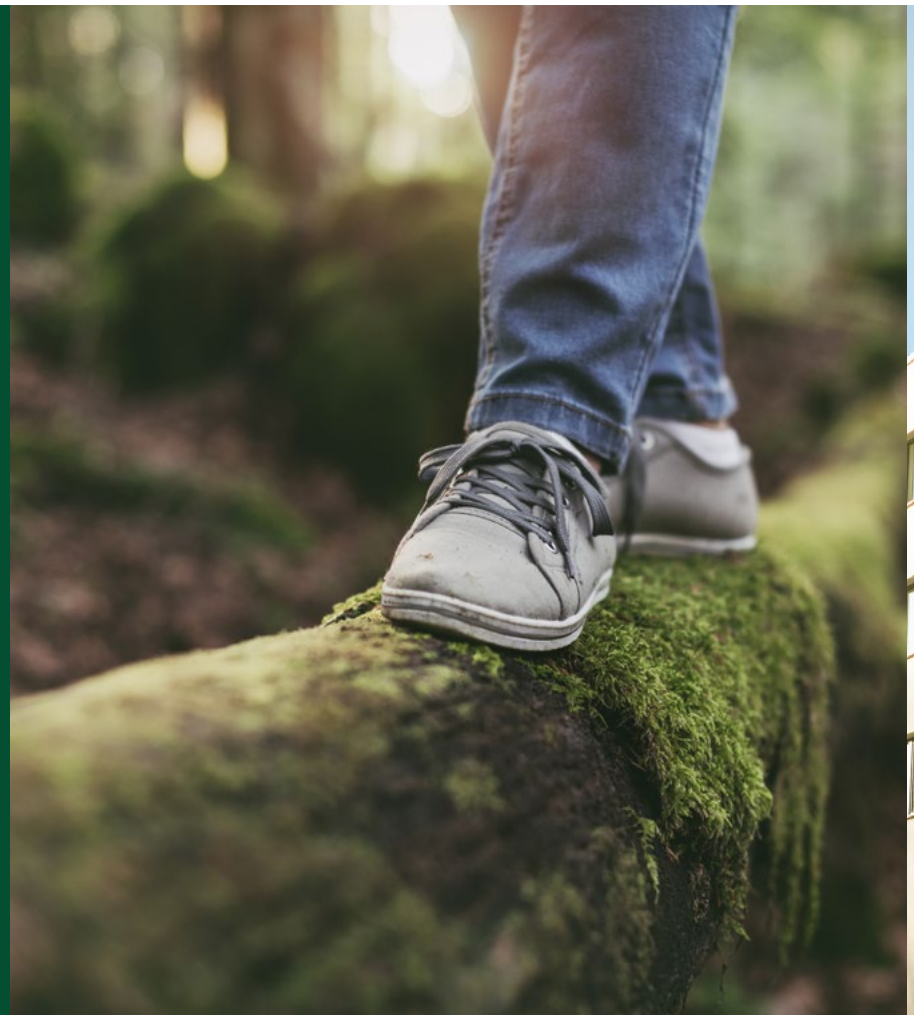
MuniFin green bonds impact report 2018



Contents

MuniFin's green bonds and Sustainable Development Goals

The Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development are universal goals that were adopted by the UN Sustainable Development Summit in September 2015. The 17 goals include 169 targets, which aim to make the world a better and more sustainable place.

MuniFin's green bonds have an impact on the following *SDGs:

- **6** Clean water and sanitation
- **7** Affordable and clean energy
- **9** Industry, innovation and infrastructure
- **11** Sustainable cities and communities
- **12** Responsible consumption and production
- **13** Climate action
- **14** Life below water

Position Paper on Green Bonds Impact Reporting 2019

Green investments must become mainstream

In 2018 MuniFin continued to profile itself as one of the forerunners in green financing. We deepened our cooperation with other Nordic green bond issuers by publishing an updated green bonds impact reporting guide: this report is following the updated recommendations. We also amended our Green Bond Framework streamlining the selection criteria for sustainable buildings. Environmental Finance's Green Bond of the Year Award for MuniFin indicates that our company has gained a strong foothold in the international green bonds market.

Also the MuniFin' green project portfolio continued to grow steadily in 2018. The year did not include the kinds of major projects that have been launched in previous years, however, the selection of environmental projects and the entities implementing the projects is diversifying at a good pace. Since the first one in 2016, the number of projects eligible for green finance is currently 60, with a combined total value of more than EUR 1.2 billion.

However, more than steady growth is needed. The report of the Intergovernmental Panel on Climate Change (IPCC) published in autumn 2018 made it clear that making public investments that are not environmentally sustainable must stop. No more talk about trailblazing projects – non-profit housing production operators receiving financial support from local and central government must ensure that all their investments have low-carbon objectives.

Finnish local authorities have in fact been setting more ambitious goals for their climate efforts in recent years. According to a study commissioned by Sitra, more than a quarter of Finns live in a municipality that aims to be carbon-neutral by 2030.

An essential, rapid way to have an impact on carbon emissions is to enhance the energy efficiency of the existing building stock. Energy efficiency can be improved by investing relatively small amounts, and the investments even pay themselves back in the form of the savings made through the rapidly lowered energy consumption. As a bonus, they also improve the conditions of use of buildings.

Each euro and kilowatt saved in energy efficiency projects frees up money for other investment needs. Currently, it is important to increase the scale of energy efficiency initiatives: rather than co-optimising individual building projects, municipalities and housing sector operators should bundle their projects into bigger entities.

Decisions that support climate targets are sometimes slowed down due to the silo mentality of decision-making processes. Access to comparable emissions data and information on the effects of emissions, costs and benefits of different actions would speed up the decision-making process. Through its work, MuniFin aims to promote access to such information and thus accelerate the breakthrough of energy efficiency thinking. Climate change mitigation requires large-scale action, and we feel it is our responsibility to ensure that such actions are implemented successfully.

Rami Erkkilä
Manager, Lending
MuniFin

Mr Erkkilä is responsible for the development of Green Finance product offering at MuniFin.

MuniFin's green finance 2016–2018

Cumulative impact of the Green portfolio based on withdrawn financing 2016–2018

Number of green projects, cumulative

60

31 Dec 2018 amount of green finance granted, EUR billion

1.235

31 Dec 2018 amount of green finance withdrawn, EUR billion

1.143

Annual energy saving, total MWh

22,200

Annual CO_2 emissions avoided, total tCO_2

21,920

Annual production of renewable energy MWh

15,240

Renewable energy production capacity MW

6.4

Annual amount of treated wastewater m^3

3,000,000

Environmental Finance
Green Bond Awards 2018
Winner
Green bond of the year – supranational, sub-sovereign and agency (SSA)

Green bonds in 2018

MuniFin awarded Green Bond of the Year

Environmental Finance magazine, which focuses on environmental finance themes and green bonds, awarded MuniFin for its euro-denominated green bond issued in 2017. The award-winning EUR 500 million Green Bond was the most sought-after loan in the history of MuniFin, six times oversubscribed in just one hour. The bond was priced very tightly. There has been demand for the bond in the secondary markets, and it had a positive effect on the valuation level of all MuniFin's euro-denominated benchmark bonds.

MuniFin was awarded the 'Green bond of the Year – Sub-sovereign, supranational and agency (SSA)' and 'Biggest issuer – Local authority' prizes by Environmental Finance magazine in the Green Bond Awards 2018.

Sustainable bonds market launched by Nasdaq Helsinki

In 2018, Nasdaq Helsinki launched a sustainable bonds market, where two of MuniFin's green bonds were dual-listed.

– Responsible financing and responsible investing are fast-growing global trends, which provide a powerful way of steering the implementation of projects towards an environmentally sustainable direction. The multiplicative effects of finance decisions can be enormous, says Esa Kallio, MuniFin's President and CEO, who rang the bell at the launch of the Sustainable Bonds Market.

MuniFin was the first Finnish issuer of green bonds earmarked for environmental projects. There are still only few green bond issuers in Finland but the launch of the new marketplace is an indication that the situation is changing.

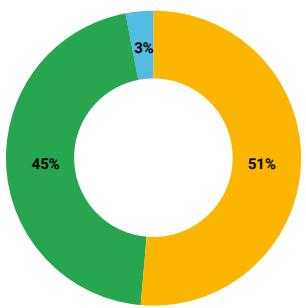
– It is crucial that a strong concentration of sustainable financing is established in Finland. Above all, it would encourage innovative environmental investments and enable the achievement of Finland's climate targets. On the other hand, it would also strengthen Finland's country brand as a responsible investment target in the international capital markets, Kallio says.

Development of MuniFin's green bonds

The Green portfolio continued to evolve but MuniFin did not issue any new green bonds in 2018. As a company, MuniFin wants to contribute to building a green and sustainable future for Finland, and therefore hopes to issue more green bonds during 2019.

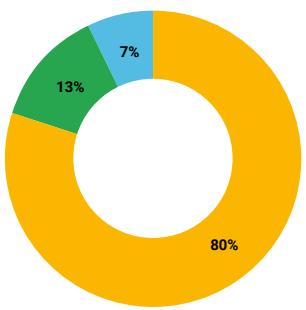
Furthermore, MuniFin has examined the possibility of issuing social bonds, which would help diversify the company's range of sustainable products and further strengthen its societal impact.

MuniFin's green bonds



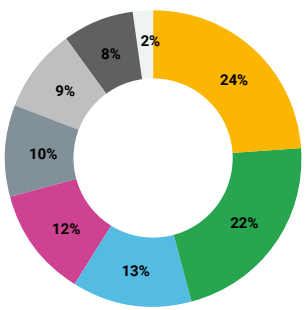
- EUR 500m matures in 2027
- USD 500m matures in 2021
- AUD 50m matures in 2027

Investor base



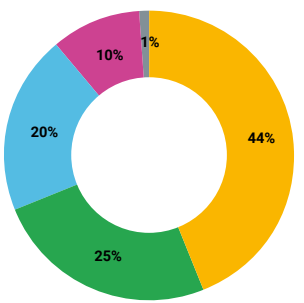
- Europe
- North America
- Asia

Geographical location



- Germany
- Nordic countries
- France
- Asia
- Benelux countries
- Other European countries
- United Kingdom
- Switzerland

Investor types



- Bank treasuries
- Pension funds and insurance
- Central banks and official institutions
- Asset managers
- Other

The centre facilitates natural encounters between pupils of different ages and customers of other services. The playground is splendid and has been received well by local families!

Markku Rimpelä, Head of Strategy, City of Hämeenlinna

Nummikeskus is great for the environment and the community

Completed in autumn 2018, Nummikeskus in Hämeenlinna is a new kind of service centre that brings together a wide range of services. The Nummi comprehensive school, morning and afternoon clubs for pupils, the Nummi library and child welfare clinic, youth work and children's cultural services are all located under one roof.

Nummikeskus is one of the first projects financed with green finance by MuniFin and implemented as a public-private partnership project with leasing financing.

Users of the centre were brought on board the project from its outset to ensure that the building is designed to be as functional and enjoyable to the locals as possible.

The cornerstones of design work were energy efficiency, comfort and flexibility of the facilities for conversions, supported by careful choices for materials. Environmentally friendly choices are reflected in the centre's daily functions. For example, logs of electricity and water consumption are used in classroom teaching.

The City of Hämeenlinna believes in experimenting and finding bold and innovative ways to support investments. In addition its environmental benefits, the Nummikeskus centre will improve the local sense of community and prevent social exclusion.

Green finance approval process and the Green Evaluation Team

In 2018, there were three 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 (member)**
  Professor, Director of the Centre for Consumption and Production, Finnish Environment Institute

As of the beginning of 2019, Kalevi Luoma resigned the Green Evaluation Team due to retirement and **Vesa Peltola**, Energy Expert, Association of Finnish Local and Regional Authorities was appointed in his place.

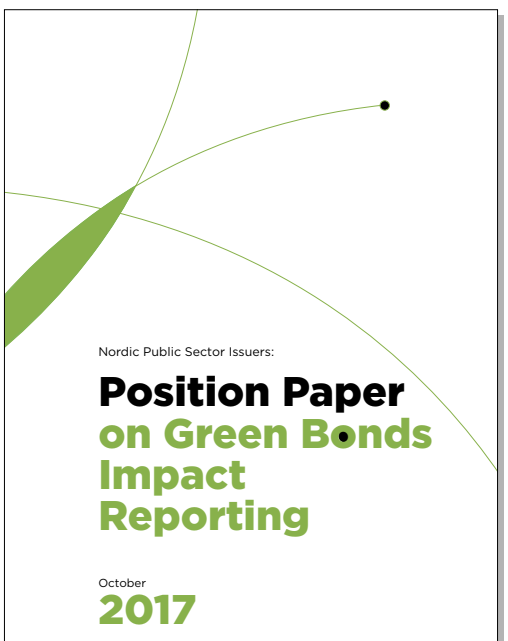
Eligible green finance projects are selected based on MuniFin's Green Framework and finally approved by an external Green Evaluation Team. Every project is assessed independently and only approved if a long-term positive environmental impact can be achieved. To attract customers to make more environmentally friendly investments, MuniFin has decided to award a margin discount for eligible projects. The discount is based on the project's estimated environmental impact. Each project will be evaluated and graded by the Green Evaluation Team between 0 and 10 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.

Green Bonds Impact Reporting – Nordic cooperation

MuniFin is one of ten Nordic issuers who jointly published a guide for green bonds impact reporting. The first Position Paper on Green Bonds Impact Reporting was published in October 2017 and an updated version at the beginning of 2019. The recommendations were drawn up by Nordic green bond issuers specialising in the public sector. MuniFin is the only Finnish issuer in the group. Other participants included two of MuniFin's counterparts – Kommunalbanken in Norway and Kommuninvest in Sweden – as well as several Swedish counties and municipalities, which have issued bonds. The aim of the guide on green bonds impact reporting to Nordic issuers is to facilitate the work of applicants for green finance, lower new issuers' thresholds for entering the green bond markets, and to provide international investors with a tool for evaluating green portfolios.

The special characteristics of green bonds issued by Nordic public sector issuers include a wide range of different sizes and types of projects to which green finance has been allocated. Other guides on green bond impact reporting already exist on the markets; however, due to the special characteristics of different markets, the Nordic guidelines had to be tailored to make them more descriptive and meaningful.

The Nordic guidelines are based on the Green Bond Principles and the recommendations of multilateral development banks. However, these have been complemented with an interpretation of impact indicators for projects focusing on issues such as public transportation and sustainable buildings. The other participants in the preparation of the guidelines were the Norwegian research institute CICERO, the Nordic Investment Bank, SEB, Crédit Agricole CIB, and a group of international investors.



Impact evaluation of green finance

The Green Framework groups the projects into seven categories.

Sustainable buildings

Energy efficiency

Renewable energy

Sustainable public transportation

Water and wastewater management

Waste management

Environmental management

MuniFin's green finance has many positive effects on the environment, in addition to its benefits to the economy and society. This report primarily focuses on the estimated direct environmental impact, but other broader benefits are also discussed. Projects funded by MuniFin are characterised by the cooperation of municipalities with other actors, which is why green bonds can be seen as promoting new kinds of partnerships and practices and the emergence of new, more sustainable business. Approved green finance projects are given a margin discount, which is rare in the green bond market. In the best case scenario, the discount enables MuniFin's customers to allocate resources also to other development projects promoting a climate resilient society and sustainable practices. In general, projects financed by MuniFin promote the transition towards a low-carbon society.

MuniFin's approach to impact evaluation

Reports on the impact of MuniFin's green financing are based on the practical guide on impact reporting for green bond issuers jointly drawn up and published by Nordic public sector issuers. In this report, MuniFin also applied the framework updated at the beginning 2019 when discussing the UN *Sustainable Development Goals (SDG).

MuniFin's impact reporting is carried out in accordance with the following principles:

- The impact of projects financed by MuniFin has been calculated in relation to MuniFin's contribution, which has been determined as the share of the total withdrawn amount disbursed at the end of the period under review in relation to the total investment cost of the project.
- The reporting is based on preliminary evaluations conducted prior to project implementation.
- The impact evaluation covers both quantitative and qualitative aspects.
- Reporting is constantly being developed and MuniFin is open to any proposals on how the report could be improved.

*Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting (2017), Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting (2019)

Impact indicators by project category

Sustainable buildings

Annual energy savings (MWh)

Annual CO_2 emissions avoided (tCO_2)

Energy efficiency

Annual energy savings (MWh)

Annual CO_2 emissions avoided (tCO_2)

Renewable energy

Annual CO_2 emissions avoided (tCO_2)

Annual production of renewable energy (MWh)

Production capacity for renewable energy (MW)

Sustainable public transportation

Annual CO_2 emissions avoided (t CO_2)

Water and wastewater management

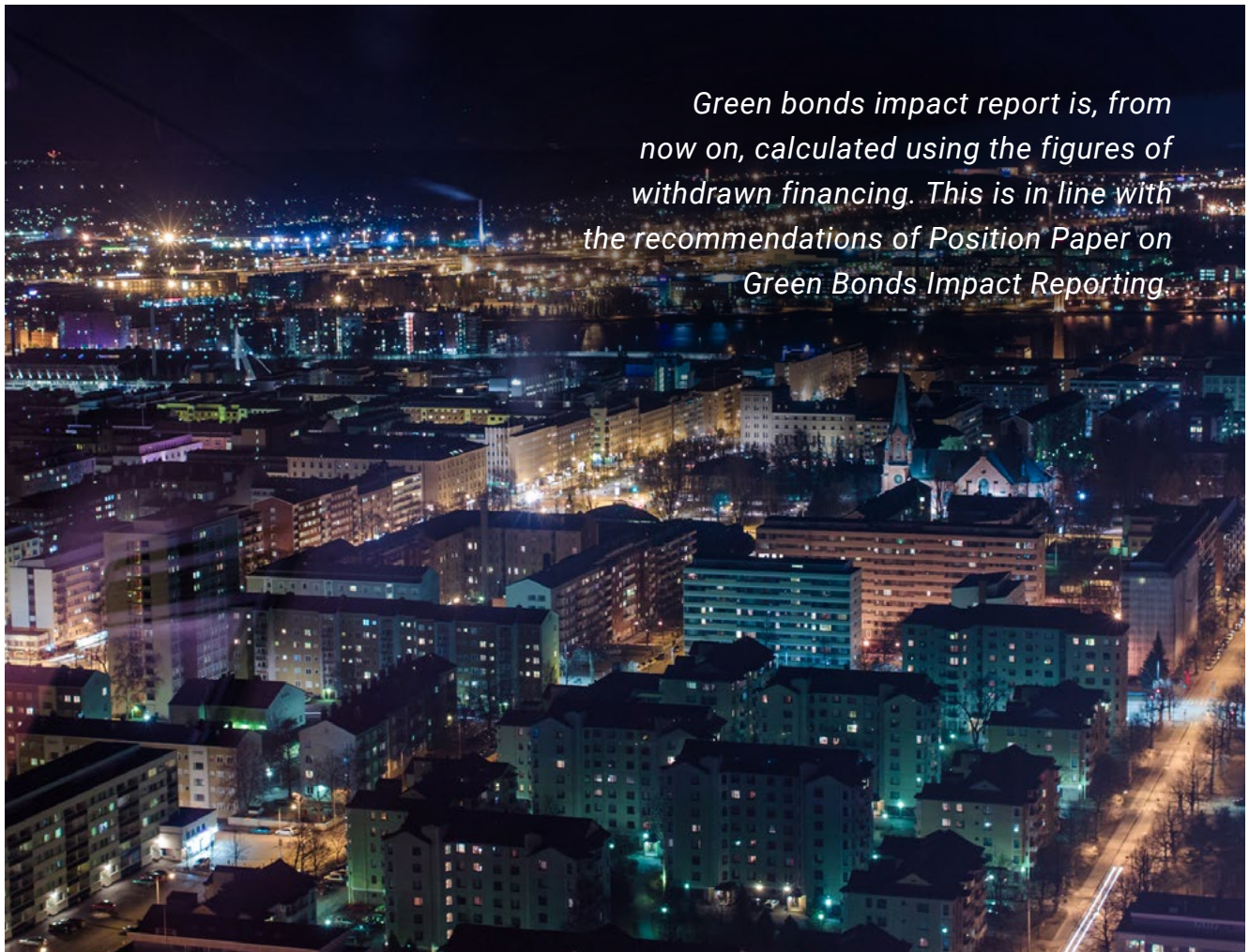
Annual amount of treated wastewater (m^3)

The key impact indicators included in the calculation are presented in the table by project category. Further information on the calculation principles and assumptions applied is provided by project category under Calculation principles", from page 33.

Changes to the results of the 2016 and 2017 impact evaluation

MuniFin carried out the green finance impact evaluation for the first time in 2016 and reiterated the evaluation for the 2017 projects in early 2018. In the previous annual Green finance reports, the estimated impact has been presented per year for projects funded during that year. In this report, the cumulative impact of the whole of the Green portfolio is discussed for the first time. This is due to the changes made to the calculation principles following the first evaluation, leading to the consolidation of the calculation principles for different years in order to achieve comparability.

The impact presented in this report has been weighted using MuniFin's contribution. MuniFin's contribution has been determined as the share of the total withdrawn amount on 31 December 2018 in relation to the total investment costs of projects financed. This figure represents MuniFin's share of the estimated impact of the project as a whole. The impact of projects financed in 2016–2017 has been re-weighted using the adjusted figures for MuniFin's contribution. Due to the changes to the calculation principles and the updated contribution figures, the impacts reported for 2016 and 2017, as presented in this report, differ from previous years' reports.



Green finance summary, 2016–2018

In 2018, 20 projects were approved into the Green portfolio. As the result, the Green portfolio grew to EUR 1,234,899,940, comprising a total of 60 projects.

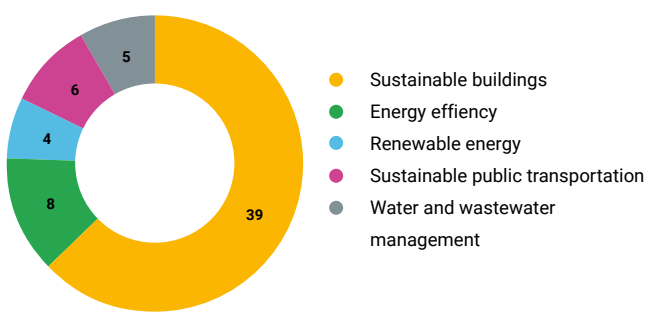
At the end of 2018, the amount of green finance withdrawn to projects totalled EUR 1,142,773,921. The average maturity of the Green portfolio at the end of 2018 was 25.0 years.

Consultancy company Deloitte carried out the analysis of the environmental impact of green finance in 2016–2018 based on data on projects financed and the calculation assumptions agreed with MuniFin. The calculation assumptions used are based on the recommendations of Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting (2017). According to the calculations, the total estimated direct annual CO2 emission avoidance impact of projects aiming to mitigate climate change (energy efficiency, sustainable buildings, renewable energy and sustainable public transportation) was approximately 21,915 tonnes of CO2. On an annual basis, the projects generate approximately 22,200 MWh worth of energy savings. Additionally, it is estimated that projects financed by MuniFin enable the annual production of approximately 15,240 MWh of renewable energy.

Between 2016 and 2018, MuniFin has financed in total 39 sustainable building projects, which makes sustainable buildings the largest project category for green finance. The estimated annual CO2 emission avoidance in these projects amounts to approximately 3,030 tonnes. Sustainable building projects focus on the construction of energy-efficient and environmentally friendly residential buildings, as well as public buildings (including schools and day care centres). Combining innovation, new technologies, learning and networks between environmental industries and society in general, sustainable building projects have far reaching and comprehensive impacts on the environment, economy and life in Finnish municipalities.

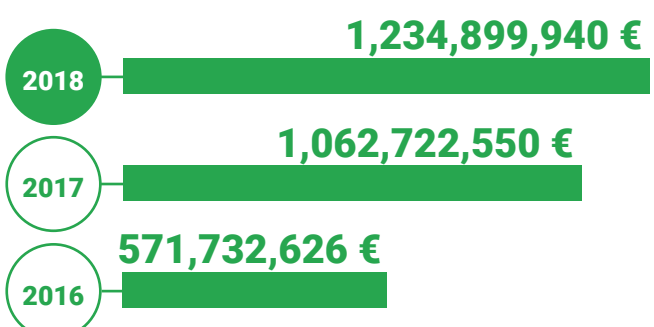
In addition, MuniFin has financed many projects related to energy efficiency, renewable energy, sustainable public transportation and water and wastewater management in different locations around Finland. Between 2016 and 2018, among other projects, MuniFin contributed to the first and second phases of the construction of the West Metro Extension in the Helsinki capital region with approximately EUR 490 million in total. The Green portfolio's key impact indicators are presented in the table below.

Cumulative number of projects by project category 2016-2018



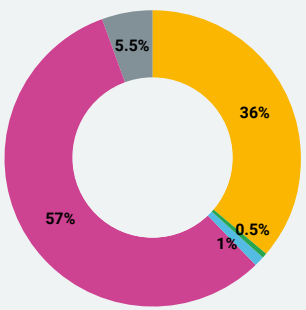
Cumulative number of projects 60, with West Metro Extension as a single project.

Green portfolio's cumulative development by granted finance 2016-2018



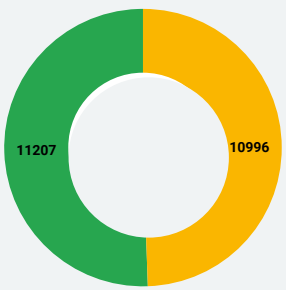
Cumulative impacts of green finance by project category 2016-2018

Withdrawn green finance, projects by category by 31th December 2018



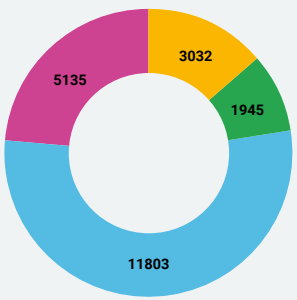
- Sustainable buildings 414,157,594 €
- Energy efficiency 6,687,222 €
- Renewable energy 12,900,000 €
- Sustainable public transportation 646,029,106 €
- Water and wastewater management 63,000,000 €

Annual cumulative energy savings (MWh) by category



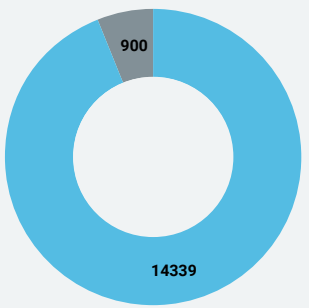
- Sustainable buildings
- Energy efficiency
- Renewable energy
- Sustainable public transportation
- Water and wastewater management

Annual cumulative reduction of CO_2 emissions (tCO_2) by category



- Sustainable buildings
- Energy efficiency
- Renewable energy
- Sustainable public transportation
- Water and wastewater management

Annual production of renewable energy (MWh)



- Sustainable buildings
- Energy efficiency
- Renewable energy
- Sustainable public transportation
- Water and wastewater management

The calculated impact is based on the share of MuniFin's contribution to the project's total investment cost.

Leppäkerttu school has fulfilled all our wishes. The facilities are modern and functional in every respect, and most importantly the children, teachers and all staff members all love it here!

Matti Raatikainen, Municipal Manager of Leppävirta

Eco-friendly heating at Leppäkerttu school

Leppäkerttu school is the newest source of pride for the town of Leppävirta in Northern Savo. Opened in late 2018, the school is one of the recipients of green lending by MuniFin. In addition to primary education, the Leppäkerttu school has morning and afternoon activity clubs and the Omenatarha preschool.

The starting points for the Leppäkerttu school project were energy efficiency, lifecycle costs and reducing the carbon footprint of the municipality as a whole. Construction has placed emphasis on renewable energy, sustainable materials and efficient use of space. Geothermal heat as the choice of heating improves user comfort.

In Leppävirta, the task of raising the younger generation to become responsible citizens is seen as integral to the role of the municipality. The Leppäkerttu school building has been designed to support teaching, including teaching about energy efficiency the building itself serves as a teaching aid. Instead of traditional classrooms, instruction takes place in cells according to age group, separated by movable partition walls.

Summary of projects financed in 2018 and their impact

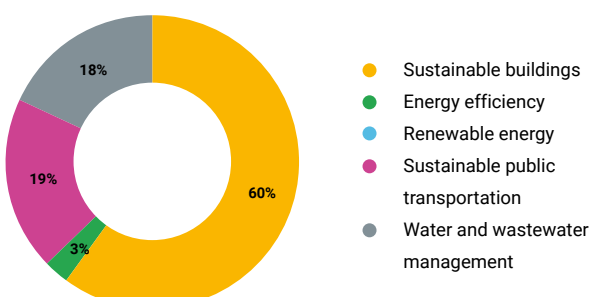
Projects approved and financed by MuniFin, which totalled EUR 129.746.463 million in 2018, were spread between 15 localities around Finland. The list of projects financed in 2018 and their locations around Finland are presented on the following pages.

In 2018, MuniFin financed in total 20 projects eligible for green finance, of which one project started receiving financing already in late 2017 and the rest of the projects during 2018. The largest project category was sustainable buildings, in both financial terms (60%) as well as based on the number of projects (11). Most of the sustainable building projects financed in 2018 involved educational buildings, such as schools and day care centres. These projects play an important role in supporting regional vitality and in the development of learning environments that support wellbeing.

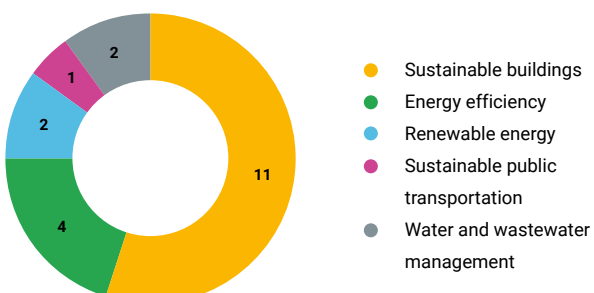
The second and third most significant project categories were sustainable public transportation (19%) and water and wastewater management (18%). MuniFin continued to contribute to the financing of a major national public transportation project West Metro, carried out by Länsimetro Oy in the Helsinki capital region, between Matinkylä and Kivenlahti in Espoo. Two projects in the water and wastewater management category play a key role in securing sufficient wastewater treatment capacity and reducing environmental loading, which are both important to society. The breakdown of the projects based on the amounts of withdrawn financing and the number of projects in each category is presented in the following graphs.

In 2018, green finance was withdrawn to 20 eligible projects in 15 different localities in Finland.

Green projects by category 2018



Number of projects by category 2018



Summary of projects financed in 2018 and their impact

Project	Customer	City or municipality	Project category	Withdrawn amount	MuniFin's share of finance
ESCO-project of Jyväskylä	City of Jyväskylä	Jyväskylä	Energy efficiency	1,358,531 €	34 %
Renovation of education center	Salpaus Further Education	Lahti	Energy efficiency	2,000,000 €	100 %
Renewing street lighting of Pielavesi	Municipality of Pielavesi	Pielavesi	Energy efficiency	117,454 €	98 %
Renewing street lighting of Rauhala	City of Kotka	Kotka	Energy efficiency	494,414 €	99 %
West metro Matinkylä-Kivenlahti	Länsimetro Oy	Espoo	Sustainable public transportation	25,000,000 €	2 %
Renovation of apartment building	The Student Union of the University of Jyväskylä	Jyväskylä	Sustainable buildings	3,500,000 €	48 %
School of Chydenius	City of Kokkola	Kokkola	Sustainable buildings	7,037,679 €	59 %
Day care center of Hammaslahti	City of Joensuu	Joensuu	Sustainable buildings	3,177,751 €	88 %
School of Heinävaara	City of Joensuu	Joensuu	Sustainable buildings	4,049,834 €	90 %
Day care center of Hukanhauta	City of Joensuu	Joensuu	Sustainable buildings	4,142,723 €	92 %
Apartment building with Nordic Ecolabel	VAV Asunnot Oy	Vantaa	Sustainable buildings	19,187,790 €	100 %
Day care center of Lehtomäki	City of Kouvola	Kouvola	Sustainable buildings	3,500,000 €	100 %
Wooden school of Mansikkala	Municipality of Imatra	Imatra	Sustainable buildings	13,844,000 €	31 %
School of Rantakylä	City of Joensuu	Joensuu	Sustainable buildings	12,387,296 €	77 %
Day care center of Tikkala	Municipality of Tohmajärvi	Tohmajärvi	Sustainable buildings	1,500,000 €	75 %
School of Jämsänkoski	City of Jämsä	Jämsä	Sustainable buildings	5,448,991 €	52 %
Bioenergy heating plant	Kangasalan Lämpö Oy	Kangasala	Renewable energy	0	-
Solar energy facilities	City of Jyväskylä	Jyväskylä	Renewable energy	0	-
Wastewater outlet	Turun Seudun Puhdistamo Oy	Turku	Water and wastewater management	15,000,000 €	50 %
Wastewater treatment plant	Water treatment plant of the city of Heinola	Heinola	Water and wastewater management	8,000,000 €	100 %

Withdrawn amount per 31 Dec 2018

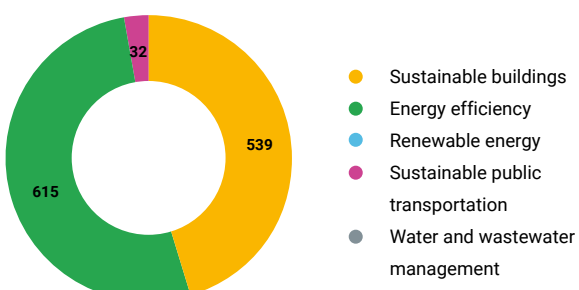
MuniFin was established for the purpose of developing the Finnish welfare society. The company supports Finnish municipalities and cities in building a sustainable society from the perspective of environmental, economic and social wellbeing. In 2018, green finance was withdrawn to projects in 15 localities in Finland.

Results of the impact evaluation 2018

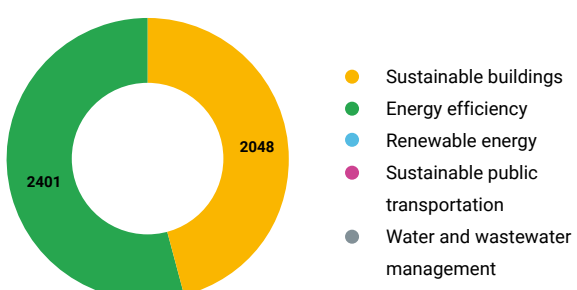
The total estimated direct annual CO_2 emissions avoided of green projects in 2018 is 1,187 tCO_2. The corresponding estimated total annual energy savings of the projects amount to 4,450 MWh. A breakdown of the calculated positive environmental effects by project category is presented in more detail in the following graphs.

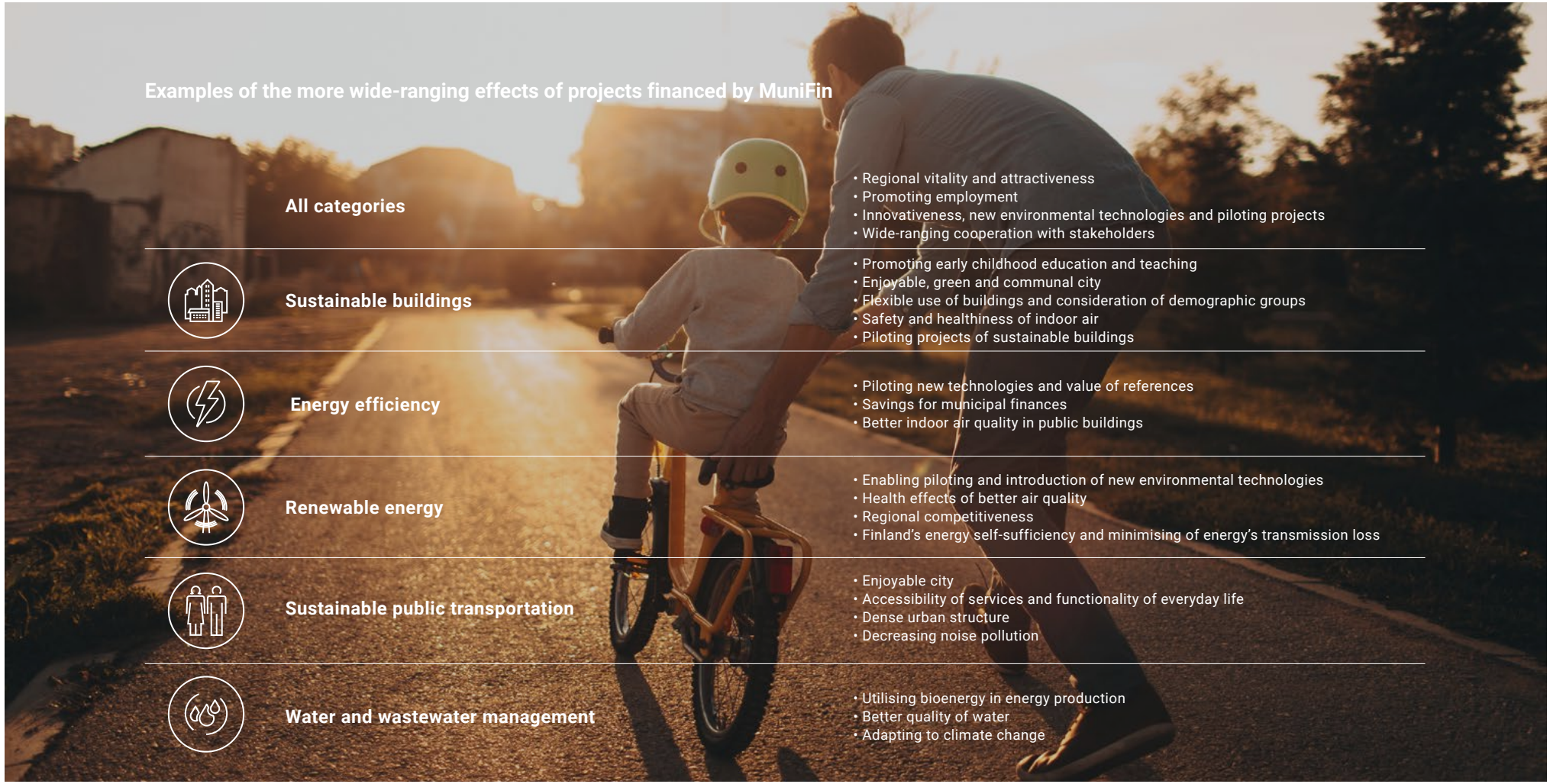
Besides the qualitative environmental benefits discussed in this report, the projects for which MuniFin has granted Green finance also have other wide-ranging effects. In addition to environmental benefits, the projects' key characteristics include various social and economic effects that are beneficial at individual level as well as locally and regionally. Offering financing for projects provides MuniFin with the opportunity to engage in activities such as supporting regional vitality and attractiveness, enabling projects aimed at improving people's wellbeing, and promoting the introduction of new, even more environmentally friendly technologies.

Annual (tCO_2) emissions avoided by project category 2018



Annual energy savings (MWh) by project category 2018





Examples of the more wide-ranging effects of projects financed by MuniFin

All categories	• Regional vitality and attractiveness • Promoting employment • Innovativeness, new environmental technologies and piloting projects • Wide-ranging cooperation with stakeholders
Sustainable buildings	• Promoting early childhood education and teaching • Enjoyable, green and communal city • Flexible use of buildings and consideration of demographic groups • Safety and healthiness of indoor air • Piloting projects of sustainable buildings
Energy efficiency	• Piloting new technologies and value of references • Savings for municipal finances • Better indoor air quality in public buildings
Renewable energy	• Enabling piloting and introduction of new environmental technologies • Health effects of better air quality • Regional competitiveness • Finland's energy self-sufficiency and minimising of energy's transmission loss
Sustainable public transportation	• Enjoyable city • Accessibility of services and functionality of everyday life • Dense urban structure • Decreasing noise pollution
Water and wastewater management	• Utilising bioenergy in energy production • Better quality of water • Adapting to climate change

Number of projects

11

Annual energy savings (MWh)

2,048

Annual CO_2 emissions avoided (tCO_2)

539

Sustainable buildings

In 2018, MuniFin financed 11 sustainable building projects under the Green Framework in 8 localities in Finland. The projects consisted of nine educational buildings, one new block of flats and one renovation of a residential building.

The ultimate goal of sustainable building projects financed by MuniFin is to make the buildings as energy efficient as possible. They take advantage of factors such as renewable energy use, energy process efficiency, and the use of intelligent control systems in order to achieve significant energy savings compared to the minimum requirements of energy efficiency legislation. Energy class B is achieved for all the buildings within the scope of the sustainable buildings project category.

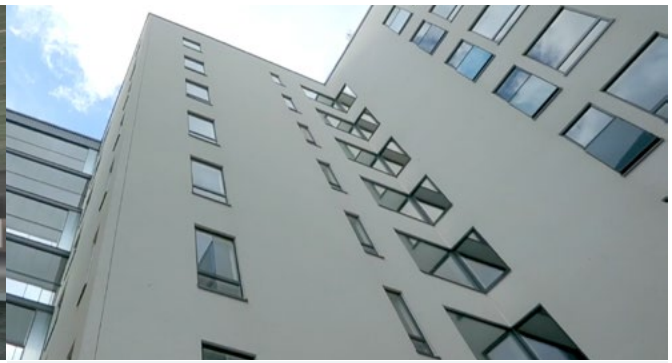
Compared to the minimum energy efficiency of new constructions, the estimated annual total amount of energy savings achieved through the sustainable building projects is 2,048 MWh. As a result of the energy savings, an estimated 539 tons of CO2 emissions are avoided each year.

In addition to the calculated positive environmental impact, the projects have broader social and economic effects:

- Many school buildings are designed from start to finish to enable the most flexible and versatile use of the premises, promoting the wellbeing and pedagogical objectives of those who use the buildings.
- MuniFin offers financing for public infrastructure projects (which cover schools, day care centres, fire stations and nursing homes) that play an important role in attracting working-age people to municipalities. High quality public buildings can thus have an indirect effect on the attractiveness and economic situation of municipalities.
- In addition to actual teaching facilities, such buildings house library services, youth centres and sports facilities, enabling their use during evenings and weekends, in order to serve a range of population groups. Many educational buildings are also designed to be modular and have lightweight structures, supporting the flexible use of the premises.
- Many new educational buildings replace old premises that have been deemed to be in poor condition, and the new buildings have been constructed with a focus on ensuring good indoor air quality in order to improve the safety of the users of the premises and to reduce adverse health effects.
- Sustainable building projects can act as important piloting sites for promoting sustainable construction (such as wood construction, outdoor and green spaces and intelligent systems).

Sustainable building projects are often implemented based on the public-private partnership (PPP) model. The implementation model for sustainable building projects enhances the sustainability performance of the buildings over their life cycle. PPP is a long-term arrangement in which the public sector acts as the project customer and owner and a private sector operator acts as a contractor for a building project.

In a PPP project, the contractor is responsible for the 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. Higher energy efficiency targets are therefore likely to be met in PPP projects.



In 2018, MuniFin financed the construction of energy-efficient school buildings in several localities in Finland:

Mansikkala wood school life cycle project

The new, 11,000 square metre school centre constructed in Imatra, scheduled for completion in autumn 2020, will be the largest wood school in Finland. The new school centre is a combination of an ecological approach, modern wood construction, and adaptable and versatile premises. The new centre will provide premises for the educational development of the pupils of three primary schools and the students of Imatra high school, which is more than 1,000 children and young people in total. The wood school in Mansikkala will be implemented as a life cycle project: the operator responsible for the design and construction of the building, and for its maintenance for the next 20 years, will be one and the same. In addition to ecological building materials, the school's energy efficiency will be clearly better than the minimum levels required by the Finnish Building Code. The implementation of Mansikkala wood school as a life cycle project not only brings ecological value added but offers a guarantee for the EUR 45 million investment in this innovative and bold project.

Lehtomäki day care centre

The new Lehtomäki day care centre in Kouvola has been designed in an environmentally friendly manner in cooperation with the children who use the building and their parents. Designed for 120 children, the day care centre has a wooden structure and is moveable. The building also has a flexible layout and can be easily adapted to the users' needs with partitions, for example. Heating costs are partly offset with the ecological geothermal heating system and the building itself generates electricity with solar panels, making the day care centre very energy efficient.

New school buildings in Joensuu

There are up to four new environmentally friendly school buildings under construction in Joensuu, which are eligible for green financing. Hammaslahti day care centre, Hukanvaara day care centre and Rantakylä school centre are all new schools centres, while the Heinävaara school centre is being expanded with a new, ecological building.

Financing was also granted to the construction of the first block of flats with the Nordic Ecolabel in the Helsinki capital region:

VAV Asunnot's Nordic Ecolabel apartment building

The block of flats with a Nordic Ecolabel built in Vantaa is not only the first of its kind in the Helsinki capital region – once completed, it will also be Finland's largest building with a Nordic Ecolabel. The building, which has 127 flats in total, has been carefully implemented based on life cycle thinking and according to the Nordic Ecolabel standards. The block of flats consists of two separate buildings, the ecology of which is highlighted not only by their energy-efficient use but also by the environmentally friendly material choices. The aim was also to minimise the environmental load during the construction phase: 74 percent of all construction waste was properly recycled using optimised supply chains and new technologies.

Number of projects

4

Annual energy savings (MWh)

2,401

Annual CO_2 emissions avoided (tCO_2)

615

Energy efficiency

In 2018, MuniFin financed 4 projects aimed at improving energy efficiency. The project sites are located in Pielavesi, Jyväskylä, Kotka and Lahti. Improving the energy efficiency of buildings is a cost-effective way of reducing carbon dioxide emissions: small actions can help achieve significant energy savings in the short term. A total of around EUR 4 million in financing was allocated to the projects by MuniFin and the estimated annual amount of energy savings to be achieved is 2,401 MWh. This equals a reduction of more than 615 tCO_2.

Energy efficiency projects offer municipalities an effective way of making cost savings, enabling them to use the saved money for other purposes and to boost their economy.

In addition to the calculated positive environmental impact, the projects have broader social and economic effects:

- Energy efficiency projects offer municipalities an effective way of making cost savings, enabling them to use the saved money for other purposes and to boost their economy.
- The projects enable the piloting of new technologies within the Finnish local government sector, while serving as a reference for the companies that develop the technologies. This plays a key role from the perspective of the scalability and export potential of the solution, for example.
- Another goal for the projects is to improve the indoor air quality of buildings. Indoor air quality plays a key role from the perspective of users of the buildings (such as schools, sports facilities, libraries and day care centres). Solutions that work can be used to indirectly improve the wellbeing of many people.

In 2018, the energy efficiency project category included, for example, the following projects:

In the city of Jyväskylä, the ESCO concept is applied in the implementation of 11 energy saving projects concerning public buildings. The ESCO (Energy Service Company) concept means an activity in which the service provider takes full responsibility for the implementation of an energy savings project for reducing the energy costs of a building, and maintains the system to ensure energy savings during the agreement period. The actions are also implemented so as to maintain or improve the perceived indoor air quality. The project's key goals are to improve the total energy economy of the buildings, maintain and raise their indoor air quality, minimise their carbon footprint and environmental loading, as well as increase the buildings' energy efficiency and level of technology through the improvements made. In Jyväskylä, the projects are helping to improve the energy efficiency of buildings such as the Vaajakoski swimming bath, the City Theatre and several schools.

The City of Kotka is replacing its current streetlight system with a new LED system, one area at a time. In 2018, the new system was installed in the Rauhala district. In previous years, MuniFin has financed similar projects in the Ristikallio and Otsola districts of Kotka. LEDs have many advantages over incandescent light sources, including lower energy consumption, a longer lifetime, improved physical robustness, smaller size, and faster switching. Several demonstrations have shown that reduced maintenance costs due to their extended lifetime, rather than energy savings, is the primary factor in determining the payback period for an LED product. Green finance also enabled the renewal of the streetlight system in the municipality of Pielavesi in 2018.

Number of projects

2

Renewable energy

MuniFin granted a loan to two renewable energy projects in 2018. However, the financing granted to these projects was not withdrawn by the end of 2018, and therefore their environmental impact has not been taken into consideration in the calculations presented in this report.

By financing renewable energy projects, MuniFin is doing its part to promote Finland's long-term goal of becoming a carbon-neutral society. Efforts are being made to increase the use of renewable energy to meet the targets set in Finland's national energy and climate strategy and the Government Programme. The national energy and climate strategy was updated in 2016. The strategy outlines the concrete actions and targets with which Finland aims to meet the energy and climate targets of the current Government Programme and the EU for 2030. Finland's targets for renewable energy use are 50% of final consumption and a 55% energy self-sufficiency rate. Concrete actions announced by the Government will end the use of oil for heating its office premises by 2025, and the Government is urging local governments and other public operators to do the same.

In addition to the calculated positive environmental impact, the projects have broader social and economic effects:

- Piloting new environmental technologies and making their deployment possible.
- Renewable energy is emission-free during the production phase, and the reduced use of fossil fuels and resulting lower levels of air pollution have an impact on the health of local residents, improving the environment and thereby having an impact on public sector health care costs.
- Diversified energy production has a positive impact on regional competitiveness and the local employment situation. It also enables the development of a new business model, thereby promoting the emergence of new types of partnerships in energy production.
- Renewable energy projects reduce Finland's dependence on oil and natural gas, increasing energy self-sufficiency and thereby reducing various risks, such as those related to oil price fluctuations.
- Energy can be produced closer to its place of use, thereby reducing the number of deliveries as well as distribution and transmission losses – this has both environmental and economic effects on society. For example, the price of solar power has dropped rapidly in recent years. At best, the price was lower than the market price, providing major savings to operators who use solar power.

By financing renewable energy projects, MuniFin is doing its part to promote Finland's long-term goal of becoming a carbonneutral society.

The planned Ranta-Koivisto bio-fuelled heating plant in Kangasala

Kangasalan Lämpö Oy will invest in a 12 MW bio-fuelled heating plant that will be connected to the city centre's district heating network. The plant will have two boilers with the nominal power of 6 MW and boiler-specific flue gas recovery systems. Special attention has been given to operational reliability and energy efficiency when designing the plant. The plan is also to install solar panels on the heating plant's roof surfaces for solar power production purposes.

The investment will allow Kangasalan Lämpö Oy to stop using the Pikkola and Lukonlämpö natural gas-fuelled plants and storing oil, which is used as reserve fuel, in the groundwater area. In the future, the Pikonkangas natural gas-fuelled heating plant will remain in backup power and peak load usage. The main fuel of a bio-fuelled heating plant is wood chips and, when switching from fossil fuel – natural gas – to using renewable biofuels, the estimated CO2 emissions avoided is approximately 12,000 tonnes per year.

The construction project is scheduled to start in the spring of 2019 and production use is expected to begin in the first half of 2020.

Number of projects

1

Annual CO_2 emissions avoided (tCO_2)

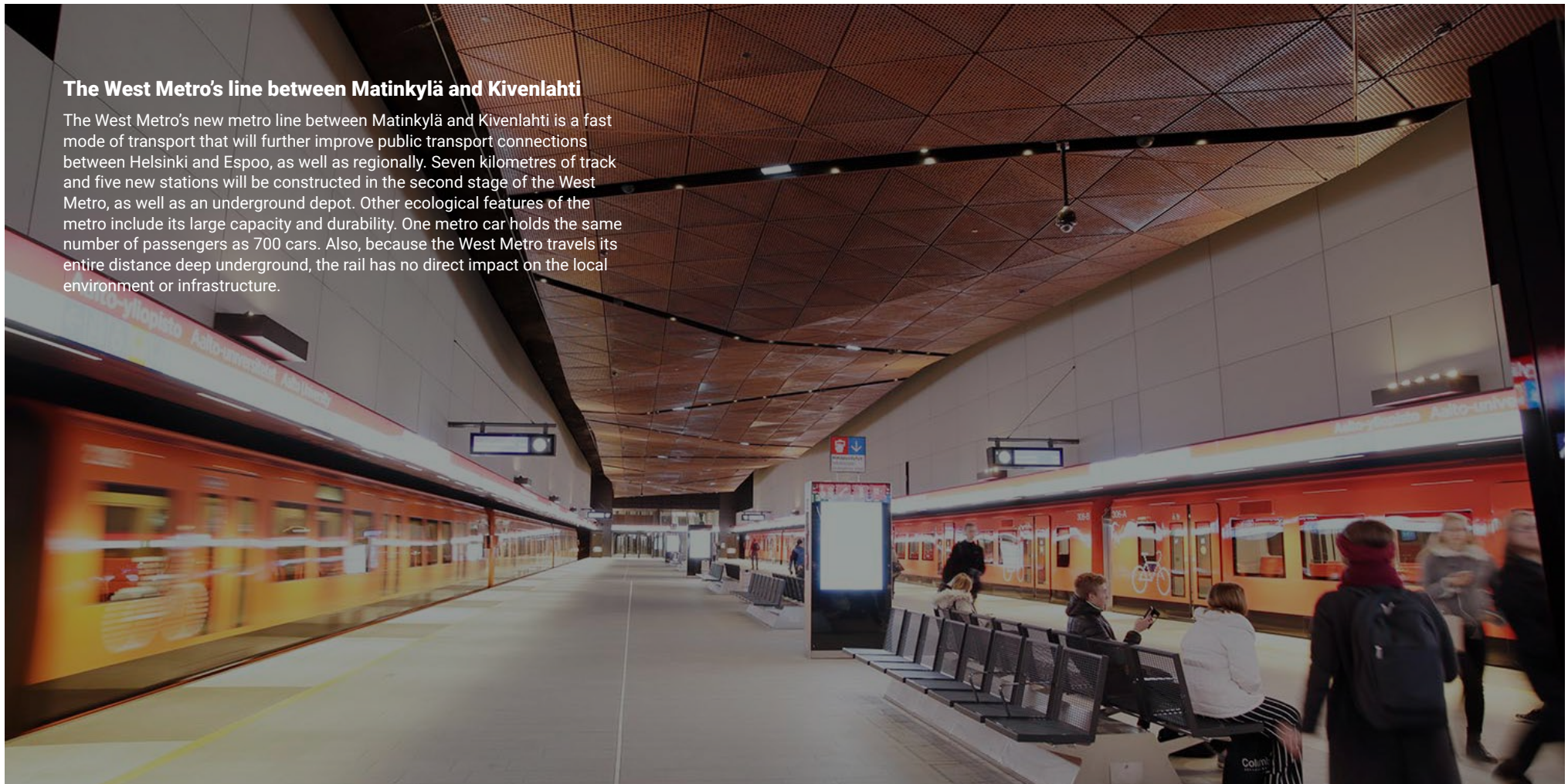
32

Sustainable public transportation

In 2018, MuniFin contributed to the financing of a major national public transportation project: the West Metro carried out by Länsimetro Oy in the Helsinki capital region, between Matinkylä and Kivenlahti in Espoo. Based on MuniFin's contribution, the weighted annual amount of CO2 emissions avoided, when calculated for sustainable public transportation projects, is roughly 32 tCO2. The indirect effects of public transportation projects often significantly outweigh their calculated direct impact. The projects enable issues such as more environmentally friendly urban development, the diversification of the city structure, densified housing production, and expanding the city beyond its traditional central area. Furthermore, new sustainable modes of transport have a wide range of effects on the everyday lives and wellbeing of people.

In addition to the calculated positive environmental impact, the projects have broader social and economic effects, as follows:

- Rail transport solutions replace the consumption of fossil fuels, while reducing private car use and the amount of other traffic in urban areas. This has an impact on how pleasant a city is perceived to be, as well as on people's health through improvements such as less peak traffic and improved air quality.
- Public transportation improves the perceived efficiency of everyday services, through greater accessibility and more accurate travel times. Public transportation makes travelling between home and the workplace, school and other public services easier and reduces the time that people spend travelling on a daily basis.
- Functional public transportation enables the densification of urban areas as housing production and services become centralised around public transport nodes. As opposed to spread land use, a densified city structure and land use will help to reduce energy consumption in the community, which means that the indirect emission avoidance through new, sustainable public transportation solutions will be greater than the calculated direct impact.
- Both metro and tram lines reduce noise pollution in urban environments, as well as being safe modes of transport. In addition, modern public transportation solutions are fully accessible by people who travel with strollers, people in wheelchairs, visually impaired people, and people with reduced mobility.



The West Metro's line between Matinkylä and Kivenlahti

The West Metro's new metro line between Matinkylä and Kivenlahti is a fast mode of transport that will further improve public transport connections between Helsinki and Espoo, as well as regionally. Seven kilometres of track and five new stations will be constructed in the second stage of the West Metro, as well as an underground depot. Other ecological features of the metro include its large capacity and durability. One metro car holds the same number of passengers as 700 cars. Also, because the West Metro travels its entire distance deep underground, the rail has no direct impact on the local environment or infrastructure.

Number of projects

2

Water and wastewater management

In 2018, MuniFin financed two projects related to water and wastewater treatment in Turku and Heinola. Projects in this category play an important role in securing wastewater treatment for the regions, responding to stricter purification requirements, and improving regional capacity to adapt to climate change.

In addition to the calculated positive environmental impact, the projects have broader social and economic effects, as follows:

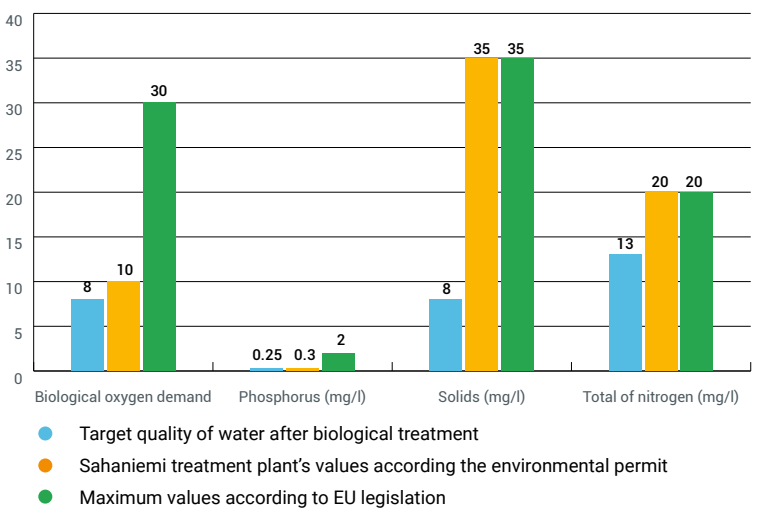
- The sludge generated as a by-product in water management processes is an excellent source of renewable energy. The sludge from the process is dried, after which it is either made into biogas at the plant or transported for raw material use to a separate biogas plant.
- Effective water purification improves the quality of water, reducing the environmental impact of water consumption by minimising, for example, the nutrient load of water discharged to bodies of water.

In Turku, MuniFin is financing the construction of a new sewer pipeline. The capacity of the sewer pipeline must be enhanced in order to ensure high-quality wastewater treatment for meeting the needs of the community in the Turku region for decades to come. Once the project is completed, the load caused by wastewater discharged to the Turku sea area will be significantly reduced. At present, wastewater is released from the treatment plant via a stormwater drainage system to an outlet located in the Turku harbour. The stormwater drainage system was built in the 1950s and 1960s, and its capacity is not sufficient for wastewater and stormwater management. After repairs, the stormwater drainage system, which has been used to dispose of treated wastewater, can be wholly dedicated to stormwater management, for example. This means that the new sewer pipeline will also improve the city's ability to adapt to the predicted increased rainfall volume, lowering the risk of flooding.

MuniFin finances the renovation and extension work of the Sahaniemi wastewater treatment plant in Heinola. During the first phase of the renovation, the aeration tanks will be expanded, the plant's sludge drying beds will be renewed, and a methanol injection system will be constructed. Other machinery, instrumentation, electrical equipment and automation will also be renewed, and various repairs carried out. The renovation and extension work will be carried out in two phases. The first phase, which started in the spring of 2018, will be completed in the spring of 2019. The wastewater treatment plant was previously renovated to a similar extent in the 1990s. The environmental permit's requirements have become stricter and basic renovation is thus needed.

The renovation and extension work will enhance the treatment plant's capacity. The following graph shows the capacity of Sahaniemi wastewater treatment plant in relation to EU requirements. The evaluation compares the maximum values for the wastewater treatment plant under the environmental permit, the target quality of water for the plant's biological treatment process, and the maximum values allowed by EU legislation.

The capacity of Sahaniemi wastewater treatment plant in relation to EU requirements



Calculation principles

The calculations presented in the report were carried out on the basis of the guidelines for green bonds impact reporting jointly drawn up by Nordic public sector issuers.* Information from public sources (e.g. the emission factors), as well as data and reports directly related to the projects (e.g. project-specific environmental calculations) have been used in the calculations. Where necessary, the information has been supplemented by requesting further information from the parties that implemented the projects. The weighted impact has been calculated on the basis of MuniFin's share of the total investment in each project. MuniFin's contribution has been calculated on the basis of the loan amount withdrawn at the end of 2018.

Emission factors used in the calculations:

- In the calculations, the emission factor for electricity is 380 g CO_2 based on the harmonised Nordic recommendations for green bond reporting (Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting, 2017)
- The emission factor for district heating is based on the values for the total or separate production of district heating reported by Motiva, according to the project locations (www.motiva.fi)
- Emission factors relating to traffic and transport are based on LIPASTO – a calculation system for traffic exhaust gas emissions and energy consumption in Finland (www.lipasto.vtt.fi/)
- With regard to projects whose estimated impact is based on the calculation results presented in project-specific environmental reports, the emission factors are those used in the original calculations

*Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting (2017)

Calculation principles by project category:

Sustainable buildings

Annual energy efficiency improvements and the amount of CO_2 emissions avoided are assessed in relation to applicable energy efficiency regulation in Finland. The energy efficiency of a building is presented as an E-value. The Finnish building code has defined a building-type-specific maximum E-value, which a new building should not exceed in order to gain a building permit. The maximum E-value allowed for a new building is used as the basis for calculating the energy efficiency of buildings. The minimum and maximum limits for the E-value were tightened at the beginning of 2018 with the adoption of a new regulation, however, to ensure comparability and coherence, the positive environmental impact achieved for the year 2018 were calculated using the old limit values. The planning phase of most of the projects took place before the entry into force of the new regulation, which supports selecting this approach.

The E-value represents a building's annual consumption of purchased energy, according to the heated net area (kWh/m2/a) and based on the standard use of the building type and the weighted factors of the energy sources used. In the evaluation, solar or wind energy generated on the property is treated as a reduction in demand for purchased energy.

The estimated emission avoidance impact is calculated by using the emission factors for the production of electricity and district heating. Different forms of energy are weighted according to their proportions presented in the building's energy certificate. The emission factor for electricity in the calculations is 380 g CO2/kWh. The values for total or separate production of district heating reported by Motiva are used in district heating calculations, based on the project locations.

Energy efficiency

The annual improvement in energy efficiency and the amount of CO2 emissions avoided are evaluated through the reduction of energy use in relation to a replacement solution, which serves as the baseline for the calculations. The annual estimated energy savings are based on the savings calculations carried out in the projects.

The estimated amount of CO2 emissions avoided is calculated by using the emission factors for electricity and district heating production. The emission factor for electricity in the calculations is 380 g CO2/kWh. The values for total or separate production of district heating reported by Motiva are used in district heating calculations, based on the project locations.

Renewable energy

The renewable energy calculations were carried out on the basis of project-specific emission calculations. With regard to the projects implemented in 2017 discussed in this report, the amount of CO2 emissions avoided in the renewable energy project category is based on the emission calculations carried out during the planning phases of the Viialantie heating plant and Energy Self-sufficient Lempäälä projects, and the estimated amount of CO2 emissions that can be avoided through the project in question.

The estimated annual production of renewable energy is based on further information requested from the energy company Lempäälän Energia Oy on the different forms of energy production and estimated energy production of the Energy Self-sufficient Lempäälä project. With regard to fuel cells and gas engines, the estimated total production is weighted using the percentage share of biogas, which is estimated to be 50% on the basis of the target set for biogas use.

Sustainable public transportation

With regard to sustainable public transportation, the amount of CO2 emissions avoided is based on the emission calculations carried out during the planning phases of the West Metro Extension and the Tampere Tramway project financed in 2017, and the estimated amount of CO2 emissions that can be avoided through the project in question. The estimated emissions avoided presented in the emission calculations for the projects have been weighted with MuniFin's contribution.

Water and wastewater management

With regard to projects financed in 2018 in the water and wastewater management category, the data presented in the report is based on reports drawn up during the projects' planning phases. Wastewater treatment plants and their capacity were evaluated in relation to the minimum requirements in force in the EU and Finland.

The information used to evaluate the impact of the Kalajokilaakso central wastewater treatment plant, financed in 2017, is based on information on the annual amounts of wastewater treated at the plant and the estimated energy production of the biogas plant, which was requested from Vesikolmio Ltd, the company implementing the project.

Municipality Finance Plc
Jaakonkatu 3 A, P.O. Box 744
00101 Helsinki, Finland
Tel. +358 9 6803 5666
www.munifin.fi
firstname.lastname@munifin.fi