



ÉGHAJLATVÁLTOZÁS



ALKALMAZKODÁS

MEGÚJULÓ
TELEPÜLÉSEK



Project Summary

Klímaválasz (Climate Response) study visit
organised by Energiaklub

Project ID: EEA-C2-4-B01



REGIONAL ENVIRONMENTAL CENTER

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A projekt izlandi, liechtensteini és norvégiai támogatásból valósul meg.



Introduction

From each group that had successfully finished the “Climate Response - Local Adaptation Knowledge” training, two persons (a total of 16) took part in the 4-day study visit to Norway sponsored by EEA Grants.

During the study visit, they increased their knowledge with the climate adaptation practices of Norwegian local governments in connection with local best practices, they established professional connections, and increased their motivation to support climate adaptation at their municipalities.

The program and technical support were organised by Energiaklub. The key features of the system of Norwegian local governments (not every municipality has its own local government, and there is an ongoing reform process that will increase the centralisation of local governments) were shared with the participants in advance.

Date of the study visit: 12th to 15th June 2016

Participants:

Name	Organization	Position	Municipality
József Kaptur	Local government of Sóly municipality	Mayor	Sóly
Dr. Andrea Tóth	Joint local government of Lepsény	Notary	Mezőszentgyörgy
László Györe	Tápiószentmárton	Mayor	Tápiószentmárton
Anna Nagyunyomi-Sényi	Chief Architect's Group, Mayor's Office of Ferencváros, Budapest 9 th district	Chief Architect's assistant	Budapest, 9 th district
Richárd Leé	Local government of Monor	Representative of the local government	Monor
Hajnalka Kalászi	Mayor's Office of Lipótváros,	Head of department	Budapest,



	Budapest 5 th district		5 th district
Viktor Pálffy	Local government of Geszteréd municipality	Consultant	Újfehértó
Angéla Kocsisné Szabó	Local government of Hajdúszoboszló	Procurement manager	Hajdúszoboszló
László Prépost	Local government of Kaposzserdahely municipality	Mayor	Kaposzserdahely
Tibor Sztányi	Local government of Kaposfő municipality	Mayor	Kaposfő
Csaba Balázs	Local government of Siklós	Vice Mayor - Head of Civil Association	Siklós
Zsófia Baloghné Gaál	Szőlő-Szem Egyesület	Vice President	Szekszárd
János Rásó	Püspökladány	Vice Mayor	Püspökladány
Tíme Gajdosné Nagy	Local government of Pilis	Council member	Pilis
László Ódor	Zöld Folt Egyesület		Zákány
Brigitta Tímea Szokolai	Komárom-Esztergom county	Rural development referee	Tatabánya



Detailed Program

12.06.2016

On the afternoon of our arrival, we saw the urban section of the Akerselva river in Oslo in the framework of a special visit guided by Energiaklub. Local specialists are constantly working on the revitalisation of this riverbank. We also saw the “Vulkan” brownfield site that was revitalised in a sustainable way.

The first interesting feature we discovered were the “irrigation bags” attached to the trunk of young trees.



Irrigation bag. Photo by: János Rásó

A double-layer bag is attached around the tree with a zipper, which can be filled with water through a small hole on top. Water can continuously leak to the roots of the tree through several tiny holes on the bottom of the bag. The bag also protects the lower part of the trunk (e.g. against mowers and animals).

The ever increasing average temperature increases the transpiration of plants, and thereby their water demand, and this handy device can be utilised well to counter the effects of long-lasting droughts.

The reconstruction of the greatest watercourse (Akerselva) of the city centre began several years ago, making the riverbank accessible to people and making the water liveable for fish.



The riverbank of the Akerselva used to run through an industrial zone; over the past years it has been transformed into a recreational park. Photo by: Hajnalka Kalászi

The former industrial zone has been revived through climate friendly architectural solutions, with a focus on energy efficiency and social sustainability.





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MEGÚJULÓ
TELEPÜLÉSEK



A former factory building with a new function on the bank of the Akerselva. Photo by: Hajnalka Kalászi

The Vulkan area is home to Norway's first low-energy office building that consumes one third of the energy used by an average office building in Oslo. The office of one of the greatest Norwegian green organisations, Bellona, is accommodated in this building. The building uses thermal energy from 300 metres below, satisfying the total heating and cooling needs of all the buildings in Vulkan, and hot water is produced by the external walls of the building using solar energy. Only one of the former factory buildings was saved from demolition in the area, which accommodates the first market in Oslo.



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The market with a terrace and bicycles. Photo by: Hajnalka Kalászi

In addition, two hotels, a school, offices, cultural institutions, restaurants and dwelling houses are located on the area that spans a mere two hectares, creating a small area where various urban functions are available (which reduces the energy need for transportation). In 2014, an urban bee-keeping farm was also opened here. Beyond the architectural solutions (renewable energy sources,



thick insulation, green roofs, proper rainwater drainage), local services also focus on sustainability: organic products are sold by local farmers on the above market, and the hotels even won prizes in the field of social integration, since 90% of their employees are workers demanding extra attention who thus gain help in returning to the labour market.

There is an iconic building, the Grünerlokka university dormitory on the other bank of the river, which was transformed between 1999 and 2001 into housing from grain silos built in 1953 that have functioned until recently. The whole building was preserved, currently it is 174 feet (58 m) high, and almost all its rooms are circular.



Grünerlokka university dormitory Photo by: ¹

13.06.2016

Just like the whole country, Oslo will also become carbon neutral by 2050, and the city already observes and prepares for the impacts of climate change. The impacts of climate change and the efforts made to mitigate the impacts have been presented by colleagues of the Environment Protection Agency (operating as a department of the local government) and CICERO Centre for International Climate and Environmental Research.

In Norway, the weather is becoming hotter, more humid and windier, and the sea level is rising. In the last hundred years the volume of precipitation has increased by 20%, which is more observable in the Eastern areas than on the already very rainy ocean coastal regions. Intensive rains that used to happen only every 10-20 years now occur 3 to 6 times annually. Predictions indicate a population growth for the next years in Norway (predominantly in urban regions), so the number of city dwellers will surely increase, also increasing the built-up density and paved surfaces. Therefore

¹ <http://inhabitat.com/oslos-grunerlokka-studenthus-is-a-student-housing-complex-located-in-a-former-grain-elevator/>



preserving or increasing green surfaces in urban areas is one of the greatest challenges. Although Oslo performs well in comparison with other cities, but city officials feel there is still room for development.



Even scientists commute by bicycle (CICERO Center). Photo by: Zsófia Pej

The 13 largest Norwegian cities (representing 50% of the population of Norway) have already started adaptation, and they are joining their efforts to make preparations in work groups of two delegates from each city in order to facilitate the exchange of experiences. The results of this cooperation speak for themselves, and by now all 13 cities:

- have objectives and plans in relation to adaptation;
- have integrated adaptation aspects into construction regulations and local regulation plans;
- have risk response plans in place.

For example, coastal municipalities have already significant experience in managing flash floods, which municipalities located in the eastern regions can use now. Researchers at the CICERO institute studied the key factors of successful adaptation in individual municipalities. The following conclusions were made:

- A charismatic leader, not necessarily the mayor, but somebody in a leading position. Naturally, it has the disadvantage that local initiations depend on one man's resolution.
- Initial motivation is often given by an extreme weather event or an emergency. It is important for the public to be aware of the most severe situations and to take them seriously.
- Small local changes must also be shown to residents, not only disasters caused by global climate change and big investments.



- Regular connection and cooperation with experts and researchers. We should not expect expert knowledge to show up at the doorstep of the municipality (local government), we should be proactive and ask the experts.

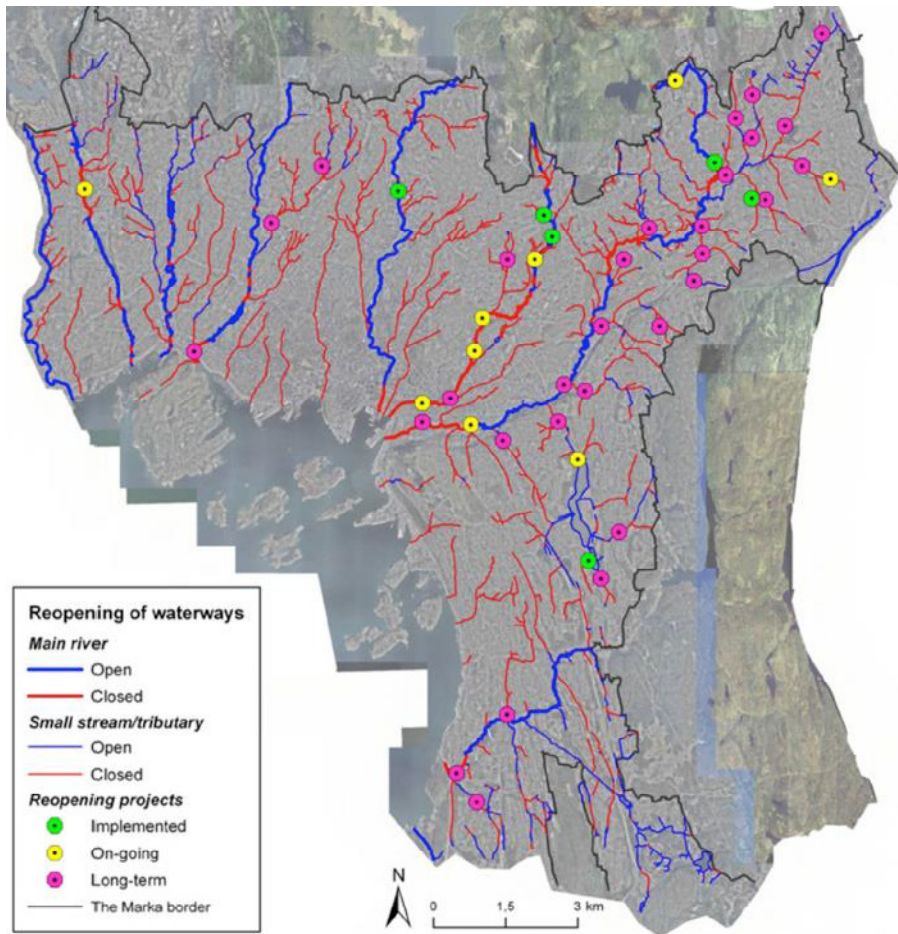
In Norway, the majority of climate change adaptation tasks are assigned to the local governments as these phenomena are local. Legislation is currently underway to describe the exact tasks on the basis of the Climate Act adopted in 2013. Based on rules already in place, local governments are already bound to create mitigation plans (in relation to carbon emission reduction) and to use adaptation considerations in local planning since 2008 (in addition to other aspects).

The adaptation strategy of Oslo for 2014-2030 was adopted in May 2015, integrating climate change adaptation into urban planning, establishing local and national networks, and making adaptation a key focus in green roof, green and blue infrastructure developments and urban agricultural initiations. In addition, a separate rainwater management action plan was also drawn, which is detailed below.

The greatest problem of the city is that the majority of the hundreds of channels and watercourses running to the sea are covered, and therefore they are not suitable for the drainage of extreme water volumes that are becoming more and more frequent (not to mention that sewage is also introduced into several of these watercourses, which further hinders the already difficult task of damage control after floods). The flash flood strategy making process started after the significant flood damages of 2011 with 3 key objectives:

1. minimising damage to the built infrastructure and the population in the event of flash floods;
2. reducing the pollution of the watercourses of the city (implementation of separated sewage drainage);
3. utilising watercourses as landscape elements.

Experts began to construct the rainwater management action plan on the basis of data obtained from insurance companies: the most sensitive areas were determined on the basis of reported damages. As a primary method of increasing adaptive capacity, the watercourses are brought to the surface, and more natural watercourses are (re)created. In addition to reconstructing the banks of these waterways, they also began to treat their water, revitalising almost lifeless sewers.



In this image open watercourses are indicated in blue, closed waterways in red, and the main rivers are indicated with thicker lines. Green circles indicate already reopened river sections, yellow ones mark those currently being opened, and pink circles show planned reopening projects.

Delegates from the Environment Protection Agency presented the Teglverksdammen development, in the course of which they brought a waterway to the surface, the lower and upper sections of which still have to be reopened. Roads will be relocated and a bridge will be built to allow the watercourse to flow on the surface again (originally, the watercourse was covered to facilitate infrastructural and factory building constructions).

The development would affect private properties on its lower sections, however, the objective is to involve and convince the owners to financially contribute to the development, instead of appropriation (as the values of their properties will increase due to the green and blue surface developments).

The waterway emerging from below-ground is treated over several steps by using segregation pools, oxygen enrichment fountains and UV radiation. Water quality is checked at several points, and marking species (e.g. trout) are also monitored.



Fountains on the reopened waterway, with a sedimentation basin in the background.

Photo by: Zsófia Pej

Then the water is introduced into a great pond on a built semi-natural section. The plants were brought here from other wetlands within Oslo. The water is continuously cleaned by the aquatic plants, and the system is able to drain larger volumes of precipitation. The urban landscape has become more favourable, and locals reclaimed the walking paths and recreational areas along the waterway.



Semi-natural section on the reopened waterway. Photo by: Zsófia Pej



The currently last section of the opened watercourse is a 3.5 m deep pond that is able to receive large water volumes in the event of floods. In order to help this, they preserved the closed underground channel as well, which is opened by a valve in the case of heavy rainfalls, and thereby the system is able to drain up to ten times the usual water volume.

The new rainwater management action plan specifies three levels of rainwater management (in relation to light, medium and heavy rainfalls):

1. Rainwater preservation and filtration. It is primarily applied around residential buildings with green roofs, rainfall beds, trees, ditches and water-permeable covers. The local government conducts constant awareness raising campaigns for the public, explaining what they should do around their own houses. Rainwater management within the site is a requirement for new constructions (rainwater filtration on the largest possible surface area, temporary storage in the case of medium rainfalls).
2. Time offset and flood mitigation. In the event of medium rainfalls (above 20 mm), rainfall beds, ditches, areas temporarily resistant to floods and open pools are involved in rainwater management.
3. Providing safe flood routes. In the case of heavy rainfalls (above 40 mm), open creeks and designed routes are involved in the water drainage system to allow the flood to get to the drainage routes safely.

What happens if a non-compliant citizen is encountered? Instead of fining him or her, information is provided, dialogue and persuasion are used as a solution. It is clear in Oslo that results can only be obtained if climate protection initiatives and developments have the support of the public.

14.06.2016

In the morning we visited the Geitmyry Cultural Centre that has been operating for five years. The purpose of the foundation that manages it is to educate the children of Oslo on sustainability and the efficient use of resources through cooking, but several other topics considered boring in the school are also taught here. For example, the origins of the ingredients can be explained during cooking, and volume measurements are also necessary: geography, chemistry, maths, biology, all can fit into a pot. With this approach, Geitmyra achieved that a multiple-day active study session at this "urban farm" became a compulsory part of the curriculum in the local education system.



A work bench designed for the size of 10-12 year old children with a safe (covered) hot-plate.

Photo by: János Rásó

One of the main aspects is that cooking is based on an animal as a whole (today one can only see fillets in the stores), and they have to use all parts of the animals, and they even taste them. Eating a fish eye is one of the highlights of the one-day or longer programs held for school groups. The site is so open-minded that even vegetarianism is not prioritised, and the presentation of foods and the efficient use of the scarce resources of the rough North are considered much more important. The centre operates in a park with kitchens furnished for children in the renovated buildings from the 18th century obtained from the local government. The complex includes a small garden, a greenhouse and a Lappish yurt so that the children can get acquainted with the life of the Sami in accordance with Norwegian traditions. The garden is used not primarily for growing food, but for getting familiar with the plants, the natural circulation, and plants that can be grown under urban circumstances.



Possibilities of plant growth under urban circumstances. Photo by: Cecília Lohász

In addition to the above, Geitmyra also hosts events – in a similar spirit – open to the public where parents can also develop a taste for sustainable gastronomy through their children.

This initiative is exemplary also because the local government and the civil initiative reinforce each other: the local government provides the area and organises the visits of school groups to the centre, and gives additional support by financing one third of the costs. The NGO provides the specialists and the programs.

On the same day we also visited Fornebu, the “city of the future”, which operated as an international airport of Oslo and Norway until 1998. The design of the new city was based on sustainability: in the planning phase they aimed to combine various functions locally, in the implementation phase they minimised material handling (i.e. the concrete and asphalt removed from the airport were reused and built into the site). The local chief architect, **Pedro Emilio Ardila** considers this development one of the greatest works of his life, he spoke to us about this process. Persuading politicians took a lot of effort, achieved primarily through presenting best practices and organising study visits. However, the development plans were also criticised due to the abundance of green surfaces, as they are contradictory to the “compact city” concept that is also based on the principles of sustainability. As an additional means, the use of materials with high CO₂ emissions was not allowed for investors (i.e. the investors were convinced to adhere to these requirements over negotiations during the licensing procedure).

The central (and of course separated) waste collection system is a vision for the future: there are containers connected to it in the schools, large public buildings and even on the streets. Waste



thrown into these containers is sucked into a central collector by vacuum, where the waste is compacted, therefore the waste collection car only comes to Fornebu every 4-6 weeks.



Central waste collection containers in Fornebu. Photo by: János Rásó

Fornebu uses a district heating system, and there is a terminal for charging electric cars in each garage – and it is used as well.

Among others, the headquarters of two Norwegian corporations, Telenor and Statoil, were built here, providing employment to several thousands of people. Even though Fornebu is a suburban municipality of Oslo, the public transport system delivers commuters from the capital to Fornebu, not the other way around.



Fornebu in 2007. Photo: <https://en.wikipedia.org/wiki/Fornebu#/media/File:Fornebu.jpg>

The municipality belongs to the local government of Baerum. The regional consultant of this local government, **Anne Kristine Feltman** held a lecture on local energy and climate strategies. She informed us on how the spread of electric cars is centrally supported:

- The electric cars are exempt from taxes (both at purchase and during use);
- They are allowed to use bus lanes;
- They are allowed to park at more locations;
- They do not have to pay toll fees (congestion charges).

Charging stations are constantly built, and regulation already stipulates that an electric charging station must be attached to each public building.

The "Climate Smart Urban Redevelopment Plan" for 2016-2019 is based on the energy and climate strategy of Baerum for 2013-2017. The first phase of the Climate Smart plan, i.e. the presentation of the program, data collection and consultations have already been implemented, and the design of specific plans is currently underway. The work is coordinated by a project team of 5 members, and representatives of the business sectors are involved in the processes as well as politicians and experts.

As a pilot project, a climate conscious house is being constructed, which will generate twice as much energy as it uses. In addition, the first energy efficiency public building project was implemented here, a kindergarten that demonstrates that proper insulation, doors and windows can achieve savings of up to 50.



Floods are a problem here as well as in Oslo, and accurate measurements were made for the flood map with laser technology using data requested from insurance companies to accurately define the break-through points (flow-off points of the surplus water).

The “blue-green factor” developed by COWI is used for the comparison of individual areas of the municipality (e.g. state before and after development) for developments, which helps municipal leaders to determine the quality of the areas by means of multipliers assigned to the various blue and green surfaces. An extensive green roof and a multilevel green surface (trees, bushes, undergrowth) are obviously not equivalent in respect of the provided services. The green surface index expressed in %, which is basically used in our country, is not suitable for such quality distinction.



Not only green, but also blue surfaces play a role in Fornebu. Photo by: János Rásó

The Norwegian construction licensing procedures were also presented to us. Any construction of a building with a surface area under 50m² has to be reported but does not need licensing. Buildings with four or more apartments need to undergo the full licensing procedure, and for buildings between these two categories there is a simplified procedure in place. To monitor developments they use aerial photographs, and on-site checks are performed based on reports from local residents. They attempt to solve all issues through expert dialogues, there is no corruption, but buildings not constructed in accordance with regulations are demolished without further ado if necessary. After the lectures, we visited the development area using public bicycles, which were officially not introduced until the next day, in the company of the chief architect who told us and showed us additional interesting things on the way.



Excursion by bicycle in Fornebu, with the Statoil headquarters in the background.

Photo by: Hajnalka Kalászi

15.06.2016

Rygge (15,400 inhabitants, 74 km², 32 km coastline, one of the butteries of Norway)

We spent the last day of the study visit with the local government of Rygge, and after **Inger-Lisa Skartlien mayor** greeted us, we got familiar with the municipality's climate-related projects and the adaptation possibilities in regional planning.

The lecturer, **Charlotte AuneBryne, the environmental referee of the municipality**, presented us the key intervention areas of Rygge's climate strategy for 2010-2018:

- transportation
- energy
- waste
- agriculture
- awareness raising and information supply

She also presented their current projects (replacement of the lighting fittings with LEDs in public areas, renovation of a sports field - integration of LEDs with brightness control; building electric charging stations).



The municipality managed to find a private investor for the district heating system through making it compulsory for the local businesses to connect to the system, and for new constructions to establish the infrastructure necessary to connect to it.

A one-week awareness raising program series is organised annually with custom counsel (in residential buildings), with telephone advisory services and with stalls at public sites and busy areas.

An excellent lecture was held by **Guri Bugge**, a county government employee who supports the achievement of adaptation goals of 17 municipalities in the county along with five colleagues. The Klima Østfold organisation coordinates the municipalities of the county, as they have a joint purpose in the field of adaptation, and they can implement their similar projects more efficiently and lobby more successfully for the available resources together.

The operation of Klima Østfold is financed through annual contributions paid by the municipalities, which consist of a fixed component and a population based component. In 2015 the support received by Klima Østfold exceeded this amount multiple times through various funds and project grants (to a total of approx. HUF 95 million). Their key principle is that they search for the right resources, investors and partners for the given objective or project, instead of jumping on any available resource. Their activities:

- they conduct public procurement procedures at county level (e.g. for the construction of electric charging stations), preserving the capacities of the individual local governments;
- they rented six electric cars (three of each type) that could be used by the local governments for a trial period of 1 to 3 months to allow them to subsequently acquire the most appropriate one.
- they have worked out a methodology to revise the SEAP (Sustainable Energy Action Plan) (from Horizon 2020 resources), which can be then used by the member local governments.

Of course, the determination on national level and the regulations and incentives play a significant role in making local-level policy makers this active in mitigating the impacts of climate change. Some examples:

- the replacement of fossil energy carriers by 2030 is a national objective;
- climate change related requirements must be included in local developments plans since 2008;
- oil heating will be prohibited from 2018 on;
- strict energy efficiency rules are in effect for newly constructed properties;
- high taxes and fees for gasoline/diesel operated cars;
- electric charging stations must be provided at 10% of public parking places;
- deposit on glasses, plastic flasks but also on aluminium cans;
- approx. HUF 0.3 tax charged for each kWh used is allocated to a fund (approx. HUF 1.35 billion annually), which is used for climate-related projects;
- they have their own environmental audit system with a strict focus on climate, the adaptation of which is a competitive advantage for the enterprises.

Rygge has a population of 15,000 people, and two hundred people farm on 700 hectares in the vicinity (typically only as a secondary job). The base rock - and thus also the soil - is very rich in



phosphor, but due to the added artificial fertilisers, significant quantities washed out and entered the surface waters, endangering the local drinking water reservoir (which is an enormous 25 m deep lake existing since the ice age). Using Interreg resources, 16 years ago the locals started an erosion reduction development project providing proper soil and water quality. As a result of the development:

- they use fertilisers with reduced P content, and they use even that more sparingly;
- it is compulsory to preserve a protective belt near waterways: 8 metres of grass (though it cannot be utilised due to the lack of animal husbandry) or 20 metres fallow;
- ploughing is restricted, the stubble-fields are not rotated in (to prevent erosion) - in Hungary this would be unfavourable due to pests;
- a system of approximately 100 sedimentation ponds has been developed, as a result of which the phosphor volume washed into the water was significantly reduced and the water quality was improved due to the sedimentation and the phosphor absorption by the water plants.



Sedimentation near Rygge, with a drinking water reservoir in the background. Photo by: Zsófia Pej

Summary

During the four-day study visit, several tools and good examples were presented, which can be used or adapted with minor changes also in Hungary. As another significant result, the participants could establish connections with each other and Norwegian experts, which they will be able to use in the planning and implementation of additional, mainly adaptation projects.