Appendix 6

Best practices for mainstreaming adaptation

Living document for CAMINO deliverable 5.3 “Future perspectives on Mainstreaming Adaptation to Climate Change”

UNESCO-IHE Institute for Water Education · Dordrecht · Bax & Willems Consulting Venturing · Triple Bridge achieving results · CAMINO Climate Adaptation Mainstreaming through Innovation · The Interreg IVB North Sea Region Programme

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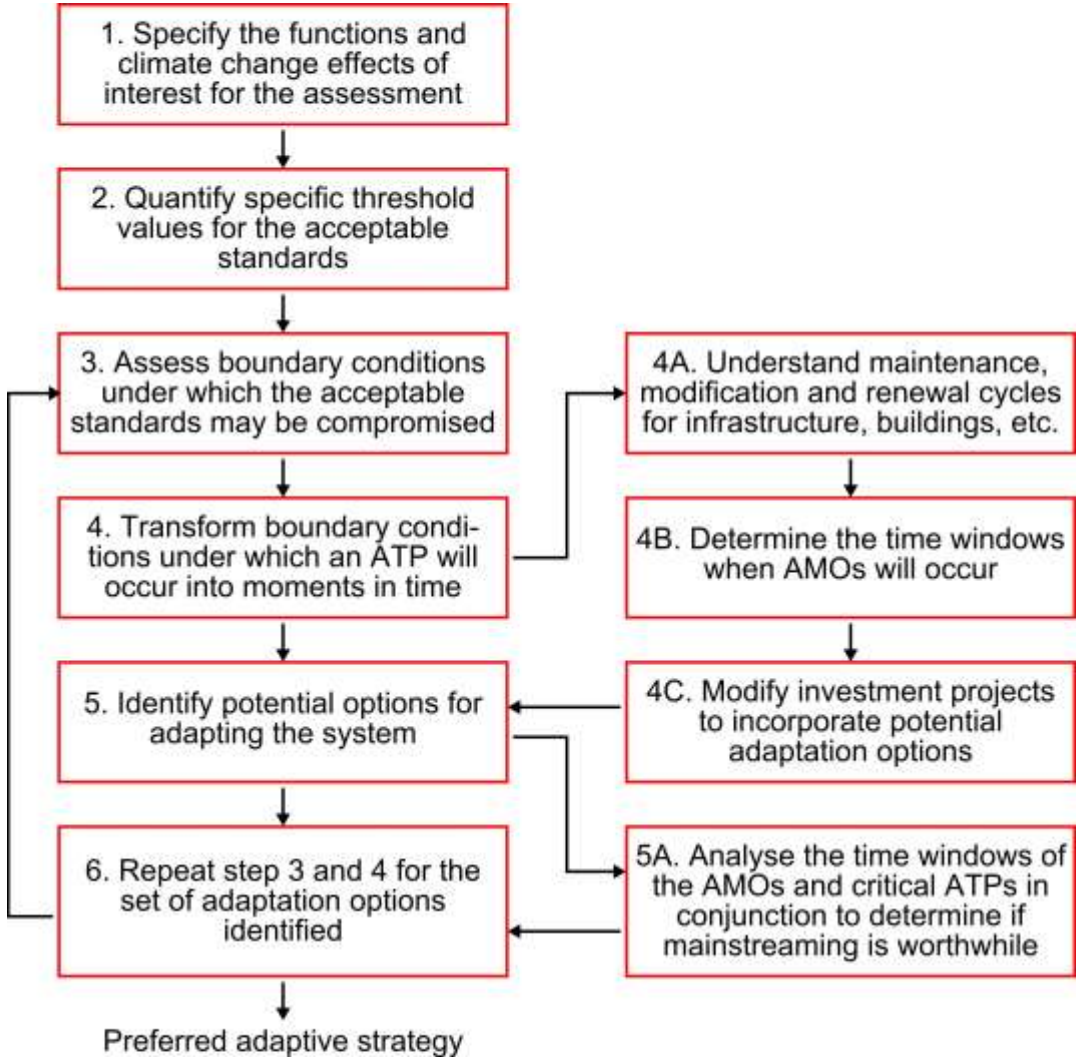
Introduction: why mainstreaming?

Many countries in Europe (and beyond) are experiencing strict austerity measures due to the economic crisis. As a consequence, public financing for adaptation to floods and droughts will become scarcer in the future. This hampers the pursuit of flood and drought resilience through stand-alone adaptation measures. In these contemporary times, a key challenge is to exploit the opportunities for mainstreaming adaptation to climate change into alternative investment agendas.

ATP-O method

Adaptation Tipping Point - Opportunity (ATP-O) is a hybrid method to facilitate mainstreaming adaptation to climate change. It starts with an analysis of ATPs, which are the points of reference where the magnitude of climate change is such that acceptable technical, environmental, societal or economic standards may be compromised. It extends the analysis of ATPs by including aspects from a bottom-up process. The extension concerns the analysis of adaptation opportunities in the system of interest and closely related systems. The results from both analyses are used in combination to facilitate cost-efficient mainstreaming.

A stepwise process



Tipping Point Analysis

1. Start by specifying the functions and climate change effects of interest for the assessment. The objectives for these functions (which are often translated into acceptable standards) are also defined. In addition, the current strategy to achieve the objectives is identified.

2. The particular threshold values for the acceptable standards are quantified. These threshold values can be defined either according to regulations (e.g., by national law) or decided by the stakeholders involved and can change over time.

3. The ATPs are identified by increasing the design loading (e.g., the rainfall intensity) on the system, as a function of time, to assess the specific boundary conditions (i.e., the magnitude of climate change) under which acceptable standards may be compromised. The results of the assessment are then represented in a bar chart.

4. Climate change scenarios are used to transform the specific boundary conditions under which an ATP will occur into an estimate of when it is likely to occur. This can be done by overlaying these scenarios (in the above bar chart) with the possible future design loadings. The output from this step will provide an estimate of the earliest and latest times that the performance of the system is likely to no longer be acceptable.

Analysis of adaptation opportunities

4A. Understand the cycles of maintenance, modification and renewal as well as the opportunities that these afford for mainstreaming adaptation to climate change. A simple but practical way to do this is to make use of predictions of expected physical lifetimes, as determined from expert knowledge and/or literature.

4B. Determine the time windows when adaptation opportunities will occur. This can be done by estimating when the existing structures will reach their end-of-life, by considering their expected physical lifetimes in relation to their construction periods. Alternatively where, for example, neighbourhood regeneration is concerned, the time windows of opportunities can be directly obtained from the existing plans for the normal investment projects.

4C. Modify the 'normal' investment projects to incorporate potential options for adapting the system. These options should then be include in the definition of the adaptive strategies in step 5 of the ATP method. Taking account of the possibilities for mainstreaming adaptation in step 6 of the ATP method will lead to a better understanding and quantification of the adaptive potential of the system of interest.

Mainstreaming adaptation

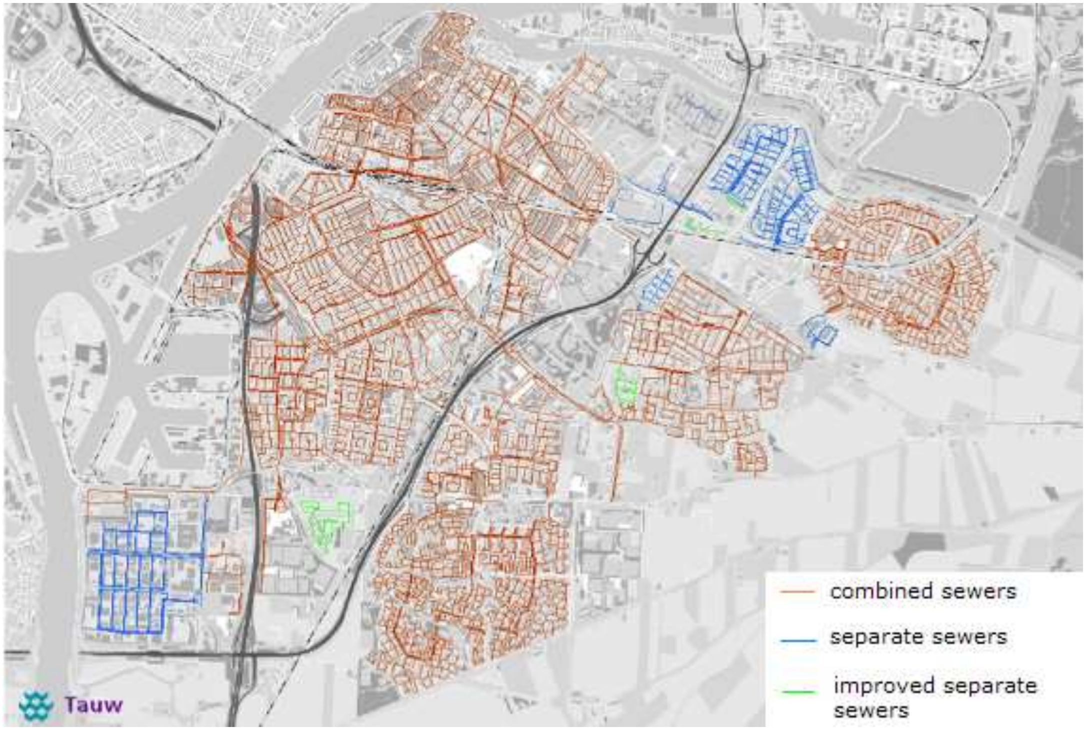
5. If it is desired that an ATP should not be reached, a change in/of the adaptive strategy will be needed to maintain or enhance climate change resilience. As there are long lead-in times to effecting structural measures this (i.e., the potential options for adapting the system) needs to be defined as early as possible and well before the critical ATP occurs.

5A. Analyse the time windows of the critical ATPs and adaptation opportunities in conjunction. If the opportunities are likely to arise earlier than the critical ATPs, then it could be economically worthwhile to move the potential adaptation options (as identified in step 5) forward in time, so as to incorporate them into the 'normal' investment projects. Whether (or not) mainstreaming adaptation is likely to be cost-efficient will, however, also depend on the length of the differential time period between the occurrence of the critical ATP and the opportunity.

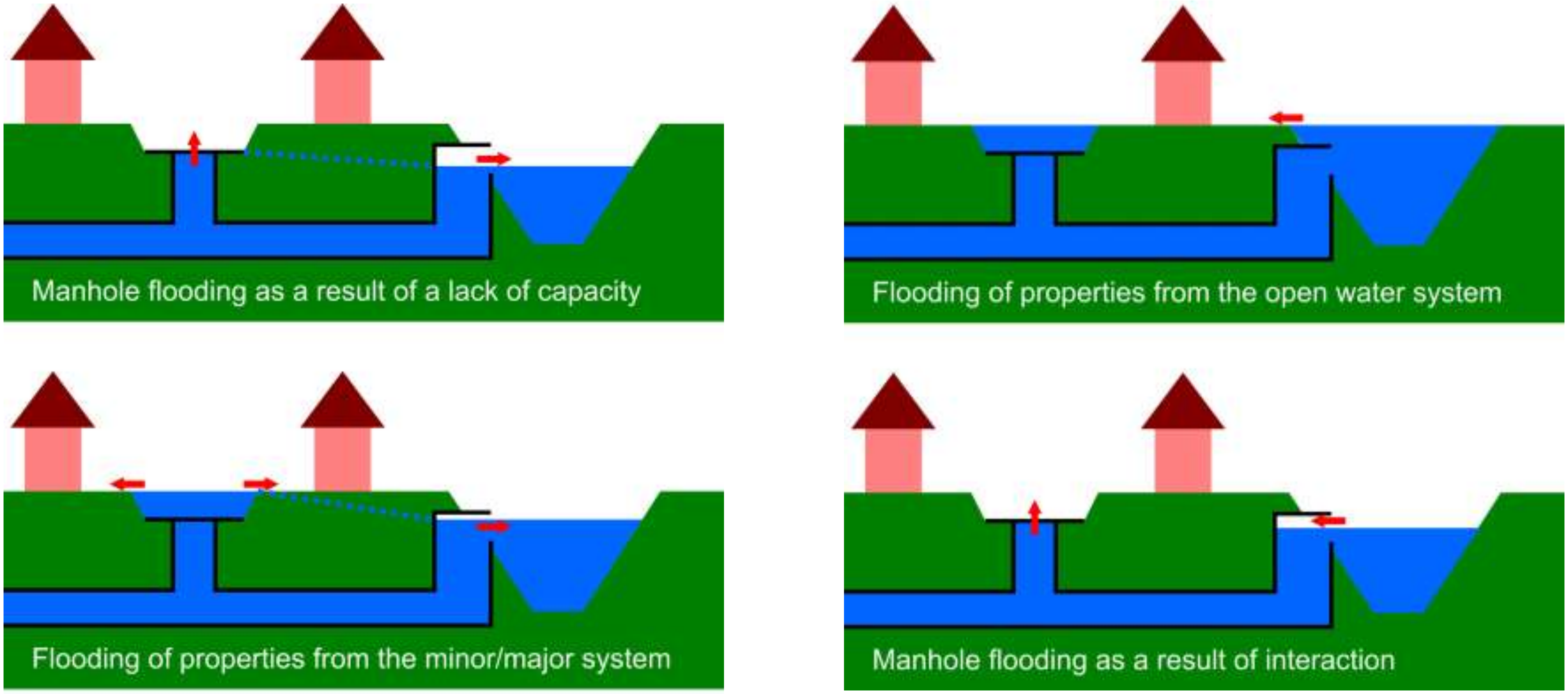
6. Analysing the potential options for adapting the system and the ATPs (by repeating steps 3 and 4) will result in the definition of a number of adaptive strategies, some structural and some non-structural. Engagement with all stakeholders is required in this step to select an adaptive strategy that is realistic and acceptable. Implementing this strategy will alter the nature and timing of the critical ATPs.

Application for pluvial flood risk management

Wielwijk is a post-war neighbourhood in Dordrecht that is being regenerated. The stormwater system includes 3 subsystems: minor drainage (combined sewers), major drainage (surface pathways) and open watercourses.



Step 1: Objectives

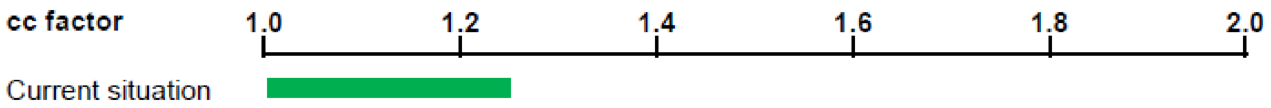


Step 2: Threshold values

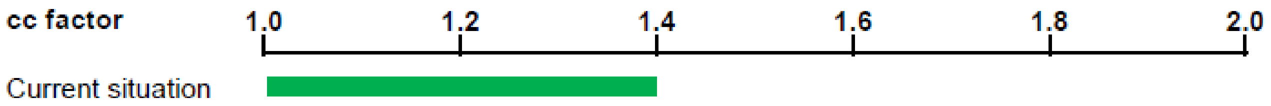
Objective	Annual frequency	Source
Prevent manhole flooding as a result of a lack of capacity in the minor drainage system	2 years	Municipal Sewer Plan
Prevent flooding of properties from the minor/major system	50 years	RIONED (2006)
Prevent flooding of properties from the open water system	100 years	NBW (2003)
Prevent manhole flooding as a result of interaction with the open water system	2 years	Water Plan Dordrecht

Step 3: Occurence of ATPs

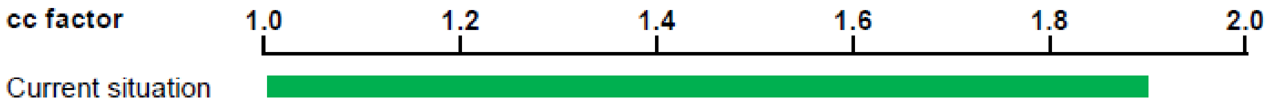
1. Manhole flooding as a result of a lack of capacity in the minor drainage system



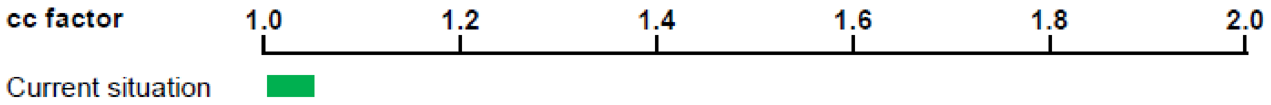
2. Flooding of propeties from the minor/major system



3. Flooding of properties from the open water system

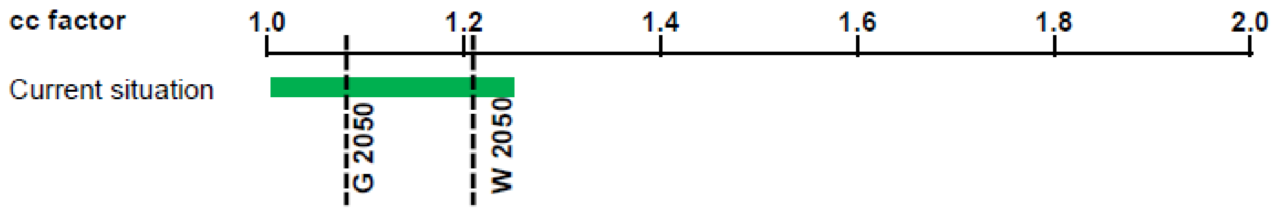


4. Manhole flooding as a result of interaction with the open water system

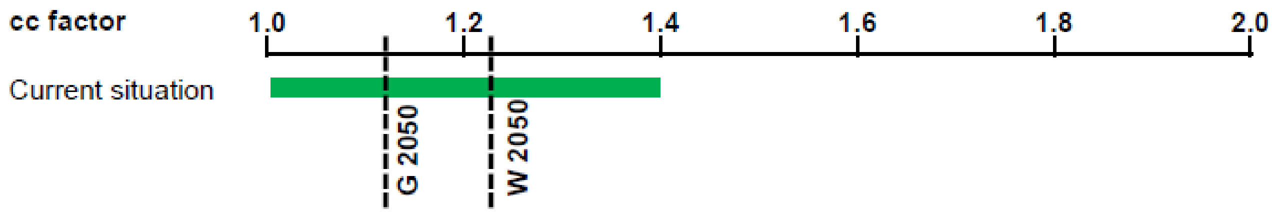


Step 4: Timing of ATPs

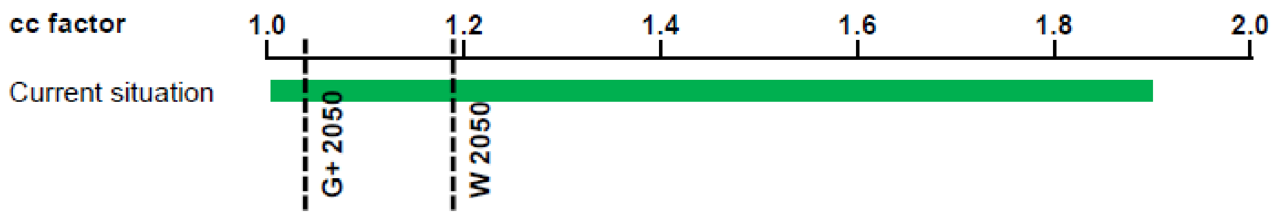
1. Manhole flooding as a result of a lack of capacity in the minor drainage system



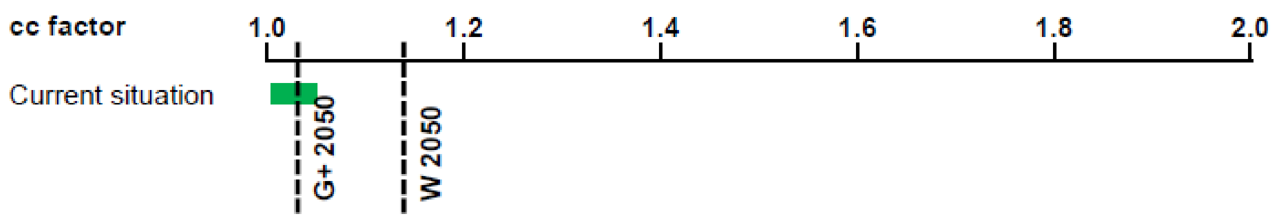
2. Flooding of propeties from the minor/major system



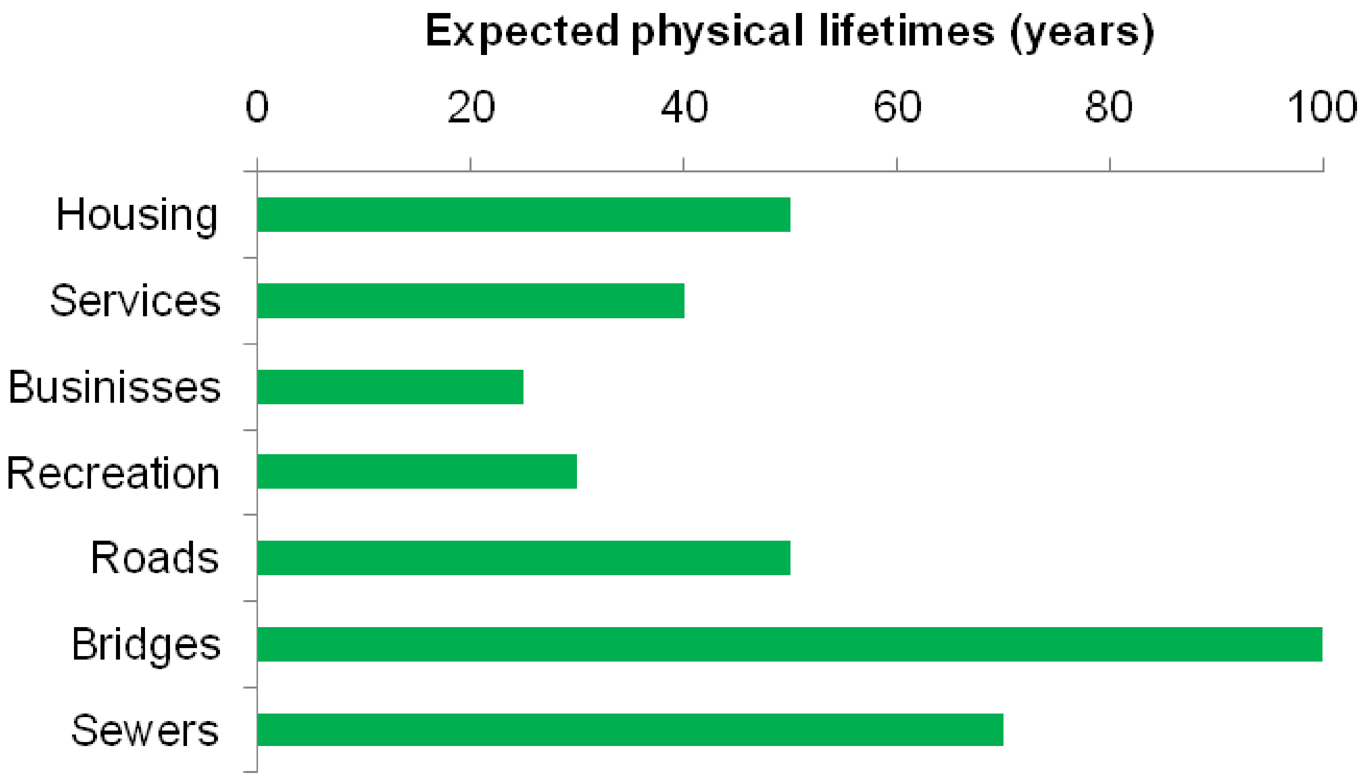
3. Flooding of properties from the open water system



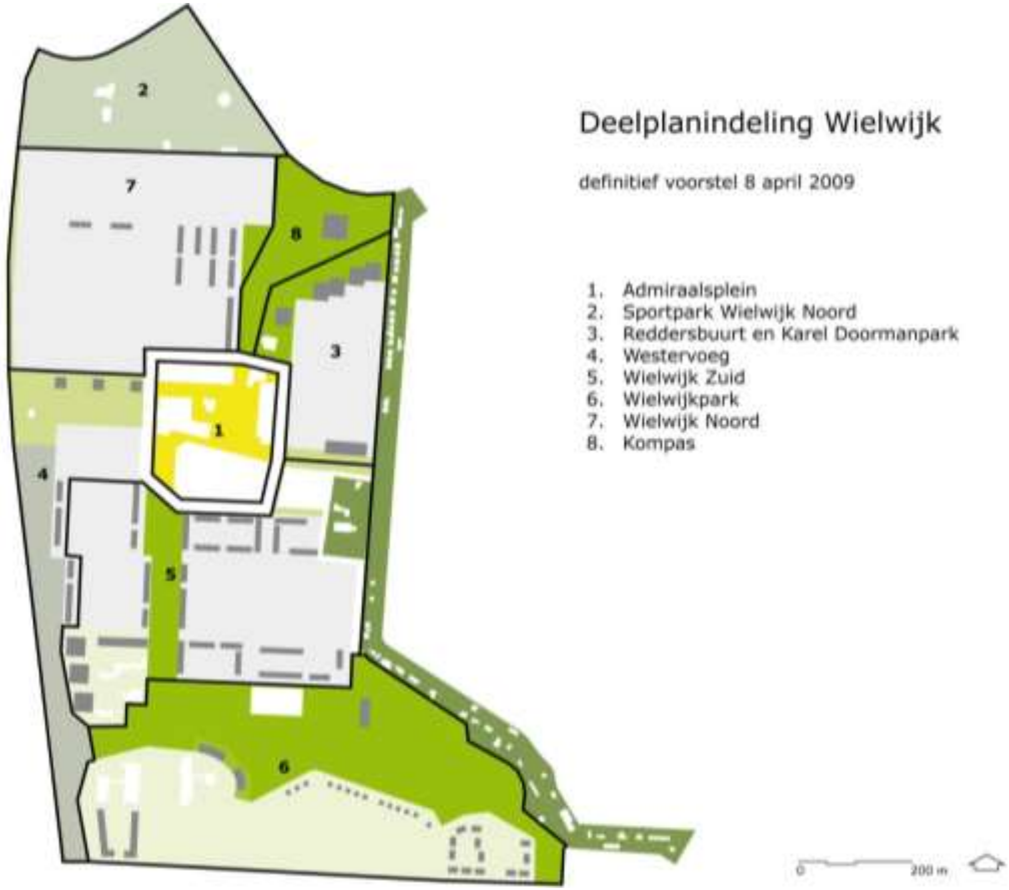
4. Manhole flooding as a result of interaction with the open water system



Step 4A: Physical lifetimes



Step 4B: Time windows of opportunities



Deelplanindeling Wielwijk

definitief voorstel 8 april 2009

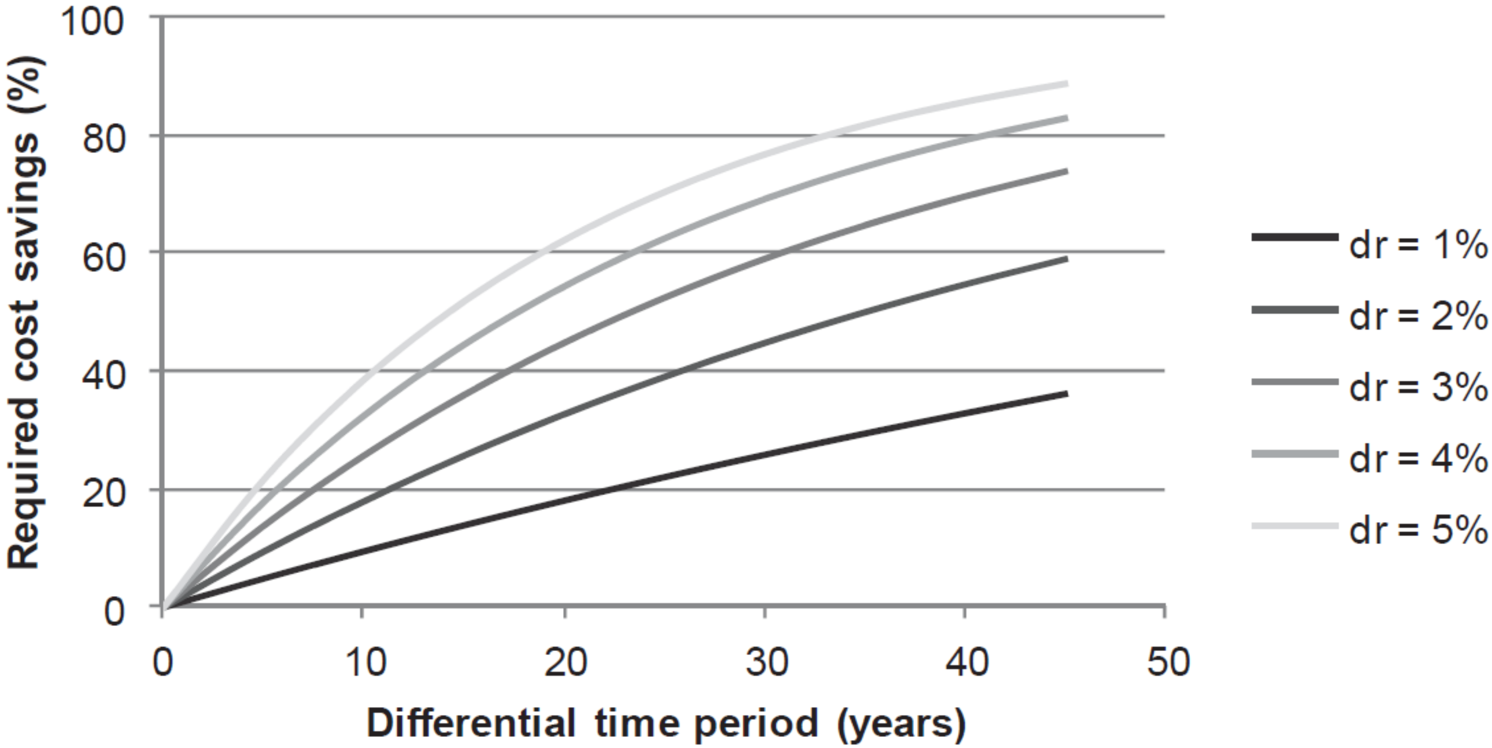
1. Admiraalsplein
2. Sportpark Wielwijk Noord
3. Reddersbuurt en Karel Doormanpark
4. Westervoeg
5. Wielwijk Zuid
6. Wielwijkpark
7. Wielwijk Noord
8. Kompas

Step 4C: Incorporate adaptation options

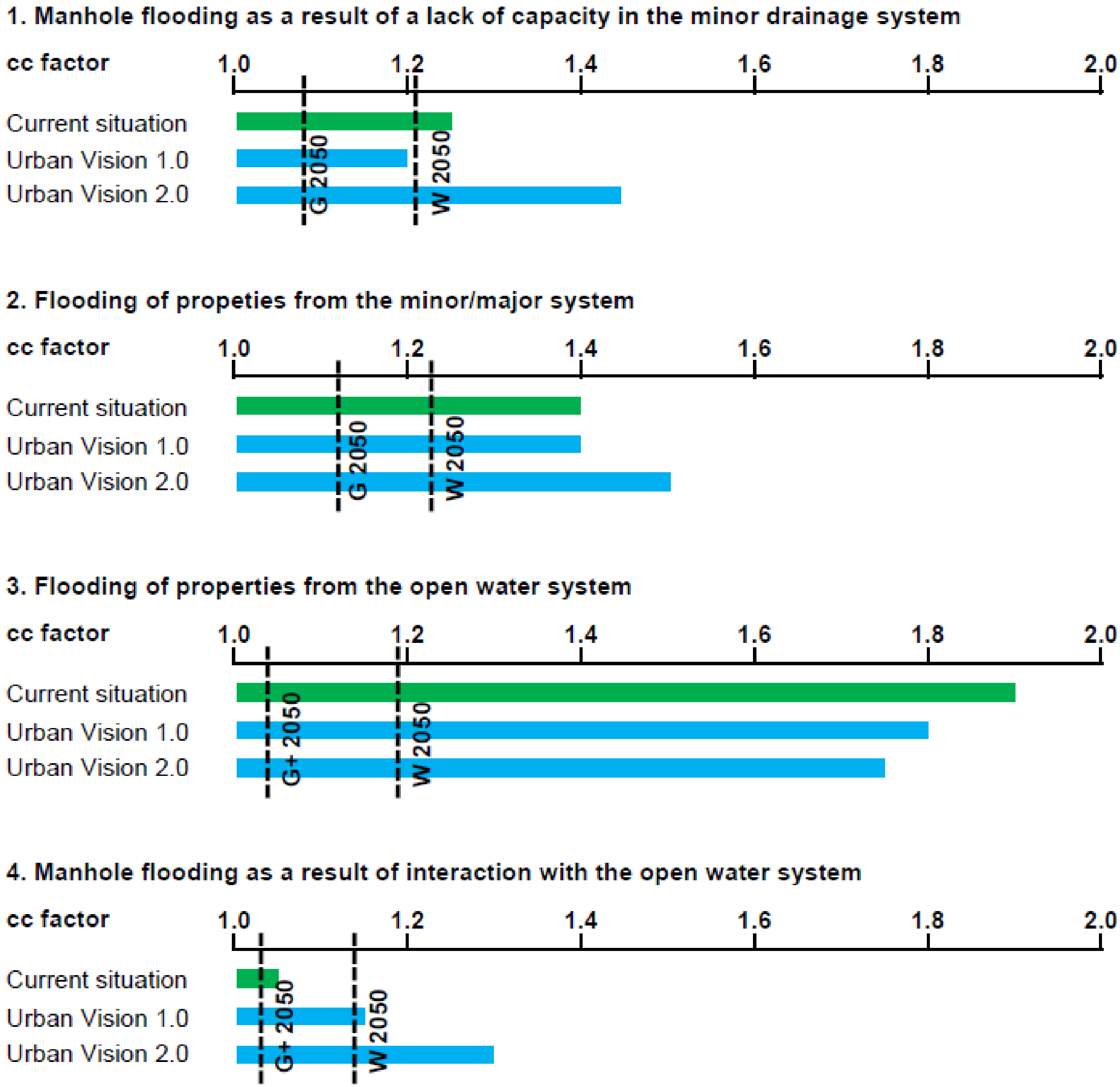
Step 5: Identify adaptation options

Step 5A: Analyse in conjunction

The required cost savings (X %) for efficient adaptation mainstreaming will depend on the differential time period between the occurrence of the adaptation opportunity and the critical ATP and the discount rate



Step 6: Repeat steps 3 and 4



Discussion of lessons learned

- Process of autonomous transformation towards an adaptive city takes decades. Too long?
- Adapt where possible rather than where necessary is the new paradigm. Seize opportunities and reframe towards broader integrated aims (e.g. resilience)
- Resilience is a complex notion for policy makers and planners. This is a challenge. E.g. Stress tests / ATP-O method can help.
- ATP-O method gives insight in the earliest and latest date that a strategy is no longer effective and in opportunities to adapt at a lower cost
- ATP-O method stimulates discussion between public and private stakeholders on performance objectives, policy development, investment strategies, risk management and urban development

Relevant literature

- EUROPEAN ENVIRONMENT AGENCY. 2013. Adaptation in Europe: Addressing risks and opportunities from climate change in the context of socio-economic developments. EEA Report, No 3/2013.
- GERSONIUS, B., NASRUDDIN, F., ASHLEY, R., JEUKEN, A., PATHIRANA, A. & ZEVENBERGEN, C. 2012. Developing the evidence base for mainstreaming adaptation of stormwater systems to climate change. Water Research, 46, 6824-6835..
- HAASNOOT, M., MIDDELKOOP, H., OFFERMANS, A., BEEK, E. & DEURSEN, W. A. V. 2012. Exploring pathways for sustainable water management in river deltas in a changing environment. Climatic Change, 115, 795-819.
- KWADIJK, J. C. J., HAASNOOT, M., MULDER, J. P. M., HOOGVLIET, M., JEUKEN, A., VAN DER KROGT, R. A. A., VAN OOSTROM, N. G. C., SCHELFHOUT, H. A., VAN VELZEN, E. H. & VAN WAVEREN, H. 2009. Using adaptation tipping points to prepare for climate change and sea level rise: a case study in the Netherlands. Wiley Interdisciplinary Reviews: Climate Change 1, pp. 729-740.

Innovative instruments for financing adaptation

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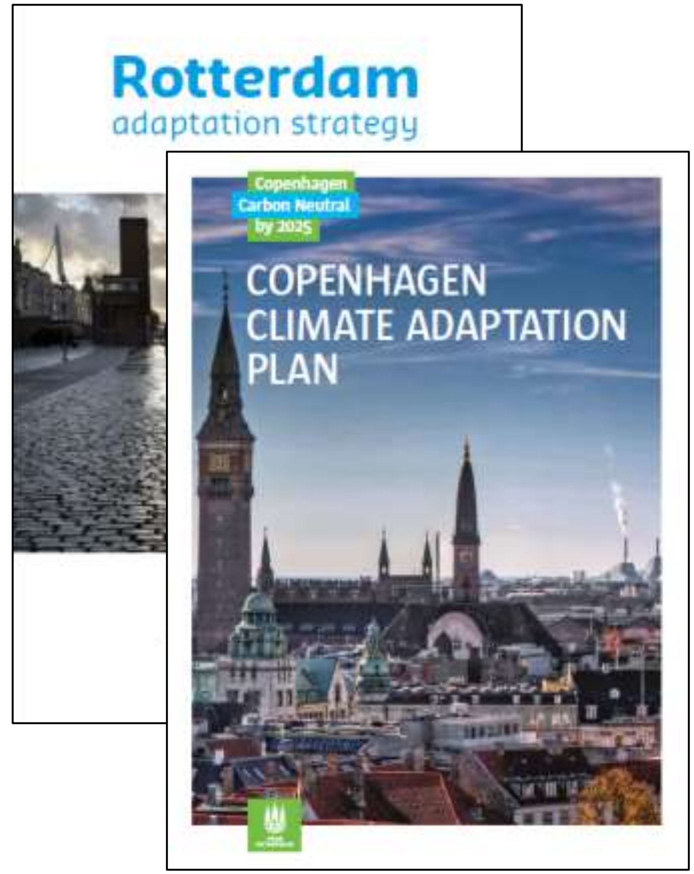
Introduction: need for financing

Many challenges to turn strategies into action:

- Political sense of urgency
- Cultural
- Institutional
- Skills & competencies
- Technical
- …
- FINANCIAL



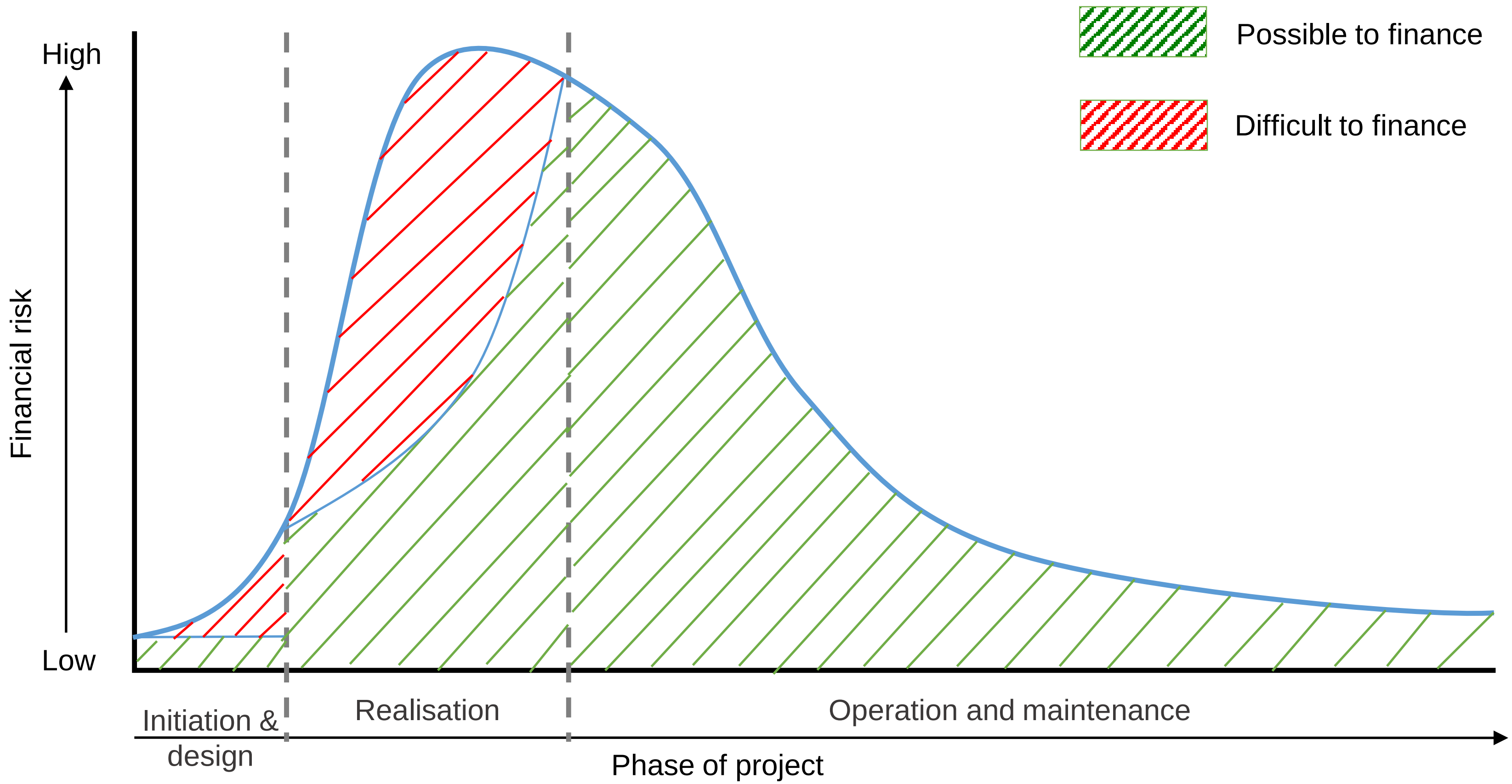
Introduction: need for financing

Adaptation from the perspective of planning/engineering:
> Minimise risk of damage and fatalities

Adaptation from the perspective of finance
> Minimise risk of negative/insufficient return on investment

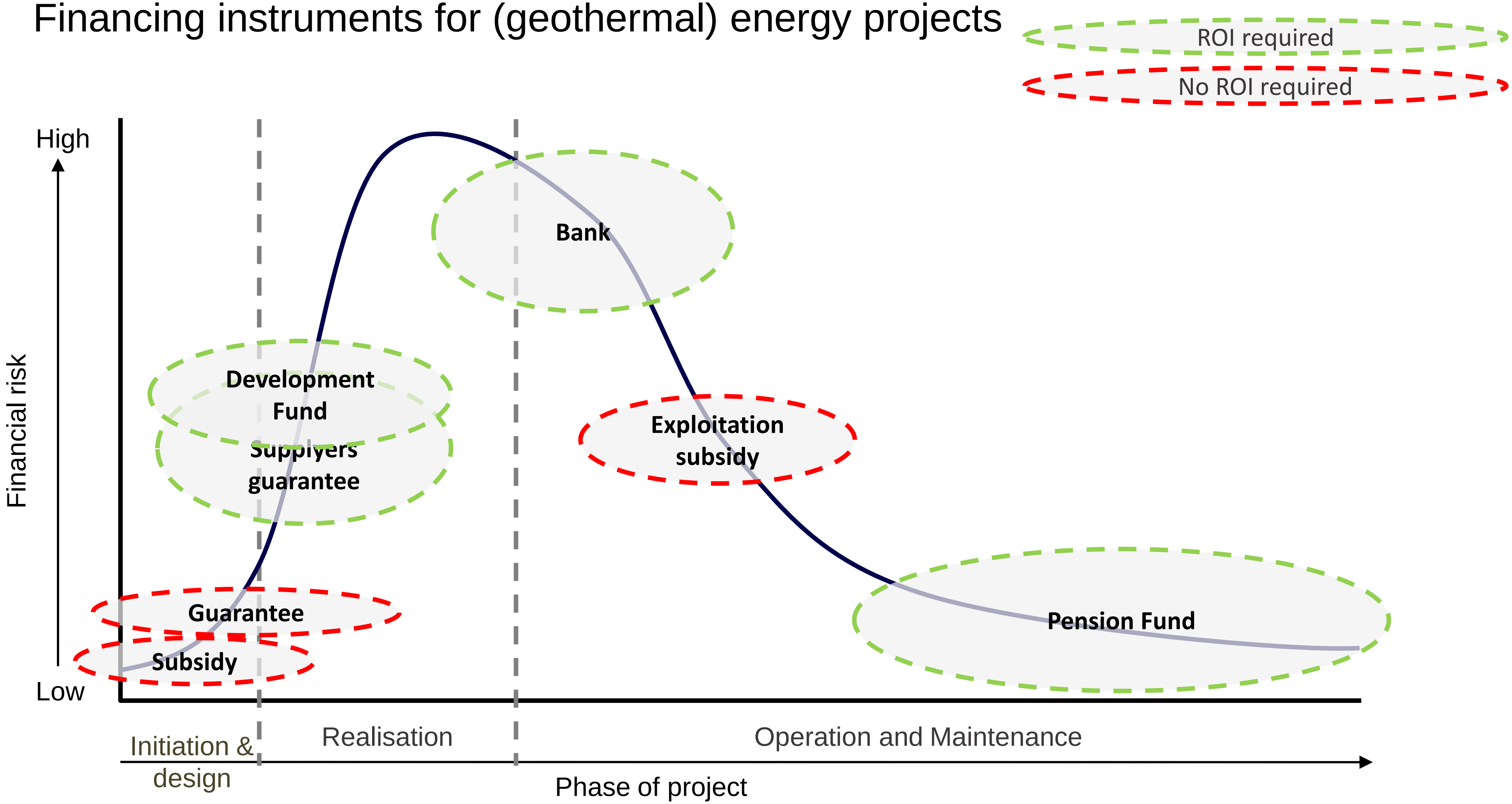
Financial risks of energy projects

Typical financial risks of (geothermal) energy projects



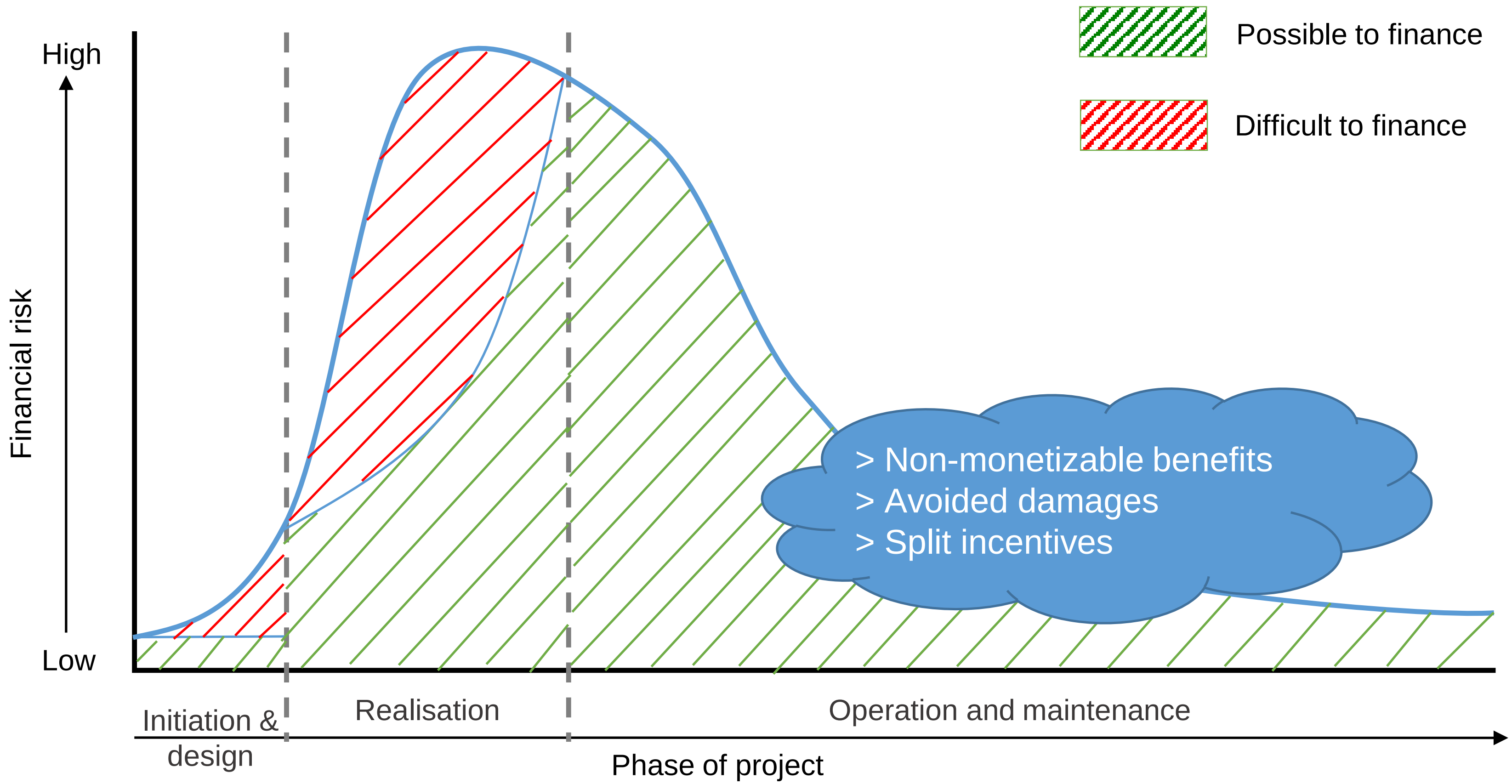
Financing instruments

Financing instruments for (geothermal) energy projects



Financial risks of water-related projects

Water-related adaptation projects are fundamentally different



Examples of financing instruments

GRANT SCHEMES	FEED-IN SCHEMES	SERVICE CONTRACTING	REVOLVING FUNDS
		ZONNEPANELEN ZONDER ZORGEN OP SCHOOL	Amsterdams Klimaat & Energiefonds
Green roof programme	Polder roof Amsterdam	Rooftop Energy	Climate and energy fund
Stimulating private investment through cofunding	Compensation for unused capacity (upfront/continuous)	Private investor taking over service provision	Venture capital for private investments
Proven technology Proven business case Willingness to invest Availability of public funds	Quantifiable benefits Co-funding capacity (upfront compensation) Long-term commitment (continuous compensation)	Idem as feed-in schemes + Ability of service provider to attract finance and manage risks during exploitation	Non-bankable projects Innovative technologies Entrepreneurship Approx 8% annual return on investment

Application for pluvial flood risk management

Zomerhofkwartier, Rotterdam (NL)

Water plaza

Temporary storage of excess runoff.
Multifunctional public space.

- Funded by city's drainage / public space budgets.
- Measures that are needed to disconnect water plaza from sewage system require additional funding sources.

Streetscape greening

Removal of paved areas to create green space and infiltrate stormwater

- City's budgets for public space and urban drainage combined
- Uncompensated contributions from local companies and community
- Maintenance covered by building owner (SERVICE CONTRACT)

Polder roof

Combination of public and private funds needed to make project feasible. For example:

- Compensation for energy savings
- Rent: branding of office building
- Compensation for water storage capacity (FEED-IN)
- Exploitation of roof (SERVICE CONTRACTING)
- Green roof subsidy (GRANT)

Discussion of lessons learned

- Cities are diverse;
- Adaptation projects are diverse;
- Financing challenges are diverse.

> Customise the use of financial instruments to their context.

Energy sector is ahead, but water sector is catching up. Learn from each other to avoid similar mistakes.

Relevant literature

- RIJKE, J. 2014. Financial arrangements for realising adaptation projects. *Deltas in times of climate change*.

Innovative developments of products / services

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1 *Introduction: need for innovation*

describes the need for innovative developments of products / services

2 *Possible instruments*

describes the instruments that policy makers and planners could use to facilitate the innovative developments of products / services (e.g. incubators, launching customers, innovation programmes, networking)

3 *Business cases*

gives examples of innovative developmets of products / services (e.g. mobile telephone / computer apps, property level protection schemes, Climate Service Office, insurance for unembanked areas)

4 *Relevant literature*

gives references to relevant literature on innovative development of products / services

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