Thank you to all of our 2015 sponsors:
Green design for urban water management in The Netherlands

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In 2050 70% of 9 billion people live in cities
Cities are the engines of economic growth

- 80% of global economic output
- 70% of global energy use and energy related GHG emissions
- US$90 trillion invested worldwide in urban and energy infrastructure in next 15 years
Climate change

The world is currently on track for warming of around 4°C

Cities are vulnerable for climate change

- **Floods**
- **Droughts**
- **Water quality**
- **Urban heat effect**
Recent worldwide urban flood events

Kopenhagen 2011: Damage > €1 billion

Bangkok 2011: Damage $45 billion

Toronto: > 100mm rain in 2013

Damage: 850 million $

Arnhem: > 120mm rain in 2014
Climate adaptation is key

- The total costs for climate adaptation will be small compared to the total expected damage.

- Integration of adaptation measures in new or redevelopment programmes today is needed to reduce additional cost in the future.
The Netherlands

- Small country with a population of 17 million
- Most heavily urbanised country in EU (83%)
- Delta of four river basins
- 26% is below sea level
- 60% is susceptible to flooding
- Flood-sensitive area is densely populated
- High level of flood protection
The Netherlands: A long history in water management

Eleven Cities Tour
Rotterdam → 100% Climate proof in 2025

**Rotterdam Approach**

100% climate proof in 2025
+ attractive and economically strong city
+ holistic approach
+ LT Vision => ST Actionplan

De gevolgen van klimaatverandering waarmee Rotterdam rekening moet houden:

- Zeespiegelstijging
- Meer intensieve neerslag
- Lagere waterstanden in de rivieren
- Hogere waterstanden in de rivier
- Langere hete periodes
- Langere droge periodes
Rotterdam Climate Change Adaptation Strategy (RAS)

**RAS ESSENCE**

1. Robust system: maintain and improve
2. Adaptation: small scale solutions on large scale
3. Cooperate and Link in with other activities
4. Benefits for living environment, society, economy and ecology
From grey to green solutions

- **Hard solutions**
  - less space, dike
  - less flexible, extra investment

- **Hybrid solutions**
  - less flexible, extra investment

- **Soft solutions**
  - more space, no dike
  - flexible and cost-effective
NL: € 9 billion investments in the next 10 years

Disconnect rain from sewage system
The Energy Factory

Energy from waste water
Soil sealing → Sealed = lost

- 46% urban surface NL sealed
- Soil is the natural basis for human, animal and plant life
Green cities: How can we increase the ‘sponge’ capacity of our cities?

- Green design
- Use of natural processes
- Increase infiltration capacity
- Visualize water system
- Reuse of rainwater
Open water
Green roofs
Urban (Rooftop) Farming
Raingardens
Rich Water World: Combining water storage, retention & purification
Climate Adaptation Support Tool: Perfect Fit between storm water management guidelines and modelling

Many adaptation options to strengthen urban resilience:
Support stakeholder contribution to climate-proof design
Benefits of green infrastructure

- Green solutions for storm water management are often equal (33%) or even cheaper (44%) than conventional solutions.
- Reduce damage by preventing floods.
- Moderating air temperatures and improving air quality.
- Enhance biodiversity.
- 5 – 30% higher property value.
- Improved quality of life.
Concluding remarks

- Climate change will increase urban flood risk
- The total costs for climate adaptation will be small compared to expected damage
- Integration of adaptation measures in new or redevelopment programmes today is needed to reduce additional cost in the future
- Green design is often a cost-effective approach for climate resilient cities and more quality of life
To explore the potential of nature to improve the quality of life

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