Making Copenhagen resilient by adaptation to Climate change

Palle D. Sørensen
Project manager
City of Copenhagen
Context

Climate mitigation plan (COP15, 2010)
Carbon Neutral Copenhagen by 2025
Climate adaptation plan (August 2011)
Cloudburst management plan (2012)
Climate adaptation plan

Hazards and risks were identified:

» Rising sea level.
  » Not a problem until ~2040

» Increasing amounts of rain and increasing intensity of rain
  » Already a problem today

» Urban Heat Island-effect
Why make a Cloudburst-management plan?

» July 2, 2012 showed, that the climate of the future is already here
Why make a Cloudburst-management plan?

» July 2. 2012 showed, that the climate of the future is already here

» Losses for 5 billion DKK (almost 1 billion US Dollars) in insurance compensation alone. Insurance has become a political issue
August 14. 2010
Juli 2. 2011
August 15. 2011

» This is why
This is why
August 14. 2010
Juli 2. 2011
August 15. 2011

» This is why
August 14. 2010
Juli 2. 2011
August 15. 2011
“Blue spot” modeling

20-year event

100-year event
Risc assessment

Risc = Probability * Losses
The aim of the Cloudburst-management plan

- To make CPH resilient to cloudbursts within 20 years.
The aim of the Cloudburst-management plan

- To make CPH resilient to cloudbursts within 20 years.
- To reduce flooding risk
The aim of the Cloudburst-management plan

• To help politicians in deciding on:
  ➢ Which level of resilience is best in CPN
The aim of the Cloudburst-management plan

- To help politicians in deciding on:
  - Which level of resilience is best in CPN
  - The best methods to reach this goal
Cloudburst-management Plan

1. Methods of reducing flooding risk
2. Accepted level of risk
3. Prioritizing implementation
Methods of reducing flooding risk

» Detentioning of storm water
  » Squares, sports fields, parks etc.

» Conveying storm water to the harbour
  » Existing watercourses
  » New Cloudburst Water Courses

» Solutions on the surface are preferred.

Added value
Methods of reducing flooding risk

» We have become wiser since Copenhagen Climate adaptation plan, August 2011.
» 250 swimming pools a 500 m³/minute
» Detentioning of water can only cover up to 10 %
» Conveying water to the harbour covers the rest
Methods of reducing flooding risk

- Flooded areas
- Tunnels
- Pipes
- Ditches

 Everywhere else: Water transport on roads
Level of accepted risk

» Two focus points for accepted risk:
   » How much water can be accepted?
   » How often may this incident occur?
» Cost/benefit-analysis.
Level of accepted risk

Cost/benefit-analyse. Economics

- Initiative costs
- Net profit
- Damage costs

Time between events
Level of accepted risk

In Copenhagen we have chosen:
» Maximum 10 cm water on the ground
» Once every 100 years (average)
Prioritizing of the catchment areas
Further actions

• The plan is up for political approval
• Each of the 26 catchment areas gives rise to separate projects, where measures and methods will be scrutinized in detail
Thank you