



LAHTI REGION



Hollola



Lahti

ENVIRONMENTAL REVIEW 2016

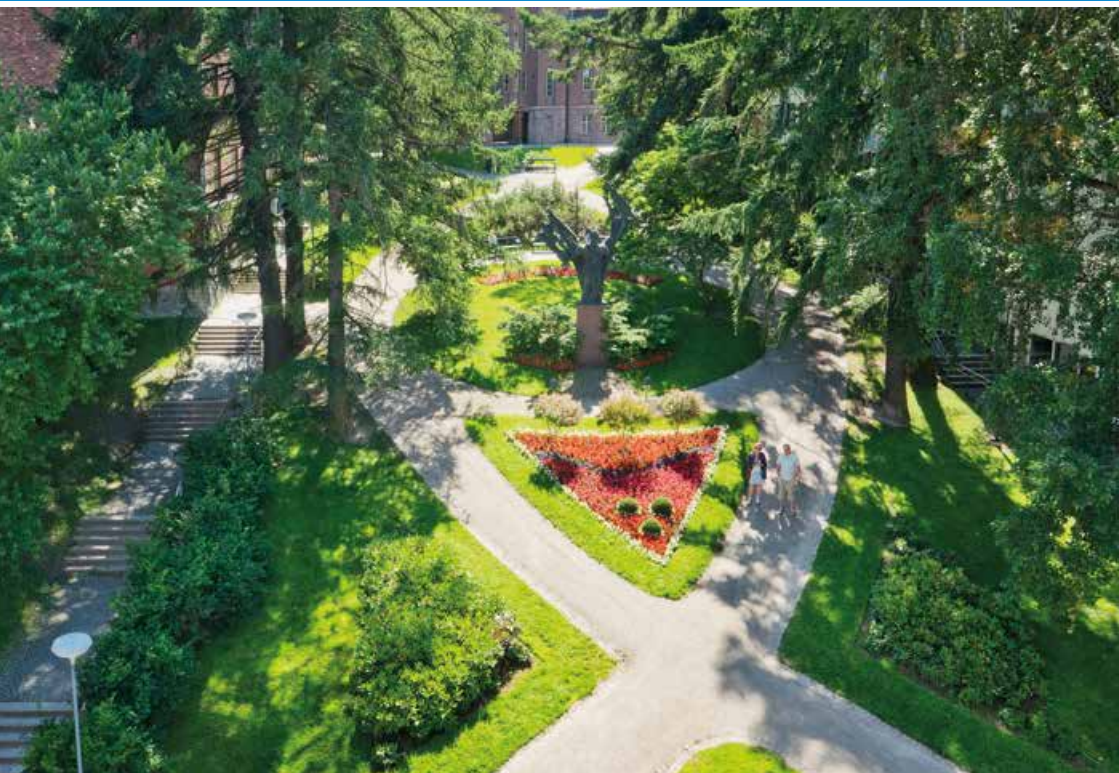


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This environmental review for the Lahti Region is the first to be compiled for the new areas of Lahti and Hollola. Lahti and Nastola merged into the new Lahti, while Hollola and Hämeenkoski merged to form the new Hollola as of the beginning of 2016. This can be seen in the form of considerable changes in many of the 2016 figures of the indicators presented in this review compared to the corresponding figures for previous years. The reporting complies with the new municipal distribution and municipal boundaries, and many of the figures are therefore not directly comparable with the previous years.

Special trends emerging in 2016 included the continuous increase in the waste utilisation rate and positive signs of the increasing popularity of cycling in Hollola and Lahti. We can also take pride in the international recognition of the region's environmental competence: as the result of an application prepared during the autumn, Lahti was shortlisted as one of the five finalists for the 2019 European Green Capital Award. We have also received recognition in Finland: Lahti was chosen as one of Finland's eight

model municipalities in terms of resource wisdom in summer 2016. Also worthy of mention is the government's key project funding to increase the efficiency of the city centre's stormwater management, which was granted to the City of Lahti towards the end of 2016.

The strategy ratified by the City Council of Lahti in April 2016 includes the objective of strengthening the city's development as an environmentally-friendly city. Reaching the objective requires that we continue to take responsibility for good environment and strengthening environmental responsibility.

We are encouraging the new municipalities, units, municipal employees, companies and citizens to continue working together for a cleaner and safer environment. One of the visions recorded in the City of Lahti's strategy is: ***"We will succeed internationally as a bold environmental city of people and businesses"*** Let's work together to make this vision a reality!

Päivi Rahkonen
Mayor of Hollola

Jyrki Myllyvirta
Mayor of Lahti

Environmental management

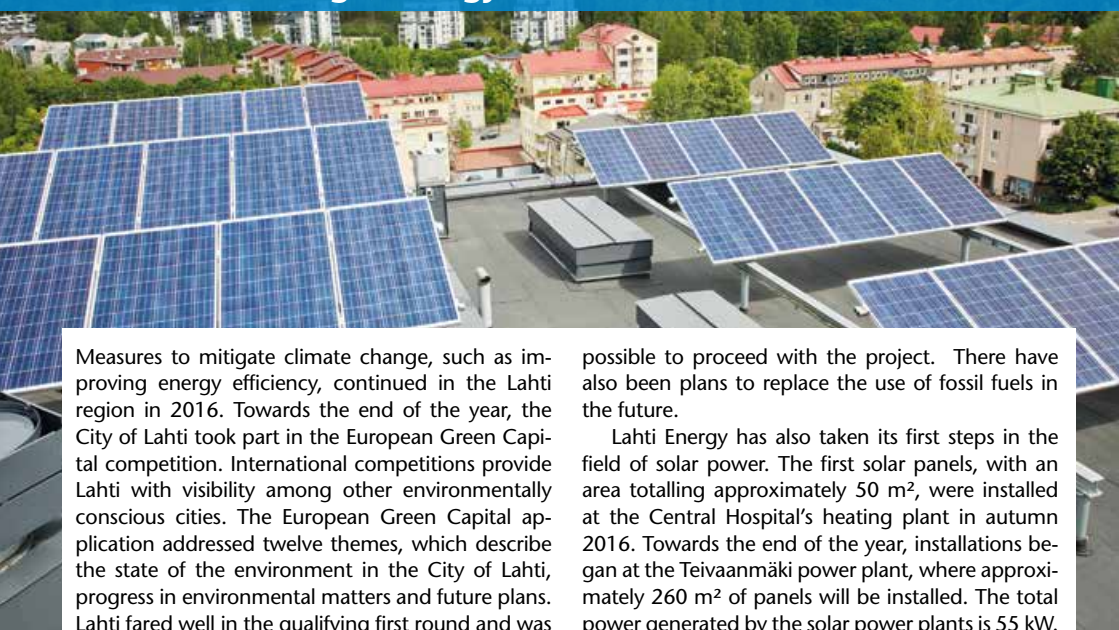
The joint environmental policy of the former three municipalities was still in force in Lahti and Hollola in 2016. As of the beginning of the year, Hollola and Lahti have had their own environmental services instead of the former joint environmental unit of three municipalities. During the year, and partially due to organisational changes, there was a gradual shift towards a more extensive environmental view in the management of environmental issues. The aim for the future is to integrate environmental control more tightly into strategy work, together with master planning.

The work as a model municipality of resource wisdom involved committing to prepare a long-term resource wisdom plan, which was named the City's new environmental programme in Lahti. The objectives of the work include achieving a carbon-neutral, wasteless urban community whose consumption will be at a globally sustainable level by 2050. One of the set aims of the preparation work was to submit a new ambitious environmental programme to the City Council to decide on by the end of 2017.

Green Office work, which has involved ten office units in Lahti, has also been part of the joint management of environmental affairs. Green Office is an environmental programme for offices co-ordinated by WWF Finland with the aim of reducing the consumption of energy, water, paper and other materials in offices and finding more sustainable solutions for work and commuting. Some of the offices have already been participating in the programme for five years.



1. Climate change, energy and emissions



Measures to mitigate climate change, such as improving energy efficiency, continued in the Lahti region in 2016. Towards the end of the year, the City of Lahti took part in the European Green Capital competition. International competitions provide Lahti with visibility among other environmentally conscious cities. The European Green Capital application addressed twelve themes, which describe the state of the environment in the City of Lahti, progress in environmental matters and future plans. Lahti fared well in the qualifying first round and was shortlisted as a finalist for the 2019 European Green Capital Award together with four other cities. The winner will be published in early June 2017.

Lahti Energy plays a significant role in reducing greenhouse gas emissions

Lahti Energy's key environmental goals are to reduce carbon dioxide emissions, minimise environmental effects, improve material and energy efficiency and increase environmental awareness. Annual milestones are set and concrete measures are taken to reach the objectives.

Significant steps were taken during 2016 to reduce carbon dioxide emissions, when the biofuel-powered Polttimo process heat plant started its operations and the environmental permit for the Kymijärvi III thermal plant was finalised, making it

possible to proceed with the project. There have also been plans to replace the use of fossil fuels in the future.

Lahti Energy has also taken its first steps in the field of solar power. The first solar panels, with an area totalling approximately 50 m², were installed at the Central Hospital's heating plant in autumn 2016. Towards the end of the year, installations began at the Teivaanmäki power plant, where approximately 260 m² of panels will be installed. The total power generated by the solar power plants is 55 kW.

The operations of power plants generate a significant amount of ash every year. The ash can be used as a substitute for natural soil and rock material in earth construction, for example. Lahti Energy has been actively looking for utilisation opportunities, and agreements made in 2016 have been so successful that practically all reusable ash has been reused. In addition, previously landfilled ash has been delivered for utilisation from the ash dumping area.

Lahti Energy joined the action plan for energy services of the national energy efficiency agreement for a new term as a group. The new term will cover the years 2017–2025. Similarly to previous years, Lahti Energy also sponsored the materials for the Energy-Saving Week for second-graders and their teachers in its supply area.

Monitoring indicators	Comparison year	2012	2013	2014	2015*
<i>Electricity consumption, kWh/resident/year</i>					
<i>Lahti</i>	<i>2000: 8,620</i>	<i>9,051</i>	<i>8,712</i>	<i>8,780</i>	<i>8,497</i>
<i>Hollola</i>	<i>2007: 8,178</i>	<i>7,976</i>	<i>7,777</i>	<i>7,446</i>	<i>7,331</i>
<i>Nastola</i>	<i>2007: 13,127</i>	<i>11,673</i>	<i>11,943</i>	<i>11,551</i>	<i>-</i>

* Electricity consumption figures are reported for the previous year

Monitoring indicators	Comparison year 2001	2012	2013	2014	2015	2016
<i>Nominal consumption of energy in the city's/municipality's office buildings kWh/m³</i>						
<i>Lahti</i>	18.2	17.9	18.2	16.9	15.7	16.9
<i>Hollola</i>		20.4	23.0	24.15	23.60	-
<i>Nastola</i>		22.4	17.6	17.88	26.59	-
<i>Heat consumption in the city's/municipality's office buildings kWh/m³</i>						
<i>Lahti</i>	52.1	43.4	41.1	40.7	39.1	40.6
<i>Hollola</i>		31.2	34.5	31.22	31.47	-
<i>Nastola</i>		48.2	42.9	41.32	42.63	-

The vehicle traffic change index could not be updated for 2016 due to the replacement of the traffic lights control system, which prevented the collection of traffic count data. Motorisation, or the number of registered passenger cars per one thousand residents, continues to grow.

Monitoring indicators	Comparison year 2001	2012	2013	2014	2015	2016
<i>Relative vehicle traffic change index</i>						
<i>Lahti (10 different sites where traffic volumes are measured)</i>	100	108.3	109.0	106.2	105.7	<i>no data</i>
<i>Motorisation, number of passenger cars / 1,000 residents</i>						
<i>Lahti</i>	387	492	502	507	512	540
<i>Hollola</i>	392	588	606	615	631	658
<i>Nastola</i>	422	599	614	621	642	-

The carbon dioxide emissions of energy production plants and the industry have increased slightly year-on-year due to growth in the emissions of the Kymijärvi power plant. The 2016 figures also include the carbon dioxide emissions of the former municipality of Nastola, which accounted for 929 tonnes.

Monitoring indicators	Comparison year 1997	2012	2013	2014	2015	2016
<i>Carbon dioxide emissions of energy production plants and the industry, t</i>						
<i>Lahti</i>	691,300	610,300	692,900	566,232	495,220	520,287



↑ View of the LATE sorting plant that entered pilot use at the Kujala waste centre in 2016.

PHJ enhanced the utilisation of waste

Almost all waste received by Päijät-Hämeen Jätehuolto Oy (PHJ) was utilised as materials or energy. Fuel was made from separately collected energy waste for Lahti Energy's Kymijärvi II power plant and other power plants. Mixed waste was also sent to be utilised in energy production. Biowaste is processed at LABIO Oy's digestion and composting plant, where it was converted into biogas and compost. At the beginning of 2016, the responsibility for the regional collection of packaging waste was transferred from Päijät-Hämeen Jätehuolto Oy to Suomen Pakkauskierrätys Rinki Oy.

↓ This pile of mixed waste, too, has a lot of material that could be utilised.



The utilisation rate of municipal waste received by PHJ amounted to 96% in 2016. Of the waste, 29% was utilised as material and 67% as energy. A total of 4% of municipal waste was landfilled, or 15 kg per resident.

A mechanical sorting plant was built at the Kujala waste centre in 2016. The plant, which utilises various screening and separation techniques, entered trial use in autumn 2016. The project aims to increase the recycling rate of municipal waste in the area of operations to the company's strategic objective of 50%. The aim is also to ensure competitive waste management services in the area of operations once the ban on landfilling organic waste took effect as of the beginning of 2016.

Monitoring indicators	Comparison year 2001	2012	2013	2014	2015	2016
<i>Amount of landfilled waste generated by the City's offices and services, t</i>	1,304	1,076	1,160	929	806	828
<i>Amount of landfilled municipal waste kg/resident (PHJ area)</i>	234 (1999)	40	21	20	35	15
<i>Utilisation rate of municipal waste received by PHJ, % (incl. utilisation in energy production)</i>	51	90.6	95.0	95	92	96
<i>Recycling rate of municipal waste received by PHJ, % (utilisation as materials)</i>		30	32	31	31	29

Lahti Aqua utilises biogas

Lahti Aqua Oy's Kariniemi, Ali-Juhakkala and Nastola wastewater treatment plants treated a total of 12 million cubic metres of wastewater in accordance with the permit conditions in 2016. The majority of wastewater from Hollola is treated at the Kariniemi and Ali-Juhakkala wastewater treatment plants, with the exception of wastewater from the Hämeenkoski urban area, which is still treated at the Hämeenkoski plant. The wastewater treatment plants are biological-chemical wastewater treatment plants where solids and sand are removed from wastewater mechanically, organic matter and nitrogen biologically and phosphorus chemically. At the Kariniemi and Ali-Juhakkala treatment plants, wastewater is hygienised using UV light before being discharged into water systems. The requirement for hygienisa-

tion is in effect from the spring to the autumn.

The biogas generated in the treatment of sludge at Lahti Aqua's wastewater treatment plants is utilised as heating energy. Of the 15,410 MWh of energy produced, 51% was used for heating the wastewater treatment plants and the rest was sold to Lahti Energy's district heating network. The heating energy input to the district heating network was equivalent to the annual need for heating energy of approximately 500 single-family homes. In all, the utilisation rate of biogas is 100%. After the digestion and utilisation of gas, 15,130 of dried sludge was delivered to LABIO Oy, where the sludge is composted. LABIO Oy produces soil conditioners through composting and biogas at the biogas plant to Gasum Oy, which refines the crude gas further into traffic fuels.

Monitoring indicators	Comparison year 1997	2012	2013	2014	2015	2016*
<i>Loading of wastewater from Lahti and Hollola on the Porvoonjoki river (tonnes) and efficiency of the treatment process (%)</i>						
<i>Phosphorus</i>	5.8	3.3 (97.2 %)	3.3 (97.2 %)	2.6 (97.7 %)	1.8 (98.3 %)	1.9 (98.2)
<i>Nitrogen (NH₄)</i>	28.8	29.3 (96.1 %)	31.4 (96.1 %)	14.4 (98.1 %)	16 (98 %)	4.7 (99.4)
<i>BHK_r</i>	140	89.5 (98.4 %)	74.5 (98.5 %)	73.0 (98.4 %)	52 (98.9 %)	43 (99.1)

*The fact that treated wastewater from Kariniemi and Ali-Juhakkala is now conducted to the Nikula equalising basin and from there after hygienisation to the Porvoonjoki River has had effects on the load calculations. Previously, the treatment plants had separate discharge points.

The process automation was renewed and a UV device was installed for hygienising wastewater at the Nastola wastewater treatment plant in 2016. The process automation and aeration equipment of the Hämeenkoski treatment plant were renewed

the same year. Lahti Aqua launched a development project in 2016 with the goal of finding an energy-efficient way to control wastewater processes at the Ali-Juhakkala and Kariniemi treatment plants.



↑ Stormwater from built-up areas is a significant source of pollutant loading to nearby water systems.

Monitoring indicators	2012	2013	2014	2015	2016
Loading of wastewater from Nastola (tonnes) and efficiency of the treatment process (%)					
Phosphorus	0.2 (98.9 %)	0.2 (98.9 %)	0.19 (98.6 %)	0.16 (98.7 %)	0.25 (98.0)
Nitrogen (NH ₄)	0.5 (99.4 %)	0.1 (99.9 %)	0.2 (99.7 %)	0.58 (99.2 %)	0.73 (99.0)
BHK ₇	4.4 (99.2 %)	3.1 (99.5 %)	2.8 (99.5 %)	2.0 (99.6 %)	2.2 (99.6)

The key project will make stormwater management more effective in Lahti

Towards the end of 2016, Lahti began a project to manage stormwater through cost-efficient hybrid solutions, which will considerably decrease the stormwater load on Lake Vesijärvi. The project is funded by the Ministry of the Environment, and it is one of the key projects in the Government Programme. The project utilises the stormwater competence of local parties, in addition to which it will function as a product development environment for stormwater management and nutrient recycling solutions. In addition, the functioning of new stormwater management structures will be researched during the project, thereby also supporting future stormwater planning.

Future challenges connected to climate change, energy and emissions:

- Stronger weather phenomena connected to climate change and the related risks
- Increasing the effectiveness of stormwater management in the centre of Lahti

2. Comfort, health and safety of the living environment



The aim of the municipalities' joint environmental policy is to promote the comfort, healthiness and safety of people's living environment. Green areas and nearby forests have been proven to provide both health and comfort-related benefits to residents. The extensive green zones in Lahti make it possible to maintain a number of free nature services. They also function as carbon sinks and slow down the greenhouse effect. No changes have taken place in the shares of green areas in the monitoring indicators.

A total of 7,084,787 journeys took place in Lahti's regional public transport, translating into 35.1 journeys per resident per year. The figure does not include the passenger volumes of valid transitional trafficking agreements or market-based traffic, and the figure is not indicative of the travel volumes in the entire Päijät-Häme region. In 2016, Lahden seudun liikenne (Lahti Region Transport) did not have traffic to Hämeenkoski, although its population has been taken into account in the calculations.

Monitoring indicators	2012	2013	2014	2015	2016
<i>Share of parks and green areas in planned areas, %</i>					
<i>Lahti</i>	30	30	29.9	29.9	29
<i>Hollola</i>	25	25	25	25	24
<i>Nastola</i>			19	19.4	-
<i>Share of plots in noise impact areas of planned single-family home plots, Lahti, %</i>	4.1	0	-	0	2.2
<i>Share of flats in noise impact areas of planned apartment block floor area, Lahti, %</i>	-	24.9	-	34.9	50.6



The regional public transport authority's buses could carry a lot more passengers.

Street dust impairs air quality, especially in the spring

During 2016, there were 28 days when the air quality was poor or very poor for at least one hour per day. All poor or very poor index values were caused by high concentrations of respiratory particles (PM10) in Laune or Rakokivi. Continuous measurements were not made in Hollola during 2016, so there is no index data for Hollola. Dust is a phenomenon that occurs every spring as wind and cars raise sanding dust. The concentrations remain high until the sand has been cleaned off the streets. During winters with little snow, the concentrations can also increase in the winter.



Monitoring indicators	Comparison year 1997	2012	2013	2014	2015	2016
Number of days with poor air quality (EU: < 30)	2002: 14	28	32	26	35	28
NO _x emissions from traffic (LIISA 2012 model), kg/resident						
Lahti	12	4.7	4.6	4.4	5.1	-
Hollola	25	10.0	9.8	9.6	8.6	-
Nastola	30	12.0	11.7	11.5	10.4	-
CO ₂ emissions from traffic (LIISA 2012 model), kg/resident						
Lahti	1,458	1,421.7	1,455.0	1,448.8	1,393.62	-
Hollola	2,816	2,744.7	2,828.6	2,838.3	2,527.7	-
Nastola	3,109	3,163.2	3,267.8	3,284.5	2,981.7	-



↓ The electric bicycle trial was highly popular.

Finland's first two-level parking area for bicycles was completed at the Travel Centre in 2016.

The popularity of cycling is increasing in Lahti

The City of Lahti aims to increase walking and cycling. Lahti has natural potential to be a cycling city, thanks to its dense urban structure. Cycling accounted for 18% of travel in the region of the old Lahti in spring 2016, while the corresponding figure for 2010 was 14%. An extensive survey was carried out in Lahti in 2016 to survey the day-to-day travel of residents. It was based on the 2010 traffic survey of the Lahti region. The survey collected information about over 1,700 journeys. The results were adjusted for age and gender to correspond to the actual age and gender distribution of Lahti. The study indicated that about one half (51%) of travel within Lahti takes place by car. Walking accounts for 26%, cycling for 17% and bus for 5% of journeys. Based on the results, one can say that walking is exceptionally popular in Lahti compared to other medium-sized cities, and the popularity of cycling has increased excellently.



Future challenges connected to the comfort, healthiness and safety of the living environment:

- Decreasing noise and its adverse effects by securing financing for noise abatement
- Further improving the preconditions for cycling, walking and other more sustainable methods of travel
- Strengthening the role of green areas as a factor of comfort in living environments

Monitoring indicators	Comparison year	2012	2013	2014	2015	2016
<i>Combined bicycle and pedestrian routes, km</i>						
<i>Lahti</i>	<i>2001: 344</i>	397	392	401	403.3	458
<i>Hollola</i>	<i>2008: 49</i>	59	66	70.8	70.8	69
<i>Nastola</i>	<i>2006: 55</i>	48	48	50.2	57	-

Biodiversity and cultural environment



A new nature conservation area, Viuha (105 hectares), was established in the City of Lahti in 2016. It includes the rocky hills Kaarlamminkallio and Il-takallio in the area between Sipurantie and the former border of the municipality of Nastola, as well as the Viirustenmäki forest.

The nature conservation areas and their services were also improved and managed in 2016; minor rehabilitation work was carried out in almost all nature conservation areas. In Luhdanjoki, the bird-

watching tower was overhauled and the management of the flood meadow through sheep grazing was continued. A Leader-funded hiking and recreation planning and investment project took place in the Nastola area. It included building duckboard routes, piers, a canoe shed, guide signs, information boards and a parking place in Lapakisto. In addition, several fauna and LUMO area surveys were made and preparations for the establishment of three new nature conservation areas began.

Monitoring indicators	2012	2013	2014	2015	2016
<i>Areas protected under the Nature Conservation Act, hectares</i>					
<i>Lahti (1995:256)</i>	380	507	513	513	915
<i>Hollola</i>	751	1,237	1,284	1,284	1,337
<i>Nastola</i>	297	297	297	297	-
<i>Habitat-type areas protected under the Nature Conservation Act, hectares</i>					
<i>Lahti</i>	23.5	23.6	23.6	23.6	35.8
<i>Hollola</i>	16.5	19.2	19.2	19.2	25.4
<i>Nastola</i>	9.1	12.2	12.2	12.2	-
<i>Share of area protected under the Nature Conservation Act of the area of the municipality, %</i>					
<i>Lahti (1995: 1.9)</i>	2.46	3.28	3.32	3.47	1.79
<i>Hollola</i>	1.41	2.33	2.41	2.41	1.84
<i>Nastola</i>	0.82	0.82	0.82	0.82	-



↑ *The flood meadow of Luhdanjoki and nearby highest birdwatching tower in Southern Finland offer magnificent views throughout the year.*

↓ *Guided nature trips provide an easy and safe way to get to know the local nature.*



In addition to conservation areas, there are LUMO biodiversity sites specified by the municipalities themselves. The number of LUMO sites increased in the new Lahti to approximately 1,500 hectares. The biodiversity sites partly overlap with the nature conservation areas.

Future challenges in the protection of biodiversity and cultural environment:

- *Development and rehabilitation of old conservation areas*
- *Surveying the biodiversity sites of the old Nastola*
- *Formalising the conservation regulations of the Kintterö and Sammalsillansuo conservation areas.*

Monitoring indicators	Comparison year	2012	2013	2014	2015	2016
<i>Valuable areas protected through planning regulations, number of plots, Lahti</i>	1983: 60	1,011	1,027	1,023	1,027	1,247
<i>Protected buildings, quantity, Lahti</i>	1979: 3	288	295	302	300	350
<i>Traditional landscapes, hectares</i>						
<i>Lahti</i>	1995: 26.6	26.6	26.6	26.6	26.6	36.5
<i>Hollola</i>	2007: 54.9	54.9	54.9	54.9	54.9	80.3
<i>Nastola</i>	2007: 9.9	9.9	9.9	9.9	9.9	-



4. Quality and volume of groundwater



The need for renovation of the water supply network is expected to increase in the future.

Springs were surveyed in Lahti in May–June 2016. The survey covered a total of approximately 100 sites marked as springs in diverse background materials, such as old maps. Their locations were recorded and the natural state, overview of the area and vegetation in the area were observed. Some of the springs were converted into wells at some time in the past, but the majority of them were almost in their natural state.

Planning work for the joint observation of groundwater began in Lahti in 2016. In the joint observation, the water utility, companies and the municipality together monitor the quality and volume of groundwater. The aim is to achieve a more accurate overview of the current state of groundwater than through separate monitoring activities.

There are 13 water intake plants in Lahti and seven in Hollola. Water quality is monitored in groundwater areas, water intake plants and in the water supply network. The volume of water pumped for consumption in Lahti and Hollola totalled 9.4 million m³ in 2016. The water supply of the region is based exclusively on groundwater,

and all of the samples met the quality requirements and recommendations for water for domestic consumption. The quality of Lahti Aqua Oy's services and the company's operations received the best score possible in a customer satisfaction survey from the residents of both Lahti and Hollola.

The chemical addition equipment and process automation were renewed and UV equipment was installed at the water intake plants in the Nastola and Hämeenkoski areas in 2016. These changes will guarantee high-quality safe water for the customers.

The indicator of the functionality and leakproofness of the water supply network is the unmeasured consumption percentage. For water pumped in Lahti, the share of unmeasured consumption was 6.8%, which is an excellent result at the national level, as the national average is around 20%. Unmeasured water consumption in the Hollola area was 12.6%, which is also well below the national average. The lower the unmeasured consumption percentage, the less water, energy and chemicals are consumed.

Monitoring indicators	2012	2013	2014	2015	2016
<i>Groundwater conductivity $\mu\text{S}/\text{cm}$. Indicates the total amount of salts dissolved in water. Threshold 2,500 $\mu\text{S}/\text{cm}$.</i>					
<i>Lahti, Jalkaranta</i>	175	184	186	184	183
<i>Hollola, Ruoppa</i>	83	106	104	106	106
<i>Nastola, Mälkönen water intake plant</i>	220	200	200	210	213
<i>Atrazine concentration in groundwater, $\mu\text{g}/\text{l}$. The threshold for an individual herbicide in water for domestic consumption is 0.1 $\mu\text{g}/\text{l}$.</i>					
<i>Lahti (HP137, trackside)</i>	2.2	2.3	1.2	1.8	2.6
<i>Nastola, Uusikylä (observation site G1)</i>	2.9	1.3	1.0	0.8	0.3
<i>Groundwater areas classified as being in a poor state, %</i>	32	29	29	29	26

There were no major changes in water consumption during the year. The nominal consumption figure includes water consumed by residents and the industry, as well as leaks. The figures for Lahti include Nastola and the figures for Hollola include Hämeenkoski.

Future opportunities and challenges:

- The need for water supply network renovations will increase as the pipelines built in the city's years of rapid growth in the 1960s and 1970s reach the end of their service life.
- Utilisation of groundwater for heating/cooling
- Climate change and salinisation of groundwater
- Contaminated land areas and groundwater
- Extraction of gravel in Renkomäki and groundwater protection



Monitoring indicators	2012	2013	2014	2015	2016
<i>Water consumption (l/resident)</i>					
<i>Lahti, nominal consumption</i>	189	184	183	179	187
<i>Hollola, nominal consumption</i>	113	113	110	102	120
<i>Nastola, nominal consumption</i>	192	211	211	216	-
<i>Lahti, household consumption</i>	125	124	122	121	120



↓ Lahti Environmental Services took part in a fish tagging study on the movement of e.g. zander (pictured) in Lake Vesijärvi.



5. Water quality, recreational and natural values of water systems



In addition to Lake Vesijärvi located in the areas of Lahti and Hollola, there are several smaller lakes in the region. Their significance is emphasised in recreational use in particular, as they are located close to the built environment, many right in the middle of residential areas. However, the value of several lakes in recreational use has been under threat in recent decades due to increased eutrophication.

Lakes are affected by everything around them: settlements, business activity, forests and agriculture. The lakes in the Lahti region are managed jointly by the municipalities and the Lake Vesijärvi Foundation. In addition to maintenance activities, measures are required in the catchment areas to reduce the external load from agriculture and drainage water.

Water management measures have continued in the area

During 2016, Lahti Environmental Services was responsible for the management of fish stocks and oxygenation of Vesijärvi and Kymijärvi, water sampling in lakes and ditches, and maintenance of

the automatic water quality station, among other things. In addition, the management of fish stocks continued in several sites, and approximately 108 tonnes of fish was caught. Fish were also planted in the Vesijärvi and Joutjärvi lakes.

Flowing water was rehabilitated in the area in the Jokitalkkari project, for example, in addition to which the construction of the Sammallsillansuo water protection wetland continued. A project to survey the possibilities of regulating the water level of lakes in the former Nastola area was begun. Stormwater management was improved through the activities of the stormwater working group and a cooperation agreement between Lahti Aqua Oy and the City of Lahti's Technical and Environmental Services Teky, in addition to which the quality of stormwater was monitored in the Vesijärvi, Alasenjärvi and Kymijärvi areas.

A measurement station operating all year round was installed in the Lankiluoto deep of Lake Vesijärvi in 2015, and its trial use continued in 2016. The station is comprised of a floating beacon and an underwater measurement sensor.

Monitoring indicators	Comparison year	2012	2013	2014	2015	2016
<i>Chlorophyll a in lake water, µg/l, in August</i>						
<i>Vesijärvi, Lankiluoto on Enonselkä</i>	1995: 10	13.0	16.0	8.7	10	12
<i>Hollola, Arkionmaanjärvi</i>		6.7	5.7	4.6	3.2	5.0
<i>Nastola, Salajärvi</i>		15.0	14.0	9.5	8.1	8.9
<i>Secchi depth of lakes, m, in August</i>						
<i>Vesijärvi, Enonselkä</i>	2001: 1.9	1.8	1.8	1.7	2.0	2.0
<i>Alasenjärvi</i>		3.2	2.0	3.0	-	4.0
<i>Hollola, Arkionmaanjärvi</i>		2.0	1.8	2.0	-	2.5
<i>Nastola, Salajärvi</i>		2.0	2.0	1.8	-	1.0
<i>Vesijärvi management of fish stock catch, t / year</i>	2001: 86	218	159	140	113	108
<i>Thermal load from Kymijärvi power plants on Vesijärvi, Tj</i>	1995: 722	817	1,293	877.4	600	519
<i>Lakes in a good or excellent state, % of the area of lakes</i>				11	11	11



Roach from Lake Vesijärvi included in Lahden Ateria's meals

Lahden Ateria took part in a project aiming to utilise roach caught from Lake Vesijärvi as part of the management of fish stocks in meals provided by the city. Previously, most of the catch was wasted. The project entered the pilot phase on 20 September, when roach from Lake Vesijärvi was served for the first time in a Lahden Ateria location with good customer feedback. Lahden Ateria aims to make roach a permanent part of its meals with the coming foodstuff tendering.

Future challenges connected to the quality, recreational and natural values of water systems:

- Reducing external and internal load on Lake Vesijärvi
- Studying the properties of sediments in Lake Kymijärvi and planning new remediation methods for cutting down the internal load
- Reaching the target level of the Water Framework Directive in all lakes
- Decreasing the stormwater load of the centre of Lahti
- Reducing the adverse effects caused by the excessive fluctuation of the water level of the lakes in the former Nastola area
- Finalising the water protection wetland of Sammallsillansuo

6. Dissemination of environmental information and residents' opportunities to act



Lapakisto is a highly popular hiking site.

The residents of the Lahti region still had an opportunity to ask about environmental matters and invite an environmental advisor to talk about waste-related matters or energy conservation in 2016. There were a total of 100 environmental counselling events for customers in 2016. In addition, the environmental counselling services' Kaisla van attended various events, such as markets and advisory sessions for adult groups. The residents also had access to counselling by telephone and e-mail. Training to support environmental education work was offered to early childhood education professionals and teachers working with children and adolescents. Encounters with children and adolescents took place during guided lessons, schools' and early childhood education institutions' theme days and various events for children and families. Environmental counselling services reached 4,600 children and adolescents in connection with environmental education for children and adolescents, which was clearly more than in previous years. Regularising the position of environmental educator early in the year contributed to this achievement. Environmental counselling services also communicated actively about topical matters on social media.

Lahti Environmental Services communicates diversely on the state of the environment through publications, public water quality monitoring data and diverse events arranged in cooperation with other parties. Such annual events include trap fishing day, lake fish day and fishing day.

Anniversary of the Environmental Week

The regional Environmental week celebrated its 20th anniversary in 2016. Environmental competence was highlighted in a diverse way by several parties, and a number of events with an environmental theme was offered to residents. Residents were encouraged to personal environmental activity through a challenge campaign, which resulted in litter being picked up for over 100 hours, and many substituted driving with cycling or walking for the duration of the week. Detrimental non-native plant species were removed from nature and several participants abstained from the use of plastic bags altogether. A total of 79 birdhouses were crafted, and the participants even made a few hedgehog houses. The week was culminated in a common picnic event in the Pikku-Vesijärvi park in Lahti.

Tealight Hunt tradition continued

The nationwide Tealight Hunt 2016–2017 was organised for the third time in Päijät-Häme. In the Tealight Hunt, primary school pupils learn about the sorting and utilisation of waste, collecting empty tealight cups. This time, 56 classes and 1,100 pupils took part in the Tealight Hunt in the operating area of PHJ. A total of 643,242 empty tealight cups were collected in Päijät-Häme. The empty tealight cups picked up from schools continued their journey to reuse.

Monitoring indicators	Comparison year	2012	2013	2014	2015	2016
Number of environmental counselling customer events	2001: 53	180	178	179	102	100
Number of environmental counselling events for children				136	117	158
Number of children reached by environmental counselling activities	2001: 2750	3,941	2,652	3,602	3,197	4,660
Land use events for residents	2000: 49	10	15	20	21	24
Satisfaction % in resident surveys, Technical Services	2001: 70	65	69	71	71	69

↓ The Lehmusreitti route going around the city centre provides views of the special natural



Environmental education work involved in schools

Environmental education work is carried out in all Lahti primary schools and upper secondary schools as part of the schools' normal education tasks. Environmental education is part of the curricula of the schools; a sustainable lifestyle and global responsibility is a theme in upper secondary school. Every primary school has its own school-specific environmental education action plan, and the achievement of objectives is systematically evaluated. Schools pay particular attention to the normal environmental practices of school work: recycling, sorting of waste, energy consumption and responsible consumption. The administration of Educational Services works in accordance with the Green Office principle, and an operating model that takes sustainability into account has also been prepared for the units. Its development is monitored with "KEKE" surveys twice a year. Here, the school self-evaluates its performance from the point of view of sustainability.

Future challenges in disseminating environmental information and residents' opportunities to act:

- Increasing the environmental competence and responsibility of residents and the City
- New methods for empowerment
- Open data and the opportunities it provides
- Supporting the activity of residents

7. Municipalities and group companies support the development of environmental responsibility throughout the area



↑ You can meet an environmental advisor at markets and public events.

Environmental aspects are addressed in all tenders organised by the City of Lahti’s procurement services, and the environment is taken into account in all operations. Approximately 70% of the purchases tendered through the City of Lahti’s procurement services included environmental criteria. The rest of the tenders concerned software and competence services. The environmental criteria practices vary by sector and procurement type. A good example is the City of Lahti’s real estate services, which usually uses environmental criteria as a basis of scoring in procurement. Product category-specific environmental guidance concerning product purchases is provided through the procurement services extranet.



Monitoring indicators	2012	2013	2014	2015	2016*
Environmental aspects addressed in tenders organised by procurement services, %	24	38	98.5	98.3	70.0

* Calculation method changed from previous years



PHJ's sorting guidance helps in problems related to waste fractions.

The development of environmentally friendly cleaning services continues in Lahden Servio

Lahden Servio carried out a self-evaluation of office cleaning in accordance with the Nordic Swan Label environmental criteria in 2016, and work to develop environmentally friendly cleaning services will continue by selecting environmentally labelled products, among other things. The office of Lahden Servio was again granted the right to use the WWF Green Office label in 2016. Lahden Servio's office has paid attention to paper consumption in the office, sustainability of procurement, waste management and travel in accordance with the requirements of the environmental programme.

Lahden Talot is developing its operations to be increasingly energy-efficient

Lahden Talot continued its work at the forefront of energy-efficient construction and renovations in 2016. Four new construction projects were designed to be almost zero-energy buildings, with a maximum energy consumption of 100 kWhE/m²/year. The company continued separate projects to control energy and water consumption; among other measures, the lighting fixtures in the properties' public areas were converted to LED lighting.

A new energy management system was deployed in the entire property stock at the end of the financial year, which will facilitate energy and water consumption monitoring at the hourly level. The change from before is significant, as the readings were previously collected at the monthly level. At the same time, the new system facilitates CO₂ calculation and higher-quality reporting.

The Luukuta Oikein sorting competition for residents stated in cooperation with PHJ in 2014 was extended for a third season. The aim of the competition is to reduce the amount of waste and improve its sorting.

Environmental education and research are strong in the Lahti region

The most important institutions of higher education in the field of increasing environmental competence in the Lahti region are the Lahti University of Applied Sciences (LAMK), University of Helsinki and Lappeenranta University of Technology (LUT).

LAMK has four strategic focus areas: clean and dynamic environment, smart industry, design, and well-being and regenerative growth. The focus area-based research, development and innovation activity provides competence and solutions in various fields, including circular economy and environ-

mental technology, to companies and stakeholders in the region. Nature-related well-being services are also being developed. LAMK launched multi-disciplinary studies in circular economy in autumn 2016, with the teams working on assignments from businesses. The first module was implemented in autumn 2016, and it received good feedback from business and students. Students' internships and diploma work contribute to the development of environmental competence in the region.

The key research branches of the **University of Helsinki** in Lahti include water system and soil ecology, urban ecosystem research, environmental microbiology, biotechnology, ecotoxicology and environmental chemistry. Circular economy became a topical theme in 2016. With one of the professors working in Lahti retiring, the process to refill the position was started. The field of the position was specified as "aquatic ecotoxicology in an urban environment", which aims to strengthen research in environmental ecology as a whole and find new potential for expanding cooperation with businesses

and ideas for establishing new companies. In environmental ecology, the research comprises both basic research and linked applied research. Several research projects involve corporate partners with which it is possible to advance from research to commercial applications and new business.

The focal areas of **LUT** Lahti's research include innovation research, entrepreneurship research, research related to performance management and sustainability research. Helena Kahiluoto, Finland's first professor of sustainability science, started working at LUT in Lahti in summer 2016. The new professor strengthened LUT's competence in sustainability science, which was extensive even before this. Sustainability science emphasises taking the ecological, economic and social dimensions of sustainability into account in all solutions. It aims to identify, understand and quantify the needs, obstacles and incentives of sustainability change. Sustainability research in Lahti received funding from the Academy of Finland and a new EU Horizon 2020 project in the autumn.



Garden waste is accepted free of charge at PHJ's waste stations.

Cooperation between institutions of higher education provides additional opportunities

During 2016, the joint “Sustainable urban environment in Lahti” project course of the University of Helsinki’s environmental ecology students and LUT’s environmental engineering students was a promising new introduction of environment-themed education cooperation between universities. Towards the end of the year, work began to survey opportunities for expanding the education cooperation from individual courses to study modules and education paths with sustainability as the theme. Another area of cooperation has been preparatory work supporting the operations of the Smart&Clean Foundation with LAMK and the City of Lahti. The working group has linked research expertise and professionals in the area, generated new research ideas and prepared applications for funding.

↓ *The University of Helsinki is researching the ability of green roofs to manage stormwater at the Soilia soil research centre in Lahti.*



Active LUMA activity

The Päijät-Häme LUMA Centre operating in the Lahti University Campus is part of LUMA Centre Finland and actively implements its strategy in Päijät- and Kanta-Häme. In 2016, the Centre organised LUMA science clubs for children and adolescent at schools and libraries, a science summer camp and a mobile coding summer camp in cooperation with LAMK. LUMA club instructors were trained both in the spring and autumn. In spring 2016, teachers were provided training in design teaching and in low-threshold coding in the autumn. Enthusiasm with coding was also promoted by various coding events for children and their guardians organised throughout the year. A technology competition organised to develop project learning inspired a total of 17 schools and 72 children from the Päijät- and Kanta-Häme region to showcase their work at the Lahden lyseo upper secondary school in March. Science class activity was piloted in autumn 2016 in the Department of Environmental Ecology’s teaching laboratory at the Niemi campus with the help of a grant from the Finnish Cultural Foundation’s Päijät-Häme trust.

Future challenges in supporting environmental responsibility throughout the region:

- Keeping high-quality higher education and research in Lahti and making the cooperation between the City and the educational institutions closer
- Updating the City’s procurement programme and how the new Lahti’s strategy will guide it
- Increasing companies’ environmental responsibility and climate work
- Improving the operating preconditions of cleantech businesses in Lahti, high-visibility reference projects and internationalisation
- Cooperation of the municipalities in the urban region without a joint environmental protection organisation

Monitoring indicators	Comparison year	2013	2014	2015*	2016
Combined revenue of cleantech companies, EUR billion	2002: 0.38	1.39	1.11	1.58	-
Number of people employed by cleantech companies	2002: 1,526	4,761	4,428	4,866	-
Starting positions in environmental degree education/year (LAMK, universities and Salpaus)	1997: 47	131	141	133	118

*The figures for 2015 presented for cleantech companies are based on preliminary data and is largely only indicative.

8. Environmental balance sheet 2016, summary, EUR 1,000



The financial statements of the City of Lahti for 2016 include a compilation of environmental indicators of the City and the city corporate group's area. Data has been collected from all sectors and functional balance sheet units for this environmental balance sheet. The city corporate group calculation includes Lahti Aqua Oy, Lahti Energy group, Päijät-Hämeen Jätehuolto Oy and Lahden Talot Oy. The environmental expenses of the entire city group amounted to EUR 37.0 million and environmental income to EUR 31.4 million. Lahti Group made a total of EUR 12.3 of environmental investments in 2016. The table below is a summary of the environmental indicators in the financial statements for 2016 at the accuracy of EUR 1,000.

Environmental classification	City of Lahti and balance sheet units			Lahti Group as a whole		
	Income	Expenses	Investments	Income	Expenses	Investments
1. Outdoor air and climate protection			34.0		4,631.0	879.0
2. Protection of waters and wastewater treatment		383.2	13.0	14,393.9	8,962.0	4,022.9
3. Waste management and prevention of littering		617.1		16,508.0	18,253.6	7,213.0
4. Soil and groundwater protection	27.0	123.0		27.0	677.0	6.0
5. Noise and vibration abatement			115.0		105.0	121.0
6. Nature and landscape conservation	50.5	80.0	21.0	50.5	80.0	21.0
7. Official action relating to environmental protection	359.0	855.6		359.0	855.6	
8. Promotion of environmental protection	50.0	682.2		359.0	1,855.6	
9. Environmental taxes and levies		1,743.3		50.0	756.9	
TOTAL	486.5	4,484.4	183.0	31,388.8	37,000.6	12,262.9
Interest expenses					169.0	
Environmental provisions					-842.0	
Change in environmental provisions (addition -, reversal +):					-842.0	
Conditional environmental liability (cost estimate):						

Note The classification in the environmental balance sheet does not comply with the headlines of this report.



Further information

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