Welcome

Denmark's Green Transition

By State of Green – a public private partnership

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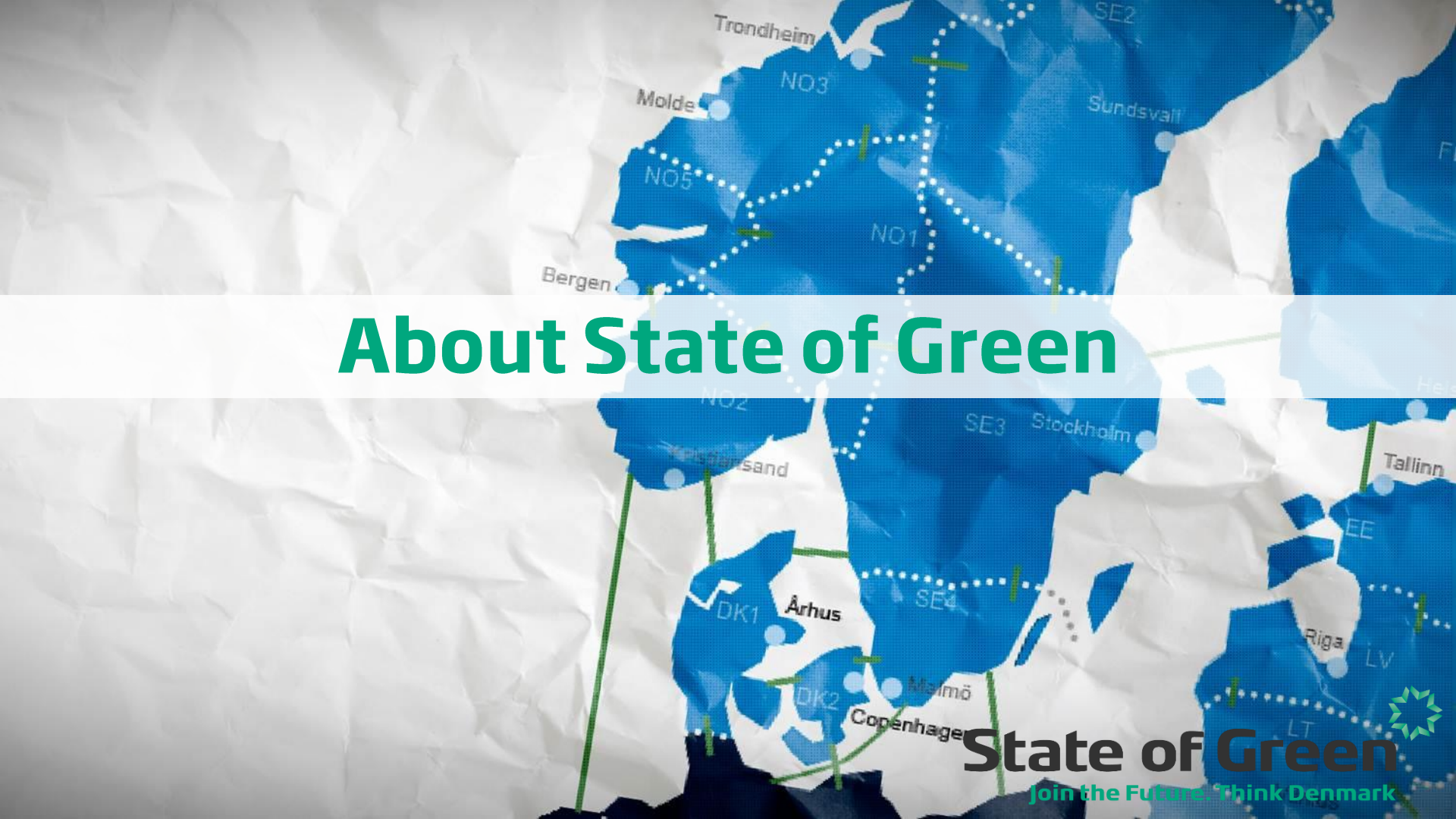

About State of Green

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What is State of Green?

State of Green is a public-private partnership founded by:

The Danish Government
The Confederation of Danish Industry
The Danish Energy Association
The Danish Agriculture & Food Council
The Danish Wind Industry Association

H.R.H. Crown Prince Frederik of Denmark is patron of State of Green

Ministry of Industry, Business and Financial Affairs
Danish Ministry of Energy, Utilities and Climate
Ministry of Foreign Affairs of Denmark
Ministry of Environment and Food of Denmark
Confederation of Danish Industry
Danish Agriculture & Food Council
Danish Energy Association
Danish Wind Industry Association

State of Green's commercial partners:

Premium partners

Danfoss · Grundfos · Rambøll · Rockwool · Vestas

Associate partners

DONG energy · Green Tech Center Smart Grid Living Lab · Fagligt Fælles Forbund · BWSC Your Global Energy Partner

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Our Purpose


We showcase Denmark's green solutions internationally and attract investments to Denmark
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Sharing Denmark's green know-how

Purpose: To showcase Denmark's green solutions internationally and attract investments to Denmark
Focus: High-level commercial and political decision makers and international media

- ENERGY EFFICIENCY
- HEATING & COOLING
- INTELLIGENT ENERGY
- WIND POWER
- SOLAR & OTHER RENEWABLES
- BIOENERGY
- WATER
- CLIMATE ADAPTATION
- ENVIRONMENT & RESOURCES
- SUSTAINABLE TRANSPORTATION

+600 Profiles

+1,400 Solutions

- State of Green Tours
- Events
- Website
- House of Green
- Press & Communication

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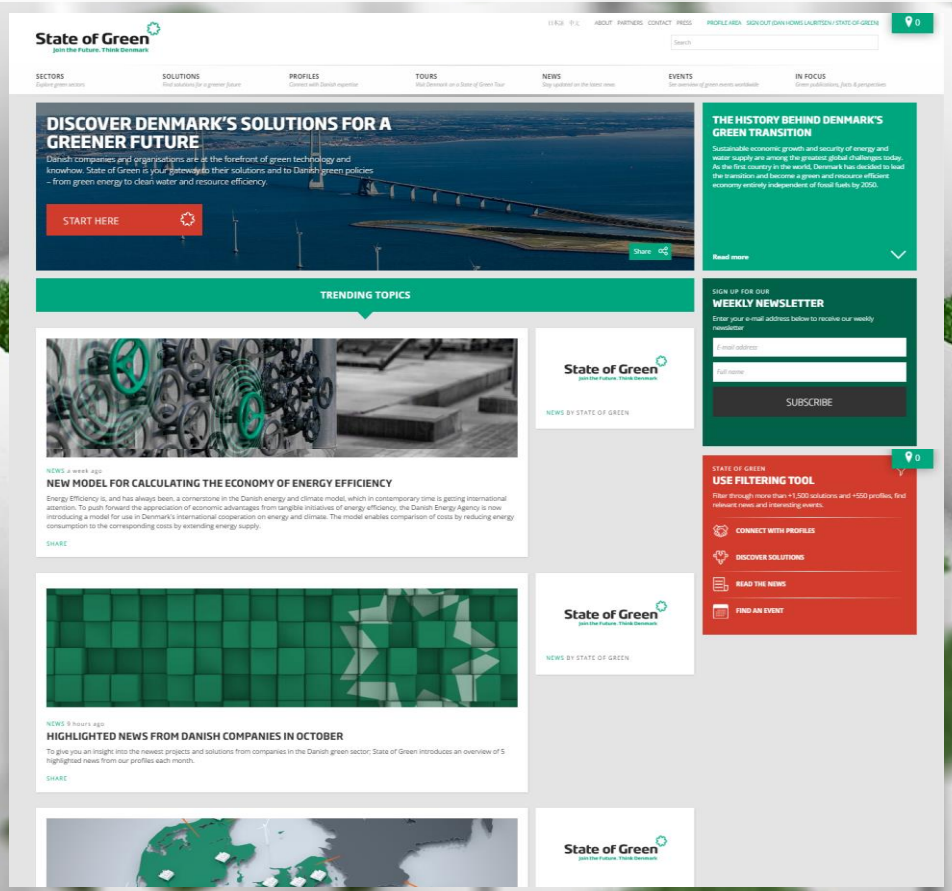
Stateofgreen.com



1,400 solutions

News
Newsletter
In Focus
Facts

600 profiles

60,000 monthly visits

English
+Chinese
+Japanese
+ German

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State of Green Tours

Technical on-site visits in Denmark

Lessons-learned from companies, institutions and governmental bodies

Tailored to suit delegation needs

2,000 visitors per year

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Towards 2050

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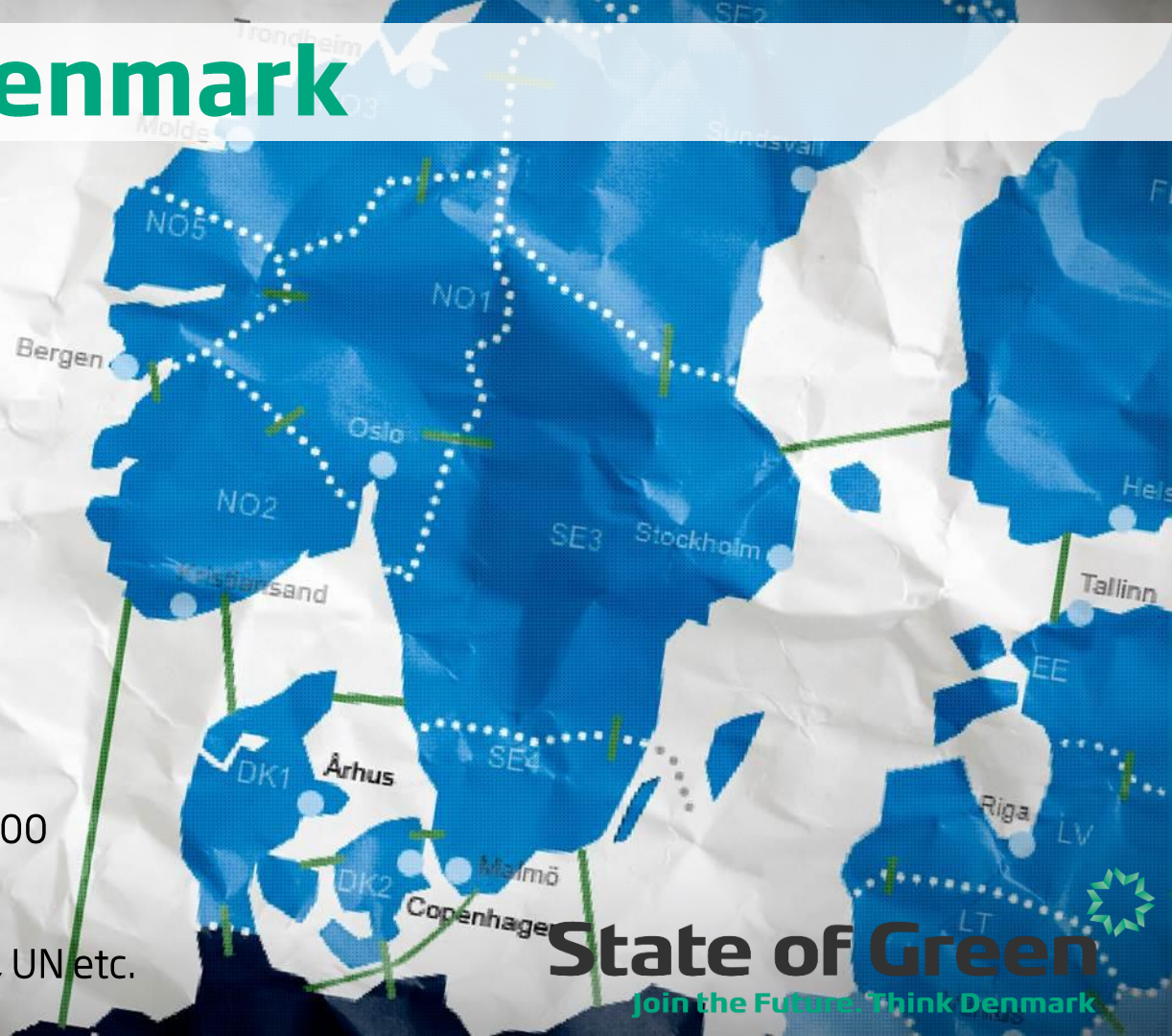
Facts about Denmark

- 5.6 million people
- Area: 43,000 km^2
- Land use:
  - Agriculture 66 %
  - Forest 16 %
  - Lakes, meadows and marsh 7 %
  - Urban zone/infrastructure 10 %
- Total coastline: 7,300 km
- Constitutional monarchy
- GDP per capita (2015): EUR 43,500
- The world's happiest nation several times according to OECD, UN etc.



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The Danish point of departure

- 1973-74 oil crisis
- 99% dependent on imported energy
- Pollution caused by fossil fuels
- Growing public concerns about environmental policy

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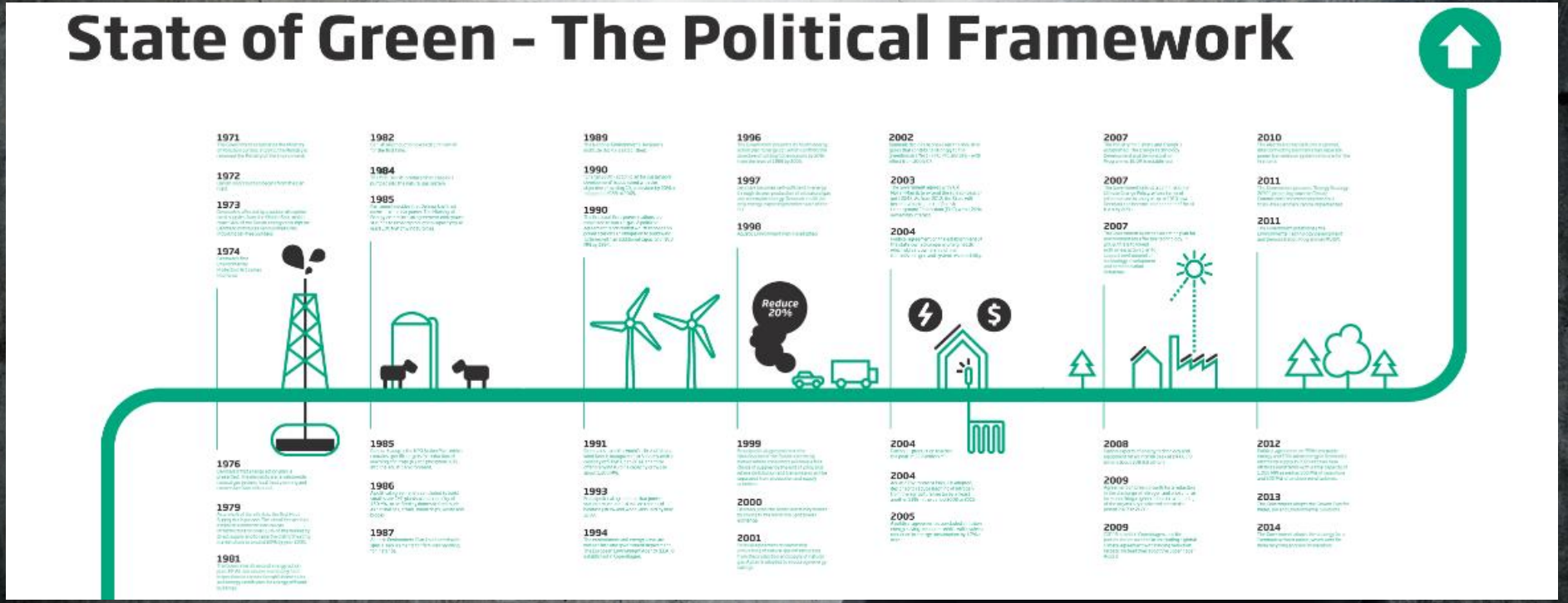
A new direction



green business

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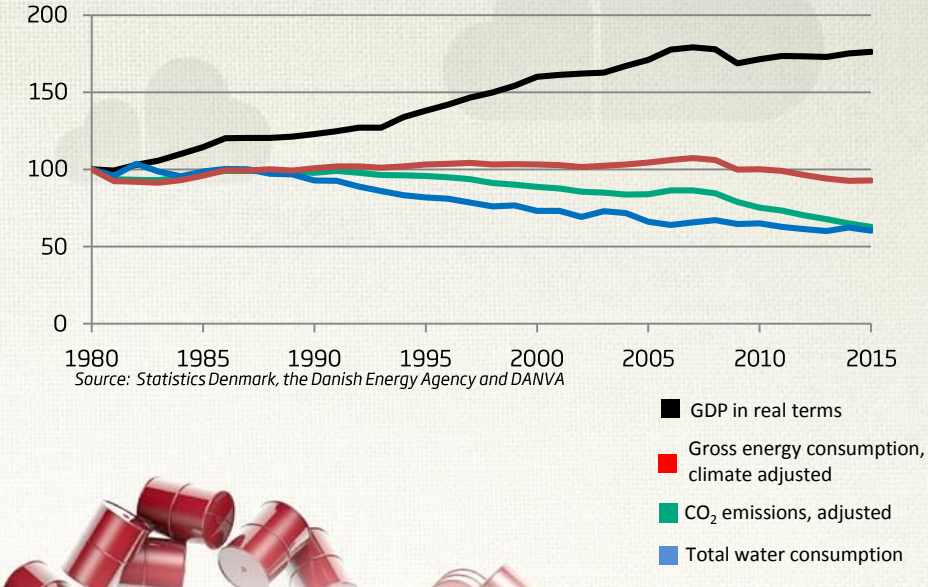
The Danish example (1980 = index 100)

Our economy has grown by more than 70% since 1980

Our energy consumption has remained the same

While CO_2 emissions have been reduced

And total water consumption has been reduced by 40%



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Denmark a fossil fuel independent society by 2050

- March 2012: New Danish energy agreement
- The agreement is characterised by its ambitious scope, broad political support and long time horizon
- Target is 100% renewable energy in the energy and transport sectors by 2050
- Energy Commission set up 2016: Focus on how to meet international climate obligations in a cost-efficient way

- 40% share of renewable energy in energy consumption by 2020
- 50% share of renewable energy in energy consumption by 2030
- 100% independent of fossil fuels by 2050

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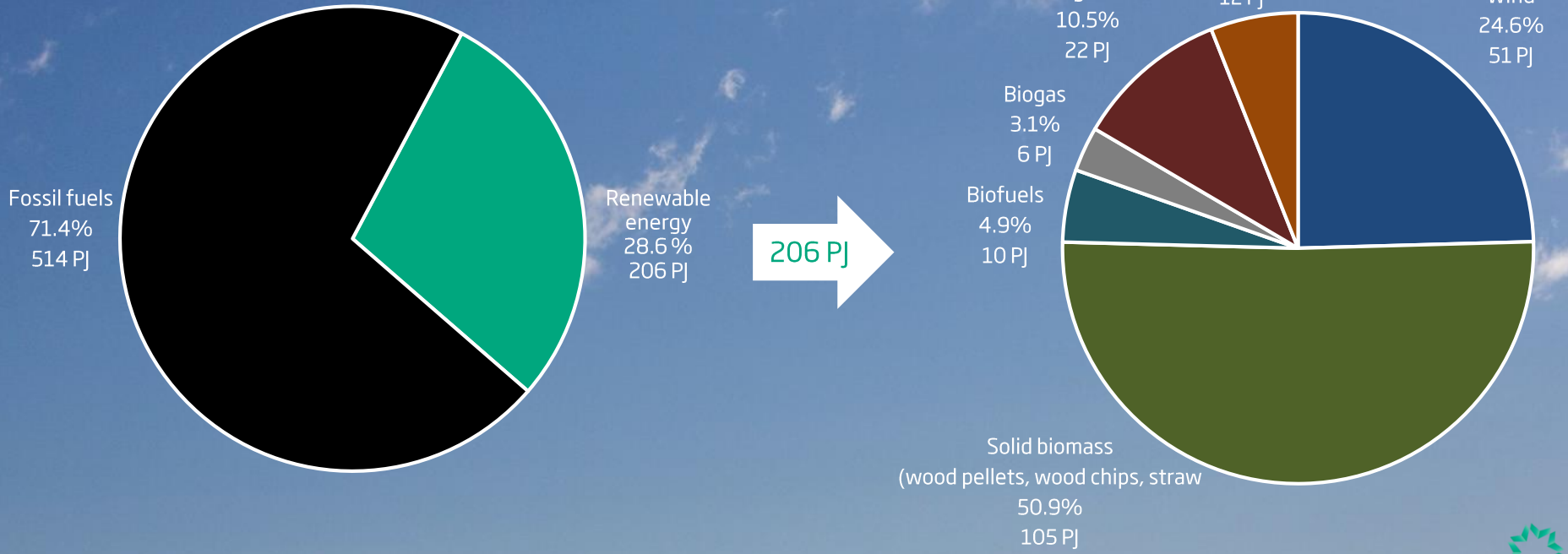
Denmark's Energy Consumption 2015



Source: The Danish Energy Agency, 2016

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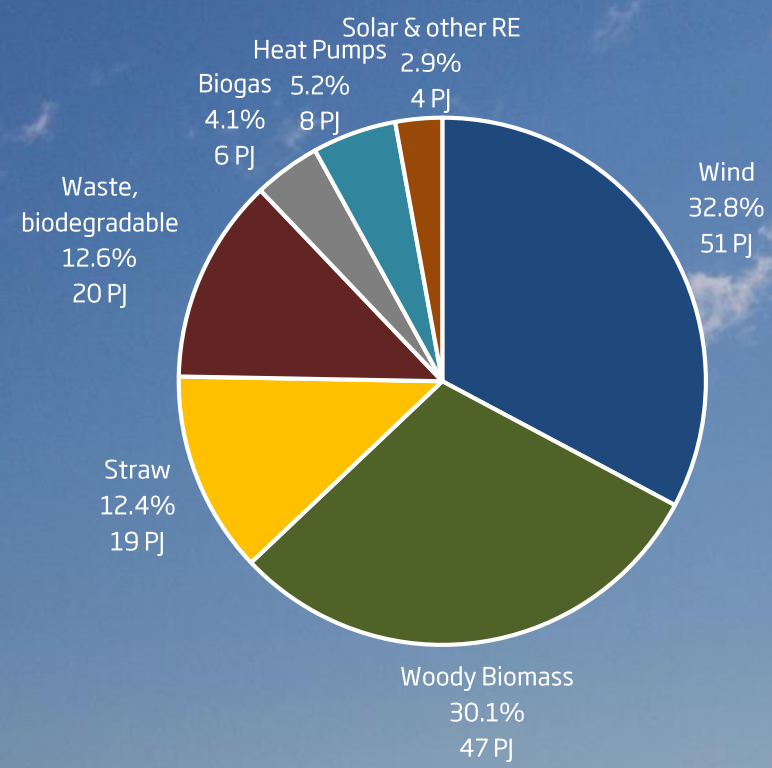
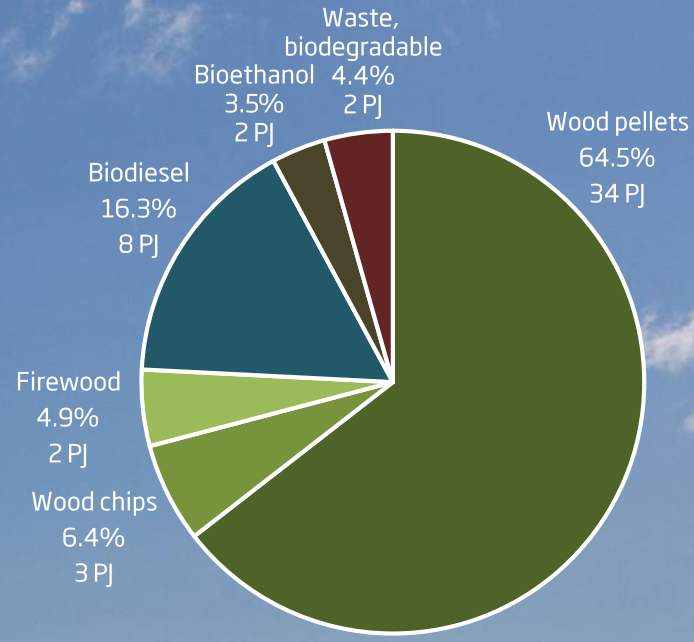
Denmark's Renewable Energy Mix 2015

National production input from resources: 155 PJ



Import: 51 PJ



Source: The Danish Energy Agency, 2016

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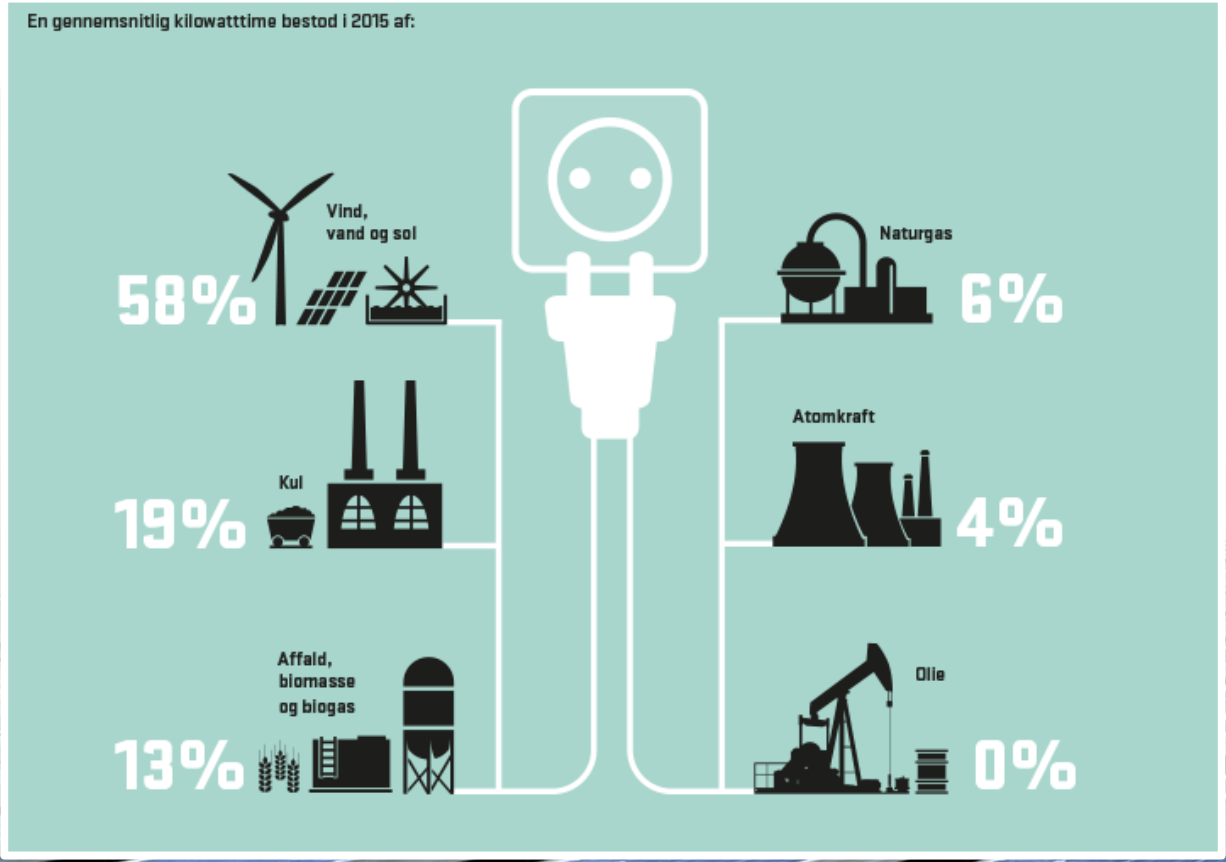
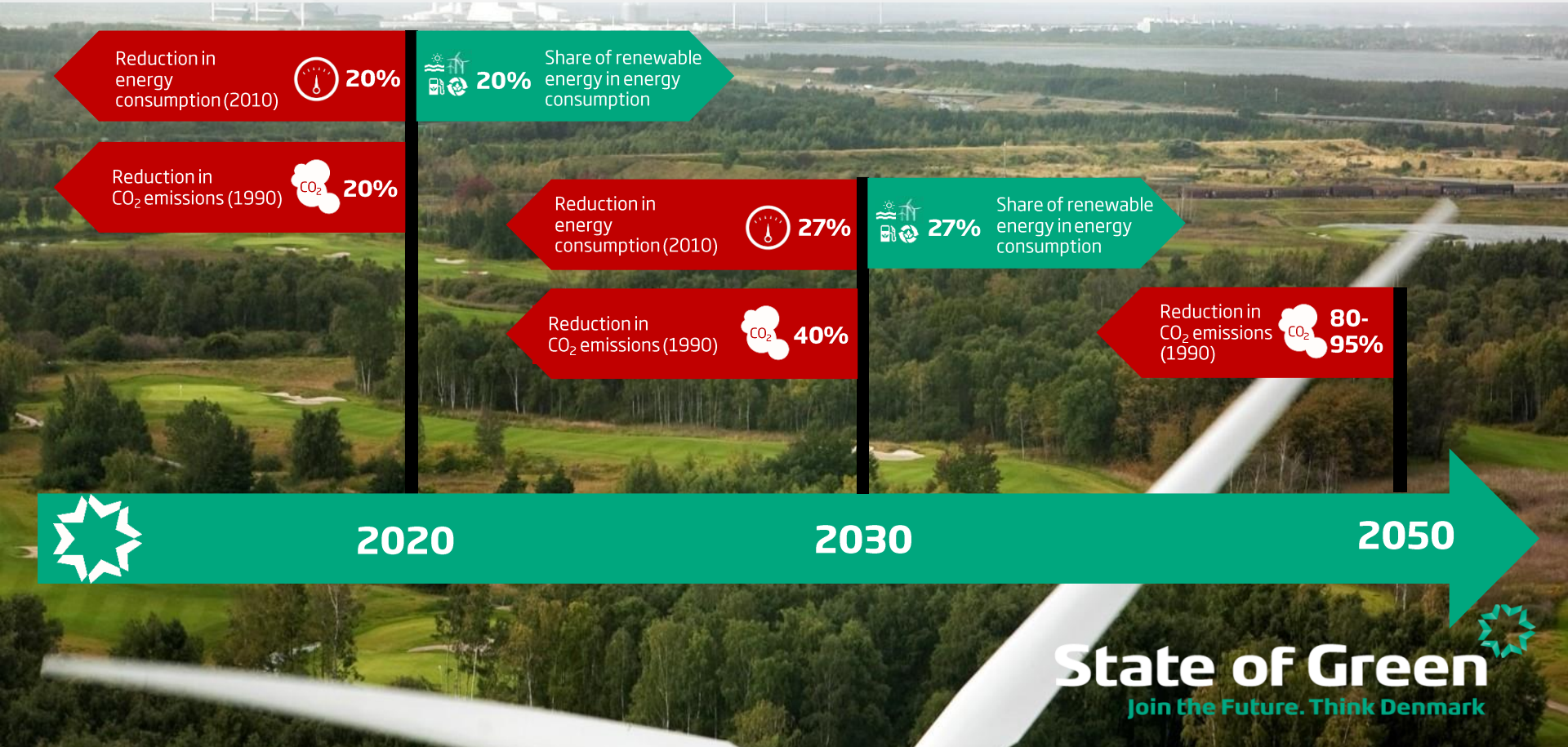
Electricity consumption



EU Targets Towards 2050



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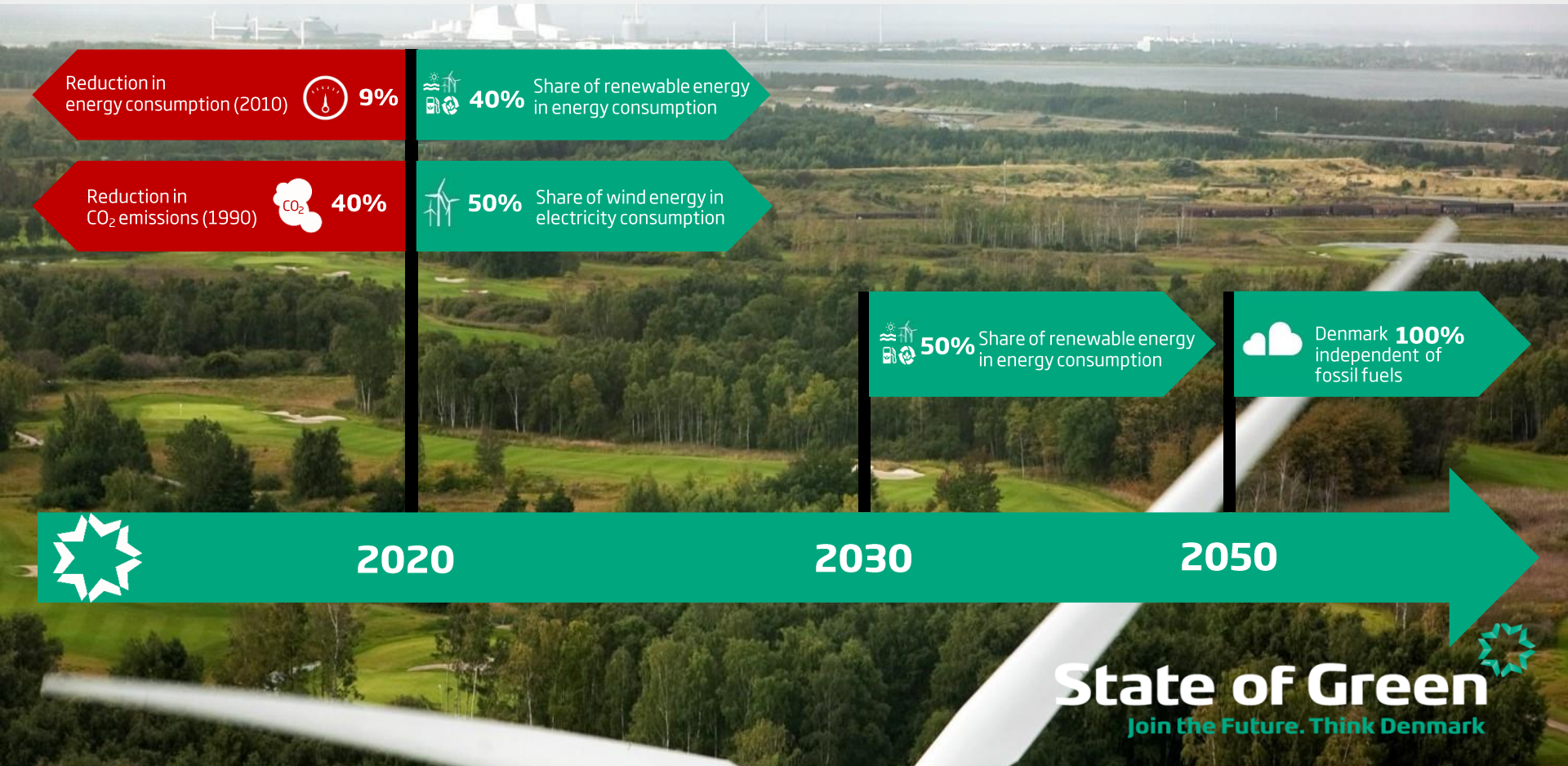
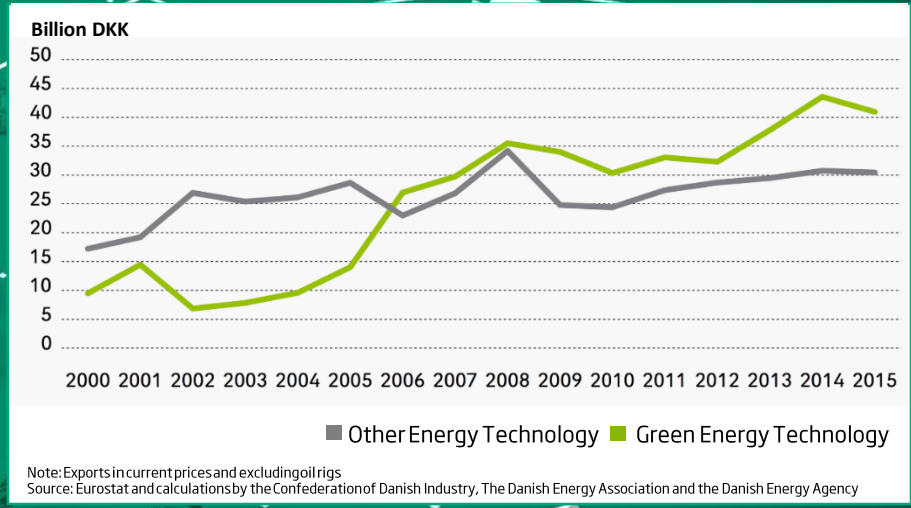
Denmark a fossil fuel independent society by 2050



Green Business is Good Business

- Exports of 'Green Energy Technology' in 2015: EUR 5.50 billion (DKK 40.9 billion) 6.4% of total Danish exports.
- Since 2000, exports of 'Green Energy Technology' have increased by more than 300%.
- Post-COP21: Increased demand for green technologies and solutions.
- Need for stable energy supply



Note: Exports in current prices and excluding oil rigs
Source: Eurostat and calculations by the Confederation of Danish Industry, The Danish Energy Association and the Danish Energy Agency

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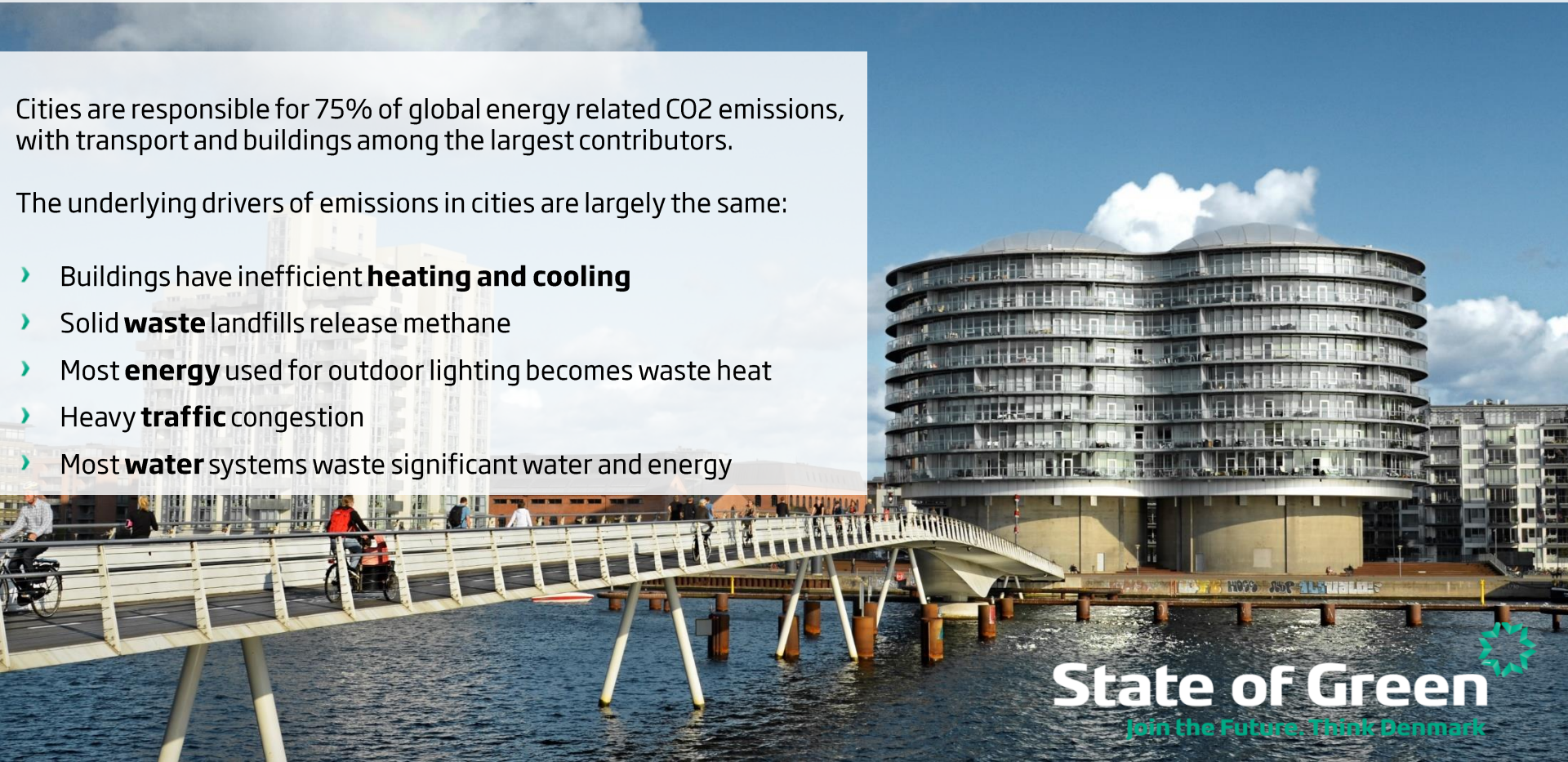
Cities as Drivers for Green Growth

Cities as Drivers for Green Growth

Cities are responsible for 75% of global energy related CO2 emissions, with transport and buildings among the largest contributors.

The underlying drivers of emissions in cities are largely the same:

- Buildings have inefficient **heating and cooling**
- Solid **waste** landfills release methane
- Most **energy** used for outdoor lighting becomes waste heat
- Heavy **traffic** congestion
- Most **water** systems waste significant water and energy



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Liveable Cities

- Liveability describes the frame conditions of a decent life for all inhabitants of cities, regions and communities.
- Good governance structures and **holistic urban planning**.
- Economy is a driving force towards or against liveability.

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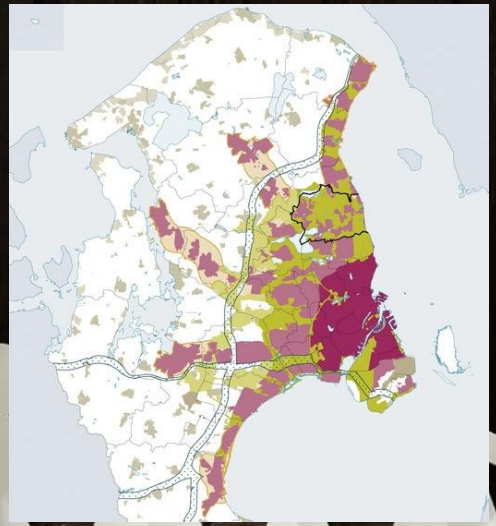
Holistic long term planning



The Finger Plan

- A strategy for the development of the Greater Copenhagen area (two million inhabitants)
- Urban development is concentrated along city fingers linked to the railway system and radial road networks
- The city fingers are separated by green wedges which are kept exempt from development.

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Copenhagen – One of the World's Most Liveable Cities

Challenges:

- Increased urbanisation: 80,000 more inhabitants in Copenhagen by 2025 compared to 2016 – a 14% increase.
- Increase in congestion: 27% more bicycle trips and 20% more cars.
- Building area expected to increase by 12%.

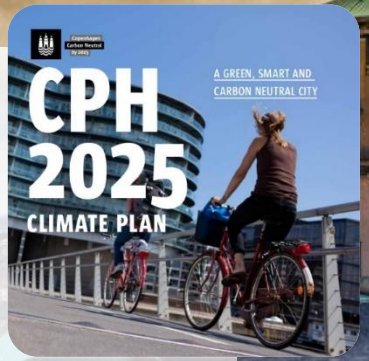
Solutions:

CPH 2025 Climate Plan with four focus areas:

- Energy Consumption
- Energy Production
- Green Mobility
- City Administration Initiatives

Three implementation periods, the first finished end of 2016.

Next: Roadmap 2017-2020 – contains 62 new initiatives.



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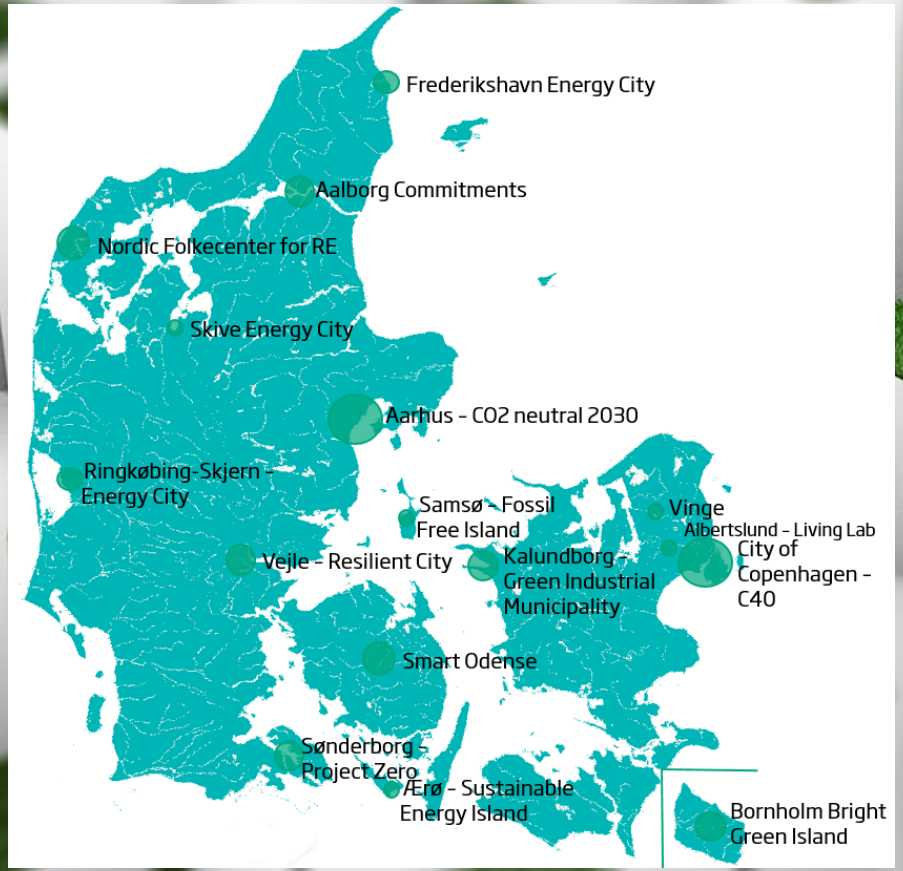
Danish Sustainable Cities



- Copenhagen
- Aarhus
- Odense
- Aalborg
- Vejle
- Vinge
- Kalundborg
- Samsø
- Bornholm
- Ringkøbing Skjern
- Skive
- Frederikshavn

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City Case Examples
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Nordhavn (North Harbour)

Northern Europe's largest new urban development area. A new liveable and smart district in Copenhagen.

- 40,000 inhabitants
- 40,000 work places
- CO2 neutral by 2025
- Smart City solutions
- Low temperature district heating
- Large energy storage
- Intelligent waste handling
- Public transport prioritisation
- Parking strategy
- Super bicycle paths
- Solar systems
- EnergyLab Nordhavn

Photo: By og Havn/Ole Malling

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Konditaget (Physical Roof) - More than a Car Park

- P-hus Lüders – Public car park
- 2,400 m2 public space for recreation and play
- Recycled material: Old tires and shoes

Photo: By og Havn/Peter Sørensen

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Copenhagen - A City of Cyclists

60 % of the Copenhageners who live and work in the city bike. But Why?

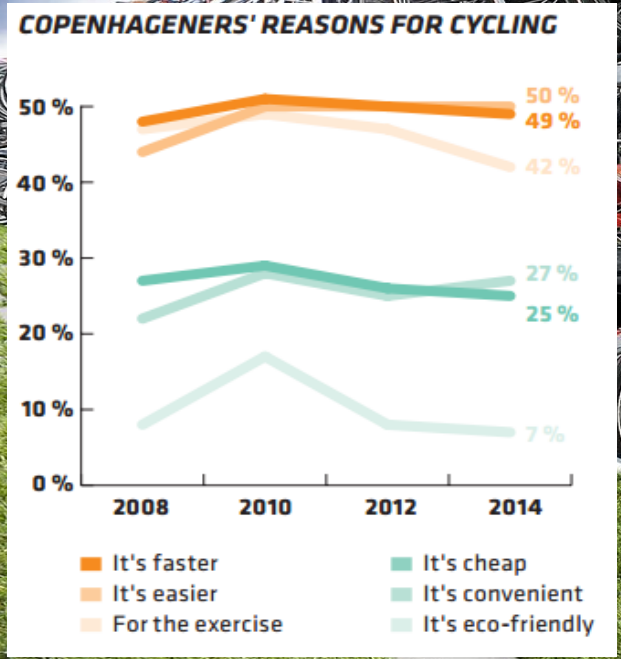

Illustration: City of Copenhagen, Bicycle Account 2014

Designing a city for bicycles

- Safety
- Timesaving
- Convenience
- Comfort
- Liveability

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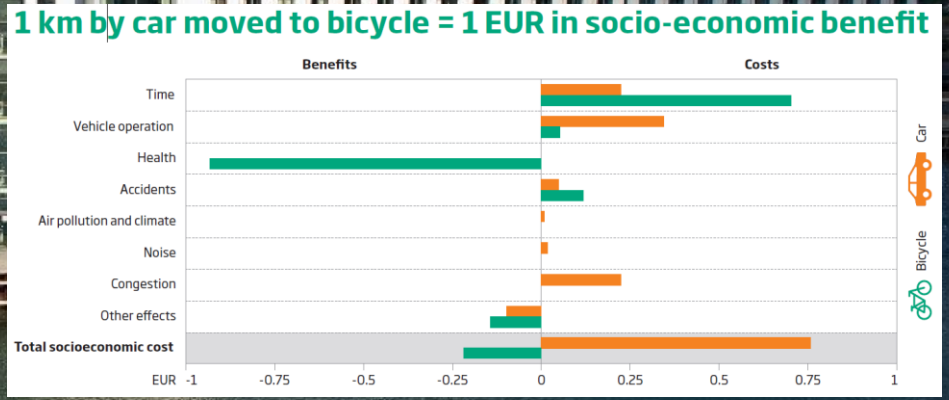
Socio-Economic Benefits



- Measuring the socio-economic benefits of alternative modes of transportation
- The Cycle Serpent – a missing link
- 1 minute saved = 700,000 EUR in socio-economic benefits yearly

Photo: Ursula Bach

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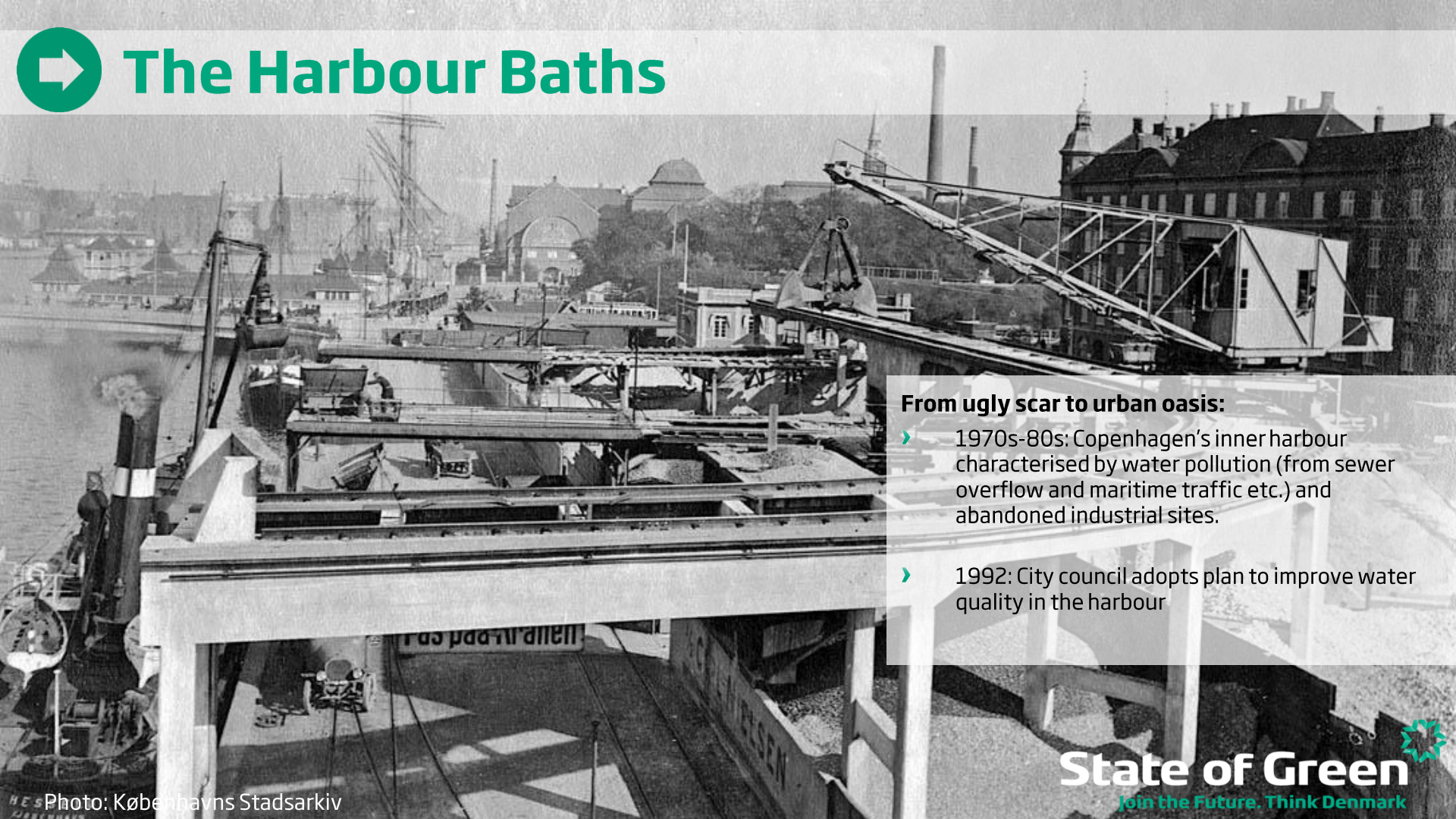
The Harbour Baths



From ugly scar to urban oasis:

- 1970s-80s: Copenhagen's inner harbour characterised by water pollution (from sewer overflow and maritime traffic etc.) and abandoned industrial sites.
- 1992: City council adopts plan to improve water quality in the harbour

Photo: Københavns Stadsarkiv

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The Harbour Baths

Measures taken:

- Integration of urban design and wastewater management
- Construction of 12 large retention basins
- Closing of sewer outlets
- Development of water quality warning system

The result:

- Harbour is now an urban oasis clean enough to swim in
- Real-estate values up by 50-100%
- Booming local service sectors

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Copenhagen Solutions Lab

City of Copenhagen's laboratory for smart urban solutions

Three roles:

- Single entry point for smart city solutions
- Coordination of internal cooperation
- Foster growth and export in the Danish smart city sector

Photo: Copenhagen Solution Lab

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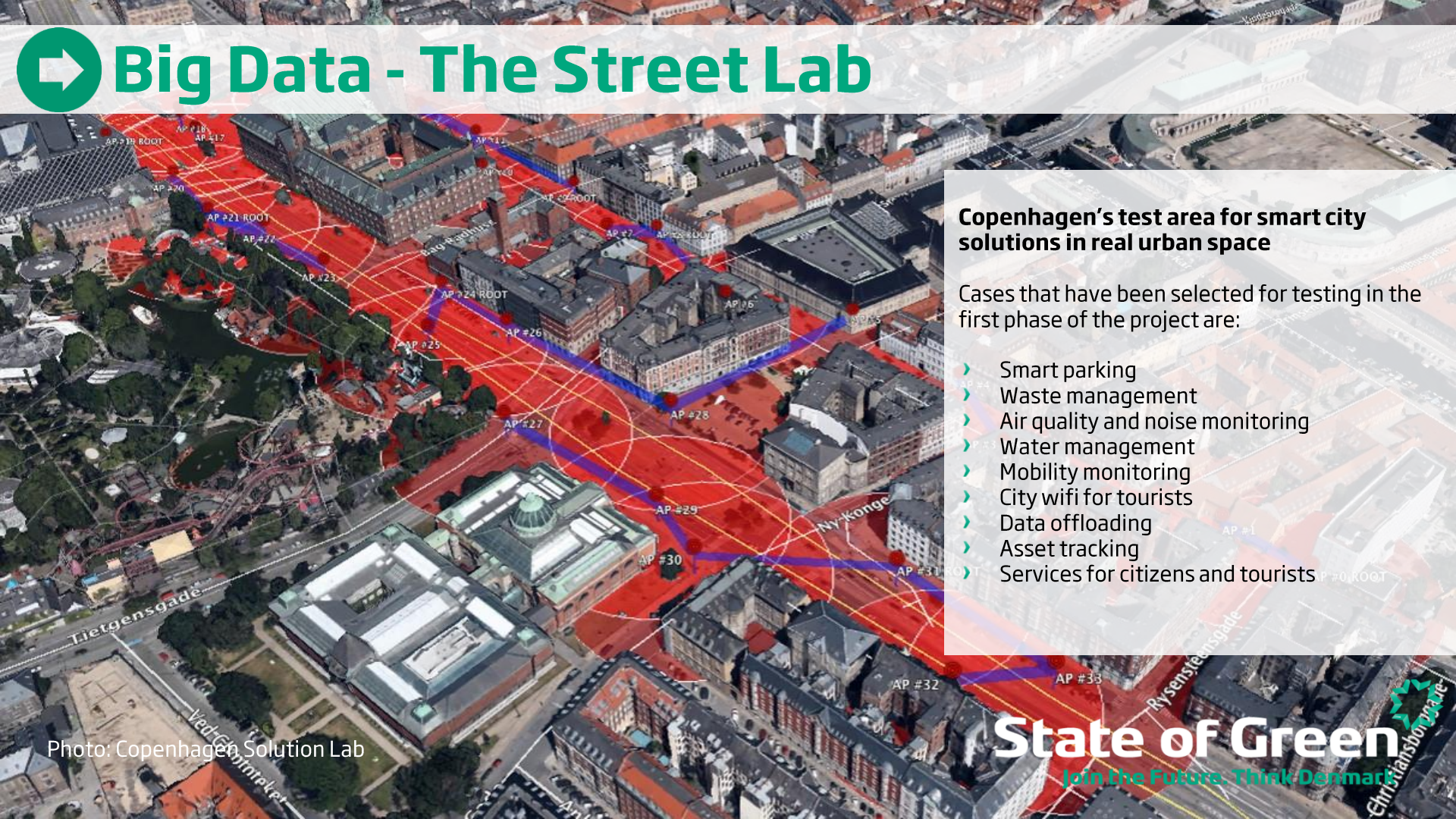
Big Data - The Street Lab



Copenhagen's test area for smart city solutions in real urban space

Cases that have been selected for testing in the first phase of the project are:

- Smart parking
- Waste management
- Air quality and noise monitoring
- Water management
- Mobility monitoring
- City wifi for tourists
- Data offloading
- Asset tracking
- Services for citizens and tourists

Photo: Copenhagen Solution Lab

Flooding - A Challenge in Many Cities

- **A 100 year extreme rain event in Copenhagen**
  - 150 mm rain in 2 hours
  - Damages close to 1 billion Euros
  - Damages to critical infrastructure
  - Heavier and more frequent rainfalls
- **High political attention** (both locally and nationally)
- **Led to change in legislation**, incl. financing mechanisms to enable more surface solutions

Photo: Thomas Melbye

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Opportunities of Climate Adaptation

- Rainwater can be used as a resource to create more liveable cities
- An integrated approach to urbanisation and climate change is **cost-efficient** and creates more **added value** to the city

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Waste as a Resource

- Waste-to-energy is an integral source to heat and power production in Copenhagen.
- 332,000 tonnes of waste is every year converted to power and heating to 150,000 households.
- Recreational area

Photo: ARC and BIG

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Thank you for your attention