4 Explore Adaptation Options

In this module the FUTURE CITIES Adaptation Compass provides an overview of possible options to adapt. The module “Explore Adaptation Options” consists of a catalogue of measures based on the FUTURE CITIES Projects experiences. The catalogue highlights not only the benefits and combination options of the measures but also gives an insight on possible obstacles.

The goal of this module is to broaden the mind of potential users regarding the questions:

- What types of adaptation measures exist?
- How do they work and what do I need to know in advance?
- Which combinations with other measures are possible and efficient?
- How can adaptation and mitigation be linked?

4.1 Purpose of the module and proceeding

The module guides you through the collected information on the adaptation options which are the focus of the FUTURE CITIES partnership. In the first place it is important to get an insight in the variety and amount of options possible.

Adaptation options are cross-sectoral, they are implemented at different spatial and time scales and they include different approaches: from building or reconstructing (e.g. infrastructure) to soft measures that aim at raising awareness for risks or adaptation and want to change behaviour.

Furthermore, you will soon realise that there is not one benefit to one option but an interaction of many. So, building green roofs helps you to cool down the building and it also retains precipitation and therefore attenuates local flooding. Moreover, by building more than one green roof in a street / quarter, the area can be upgraded and for the owners a green roof means a longer lifetime of the roof.

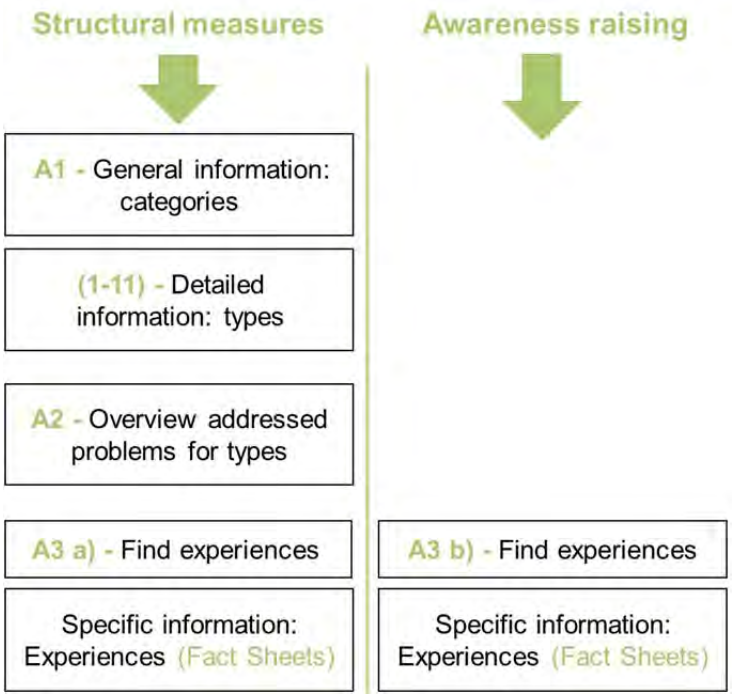
To nevertheless organise these different aspects, the following structure was developed: In the catalogue of adaptation options it is distinguished between structural measures and raising awareness measures.

Please note

Although the FUTURE CITIES project has gathered lots of background information on Adaptation Options, it is not complete. There are many more options for each sector, for urban and rural areas, for geographical regions, like e.g. the Alpine Space. The options described in the module are the good-practice measures from FUTURE CITIES, not a comprehensive catalogue.

Also, the state of the art is changing fast: Adaptation measures are continuously developed further and new ideas are implemented.

So, keep an open mind towards innovative ideas for adapting to climate change!



Structural adaptation options are those options that require building, reconstruction or modification of infrastructure, quarters, houses, industrial sites and more.

Information is provided on three levels:

- General information for each **category of measures** is provided.
- Detailed background information on each **type of measure** is given.
- Specific **examples of implementation** within the FUTURE CITIES partnership show good-practice experience and possible obstacles.

Raising awareness measures are options that inform about the risks and adaptation, that communicate with people and let them participate in any process. They aim at raising awareness for risks, raising acceptance and fostering adaptation options as well as changing behaviour.

Raising awareness measures have to correspond to the specific situation, thus generalised information is less useful. Specific **examples of implementation** within the FUTURE CITIES partnership describe activities in detail and show experiences and obstacles during implementation.

The tables provided in the module and information given are described in the chapters 4.2 and 4.3. There is no specific and recommended way through the module, you are welcome to EXPLORE.

Key terms

Category of measure/ Type of measure

Structural adaptation measures in the FUTURE CITIES Adaptation Compass are organised in categories and types: categories are green structures, water systems, energy efficiency and mitigation and urban structure. Types are described with more detail. In the Compass there are 2-4 types per category. The categories and types are listed in chapter “Categories and types of measures”.

Synergy

In the Adaptation Compass the term is used with regard to the adaptation measures. The combination of several measures may produce a better result than implementing only one single measure. This context is called synergy.

4.2 Structural adaptation measures

In the following, the organisational structure and the tables providing information on the structural adaptation options are described. The contents can be found in the Adaptation Compass.

4.2.1 Categories and types of measures

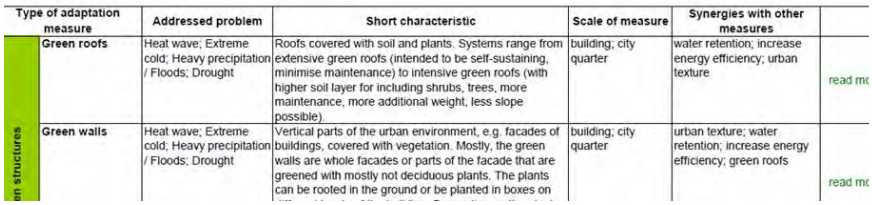
The **categories** comprise the structural measures **green structures, water systems, energy efficiency and mitigation** and **urban structure.**

All categories and types of measures are displayed in an overview table with the major information like problems addressed, characteristic, scale of measure and synergies.

A1 – General information: Categories

The available adaptation options are shortly characterised in an overview table. Further information is given on the scale of measure, synergies and the problems addressed.

If more detailed information on a type of measure is needed, just click on "read more". You can also add more measures, if needed.



Type of adaptation measure		Addressed problem	Short characteristic	Scale of measure	Synergies with other measures	
en structures	Green roofs	Heat wave; Extreme cold; Heavy precipitation / Floods; Drought	Roofs covered with soil and plants. Systems range from extensive green roofs (intended to be self-sustaining, minimise maintenance) to intensive green roofs (with higher soil layer for including shrubs, trees, more maintenance, more additional weight, less slope possible).	building; city quarter	water retention; increase energy efficiency; urban texture	read mo
	Green walls	Heat wave; Extreme cold; Heavy precipitation / Floods; Drought	Vertical parts of the urban environment, e.g. facades of buildings, covered with vegetation. Mostly, the green walls are whole facades or parts of the facade that are greened with mostly not deciduous plants. The plants can be rooted in the ground or be planted in boxes on	building; city quarter	urban texture; water retention; increase energy efficiency; green roofs	read mo

By clicking on ***read more*** you are directed to the selected type of measure.

On each **type** of measure general information is provided, e.g. within the category **green structures** the types **green roofs, green walls** and **green open spaces** (e.g. courtyards, alongside water bodies) are used. The presentation of the types of adaptation measures focuses on their synergies related to climate protection and impacts related to other aims which are on the agenda of cities, like coping with demographic change or regenerating industrial areas. These additional aspects of an adaptation measure facilitate actual implementation.

Key terms

Spatial scale of measure

The spatial scale of an adaptation measure describes where (area size) the measure is showing its impacts.

Addressed problems

Addressed problem relates to the climate change impact and the hence arising risks, which are addressed and reduced by the selected adaptation measure.

Energy efficiency

Energy efficiency describes the capacity of a machine, method or approach to transform energy from an energy carrier. Often also efforts to power-saving (e.g. energy-saving lamps, insulation of buildings) are included under the term energy efficiency. The increase of energy efficiency is a claim in order to reduce energy consumption and eliminate energy wastage. The aim behind this strategy is to mitigate greenhouse gas emissions.

Detailed information: Types

For every type of measure a single page containing detailed information, like e.g. technical data, is given. Altogether, there are 11 tables for the types of measures.

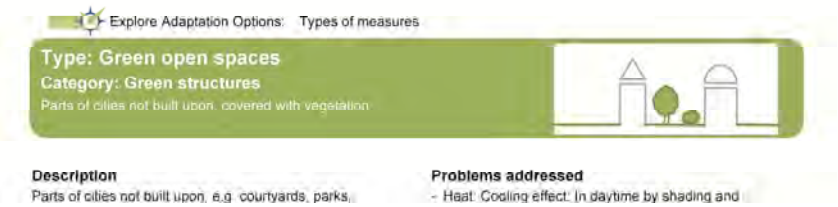


Table: Overview on categories and types of measures as well as descriptions used in the Adaptation Compass

Category of structural measure	Type of measure	Description as used in the FUTURE CITIES Adaptation Compass
Green structure	Green roofs	Roofs of buildings covered with vegetation
	Green walls	Walls covered with vegetation
	Green open spaces	Parts of cities not built upon, covered with vegetation
Water system	Water retention	Elements of the urban water system meant to delay the discharge of rainwater
	Water drainage	Elements of the urban water system that function for draining rainwater
	Urban water spaces-flowing	Open water elements in the urban environment with flowing water, e.g. rivers, streams
	Urban water spaces-standing	Open water elements in the urban environment with standing water
Energy efficiency and mitigation	Increase energy efficiency	Less energy need for the same results in the urban structure, water and green structures
	Renewable energy	Measures for using renewable energy sources, in the urban environment
Urban structure	Urban setting	Measures addressing the elements of the urban environment in their configuration
	Urban texture	Measures addressing the urban surfaces related to their material

Key terms

Urban or city structure

Urban structure is in the Adaptation Compass a category for adaptation measures addressing the whole city and its morphology, i.e. the city build-up as well as its elements and materials are regarded (volume, density of buildings related to open spaces).

Lessons-learned

The experiences made by the FUTURE CITIES partners while implementing adaptation measures were collected and assessed. Finally, they were integrated in the Adaptation Compass to pass the experiences to further users.

Green structure

Green structure in the Adaptation Compass is a category for adaptation measures dealing with the installation of green features (flora) in the city, e.g. building green roofs, redesigning park areas.

Water system

Water system in the Adaptation Compass is a category for adaptation measures dealing with water in the city, e.g. the integration of water bodies in cities or the improvement of water management.

4.2.2 Experiences from FUTURE CITIES

Fact sheets inform about the **implemented measures** in FUTURE CITIES. They document the technical description and practical experience of FUTURE CITIES pilot projects and lessons learned: e.g. spatial characteristics of the measure – such as scale (region, town, quarter etc.) and use (city centre, business, residential), the adaptation problems which can be addressed with the measure and the synergies and conflicts encountered with other adaptation and mitigation measures or other sustainability aims.

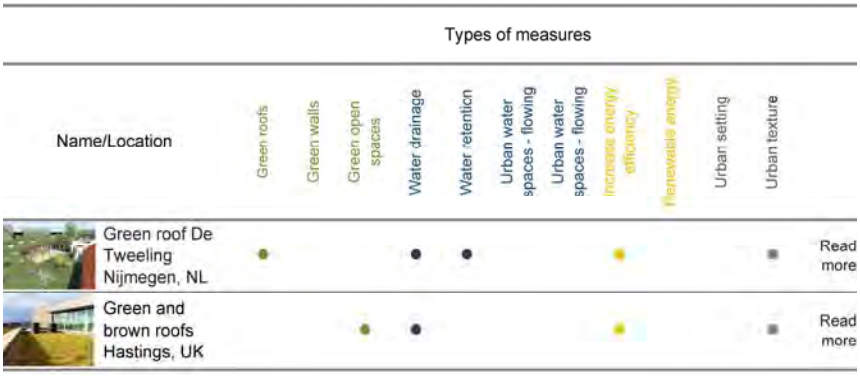
The implemented adaptation measures cannot be connected with only one category of measure but is connected to more categories. In theory, the types of measures described have a very clear focus but all measures affect their surroundings in a variety of ways. For the implemented measures in FUTURE CITIES one major category was determined by its pattern and one or two further categories are additionally given remarking the further positive impacts of the options. For example a measure “Building green roofs” is mostly a green structure as vegetation is planted but water systems and energy efficiency are also involved as the measure is connected with ideas to improve rain water management and building insulation.

A3 a) - Find experiences

There are different ways to find the implemented examples you are interested in:

- the types of adaptation measures and their combinations
- the country and region (location) where the measures were implemented.

To learn more about the implemented measures, click on the respective names or on read more.



The Fact Sheets can be opened from the Adaptation Compass and are also available as a separate publication.

Key terms

Awareness raising measure

An awareness measure in the Adaptation Compass is a category for adaptation measures aiming to raise awareness and integrate the public or other target groups in the adaptation process.

Fact sheet

A fact sheet is a presentation of information in a format which clarifies the key points. The layout is simple and mostly standardised.
In the Adaptation Compass the Fact Sheets are standardised sheets, which contain information on the good-practice adaptation measures implemented in the FUTURE CITIES project.

Sustainability

Sustainability is a development that meets the needs of the present without comprising the ability of future generations to meet their own (UN, 1992).

4.3 Raising awareness measures – Experiences from FUTURE CITIES

The FUTURE CITIES Partnership has implemented many measures to raise awareness for the topic of adaptation in general, to support the implementation of structural adaptation measures and to change the behaviour of the citizens.

These actions are described in the **Raising awareness fact sheets** in the Compass. They comprise a description of the measures implemented, their location, aim of the measure and the target groups approached. Furthermore, details are given on the instruments used and the experiences made. For each measure contact data of the responsible organisation is given. Feel free to contact them for further insights.

The examples are structured into the types of target group integration:

- **Inform**: the role of the target groups is observer / listener.
- **Consult**: the target group advices or consults in the measure.
- **Co-produce**: the target group functions as co-partner in implementing the measure.

Similar to the structural fact sheets (see chapter 4.2) there are different ways to find the implemented examples you are interested in: you can search for

- the **type** of the measure (e.g. Inform or Consult)
- the **target groups** approached (e.g. professionals) or
- the **country and region** in which the measures were implemented.

A3 b) - Find experiences

There are different ways to find the implemented examples you are interested in: You can search for **type of measure - target group - location**. To learn more about the implemented measures, click on the respective names.

Name/Location	Inform Role of target group: Observer/listener	Consult Role of target group: Consultant/advisor	Co-produce Role of target group: Co-partner	Target Group	
 Energise Hastings Hastings, UK	•	•	•	Population, Professionals	Re mo
 Sustainable stormwater management Essen, DE	•	•	•	Professionals, population, specific sectors	Re mo

Key terms

Target group

Each message that is disseminated should be fitted to a group of people to reach the optimum impact. This group of people is called target group. Messages specified for a target group are more likely to be understood and implemented.

4.4 Addressed problems

The types of adaptation measures (only structural measures) presented need to be assessed regarding the identified vulnerabilities and risks. Only after that the suitable types of adaptation measures for your local situation can be selected in the final module.

Therefore, an overview on the positive and negative impacts of all types of structural adaptation measures is included in the Adaptation Compass. This table lists all types of adaptation measures included in the Adaptation Compass and their addressed problems, i.e. the effect on the identified risks.

The criteria for evaluation are the following:

- Significant reduction of risks: **++**
- Reduction of risks: **+**
- If there is no impact to be expected: **o**
- Increases risks or has a negative impact: **–**
- No connection between the measure types and the problem: **n/a**

With this system you can, on the one hand, find all measures that address your specific problem. On the other hand, conflicts can be identified: E.g. you want to improve the city ventilation to address the increasing problems arising from heat in your city. The table shows you though that for extreme cold spells this measure has some negative impacts, as wind channels decrease the comfort and increase e.g. the risk for black ice.

A2 - Overview addressed problems for structural types

Get an overview on the types of adaptation measures and their addressed problems. You can come from the adaptation measure side: check all problems addressed; or from the problem's side: what measures address my problems?

- As standard the table shows only the receptors you selected in Sheet V3; you can switch the appearance of the table between all receptors and only the selected by using the buttons on the left;
- Additionally, a possibility to change the criteria given is provided – just click on the cells you want to change.

Adaptation measure / Addressed problems	Green structures			Water systems				Energy efficiency and mitigation		Urban structur	
	Green roofs	Green wall	Green open spaces	Water retention	Water drainage	Urban water spaces - flowing	Urban water spaces - standing	Increase energy efficiency	Renewable energy	Urban setting	Urb text
blic health - Heat wave	++	++	++	o	o	++	+	n/a	n/a	++	+
blic health - Extreme cold	+	+	o	o	o	-	o	n/a	n/a	-	o
blic health - Drought	-	-	-	o	o	o	o	n/a	n/a	o	o
blic health - Heavy precipitation / ods	++	+	++	++	++	+	o	n/a	n/a	o	+
blic health - Storm	o	o	-	o	o	o	o	n/a	n/a	-	o
insport - Heat wave	n/a	n/a	+	o	o	+	n/a	n/a	n/a	+	+
insport - Extreme cold	n/a	n/a	o	o	o	o	n/a	n/a	n/a	-	o
insport - Drought	n/a	n/a	o	o	o	o	n/a	n/a	n/a	o	o

Please note:

The table A2 – Overview addressed problems for types is the basis for the sorting of adaptation measures according to the effect on the identified problems which is part of Module "Determine the need for action and select measures".