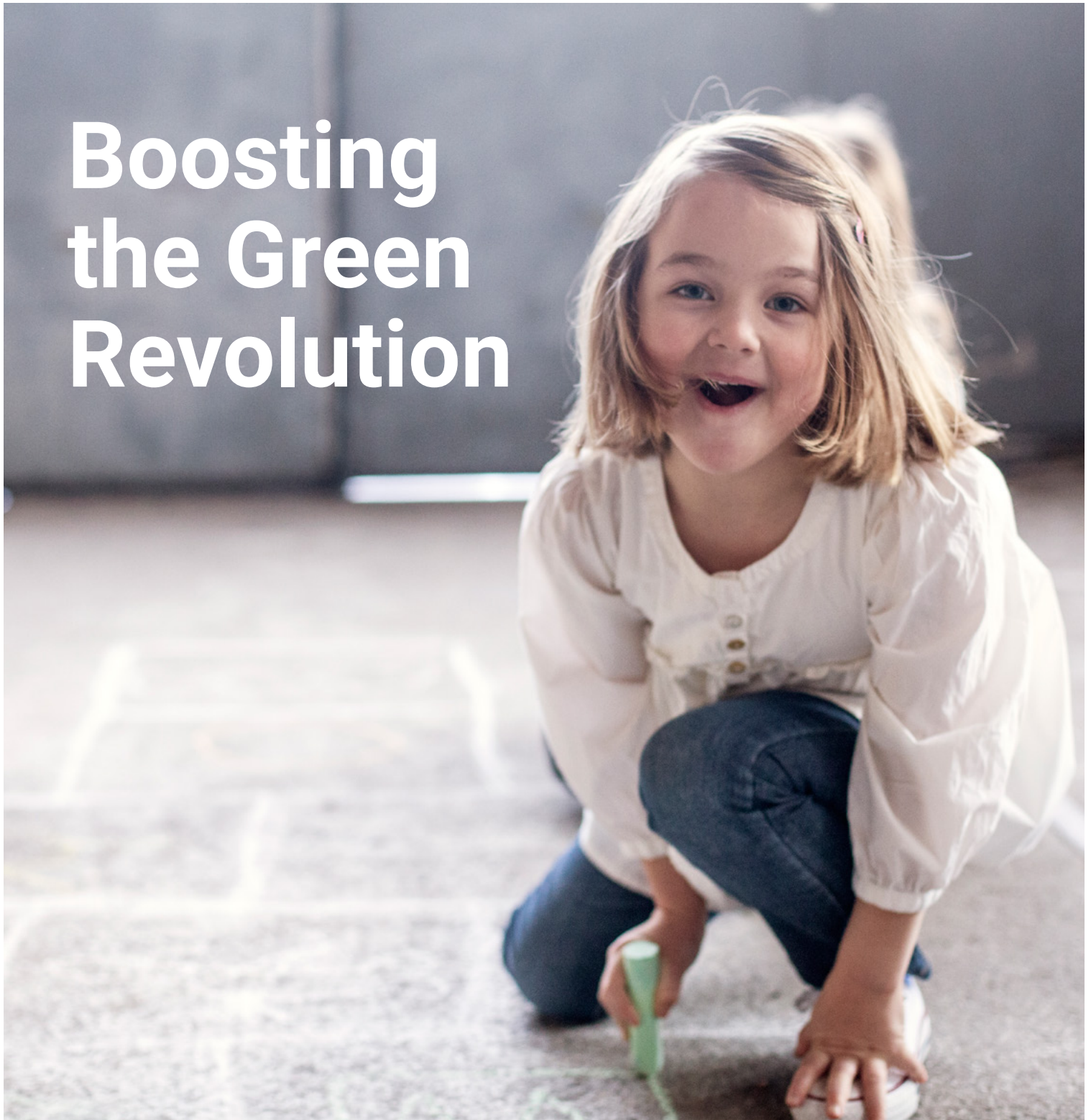


Boosting the Green Revolution



MuniFin Green Bond Report 2016



Towards a greener Finland

MuniFin started to offer Green finance to its customers in early 2016. Investments in the Finnish local government sector are large and carry significant potential to reduce greenhouse gas emissions and improve energy efficiency. As being the most important financier of this sector, MuniFin has a key role to promote and increase the awareness of environmentally friendly investments among its customers. According to the Finnish Climate Change Act from 2015, Finland is engaged to reduce greenhouse gas emission by at least 80% by 2050, compared to 1990 levels.

During the year 2016, 17 green loan and leasing applications were approved and 1 was declined. At the end of 2016 the total amount of allocated green loan and leasing agreements totaled EUR 442.5 million. The majority of eligible projects are long-term with final maturities varying between 5 to 41 years. Average maturity of the portfolio was approximately 20 years.

The total estimated direct annual CO₂ emission avoidance impact of climate mitigation projects (energy efficiency, sustainable buildings and public transportation) totals approximately 8,650 tCO₂. Annual estimated energy savings from climate mitigation projects totals approximately 35,000 MWh. This corresponds to the average annual electricity consumption of some 17,500 double room (50 m²) apartments in Finland.

MuniFin's eligible projects also have significant indirect impacts. For example, the Länsimetro rail system extension will make possible to densify land use near the metro stations. It has been studied by the Helsinki Region Environmental Services Authority that densification of urban areas can reduce approximately 330,000 tonnes of CO₂ emissions per year in the Helsinki metropolitan area.

Most of MuniFin's financing goes to socially responsible and sustainable projects, but green finance acts as a specialized tool for combatting climate change. Year 2016 was an excellent start for our new lending product and we are very proud to be the first Finnish Green Bond issuer. In March 2017, MuniFin received the Climate Bonds Initiative's Green Bond Pioneer Award for its pioneering issuance and its work for reaching the Finnish climate goals.

Our main task in 2017 is to deepen the co-operation between financial and environmental functions in the Finnish municipalities as both functions play a key role in our green finance. Our role and responsibility is to encourage our customers to take concrete steps to reach the national environmental objectives and goals.



Antti Kontio
Head of Corporate Responsibility

Selection process and the role of the Green Evaluation Team

MuniFin's Eligible projects are selected based on the Green Framework and finally approved by an external Green Evaluation Team. Every project is assessed independently and only approved if there is a high likelihood of achieving long-term positive environmental effects.

In order to attract customers to make more environmentally friendly investments, MuniFin has decided to give a margin discount for eligible projects. Discount is based on estimated ex-ante environmental impacts of the project. Each project will be assessed and graded by the Green Evaluation Team between 0 and 10 "green points". Dark green projects are usually graded between 7-10 points, medium green between 4-6 points and light green 1-3 points. The final margin discount for the customer will be based on these points.

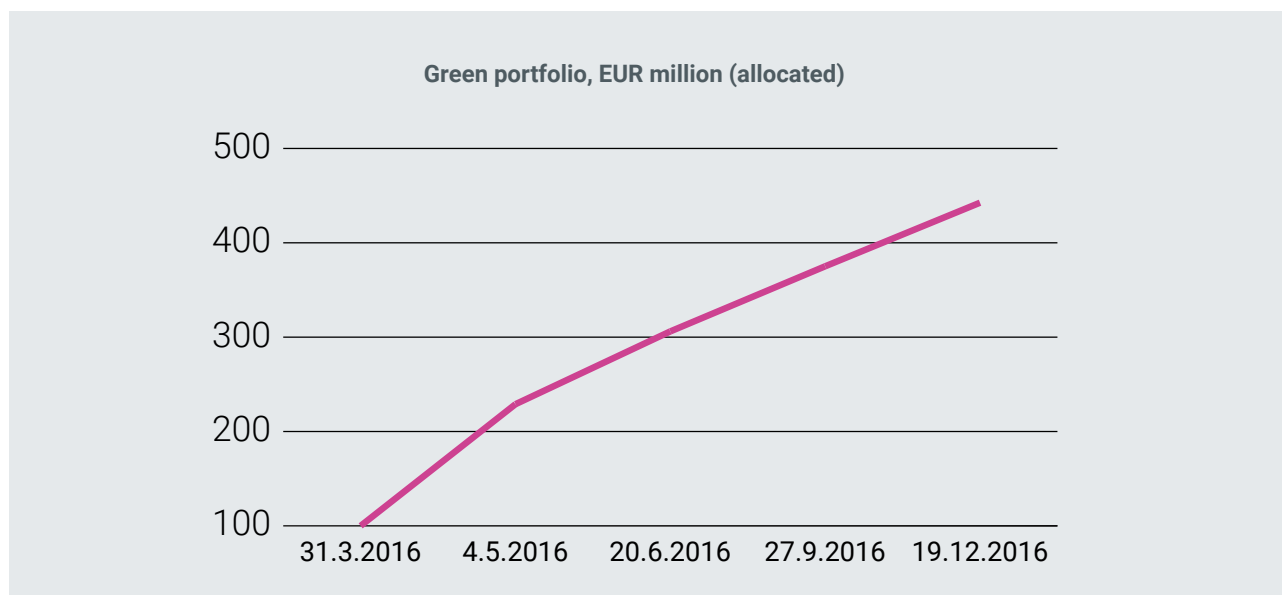
At the end of 2016 there were 3 members in the Green Evaluation Team:

- Mrs. Saara Vauramo (Chair), Environmental Director, City of Lahti
- Mr. Kalevi Luoma (Deputy Chair), Energy Engineer, Association of Finnish Local and Regional Authorities
- Mr. Jyri Seppälä, Professor of sustainable consumption and production, Finnish Environment Institute

MuniFin's Green Framework divides projects into seven categories:

- Renewable energy
- Energy efficiency
- Sustainable public transportation
- Waste management
- Water and waste water management
- Sustainable buildings
- Environmental management incl. nature conservation (max 20%)

Third party evaluation of MuniFin's Green Framework has been provided by CICERO in collaboration with the Stockholm Environment Institute (SEI). Both MuniFin's Green Framework and the Second Opinion are accessible on MuniFin's website / Investor Relations section.

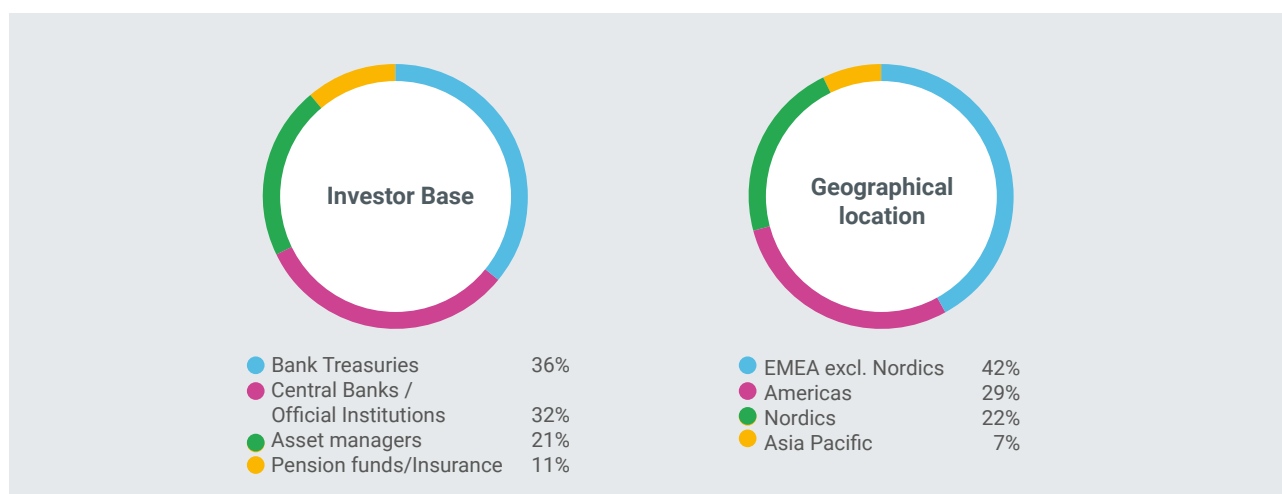


First green bond from Finland

In early October, 2016 MuniFin became the first Finnish issuer of an international green bond. The 5-year USD 500 million bond was priced 33 basis points over the 5-year USD mid-swap and pays a fixed coupon of 1.375%. Re-offer price was 99.495% and the spread over the 5-year Treasury bond was 36.7 basis points.

In total 49 investors participated in the transaction and approximately 20 of them were new for MuniFin. The bond was well distributed around the globe. Europe (excluding the Nordics) accounted for 42%, Americas 29%, Nordics 22% and Asia Pacific 7%. There was a very strong support from environmentally focused accounts including CalSTRS, Calvert, Mirova, NIB, Praxis Impact Bond Fund, Raiffeisen Capital Management, Swisscanto Funds and Syz AM, and many more.

Joint lead managers of the transaction were Bank of America Merrill Lynch, Credit Agricole CIB, HSBC and SEB. The bond is listed on London Stock Exchange's Green Bond Segment.



Proceeds of the USD 500 million inaugural Green Bond after cross-currency hedging transactions totaled EUR 444.8 million. In the end of 2016 the amount disbursed totaled EUR 300.9 million and the remaining EUR 143.9 million was invested into short-term investments according to MuniFin's short-term investment policies.

In March 2017 MuniFin received an international recognition for Finland's first green bond issuance and its pioneering work to promote the reaching of the Finnish climate goals. The Green Bond Pioneer Award was given by the Climate Bonds Initiative (CBI), an investor-focused not-for-profit organisation promoting the development of the green bond market.

MuniFin estimates to be able to issue its second benchmark-sized green bond in late 2017 or latest in early 2018.



Impact evaluation

Introduction

The total amount of MuniFin's eligible green projects for climate mitigation and climate adaptation projects reached EUR 442.47 million in the end of 2016. Impact evaluation and the calculations are being conducted by a consultancy firm, Ramboll Finland Ltd.

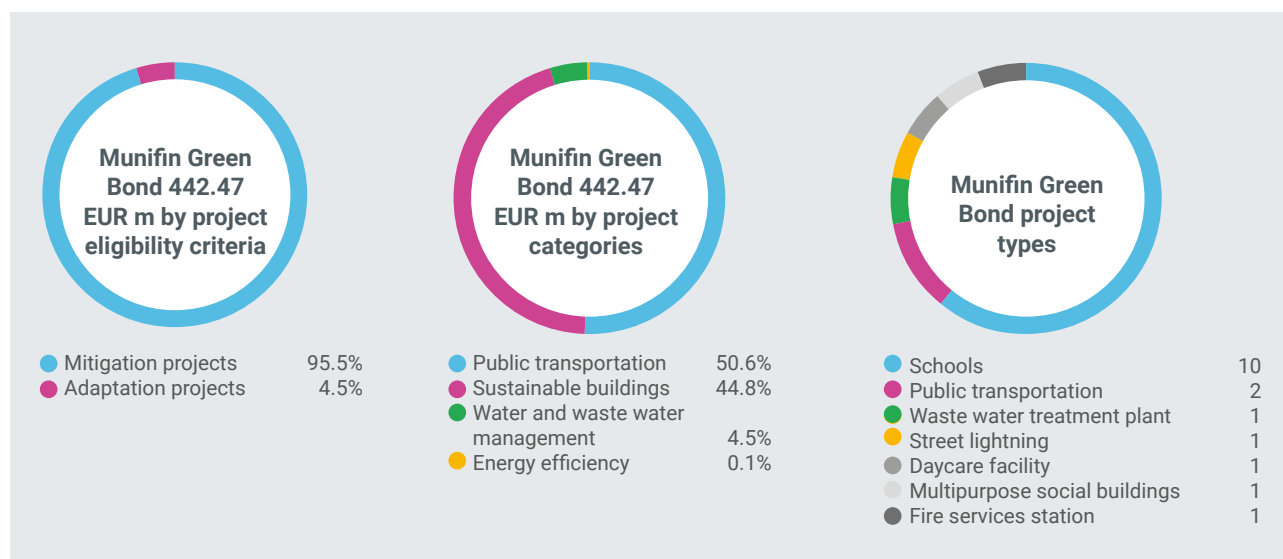
The total estimated direct annual CO₂ emission avoidance impact of climate mitigation projects (energy efficiency, sustainable buildings and public transportation) totals 8,641.5 tCO₂. Annual estimated energy savings from climate mitigation projects sums up to a total of 34,990.5 MWh.

MuniFin's eligible projects have also indirect impacts which are significant compared to direct environmental impacts. For example, public transportation will make possible to densify land use near the metro stations. This will decrease the energy consumption and enhance waste management among other positive effects. In addition, climate adaptation projects (water and waste water treatment) demonstrate the innovativeness and adoption of latest environmental technology. Membrane technology (MBR) in the cleaning of municipal wastewater is one example of this.

Public Private Partnership (PPP) realization model of sustainable building projects enhances the sustainability performance of the buildings over their life-cycle. PPP is a long-term arrangement in which public sector act as a customer and an owner of a project and private sector operator act as a contractor for a building project. In a PPP project the contractor has a responsibility for carrying out design and construction of the building as well as all maintenance and repairs, typically for 20 to 25 years. In the PPP projects included in MuniFin Green project portfolio the contractor has an economical risk of meeting the agreed quality standards and energy efficiency levels of the building. Hence, even higher energy efficiency targets are likely to be met in the PPP projects.

Green Bond Eligible Projects Summary for 2016

Project	Customer	Project eligibility	Project category	Allocated amount
Street lightning renovation	City of Kotka	Mitigation	Energy efficiency	400,000€
Western metro extension	Länsimetro Oy	Mitigation	Public transportation	220,000,000€
Electric buses and charging infrastructure	City of Turku	Mitigation	Public transportation	4,000,000€
Heinsuo school (PPP)	Hollola municipality	Mitigation	Sustainable buildings	20,302,520€
Kalliola school (PPP)	Hollola municipality	Mitigation	Sustainable buildings	18,787,240€
Nummi service centre (PPP)	City of Hämeenlinna	Mitigation	Sustainable buildings	26,000,000€
Janakkala fire services station	Municipality of Janakkala	Mitigation	Sustainable buildings	6,126,000€
Karhunmäki school	City of Joensuu	Mitigation	Sustainable buildings	11,000,000€
Nepemäki school	City of Joensuu	Mitigation	Sustainable buildings	25,000,000€
Jynkkä school (PPP)	Kuopion Koulutilat Ltd	Mitigation	Sustainable buildings	14,960,000€
Karttula school (PPP)	Kuopion Koulutilat Ltd	Mitigation	Sustainable buildings	12,190,000€
School campus of Vipusenkatu	Salpaus municipal federation	Mitigation	Sustainable buildings	8,000,000€
Green timber school	City of Kuhmo	Mitigation	Sustainable buildings	12,000,000€
Hyökännummi school and daycare centre (PPP)	City of Mäntsälä	Mitigation	Sustainable buildings	15,418,000€
Riihenmäki school (PPP)	City of Mäntsälä	Mitigation	Sustainable buildings	14,284,000€
Rantarousti school	Tyrnävä municipality	Mitigation	Sustainable buildings	14,000,000€
Metsä-Sairila wastewater treatment plant	City of Mikkeli	Adaptation	Water and waste water treatment	20,000,000€



In the end of 2016 all green projects were still in the construction phase.

Approach to Impact Reporting

MuniFin Green Bond impact reporting follows the reference framework for reporting “Green Bonds Working towards a Harmonized Framework for Impact Reporting” developed by a group of multilateral development banks.¹ Furthermore, the principles and recommendations of Green Bond Principles (GBP) are applied.²

Reporting is based on “one-off” principle and “ex-ante” impact estimates at the time of project appraisal. Reporting is limited to project boundaries. There is no guarantee that reported expected annual impacts will ultimately materialize over the operation of financed projects.

Impacts are reported on project category basis.

Interpreting Impact Indicators

Impact indicators are tracked first on a project-level and have not been prorated for the portion of MuniFin’s contribution. All the projects, except two, are fully financed by MuniFin and no climate related portion of the individual projects is defined.

The core indicators, referred to energy efficiency (EE) and renewable energy (RE) by GBP reference framework are as follows:

1. Annual energy savings (MWh)
2. Annual CO₂ emissions avoided (tCO₂)

Further eligible project category specific indicators beyond EE and RE indicators are applied for illustrating impacts of climate adaptation projects focusing on water and waste water treatment where no commonly agreed indicators or calculation methodology exists. These indicators are as follows:

3. Reduction in total nitrogen (N mg/l,%)
4. Reduction in total phosphorus (P mg/l,%)
5. Reduction in total suspended solids (mg/l,%)
- Reduction in Biological oxygen consumption (BOD,%)

Reporting is not limited to environmental impacts only, social and economic impacts are reported among qualitative impacts when feasible and material.

Project Category	Baseline for calculations	Unit emission factors
Energy efficiency	Street lights: previous lighting system	210 gCO ₂ /kWh for electricity
Public transportation	Electric buses: diesel bus alternative Länsimetro rail system: situation now	Diesel fuel 10 kWh/l and 265 gCO ₂ /kWh Länsimetro project for electricity 260 gCO ₂ /kWh
Sustainable buildings	Energy efficiency: E class C, 170kWh/m ² , a Heating energy source: Local district heat provider Portion of heat and electricity consumption: average ratio of a new educational building in 2016	209 gCO ₂ /kWh for electricity 207 gCO ₂ /kWh district heating Whenever possible, emission factors provided by the local district heating provider are used.
Water and waste water	Maximum values set in EU and in Finland (Council of State 888/2006) and Best available technique (BAT) values	

¹ Green Bonds Working Towards a Harmonized Framework for Impact Reporting (GBP 2015)

² www.nrwbank.com/en/investor-relations/NRW.BANK.Green_Bond_2016.html, www.nrwbank.com/green-bond, www.icmagroup.org/Regulatory-Policy-and-Market-Practice/green-bonds/green-bond-principles/

A wide range of green projects



The metro encourages choosing public transport over private cars

The Western Metro Extension will create an infrastructure for reducing traffic emissions in the Helsinki Metropolitan Area on a long-term basis. It is estimated that the new metro line will transport 170,000 people a day, which will significantly reduce private car use and bus traffic, while helping to cut down emissions from private and public transport. The new metro line will also concentrate the residential structure and increase urban density, which will support environmentally friendly urban development.

Länsimetro (Western Metro Extension)

Recipient of financing: Länsimetro Oy
Project category: Public transport
Loan amount: € 220,000,000
Financing period: 30 years

A wastewater treatment plant that meets future needs

The wastewater treatment plant that will be completed in the Metsä-Sairila area of Mikkeli in 2020 will raise the city's wastewater treatment to a new level. Due to the membrane bioreactor technology that will be applied, the purified water will be cleaner and of even quality. The ultimate aim is to improve the condition of Lake Saimaa into which the purified water is discharged. The treatment plant will also generate new environmental business in the surrounding area of EcoSairila. The project is financed with MuniFin's green bond.

Metsä-Sairila wastewater treatment plant

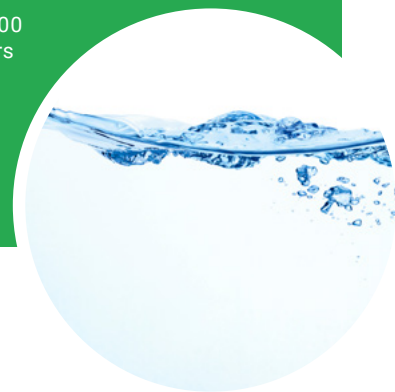
Recipient of financing: City of Mikkeli
Project category: Water purification and wastewater treatment
Loan amount: € 20,000,000
Financing period: 23 years

A service centre based on the life cycle principle

The Nummi service centre in the city of Hämeenlinna will be based on a new model of local services. All of the centre's operations will be guided by a clear goal: ensuring a good day for children and young people. The services intended for them will be designed and provided in accordance with the life cycle principle. To be completed in 2018, the property features top-level energy efficiency and is financed with MuniFin's green real estate leasing.

Nummi service centre

Recipient of financing: City of Hämeenlinna
Project category: Sustainable construction
Amount of lease financing: € 26,000,000
Financing period: 20 years + optional 5 years



Sustainable buildings

Annual energy efficiency improvement and amount of avoided CO₂ emissions are assessed in relation to applicable energy efficiency regulation in Finland. Energy efficiency of a building is presented through an E-value. Finnish building code defines a building type specific maximum E-value which a new building should not exceed in order to get a building permit. The maximum E-value allowed for a new building is used as the basis of calculation for energy efficiency improvement of buildings.

The E-value represents a building's annual consumption of purchased energy, according to the heated net area (kWh/m²a) and based on the standard use of the building type and weighted coefficients of the energy sources used. The E-value is calculated as the sum of the buildings weighted, purchased energy sources. In the E-value indicator, the calculated purchased energy used by a building is multiplied with energy source-specific coefficients that describe the consumption of primary energies. The calculation includes the use of appliances, but does not include consumption taking place on the plot. In the assessment, solar or wind energy produced on the property is considered as a reduction in the demand for purchased energy. The E-value indicator is weather-normalized according to the climate conditions in southern Finland.

E-value doesn't reflect the actual energy consumption of a building when it will be operated, being purely computable value. E-value is calculated according to building type and hence different building parts can have different E-value.

The scope of this report covers in major part school buildings, one day care unit, two multipurpose social/communal buildings and a fire service station. Reference level for an educational building, a day care building as well as an office building is 170 kWh/m² in a year. Energy savings have been calculated on basis of minimum energy efficiency level required for a new building. Portion of heating energy consumption and electricity consumption of the total energy consumption in reference building is based on average ratio of among new educational buildings found in the public energy certificate register.³ Heat energy source in reference building is assumed to be the local district heating system.

Produced and avoided CO₂ emissions are calculated by using emission factors for electricity and district heating production. CO₂ emission factor for electricity is 209 gCO₂/kWh. CO₂ emission factor of local energy producers was used for district heating. If a local emission factor was not available, the Finnish average emission factor of combined heat and power production were used (183 gCO₂/kWh). The used emission factors are sourced from Motiva based on 5 years rolling average in Finland.⁴

Sustainable building projects are compared to national minimum level of regulation, which is high by the fact in Finland. This may result in a smaller improvement in energy efficiency of sustainable buildings than in other regions in the world.

Energy efficiency

Annual energy efficiency improvement and amount of avoided CO₂ emissions are assessed in relation to replaced, traditional solution with the same output. In the streetlight project in Kotka, the annual energy consumption of the traditional solution has been 293 MWh. The annual energy consumption of the new Low-Emitting Diode (LED) solution will be 68 MWh. Annual avoided CO₂ emissions are calculated by using the five years rolling average unit emissions for electricity in Finland 209 g CO₂/kWh.⁵

Public transportation

Turku electric buses project annual energy efficiency improvement and amount of avoided CO₂ emissions are assessed in relation to existing diesel bus alternative. The annual energy consumption of diesel buses has been 2,650 MWh. The annual energy consumption of new electric buses will be 990 MWh. The city of Turku will purchase CO₂ neutral power for electronic buses. Annual avoided CO₂ are calculated by using unit emissions for diesel fuel 10 kWh/l and 265 g CO₂/kWh.⁶

Länsimetro extension project is assessed including all traffic emissions compared to 0 alternative (= situation now). The emission calculations are based on traffic forecast model and national VTT LIPASTO unit emissions. Comparable emissions occurring from diesel bus traffic have been calculated by using EURO 3 norm vehicles. EURO 4 or 5 norm unit emissions were not available for calculations. Calculation of energy consumption of the rail traffic system is based on general emission factor for electricity production in Finland. Länsimetro extension project's annual avoided CO₂ emissions are calculated by using unit emission factor for electricity 260 gCO₂/kWh.⁷ Hypothesis of possible impacts of climate targets and emissions trading to electricity production in Finland in 2030 have not been taken into account in the calculations.

3 Energiatodistustarekisteri.fi (Energy Performance Certificate register)

4 www.motiva.fi

5 www.motiva.fi

6 www.stat.fi (Finnish Energy Statistics).

7 Länsimetro Environmental Impact Assessment (EIA)

Climate change adaptation

Water and waste water treatment

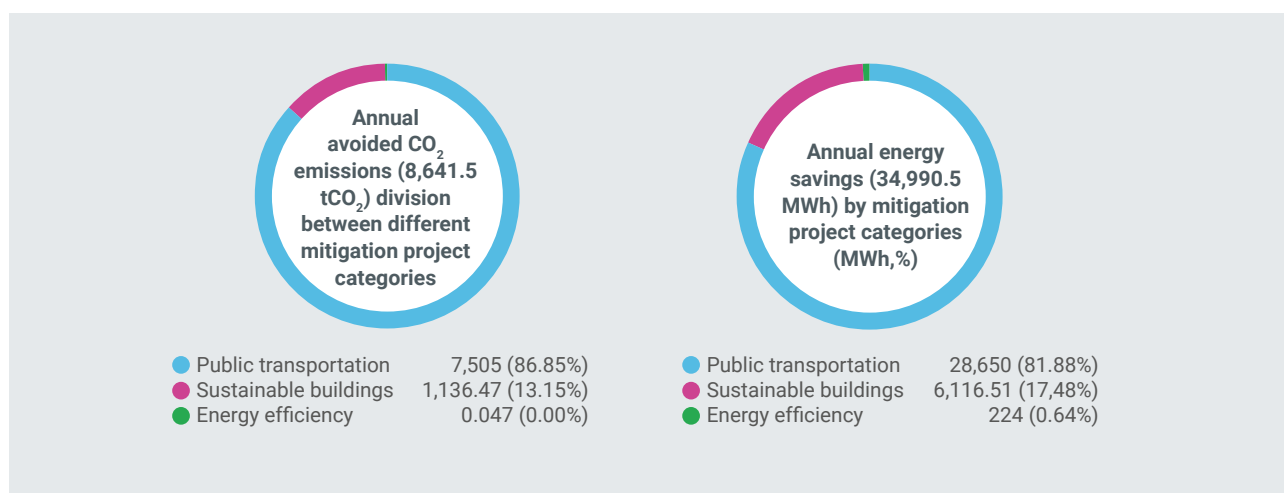
Waste water treatment plants and their purification capacity were assessed both in relation to applicable minimum regulation in the EU and in Finland (Council of State 888/2006) and to the best available techniques (BAT) values for the plant, which size class is >10 000 population equivalent.

	Maximum values in EU and national legislation (Council of State 888/2006)	The best available techniques (BAT) values for the plant, size class >10 000 population equivalent	Mikkeli Metsä-Sairila treatment plant
Total nitrogen N mg/l	15	-	12.1
Total phosphorus P mg/l	2	0.3	0.16
Total suspended solids mg/l	35	10	1.4
Biological oxygen consumption (BOD)	30	10	2.5

Impact Reporting

MuniFin's Green finance produces various positive environmental, economic and social impacts. Firstly, a margin discount is offered for eligible projects. This is unusual in the Green bond market. Due to the discount, municipalities have the possibility to allocate the benefit in other development projects, in the best case in other projects contributing climate resilient society.

Financed projects are characterized by co-operation between multiple municipalities and actors. Sustainable buildings are designed for multi-purpose uses, serving various groups of citizens and improving the local community well-being while saving natural resources. Combining innovation, new technologies, learning and networks between environmental industries and wider society, these projects have far going and comprehensive impacts on the environment, economy and life in the Finnish municipalities.



Energy efficiency

The city Kotka will replace the current streetlight system with new LED system one area at the time. LEDs have many advantages over incandescent light sources including lower energy consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. Several demonstrations have shown that reduced maintenance costs from this extended lifetime, rather than energy savings, is the primary factor in determining the payback period for an LED product.

Public transportation

According to the Länsimetro environmental impact assessment report (EIA), rail system is the most advantageous traffic system alternative on the strength of environmental impacts and operating costs. Also the amount of passengers on the boundary of cities of Helsinki and Espoo will be greater in rail system compared to bus alternative.

The Länsimetro rail system will decrease air emissions significantly in Helsinki city center highly run streets. For example, in Kamppi and Ruoholahti, the rail system will decrease emissions 16-60% compared to diesel bus alternative. In Länsiväylä, the emissions occurring from public transport will also decrease about 10% but the rail system has no impact on emissions occurring from private cars.

The Länsimetro rail system will also make possible to densify land use near to the metro stations. Densification of land use will decrease the energy consumption of community compared to spread land use but this has not been taken into account in the climate impact assessment of the project.

It has been studied⁸ that significant densification of urban areas can reduce approximately 330,000 tonnes of CO₂ emissions per year. This is more than CO₂ emission reductions that can be achieved by enhancing waste management (-311,000 tonnes of CO₂ per year) or by burning waste and using it in energy production (-227,000 tonnes of CO₂ per year). This bears the assumption that the rail system has also significant indirect impacts on CO₂ emissions and densification of land use will make it possible to reduce emissions significantly more than directly calculated.

The primary target of the electric buses project in the city of Turku is to reduce energy consumption and harmful environmental impacts as well as increase the use of renewable energy. By replacing diesel buses with electric buses the city of Turku will create the first part of the public electronic transportation ecosystem of the area. The project enhances Smart & Sustainable mobility in the urban area.

Sustainable buildings

Buildings consume 40% of all energy consumption in Finland and hence building regulations have been tightened to promote and improve energy efficiency in the building sector. In 2016, 13 sustainable building projects were eligible for MuniFin Green finance. All buildings have strong emphasis on energy efficiency and reached energy class A or B. In five of these projects a geothermal heat system was used as a heating system and in three cases had solar panels to generate on site renewable energy to cover electricity consumption. Solar panels produce over 76 MWh of electricity per year. When compared to minimum energy efficiency level of new buildings, energy savings are 6,117 MWh per year which is equal to energy consumption of 312 electrically heated detached houses.⁹ As a result of energy savings, 1,136 tons of CO₂ emissions are avoided each year.

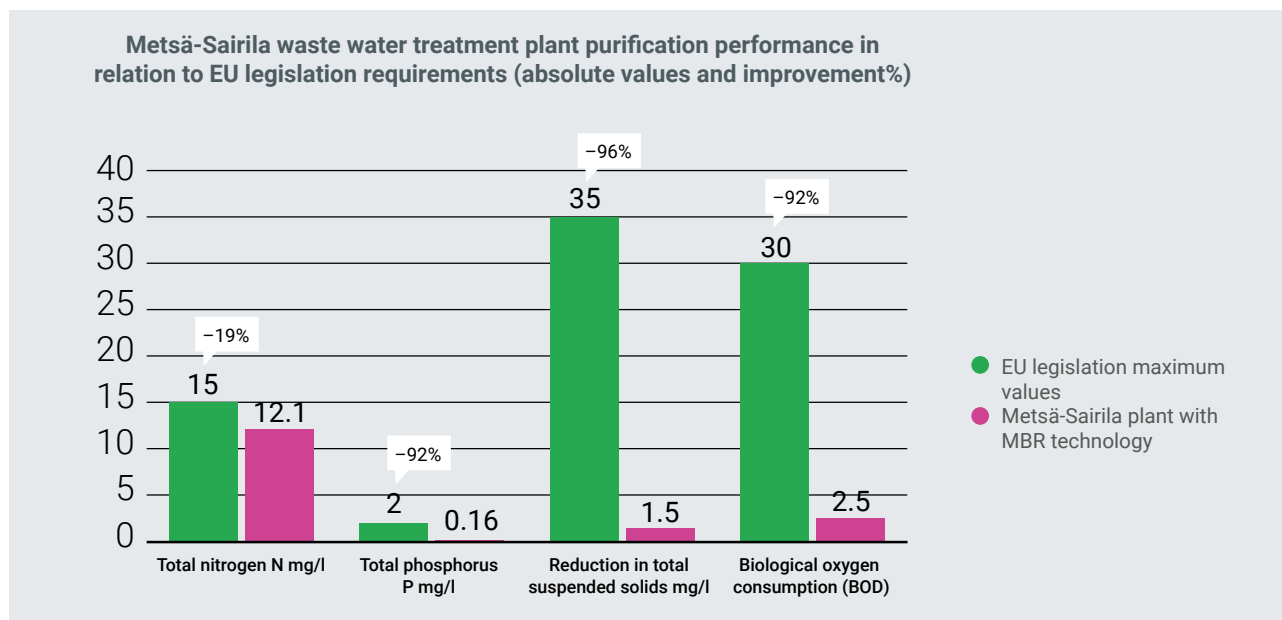
In two of the building projects ecological building materials were promoted. The use of wooden structures instead of conventional building materials may reduce greenhouse gas emissions generated by the building materials. The CO₂ reduction due to the use of wooden structures were not evaluated in this report.

8 Pääkaupunkiseudun kasvihuonekaasupäästöihin merkittävästi vaikuttavat hankkeet – päästöjen vähentämismahdollisuudet, YTV C2002:6 (Greenhouse gas emissions in Helsinki metropolitan area and projects with significant reduction impact potential)

9 Adato Energia Oy. 2013. www.motiva.fi/files/8300/Kotitalouksien_sahkonkaytto_2011_Tutkimusraportti.pdf

Water and waste water treatment

Metsä-Sairila waste water treatment plant is one part of the larger EcoSairila 2020+ unity, where new kind of circular economy based business, research and development environment will be created next to the treatment plant. Metsä-Sairila will be the most advantageous waste water treatment plant in the world. Constantly tightening regulation can be met with help of innovative technologies.



For the first time in Finland membrane technology (MBR) will be used for cleaning water in Metsä-Sairila. Water cleaned by a membrane bioreactor is of a more even quality than that from a traditional wastewater cleaning plant. In the traditional process not all the substances are necessarily removed as high levels of impurities get out of the settler from time to time and pass into watercourses. All bacteria and solids are removed from water cleaned in a membrane bioreactor. That is why water cleaned in an MBR is easier to process further than water cleaned traditionally. It does not require the vast settling tanks needed by the traditional approach to water purification so a membrane bioreactor plant can be built cost effectively in a smaller area. Part of the cleaned water will be processed further in other industrial facilities in the EcoSairila region.

Joint Nordic issuer discussion on impact reporting

MuniFin takes part in a group of Nordic public sector issuers of green bonds¹⁰ which during 2016 initiated discussions regarding a joint common approach to green bonds impact reporting. This was done in the belief that a common Nordic position to the issues involved would be beneficial to other public sector issuers as well as the investor community. Issuers also felt that sharing experiences and know-how would benefit all as individual issuers.

The group's ambition is to develop a practical guide for Nordic public sector green bond issuers, for publication in the second half of 2017. This work is still ongoing and the outcome of the discussions is not yet finalized. The outcome may have an effect on how MuniFin reports the impacts of green finance in the future.

More information:

www.munifin.fi/green-bond

or

contact the MuniFin funding team via funding@munifin.fi

¹⁰ Participants (DK=Denmark, FI=Finland, NO=Norway, SE=Sweden): City of Göteborg (SE), Kommunalbanken (NO), Kommuninvest (SE), Municipality Finance plc (FI), Municipality of Borås (SE), Municipality of Norrköping (SE), Municipality of Örebro (SE), Stockholm County Council, SLL (SE), Swedish Export Credit Corporation, SEK (SE)