GREEN ROOFS ARE NEEDED

Conditions in cities are changing. The population will be centred largely on cities in the next couple of decades. Helsinki is growing and becoming denser, and it has to anticipate the challenges caused by climate change and urbanisation and try to resolve them using the available means. The goal is the adaptability of the urban environment, i.e. alleviating the effects of extreme conditions, which are becoming increasingly common, flexibility and rapid recovery.

Lots of benefits can be obtained from the construction of green roofs. They make it possible to improve the provision of ecosystem services, i.e. non-material and material nature services in the urban area as well as to increase the well-being of citizens in the future.

Rainfall is expected to increase in Finland, and also heavy downpours are expected to become even heavier, increasing the peak loading of storm water systems. The risk of urban floods will increase. Green roofs retain and delay rainwater, thereby providing a partial solution for the management of storm water.

As a result of global warming, heat waves will become more common. Green urban structures help to balance the temperatures and to prevent the heat island effect. Green roofs containing lots of vegetation may also bind particulate emissions and improve air quality.

Green roofs are one of the methods which can be used for the promotion of the diversity of urban nature also in the constructed areas of the densifying city and to reduce the effects of supplementary construction. Green roofs supporting diversity provide habitats for plants, invertebrates and birds and function as a part of the ecological network. A varying growth layer thickness strongly increases the diversity and vitality of the green roof. The construction of green roofs, structural solutions, maintenance and the economy of solutions are developed by means of tests and trial construction.

Investing in green infrastructure is economically feasible (see “Cost-benefit analysis of green roofs”). The green layer of the green roof protects the outer roof layer from the wearing effects of UV radiation and heat and increases the life span of the roof. A green roof may reduce the consumption of heating and cooling energy in the building. The construction of green roof helps to add value to plots and properties.

In addition to creating a better urban landscape, utilising the roofs provides new opportunities for arranging cozy outdoor areas in residential areas, workplaces and public buildings and for urban agriculture, for example.

The latest research in the field has been utilised in the preparation of Helsinki’s green roof policy, and the work is ongoing. A green roof web site will be created for the provision of the latest information on green roofs, such as the costs of and technical solutions for green roofs.

The City of Helsinki is committed to the promotion of green roofs according to the means presented in this green roof policy.

City Board, January 2016.

KVSTO 15.5.2013

“The City Board states that the city’s strategic goals, such as climate and air protection, noise prevention, water protection and nature protection, can be promoted by means of green roof construction.

The City Board finds that specifying policies in order to promote the construction of green roofs should be supported. Research and development concerning green roof construction as well as aspects related to legislation, conditions, financial and other factors should be taken into account in this work.

The City Board aims at advising the Public Works Department to prepare the policies promoting green roofs and similar structures for the city in cooperation with the various administrative branches and other stakeholders.”
The City of Helsinki wants to profile itself as the pioneer of green roof construction in Finland.

The goals of the green roof policy of the City of Helsinki are:

- A better management of storm water during heavy downpours
- Mitigating the urban heat island effect
- Ensuring and promoting the diversity of urban nature
- An active utilisation of roofs as a functional, economic and aesthetic resource
I The City of Helsinki will promote the construction of green roofs by means of city planning, the allocation of plots and trial construction of green roofs.

II In new buildings with a roof angle of less than 20 degrees, a green roof shall be the first option to be explored in city planning and design. A green roof must be used as the primary option in unheated adjacent buildings and shelters.

III The depth of the substrate of the green roofs being constructed shall correspond to the functional requirements. A varying depth, versatile vegetation and prioritising species and substrates of domestic origin must be aimed at in the green roofs.

IV Helsinki will promote and seek environmentally responsible solutions, such as the use of resource-efficient materials in green roof structures.

V The City will increase green roof expertise by means of project monitoring and evaluation, training of city personnel and various types of trial construction and visit sites.

The City will distribute information on the benefits of green roof construction, functional structural solutions, costs and best practices.
## ACTIONS

### CONSTRUCTION PROJECTS

The city will construct technically functional green roofs in new schools, daycare centres, administrative, service and maintenance buildings, in its own housing production and other suitable projects in the event that a green roof is justified in order to fulfil the goals of the green roof policy.

The possibility to implement green roofs will be examined in renovation projects.

<table>
<thead>
<tr>
<th>Responsible party (implementation of action)</th>
<th>Cooperation parties</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kv, Att, Liv</td>
<td>Ksv, Hkr</td>
<td></td>
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</tbody>
</table>

### CITY PLANNING

In city plans aiming at new construction, the construction of green roofs is required when such a regulation is justified in order to fulfil the goals of the green roof policy, taking local conditions into consideration.

The functional goals of green roofs are specified in each case in the city plan orders and explanations.

Helsinki’s green factor method is utilised as a tool for the specification of the role of green roofs in planning and in construction projects.

<table>
<thead>
<tr>
<th>Ksv</th>
<th>Ymk, Rakvv</th>
<th>2015-</th>
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</thead>
</table>

### FINANCIAL SUPPORT

The city is exploring methods for the development of a financial instrument which promotes the construction of green roofs as specified in sections III and IV of this policy in new construction and renovations.

<table>
<thead>
<tr>
<th>Kanslia, Kv</th>
<th>Rakvv, Ksv</th>
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</table>

### TRIAL CONSTRUCTION

The city will initiate trial construction projects for the determination and development of solutions which are the most suitable and the most environmentally responsible for the Helsinki region, in terms of maintenance, economy and technology. Different biotopes will be tested on green roofs with a special emphasis on plant species of local origin.

The trial construction sites will be documented, monitored and evaluated.

<table>
<thead>
<tr>
<th>Kv, Att, Liv</th>
<th>Ksv, Ymk, Kanslia, Hkr</th>
<th></th>
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</thead>
</table>

### GREEN ROOF TEAM

The city will set up a green roof team to monitor the implementation of the green roof policy and to evaluate the construction, benefits, overall economic benefit, use and maintenance of green roofs.

The green roof team will report to the City Council on the execution of the actions.

<table>
<thead>
<tr>
<th>Kanslia</th>
<th>Kv, Rakvv, Hkr, Ksv, Ymk</th>
<th>2016</th>
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|                                                |                          | 2020     |
**RESEARCH**

The city will cooperate with parties researching green roofs. Co-design and research of trial construction sites hold a prominent position.

<table>
<thead>
<tr>
<th>Green roof team</th>
<th>Industry organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ymk, Kv</td>
<td>Ksv, Hkr, Att, Liv</td>
</tr>
<tr>
<td>Universities and research institutions</td>
<td></td>
</tr>
</tbody>
</table>

**TRAINING**

The city will organise seminars and training for city staff (such as cost of green roofs and maintenance-related matters, such as costs and benefits of green roofs, functional and environmentally responsible structural solutions and maintenance).

The city will set up a green roof site providing information on the construction of green roofs.

<table>
<thead>
<tr>
<th>Green roof team</th>
<th>Industry organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kanslia</td>
<td>Administrative bodies</td>
</tr>
<tr>
<td></td>
<td>2015-2016</td>
</tr>
</tbody>
</table>

**BUILDING CODE**

The city will promote the construction of green roofs in unheated adjacent buildings by means of a regulation in the building code.

<table>
<thead>
<tr>
<th>Rakvv</th>
<th>Hkr, Kv, Pel</th>
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</thead>
</table>
FURTHER INFORMATION

Concepts:

- **Biotope**: A habitat type of a community of species in which the most relevant environmental factors are similar.
- **Ecosystem services**: Material and non-material services offered by nature, utilised by humans.
- **Stormwater**: Run-off water from rain or melting snow in urban areas.
- **Urban green**: Green infrastructure is the network of natural and constructed green elements.
- **Heat island effect**: The relatively higher temperature of a city compared to the surrounding rural areas. Factors affecting the formation include the release of solar radiation energy stored in urban structures, waste heat caused by human activity and the low degree of evaporation.
- **Diversity**: Biodiversity or biological diversity is a concept referring to the diversity of all living nature.
- **Building code**: Local regulations supplementing the building legislation (such as city planning, town planning or the National Building Code of Finland).
- **Resource efficiency**: The use of the earth's limited resources in a sustainable manner while minimising the environmental effects. “Resource-efficient Europe” is the flagship initiative of the EU’s Europe 2020 strategy.
- **Invertebrates**: Animals (97% of all animal species) which do not have an internal skeleton or spine.
- **Financial instrument**: An administrative payment mechanism, for example.
- **Green factor**: The relationship between the plot's weighted green surface area and its total area. The weighted area consists of the total area of the various green factor elements (such as lawn, green roof, planted tree).
- **Environmental responsibility**: The aim to operate in the most environmentally responsible manner. Depends on the abilities of the individual or the community as well as the opportunities offered by the environment.

Foreign references of green roof strategies and guidelines:

- **Basel**: grabs-eu.org/membersarea/files/basel.pdf
- **Chicago**: cityofchicago.org/city/en/depts/bldgs/provdrs/green_permit.html
- **Copenhagen**: kk.sites.itera.dk/apps/kk_pub2/pdf/1017_sj43Q6DDyY.pdf
- **London**: london.gov.uk/sites/default/files/living-roofs.pdf
- **Malmö**: greenroof.se
- **Seattle**: seattle.gov/dpd/cityplanning/completereprojectslist/greenfactor
- **Singapore**: skyrisegreenery.com/index.php
- **Toronto**: toronto.ca/greenroofs
Domestic research and publications on the subject

- Fifth Dimension - Green Roofs in Urban Areas research program, University of Helsinki (information on research and publications available on the website).
  luomus.fi/viherkatot

- Laurila, Sari et al. (2014): Normeja viherkatoille – perusteita kehittämiseen [Norms for green roofs – principles for development, available only in Finnish], University of Helsinki’s education and development centre Palmenia in cooperation with University of Helsinki’s “Fifth Dimension” research programme and Viher- ja ympäristörakentajat ry.

  luomus.fi/sites/default/files/files/green_roof_cost_benefit_analysis_raportteja_2-2013.pdf


  edilex.fi/ymparistojuridiikka/13728


  www.grabs-eu.org/membersArea/files/Database_Final_no_hyperlinks.pdf

- Sveta Silvennoinen, Maija Taka, Harri Koivusalo, Vesa Yli-Pelkonen, Heikki Setälä (publication expected in 2016): Monetary value of urban green space as ecosystem service provider: a case study of stormwater volume in Finland.

- ILKKA project
  (Ilmastonkestävä kaupunki – työkaluja suunnitteluun)

- Viherkerroin, viherkerroinmenetelmän kehittäminen Helsingin kaupungille
  (Helsingin kaupungin ympäristökeskuksen julkaisu 8/2014)

- Helsingin luonnon monimuotoisuuden turvaaminen
  (Helsingin kaupungin ympäristökeskuksen toimintaohjelma 2008-2017)

- Ympäristöohjelma
  (Helsingin kaupungin rakennusviraston ympäristöohjelma 2013-2016)

- Hulevesistrategia
  (Helsingin kaupungin rakennusviraston julkaisu 2008:9)

- Pääkaupunkiseudun ilmastonmuutoksen sopeutumisen strategia
  (Helsingin seudun ympäristöpalvelut – kuntayhtymä HSY:n julkaisu 2012:10)

- RT 85-10709 instruction card, Kansi- ja kattopuutarhat sekä viherkatot
  (Rakennustieto will be publishing an updated instruction card on green roofs)
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