LAHTI REGION ENVIRONMENTAL REVIEW 2017

Hollola

Lahti

CONTENTS

FOREWORD

All municipalities seek ways to be more attractive and inviting. Nature is among our municipalities' and cities' best assets, but it is also much more – nature affects our quality of life and health, invites us to exercise more, and helps take the weight of everyday life off our minds. We must also make efforts in internal marketing; people living within the region have an excellent opportunity to promote their health and wellbeing in their surrounding areas. We should further improve the signposting for our nature paths so that as many people as possible can find their way to our various nature destinations.

City and municipality leaders, operators within various industries, businesses, organizations and the residents are all responsible for preserving our nature for the generations to come. This responsibility also sets us limitations and puts us under pressure to compromise, as has become evident in terms of our groundwater supply. However, the impact of clean groundwater to our residents' wellbeing is undeniable and far-reaching. Climate change will influence bodies of water and the circulation of groundwater, and its impact may be unexpected. Many things we have taken for granted may no longer be a given as the world around us changes. We must anticipate the change and prepare ourselves for it.

The mayor of Lahti will be recruited in 2018. After the next regional elections, Lahti will adopt a political mayor system, and the new mayor will become a chief secretary.

Climate objectives both in the EU and in Finland encourage or, depending on viewpoint, force us to keep a closer eye on our emissions. These limitations should be turned into a strength. The circular economy creates a great platform for innovation, which in turn creates jobs, but above all the circular economy is a way of creating sustainable and far-reaching wellbeing with a look to the future. Being a pioneer creates pressure and encourages improvement. A municipality must be able to serve its residents in terms of changing values and expectations as well as the future.

This is a joint environmental review for Lahti and Hollola, despite the dismantlement of a shared environmental organization in 2015. Various indicators have been monitored regionally for a long time, and this long-term data brings a good viewpoint into our development. In 2017, the good news include the increase in municipal waste recycling rates, involvement and residential events, as well as in the use of varied communication channels in participation. Additionally, the number of days when air quality is poor has decreased.

Jyrki Myllyvirta
Mayor of Lahti

Päivi Rahkonen
Mayor of Hollola

The Environmental Policy Guides

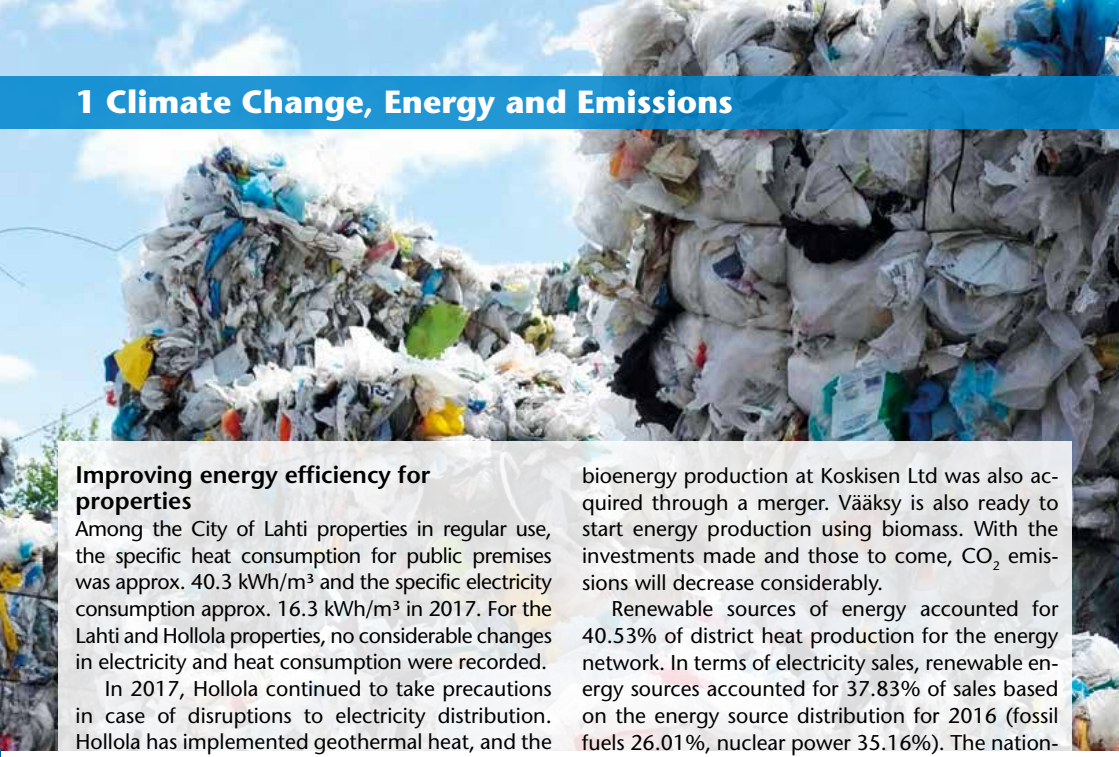
Strategy is a primary tool for leadership in cities and municipalities. In the City of Lahti, strategy outlines the development as an environmental city that continues to take responsibility for a good environment and for strengthening environmental responsibility.

In the strategy of Hollola, responsibility is featured as a core value.

The award-winning Päijät-Häme circular economy roadmap into 2030, developed jointly by the municipalities, the Lahti University of Applied Sciences and the Regional Council of Päijät-Häme, is based on the region's existing strengths and guides the municipalities' activities.

In all of Finland, Lahti has been a model student in the smart use of resources, and in 2017 the municipality joined Circular economy forerunners network. Lahti has prepared a new Environmental programme, which will also become a roadmap of resource wisdom into 2050. In the long run, the Environmental programme aims for zero emissions and zero waste as well as a sustainable level of consumption. The programme's milestones will be 2022 and 2030, where the targets will be set.

1 Climate Change, Energy and Emissions



Improving energy efficiency for properties

Among the City of Lahti properties in regular use, the specific heat consumption for public premises was approx. 40.3 kWh/m³ and the specific electricity consumption approx. 16.3 kWh/m³ in 2017. For the Lahti and Hollola properties, no considerable changes in electricity and heat consumption were recorded.

In 2017, Hollola continued to take precautions in case of disruptions to electricity distribution. Hollola has implemented geothermal heat, and the Kalliola School is practically self-sufficient in terms of heat and electricity in case of a power failure. Koivukoto and the Hollola fire station have also implemented stationary emergency power equipment. Additionally, the municipality has a mobile emergency power equipment.

The new Southern Lahti catering center has focused on energy efficiency. The catering center can prepare 10,000 meals daily for the schools and kindergartens in the Southern Lahti area. Heat energy for the catering center is provided by a hybrid heat pump and district heating. The hybrid heat pump generates heat energy from the building's refrigerating machines and cooling equipment. The cooling energy is also provided by a hybrid heat pump. The catering center has mechanical incoming and exhaust air ventilation with an effective heat recovery system. The roof boasts a 100 square metre solar panel system, which in 2017 produced 12.7 MWh/a of usable electricity for the property.

Towards sustainable power and heat production

The main environmental objective for Lahti Energy is decreasing CO_2 emissions. This started to become a reality in 2017, when construction for the Kymijärvi III biothermal power plant began. Alongside the already operative BioPolttimo, the bioenergy production at Koskisen Ltd was also acquired through a merger. Vääksy is also ready to start energy production using biomass. With the investments made and those to come, CO_2 emissions will decrease considerably.

Renewable sources of energy accounted for 40.53% of district heat production for the energy network. In terms of electricity sales, renewable energy sources accounted for 37.83% of sales based on the energy source distribution for 2016 (fossil fuels 26.01%, nuclear power 35.16%). The national energy source distribution for 2017 will not be published until Summer 2018.

Lahti Energy has replaced the oil containers and outlets for four of its heating plants in order to comply with the new legislation, while the oil storage capacity in the groundwater area has been reduced. These renewals are a continuation to changes already made in the past years.

2017 was a good year for the recovery and reuse of ash. The volume of ash produced was smaller than that collected for reuse. Previously piled ash was delivered for use at earth work sites, and the first steps in the use of ash in fertilizer production were taken with the ashes from BioPolttimo.

Lahti Energy has considerably increased the proportion of wind power in its acquisition of energy through cooperative energy producers. Lahti Energy has installed three charging points –each point can charge two cars– in Lahti. E-cars can be charged at Kauppakatu 31, at Sibelius Hall and at Lahti Sports Center. Additionally, Lahti Energy has developed other services for e-cars, including a service providing properties with charging infrastructure. The service development has particularly focused on the development and piloting of new energy management solutions and energy efficiency services. With the new solutions, properties can manage their energy consumption in a smart way.

In 2017, the Kujala Waste management area was looking into new energy solutions, including the use of solar energy and the recovery of heat produced as a byproduct of waste processing. All key operators in the Kujala area participated in the project. In Fall 2017, two solar power plants were constructed in the area of the waste sorting facility, producing over 80 MWh of electricity every year. In addition to energy production, the objective is to test different types of solar panels in an environment such as the Kujala waste sorting facility. The solar panel project is continued and developed further in cooperation with Lahti Energy. The objective is also to repurpose the closed landfill area. With a potential new power plant, the waste sorting facility's energy self-sufficiency would go up from the 5% to approximately 15%.

Municipal total electricity consumption increased considerably due to the consolidation of municipalities.

Monitoring indicators	**Base year**	**2012**	**2013**	**2014**	**2015**	**2016***
Electricity consumption (kWh per resident per year)						
Lahti	*2000: 8,620*	*9,051*	*8,712*	*8,780*	*8,497*	***9,141.8***
Hollola	*2007: 8,178*	*7,976*	*7,777*	*7,446*	*7,331*	***8,280.4***
Nastola	*2007: 13,127*	*11,673*	*11,943*	*11,551*	**	**

**Electricity consumption data for 2017 not available in Spring 2018 **The municipalities of Nastola and Lahti were consolidated in 2016, as were the municipalities of Hollola and Hämeenkoski*

Monitoring indicators	**Base year 2001**	**2013**	**2014**	**2015**	**2016**	**2017**
Specific electricity consumption in municipalities' non-residential buildings (kWh per cubic metre)						
Lahti	*18.2*	*18.2*	*16.9*	*15.7*	*16.9*	***16.3***
Hollola		*23.0*	*24.2*	*23.6*	*22.7*	***22.7***
Nastola		*17.6*	*17.9*	*26.6*	*	*
Heat consumption in municipalities' non-residential buildings (kWh per cubic metre)						
Lahti	*52.1*	*41.1*	*40.7*	*39.1*	*40.6*	***40.3***
*Hollola***		*34.5*	*31.2*	*31.5*	*40.3*	***40.1***
Nastola		*42.9*	*41.3*	*42.6*	*	*

**The municipalities of Nastola and Lahti were consolidated in 2016, as were the municipalities of Hollola and Hämeenkoski **The figures for Hollola are not weather-normalized, those for Lahti are*

Monitoring indicators	**Base year 1997**	**2013**	**2014**	**2015**	**2016**	**2017**
Carbon dioxide emissions from power plants and industries, Lahti (tonnes)						
Lahti	*691,300*	*692,900*	*566,232*	*495,220*	*520,287*	***452,749***

The circular economy

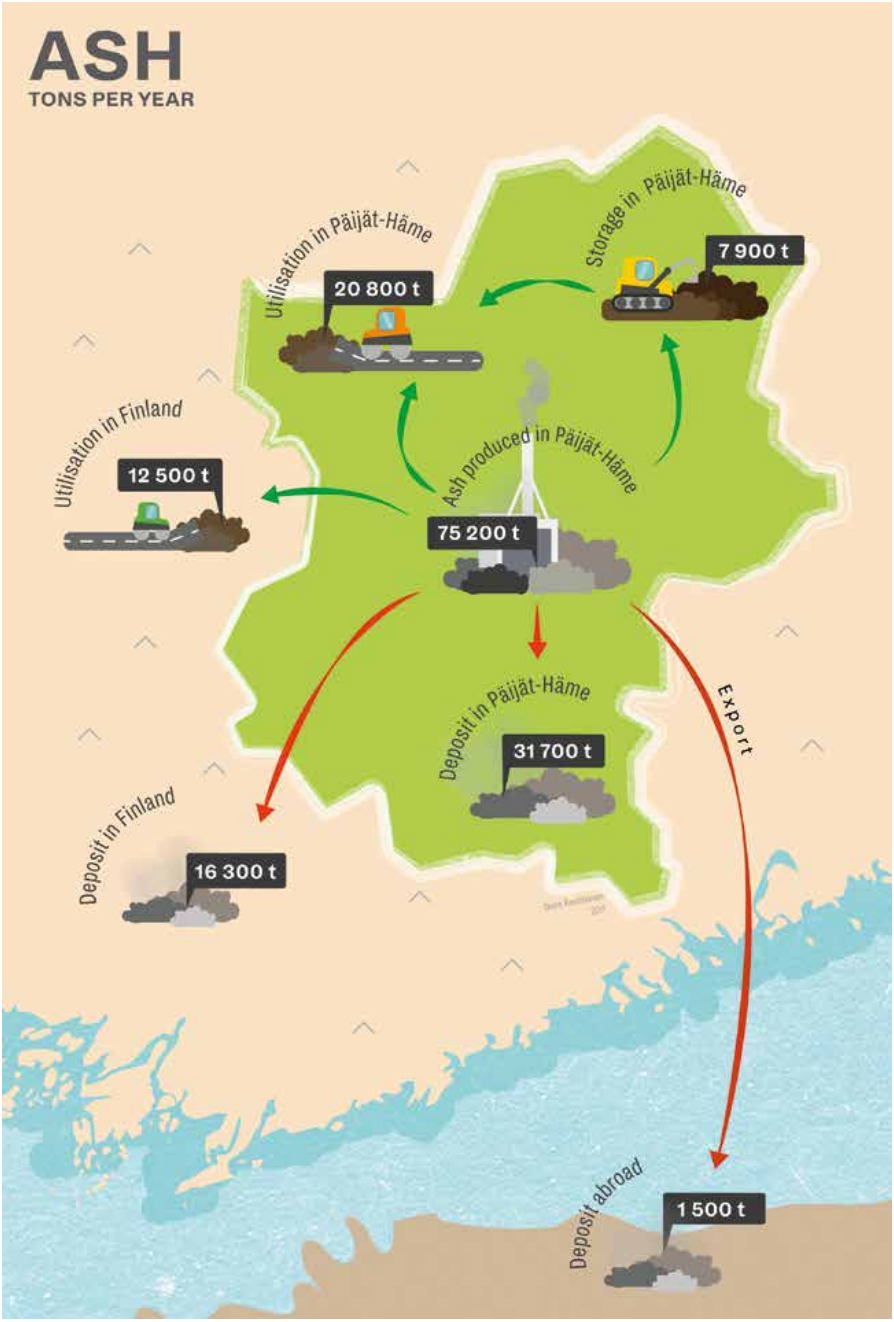
As in the past years, nearly all waste received by Päijät-Häme Waste Management Ltd (PHJ) was utilized as materials or energy. PHJ aims to enhance their use of renewable sources of energy in their own operations, too. Fuel was made from separately collected energy waste for use at Lahti Energy's Kymijärvi II power plant and other power plants. Mixed waste was also delivered for use in energy production. Biowaste was processed at LABIO Ltd digestion and composting plant, where it was converted into biogas and compost.

The utilization rate of municipal waste received by PHJ amounted to 95% in 2017. Of the waste, 32% was utilized as material and 63% for energy. A total of 5% of municipal waste was used as landfill, amounting to 26 kg per resident.

The mechanical sorting plant LATE built at the Kujala waste sorting facility in 2016 utilizes various screening and separation techniques and was implemented in 2017. The plant should raise the recycling rate of municipal waste up to the objective of 50%. The processing of waste was impeded by a fire at the Murre crushing facility's magnetic station in May of 2017, which resulted in damages of over one million euros but did not impact the rate of waste recovery and reuse.

Lahti Aqua Ltd has an important role in environmental protection, as they treat wastewaters for 140,000 residents and for the businesses operating in the region. Lahti Aqua's Kariniemi, Ali-Juhakkala and Nastola wastewater treatment plants treated a total of 13 million cubic metres in 2017, and the treatment results fulfilled all permit conditions at an annual level. The plants are biological-chemical wastewater treatment plants where solids and sand are removed from wastewater mechanically, organic matter and nitrogen biologically and phosphorus chemically. The treated wastewater is made hygienic using UV light before being discharged into water systems. Thanks to the efficient UV light treatment, nearly 100% of fecal microbes are eliminated. The UV treatment considerably improves the hygienic quality of the River Porvoonjoki.

100% of the biogas generated in the treatment of sludge at the Kariniemi and Ali-Juhakkala wastewater treatment plants is utilized as heating energy. Of the total 15,182 MWh of energy produced, 51% was used for heating the wastewater treatment plants and the rest was sold to Lahti Energy for use in the district heating network. The heating energy input to the district heating network was equivalent to the annual heating energy consumption of approximately 500 detached houses. After the digestion and utilization of gas, 14,650 tonnes of dried sludge was delivered to LABIO, where the sludge is composted. LABIO produces soil conditioners through composting and biogas at their biogas plant for Gasum Ltd, who then refine the crude gas further into vehicle fuels.


ASH
TONS PER YEAR
Utilisation in Päijät-Häme
20 800 t
Storage in Päijät-Häme
7 900 t
Utilisation in Finland
12 500 t
Ash produced in Päijät-Häme
75 200 t
Deposit in Päijät-Häme
31 700 t
Export
Deposit in Finland
16 300 t
Deposit abroad
1 500 t

Monitoring indicators	Base year 2001	2013	2014	2015	2016	2017
Amount of mixed (landfill) waste produced by Lahti departments (tonnes)	*1,304*	*1,160*	*929*	*806*	*828*	***725***
Amount of municipal waste to be disposed of as landfill (PHJ area) (kg per capita)	*234 (in 1999)*	*21*	*20*	*35*	*15*	***26***
The reuse rate of municipal waste received by PHJ (incl. energy use) (%)	*51*	*95*	*95*	*92*	*96*	***95***
The recycling rate of municipal waste received by PHJ (reuse as materials) (%)		*32*	*31*	*31*	*29*	***32***

Monitoring indicators	Base year 1997	2013	2014	2015	2016*	2017*
Loading of wastewater from Lahti and Hollola on the River Porvoonjoki (tonnes) and efficiency of the treatment process (%)						
Phosphorus	*5.8*	*3.3 (97.2%)*	*2.6 (97.7%)*	*1.8 (98.3%)*	*1.9 (98.2)*	***2.3 (98.0%)***
Nitrogen (NH_4)	*28.8*	*31.4 (96.1%)*	*14.4 (98.1%)*	*16 (98%)*	*4.7 (99.4)*	***11 (98.8%)***
BHK_4	*140*	*74.5 (98.5%)*	*73.0 (98.4%)*	*52 (98.9%)*	*43 (99.1)*	***60 (98.9%)***

**The load calculations have been affected by the fact that treated wastewater from Kariniemi and Ali-Juhakkala is sluiced to the Nikula equalizing basin and from there, after being made hygienic, to the Porvoonjoki river since 2016. Previously, the treatment plants had separate discharge points.*

Monitoring indicators	2013	2014	2015	2016	2017
Loading of wastewater from Nastola (tonnes) and efficiency of the treatment process (%)					
Phosphorus	*0.2 (98.9%)*	*0.2 (98.6%)*	*0.2 (98.7%)*	*0.3 (98.0)*	***0.4 (98.2)***
Nitrogen (NH_4)	*0.1 (99.9%)*	*0.2 (99.7%)*	*0.6 (99.2%)*	*0.7 (99.0)*	***1.1 (98.9)***
BHK_4	*3.1 (99.5%)*	*2.8 (99.5%)*	*2.0 (99.6%)*	*2.2 (99.6)*	***2.2 (99.6)***

Future plans and challenges:

- *Continuing climate change mitigation, while preparing for the changes already under way.*
- *Hollola will continue to implement back-up power solutions for public facilities.*
- *Lahti Aqua has launched a development project with the goal of finding an energy-efficient way to control wastewater processes.*
- *The PHJ energy infrastructure development project will continue. Development of plant functionality.*
- *Increasing the number of vehicles running on biogas and electricity.*

2 Health, safety and quality of life in residential environments

A varied environment of green areas and woods have been proven to have both health and recreational benefits to residents. The extensive green areas in the Lahti region allow for many free-of-charge nature services, function as a carbon sink and slow down climate change.

The Lahti's Direction project combines traffic planning and land-use planning in a whole new way, helping build a sustainable city together with the different parties. The Lahti's Direction project includes a Master plan, a Sustainable Urban Mobility Plan, and the Environmental programme and a Service programme.

The Master plan is an illustrated strategy, explaining our shared objectives in terms of land use and traffic planning. The Master plan of Lahti will be updated every four years, upon the re-election of a city council. The latest plan was drafted in early 2017, and the finished plan will be approved in 2020. Various workshops for residents, experts and interest groups were held in 2017 in order to gauge the current state of e.g. traffic and mobility of people.

Monitoring indicators	**2013**	**2014**	**2015**	**2016**	***2017***
Percentage of parks and green areas within the city planning areas (marked V) (%)*					
Lahti	*30*	*29.9*	*29.9*	*29*	***29***
Hollola	*25*	*25*	*25*	*24*	***21***
Nastola		*19*	*19.4*	*-*	*-*
Percentage of building lots in noisy areas relative to all planned detached house lots, Lahti (%)	*0*	*-*	*0*	*2.2*	***3.3***
Percentage of apartments in noisy areas relative to all planned apartment square metres, Lahti (%)	*24.9*	*-*	*34.9*	*50.6*	***75***

Number of journeys made by public transport grew

The number of journeys made using regional public transport in 2017 was 7,320,913 for the entire region. This means an average of 36.3 journeys per resident. Other news in public transport in 2017:

- *A mobile ticket application was implemented in February 2017. In 2017, a total of 22,000 mobile tickets were sold, and the system continues to be developed.*
- *A 24-hour ticket was implemented before the 2017 World Championship Games.*
- *A senior discount was piloted between 1 August and 31 December 2017, and it will be maintained as a permanent discount.*

The relative change index for vehicle traffic, calculated with data from ten individual monitoring points, was on the rise in 2017. This rise is explained by the increased traffic on Vesijärvenkatu and Mannerheiminkatu after the removal of roadblocks at the travel center construction site. Also this is explained by growth of drive-through traffic on a national level, and growth of local vehicle mileage.

Relative change index for vehicle traffic	**2001**	**2012**	**2013**	**2014**	**2015**	**2016***	**2017**
Lahti (ten locations where traffic volumes are monitored)	*100*	*108.3*	*109.0*	*106.2*	*105.7*	*no data*	***110.4***
Car dependency. Number of cars / 1,000 residents							
Lahti	*387*	*492*	*502*	*507*	*512*	*540*	***552***
Hollola	*392*	*588*	*606*	*615*	*631*	*658*	***676***
Nastola	*422*	*599*	*614*	*621*	*642*	*-*	*-*

**The municipalities of Nastola and Lahti were consolidated in 2016, as were the municipalities of Hollola and Hämeenkoski*

Air quality

For a medium size city, Lahti monitors its air quality with as many as four monitoring stations. Additionally, Lahti has had a mobile air quality monitoring station since 2015. In 2017, the mobile station was located in Salpakangas, Hollola. In 2017, EUR 32,000 was invested in an analyzer measuring the concentration of various particles in the air.

The automatic monitoring stations monitor the amount of ozone and particles of varying sizes in the air, and three stations also have monitoring tubes for detecting VOCs (Volatile Organic Compounds) over periods of two weeks.

In 2017, the monitoring of air quality was launched in two residential areas of detached houses. The mobile monitoring station in particular is used for monitoring concentrations of PAH compounds. PAH compounds are produced when organic matter such as wood burns incompletely. Many PAH compounds can cause cancer or mutations.

During 2017, there were 21 days when the air quality was poor or very poor for at least one hour per day. These notches in air quality were caused by high concentrations of particles in the air.

Monitoring indicators	Base year 1997	2013	2014	2015	2016	2017
Number of days with poor air quality (EU: < 30)	*2002: 14*	*32*	*26*	*35*	*28*	***21***
NOx emissions from traffic (LIISA 2012 model) (kg/resident)						
Lahti	*12*	*4.6*	*4.4*	*5.1*	*5.0*	*
Hollola	*25*	*9.8*	*9.6*	*8.6*	*7.6*	*
Nastola	*30*	*11.7*	*11.5*	*10.4*	-	
CO_2 emissions from traffic (LIISA 2012 model) (kg/resident)						
Lahti	*1,458*	*1,455.0*	*1,448.8*	*1,393.6*	*1,684.0*	*
Hollola	*2,816*	*2,828.6*	*2,838.3*	*2,527.7*	*2,792.7*	*
*Nastola***	*3,109*	*3,267.8*	*3,284.5*	*2,981.7*	-	-

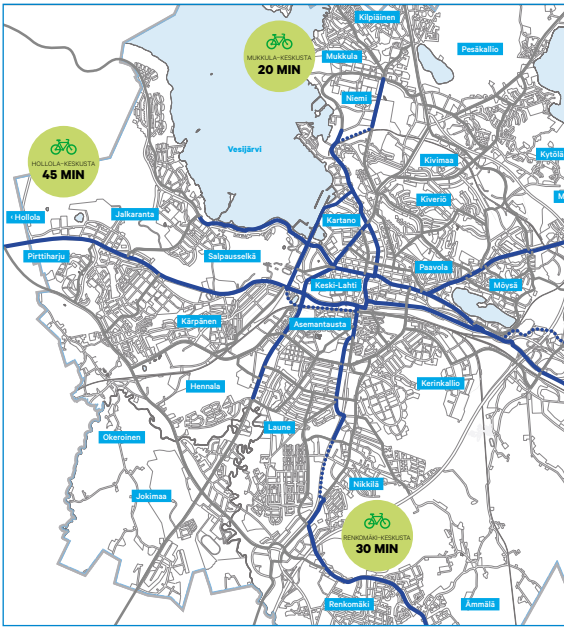
** Data for 2017 not available in Spring 2018 **The municipalities of Nastola and Lahti were consolidated in 2016, as were the municipalities of Hollola and Hämeenkoski*

Promotion of cycling

In 2017, Lahti received EUR 4.7 million European Urban Innovation Action project: The CitiCAP project aims to encourage residents to move more sustainably, reduce traffic emissions, compile and share digital resources on transportation as well as develop new transportation services for the residents. The project develops and pilots the residents' personal emissions trading as part of transport policy, together with the Lappeenranta University of Technology. Additionally, a smart cycling route will be constructed to connect Apilakatu to the city center, and the mobility data currently being collected on various platforms will be compiled in a more usable format.

Monitoring indicators	Base year	2013	2014	2015	2016	2017
Combined pedestrian and cycling paths (km)						
Lahti	*2001: 344*	*392*	*401*	*403.3*	*458*	*538*
Hollola	*2008: 49*	*66*	*70.8*	*70.8*	*69*	*72*
Nastola	*2006: 55*	*48*	*50.2*	*57*	-	-

According to current data, cycling will not be efficiently promoted through the construction of paths shared by pedestrians and cyclists. Instead, more attention should be paid to the quality and maintenance of cycle ways, as well as comfortability and safety of the walking environment.



Future plans and challenges:

- *Achieving a change in modes of transport: 2030 more than 50 percent of journeys will be made sustainably.*
- *Increasing the comfort and safety of the urban environment.*
- *Ensure investment funding for main cycle ways / separated cycling routes.*
- *Understanding the overall picture and enhancing co-operation in promoting sustainable urban mobility.*
- *Decreasing noise and its adverse effects.*

3 Nature's diversity and cultural heritage

Establishment of the new Kintterö nature conservation area (72 ha) was prepared for the City of Lahti in 2017. The formalization was in 2018. Nature conservation areas and their services were also improved and maintained. Maintenance work was carried out in almost all of the nature conservation areas. In addition, several biota and LUMO area surveys were carried out and preparations for the establishment of a new nature conservation area began.

Hollola has a total of 1,610 hectares of natural conservation areas. The number does not cover areas in ridge protection programs or Natura reserves, as these partially overlap with other nature conservation areas. Among the environmental action taken by Hollola in 2017, the reparation of the duckboards in the Soisalmensuo nature conservation area should be mentioned.

Monitoring indicators	2013	2014	2015	2016	2017
Areas protected under the Environmental Protection Act (ha)					
Lahti (in 1995:256)	*507*	*513*	*513*	*873*	***873***
Hollola	*1,237*	*1,284*	*1,284*	*1,337*	***1,585***
Nastola	*297*	*297*	*297*	-	-
Habitat sites protected under the Environmental Protection Act (ha)					
Lahti	*23.6*	*23.6*	*23.6*	*35.8*	***35.8***
Hollola	*19.2*	*19.2*	*19.2*	*25.4*	***25.4***
Nastola	*12.2*	*12.2*	*12.2*	-	-
Areas protected under the Environmental Protection Act, percentage of the municipal land area (%)					
Lahti (1995: 1,9)	*3.3*	*3.3*	*3.5*	*1.8*	***1.8***
Hollola	*2.3*	*2.4*	*2.4*	*1.8*	***2.2***
Nastola	*0.8*	*0.8*	*0.8*	-	-

In addition to conservation areas, there are LUMO biodiversity sites specified by the municipalities themselves. The total area covered by LUMO sites increased in the new Lahti to approximately 1,500 hectares. The LUMO biodiversity sites partially overlap with the other nature conservation areas.

Monitoring indicators	base year	2013	2014	2015	2016	2017
Valuable sites protected under city planning regulations, Lahti (number of lots)	*1983: 60*	*1,027*	*1,023*	*1,027*	*1,247*	***1,269***
Number of protected buildings, Lahti	*1979: 3*	*295*	*302*	*300*	*350*	***385***
Cultural heritage landscapes (ha)						
Lahti	*1995: 26.6*	*26.6*	*26.6*	*26.6*	*36.5*	***36.5***
Hollola	*2007: 54.9*	*54.9*	*54.9*	*54.9*	*80.3*	***no data***
Nastola	*2007: 9.9*	*9.9*	*9.9*	*9.9*	-	-

Future plans and challenges:

- *Improved signposting for nature conservation areas. Improved signposting for geological sites.*
- *Applying for Geopark status.*
- *Formalizing the conservation of the Sammalsillansuo conservation area.*

4 Quality and availability of groundwater

Lahti and Hollola are located above the significant I Salpausselkä groundwater reserves. 2017 saw the commencement of construction work for the Lahti southern ring road, as well as the more detailed planning of the parts of the project carrying a considerable risk to the groundwater reserves. The project entails the lowering of groundwater surface level on the west side of Sokeritoppa by several metres from its natural level during construction. On this site, the groundwater surface level will be permanently lowered by approx. two metres. In the Liipola area, groundwater levels must be lowered by several metres due to tunnel construction, and the same applies to Patomäki. In order to minimize the risks to groundwater reserves, the project must be planned and implemented in close co-operation with the planners, Lahti Aqua as well as the various authorities concerned (Lahti Urban Environment service area, the Centre for Economic Development, Transport and the Environment, the Regional State Administrative Agencies).

In 2017, Lahti implemented potassium and natrium formate as a replacement for de-icing salt in preventing slippery road surfaces. The impact of this change on groundwater quality will be monitored in the city centre over the coming years. The planning of joint monitoring of groundwater continued 2017 and preparation will carry on for the year 2018. Joint monitoring will commence in the Lahti groundwater area at the beginning of 2019.

The City of Lahti purchased the former Vientikerma water intake facility located in Asemantausta. Water intake ended when the facility ceased its operation, and at the same time the protective pumping of groundwater polluted by industrial cleaning activities stopped in the area. After the change of ownership, the water intake facility will be recommissioned for protective pumping, preventing the flowing of polluted groundwater from the area.

The water acquisition of Lahti and Hollola is solely based on groundwater reserves. The volume of water pumped for consumption in Lahti and Hollola totaled 25,000 m^3 per day in 2017. All water samples taken met the quality requirements and recommendations set for household water. Approximately 100,000 m^3 of groundwater is formed in the Lahti groundwater reserves every day, around four times the daily consumption.

The unmetered consumption percentage is as an indicator of the functionality and leakage rate of the water supply network. For all the water pumped in Lahti, the share of unmetered consumption was 7%, which is an excellent result at the national level, as the national average is around 20%. The unmetered consumption for the Hollola region was 12%. The lower the unmetered consumption rate, the smaller the amount of water, energy and chemicals going to waste.

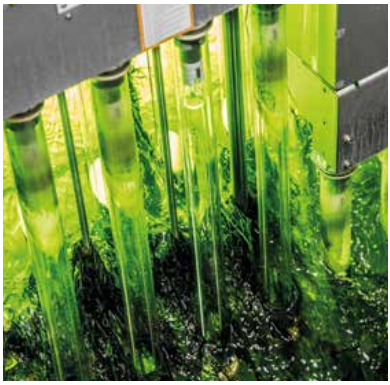
Monitoring indicators	2013	2014	2015	2016	2017
Groundwater conductivity (µS/cm). Indicates the total amount of salts dissolved in the water. Limit value 2,500 µS/cm.					
Lahti, Jalkaranta	*184*	*186*	*184*	*183*	***186***
Hollola, Ruoppa	*106*	*104*	*106*	*106*	***107***
Nastola, Mälkönen water intake facility	*200*	*200*	*210*	*213*	***220***
Atrazine levels in groundwater (µg/L). Limit value for any particular pesticide in household water is 0.1 µg/L.					
Lahti (HP137, trackside)	*2.3*	*1.2*	*1.8*	*2.6*	***3.2***
Nastola, Uusikylä (observation point G1)	*1.3*	*1.0*	*0.8*	*0.3*	***0.3***
Groundwater areas classified as being in a poor state, %	*29*	*29*	*29*	*26*	***26***

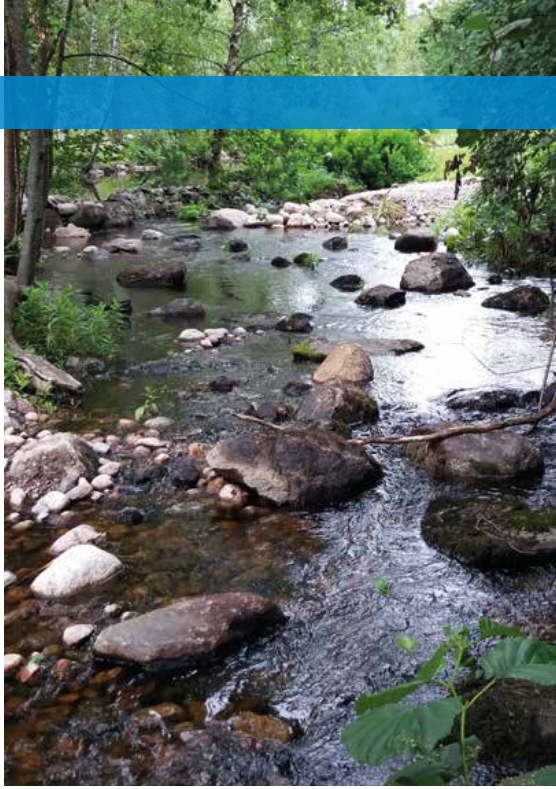
There were no major changes in water consumption during the year. The specific consumption figure includes water consumed by residents and the industry as well as loss caused by leakage. The figures for Lahti include Nastola and the figures for Hollola include Hämeenkoski.

Monitoring indicators	2013	2014	2015	2016	2017
Water consumption (litres / resident / day)					
Lahti, specific consumption	*184*	*183*	*179*	*187*	***181***
Hollola, specific consumption	*113*	*110*	*102*	*120*	***120***
Nastola, specific consumption	*211*	*211*	*216*	-	-
Lahti, household consumption	*124*	*122*	*121*	*120*	***119***

Future plans 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 will reach the end of their lifecycle.*
- *The construction of a motorway in the groundwater reserve area, and the resulting risks with lowering groundwater surface levels (highway 12).*
- *The regional preparation and implementation of the groundwater joint monitoring program.*
- *Monitoring the impact of the new de-icing method on the chloride levels in groundwater (observation point 126 central hospital).*





Future plans and challenges:

- *Reducing the external and internal load on Lake Vesijärvi.*
- *A rehabilitation method for cutting down the internal load will be planned for the Lake Kymijärvi.*
- *Achieving the target levels outlined in the Water Framework Directive for all lakes.*
- *Decreasing the storm water load of Lahti city centre.*
- *Reducing the adverse effects caused by the excessive fluctuation of the water level of the lakes in the former Nastola area.*

5 Water quality, recreation and nature-related values

Lahti Environmental Services continued the maintenance of the Lake Vesijärvi and other small lakes as a part of the Vesijärvi program devised together with the Vesijärvi Foundation. Lahti Environmental Services was responsible e.g. for the management of fish stocks and oxygenation of Lake Vesijärvi and Lake Kymijärvi, water sampling in lakes and ditches, and the maintenance of ten automatic water quality monitoring stations. The fishing catch from Lake Vesijärvi and Lake Kymijärvi was total 140 tons, of which up to 65 tons could be utilized. Breams were delivered especially for raw material of fish steaks and roaches for preservatives. The River Caretaker project included repairs to the River Seestanjoki, improving the flow of its waters, as well as the introduction of a trout population to the river. A protective wetland area covering over two hectares was established in the Lake Sylvöjärvi delta. A preliminary report concerning the adjustment of lake water surface levels in the Nastola area was completed. During 2017, various reports were prepared relating to the condition of water bodies, to the environmental strain they bear as well as their populations of fish and other animals. Populations of eel and trout were introduced to Lake Vesijärvi, while pikeperch were introduced to the Lake Joutjärvi.

The implementation of storm water management is quided by the city's storm water programme, and the application is governed by the Stormwater working group. Actions in stormwater project were implemented in Ranta-Kartano and Western Hennala areas. The project is funded by Ministry of Environment and it is a spearhead project of government programme in water and marine management.

In addition, an AIKO funding was applied and granted for the Hule Smart&Clean project coordinated by the City of Lahti, aiming to develop new ways of storm water quality management together with different cities, businesses and universities. Storm water quality is constantly monitored at two automatic monitoring stations in the Lake Vesijärvi area. Monitoring samples are also taken in the Lake Kymijärvi area and in Western Hennala, and a total of 55 samples were taken in 2017.

Monitoring indicators	Base year	2013	2014	2015	2016	2017
Lake water chlorophyll a, measured in August (µg/L)						
Vesijärvi, Lankiluoto in Enonselkä basin	*1995: 10*	*16*	*8.7*	*10*	*12*	***12***
Hollola, Lake Arkionmaanjärvi		*5.7*	*4.6*	*3.2*	*5.0*	***4.9***
Nastola, Lake Salajärvi		*14.0*	*9.5*	*8.1*	*8.9*	***8.4***
Lake water transparency measured in August (m)						
Vesijärvi, Enonselkä basin	*2001: 1,9*	*1.8*	*1.7*	*2.0*	*2.0*	***2.5***
Alasenjärvi lake		*2.0*	*3.0*	*-*	*4.0*	***3***
Hollola, Arkionmaanjärvi lake		*1.8*	*2.0*	*-*	*2.5*	***2.3***
Nastola, Lake Salajärvi		*2.0*	*1.8*	*-*	*1.0*	***1.6***
Vesijärvi management fishing catch (tonnes/year)	*2001: 86*	*159*	*140*	*113*	*108*	***121***
Kymijärvi power plant's heating load into Lake Vesijärvi (TJ)	*1995: 722*	*1293*	*877*	*600*	*519*	***278***
Percentage of lakes in good or excellent condition (% of total surface area)			*11*	*11*	*11*	***11***

6 Environmental counselling and opportunities for participation

The year 2017 saw collaborative planning on various areas undergoing changes. The collaborative planning events held were multidisciplinary and organized in cooperation between various parties. Participation was supported by online communication, employing map surveys, the Porukka mobile application, social networking services and a blog. There was plenty of interaction relating to the objectives stated in the strategic mobility plan and the strategic Master plan: these objectives included in the Lahti's Direction project were prepared based on a review of the current situation using different scenarios in large-scale cooperation with various participants. The objectives for a sustainable physical urban environment and movement were drawn up as a single whole with shared success indicators. The City Council approved the stated objectives in January 2018.

A total of 27 events for land use planning were held in 2017. A visible and a highly successful example of such planning in 2017 was the Rakokivi shopping center area. In November, a collaborative planning event was organized together with the New City Collective of young architects. During the New Rakokivi event, over 250 residents of Nastola came in to contribute to the planning of the area's future. As a result, a planning idea for the Rakokivi square and its surrounding area was brought up.

The construction of the southern ring road affects the Kerinkallio woodland area. To protect the woodland areas and to compensate for changes to the environment, the area was surveyed together with the local residents. People could contribute to the planning during the experience walk organized in the Kerinkallio area and with a map survey. Another relevant theme for 2017 was reviewing the service network for playgrounds. Families with children and people working with children had the opportunity to share their valuable views with a map survey. Playground experts were not forgotten either, and the children's perspective was brought into the planning by photographing the playgrounds together with the children and by interviewing them.

PHJ and the Lahti Environmental Development unit jointly organized waste management counselling in 2017. Composting courses were also organized in Spring 2017 together with the 4H organization. The Consumer Energy Consultation project offered energy consumption counselling in Päijät-Häme.

Environmental education work was continued in schools and kindergartens, and particular focus was given to making use of the geological sites close to kindergartens in the children's games and play. Approximately 11,000 people were reached by the environmental counselling events in 2017.

Monitoring indicators	Vertailuvuosi	2013	2014	2015	2016	2017
Number of environmental counselling events for residents	*2001: 53*	*178*	*179*	*102*	*100*	***101***
Number of environmental counselling events for children			*136*	*117*	*158*	***207***
Number of children reached by the Environmental Counselling Centre	*2001: 2 750*	*2,652*	*3,602*	*3,197*	*4,660*	***4,823***
Number of events for residents related to the planning of land use	*2000: 49*	*15*	*20*	*21*	*24*	***27***
Satisfaction rate in resident questionnaires, Technical Services (%)	*2001: 70*	*69*	*71*	*71*	*69*	***70***

Future plans and challenges:

- *Increasing the environmental competence and responsibility of both residents and the municipalities.*
- *New methods for involvement.*
- *Open data and the opportunities it provides.*
- *Promoting the activity of residents.*


VÄHENNÄN PUNAISEN
LIHAN KÄYTTÖÄNI
ENTISESTÄÄN - ETENKIN
ULKOMAISEN
#ILMASTOLUPAUS #EARTHHOUR
#LAHTI #LAHELT

7 Municipalities and group companies promote environmental responsibility throughout the region

2017 was an unusual year for the Lahti Procurement services, as the Social and Welfare services were entered into the Consolidated Welfare Municipalities, together with all but two employees in procurement. This was challenging e.g. for follow-up. The environmental criteria practices vary by sector and procurement type.

The procurement of the City of Lahti's recycled asphalt was awarded the Innovative Procurement Award in 2017. Another great example is the Lahti Premises department, which frequently use environmental criteria as a basis for scoring in procurement. Product category-specific environmental guidance concerning

Monitoring indicators	2013	2014	2015	2016*	2017
Environmental aspects addressed in tenders organized by procurement services, %	*38*	*98.5*	*98.3*	*70.0*	***no data received***

** Calculation method changed from previous years*

product procurement is provided through the Procurement services extranet.

The Päijät-Häme Catering Services promoted sustainable development: The demand for environmentally friendly choices has been increased by offering more vegetables to the clients. With the Taste Alphabet diploma, more vegetables have been offered to children in kindergartens. Similarly, the School Meal diploma has focused on the plate model and on increasing the amount of vegetables served as part of school meals. Schools offer a vegetarian meal option every day, and it has increased in popularity relative to the number of children eating a school lunch. During the week of All Saints' Day 2017, vegetable tasters and taste recognition competitions were arranged.

Changes in higher education and research of environmental issues

Student intake in higher education institutions and degree requirements have changed, and there no longer is a number of students admitted specifically in Lahti.

Regional group of environmental experts have been operating actively from beginning of 2017. The group includes experts from the University of Helsinki, Lappeenranta University of Technology, Lahti University of Applied Sciences, City of Lahti and Lahti Region development (LADEC). The group promotes Lahti's objectives in acquiring circular economy references for the city, and for Lahti to develop into a circular economy city.

The merging of Lahti University of Applied Sciences and Lappeenranta University of Technology was prepared and decided on in 2017, and the merge was realized in 2018.

Lappeenranta University of Technology made new proposals for teaching in Lahti: four Masters' programs were planned in 2017, one of which was a graduate engineering program in circular economy. Teaching for the new programs commences in Fall 2018. The focal areas of LUT Lahti's research include innovation research, entrepreneurship research, research related to performance management and sustainability research. LUT is also involved in the CitiCAP project launched in 2017, which aims to encourage residents to move more sustainably, reduce traffic emissions, compile and share digital resources on transportation as well as develop new transportation services for the residents.

Lahti University of Applied Sciences focuses on circular economy solutions, among other areas of research. Lahti University of Applied Sciences also is part of the CitiCAP project.

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. The circular economy has become a highly relevant theme. Related training is included in the BSc degree program in environmental science as well as in various MSc programs, primarily those in environmental change and global sustainability.

Environmental maintenance training at the ***Education Centre Salpaus*** focuses on the maintenance,

repair and condition assessment of various types of urban environments. Students can choose between pathways on repair operations, waste management, water maintenance operations or environmental communication and counselling. The Asikkala facility at Salpaus has been awarded a sustainable development certificate. The renewal audit for the certificate was approved in 2017 for the next three years. Focusing on environmental training, a sustainable development workgroup has been created, deciding on sustainable development actions to be taken in accordance with the certificate. Indicators include e.g. electricity and water consumption as well as the volume of biowaste produced. These issues are brought up in the training.

The new build project (7,900 m^2) by the consolidated municipality of Salpaus on Vipusenkatu has received Green Municipal Funding. The project has taken into account the new build's energy efficiency and green values. The site has a geothermal heating system, the rest of the energy required will be produced by solar panels and peak consumption covered by district heating. The structural planning has implemented insulation that improves energy efficiency and provides insulation results that exceed the minimum requirements. The build's technology and technical facilities are used as a learning environment for environmentally friendly technology in the Education Centre Salpaus' heating, plumbing, air conditioning and automation training.

LUMA activities

The Päijät-Häme LUMA center operating on the University of Lahti campus implemented Science Up Your Summer camps for elementary school students in Lahti and Riihimäki in Summer 2017. Together with the Lahti University of Applied Sciences, a Mobile Coding camp was organized for 10 to 16-year-olds in Lahti. The Päijät-Häme LUMA center also participated in organizing e.g. the Science2 upper secondary school course focusing on water system preservation together with Lahti upper secondary education, the Lahti Region Development LADEC and upper secondary schools in St Petersburg. In Fall 2017, LUMA activities received their own facilities, as the science classroom SOLU, consisting of a laboratory and a rec room, was completed on the Niemi campus. All the club and camp activities are now centered there.

The StarT project supporting phenomenological and multidisciplinary learning was also implemented in Päijät-Häme. StarT project works created by learning teams were presented and the best were awarded in April at the Kanta-Häme and Päijät-Häme joint regional festival at the Lahti Sibeliustalo. The City of Lahti was awarded as Finland's most active StarT municipality in 2017. The training events Mathematics of the Origami and Astronomy in Teaching Mathematics supported the professional development of teachers.

Cleantech sector

Lahti features an active cleantech cluster. Cleantech covers water management and wastewater processing, waste management and recycling, renewable energy, energy efficiency, clean processes, materials and products, consultation and counselling as well as green construction. In 2015, the clean technology sector employed approximately 4,900 people and had a total revenue of EUR 1.58 billion. An innovation developed in Lahti in 2006, the Cleantech Venture Day bringing together investors and cleantech businesses was held again in 2017. This time the event took place in London, in collaboration with Cambridge Cleantech. The investment event was a success and had participants from all over the world. In 2018 the event will return to Lahti.

Future plans and challenges:

- *Implementation of the strategic procurement program.*
- *Raising corporate environmental awareness and working for the climate.*
- *Improving business opportunities for the cleantech sector in Lahti, prominent references and internationalization.*
- *Municipal co-operation without a common organization for environmental protection.*

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

The financial statements of the City of Lahti for 2017 include a compilation of environmental indicators of the City and the City Corporate Group's area. Data has been collected from all service sectors and functional balance sheet units for this environmental balance sheet. The City Corporate Group calculation includes among others Lahti Aqua Ltd, Lahti Energy Group, Päijät-Häme Waste Management Ltd and Lahden Talot Ltd. Environmental expenses for the entire City Group amounted to EUR 39.2 million, and environmental income to EUR 32.7 million.

Environmental expenses refer to expenses incurred with the primary intention of promoting nature conservation, preventing, minimizing or compensating for environmental impact, or promoting the sustainable use of nature resources. In addition to the sections featured here, the City of Lahti Financial Statement document includes reports of various units' environmental actions and investments.

Out of the environmental expenses for the city organization, the most notable were those incurred by various environmental authorities' activities as well as expenses incurred by various activities promoting nature conservation. The most notable income was produced by various projects and permit and other fees collected by the authorities.

Environmental investments

Lahti Group invested a total of EUR 14.3 million in the environment in 2017. The table below summarizes the environmental indicators in the financial statements for 2017 with an 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. Air and climate conservation	*116.5*	*106.7*	*31.5*	*116.5*	*5,043.7*	*3,423.5*
2. Protection of waters and wastewater treatment	*176.0*	*610.2*		*14,373.8*	*9,631.9*	*6,472.5*
3. Waste management and litter prevention		*634.3*		*17,833.0*	*21,183.6*	*777.0*
4. Soil and groundwater protection		*59.6*	*1,566.0*		*221.6*	*2,440.0*
5. Noise and vibration abatement		*15.5*	*142.9*		*21.5*	*145.4*
6. Nature and landscape conservation		*53.0*			*53.0*	
7. Administrative functions relating to environmental protection	*328.9*	*997.5*		*328.9*	*997.5*	
8. Promotion of environmental protection	*15.7*	*152.5*		*15.7*	*225.2*	*1,041.0*
9. Environmental taxes and levies		*1035.6*			*1 809.1*	
TOTAL	***637.1***	***3,664.9***	***1,740.3***	***31,388.8***	***39,187.0***	***14,299.3***
Interest costs					*189.0*	
Environmental provisions					*-803.0*	
Change in environmental provisions (addition -, reversal +)					*-803.0*	
Contingent environmental debt (estimated cost)						

Note: the classification does not correspond to the sections in this review.

Further information

Group Administration
Askonkatu 2, 15100 Lahti

Saara Vauramo, Environmental Director, saara.vauramo@lahti.fi
Editor: Eira Rosberg, Sustainable Development Coordinator, eira.rosberg-airaksinen@lahti.fi, +358 (0)44 4163499

www.lahti.fi

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