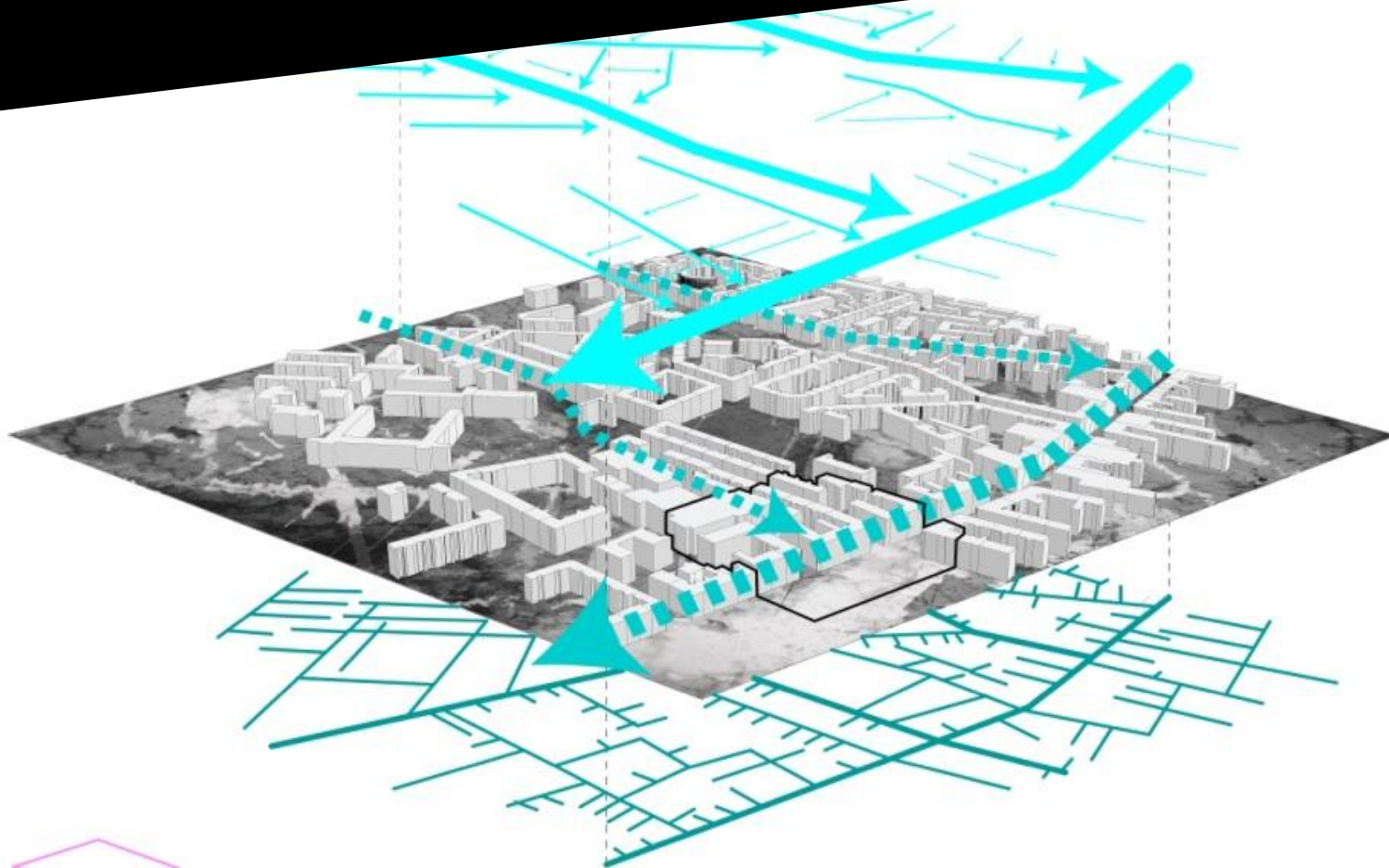
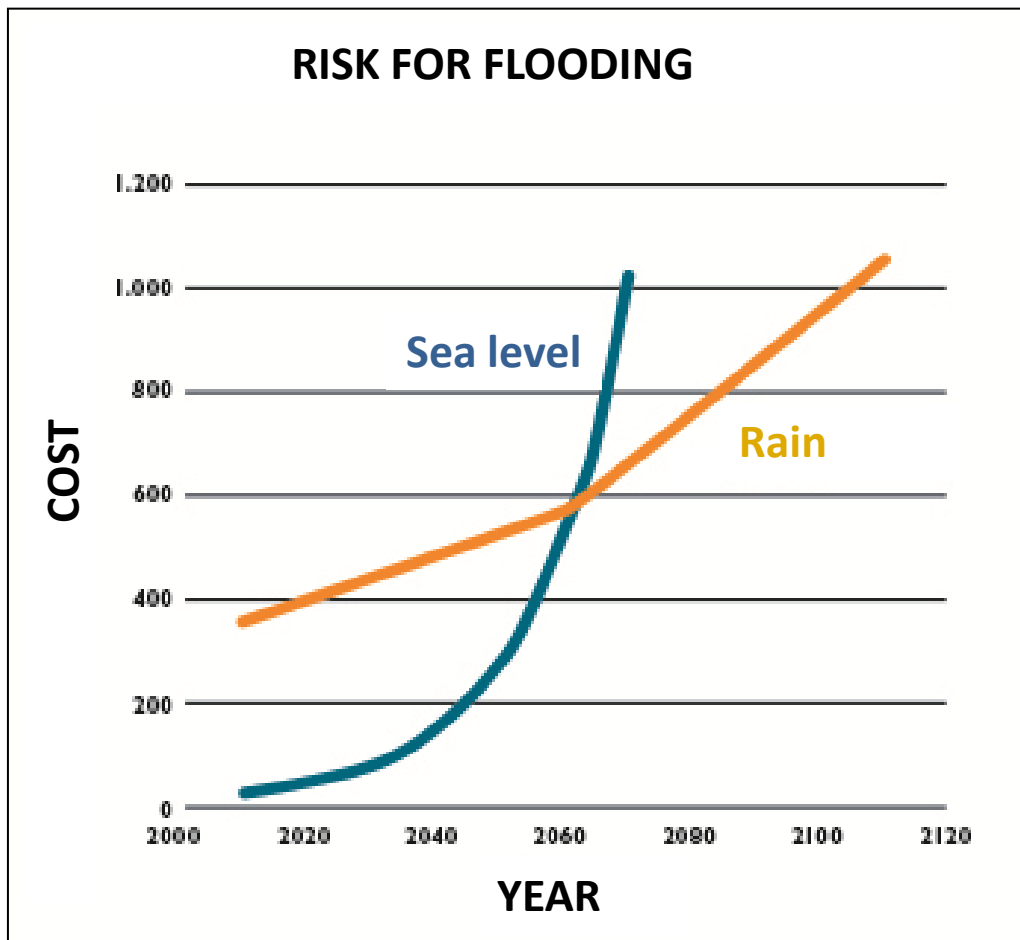
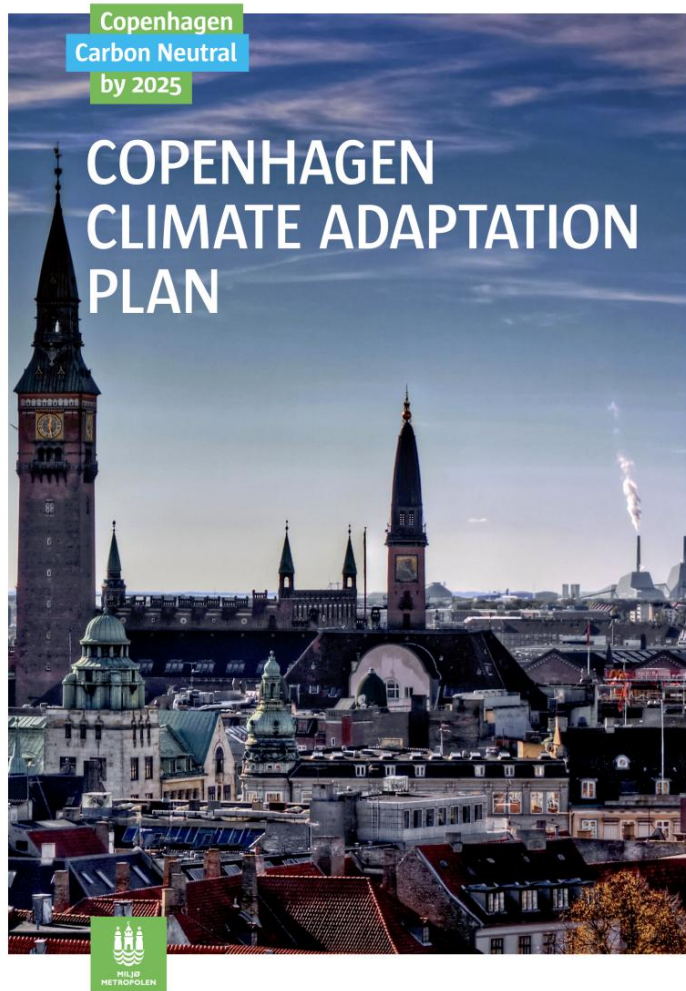


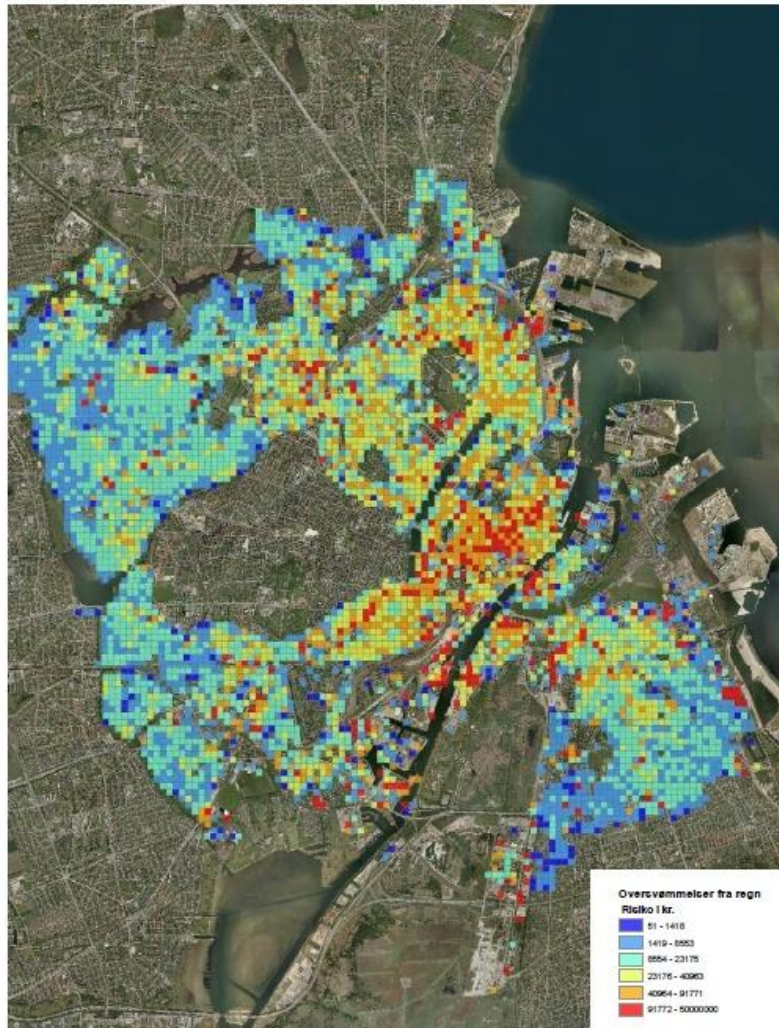
Innovative Urban Planning in Copenhagen



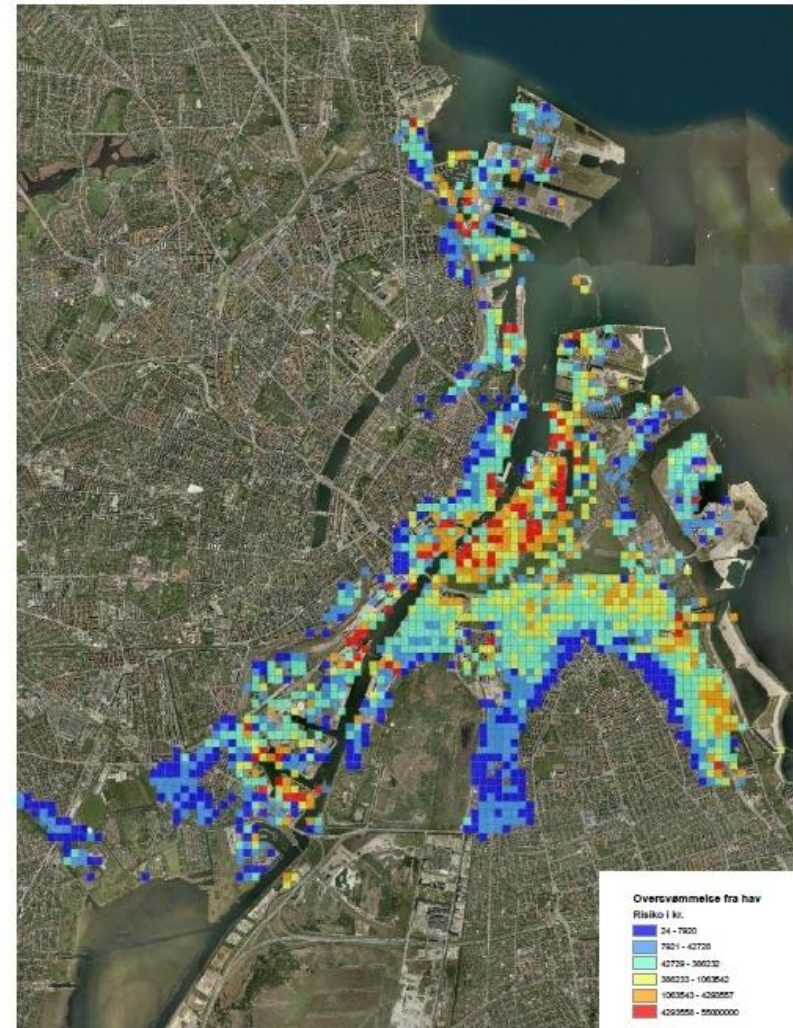
The adaptation plan



Risk assessment



Risk map for flooding caused by rain in 2110

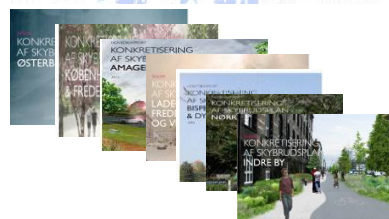
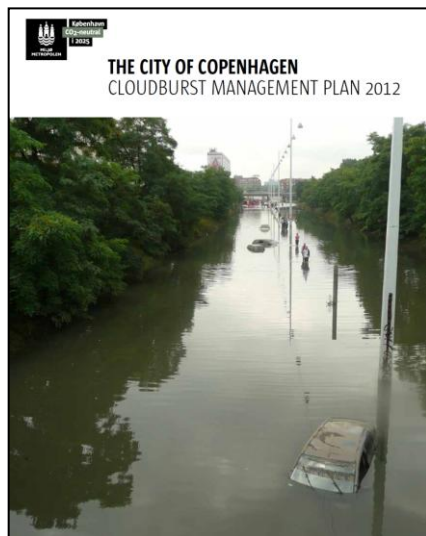


Risk map for storm surges from the sea in 2110

Cloudburst over Copenhagen



Time line of adaptation process in Copenhagen



August 2011

Plan approved by City Council

December 2012

Plan approved by City Council

2013-2014

Preparation of plan for each water catchment area

November, 2015

Political decision for implementation

Implementation period 20 years



2016

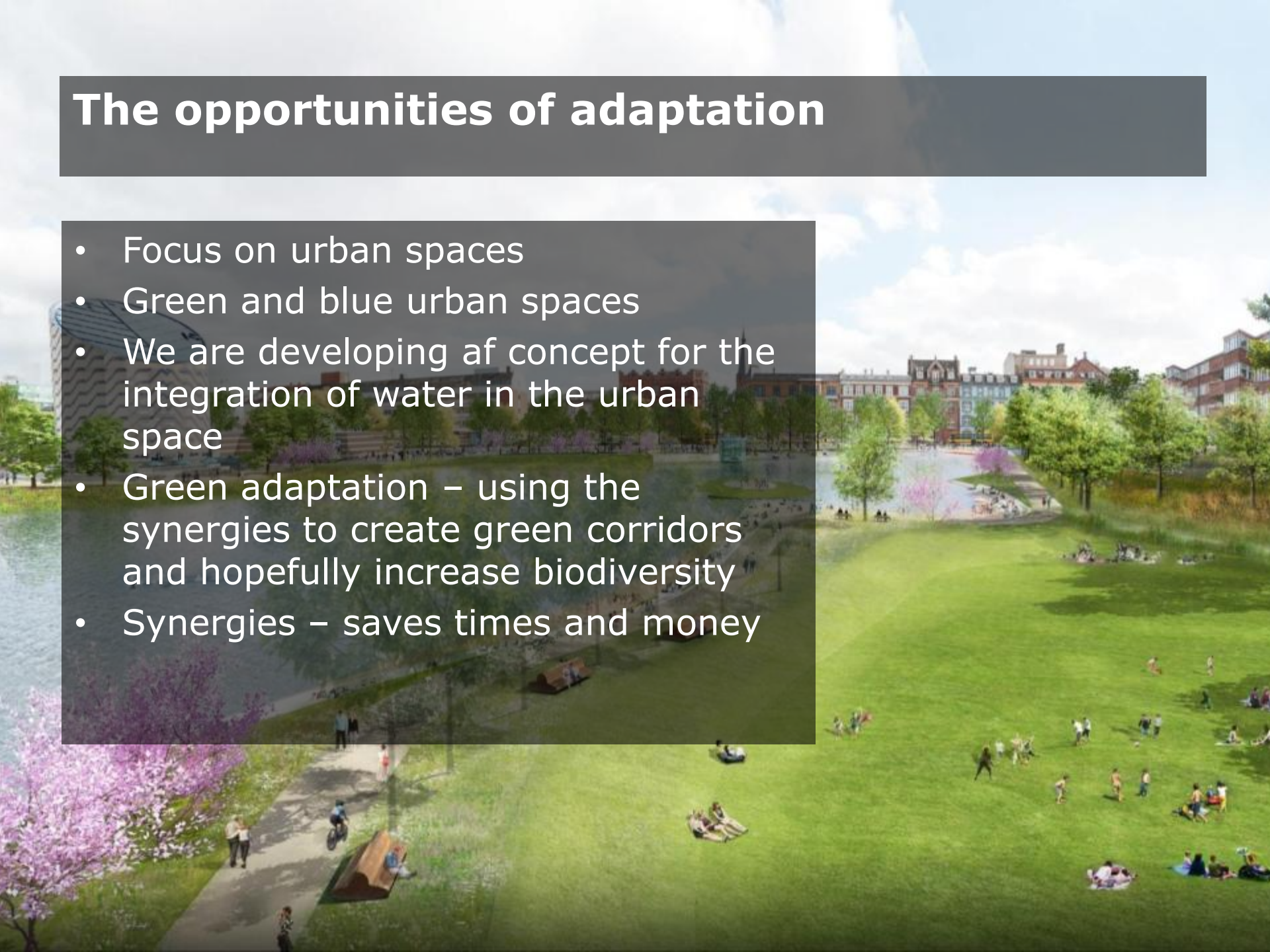
**Plan approved by
government authorities**

2015-2035

**Implementation of the
cloudburst plan**

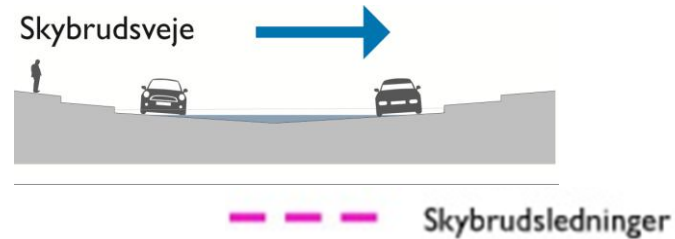
The opportunities of adaptation

- Focus on urban spaces
- Green and blue urban spaces
- We are developing a concept for the integration of water in the urban space
- Green adaptation – using the synergies to create green corridors and hopefully increase biodiversity
- Synergies – saves times and money

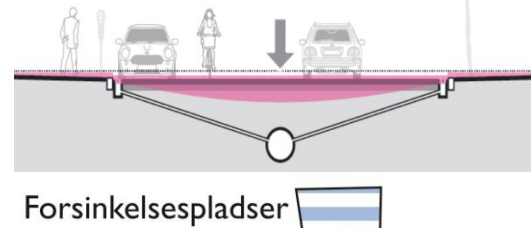


5 TYPES OF SOLUTIONS

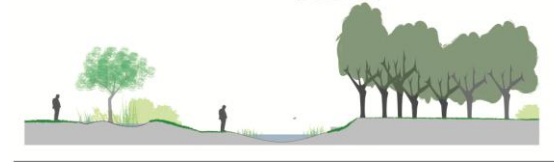
1. **Cloudburst boulevards – transporting water**



2. **Pipes transportation under ground**



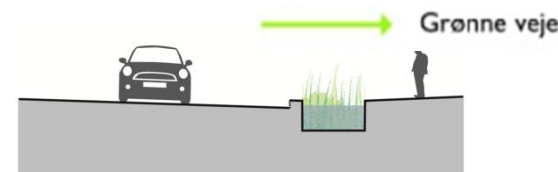
3. **Retention boulevards – delaying water**



4. **Central delays – for storing water**

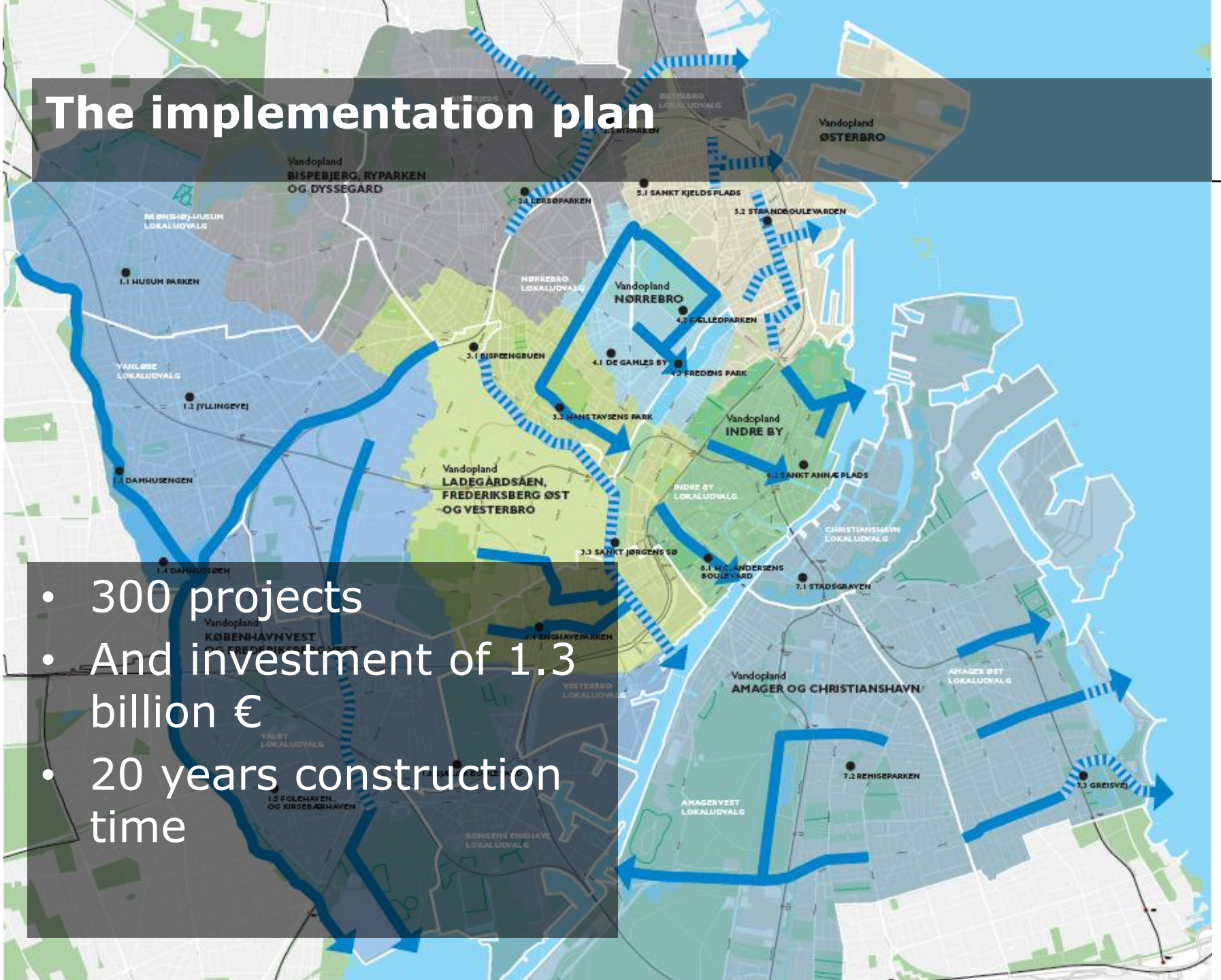


5. **Green roads – transport and delay of water on small roads**



The implementation plan

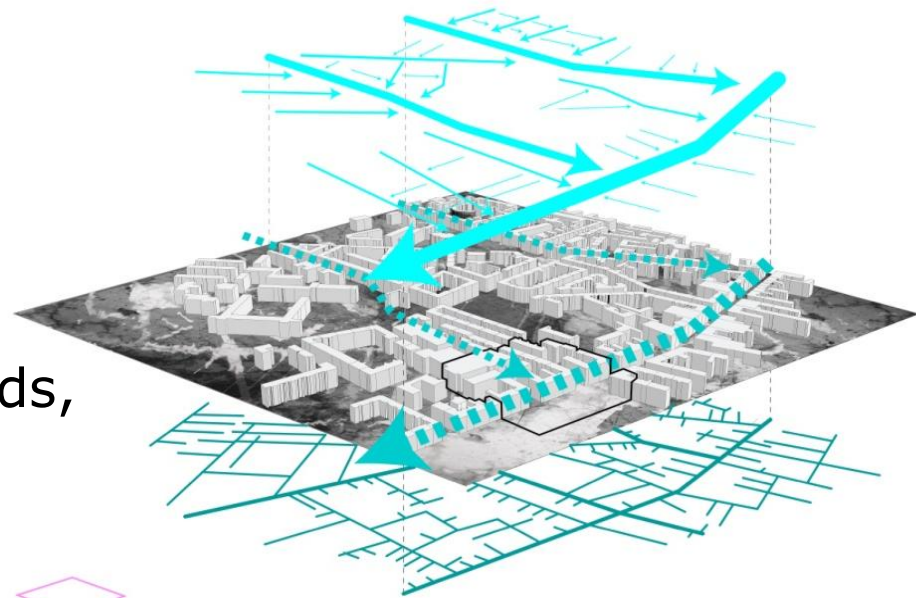
- 300 projects
- And investment of 1.3 billion €
- 20 years construction time



Annual project package

- **CLIMATE ADAPTATION IS THE BACKBONE OF URBAN DEVELOPMENT**

- Hydraulic planning
- Areas with high risk
- Overlap with other projects (roads, urban development etc.)
- Synergy with other projects –
Such as implementation of water action plans, environmental and nature plans and construction works



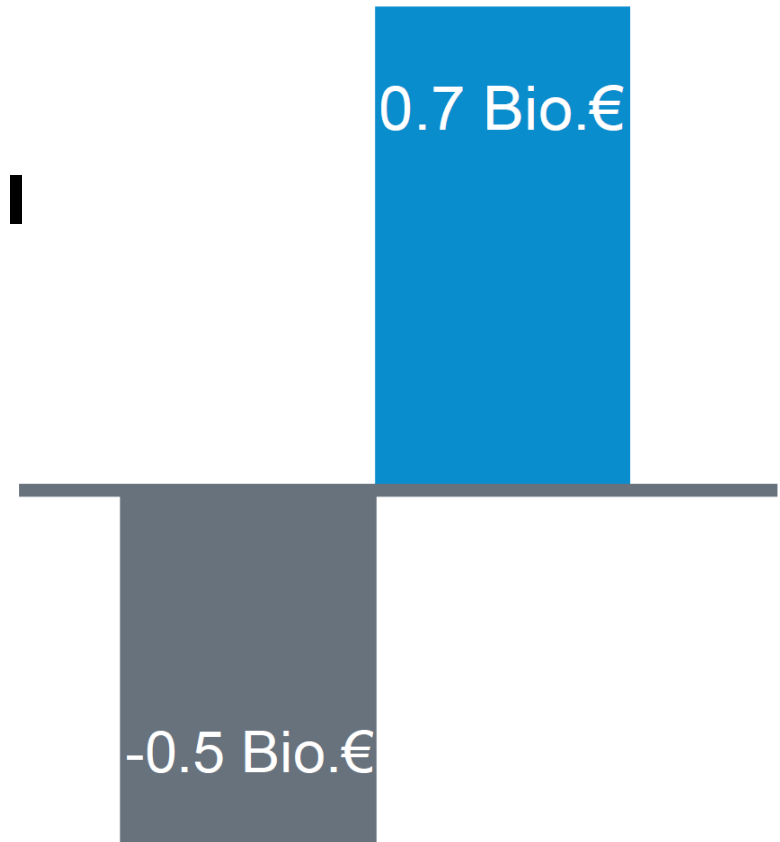
CONSTRUCTION COST ESTIMATE – 1.3 BIO. €

CONSTRUCTION ESTIMATES FOR ALTERNATIVE SOLUTION AT 2015 PRICES (DKK MILLION)

CONSTRUCTION	CONSTRUCTION COSTS	FINANCING
SURFACE SOLUTIONS	4,975	Costs of municipal and private co-financing projects are reimbursed through water charges
CLOUDBURST PIPES	2,600	Water charges (HOFOR)
DISCONNECTION AND CONNECTION OUTSIDE PROPERTY BOUNDARY	1,010	Water charges (HOFOR)
PROTECTION OF HOMES WITH ANTI-FLOOD BACKWATER VALVES AND DISCONNECTION WITHIN PROPERTY BOUNDARY	2,420	Landowner
TOTAL	11,005	
OPTION OF URBAN SPACE IMPROVEMENTS	1,000	City of Copenhagen

A GOOD BUSINESS CASE

- **Robust socio economic figures**
- **Cheaper than traditional solutions**
- **Less flooding – less damage**
- **Lower insurance costs**
- **Higher house prices**
- **Total costs 1.3 billion €**



Skt. Kjelds – a climate quarter in Copenhagen

- **Residential neighbourhood with 15.000 residents**
- **Local regeneration and adaptation go hand in hand**
- **Urban planning, refurbishing buildings and improving urban spaces.**
- **Involving the public in the development of the neighbourhood**

Tåsinge Plads



Tåsinge Plads – the first water park



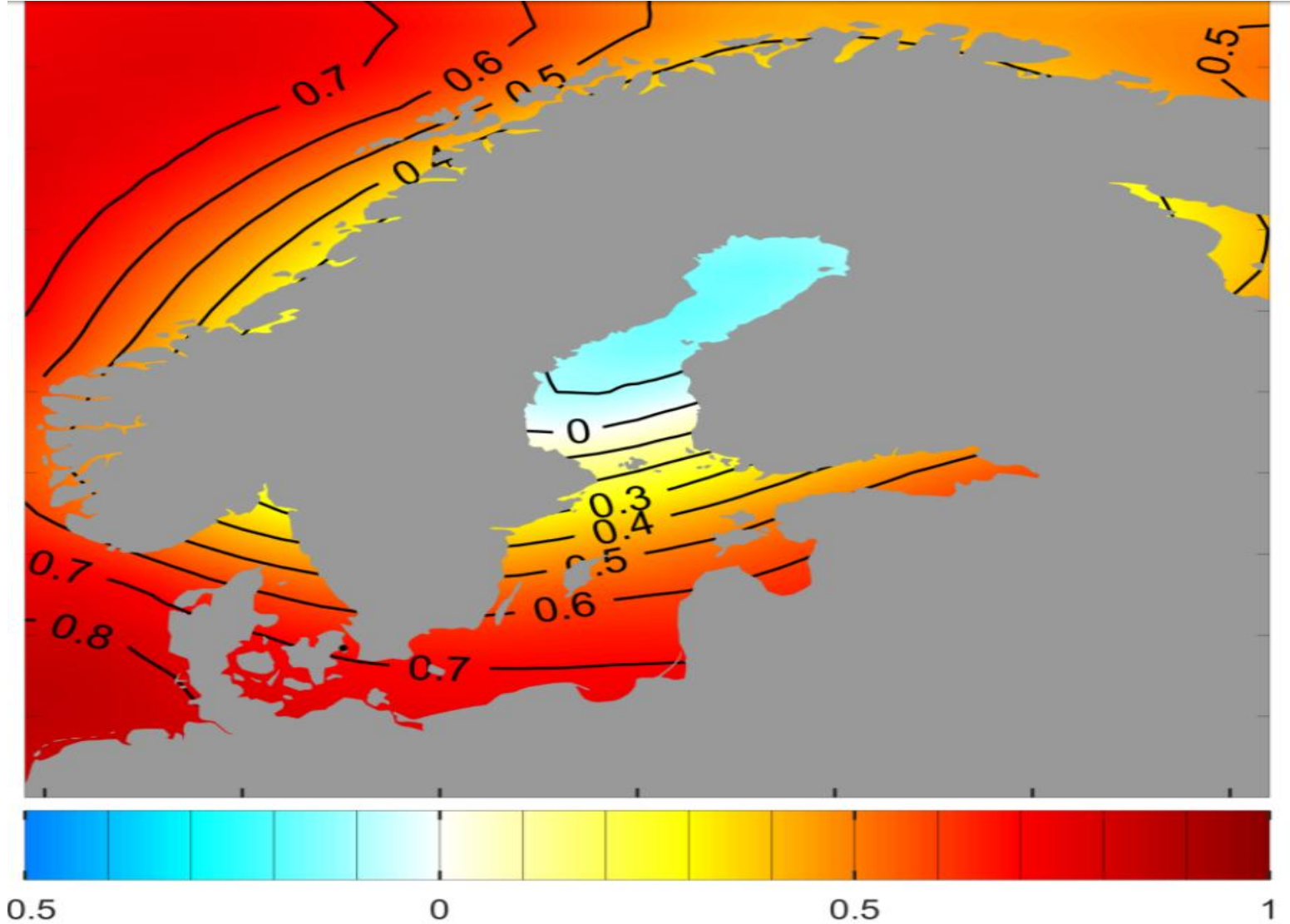
And it works....

07-11-2017

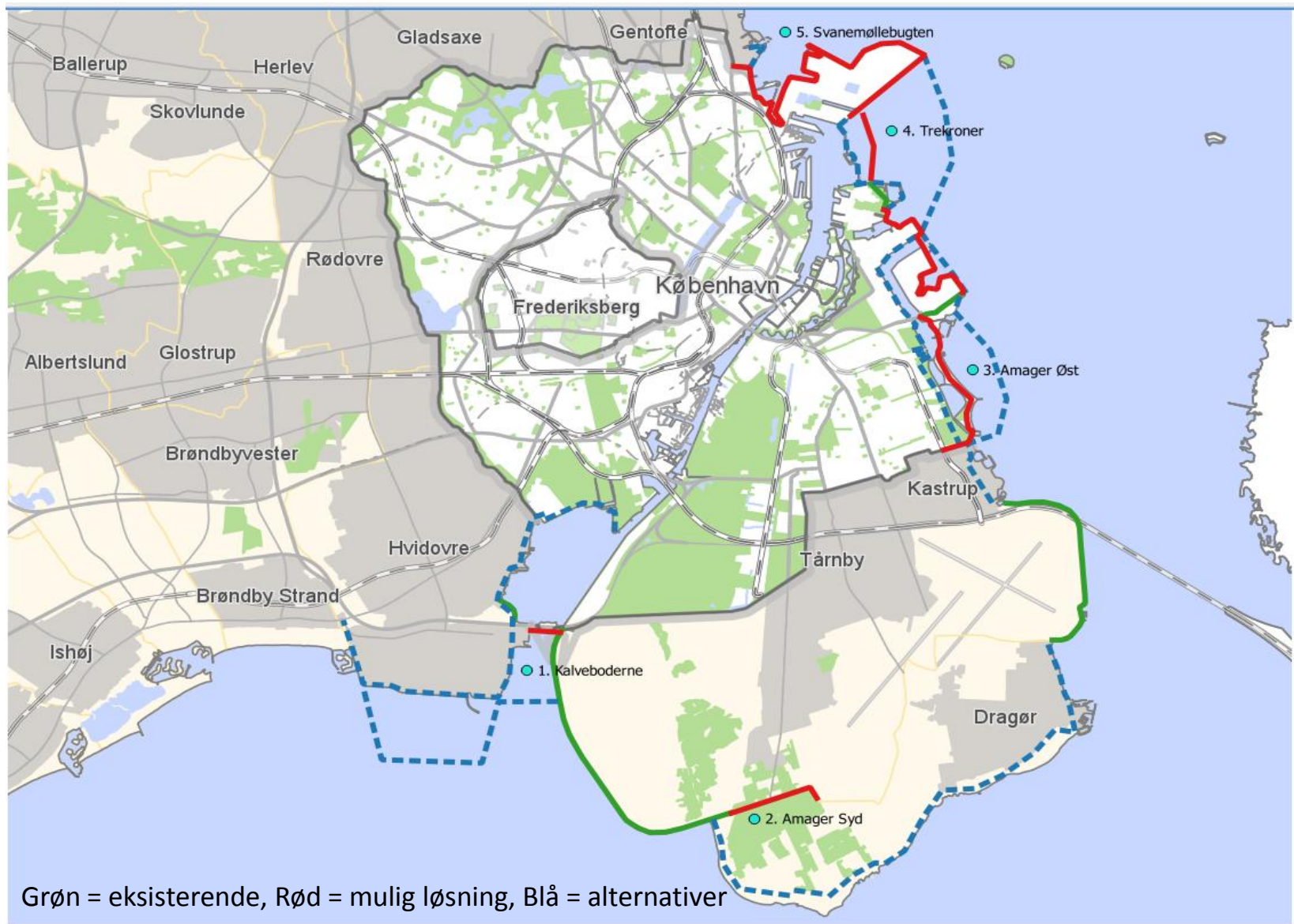


Foto: Søren Svendsen

Sea level rise 100 years ahead



Possible solutions





Thank you for your attention
Jan Rasmussen, city of Copenhagen