Norwegian examples of ~~drought and flood prevention~~ Multifunctional Green Infrastructure

DAVID VERNON BRASFIELD

CHAIRPERSON – NORWEGIAN ASSOCIATION FOR GREEN INFRASTRUCTURE

BOARD MEMBER AND SECRETARY – WORLD GREEN INFRASTRUCTURE NETWORK


NEXT 1 km

Norwegian Association for Green Infrastructure

WORLD GREEN INFRASTRUCTURE NETWORK
vegetation makes it possible!

David Brasfield

- Architect / building engineer
- Urban planning background
- Urban sustainability policy development
- Oslo Future Cities (project lead for energy and climate change adaptation)
- Environmental Manager at Sunnaas Rehabilitation hospital since 2013
- Member, European Healthcare Climate Council
- Active promotion of green roofs & GI since 2005.
- Chairperson, Norwegian Association for Green Infrastructure (NFGI)
- Board member and secretary, World Green Infrastructure Network

NFGI - Who are we?

NFGI Office manager post@nfgi.no,
Internet: www.nfgi.no

LinkedIn: www.linkedin.com/company/nfgi-norsk-forening-for-grønn-infrastruktur/

NFGI is registered with the Norwegian national business register with org.nr. 890957072

NFGI
Norwegian Association for Green Infrastructure

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Creative commons: Tim Adams

NFGI – What do we do?

- Ideal non-profit NGO advocating the uptake of blue-green infrastructure technology, especially in urban areas
- Earlier focus on green roofs and walls, expanding to other aspects of GI, for example urban trees
- Organisational background from the rural turf roof industry for cabins stemming from the norwegian vernacular green roof tradition
- Membership in and cooperation with Scandinavian Green Infrastructure Association and World Green Infrastructure Network
- Our members and network – suppliers, organizations, public sector, research/education actors and individuals

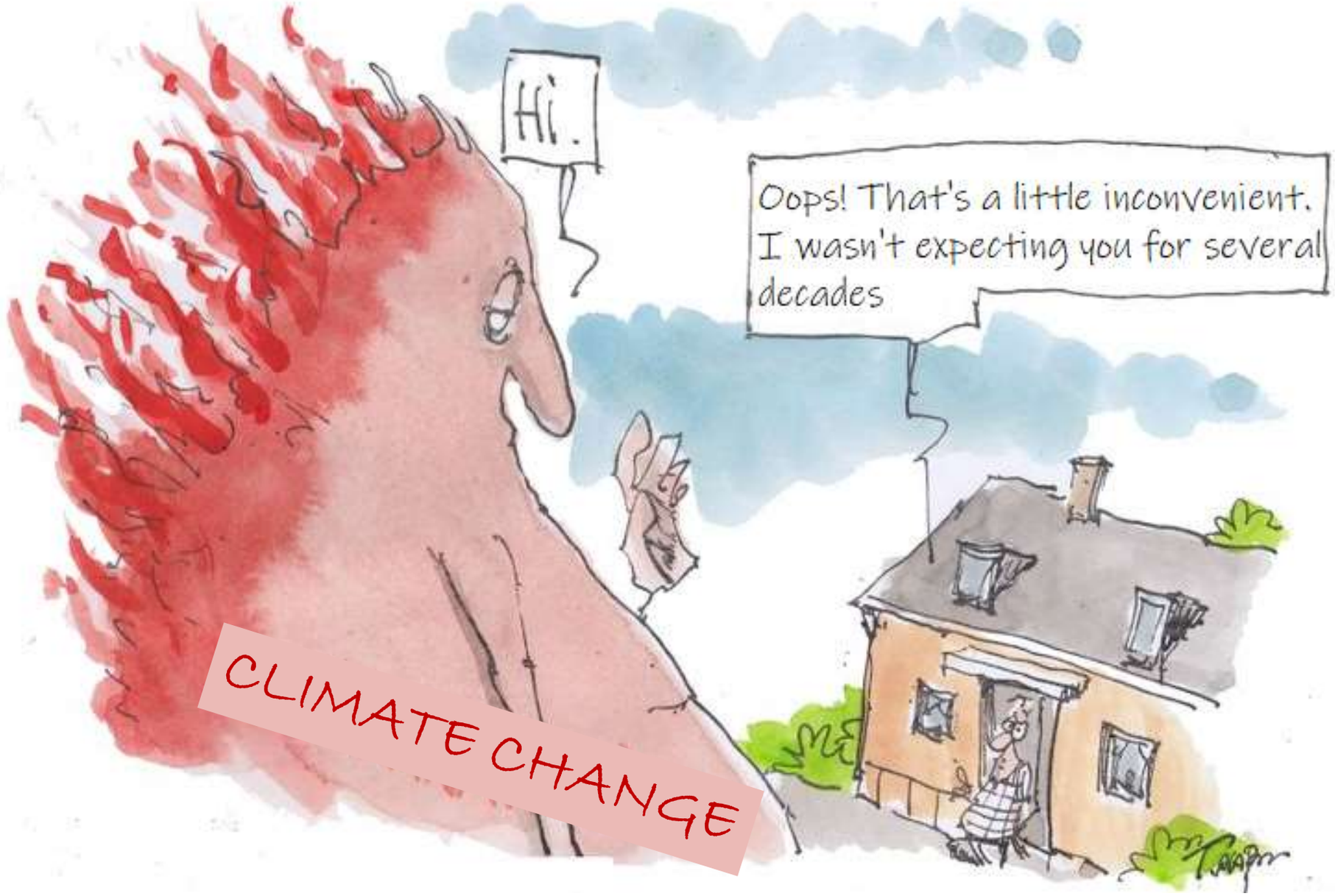
My favorite green roofs. Not prize winners. Nature's own creation and DIY green roofs.

https://www.google.no/maps/search/60.8735798,8.4945374,28/@60.8737506,8.4956482,152m/data=!3m1!1e3

Sustainable financing of climate resilience

Willingness to pay:
Insurance industry
(circular resilience financing)

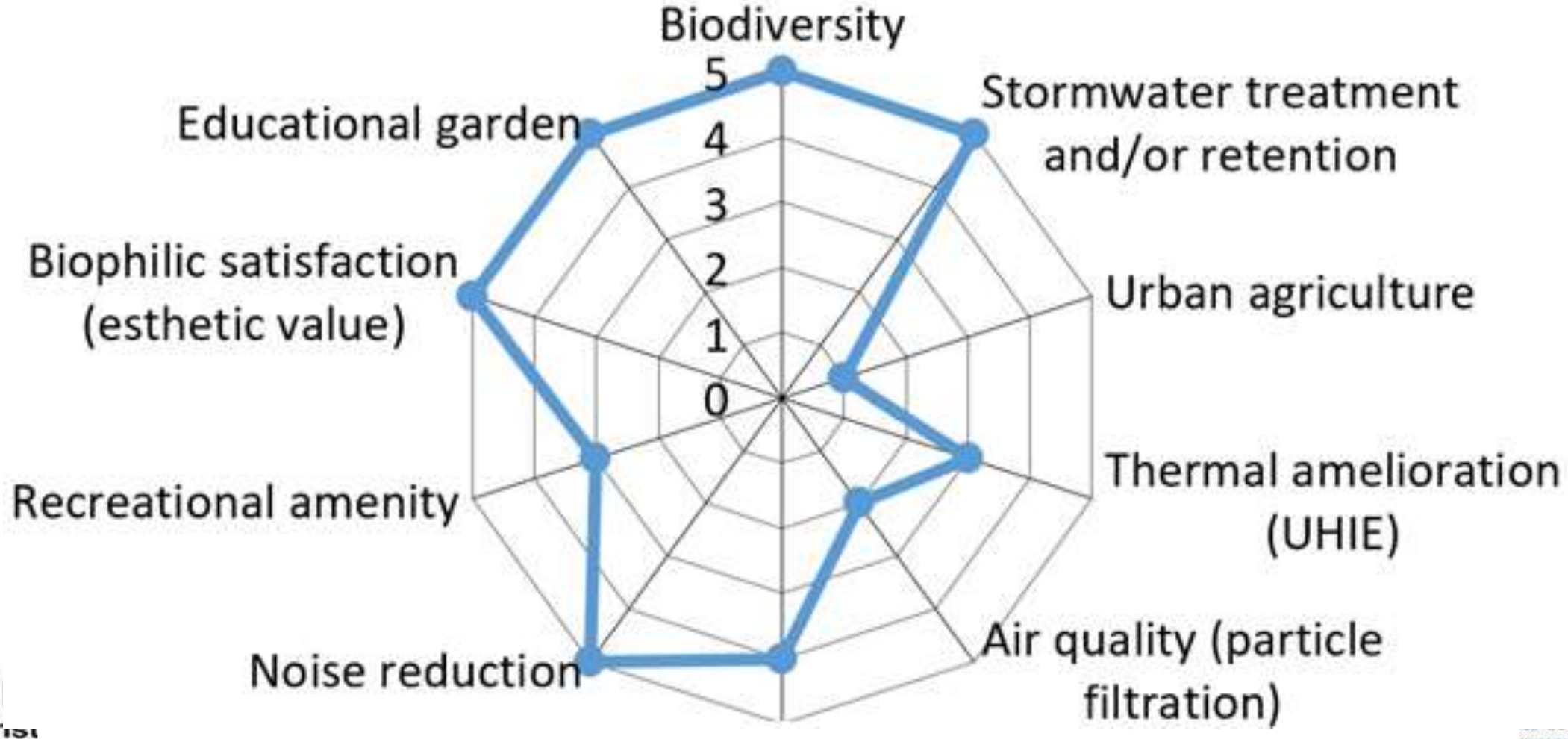
Private property owners?
Public sector?


Hi.
Oops! That's a little inconvenient. I wasn't expecting you for several decades
CLIMATE CHANGE

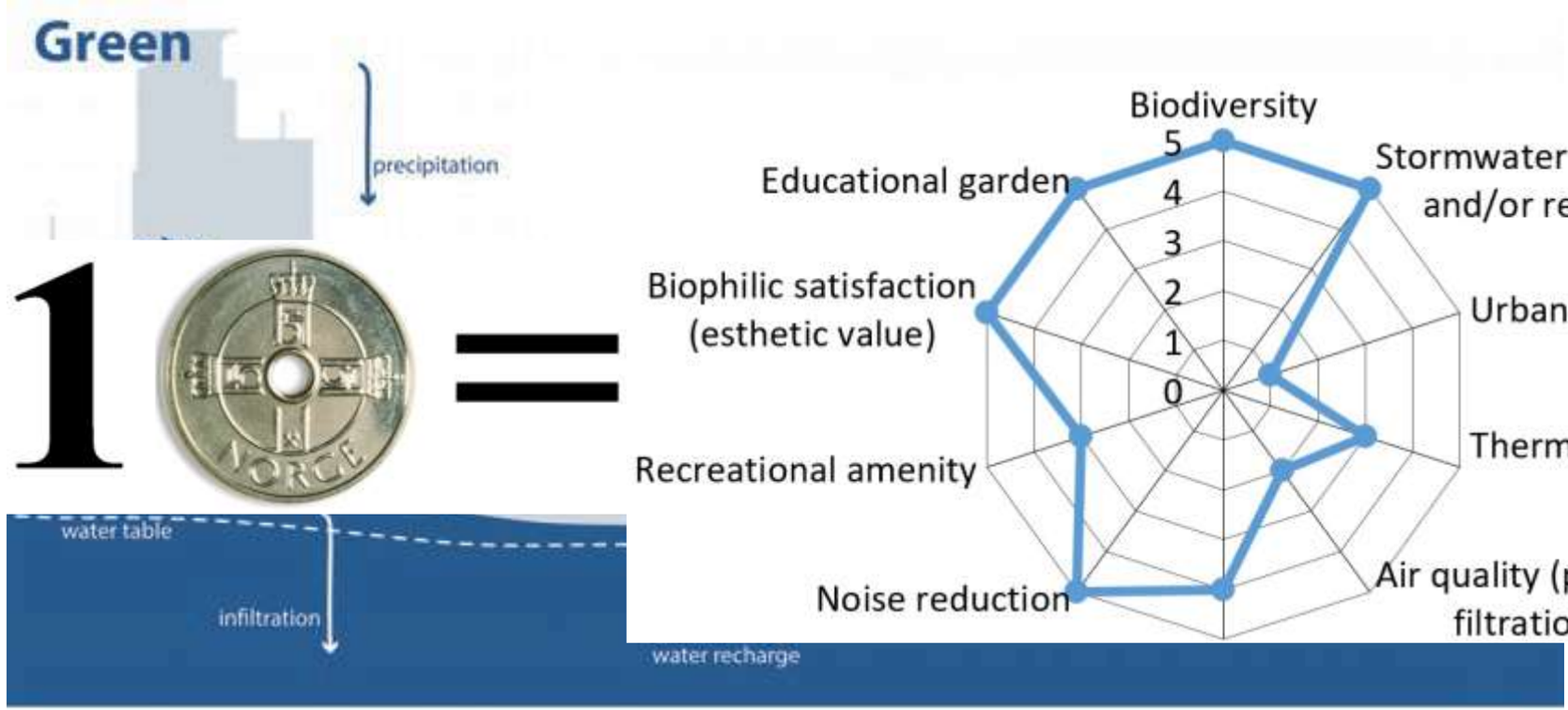
Value creation for Piastow by making connections

- **Connections between Poland and Norway**
  - Green infrastructure knowledge, projects, international trade?
  - Connection with municipal policy makers and administrators
  - Connections between GI centers of excellence in education and research
- Connection between Piastow's work force and the new green economy
- Biological corridors for thriving and **healthy urban ecosystems**
  - Connections between species and improved habitats
- Improved connection between citizens and local nature amenities
- Connections between elements in the local hydrological system
  - Smart **stormwater management and flood control**
  - Improved **climate resilience** (including evapotranspiration and UHIE)
- Connections in material flows through the application of **circular economy** principles in green infrastructure design choices (green green infrastructure)

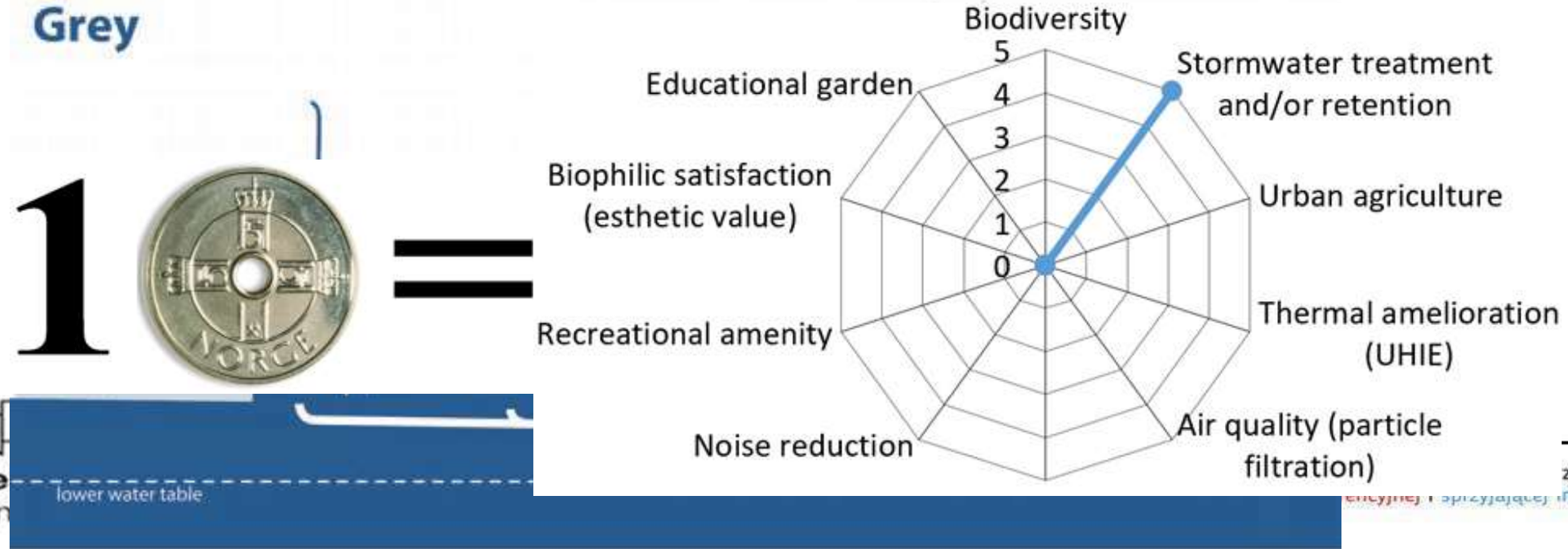
Multifunctionality means we need to prioritize which functions we wish to achieve in green roof design



Green



Grey



Iceland
Liechtenste
Norway gran

zecz Europy zielonej.
ntegracji społecznej.

Multifunctional and climate smart!

Less intensive use of materials and excavation to produce storm water retention yields reduced carbon footprint

Biophilia
Biophilic design as a principle of healing environments

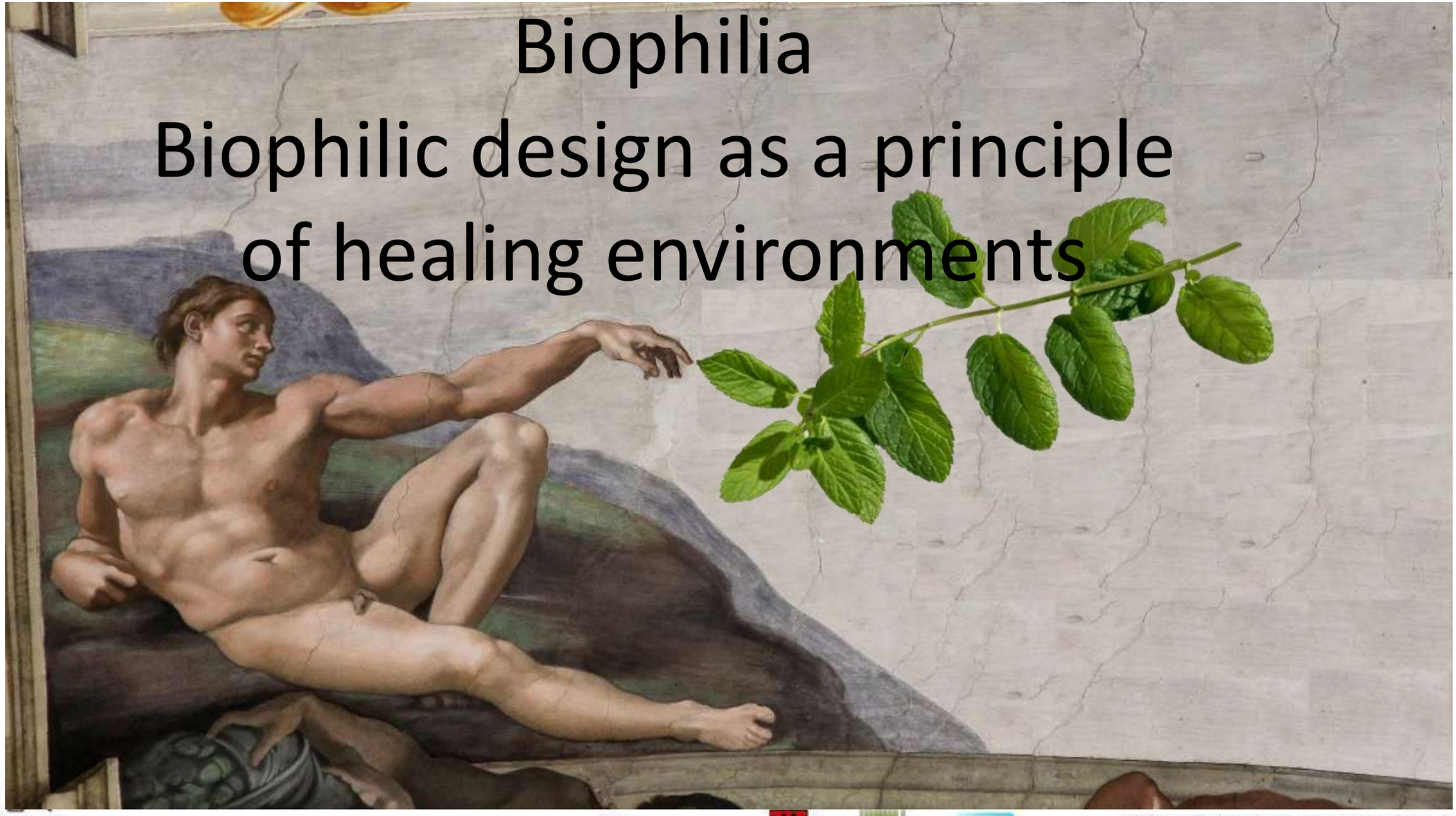


image credit: David Brasfield

natural selection noun

Save Word

Definition of *natural selection*

: a natural process that results in the survival and reproductive success of individuals or groups best adjusted to their environment and that leads to the perpetuation of genetic qualities best suited to that particular environment

Through millions of years of evolution humans have become biophilic by design

"Nature deficit disorder" and stress (biophilic deprivation)

Nature deficit disorder refers to the phrase coined by Richard Louv in his 2005 book Last Child in the Woods that human beings, especially children, are spending less time outdoors resulting in a wide range of behavioral problems.

Nature deficit disorder - Wikipedia, the free encyclopedia
https://en.wikipedia.org/wiki/**Nature_deficit_disorder**

Forest bathing in Japan – *Shinrin yoku*

https://commons.wikimedia.org/wiki/File:Bamboo_forest,_Arashiyama,_Kyoto_(oliveheartkimchi).jpg

Icelan
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py zielonej.
społecznej.

Blue-green factor for smaller municipalities?

Norwegian Standard for «Blue-green» factor

Foto: Hanne G. Wells

Vil du være med å utarbeide ny Norsk Standard for «Blågrønn faktor»?

Blågrønn faktor er et verktøy for kvantifisering av vegetasjon og vannelementer i byggesaker. Dette bidrar til uterom tilrettelagt for vannhåndtering, vegetasjon og biodiversitet. Nå starter arbeidet med å lage Norsk Standard.

BLÅGRØNN FAKTOR (BGF) Samarbeidsprosjekt mellom Bærum og Oslo kommune som del av programmet Framtidens byer.
Utarbeidet for Bærum og Oslo kommune av Dronninga landskap, COWI og CF Møller. Revidert Oslo kommune 28.01.2014.

Verdi	Symbol	Faktor	Beskrivelse	Areal m²	BGF
			TOMTENS AREAL (INKLUDERT BEBYGD AREAL). FYLL UT TOMTENS AREAL:	0	
		1. BLÅGRØNNE FLATER			
1		ÅPENT PERMANENT VANNSPEIL SOM FORDRØYER REGNVANN	Permanente vannspeil som tilføres regnvann fra tomten, uansett om dette er en kanal med betongbunn, bekk med grønne bredder eller annet type vannspeil. Kun selve vannspeilet regnes.	0	0
0,3		DELVIS PERMEABLE FLATER SOM GRUS, SINGEL OG GRESSARMERT DEKKE	Harde overflater med permeabilitet, som sørger for infiltrasjon. For eksempel gressarmering av betong, grus eller singel. Gjelder ikke flater over underliggende harde dekker dersom jorddybden er mindre enn 80 cm.	0	0
0,2		IMPERMEABLE OVERFLATER MED AVRENNING TIL VEGETASJONSAREALER ELLER ÅPENT FORDRØYNINGSMAGASIN	F.eks. betong, asfalt, takflater og belegningsstein. Beregnes for areal tilsvarende størrelsen på vegetasjonsflaten som mottar vannet. Fordrøyningsmagasin må ha kapasitet iht. kommunale krav til påslipp til offentlig avløpsnett.	0	0
0,1		IMPERMEABLE OVERFLATER MED AVRENNING TIL LOKALT OVERVANNSANLEGG UNDER TERRENG	F.eks. betong, asfalt, takflater med avrenning som ledes til anlegg under terreng for fordrøyning og rensing av overvannet. Dette gjelder også underjordiske løsninger med kombinert vanning av trær. Hele arealet teller forutsatt at fordrøyningsmagasinet er iht. kommunale krav til påslipp til offentlig avløpsnett.	0	0
1		OVERFLATER MED VEGETASJON FORBUNDET MED JORD ELLER NATURLIG FJELL I DAGEN	Vegetasjon som vokser i jord og har kontakt med jorden under. Gunstig for utvikling av flora og fauna og for vann som kan trekke ned til grunnvannet. Punktet gjelder også for naturlige fjellknauser og svaberg.	0	0
0,8		OVERFLATE MED VEGETASJON, IKKE FORBUNDET MED JORD >80 cm	Vegetasjon som vokser i jord på min. 80 cm dybde, men som ikke har kontakt med jorden/grunnen under; f.eks. oppå et garasjeanlegg eller tak. Dybden er stor nok til at større trær kan vokse.	0	0
0,6		OVERFLATE MED VEGETASJON, IKKE FORBUNDET MED JORD 40-80 cm	Som over, men med 40-80 cm jord for at hekker, store busker og små og mellomstore trær kan vokse.	0	0
0,4		OVERFLATE MED VEGETASJON, IKKE FORBUNDET MED JORD 20-40 cm	Som over, men med 20-40 cm jord for mulig vekst av stauder og små busker.	0	0
0,2		OVERFLATE MED VEGETASJON, IKKE FORBUNDET MED JORD 3-20 cm	Som over, men med 3-20 cm jord, for mulig vekst av sedum, gress, og markdekkere.	0	0
		2. BLÅ OG GRØNNE TILLEGGSKVALITETER. GIR EKSTRAPOENG, DET SAMME AREALET KAN DERFOR TELLES FLERE GANGER.			
		BLÅ TILLEGGSKVALITETER			
0,3		NATURLIGE BREDDER TIL VANNSPEIL	Åpent vannspeil med naturlige bredder telles med i denne kategorien dersom det er tilgjengelig for flora/fauna i bakkenivå og har naturlig bunnsubstrat og kantsone. F.eks: bekk, kanal og dam med grønne bredder. Arealet som regnes er bredden til vannspeilet.	0	0
0,3		REGNBED ELLER TILSVARENDE	Vegetasjonsareal som fungerer som regnbed eller tilsvarende beplantet infiltrasjonsløsning som samler opp, fordrøyer og infiltrerer regnvann ned i jorden/grunnen. Dette gjelder ikke permanente vannspeil og fordrøyningsbasseng som telles i blå flater.	0	0
		GRØNNE TILLEGGSKVALITETER, PUNKTENE UNDER (TRÆR) SKAL FYLLES INN SOM STYKK		STK	
1		EKSISTERENDE STORE TRÆR >10 m	Eksisterende store trær; over 10 m. Faktor: 25 m²/tre.	0	0
0,8		EKSISTERENDE TRÆR SOM FORVENTES BLI >10 m	Eksisterende trær som blir over 10 meter høye. Skogstrær, edelløvtrær og parktrær, som f.eks; alm, ask, bjørk, eik, lind, lønn, kastanje, furu og mange flere. Det forventes at treet skal ha nok jord til å vokse (min 100 cm). Faktor: 25 m²/tre (x 0,8).	0	0
0,6		EKSISTERENDE TRÆR SOM BLIR SMÅ/MELLOMSTORE (5-10 m)	Eksisterende trær som er 5-10 meter høye. Prydtrær og frukttrær, f.eks; epal, kirsebær, magnolia, pæretre, robinia og mange flere. Gjelder også formklipte trær. Det forventes at treet skal ha nok jord til å vokse (min 60 cm). Faktor: 16 m²/tre (x 0,6).	0	0
0,7		NYPLANTEDE TRÆR SOM SOM FORVENTES BLI >10 m	Trær som blir over 10 meter høye. Art: Se to spalter over. Det forventes at treet skal ha nok jord til å vokse (min 100 cm). Faktor: 25 m²/tre (x 0,7).	0	0
0,5		NYPLANTEDE TRÆR SOM FORVENTES BLI SMÅ/MELLOMSTORE (5-10 m)	Trær som blir 5-10 meter høye. Art: Se to spalter over. Det forventes at treet skal ha nok jord til å vokse (min 60 cm). Faktor: 16 m²/tre (x 0,5).	0	0
		PUNKTENE UNDER SKAL FYLLES INN SOM m²		Areal m²	
0,6		STEDEGEN VEGETASJON	Etablering eller verning av overflater med stort innslag av verdifulle plantearter som inngår i det lokale, historiske natur- og kulturlandskapet.	0	0
0,4		HEKKER, BUSKER OG FLERSTAMMEDE TRÆR	Hekker, busker og flerstammete trær beregnes maksimalt for dryppsonen til busken, kronens utstrekning.	0	0
0,4		GRØNNE VEGGER	For klatreplanter og andre grønne vegger regnes veggarealet som forventes å være dekket i løpet av 5 år (maks 10 m i høyde for klatreplanter).	0	0
0,3		STAUDER OG BUNNDEKKERE	Gjelder ikke plen eller sedum.	0	0
0,1	75m²	SAMMENHENGENDE GRØNTAREALER OVER 75 m²	Sammenhengende grøntareal som er større enn 75 m², som for eksempel store gressplener, plantefelt eller annet.	0	0
					0
		PUNKTENE UNDER SKAL FYLLES INN MED TALLET 0,05		0,05	
0,05		KOBLING TIL EKSISTERENDE BLÅGRØNN STRUKTUR	Dersom blå og/eller grønne elementer i området kobles til eksisterende blågrønn struktur utenfor området. Sammenhengen skal være tydelig. For eksempel en bekkeåpning, en kobling til eksisterende kanal eller vannspeil, fiomvei, forlengelsen av en allé eller et skogholt, sammensiåing av flere gårdsrom med fri ferdsel mellom dem. Dette gir et generelt tillegg på 0,05 i BGF.	0	0
		TOTAL BLÅGRØNN FAKTOR (BGF)			###

Resultat

Total BGF score for Sunnaas Sykehus basert på beregningen beskrevet over er

$BGF_{Sunnaas}$= 0.916

Lake Constance Foundation
Bodensee Stiftung

- Contact - Sven Schulz
- https://www.bodensee-stiftung.org/en/kreisweite-initiative-fuer-naturnahe-firmengelaende-treibt-erste-blueten/

- **Biodiversity Oriented Business Premisis**
  (EU LIFE BooGI-BOP Project)

https://www.biodiversity-premises.eu/en/

Project period Oct. 2018 – Nov. 2021

Foto: Sven Schulz

Iceland Liechtenstein Norway gran

ecz Europy zielonej.
ntegracji społecznej.

Foto: Sven Schulz

Foto: Sven Schulz

Iceland Liechtenstein Norway gran

ecz Europy zielonej.
ntegracji społecznej.

Foto: Sven Schulz

Iceland Liechtenstein Norway gran

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tegracji społecznej.

Foto: Sven Schulz

Iceland Liechtenstein Norway gran

ecz Europy zielonej.
tegracji społecznej.

Foto: Sven Schulz

Foto: Sven Schulz

Iceland Liechtenstein Norway grants

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ntegracji społecznej.

Foto: Sven Schulz

Iceland Liechtenstein Norway gran

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ntegracji społecznej.

The Mayor of London's new £600,000 Rewild London Fund: what you need to know

Natural Environment

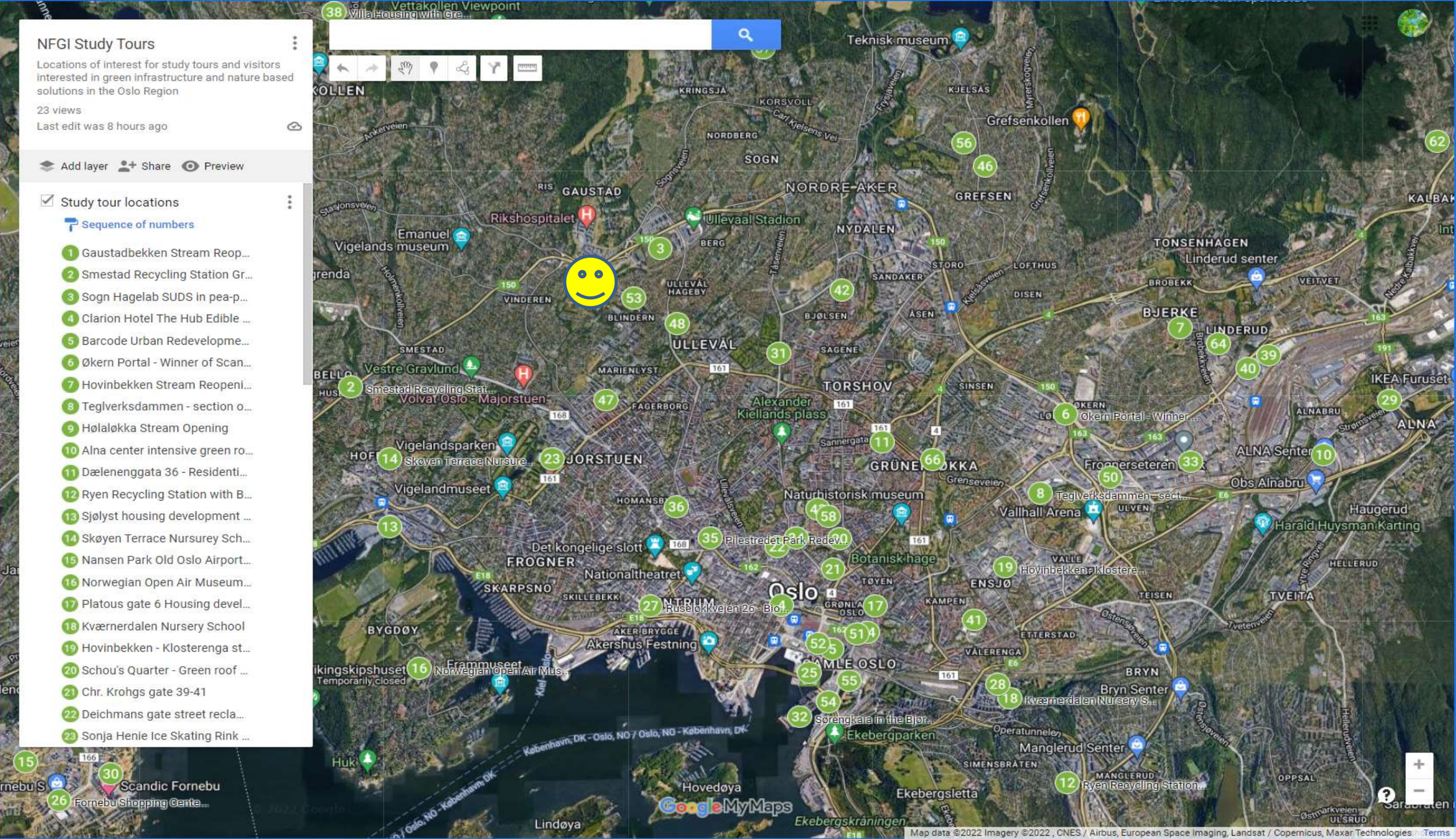
Rewilding – restoring and protecting our natural spaces to help in a bid to tackle the climate emergency – is one of the key climate action pillars, and the announcement today of a new fund to support just this in the capital is likely to be met with open arms.

Introducing the Rewild London Fund, Mayor of London Sadiq Khan, said: "The UK is one of the most nature depleted countries in the world. In London, we need to take bold action to ensure that we not only halt the decline of biodiversity in our natural environment but pave the way for growth and change.

Meet new Technician member: Johnathan Clark

10 May 2022

Johnathan Clark, TechCIWEM is a leakage technician for Crowder Consulting and is one of CIWEM's new Technician members. We learn more about


NFGI Study Tours
Locations of interest for study tours and visitors interested in green infrastructure and nature based solutions in the Oslo Region
23 views
Last edit was 8 hours ago
Add layer
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Study tour locations
Sequence of numbers
1 Gaustadbekken Stream Reop...
2 Smestad Recycling Station Gr...
3 Sogn Hagelab SUDS in pea-p...
4 Clarion Hotel The Hub Edible ...
5 Barcode Urban Redevelopme...
6 Økern Portal - Winner of Scan...
7 Hovinbekken Stream Reopeni...
8 Teglverksdammen - section o...
9 Hølaløkka Stream Opening
10 Alna center intensive green ro...
11 Dælenenggata 36 - Residenti...
12 Ryen Recycling Station with B...
13 Sjølyst housing development ...
14 Skøyen Terrace Nursurey Sch...
15 Nansen Park Old Oslo Airport...
16 Norwegian Open Air Museum...
17 Platous gate 6 Housing devel...
18 Kværnerdalen Nursery School
19 Hovinbekken - Klosterenga st...
20 Schou's Quarter - Green roof ...
21 Chr. Krohgs gate 39-41
22 Deichmans gate street recla...
23 Sonja Henie Ice Skating Rink ...
Teknisk museum
Grefsenkollen
Rikshospitalet
Ullevaal Stadion
Emanuel Vigelands museum
Linderud senter
Vestre Gravlund
Smestad Recycling Stat...
Volvat Oslo - Majorstuen
Alexander Kiellands plass
Økern Portal - Winner ...
IKEA Furuset
Vigelandsparken
Skøyen Terrace Nursure...
Vigelandmuseet
Naturhistorisk museum
Teglverksdammen - sect...
Obs Alnabru
Vallhall Arena
Harald Huysman Karting
Det kongelige slott
Pilestredet Park Redev...
Botanisk hage
Nationaltheatret
Hovinbekken - Klostere...
Oslo
Ruselokkveien 26 - Bio...
Akershus Festning
Frammuseet
Norwegian Open Air Mus...
Temporarily closed
Bryn Senter
Kværnerdalen Nursery S...
Søreng kaia in the Bjør...
Ekebergparken
Manglerud Senter
Ryen Recycling Station...
Scandic Fornebu
Fornebu Shopping Cente...
Hovedøya
Lindøya
Ekebergsletta
Ekebergskråningen
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Terms

https://www.google.com/mymaps/viewer?mid=1OCJOw8yManHp3kuL_M_H3fv5gqfHZzRx&hl=en

Gaustad stream by University in Oslo. Foto: Mirar85 / Creative Commons

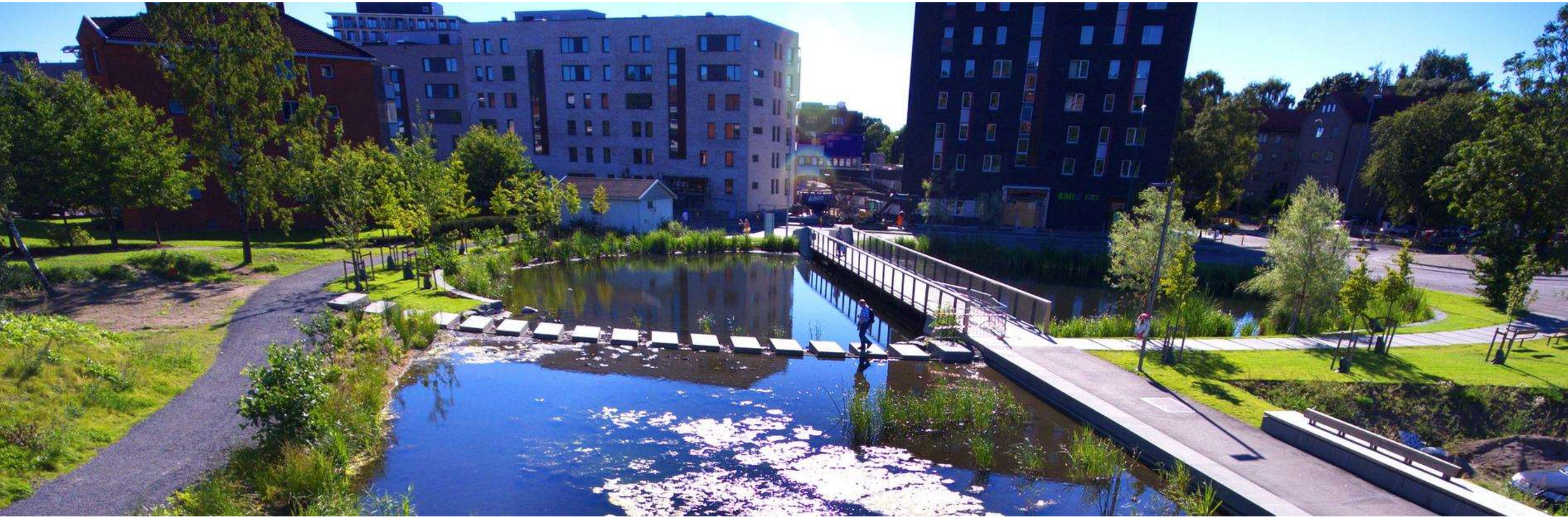
Hovinbekken stream deculverting
Bjerke valley neighborhood

Hovinbekken stream deculverting
Bjerke valley neighborhood

Hovinbekken stream deculverting Teglverksdammen

Hovinbekken stream deculverting – Teglverksdammen

Hovinbekken stream deculverting – Teglverksdammen

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OPEL
HYUNDAI


hovinbekken

Iceland
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i społecznej.

Hovinbekken - Jordal


Hovinbekken - Jordal


Hovinbekken - Jordal

Rain gardens in Grefsen neighborhood
Decoupling roof runoff from municipal stormwater system

Rain bed doubling as a flower bed with temporary storage of stormwater

Roof run off is led to a rainbed

Recessed lawn area leading rainwater to a rain bed at the corner of the garden

Rain bed with stepping stones. This rain bed filters storm water and prevents particle pollution of the Aker river

Receiving water from roof and permeable pavers

Haraldrud waste recycling station. Largest green roof in Europe when constructed in 2008

Haraldrud recycling station

Haraldrud recycling station

Iceland Liechtenstein Norway grants

KONFERENCJA OTW
PIASTÓW, 2

Ryen waste recycling station with biosolar roofs

Biosolar roof at waste recycling station. Keeping a comfortable working temperature below and aiding solar cell production above


Ryen gjenbruksstasjon

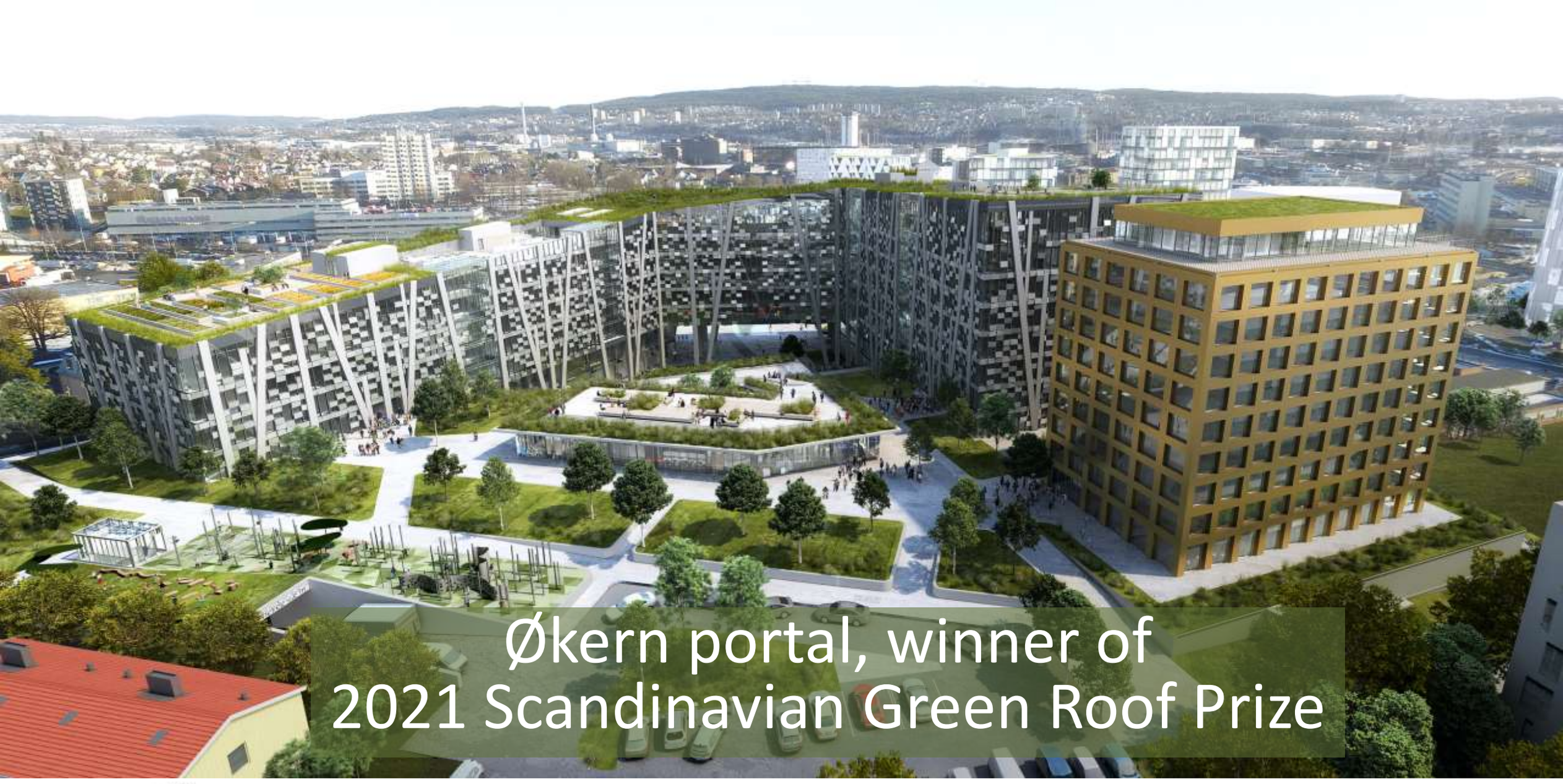
Russeløkveien 26. Newly completed commercial redevelopment in downtown Oslo. BREEAM excellent

The Plus Furniture Factory. Completion summer 2022. BREAM Outstanding

VESTRE FURNITURE FACTORY
MAGNOR, NORWAY

Landscape Contractor: SveinBoasson
Green roof: Mattak
Environmental certification: BREEAM Outstanding
Architect: Bjarke Ingels Group

VESTRE FURNITURE FACTORY



Økern portal, winner of 2021 Scandinavian Green Roof Prize

Økern portal, winner of 2021 Scandinavian Green Roof Prize

Rooftop food production for use in local restaurant

https://www.youtube.com/watch?v=mh5nH-jXqrs

Aker River passing the Munch Museum. River edge reconstruction

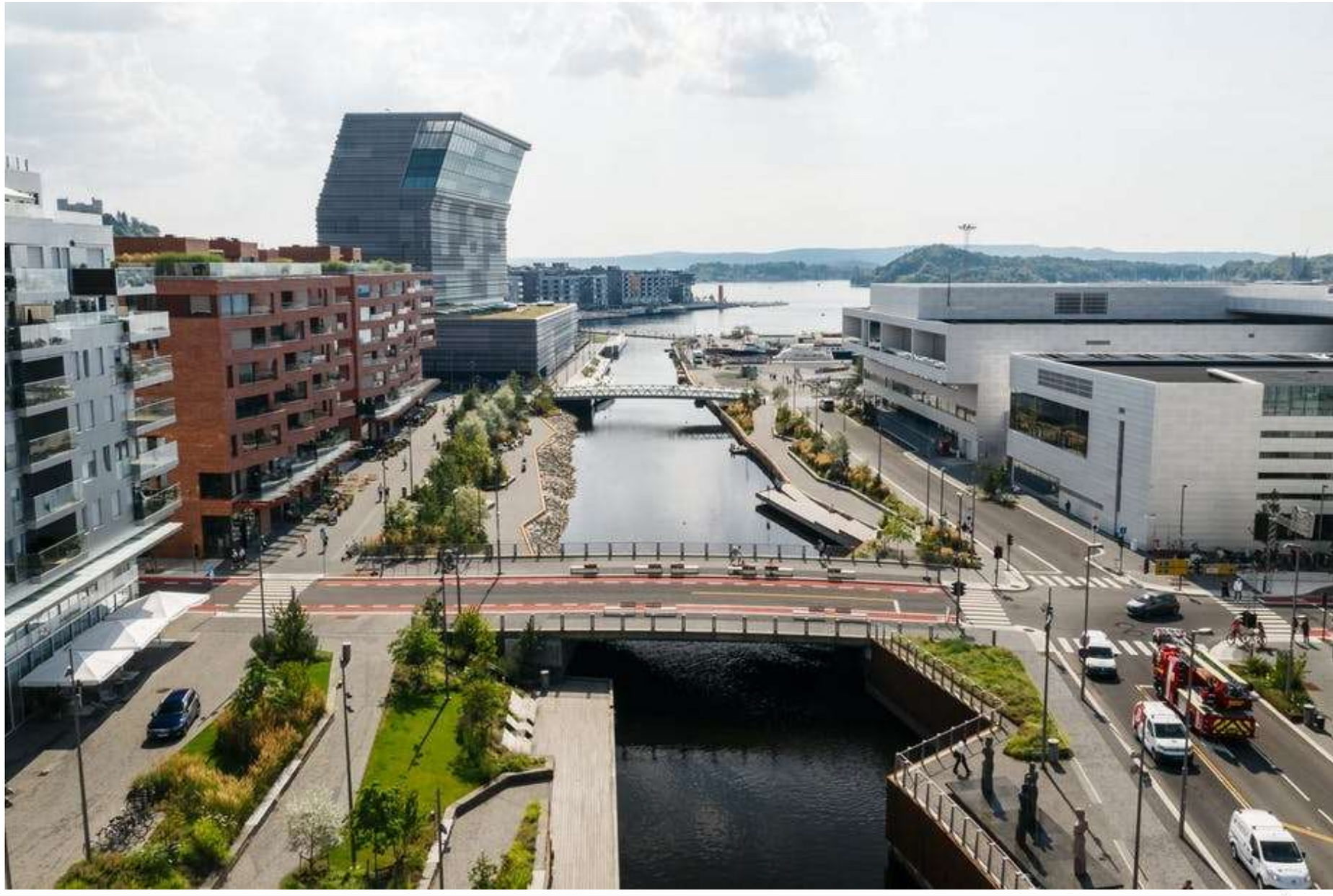
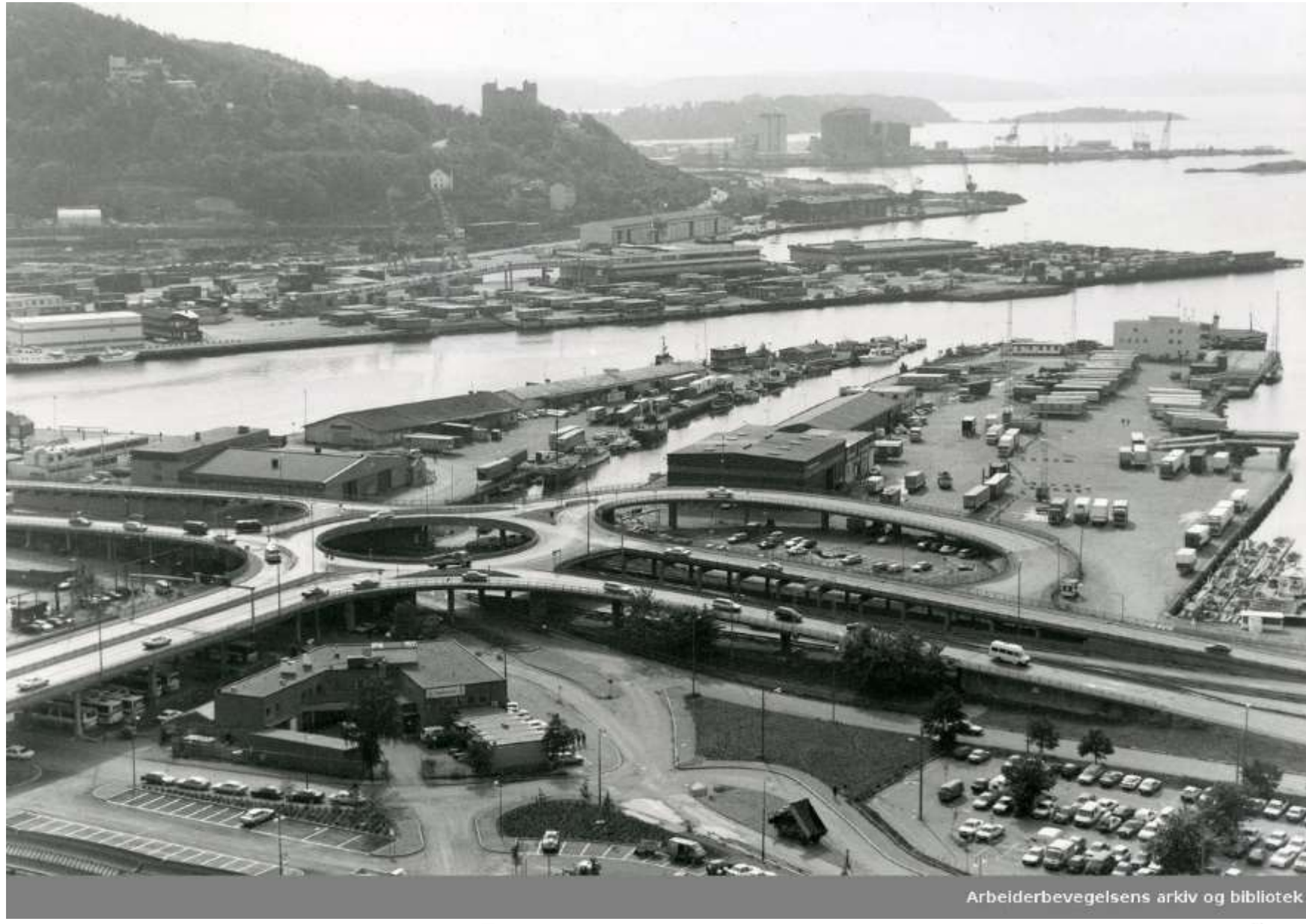


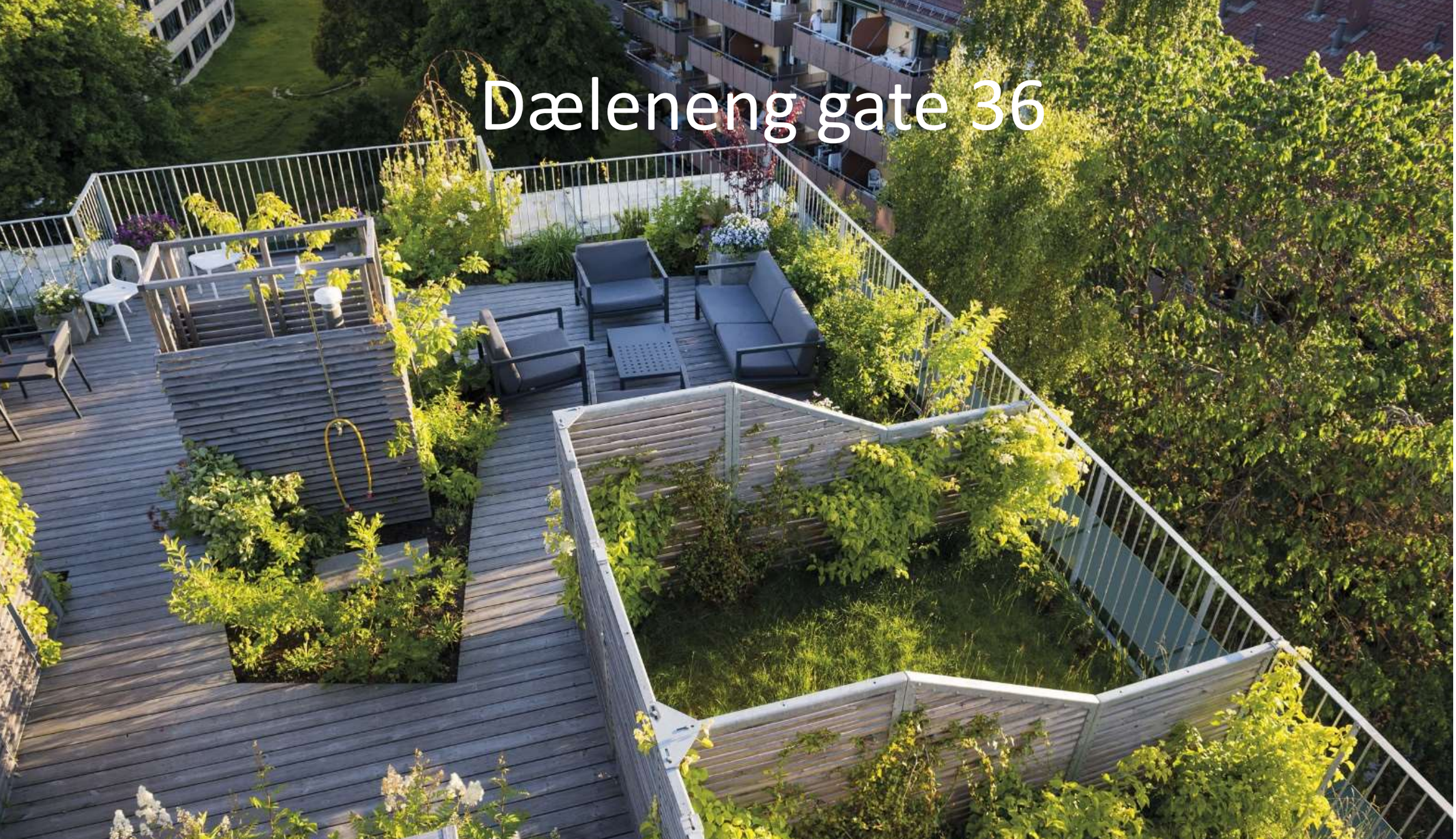
Photo - 1992
Marienborg, Stein

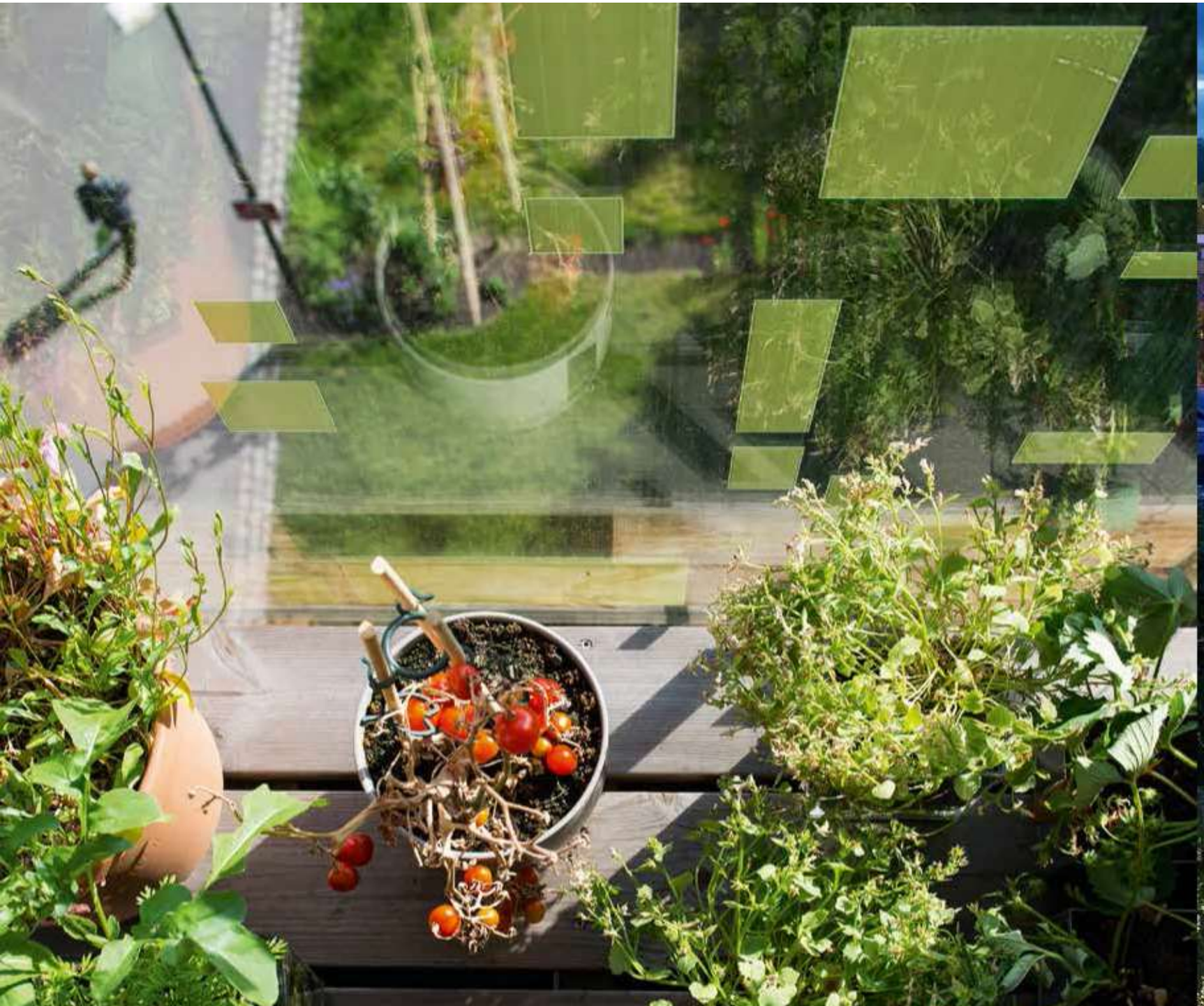



Noise from elevated motorway masked by waterfall after Aker River passes under train depot

Platous gate 6

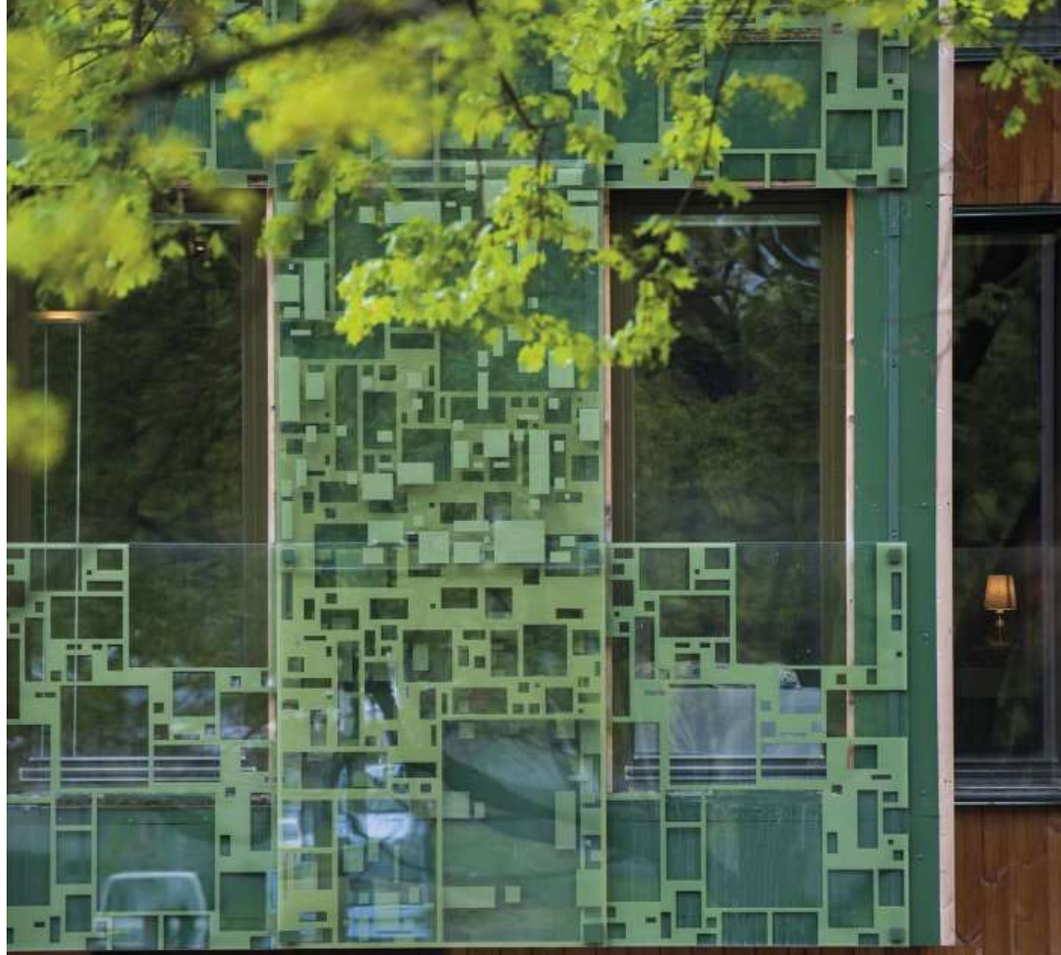
Dæleneng gate 36





Yet another model is for developers to offer individual farm plots for sale on condominium roofs, much like the way they sell parking spots or storage areas. Lots as small at 10 by 15 feet may fetch as much as $20,000 or more. An award-winning rooftop farming condominium in Oslo, Norway, for example, is housing block Dælenenggata 36, designed by Oslo House Architects. The developer sold private roof plots to the building occupants. The roof garden has apple trees, plum trees, currants and cherries and fantastic views of downtown Oslo and the fjord. The roof is also designed for several communal spaces allowing everyone in the building to enjoy the greenspace and view. These initiatives raised more revenue than the green roof cost to build and maintain. https://livingarchitecturemonitor.com/articles/include-food-production-next-building-sp22

Non vegetative biophilic design on facades



Case Study

Impact of Urban Green Space on Residential Housing Prices: Case Study in Shenzhen

Jiansheng Wu[1]; Meijuan Wang[2]; Weifeng Li[3]; Jian Peng[4]; and Li Huang[5]

Abstract: Public resources such as transportation, hospitals, parks, and schools are important factors in housing prices. However, studies on property value have mainly concentrated on transportation, and few studies have focused on the effect that green space has on property values. Researchers have mainly focused on specific parks within different communities rather than parks (on a larger scale) to study the average impact of green space on housing prices. Therefore, the objective of this research is to quantify the effect of public resources on property value, especially green space, using the hedonic pricing method (HPM). This paper focuses on 71 parks within Shenzhen to make results universal. Transaction price data and the structural attributes of 6,473 dwelling units were collected. This paper looks at HPM from three dimensions: structural attributes, location variables, and environmental variables. The results showed that (1) proximity to a central business district (CBD) produced the greatest effect on housing prices, followed by distance to park, distance to school, distance to arterial road, and distance to subway; (2) proximity to a park noticeably contributes to housing prices at 0.041%, and housing prices decline at a rate of 20,920 CNY (US$3,356)/km depending on distance to the nearest park; and (3) the average influence radius of Shenzhen parks was 1.73 km, and the 71 parks could promote an increase in value across 412.14 km^2 of land. This research will be helpful in residential housing purchase decision-making, for reasonable estate development layouts (for developers), and for governments (in terms of increasing environmental tax to promote green space preservation). **DOI:** 10.1061/(ASCE)UP.1943-5444.0000241.

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Introduction

Public resources such as transportation, parks, hospitals, schools, and lakes can be convenient for residents and can play an important role in the housing market (Chin and Foong 2006; Li and Wang 2010), especially in terms of green space, which can provide multiple benefits, including aesthetic enjoyment, recreational opportunities, and ecological services (Cho et al. 2006; Gómez et al. 2010; Maimaitiyiming et al. 2014). Urban green space has significant cultural and ecological value. It also benefits human health by providing a location for outdoor exercise and for releasing pollutants (Maller et al. 2006; Sander and Polasky 2009). Thus, renters and homebuyers are willing to pay more for houses adjacent to urban landscapes. However, the amenity values provided by green space are usually difficult to assess and quantify because they are intangible and cannot be easily priced, especially in the residential housing market (Jim and Chen 2006; Liu and Hite 2013).

Fortunately, the hedonic pricing method (HPM), which is widely used by domestic and foreign researchers in empirical studies, can help people quantify the value-added effect of green space on residential housing prices. The HPM has been applied to several empirical studies on the residential housing market. However, its main focus is on urban transportation (Wei et al. 2014; Dziauddin et al. 2013; Pan 2013), according to the China National Knowledge Infrastructure (CNKI). In contrast, few studies have focused on urban green space, based on a search using the keywords "rail transportation," "hedonic pricing method," and "urban landscape." It shows that research from 2002 to 2012 focused more on transportation than on urban landscapes (Fig. 1).

The earliest study on the impact of landscapes (parks, wetlands, lakes, rivers, and urban forests) on the housing market was an external benefit analysis of three urban water parks in California (Darling 1973). Previous landscape studies have played an active role in promoting residential housing and have had a positive impact on property values and urban shapes and structures (Yin and Xu 2009). For example, Doss and Taff (1996) discovered that different wetlands have different influences on housing prices and that maritime areas and swamps may add a premium of $99 and $145 to residential property values, respectively (Doss and Taff 1996). Mahan found that housing prices in Portland had a negative correlation to distance from wetlands and a positive correlation to wetland areas (Mahan et al. 2000). Tyrväinen found that in Finland the price of residential housing rose by 5.9% as the distance from urban forests increased by 1 km (Tyrväinen and Miettinen 2000). Luttik found that water and open green space can increase profits of residential property values in the Netherlands by 8–10% and 6–12%, respectively (Luttik 2000). Wolf found that development costs were 5.5% greater for lots where trees were conserved (Wolf 2007). There are also negative landscape factors that affect housing prices, such as garbage, urban villages, and noise. Baranzini and Schaerer (2011) discovered that having visible manufacturing factories can reduce the prices of

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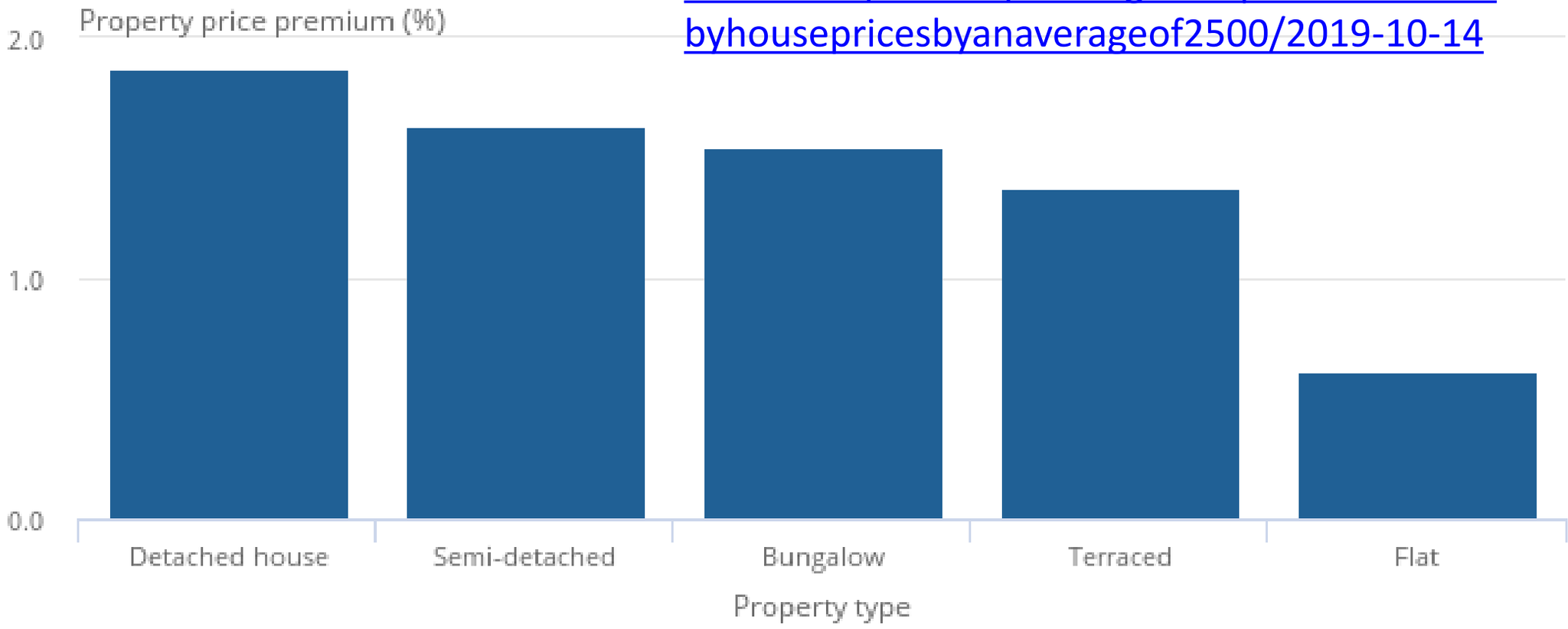
https://web.pkusz.edu.cn/wujs/files/2017/10/32-Impact-of-Urban-Green-Space-on-Residential-Housing-Prices_-Case-Study-in-Shenzhen.pdf

Detached houses attract the biggest premium, flats the smallest

Estimated premium for properties within 100 metres of publicly accessible green space compared with properties more than 500 metres away, by property type

https://www.ons.gov.uk/economy/environmentalaccounts/articles/urbangreenspacesraisenearbyhousepricesbyanaverageof2500/2019-10-14

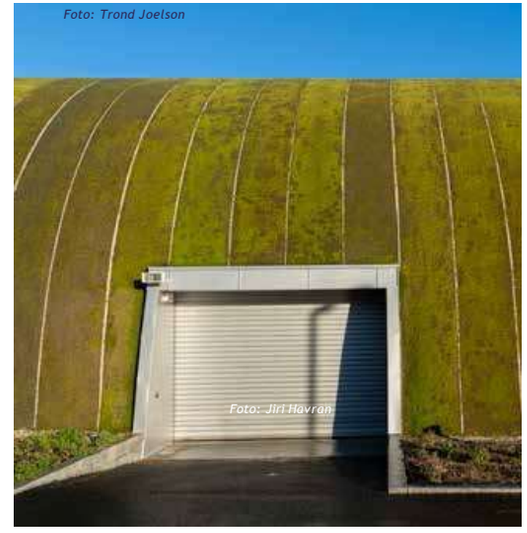


SONJA HENIE ICE ARENA

OSLO, NORWAY

Oslo Municipal Undertaking for Cultural and Sport Facilities

SONJA HENIE ICE ARENA



VEGA SCENE, OSLO “BlueProof Green"

- «BlueProof Green» roof by Protan AS and Bergknapp AS
- 10 cm deep rainwater reservoir under vegetation
- Controlled release of stormwater over time
- Re-creation of local lime rich biotope

VEGA SCENE, OSLO “BlueProof Green"

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