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**Green transition and building smarter cities in
Greater Copenhagen**



Fredensborg Municipality

- Just 40 KM North of Copenhagen
- 40.000 citizens
- Budget of 400 mio. €
- 3.000 public servants
- 75-100% ecological food served
- 30 percent of citizens in public housing

Agenda:

- Greater Copenhagen
- Our Smart City
- Our Green Goals
- Our Actions
- The Living Lab Concept



Greater Copenhagen

A stylized map of the Greater Copenhagen region. The landmasses are shown in light grey. The region of Denmark is highlighted in yellow, and the region of Sweden is highlighted in blue. The map is set against a background of light grey rays emanating from the center.

- 2 countries
- 3 regions
- 4 mio. people
- 79 municipalities


Smarter cities based on

Cooperation between cities

Co-creation with private sector and universities

To support liveability, sustainability, efficiency and growth

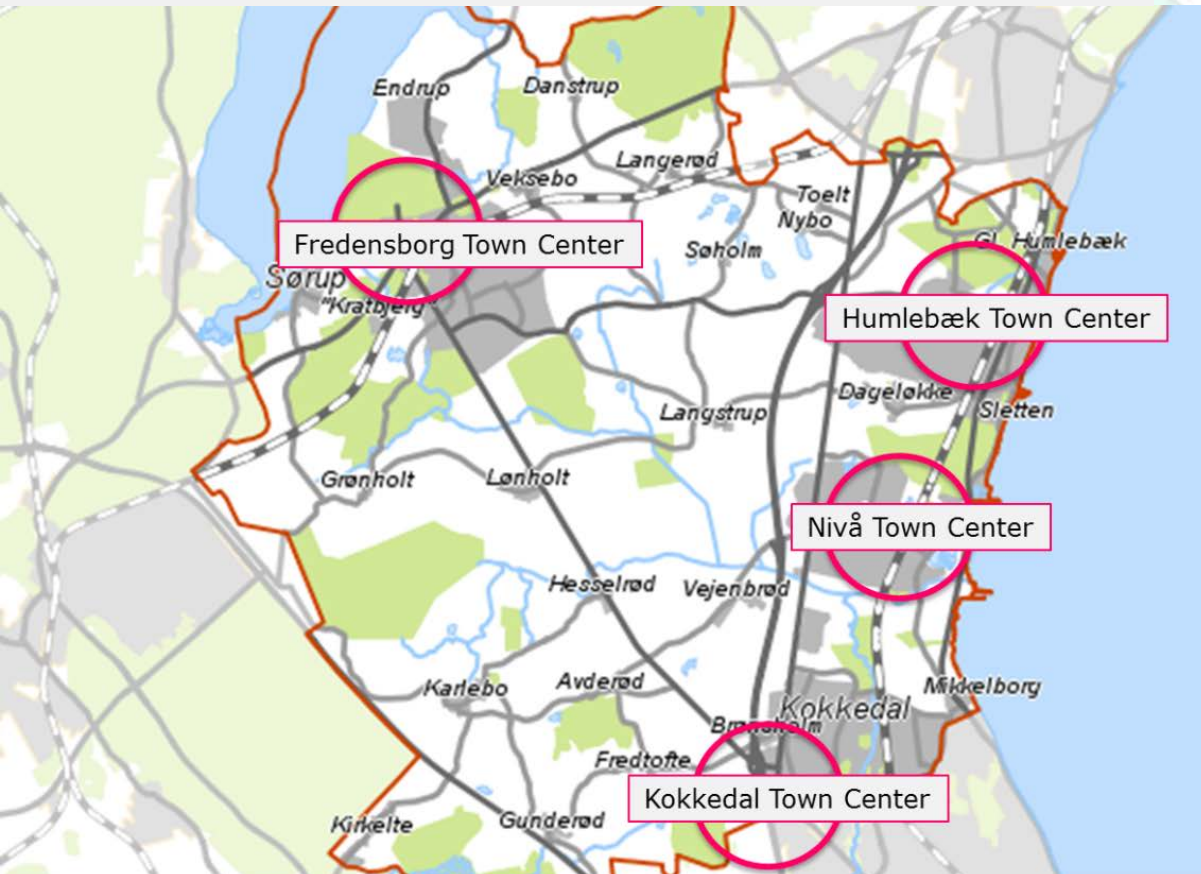
**At Gate 21 we help make
Greater Copenhagen the
world's leading region
for green transition and
growth**

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- An aerial photograph of a parking lot with a white canopy structure covering the cars. The canopy is supported by several vertical posts. The cars are parked in rows, and the ground is paved. In the background, there are trees and a clear blue sky. The image is used as a background for the text.
- As part of "Smart Greater Copenhagen" Fredensborg Municipality is developing a Smart City strategy
 - Thereby solving local issues, such as:
 - Increasing renewable energy supply
 - Reducing energy consumption
 - Better transportation infrastructure
 - Citizens' use of the urban space for example Nature Trails in recreational areas with free Wifi for online information

Smart City Strategy in Fredensborg Municipality

Smart Municipality

- Development of 4 Town Centres
- Focus on Smart Solutions (Energy, digital Infrastructure, Shopping,...)



Street Lighting in strict Local Management

- Better access to Smart Monitoring, Control and Management
- LED Lighting: 30% in 2024 -> raising to 100% in 2030
- Total savings Year 1: 220.000 kWh / 70 Tonnes CO2
- Local Producer won Bid on Smart Lighting Solution



(Photos from focuslighting.dk)

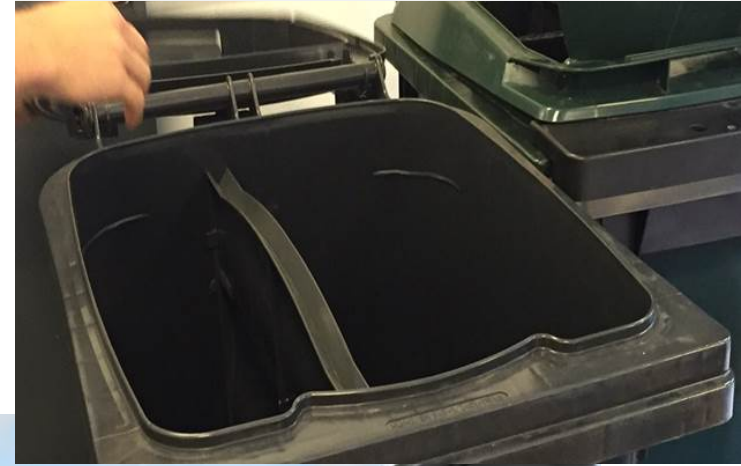


Smart Municipality

- Electric cars and bikes for meetings and visits



- Recycling

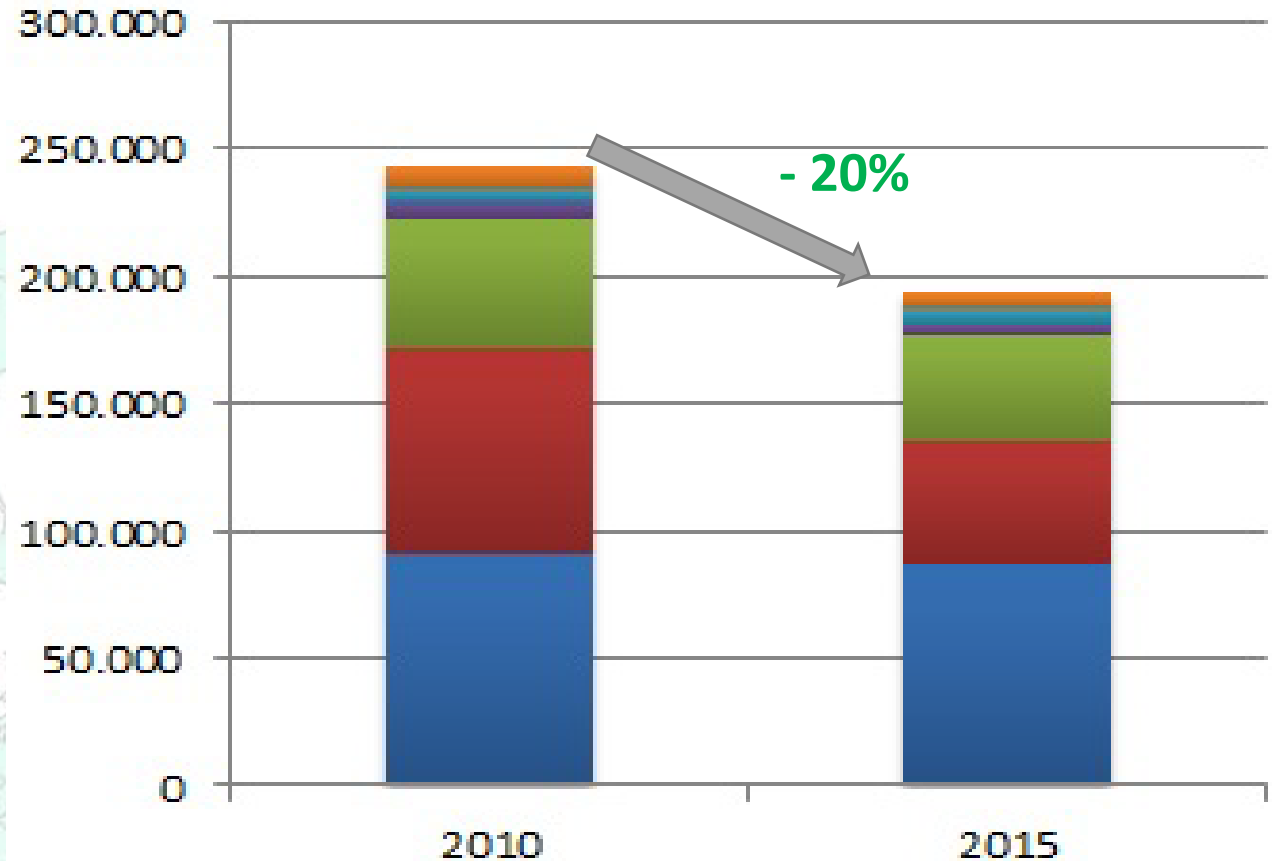


Climate goal for Fredensborg Municipality

25 pct. Reduction of CO2 in 2020 compared to 2010

Status 2018:

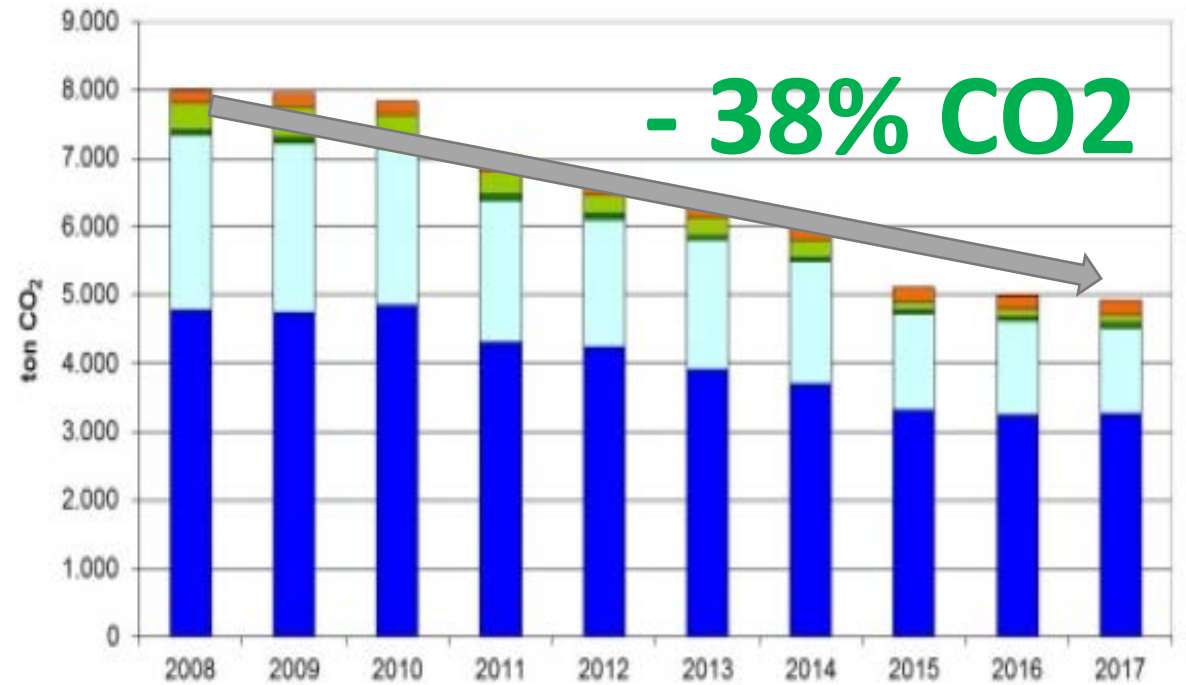
20 pct. Reduction of CO2 from 2010 ->2015



The Journey



CO₂-udledning fra Fredensborg Kommune ejendomsdrift og transport



- **38% CO₂ Reduction in 2017** (Baseline 2008)
- Accumulated Savings: **38 mio. DKK (~ 5 mio. €)**
























































Smart use of Municipality Buildings

Managing energy savings, air, temperature, access etc.

- 165 Buildings in total
- 582 Energy meters
- Centralised surveillance and Alert System
- Help Desk

Smart data:

- Intensive datalogging of energy
- Intensive monitoring of loggers
- Data also used for budgets

| Måleradr | FA | Energiform | Jan 2017 | Feb 2017 | Mar 2017 | Apr 2017 | Maj 2017 | Jun 2017 | Jul 2017 |
|---|---|------------|---|---|---|---|---|---|---|
| ♦ Fjernvarme. Ny afd. Bygn. 1, 2, 3 og 4, 6750154 |  | Fjv. MWh |  |  |  |  |  |  |  |
| ♦ Fjernvarme. Gl. afd. bygning 5 og 6, 6521963 |  | Fjv. MWh |  |  |  |  |  |  |  |
| ♦ Vandmåler. Ny afd. Bygning 1, 2, 3 og 4, 5456080011 |  | Vand |  |  |  |  |  |  |  |
| ♦ Vandmåler. Gl. afd. Bygning 5 og 6, 5769910034 |  | Vand |  |  |  |  |  |  |  |
| ♦ Elmåler. Ny afd. Bygning 1, 2, 3 og 4, 3106338 |  | EI kWh |  |  |  |  |  |  |  |
| ♦ Elmåler. Gl. pedelbolig, 4035671 |  | EI kWh |  |  |  |  |  |  |  |
| ♦ Elmåler. Gl. inspektørbolig, 21227705, FA | | EI kWh |  |  |  |  |  |  |  |

Energy Savings in Public Buildings

Unique Incentives Model:

- Local Responsibility for energy budget
- 50% of savings finance the investments
- 50% of savings transferred to local budgets
- Local Maintenance Staff trained in saving energy

Vilhelmsro – Our new Green School

Indoor climate and the learning curve

- 20-25% faster learning in Class rooms with good daylight conditions
- 11-25% better scores in Math with optimal lighting
- 5-6% weaker achievements if CO₂-level is over 2.000 ppm

Focus on:

- The energy consumption in the daily use
- The choice of materials in the building construction and building process
- The food offered in the cantina
- The indoor climate in the class rooms



Private Energy Savings

In private housing

- ~12.500 Single Family Houses in Fredensborg Municipality
- Energy Reports free of charge
~ 900 houses covered (7%)
- 150 households has renovated and saved energy
- Actual savings to day: 400.000 kWh/year
(40% of Potential savings and 14% of total consumption)

In Businesses

- Energy Reports – free of charge
- 52 Energy Reports free of charge
- 5-20% Savings with good PayBack Scenarios



Leading facility in Europe

10.000 employees area

12 kilometres of road

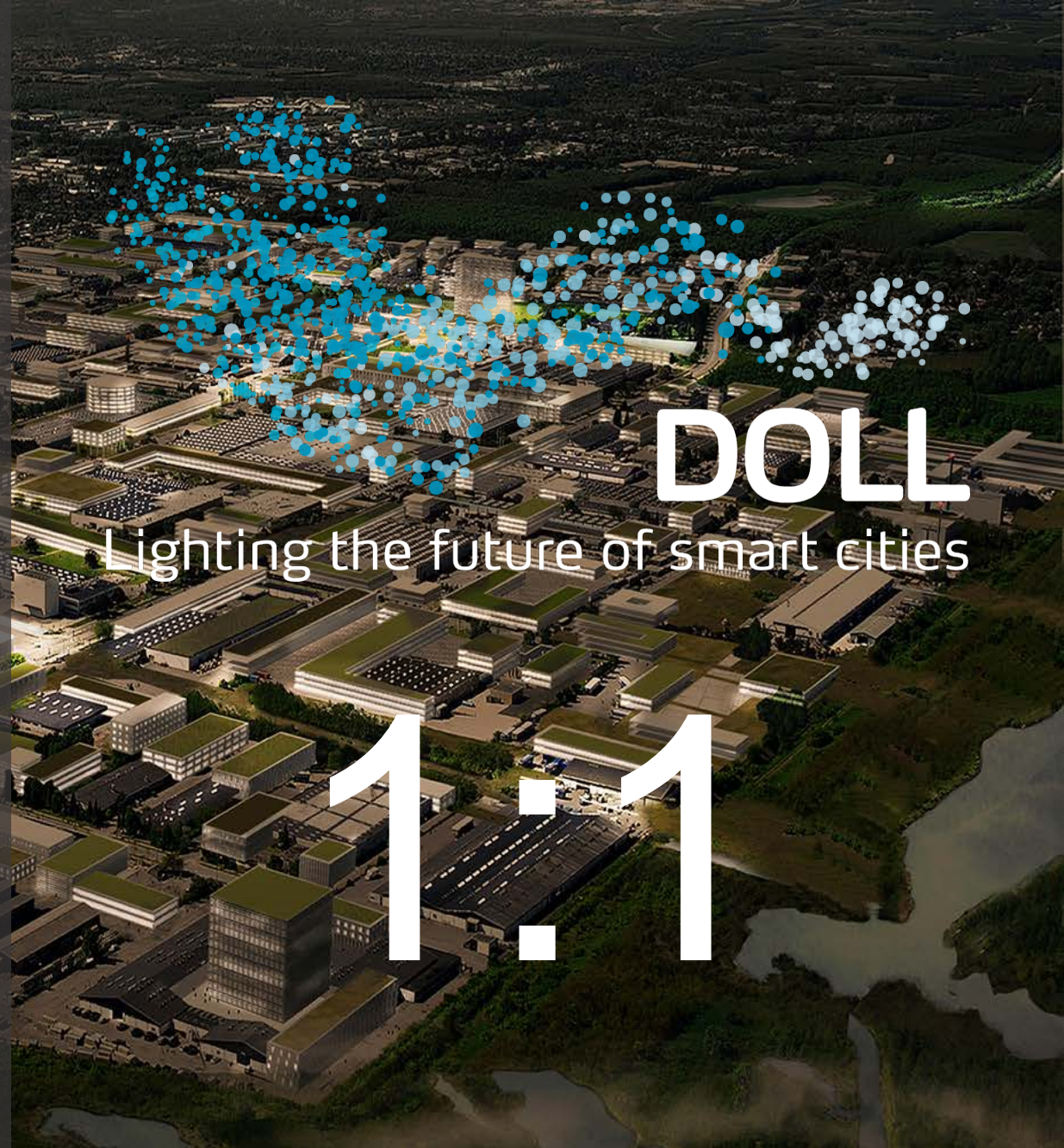
6 digital networks

435 connected light points

255 sensors

20 management systems

1 city data platform

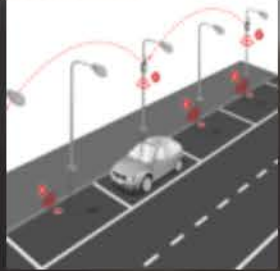


DOLL

Lighting the future of smart cities

1:1

Smart Urban Services



Smart Parking



Smart Outdoor Light



City WiFi



Infrastructure monitoring & maintenance



Navigation Smart Bus Stops



Beacons & Hyper Local Advertising



Air Quality



Waste Collection



Security & Surveillance



Smart Grid



FREDENSBORG
KOMMUNE



ÉN KOMMUNE – FEM UNIKKE STEDER
• FREDENSBORG • HUMLEBÆK • NIVÅ • KOKKEDAL • LANDET