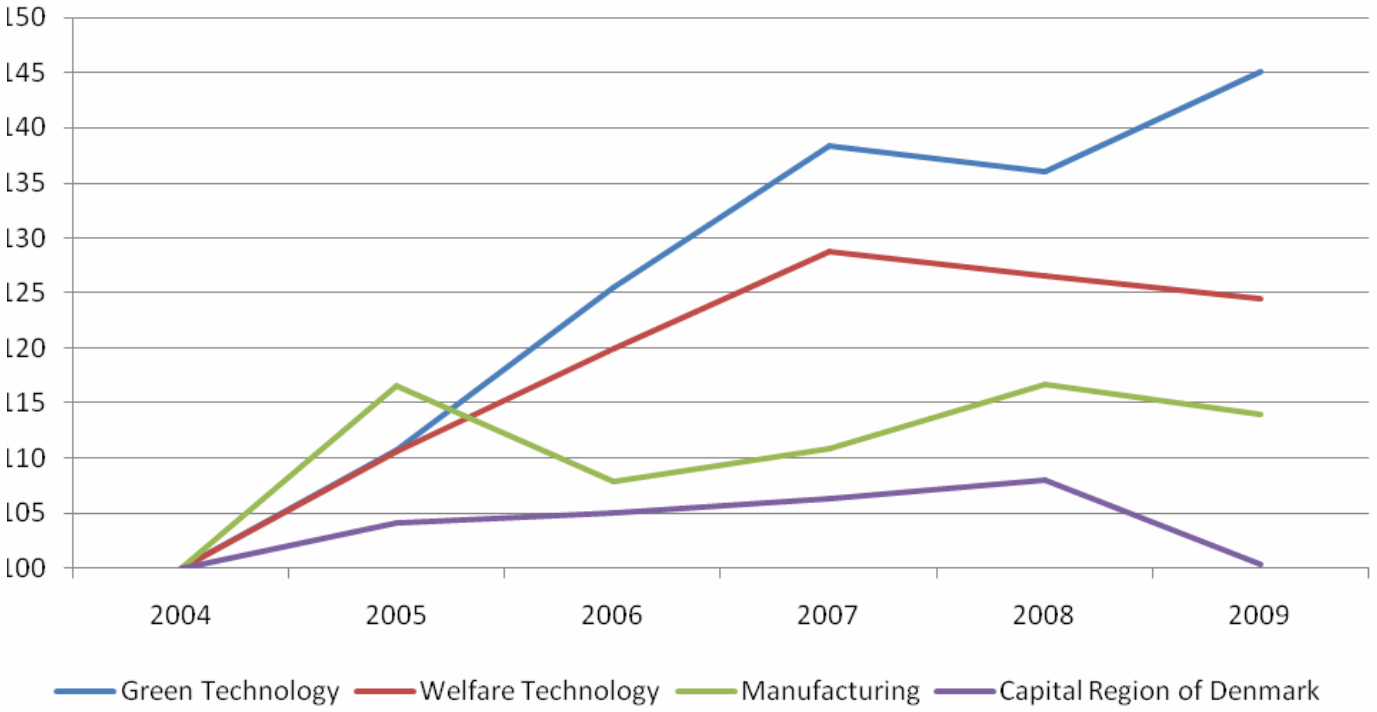
Global Challenges
COPENHAGEN
SOLUTIONS

CLIMATE CAPITAL COPENHAGEN

Copenhagen Carbon Neutral by 2025

… og gennem øget produktivitet

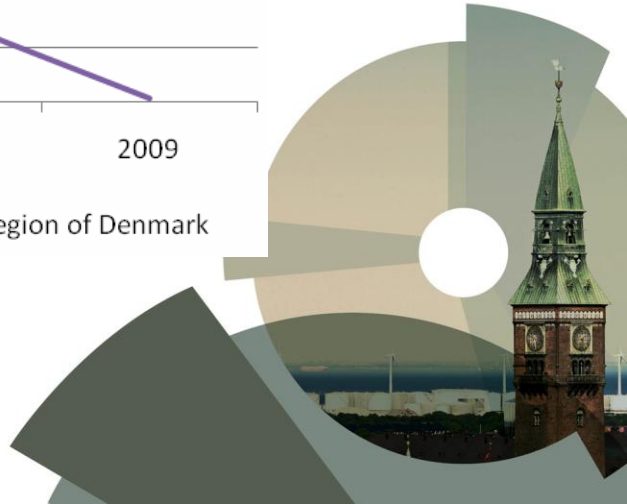
» Produktiviteten i den grønne sektor er vokset med 45 pct. over fem år.



Global Challenges
COPENHAGEN
SOLUTIONS

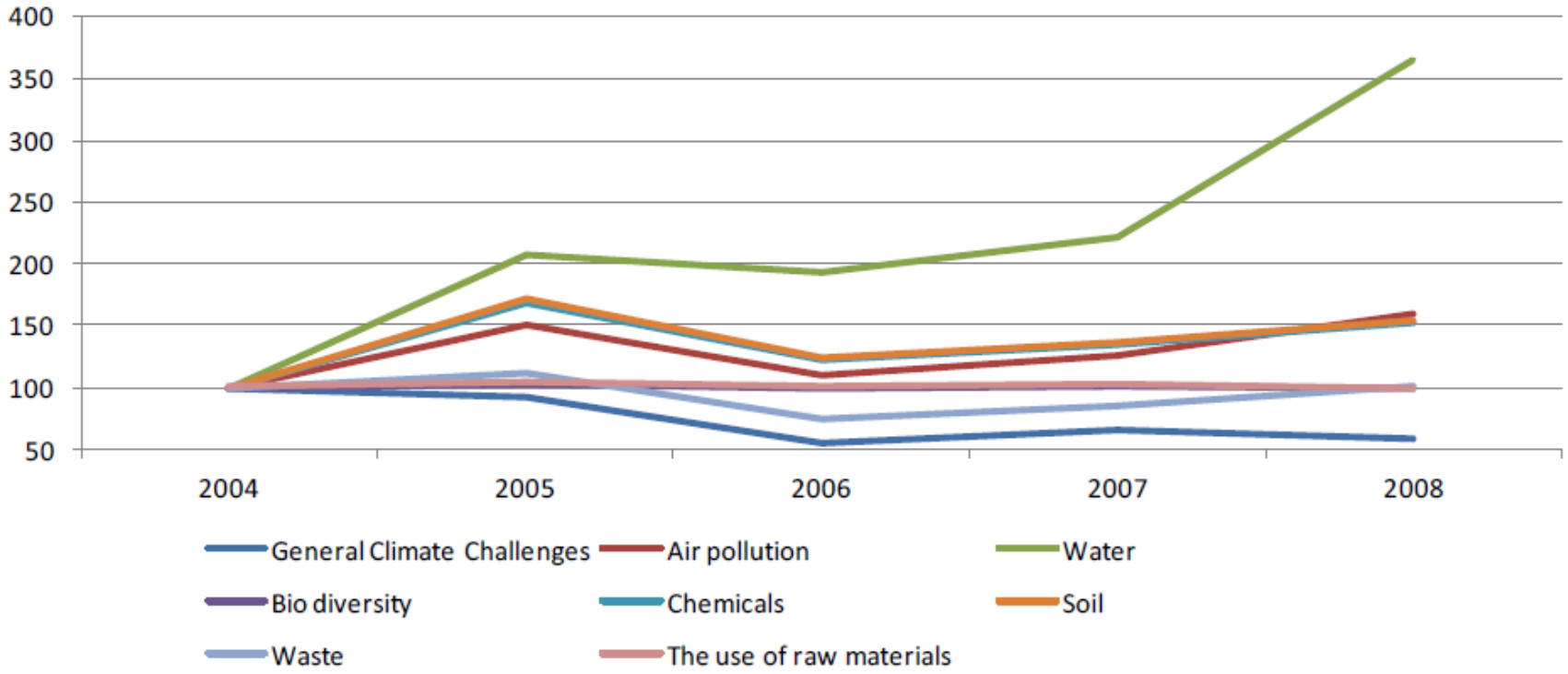
CLIMATE CAPITAL COPENHAGEN

Copenhagen Carbon Neutral by 2025



Vandteknologi er centralt

Development of turnover divided by environmental challenge in the Greater Copenhagen Area



Source: DAMVAD 2011, own calculation based on Statistics Denmark.

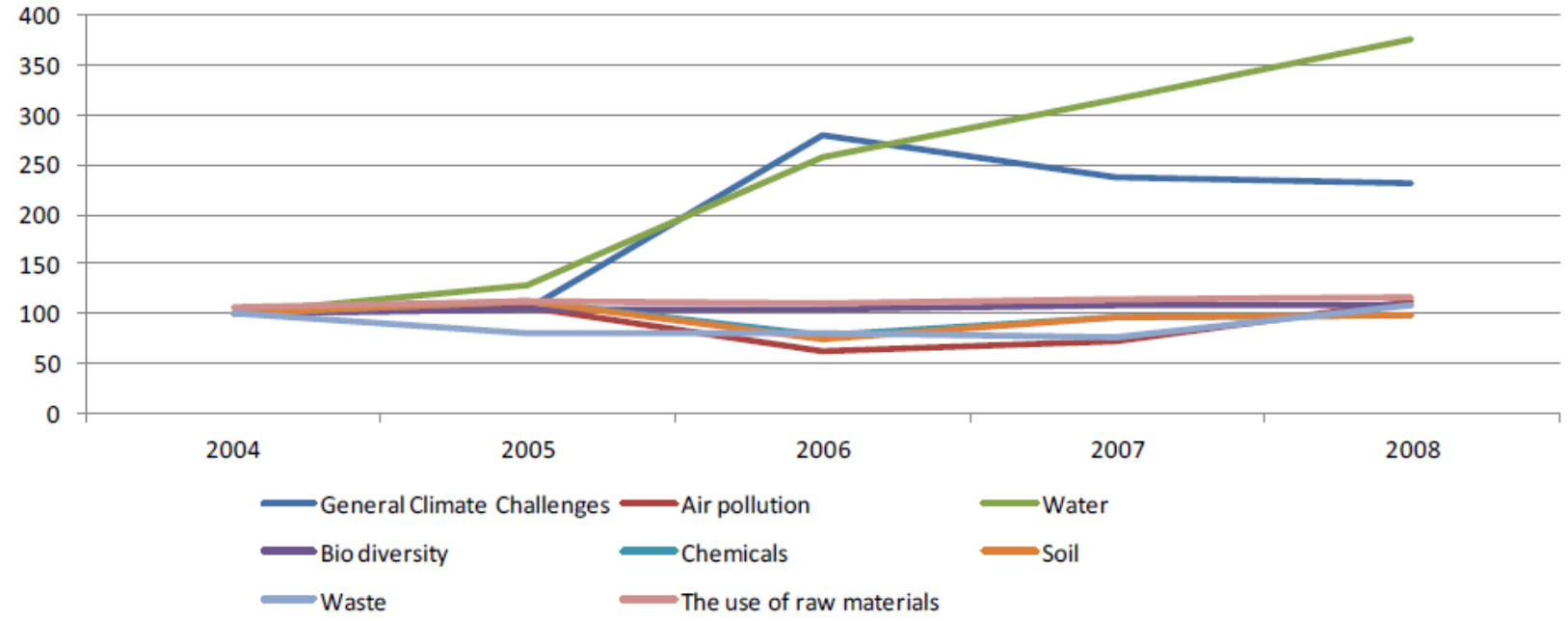
SOLUTIONS

CLIMATE CAPITAL COPENHAGEN

Copenhagen Carbon Neutral by 2025

… også for eksporten

Development of exports divided by environmental challenge in the Greater Copenhagen Area



Source: DAMVAD 2011, own calculation based on Statistics Denmark.

C40 CITIES ARE IMPORTANT TO TACKLING CLIMATE CHANGE

People

297 MILLION

Global emissions

CO_2 10%

Global GDP

18%

Export of CPH solutions

Credit: Kishi, Happy Living

OUR SOLUTION IN MORE DETAIL//

- Identification of co-located buildings - with cooling requirements to ensure there was an adequate demand for a district cooling network.
- Building a new cooling station – with a capacity of 15MW and utilizing a combination of existing resources: seawater from the Port of Copenhagen in periods where the seawater is sufficiently cold, and surplus heat from the district heating network during periods of low heat demand.
- Cooling: our solution – the use of excess heat from the district heating system during the summer months (this also helps balance the district heating system)
- Integration of different principles of cooling – the plant was designed around three different methods of cooling making it very flexible and highly energy-efficient, depending on the temperature of the seawater:
  - Free Cooling – Seawater temperature is below 5.5 degrees Celsius and cooling demand low (less than 2400 kW). All cooling demands are covered by free cooling heat exchangers.
  - Combined operation – Seawater temperature is between 5.5°C and 11.5°C. Heat exchangers are used for pre-cooling of the cooled water, before it is fully cooled by chillers to the desired temperature.
  - Chiller cooling – Seawater temperature is above 11.5°C. The seawater is too warm to be used for free cooling so absorption and compression chillers provide all cooling. Free cooling heat exchanges are bypassed completely.
- Created multiple connections to a network – District Cooling works on the same principles as district heating. Chilled water is produced centrally and carried to the end customers through a system of pipes. Networks can be built adjoining district heating pipework, or can be laid where no existing network is in place.
- Commercial development of network - are based on profitable business cases.

THE BENEFITS OF OUR NEW COOLING SYSTEM//

- ENVIRONMENTAL:
  - Carbon dioxide reduction of 67%, compared to traditional cooling. The annual sulphur dioxide and nitrogen oxide savings are 62% and 69% respectively.
  - Potential to negate or, at least, reduce the urban heat island effect.
  - Demand for electricity is reduced because electrically operated chillers are replaced by free cooling and heat operated chillers and District Cooling.
  - Excess heat, noise and chemicals from or used in compressions chillers are avoided in individual buildings.
- SOCIAL:
  - Zero noise, in contrast to conventional cooling methods
  - Removes many of the health risks associated with cooling towers e.g. Legionnaire's disease.
  - Increased energy security from a centralised supply with improved resilience built in.
  - Back up provision available.
- ECONOMIC:
  - Reduction in expenditure for energy imports.
  - Cooling contracts with different organisations and institutions can be replicable, allowing easy transferability.
  - Free up commercial, retail and parking spaces as conventional cooling systems and fan coils on roofs are replaced by underground infrastructure.

THE CONDITIONS FOR CHANGING AIR CONDITIONING//

- Client demand - a customer base is a key requirement. Organisations with existing cooling systems of more than 150kW are likely to be interested in district cooling, as it becomes both financially feasible and attractive. A sufficient supply of customers in the vicinity of a plant is required to maximise the plant's total cooling capacity.
- Suitable mix of buildings for developing network – the district cooling network can be retrofitted in existing buildings (often overcoming issues of external units in the historic urban landscape), as well as being incorporated into new buildings.
- Available Coolth - a source of either surplus heat, e.g. from CHP or cooling provided by seawater.
- Legal framework – the District Cooling Act 2008 allows municipalities that fully or partly own district heating companies to create and run district cooling networks.

70%

Reduction of Co_2 emissions.

80%

Reduction of electricity consumption.

Does not influence the architectural impression of the city.

Effects of district cooling compared to traditional cooling methods.

Tested and approved in NORDHAVN

We hope you were as inspired by our sustainable solutions as we often are by other cities and their solutions.

The City of Copenhagen is pleased to provide more information about the solutions.

More information is available at: www.kk.dk/english including photo-downloads for the press.

Please mail remaining questions regarding the solutions, processes and their results to: copenhagensolutions@okkk.dk

The district cooling system distributes chilled water to cool the indoor air of buildings

København:
Fremtidens Grøn Vækst motor

Lars Lindholm
lal@okf.kk.dk

Global Challenges
COPENHAGEN
SOLUTIONS

CLIMATE CAPITAL COPENHAGEN

Copenhagen Carbon Neutral by 2025