5. Ambient air quality

5A. Present Situation

Please complete the following table providing the most recent data that is available:

Indicator		Unit	Year of data
Max Number of days per year on which EU target value for ozone was exceeded (8h mean);	1	Days	2014
Number of ozone monitoring stations	3	No of monitoring stations	2014
Max Number of days per year on which EU target value for PM_{10} was exceeded (8h mean);	4	Days	2014
Number of PM_{10} monitoring stations	3	No of monitoring stations	2014
PM_{10} - Max concentration recorded	24 h – 75 1 h – 259.7	ug/m3	2014
Number of NO_2 monitoring stations	3	No of monitoring stations	2014
NO_2 - Max concentration recorded	24 h – 68.8 1 h – 132.4	ug/m3	2014
NO_2 - Annual Average concentration	City Centre – 19.4 Northern Tallinn – 13.5 Õismäe – 11.2	ug/m3	2014
Number of $PM_{2.5}$monitoring stations	1	No of monitoring stations	2014
$PM_{2.5}$- Max concentration recorded	24 h – 30.7 1 h – 71.1	ug/m3	2014
$PM_{2.5}$- Annual Average concentration	8.4	ug/m3	2014

Source: Tallinn Environment Department

Describe the present situation in relation to ambient air quality, including any relevant disadvantages or constraints resulting from historical, geographical and/or socio-economic factors which may have influenced this indicator area. Topographical constraints, the use of green areas to improve air quality and risk reduction for the urban heat island effect should also be mentioned where relevant. Where available, information/data should be provided from previous years (5 – 10) to show trends.

Make reference, providing data in the table above, to:

1. Number of days per year on which EU target value for ozone was exceeded (8h mean);
2. Number of days per year on which EU limit values were exceeded for PM_{10} (daily mean);
3. Number of hours per year on which EU limit values were exceeded for hourly NO_2 (hourly mean)
4. Annual mean concentration of NO_2, PM_{10} and $PM_{2.5}$;
5. Assess the contribution from local sources and from long-range transport for annual mean concentration of NO_2, PM_{10} and $PM_{2.5}$.

(max. 1,000 words & 5 graphics, images or tables)

The ambient air quality of Tallinn reflects the major social changes that have occurred in the city's recent history. On the one hand, the economy was restructured after Estonia regained its independence in 1991, which led to the closure of polluting industrial companies and a decrease in emissions from point sources of pollution. However, the number of cars increased, which led to an increase in air pollution generated by traffic. The number of cars more than doubled in Estonia from 1990-2009: there were 241 cars per thousand people in Estonia in 1990, but by 2008 this figure had risen to 546.

The increase in the number of cars and transit on railways and roads increased until 2008, when the decline and stabilisation caused by the recession arrived. The recession gave Tallinn better levers for diverting activities that cause noise and spoil the quality of ambient air from the city. The storage, handling and manoeuvring of oil products and other container goods at Kopli railway station ended in 2008. Since then, these activities are carried out at the Ülemiste cargo station in the outskirts of the city. The transit of cargo trains though Tallinn, and the transport of goods via ports and the city centre, also decreased.

At present, **Tallinn is among the European capitals with the cleanest ambient air**. According to the study of the World Health Organization (WHO) published in 2014, it is **one of 500 cities with the cleanest air in the world**.

As Tallinn is a maritime city, the good circulation of air generally prevents the emergence of extremely high concentrations of pollutants. The vicinity of the Gulf of Finland affects the direction of the wind in Tallinn and its daily variation, and helps to disperse pollution. Air quality in Tallinn may temporarily deteriorate due to a phenomenon known as temperature inversion when it coincides with the heating period in winter or the period of little rainfall after the snow melts in spring.

Tallinn has few topographic peculiarities that influence the spread of air pollution. Higher parts of the city – Nõmme, Lasnamäe and Toompea (the maximum difference in altitudes in Tallinn being 50-60 m) – have a minor impact on the dispersion of pollutants. The shape of Tallinn is very important in terms of traffic flows and the pollution generated by traffic. Since Tallinn is squeezed between the Gulf of Finland and Lake Ülemiste, most of the transport in the city passes through a narrow section and the options for diverting traffic in the case of high pollution levels are very limited.

Measurements are carried out at three automated **monitoring stations** in Tallinn within the scope of the national air surveillance programme. The stations are located in different parts of the city and their data can be monitored in real time online. The City Centre Monitoring Station was established to characterise typical city-centre pollution caused by transport, while the Kopli Monitoring Station characterises the air quality of an industrial and local heat supply area and the Õismäe Monitoring Station monitors the quality of ambient air in a residential area and the overall exposure of the population to pollution by being a background station in an urban environment (Figure 1).

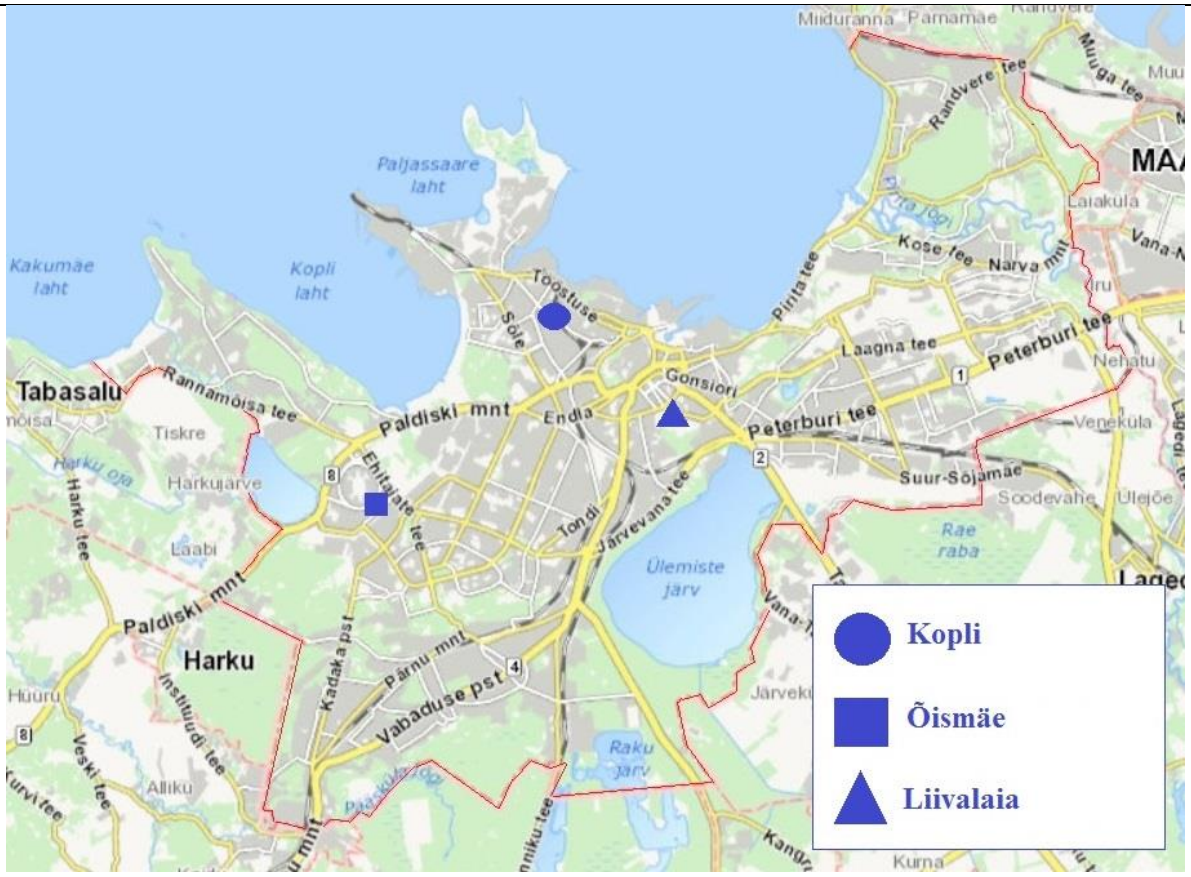

Figure 1. Location of air monitoring stations in Tallinn

The air pollution index and the hourly average concentrations of NO_2 and SO_2 particles modelled on the basis of the meteorological data of Tallinn for the last hour can be observed for each day in the same regions. The annual report of air quality surveillance is available on the website of the national environmental monitoring programme.

In addition to national surveillance, the ambient air pollution level is also modelled and air quality is monitored in companies whose activities generate pollutant emissions that exceed limit values and that therefore require ambient air pollution permits. There are 492 such companies in Tallinn and they are monitored by the Environmental Board of the state.

When an increase in air pollution can be forecast with a planned new activity (when larger developments, e.g. shopping centres, are planned), Tallinn City Government requires pollution level modelling within the scope of plans, environmental impact assessments and strategic environmental impact assessments.

The **large green urban areas** and diverse greenery of Tallinn help to bind fine dust and maintain the quality of ambient air. **Green urban areas comprise almost a quarter (25%, *ca* 4000 ha) of the territory of Tallinn**. Three-quarters of the area of green urban areas consist of **forest** (3121.44 ha). There are **three national landscape protection areas** and **two special conservation areas, one local conservation area** and 61 parks and other smaller green urban areas in Tallinn. The zone of parks around the Old Town (30 ha), which is over 150 years old, helps to bind air pollution in the city centre.

The main pollutants in Tallinn are the fine particles PM_{10} and $PM_{2,5}$, ozone, NO_x, SO_2 and CO. **The level of air quality in Tallinn has improved considerably over the years and pollution levels constantly**

remain below the standards established by the European Union (Tables 1 and 2).

The number of cases in which ozone and PM_{10} concentrations have been exceeded in Tallinn has decreased tenfold in the last 10 years (Table 1). The annual mean concentrations of pollutants (O_3, PM_{10}, NO_2) have always been lower than the limit values in the last 10 years, often as much as 2-4 times lower (Table 2).

The limit values of SO_2 and CO have not been exceeded one single time in Tallinn in the last 10 years.

Table 1. Cases where pollutant concentrations were exceeded in Tallinn by year

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Average limit value for 8 hours 120 µg/m^3										
O_3	31	31	0	2	25	28	6	0	0	1
Average limit value for 24 hours 50 µg/m^3										
PM_{10}	61	89	85	44	11	11	5	1	5	4
Average limit value for 1 hour 200 µg/m^3										
NO_2	0	0	1	0	0	0	0	0	0	0

Table 2. Annual mean pollutant concentrations (µg/m^3) in Tallinn

	Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
the annual mean limit value is 40 µg/m^3											
PM_{10}	**City centre**	35	32.5	34.3	25.5	19.1	17.8	15.7	14.4	17.5	16.9
	Õismäe	20	22.5	20.7	11.1	13.3	11.5	10.6	12	13.2	14.5
	Kopli	23	25.7	29.4	18.3	19.9	14.2	12.3	10.8	11.7	13.2
the annual mean limit value is 40 µg/m^3											
NO_2	**City centre**	29.6	31.4	32.4	25.9	21.1	22.4	20.9	21.5	22.9	19.4
	Õismäe	11.9	12.8	11.4	10.1	10	13	11	11.2	11.7	11.2
	Kopli	36.9	22.1	19.2	15.4	13.1	16	14.9	14.7	15.1	13.5
the annual mean limit value is 25 µg/m^3											
$PM_{2,5}$	**Õismäe**		11.6	10.9	5.7	4.9	6.36	6.62	7.4	8.2	8.3
no annual mean limit value has been established											
SO_2	**City centre**	1.53	2.4	1.4	1	1.3	1.33	1.22	1.2	1.3	1.2
	Õismäe	1.86	2.3	1.4	0.91	1.1	0.78	1.07	1	0.9	1.03
	Kopli	3.4	2.8	2.2	1.7	1.5	1.51	1.17	0.98	0.9	0.98
no annual mean limit value has been established											
CO	**City centre**	0.47	0.4	0.4	0.3	0.26	0.28	0.26	0.23	0.28	0.2
	Õismäe	0.26	0.3	0.2	0.21	0.21	0.24	0.22	0.2	0.22	0.21
	Kopli	0.28	0.3	0.3	0.23	0.22	0.27	0.26	0.23	0.26	0.23

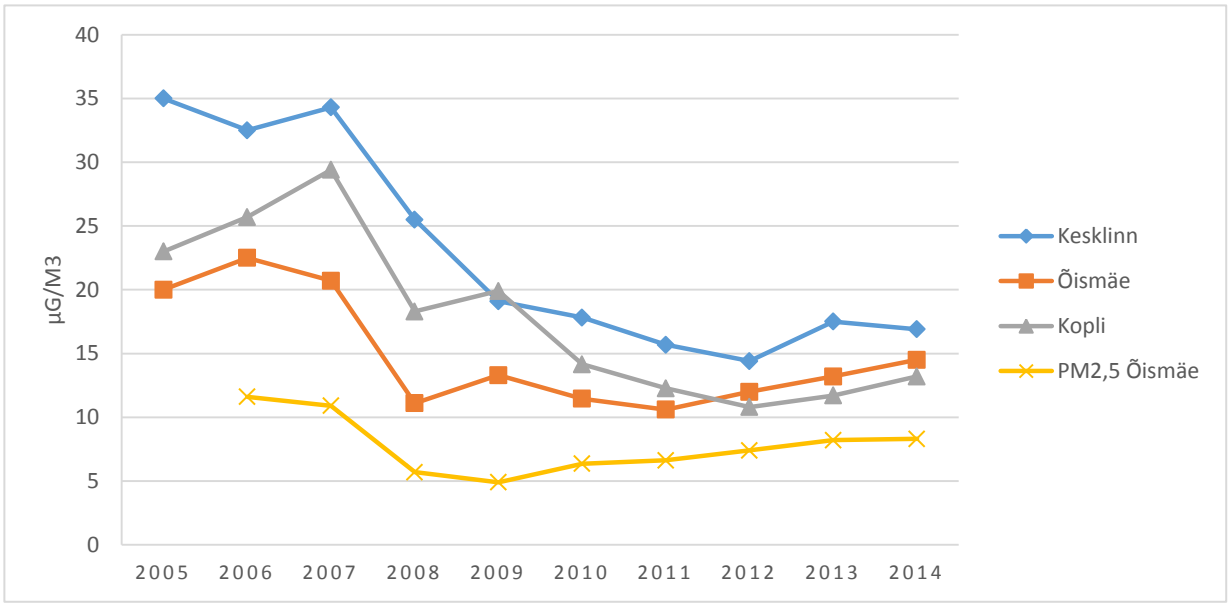

Figure 2. The annual mean concentrations of PM_{10} and $PM_{2,5}$ in the permanent ambient air monitoring stations in Tallinn

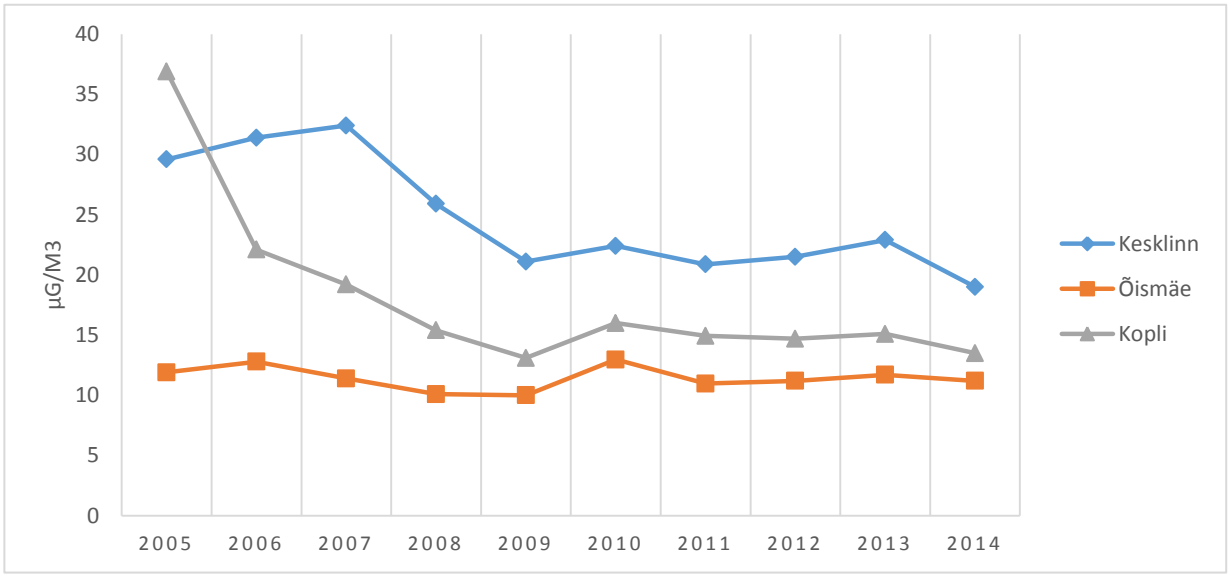

Figure 3. The annual mean concentrations of NO_2 in the permanent ambient air monitoring stations in Tallinn

Cases where the limit values of the fine dust **PM_{10}** have been exceeded have been decreasing constantly since 2007. Several factors contributed to the limit values being exceeded 10 years ago: the larger number of vehicles, incl. heavy goods vehicles in the city centre; extensive grass-fires in spring; smoke from forest fires that spread to the city; the lower quality of street cleaning and activities of cargo ports and rail transport.

Currently the main sources of PM_{10} pollution in Tallinn, starting from the most important, are the following:

- PM_{10} emissions from traffic (exhaust fumes, wear of road surface);

- PM_{10} resuspension caused by de-icing in winter and road erosion;
- PM_{10} from point sources of pollution;
- use of solid fuel (mostly firewood) in households;
- transmission of PM_{10} from rural areas to the city; and
- secondary $PM_{2.5}$ and PM_{10} particles formed by combinations of other pollutants.

PM_{10} levels have been relatively stable in recent years. Limits have mostly been exceeded at the City Centre Monitoring Station, where a significant proportion of pollution is traffic-induced.

As the emergence of **ozone** is caused by the photochemical reaction between nitrogen oxides and hydrocarbons, the emergence of ozone in Tallinn is very uneven and depends on the weather and the number of cars. Ozone concentration level is lower in the case of a higher level of NO_x induced by vehicle emissions. This means that the larger number of cars in the city can be considered one of the factors causing the decrease in ozone concentrations and also the decrease in the number of cases where the limit value was exceeded in Tallinn (Table 1).

The limit of **nitrogen dioxide** has only been exceeded once, in 2007. Nitrogen dioxides usually come from vehicle emissions. This is indicated by their higher content in air during rush hour. Due to the higher traffic volume, the concentration of nitrogen is higher at the City Centre Monitoring Station.

The state has established strict sulphur content standards for liquid fuels, which is why **SO_2** concentrations are considerably lower than the limit values.

The **Action Plan for Improving Ambient Air Quality in Tallinn Conurbation** was completed in 2010. Its goal was to improve the quality of ambient air in Tallinn, as the pollution level had exceeded the established limit values in previous years. The Tallinn conurbation action plan examined the possible origins of PM_{10} and other particle fractions, previous monitoring results and the long- and short-term measures implemented upon the emergence of raised PM_{10} levels for the reduction of PM_{10} and other particle fractions.

Tallinn City Government has commissioned various studies for the assessment of the chemical composition of the pollutant particles in ambient air and the proportions of sources of pollution, which can also be found on the city's website. For the most recent study, nine episodes of higher pollution levels which lasted from one to four days were selected from the first half of 2013. As a result of the study, it was found that one-third of the cases involved long-range transport of air pollution and two-thirds were of local origin caused by particles generated by burning processes (predominantly traffic and household heating). There are no accurate data about long-range transport of pollution in Tallinn from the earlier years.

5B. Past Performance

Describe the plans and measures implemented over the last five to ten years for the improvement of ambient air quality. Comment on which measures have been most effective.

Particular reference should be given to:

1. Existence and implementation status of an air quality management plan;
2. Local measures taken to improve air quality and quantify their effect on air quality;
3. Information to the public (both inhabitants and tourists) on air quality levels (e.g. web pages, information screens) in order to increase public awareness and behavioural change.

(max. 800 words & 5 graphics, images or tables)

The significant improvement in ambient air quality indicators in Tallinn in the last 10 years is a result of the positive confluence of several actions.

The **Action Plan for Improving Ambient Air Quality in Tallinn Conurbation** was completed in 2010. Its goal was to improve the ambient air quality, as the level of pollution in Tallinn had exceeded the limit values established 10 years previously. Reduction in the number of cars in Tallinn (especially in the city centre) started according to the action plan via the creation of better conditions for the use of public transport and bicycles.

Public transport on the city's buses, trolleybuses and trams has been free of charge for residents of Tallinn since the beginning of 2013. The number of passengers increased by 6% in 2013 in comparison to 2012 following the introduction of free public transport. Registered residents of Tallinn have also been able to use trains free of charge within the borders of the city since October 2013.

A **joint travel card ticket system** that uses contactless chip cards was also introduced when free public transport was implemented. All public transport vehicles were equipped with ticket validators and the central software that manages the system was created, and the information it stores is used for the optimisation of the route network. The new ticket system is compatible with the ticket systems of neighbouring municipalities and towns and with the Tallinn Card aimed at tourists.

Separate lanes were gradually created for **public transport** on all of the main roads leading in and out of the centre of Tallinn from 2004 onwards (Table 1, Figure 1) in order to make public transport as fast as possible, especially during rush hour, and that in turn also reduced air pollution.

Table 1. Length of public transport lanes in Tallinn

Year	2004	2006	2007	2012	2013	2014
Total length (km)	4.45	5.24	17.40	26.10	27.60	28.60

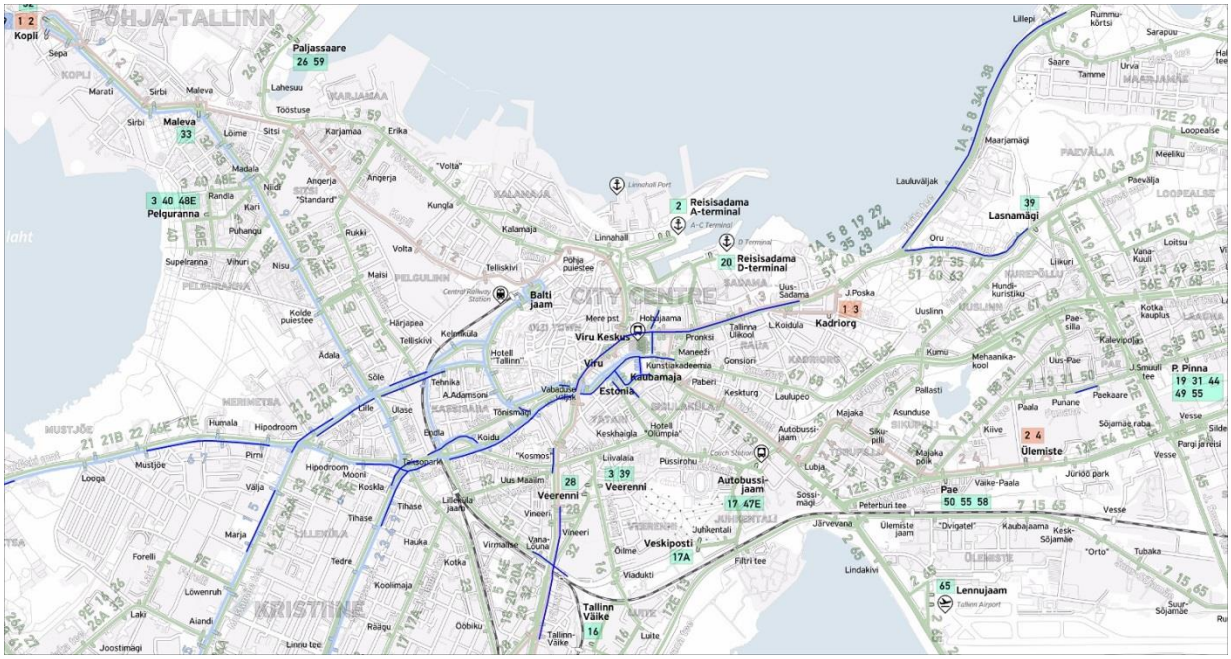

Figure 1. Public transport lanes in Tallinn in 2015

Since 2007 Tallinn has been running morning **school buses** in cooperation with neighbouring municipalities to reduce the need for parents to drive their children living in neighbouring municipalities to schools in Tallinn (mostly the city centre). The school bus is available on several routes in both the easterly and westerly directions and 200 students on average use the service every school day. The school bus has helped reduce traffic jams and air pollution on the borders of the city and in the city centre zones.

Paid parking with three parking zones has been established in the city centre in order to limit the number of cars and the air pollution they cause. The inner city paid parking area has been constantly expanded (Table 2). In summer, people who park near Pirita beach must also pay. Also, the movement of cars in most of the Old Town has been restricted and some areas are totally car-free.

Table 2. Area of parking zones, km^2

	2003	2007	2014
Old Town 24 h	0.92	0.97	0.97
Inner city	0.71	0.82	1.16 (24 h)
City centre	1.69	5.66	5.32

The **Maintenance Rules of Tallinn City**, which were established in 2006 in order to guarantee cleanliness and high maintenance quality in the city, are one of the most important regulations in terms of improving ambient air quality in Tallinn. Burning waste, incl. gardening waste, in the city is prohibited according to these rules. People who wish to make a bonfire need to request a bonfire permit from the city government.

However, rules could not have had the desired impact without supervision. In 2003, Tallinn City Government established the **Municipal Police Department,** which supervises compliance with the rules adopted by Tallinn City Council and conducts misdemeanour proceedings if such rules are breached. The **Tallinn helpline** 1345 has been operating since 2001, which people can call when city management problems (issues related to electricity, water and sewerage, heating systems, public order, road and street maintenance and utilities) need to be resolved. Active supervision by the Municipal Police and the helpline have clearly helped to reduce the number of illegal bonfires and grassfires, contributing to the lower concentration of pollutants in ambient air.

Tallinn has also **advanced its road cleaning equipment and methods** in order to improve ambient air quality by reducing the quantity of dust on the streets. Tallinn has also set **increasingly stricter quality requirements for its contractual partners** that clean the streets of the city. The companies are required to use **modern cleaning equipment**, incl. suction sweepers and pressure washers. The quality of machines has also improved – machines had to comply with EURO 3 requirements in 2007, but in 2015 they have to comply with EURO 4 requirements. Dry collection of sweepings is used in snow-free periods in winter, as this enables more street dust to be collected.

Figure 2. The continuous development of district heating regions in Tallinn and the use of more efficient cleaning equipment in heating stations has reduced the quantities of carbon dioxide and sulphur dioxide emitted into the air over the years

Tallinn has also established a **parking discount for electric vehicles** that do not pollute the air. Parking is free for vehicles whose CO_2 emissions are zero grams per kilometre. The state and the city have also established 28 **electric car charging points** in Tallinn. Also, 32 **electric taxis** have been offering their services in Tallinn since 2014, and the short-term rental of electric cars has been successfully launched.

Tallinn has actively **renewed its bus fleet**. Tallinn has 466 buses at present, including 85 EEV buses, 26 EURO 6 buses and 7 CNG buses. Tallinn will acquire another 20 EURO 6 and 24 hybrid buses by the end of 2015. Tallinna Linnatranspordi AS has tested the suitability of electric buses and hybrid buses for traffic in Tallinn from 2014-2015.

Tallinn has 70 trams and 85 trolleybuses running on electricity. The share of vehicles with low emissions is 40%.

20 new trams will be bought from 2015-2016 (Figure 3, Section 5C), which will be preceded by the renovation of tram tracks on routes 3 and 4, and the tram line will be extended to Ülemiste railway station in 2015. This will encourage people to use more public transport and will reduce noise and air pollution.

Tallinn has also made **cycling** more convenient. **256.2 km of bikeways** (for cycling and walking) have been established or marked in Tallinn since 1998. Two free guarded bicycle parks are open in the Old Town during the summer season (1 May to 22 September). Tallinn City Government has also installed 96 bicycle holders in various places in the city centre.

Figure 3. An environmental information screen has been set up in the city centre to inform people about the status of ambient air, which shows the changing PM_{10} content as well as the most recent noise map of Tallinn

Tallinn has organised several **campaigns to promote** public transport, cycling and walking, several of which have become regular and increasingly popular among residents. The city has been organising the international Car Free Day since 2000, and since 2005 it has also been organising Car Free Week as a campaign event. The campaign has grown since 2012 to last for the entire month of September. It is known as Environmentally Friendly Mobility Month and consists of dozens of different events related to mobility and health. It promotes the use of environmentally friendly vehicles with low CO_2 emissions and explains the advantages of environmentally friendly modes of travel.

Tallinn City Government has also given considerable attention to **raising awareness** about air quality. **Maintenance Month** is held every spring from 15 April to 15 May. Its goal is to clean the city of winter rubbish in cooperation with different departments and district administrations, to involve citizens in the maintenance of the surroundings of their homes and to raise the environmental awareness of citizens. The brochure The ABC of Public Facilities and Maintenance is distributed everywhere within the scope of Maintenance Month.

5C. Future Plans

Describe the short and long term objectives for the future, proposed plans and the proposed approach and measures for their achievement. Quantify the effects of proposed measures on air quality.

Emphasise to what extent plans are supported by commitments, budget allocations, and monitoring and performance evaluation schemes.

(max. 800 words & 5 graphics, images or tables)

Tallinn Environmental Strategy to 2030 and the Tallinn Environmental Protection Action Plan 2013-2018

set out the measures for the improvement of ambient air quality in Tallinn. The goal is to guarantee compliance with the limit values established for ambient air pollution levels and to reduce CO_2 emissions by 40% by 2030 compared to 2007.

The most important measure for achieving this goal is the **reduction in the number of cars** in the city, as this will also reduce the level of noise in addition to air pollution. The **public transport lane network** is being developed further and new options for cycling are being created in order to achieve the goal. The plan is to build *ca* 40 km of new bicycle paths and footpaths in Tallinn in the coming years.

For the **development of a balanced city centre** it is planned to redesign the main street of Tallinn (the city centre section between two historical streets – Narva Road and Pärnu Road) as a street where sustainable modes of travel are preferred. The concept of the 'Main Street of Tallinn' has been prepared and, as a result of the project, the pavements on the street will be made wider, new bicycle paths and greenery will be added, the conditions of use of public transport will be improved, additional pedestrian crossings will be created and the traffic scheme on the Viru roundabout will be changed so that the historical square can be given back to pedestrians.

The establishment of a **bike sharing and car sharing schemes** is planned. The option of establishing a congestion charge for driving in the city centre will be studied and promoting the use of non-studded winter tyres instead of studded ones.

Attention will also be given to connecting public transport and bikeways with train traffic and the development of car-pooling and the parking system.

The city is preparing the **Tallinn Strategy of Bicycle Traffic**. Stage I of the strategy was completed in 2012 and mapped the existing situation of bicycle traffic in Tallinn. Preliminary studies for the identification of the proportion of bicycle traffic and bottlenecks were carried out in stage I. The terms of reference of stage II, which will focus on the future of bicycle traffic in Tallinn, have been prepared.

Figure 1. For improving the air quality Tallinn continues to expand the existing bikeway network

Tallinn is planning to create a **citywide rental bike system** in the coming years. In order to make it easy for local people and tourists to get from one place to another, the city has considered the implementation of various rental bike systems. Such a system makes it possible to use bicycles as means of transport and thereby helps to reduce the use of cars in the city.

A good example of this is the architectural contest *Velokoda* (Bike shed) organised by Tallinn City Government in 2015. The goal of the contest was to develop a model for a lockable bicycle shed suitable for areas of apartment buildings. No thought was given to bicycle storage in the apartment buildings designed in Soviet times, which means that safe storage of bicycles is either impossible or inconvenient. The installation of bicycle sheds in the city will provide residents with a convenient bicycle storage option, help to promote everyday cycling, increase the quality of the living environment and motivate people to become more active, which is good for their health.

The volume of traffic caused by commuting will also be reduced. This will be made possible by efficient management of public transport with neighbouring municipalities and the development of the **Park & Ride** (P&R) system. P&R is the system of car parks on the outskirts of the city (Figure 2), where it is easy to continue travelling to the city centre by public transport. These car parks have been up to 95% full so far. P&R is also connected to the electronic ticket system. The plan is to establish four more P&R car parks in the city from 2015-2020.

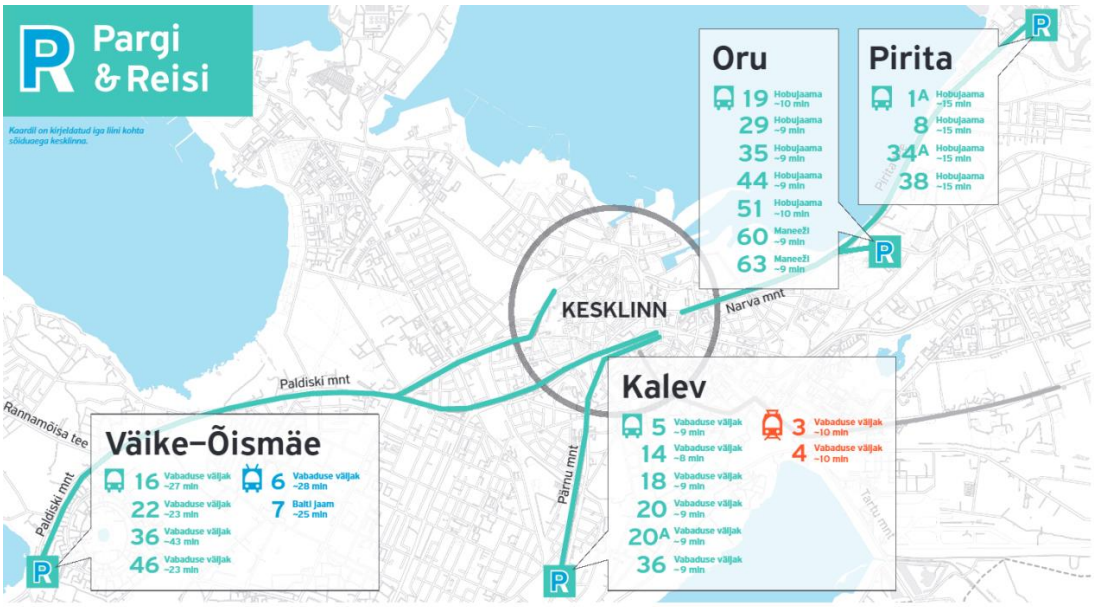

Figure 1. Park & Ride in four main directions

The major project related to **trams** will be carried out in the coming years – extension of the tram route to the Lennart Meri Tallinn Airport. In addition, two large shopping centres and the Ülemiste City office and residential area will also be connected to the tram route. The Rail Baltic railway station/public transport centre will also be built in this area. The tram line to the airport should be completed by the end of 2017.

Figure 3. One of the twenty new trams that will start driving in Tallinn in 2015 and 2016

The **number of local boiler houses** in Tallinn must be **reduced** and the use of **alternative heating solutions** must be promoted according to the Tallinn Environment Strategy to 2030. In the case of buildings that will be built outside the district heating area, people will be informed about the use of sustainable alternative heating solutions, such as heat pumps or solar panels. People are advised to use the concept of energy-efficient or passive houses when planning their homes.

In regions where stove heating still dominates, people are given **information** how to minimize air pollution. For example, a booklet about the basic truths of stove heating will be published at the end of 2015.

Several actions that concern the field of ambient air have been laid down in Tallinn Environmental Protection Action Plan 2013-2018. For example, measuring ambient air quality in different city districts every year is being planned. Pollutant reductions plans will be prepared for the most polluted regions. Sustainable solutions, such as heat pumps and solar panels, will be introduced to people. 502,000 euros has been prescribed for these actions in the action plan.

5D. References

List supporting documentation, adding links where possible. Further detail may be requested during the clarification phase. Documentation should not be forwarded at this stage.

(max. 400 words)

Action Plan for Improving Ambient Air Quality in Tallinn Conurbation – http://www.keskkonnaamet.ee/public/ohk/tallinna_linnastu_tegevuskava_20092010.pdf

Air Pollution Index in Tallinn – http://airviro.klab.ee/seire/airviro/apitallinn.html

Ambient Air Monitoring Data – http://seire.keskkonnainfo.ee/index.php?option=com_content&view=article&id=2129&Itemid=3

Assessment of Chemical Composition of Particles and Proportions of Pollution Sources in Tallinn – http://www.tallinn.ee/g13206s70462

Budget Strategy of Tallinn for 2016-2019 – https://oigusaktid.tallinn.ee/?id=3002&aktid=131353&fd=1&leht=1&q_sort=elex_akt.akt_vkp

Environmentally Friendly Mobility Month – http://www.tallinn.ee/liikumiskuu

Hourly mean concentrations of modelled fine particles, nitrogen dioxide and sulphur dioxide in Tallinn – http://airviro.klab.ee/seire/airviro/disptallinn.html

Maintenance Month – http://www.tallinn.ee/heakorrakuu/

Regulations for Public Facilities and Maintenance in Tallinn – https://oigusaktid.tallinn.ee/?id=3001&aktid=105031&fd=1&leht=5&q_sort=elex_akt.akt_vkp

Study of Origin of Fine Particles – http://www.tallinn.ee/Peente-osakeste-paritolu-uuring-2010.pdf

Tallinn Environmental Protection Development Action Plan 2013-2018 – https://oigusaktid.tallinn.ee/?id=3001&aktid=125983&fd=1&leht=1&q_sort=elex_akt.akt_vkp

Tallinn Environmental Strategy until 2030 – https://oigusaktid.tallinn.ee/?id=3001&aktid=120867&fd=1&leht=1&q_sort=elex_akt.akt_vkp

The ABC of Public Facilities and Maintenance – http://www.tallinn.ee/eng/The-ABC-of-Public-Facilities-and-Maintenance

Urban air monitoring – http://airviro.klab.ee/seire/airviro/linnaohk.html

WHO Study (2014) – http://www.who.int/entity/quantifying_ehimpacts/national/countryprofile/aap_pm_database_may2014.xls?ua=1