

# Good practice spotlight: Bergen, Norway



# Adapting to climate change

Expected climate changes in Bergen:

- Precipitation is expected to increase,
  - Higher risk for flooding
- Sea level and high tide is expected to rise
  - Overflowing the wharf and World Heritage site Bryggen and lower parts of the city
- More strong winds





# Risk and vulnerability - extreme weather



# How we address climate adaptation

- Standards and requirements for stormwater management - local management, open solutions, standards are used in land use planning (area plan etc)
- Green structures, purification of surface water
- Risk and vulnerability - Focus on Civil Protection – collaboration: Cheaper to prevent than to repair - Safety and Emergency
- Participation in projects in Norway and in Europe – increased competence
- Learning and action alliances with private sector, universities, regional and national bodies, NGOs





# Green structures



# Learning and action alliances, examples

- Bjerknes Centre for Climate Research
- Nansen Environmental and Remote Sensing Center (Research)
- University of Bergen
- Norwegian school of Economics
- Insurance companies
- Bergen Chamber of Commerce
- County - County Governor
- Regional climate council (politicians) and regional professional network
- Norwegian Water Resources and Energy Directorate
- Norwegian Directorate for Civil Protection
- European cities
- NGOs

# 22000 square meters of sedum on the roof of Ikea in Bergen

- To be allowed to build a huge building like that Ikea were forced to have a green roof to blend in
- Works as a great insulator and rain absorption system
- Saves energy



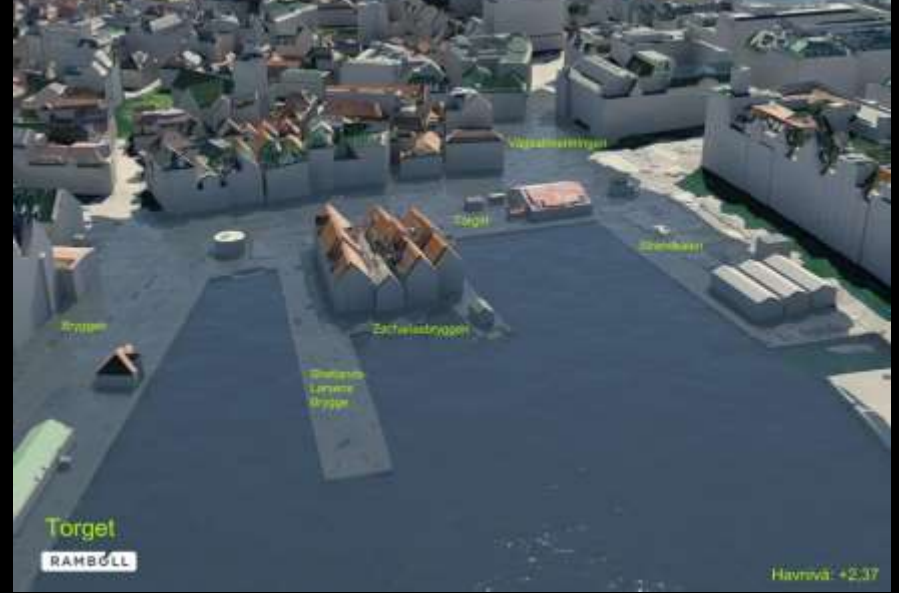
# Challenges

Which climate scenarios should be used?

- Best case?
- Worst case?
- Something inbetween?
- Several scenarios?







100 years ahead the sea-level will be more than half a meter above today's level - we need to prepare for the changes – and we need to reduce the emissions that cause the climate changes

# Make conscious choices although many questions

- Are the cities equipped for downpour?
- Blue and green structures in the city - how do they function as part of flood risk management?
- Stormwater Management and densification policies – which instruments do municipalities need?
- Small rivers and intense rainfall, water flow and water quality?



# Risk analysis - Sheltered Food court



- The new Food Hall's lowest threshold is +1.65 above sea level
- The highest measured water levels since registration started in Bergen in 1915, is +1,51 above sea level

NorPhoto.no

# Bryggen - what will happen?

- Made a big effort with drainage systems - this has stopped the ongoing "surge" into the buildings
- Rising sea levels may pose a problem for large parts of Bergen - not only Bryggen
- Some of the buildings has restored foundations, this has resulted in the elevation of the building, and it has also added jacking point for future jacking up the building if it is needed





# More precipitation and more intense rainfall in cities and towns

- The need for more knowledge about how different water solutions work: Rainbed, green roofs and walls, flooding roads, permeable surfaces, gravel, custom paving stones, important to take frost, clay and mountains into consideration ....



Bergen

