Kommuninvest Green Bonds Impact Report, December 2018

KOMMUNINVEST

Report on 227 Swedish local government investment projects financed by Kommuninvest Green Bonds as of year-end 2018

At 31 December 2018, Kommuninvest had disbursed a total of SEK 25.8 (19.9) billion, equivalent to USD 2.9/EUR 2.5 billion, in Green Loans to investment projects aligned with our Green Bond Framework.

This report presents the expected impacts of these projects, the governance process to verify and select them and the impact reporting methodology we apply. Unless otherwise indicated, the reported impact is Scope 1 and 2 according to the Greenhouse Gas Protocol. Impact is reported for the aggregated portfolio of eligible assets as of 31 December 2018.

GREEN LOANS	GREEN BONDS
25.8 SEK bn	20.4 SEK bn
Green Loan Ratio[1]: 7.4 %	Green Bond Ratio[2]: 5.1 %

Annual greenhouse gas (GHG) emissions savings

662,390 tCO_2

638,932 tCO_2
avoided annual emissions[3]

23,458 tCO_2
reduced annual emissions[4]

29.7 tCO_2
Impact, tonnes CO_2e per SEK mn
(relevant to 85 % of Green Loan disbursements)

3.0 TWh
Annual renewable energy generation

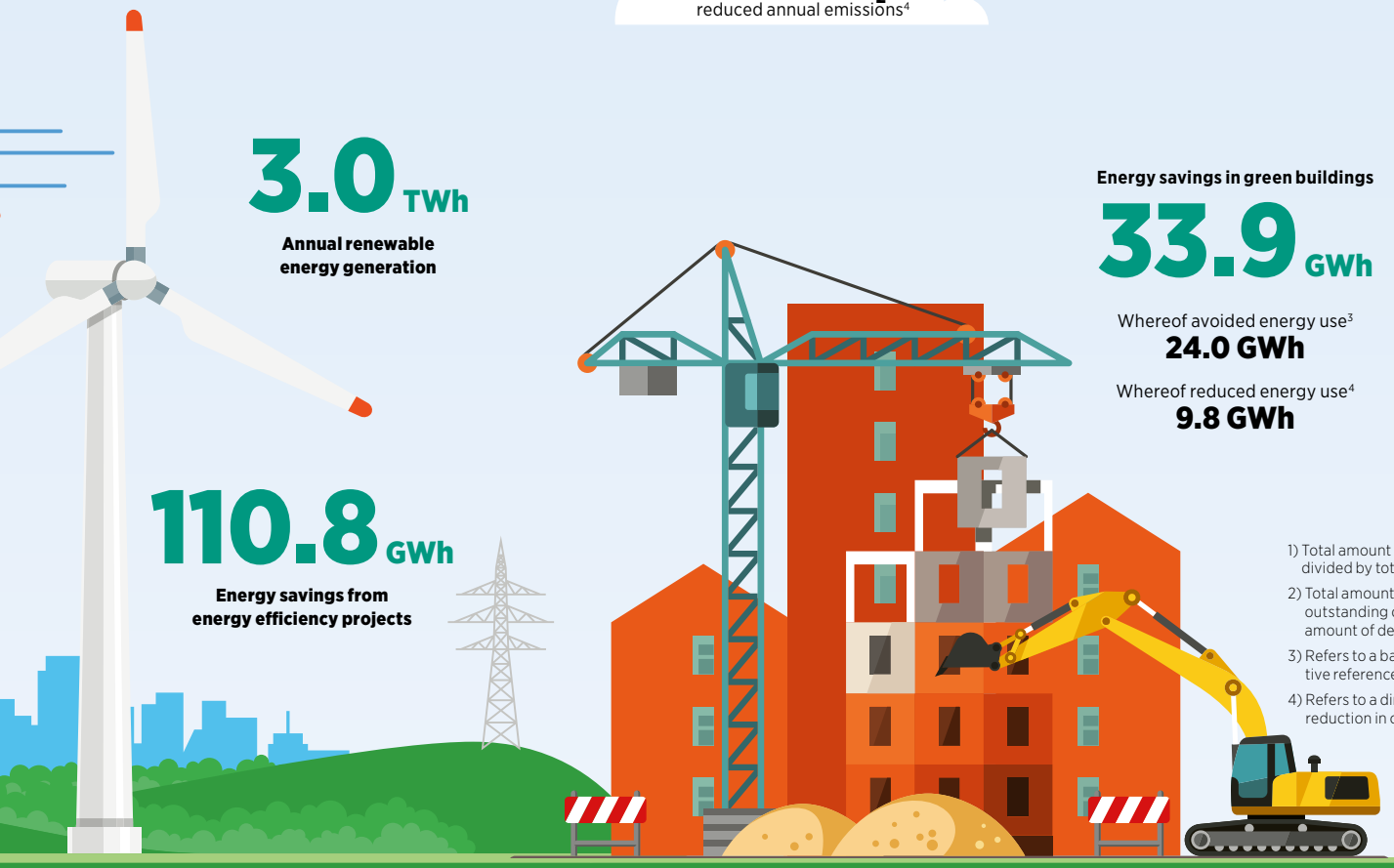
110.8 GWh
Energy savings from energy efficiency projects

Energy savings in green buildings

33.9 GWh

Whereof avoided energy use[3]
24.0 GWh

Whereof reduced energy use[4]
9.8 GWh



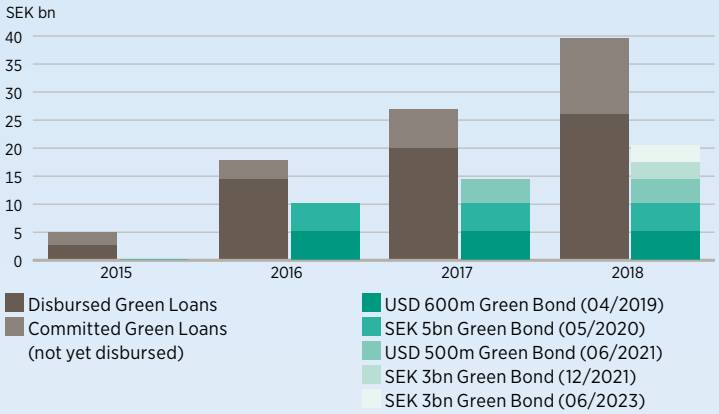
1) Total amount of Green Loans divided by total loan portfolio.
2) Total amount of Green Bonds outstanding divided by total amount of debt outstanding.
3) Refers to a baseline/alternative reference scenario.
4) Refers to a direct or absolute reduction in operation.

Kommuninvest reports its Green Bonds impact in accordance with the "Nordic Public Sector Issuers: Position Paper on Green Bonds Impact Reporting", published by a group of Nordic public sector green bond issuers. If we deviate from the Position Paper recommendations in our reporting, this will be indicated.

Executive Summary

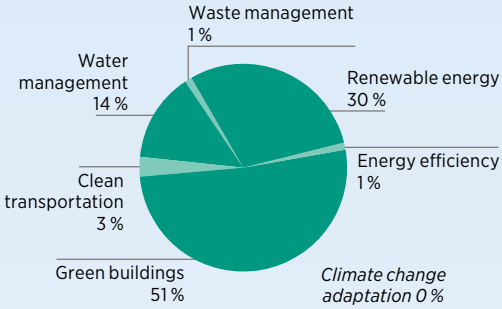
AS OF 31 DEC 2018

GREEN BONDS ISSUANCE AND GREEN PROJECT PORTFOLIO



GREEN PROJECT PORTFOLIO DISTRIBUTION

based on disbursed amounts



CO_2 IMPACT AND GREEN INDICATORS

based on outstanding disbursed amounts[1]

Project category	GHG emissions reduced/ avoided, tonnes CO_2e/year	Outstanding disbursed amounts to projects, SEK mn	Impact, tonnes CO_2e per SEK mn
Renewable energy	634,446	7,878	80.5
Green buildings	4,915	13,295	0.4
Energy efficiency	21,796	235	92.7
Clean transportation	651	730	0.9
Waste management	583	155	3.8
Water management	n/a	3,442	n/a
Climate change adaptation	n/a	16	n/a
Total	**662,390**	**25,750**	**n/a**
Disbursed amounts with CO_2 impact		**22,293**	
Impact, tonnes CO_2e per SEK mn			**29.7**
Annual renewable energy generation, GWh			**3,032,220 MWh p.a.**
Annual energy reduced/avoided, MWh			**144,706 MWh p.a.**

1) This table presents the calculated impact in terms of CO_2 reduced or avoided. Aggregated project data reported represent both ex-ante estimates and ex-post outcomes. Reporting methodology presented on pages 38–46. The complete project-by-project-reporting is available in spreadsheet format at kommuninvest.se ==> For investors ==> Green Bonds ==> Impact Reporting.

Impact attributable to green bond investors[1]	78%
Whereof impact attributable to Green Bond USD 600 mn maturing 23 April, 2019	19%
Whereof Impact attributable to Green Bond SEK 5 bn, maturing 5 May, 2020	19%
Whereof Impact attributable to Green Bond USD 500m, maturing 1 June, 2021	17%
Whereof Impact attributable to Green Bond SEK 3 bn, maturing 15 December, 2021	12%
Whereof Impact attributable to Green Bond SEK 3 bn, maturing 1 June, 2023	12%

1) Total outstanding green bonds divided by total outstanding disbursed amounts to projects (in SEK).

KEY PROCEDURAL ASPECTS

- Kommuninvest's Green Project portfolio exclusively consists of Green Loans to Swedish municipalities and county councils/regions.
- Each loan is selected according to the Kommuninvest Green Bonds Framework (see pages 14–16). The complete framework is available online.
- Kommuninvest reports on a portfolio basis, and in Swedish kronor (SEK). F/X rate as per the date of Green Bonds issuance.
- For this document, the reporting period ends on 31 December 2018.

KEY REPORTING METHODOLOGY

- Kommuninvest reports on the basis of the share of the project's total investment cost financed with green bonds (net of redemptions).
- Impacts are based on outstanding disbursed amounts to projects.
- Total amounts committed (net of redemptions) are indicated for reference.

Contents

KOMMUNINVEST

kommuninvest.se

Cover page: Shutterstock

ISBN: 978-91-983081-3-6

About Kommuninvest

Kommuninvest is a Swedish municipal cooperation set up in 1986 to provide cost-efficient and sustainable financing for local government investments in housing, infrastructure, schools, hospitals etc. The cooperation comprises 289 out of Sweden's 310 local governments, of which 277 municipalities and 12 county councils/regions. Kommuninvest is the largest lender to the Swedish local government sector and the sixth largest credit institution in Sweden. At year-end 2018, total assets were SEK 417 billion (USD 46.5 billion[1]), with a loan portfolio of SEK 356 billion (USD 39.6 billion). The head office is located in Örebro.

1) USD/SEK=8.971 as of 31 Dec, 2018

About this report

This report was written and compiled by:

- **Björn Bergstrand,** Head of Sustainability/Senior Investor Relations Manager, Kommuninvest i Sverige AB
- **Erik Törnblom,** Analyst, Kommuninvest i Sverige AB

Any errors, omissions or otherwise are our responsibility. Project impact reporting is based on data collected from financed projects during Q1-2019. The data has been reviewed by Kommuninvest however their accuracy has not been verified by neither Kommuninvest nor a third party. Climate impact calculations have been made by Kommuninvest, and their accuracy has not been verified by a third party. The information has been reviewed and approved for publication by the Kommuninvest Environmental Committee, whose members are presented on page 16.

Green finance A catalyst for change

Green bonds are a major innovation and a key enabler for capital markets. We believe their greatest benefit is how they promote interdisciplinary cooperation at the project owner/borrower level.

The members of the Kommuninvest Green Bonds Environmental Committee: Sara Pettersson, City of Gothenburg; Susanne Arneborg, Municipality of Borås; Björn Söderlundh, Kommuninvest; Hanna Ryman, Municipality of Örebro; Andreas Hagnell, Swedish Association of Local Authorities; Marta Fallgren, Region Uppsala. The Committee also includes Daniel Nyqvist and Ann Sörman from Kommuninvest. As of April 2019, Lisa Järner, City of Mölndal, replaces Sara Pettersson.

THE ROLE CAPITAL MARKETS and green bonds can play in the transition to a sustainable global economy are becoming increasingly clear. The European Commission's Action Plan on Financing Sustainable Growth, launched in March 2018, sets out the strategy to further connect finance with sustainability, including the establishment of a taxonomy for sustainable economic activities and the proposal for a Green Bond Standard in the European Union.

We know that a large share of the investments needed to support a climate-resilient, sustainable economic system that mitigates climate change and stops depletion of natural capital has to be financed by bond markets. Green bonds have grown rapidly in size and market scope, enabling a larger share of capital flows to be consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.

Green bonds represent a considerable innovation through their focus on green use of proceeds, tracking, impact reporting and external reviews. But the greatest benefit, in our view, is how the green loans linked to the green bonds promote interdisciplinary cooperation at the project owner/borrower level, allowing finance and environmental professionals to interact on common topics and challenges. In our experience, this can bring about real green additionality, resulting in incremental investments that may otherwise not have taken place.

One of Kommuninvest's more progressive green loan borrowers, the Municipality of Skövde, with around 50 percent of its external funding in green loans, is a good example. Here, thanks to increased cooperation between the finance, environmental and property departments, internal policy and budget hurdles have been removed, resulting in incremental energy efficiency investments and a tenfold increase in solar energy investments.

Strong demand for green loans by Kommuninvest's members has enabled Kommuninvest's leading position in green bond markets. It has also attracted considerable international attention for the Swedish model for municipal financing. Overall, Swedish municipalities, banks and corporates are leading the way – analysis shows that the proportion of green bonds in the bond market is higher here than anywhere else.

We want to thank green bond investors for your continued support of the green transition in Swedish local governments. As this report shows, the impacts from the projects that you finance are considerable. In our continous efforts to develop reporting that meets your needs, we invite and value your feedback.

The role of Swedish local governments

Sweden aims to be one of the world's first fossil fuel-free welfare nations. To a large degree, Sweden's efforts are led by the local government sector, which accounts for the majority of public sector investments.

BY 2030, Sweden aims to have reduced its emissions by 63 percent compared with 1990; by 2045 Sweden should have no net emissions of greenhouse gases into the atmosphere. The overall objective of Sweden's environmental policy is to hand over to the next generation a society in which our country's major environmental challenges have been solved, without increasing negative environmental and health effects outside Sweden.

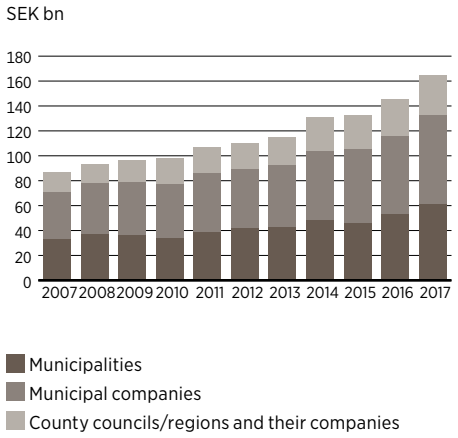
The commitment can be illustrated by the long-term multi-party agreement on Swedish energy policy, concluded in 2016 between five political parties. The agreement lays out the roadmap for a controlled transition to an electricity system entirely based on renewables by 2040.

The municipalities and regions are responsible for many of the welfare services Swedish citizens encounter on a daily basis, including education, childcare, healthcare, water management, waste management, local transport, etc. The local governments are also major employers. 23 percent of the total number of jobs in Sweden in 2017, were in the local government sector (in municipalities, municipal companies and regions).

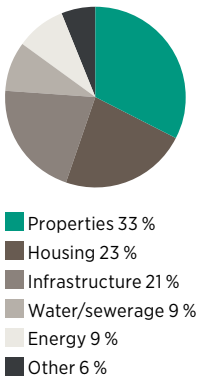
Swedish local government investments have been growing steadily for a long time and are expected to continue to grow, due to population growth, urbanization trends and demographic changes. Investments are to a large degree focused on areas where ambitious environmental objectives can be demonstrated, including commercial and residential real estate, water management, waste management, clean transportation, energy supply and other infrastructure.

More than 90 percent of the municipalities have set out own environmental targets or adopted national or regional goals. In addition to the major investments in green infrastructure that they undertake, local government are responsible for city planning and infrastructure and for environmental supervision. A survey from the spring of 2017 showed that nearly half of the municipalities and regions use UN's new global development goals, the Sustainable Development Goals, as a tool for sustainable development.

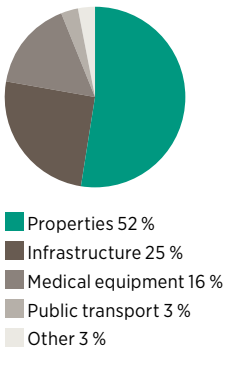
Local government investment volumes



Municipal investments, distribution (2017)



Regional investments, distribution (2017)



Case Uppsala Global climate city of the year

Financed projects*: Municipality of Uppsala: # 163; Region Uppsala: # 382, 404, 405, 406, 408, 409, 410, 411

Project categories: Energy efficiency in energy systems, Clean transportation, Green buildings, Water and wastewater management, Waste management

Disbursed (committed) Green Loans: Municipality of Uppsala: SEK 200 (1,000) million; Region Uppsala: SEK 300 (960) million

* The complete project-by-project-reporting is available for download in spreadsheet format at kommuninvest.se ==> For investors ==> Green Bonds ==> Impact reporting

Recognising that cities are the hotspots for development of transformative climate change solutions, WWF's One Planet City Challenge aims to mobilize cities to deliver on the Paris Agreement. Swedish cities like Göteborg, Umeå and Stockholm have historically competed to win; in 2018 Uppsala finally eclipsed it.

Winning cities are recognized for best practice and a strategic approach in climate mitigation and adaptation plans. This is true for Uppsala, which aims to be fossil-free in 2030 and has incorporated the UN SDGs into the city's long-term objectives.

– Green finance brings about engagement and co-operation, and stimulates a holistic perspective, says David Arnell, Finance Strategist at the Municipality of Uppsala. The Green Loan Ratio is currently 8 percent and will likely grow; we recently amended the finance policy to facilitate the use of green finance for suitable investment projects.

One example is the Uppsala City Hall 2020 project (#163), which involves the creation of a new 27,000 sq.m. complex through renovation and new construction. Expected environmental and social benefits include a reduction in energy use and less travel due to co-location of municipal activities. The aim is BREEAM Excellent certification.

Ambitions are high also in Region Uppsala, the body responsible for healthcare and public transport (the latter jointly with the city). Several projects (#408, 409, 410, 411) are carried out at the Uppsala University Hospital, targeting energy efficiency, water management and waste management. The largest project (#404) is a new, ISO 14001-certified city bus depot, for buses powered by biogas, biodiesel and electricity. The project includes construction of a biogas pipeline to enable refueling at the depot.

uppsala.se

Kommuninvest – a provider of sustainable finance

Kommuninvest is the largest provider of credit to Swedish local governments and offers both labelled green financing and traditional balance sheet financing. The Green Loan ratio amounted to 7.4 (6.5) percent on 31 December 2018.

The role of Kommuninvest, a credit institution owned by 289 out of Sweden's 310 local governments, is to provide stable and cost-efficient funding for local government investments. 55 (51) percent of the external financing undertaken by Swedish local governments at year-end 2018 was through Kommuninvest.

Ours intermediary role between local governments and capital markets makes it possible to finance all the welfare investments carried out among members and customers – in new schools and housing, in energy production and other infrastructure – in an economically sustainable fashion. In spite of substantial growth in local government borrowing, debt levels of local governments are low and stable, at between 11-13 percent of GDP over the past ten-year period.

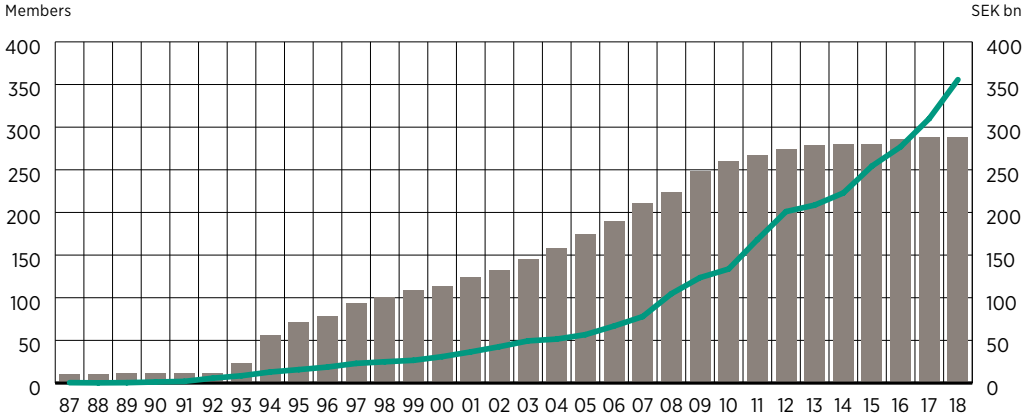
Kommuninvest's financing takes the form of both labelled green financing, ie. Green Loans for green investment projects, and non-labelled financing, for traditional balance sheet financing. From its start in 2015, Green Loans have grown increasingly popular. At year-end 2018, Green Loans represent 7.4 (6.5) percent of Kommuninvest's total lending.

Green Loans are important tools as Kommuninvest seeks to apply finance in support of its clients' efforts to transform the Swedish society to a low-carbon and resilient future, and other important environmental challenges. We fund the Green Loans by issuing Green Bonds in national and international capital markets. By year-end 2018, SEK 20.4 (14.4) billion was outstanding in five Green Bonds, see page 12.

Behaving ethically and taking responsibility for economic, environmental and long-term sustainable social development are fundamental elements of Kommuninvest's sustainability efforts. We also seek to promote a dynamic dialogue and communication with stakeholders. Key performance indicators related to sustainability are presented on the next page. Additional information can be found in the Sustainability Report, see pages 14-22 of the Annual Report 2018.

Number of members and lending volume, SEK bn

1987–2018



Kommuninvest's lending has grown primarily due to an increased number of owners/members, and owners/members choosing to place increasingly larger shares of their borrowing with Kommuninvest.

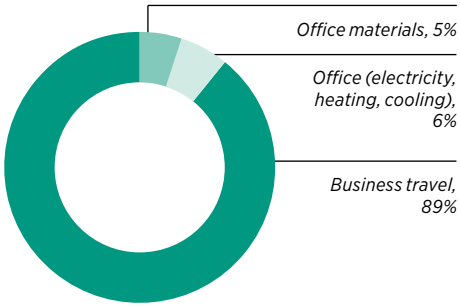
Number of members of the Kommuninvest Cooperative Society

Lending by Kommuninvest i Sverige AB

Focus on business travel to reduce our own footprint

About 90 percent of Kommuninvest's total climate impact (from own operations) is related to business travel, and this is where we focus our CO_2 reduction efforts. Over the past five years, Kommuninvest's business travel, particularly by air, has declined considerably. Air travel, measured in kilometres flown, has decreased by more than 60 percent. Over the same period, rail travel has increased by slightly more than 20 percent.

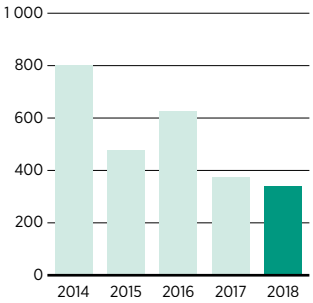
Distribution of total climate impact



The analysis related to the 2017 financial year and comparative values are not available.

Source: Tricorona Climate Partner

CO_2 emissions from business travel, tonnes



Source: Kommuninvest, based on data from Big Travel (an RFI factor of 2.7 have been applied to emissions to take into account the high altitude effects of air travel).

Environmental indicators – Kommuninvest Group

	Unit	2018	2017	2016
Energy consumption				
Total energy consumption (in buildings)	kWh	620,068	585,678	463,034
– of which, electricity	kWh	365,237	333,210	295,084
– of which, heating	kWh	254,831	252,468	167,950
Proportion of renewable energy in energy consumption of electricity	%	100	100	100
Change in electricity consumption compared to the preceding year	%	10	13	-1
Proportion of renewable energy in energy consumption for heating	%	100	100	100
Total office space	m^2	2,217	2,217	2,217
Total energy consumption per square metre	kWh/m^2	280	264	209
Total energy consumption per employee	kWh	6,392	6,436	5,447
Resource usage				
Purchased office paper	Tonnes	0.5	0.5	0.8
–of which sustainability labelled paper (PEFC)	Tonnes	0.5	0.5	0.8
Proportion of sustainability labelled office paper, of total purchases	%	100	100	100
Total paper consumption per employee	Kg	10.3	11.0	11.8
Paper recycling, incl. purchased and delivered paper	Tonnes	2.0	3.0	2.4
Business travel				
Total business travel	Km	862,896	887,488	1,319,646
Total business travel per employee	Km	8,896	9,753	15,525
Total air travel	Km	515,965	591,480	992,144
Rail travel in Sweden	Km	311,037	291,456	327,162
Total CO_2 emissions from business travel[1]	Tonnes	338.4	375.8	625.6
CO_2 emissions from business travel, per employee[1]	Tonnes	3.5	4.1	7.3

1) Effective from 2018, Kommuninvest observes a so-called RFI factor of 2.7 in its emissions calculations, with regard to the aviation industry's high altitude effects. Previously published emission values for 2017 and 2016 have been adjusted.

Ann Sörman, Customer Relationship Manager

Björn Söderlundh, Head of Lending

Daniel Nykvist, Deputy Head of Lending

Erik Törnblom, Analyst

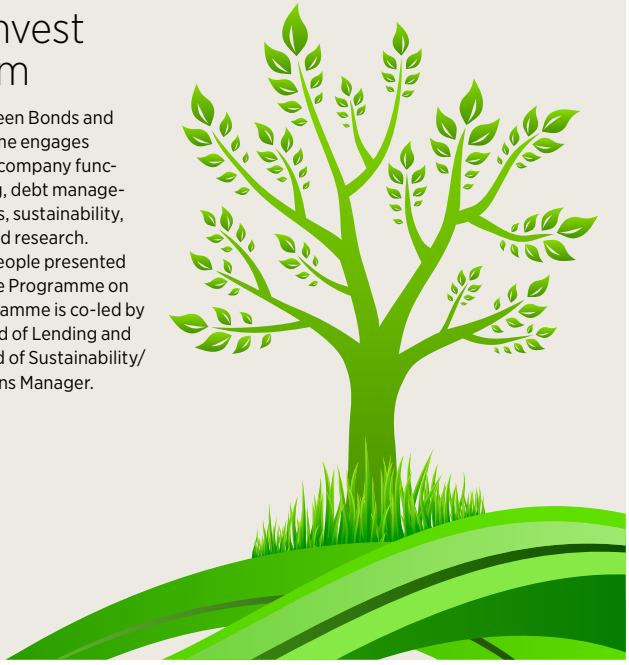
Patrik Stenman, Customer Relationship Manager

Theodora Batan, Business Control Manager

Björn Bergstrand, Head of Sustainability/ Senior Investor Relations Manager

Kommuninvest Green Team

The Kommuninvest Green Bonds and Green Loans Programme engages numerous staff across company functions, including lending, debt management, investor relations, sustainability, communications, IT, and research. The smaller group of people presented here are engaged in the Programme on a daily basis. The Programme is co-led by Björn Söderlundh, Head of Lending and Björn Bergstrand, Head of Sustainability/ Senior Investor Relations Manager.



Project #383 Nordic Swan eco-label to sustainable housing block with 177 apartments

Client: Eidar Trollhättans Bostadsbolag (Trollhättan Municipal Housing Company)

Investment cost: SEK 443 million

Green loans from Kommuninvest (disbursed amounts): SEK 230 million

Completed (year): 2018

Total energy performance/year: 59 kWh/m²

Total energy requirement (BBR25): 85 kWh/m²

Estimated CO_2 emissions reductions: 30 tonnes CO_2e per year

Impacts: Eidar, the municipal housing company in Trollhättan (pop. 58,728), has launched its first ecolabelled housing project, the Mars block with 177 apartments. The Nordic Swan ecolabel implies a quality-assured construction process with high environmental and health requirements for construction products, materials and chemical products. In addition, the apartments will have a low energy consumption. Care has been taken to the social aspects, with a welcoming inner yard comprising a conservatory, playground, outdoor gym and benches among plantings with edible fruit and berry bushes. The block also comprises housing for the elderly. Tenants will be provided with a 5-year free membership in a car pool.

eidar.se, trollhattan.se

Kommuninvest Green Bonds

KOMMUNINVEST ISSUED its inaugural Green Bond in March 2016 and by year-end 2018 had issued five Green Bonds in total, with an outstanding amount of SEK 20.4 (14.4) billion, equivalent to USD 2.3/EUR 2.0 billion. This made Kommuninvest the largest Swedish issuer of Green Bonds.

Kommuninvest's Green Bond Framework was reviewed by the international research institute CICERO in 2018. The project categories have been awarded either a Dark Green or Medium Green shading, and the overall Green Bond Framework a Medium Green shading.

BOND RATINGS

Standard & Poor's **AAA** stable

Moody's **Aaa** stable

Ratings updates as of June and March 2018.

OUTSTANDING GREEN BONDS

Issue date	Amount issued	Maturity	Coupon	Coupon
15 March 2016	USD 600 mn	23 April, 2019	1.50% (semi-annually)	XS1383831648 (RegS) US50046PAU93 (144A)
16 October 2016	SEK 5 billion	5 May, 2020	0.00% (annually)	XS1508534861
16 May 2017	USD 500 mn	1 June, 2021	1.875% (semi-annually)	XS1618289802 (RegS) US50049GAB86 (144A)
23 October, 2018	SEK 3 billion	1 June, 2023	0.625% (annually)	XS1897258098
30 April, 2018	SEK 3 billion	15 December, 2021	0.125% (annually)	XS1814404577

CICERO SHADES OF GREEN

DARK GREEN	Projects and solutions that correspond to the long-term vision of a low-carbon and climateresilient future.
MEDIUM GREEN	Projects and solutions that represent steps towards the long-term vision but are not quite there yet.
LIGHT GREEN	Projects and solutions that are environmentally friendly but do not by themselves represent or contribute to the long-term vision.
BROWN	Projects that are in opposition to the long-term vision of a low-carbon and climate-resilient future.

KOMMUNINVEST PROJECT CATEGORIES

- Renewable energy[1]
- Green buildings
- Water management
- Energy efficiency
- Climate change adaptation
- Clean transportation
- Environmental management
- Waste management

1) Bioenergy and biogas from waste is Medium green.

Key reporting methodology

Kommuninvest reports impact from financed green investment projects based on jointly established Nordic guidelines, which build on and complement international recommendations.

SINCE 2016, a group of Nordic public sector green bond issuers cooperate on impact reporting topics, with the aim of harmonising and advancing reporting practices across the Nordic region. The results of this work have been published in a Position Paper on Green Bonds Impact Reporting, launched in October 2017 and updated in January 2019. These Nordic reporting guidelines builds on and complement international recommendations, as outlined by the Green Bond Principles.

Kommuninvest's impact reporting is carried out in accordance with the principles and methodology presented in the Position Paper on Green Bonds Impact Reporting. The Position paper has been developed by a group of Nordic public sector green bond issuers, initiated and led by Kommuninvest.

KEY REPORTING PRINCIPLES

- A project's impact is quantified based on the share of the investment cost that has been financed by Kommuninvest and on Green Loans disbursed and outstanding.
- Calculations are based on projected (ex-ante) values; unless actual outcomes (ex-post) are available.
- CO_2 emissions and emissions reductions are reported as scopes 1 and 2 as defined by the Greenhouse Gas Protocol, ie. direct emissions from projects and indirect emissions from the production of electricity and/or district heating.
- Energy production, energy savings and other sustainable activities are converted into greenhouse gas emissions savings using an emission factor for electricity production in mainland EU and Norway of 380g CO_2/kWh. Please see page 42 for further information about baseline choices.
- We report impact from activities financed by green bonds on a yearly basis.

Project categories

Kommuninvest Green Bonds finance investment projects undertaken by our member municipalities and regions. We offer Green Loans to projects which meet pre-determined sustainability criteria and within eight areas of investment.

ALL PROJECTS MUST

- Promote the transition to a low-carbon and climate-resilient society
- Be part of the systematic environmental work in the applicant municipality or region
- Be related to Sweden's national environmental objectives, or to regional environmental goals
- Target either mitigation of climate change, adaptation to climate change, or be a project related to environmental management in other areas than climate change

RENEWABLE ENERGY

Investments in this category aim to reap the energy potential of the wind, the sun, the ground, the sea, biomaterials and other renewable energy carriers, and to replace non-sustainable energy sources. Projects include production and distribution of renewable energy including wind, wave, solar, hydro, geothermal, bioenergy, biogas and excess heat.

ENERGY EFFICIENCY IN ENERGY SYSTEMS

Projects within this category reduce the energy requirements in existing energy systems and phase out the use of fossil energy sources. Projects may be related to district heating/cooling, electricity grids/smart grids, energy recovery and storage.

GREEN BUILDINGS AND ENERGY EFFICIENCY

New or existing residential (multi-family) or non-residential buildings. Residential buildings must have an energy performance per sq.m. of at least 15 percent below the Swedish building code; for non-residential buildings this requirement is at least 20 percent. Major renovations of buildings must lead to at least 30 percent less energy use per sq.m. per year (or to compliance with the Swedish building code); energy efficiency measures in partial systems to at least 30 percent less energy use.

CLEAN TRANSPORTATION

Transport solutions that result in minimal or zero emissions. Project examples may include trains, underground, trams and hybrid buses. Also infrastructure supporting public transportation and other sustainable transportation, such as pedestrian- and cycle paths, charging points for electric vehicles and fueling stations for renewable fuels.

WASTE MANAGEMENT

Investments are intended to ensure sustainable, energy efficient and resource-saving waste management. Eligible projects include the construction of new waste management facilities, upgrades/expansion of existing ones; waste collection systems that minimise transport requirements and increase recycling scope, etc.

WATER AND WASTEWATER MANAGEMENT

Construction and upgrading of freshwater and wastewater systems to accommodate population growth and higher precipitation levels and to meet environmental regulations. Project that apply innovative technologies to reduce levels of harmful substances and make good use of the resources contained in wastewater. Examples: water and wastewater networks, water treatment plants, treatment of discharges to watercourses, and investment in energy and heat recovery from water and wastewater networks.

CLIMATE CHANGE ADAPTATION

Investments in this category are intended to improve local adaptation to climate change. This includes facilities and installations to manage urban runoff, floods, landslides, avalanches, rising sea levels, and other challenges due to changed weather and climate conditions. Measures undertaken may be related to buildings, infrastructure and sensitive surroundings.

ENVIRONMENTAL MANAGEMENT

This category covers a range of projects that intend to ensure sustainable use of land. This may include projects such as restoration of biodiversity, planting forests, cleaning up of harmful substances, developing land into recreational space, facilitating walking, cycling and public transportation solutions. Measures may include nature conservation and improving eco-system services.

Process for project evaluation and selection

Green Loan applications are reviewed and finally approved by an advisory committee – the Kommuninvest Green Bonds Environmental Committee – comprising Swedish local government climate specialists.

INVESTMENT PROJECTS are initially identified, verified and selected by the environmental functions and treasury departments in Kommuninvest's member municipalities and regions. Eligible projects are then screened by Kommuninvest's Lending department, and, on a quarterly basis, reviewed and finally approved by consensus vote in the Kommuninvest Green Bonds Environmental Committee.

The Committee consists of representatives from the environmental function of at least two member municipalities and regions, environmental experts from other relevant public sector organisations or academia/non-governmental organization, and from Kommuninvest's management and lending group.

COMMITTEE MEMBERS

- **Andreas Hagnell,** Senior Advisor Environment and Energy, Swedish Association of Local Authorities and Regions (SALAR)
- **Susanne Arneborg,** Strategic Urban Planner, Municipality of Borås
- **Marta Fallgren,** Environmental Manager, Uppsala County Council
- **Hanna Ryman,** Sustainability Manager, Municipality of Örebro
- **Sara Pettersson,** Urban Development Officer (with focus on Climate and Environment), City of Gothenburg (until April 2019)
- **Lisa Järner,** Environmental Coordinator, City of Mölndal (from April 2019)
- **Björn Söderlundh,** Head of Lending, Kommuninvest
- **Daniel Nyqvist,** Deputy Head of Lending, Kommuninvest
- **Ann Sörman,** Client Relationship Manager, Kommuninvest

From left to right: Sara Pettersson, City of Gothenburg; Susanne Arneborg, Municipality of Borås; Björn Söderlundh, Kommuninvest; Hanna Ryman, Municipality of Örebro; Andreas Hagnell, Swedish Association of Local Authorities and Regions; Marta Fallgren, Uppsala County Council.

ASSURANCE REPORT PUBLISHED ANNUALLY

Kommuninvest regularly publishes an external assurance report regarding its Green Bonds Framework, in line with the recommendations of the Green Bond Principles. The report, performed by our external auditor, provides assurance on the management of proceeds obtained from the issuance of green bonds. Green Bond proceeds and disbursements to Green Loans are tracked by Kommuninvest according to internal instructions.

Project #340 Energy self-sufficiency in multi-family housing

Client: Vårgårda Bostäder AB (Vårgårda Municipal Housing Company)

Investment cost: SEK 270 million

Green loans from Kommuninvest (disbursed amounts): SEK 95 million

Completed (year): 2021

Total energy performance/year: 9.1 kWh/m²

Total energy requirement (BBR25): 85 kWh/m²

Estimated CO_2 emissions reductions: 50 tonnes CO_2e per year

Impacts: Ambitious renovation and extension of housing complex built during the Swedish Million Programme between 1965 and 1974. Thanks to the use of solar energy, fuel cells, hydrogen gas and batteries, 172 apartments and six buildings will become self-sufficient in energy for heating. Fuel cells will be installed in each house, with the generated hydrogen gas stored in a separate building. The houses, originally two-storey buildings, are being equipped with a third floor to accommodate more apartments, as well as new roofs optimized for solar cells. This is the first time the technology has been tested on multi-family dwellings in Sweden. The long-term aim is to reduce energy performance, ie. purchased energy, to zero.

bostad.vargarda.se

Case Skellefteå Spearheading the use of green finance

Financed projects*: # 2, 65, 66, 154, 155, 156, 158, 345, 380

Project categories: Energy efficiency in energy systems, green buildings, renewable energy, water management

Disbursed (committed) Green Loans: SEK 2,140 (2,599) million

Green Loan Ratio in municipal balance sheet (2018): 55% (30% in Skellefteå Stadshus AB)

* The complete project-by-project-reporting is available for download in spreadsheet format at kommuninvest.se ==> For investors ==> Green Bonds ==> Impact reporting

With a total of nine investment projects and SEK 2.3 billion financed, the municipality of Skellefteå is one of Kommuninvest's most prominent Green Loan borrowers. The municipality has deployed Green Loans as a funding instrument since 2015, and today utilize these instruments widely. Many of the Green Loans have been channeled through the municipal holding company Skellefteå Stadshus AB, which comprises Skellefteå Kraft AB, one of Sweden's largest energy companies.

Samuel Lundqvist, the CFO for Skellefteå municipality, sees benefits from including institutional investor capital in investments for a more sustainable future.

– By demonstrating a commitment to green finance at the local level, we make a contribution which is positively recognised by essentially all parties we interact with. A bonus is the ability for lower interest rates, even though this incentive is currently relatively marginal.

Skellefteå's location in northern Sweden, its sparse population and good wind conditions, make it a natural base for renewable energy generation from wind (the Blaiken wind farm, #2, is one of Europe's largest). This, in combination with the city's industrial heritage and ample hydro energy resources, is now attracting energy-intensive industry operations. The foremost example is the Northvolt giga factory for battery production.

Equally logical is the focus on sustainable, wood-based property construction. The forests in northern Sweden have enabled the development of know-how and resources to build increasingly complex constructions with a core wood structure. All municipal property construction is now based on Skellefteå's nine guidelines for sustainable construction, adopted in 2014 and which take environmental, social and economic factors into account.

skelleftea.se

SDG Mapping

The Kommuninvest Green Bonds Framework addresses nine of the SDGs[1]. The mapping below has been developed as part of Kommuninvest's collaborative work with other Nordic public sector green bond issuers, see Key reporting methodology on page 13.

The mapping has been inspired by the GBP/ICMA mapping (see "Green and Social Bonds: A High-level Mapping to the Sustainable Development Goals", June 2018) and the existing practices of Nordic issuers.

1) The Sustainable Development Goals (SDGs), officially known as "Transforming our world: the 2030 Agenda for Sustainable Development", are a set of seventeen aspirational global goals, with 169 specific targets, adopted through a United Nations resolution in September 2015.

Green Loan portfolio

The portfolio of eligible green investment projects numbered 227 (146) as of year-end 2018, across 109 (81) Swedish municipalities and regions. Total Green Loan disbursements amounted to SEK 25.8 (19.9) billion.

PROJECTS IN THE categories Green buildings and Renewable energy accounted for 52 (49) percent and 30 (39) percent of disbursements, respectively. Water management accounted for 14 (8) percent of disbursements, while Clean transportation and Energy efficiency accounted for 3 (2) and 1 (1) percent, respectively. Waste management and Adaptation projects accounted for 1 (1) percent and 0 (0) percent, respectively.

Project in seven out of eight framework categories had been approved. There had been no applications for projects in the Environmental management category. Total committed Green Loan funding amounted to SEK 39.7 (26.1) billion.

During the reporting back period in Q1-2019, five projects were excluded from the Green Loan portfolio, due to non-compliance with reporting requirements or failure to comply with the requirements of the Green Bonds Framework. This explains why data on the Green Loan portfolio in this report differs from Kommuninvest's Annual Report 2018, which states 232 financed green projects and SEK 26.2 billion in Green Loan disbursements.

NEW AND REFINANCED PROJECTS

Kommuninvest deploys a bottom-up approach to green financing, whereby Eligible Projects are identified and pre-financed first, and Green Bonds are issued as the second step. This approach has a number of distinct advantages:

i) It enables Kommuninvest to manage its green framework in a conservative manner, with the size of the portfolio of approved Eligible Projects guiding the volume of Green Bonds issuance. As a rule, Kommuninvest aims for aggregated Green Bond Proceeds not to exceed total disbursements to Green Loans.

ii) It provides investors with transparency regarding which Eligible Projects the Green Bonds will finance, including the composition of green assets, as well as assurance that Green Bond proceeds will be matched to actual Green Loan disbursements.

COMMITMENTS BY CATEGORY

31 December 2018

Project category	Disbursed Green Loans, SEK mn	Committed Green Loans, SEK mn	# projects[1]
Renewable energy	7,878	11,313	41
Energy efficiency	235	286	7
Green buildings	13,295	20,078	141
Clean transportation	730	1,980	8
Waste management	155	226	4
Water management	3,442	5,844	25
Climate change adaptation	16	16	1
Environmental management	0	0	0
Total	**25,750**	**39,743**	**227**

1) A number of Green Loans refer to the same physical investment project. As a consequence, Kommuninvest's detailed project by project reporting, available at kommuninvest.se, lists 223 projects, compared with 227 Eligible Projects that have recieved financing.

With this model, it could be argued that all Green Bond proceeds are used for refinancing. Moreover, the relatively short duration of Green Loans means that parts of the Green Loans portfolio will likely be refinanced during the lifetime of the Green Bond.

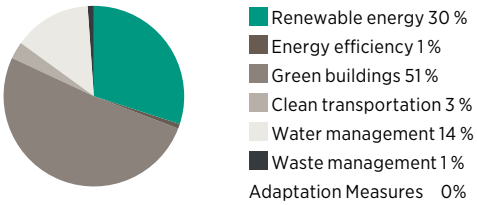
In Kommuninvest's case, the refinanced portion is therefore less relevant. To guide stakeholders with regards to the share of green bonds proceeds that are allocated to new projects, Kommuninvest provides information on the physical age of the financed projects. We also provide information on the maturity profile of outstanding Green Loans, to serve as a guide on expected refinancing activity within the portfolio of Green Loans.

As of 31 December 2018, 35 (37) percent of the eligible projects were deemed new (ie. planned, under construction, or no more than 9 months old at the cut-off date). 19 (31) percent of projects were 9-24 months old. In total, 73 (85) percent of the Eligible Projects were less than 3 years old.

The average duration in the Green Loans portfolio was 4.4 (4.2) years. The age distribution of eligible projects and the distribution of scheduled Green Loan redemptions are shown in the graphs below.

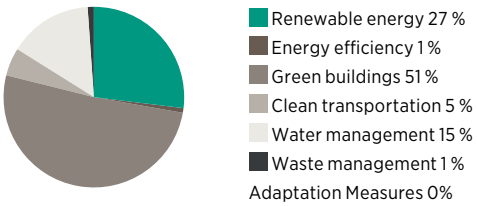
DISBURSED GREEN LOANS SEK 25.8 bn

as of 31 Dec 2018



COMMITTED GREEN LOANS SEK 39.7 bn

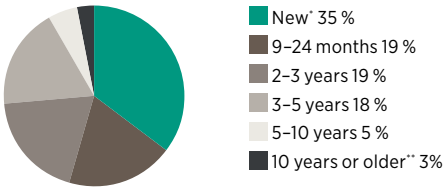
as of 31 Dec 2018



AGE DISTRIBUTION OF ELIGIBLE PROJECTS

as of 31 Dec 2018

based on project completion date and disbursed outstanding amounts

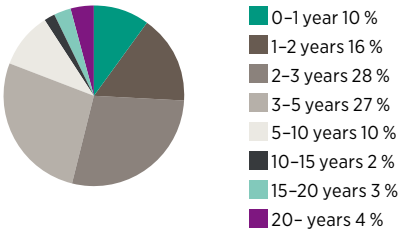


*) Planned, on-going or a maximum of nine months has passed since completion

**) Adjusted to include projects where project completion date refers to date of transaction (#12, #51, #144 - acquisition finance for hydro power stations).

MATURITY PROFILE GREEN LOANS

as of 31 Dec 2018



Renewable energy

Investments in this category aim to reap the energy potential of the wind, the sun, the ground, the sea, biomaterials and other renewable energy carriers, and to replace non-sustainable energy sources. Projects include production and distribution of renewable energy including wind, wave, solar, hydro, geothermal, bioenergy, biogas and excess heat.

KOMMUNINVEST GREEN LOANS TO RENEWABLE ENERGY

Total amounts disbursed and outstanding

7,878 MSEK

Total number of projects

41

ESTIMATED ANNUAL IMPACT OF GREEN LOANS[1]

Estimated annual energy production

3,032,220 MWh

GHG emissions avoided

634,446 tonnes CO_2e

1) Refers to the Green Loan share of project impacts. The impact attributable to Green Bond investors is presented on page 3.

Complete project-by-project-reporting in spreadsheet format at kommuninvest.se

For investors · Green Bonds · Impact Reporting

#1 NEW WIND POWER TURBINES

Investment in four new wind power turbines located outside Sollefteå.

Borrower
Eskilstuna municipality

Project completion
2015

KI share of financing
100 %

Expected or Actual impact
Expected

Total investment, SEK
165 million

Disbursed amount, SEK
165 million

Estimated impact attributable to green loan

Renewable energy generation
37,000 MWh

GHG-emissions reduced/avoided
14,060 tCO_2e/year

#14 FORSBACKA BIOGAS PRODUCTION FACILITY

Production of biogas, mainly from food waste, upgraded to vehicle fuel.

Borrower
Gävle municipality

Project completion
2017

KI share of financing
87 %

Expected or Actual impact
Expected

Total investment, SEK
127 million

Disbursed amount, SEK
110 million

Estimated impact attributable to green loan

Renewable energy generation
23,386 MWh

GHG-emissions reduced/avoided
6,057 tCO_2e/year

#50 SOLAR PARK

Construction of solar energy production facility.

Borrower
Arvika Kraft AB (Arvika Power Company)

Project completion
2015

KI share of financing
100 %

Expected or Actual impact
Expected

Total investment, SEK
15 million

Disbursed amount, SEK
15 million

Estimated impact attributable to green loan

Renewable energy generation
1,004 MWh

GHG-emissions reduced/avoided
382 tCO_2e/year

#115 NEW BOILER FOR DISTRICT HEATING

New boiler for district heating, equipped with flue gas condensator, total capacity 14.6 MW.

Borrower
Nässjö Affärsverk AB (Nässjö Energy & Environment Company AB)

Project completion
2010

KI share of financing
100 %

Expected or Actual impact
Actual

Total investment, SEK
62 million

Disbursed amount, SEK
62 million

Estimated impact attributable to green loan

Renewable energy generation
40,000 MWh

GHG-emissions reduced/avoided
11,006 tCO_2e/year

All borrowers | Renewable energy

Arjeplog Municipality
Arvika Fjärrvärme AB (Arvika District Heating Company)
Arvika Kraft AB (Arvika Power Company)
Biogasbolaget i Mellansverige AB
Borås Municipality
Botkyrka Municipality
Eskilstuna Municipality
Falu Energi och Vatten AB (Falun Energy and Water Company)
Forshaga Energi AB (Forshaga Energy Company)
Gävle Municipality
Hedemora kommunfastigheter AB (Hedemora Municipal Housing Company)
Huddinge Municipality
Karlskoga Energi och Miljö AB (Karlskoga Energy and Environment Company)
Karlstad Municipality
Kopparstaden AB
Kumbro Vind AB (Kumla and Örebro Wind Company)
Lessebo Fjärrvärme AB (Lessebo District Heating Company)
Mjölby Svartådalen Energi AB (Mjölby Energy Company)
Norrenergi AB (Solna and Sundbyberg Energy Company)
Nässjö Affärsverk AB (Nässjö Energy and Environment Company)
Region Jämtland Härjedalen
Skellefteå Stadshus AB (Skellefteå Municipal Holding Company)
Skövde Municipality
Sollefteå Municipality
Tanums Bostäder AB (Tanum Municipal Housing Company)
Tanum Municipality
Umeå Municipality
Varberg Municipality
Vimmerby Energi & Miljö AB (Vimmerby Energy and Environment Company)
Vimmerby Municipality
Ånge Energi AB (Ånge Energy Company)

Energy efficiency in energy systems

Projects within this category reduce the energy requirements in existing (predominantly fossil-free) energy systems and phase out the use of fossil energy sources. Projects may be related to district heating/cooling, electricity grids/smart grids, energy recovery and storage.

KOMMUNINVEST GREEN LOANS TO ENERGY EFFICIENCY

Total amounts disbursed and outstanding

235 MSEK

Total number of projects

7

ESTIMATED ANNUAL IMPACT OF GREEN LOANS[1]

Energy savings

110,845 MWh

Whereof avoided energy use[2]	**0 MWh**
Whereof reduced energy use[3]	**110,845 MWh**

GHG emissions reduced

21,796 tonnes CO_2e

1) Refers to the Green Loan share of project impacts. The impact attributable to Green Bond investors is presented on page 3.

2) Avoided energy use refers to a baseline/alternative reference scenario.

3) Reduced energy use refers to a direct or absolute reduction in operation.

Complete project-by-project-reporting in spreadsheet format at kommuninvest.se

For investors · Green Bonds · Impact Reporting

#44 DISTRICT HEATING PIPELINE

Linking together the district heating networks of Falun and Borlänge which leads to increased utilization of surplus heat.

Borrower
Falu Energi & Vatten AB (Falun Energy & Water Company)

Project completion
2014

KI share of financing
50 %

Expected or Actual impact
Expected

Total investment, SEK
128 million

Disbursed amount, SEK
64 million

Estimated impact attributable to green loan

Energy savings
25,000 MWh

GHG-emissions reduced/avoided
1,322 tCO_2e/year

#66 FLUE GAS CONDENSTAION

Flue gas condensation investment at the Hedensbyn bioenergy production plant.

Borrower
Skellefteå Stadshus AB (Skellefteå Municipal Holding Company)

Project completion
2016

KI share of financing
86 %

Expected or Actual impact
Expected

Total investment, SEK
83 million

Disbursed amount, SEK
71 million

Estimated impact attributable to green loan

Energy savings
85,542 MWh

GHG-emissions reduced/avoided
17,859 tCO_2e/year

#82 TRANSIT PIPE

Connecting the Köping and Arboga district heating grids and increasing the use of surplus heat recovery.

Borrower
Västra Mälardalens Energi och Miljö AB (Arboga and Köping Municipal Energy Company)

Project completion
2017

KI share of financing
30 %

Expected or Actual impact
Expected

Total investment, SEK
330 million

Disbursed amount, SEK
100 million

Estimated impact attributable to green loan

Energy savings
303 MWh

GHG-emissions reduced/avoided
2,615 tCO_2e/year

All borrowers | Energy efficiency in energy systems

Västra Mälardalens Energi och Miljö AB (Arboga and Köping Municipal Energy Company)	Skellefteå Stadshus AB (Skellefteå Municipal Holding Company) Region Uppsala	Falu Energi och Vatten AB (Falun Energy and Water Company)

Total area of Green Buildings financed

1,051,374 sq.m.

Whereof Residential buildings	**389,836 sq.m.**
Whereof Non-residential buildings	**475,052 sq.m.**
Whereof Other buildings	**186,486 sq.m.**

Green buildings

New or existing residential (multi-family) or non-residential buildings. Residential buildings must have an energy performance per sq.m. of at least 15 percent below the Swedish building code; for non-residential buildings this requirement is at least 20 percent. Major renovations of buildings must lead to at least 30 percent less energy use per sq.m. per year (or to compliance with the Swedish building code); energy efficiency measures in partial systems to at least 30 percent less energy use.

KOMMUNINVEST GREEN LOANS TO GREEN BUILDINGS

Total amounts disbursed and outstanding

13,295 MSEK

Total number of projects

141

ESTIMATED ANNUAL IMPACT OF GREEN LOANS[1]

Energy savings

33,861 MWh

Whereof avoided energy use[2]	**24,046 MWh**
Whereof reduced energy use[3]	**9,851 MWh**
Energy production in green buildings	**1,807 MWh**

GHG emissions avoided/reduced

4,915 tonnes CO_2e

1) Refers to the Green Loan share of project impacts. The impact attributable to Green Bond investors is presented on page 3.

2) Avoided energy use refers to a baseline/alternative reference scenario. Net value, inclusive of energy production in green buildings.

3) Reduced energy use refers to a direct or absolute reduction in operation.

Complete project-by-project-reporting in spreadsheet format at kommuninvest.se

For investors · Green Bonds · Impact Reporting

#41 ELME SCHOOL

The new Elme school in Älmhult, built as a 13,000 sq.m passive house for 800 students, has an expected energy performance of 23 kWh per sq.m.

Borrower
Älmhult municipality

Project completion
2017

KI share of financing
100 %

Expected or Actual impact
Expected

Total investment, SEK
215 million

Disbursed amount, SEK
215 million

Estimated impact attributable to green loan

Energy savings
871 MWh

GHG-emissions reduced/avoided
254 tCO_2e/year

#43 GREEN SWIMMING FACILITY

New energy-efficient swimming facility. Environmental certification according to Miljöbyggnad Silver.

Borrower
AB Sjöbohem (Sjöbo Municipal Housing Company AB)

Project completion
2015

KI share of financing
79 %

Expected or Actual impact
Actual

Total investment, SEK
151 million

Disbursed amount, SEK
120 million

Estimated impact attributable to green loan

Energy savings
117 MWh

GHG-emissions reduced/avoided
11 tCO_2e/year

#54 MULTI-FAMILY HOUSING IN MALÅ

New residential housing housing based on the Secure Accommodation concept ("Trygga Boendet"), flexible apartment blocks that can be used for supplemental buildings. Public procurement concept by SABO, the Swedish Association of Public Housing Companies.

Borrower
Malå municipality

Project completion
2017

KI share of financing
45 %

Expected or Actual impact
Expected

Total investment, SEK
37.5 million

Disbursed amount, SEK
17 million

Estimated impact attributable to green loan

Energy savings
59 MWh

GHG-emissions reduced/avoided
8 tCO_2e/year

#320 DEEP RENOVATION OF OLDER RESIDENTIAL BUILDING

Renovation of multi-family housing built in the 1960s resulting in 31 % energy savings. Measures addressing ventilation system, windows, additional insulation. Replacement of radiator valves, thermostats, control system and adjustment of the heating system. LED lighting and measures to reduce water consumption.

Borrower
Falköpings Hyresbostäder AB (Falköping Municipal Housing Company)

Project completion
2017

KI share of financing
100 %

Expected or Actual impact
Expected

Total investment, SEK
30.5 million

Disbursed amount, SEK
30.5 million

Estimated impact attributable to green loan

Energy savings
164 MWh

GHG-emissions reduced/avoided
10 tCO_2e/year

All borrowers | Green buildings

AB Eidar (Trollhättan Municipal Housing Company)

AB Härnösandshus (Härnösand Municipal Housing Company)

AB Karlsborgsbostäder (Karlsborg Municipal Housing Company)

AB Kristianstadsbyggen (Kristianstad Municipal Housing Company)

AB Tierpsbyggen (Tierp Municipal Housing Company)

AB Timråbo (Timrå Municipal Housing Company)

AB Sjöbohem (Sjöbo Municipal Housing Company)

AB Vingåkershem (Vingåker Municipal Housing Company)

AB Väsbyhem (Upplands Väsby Municipal Housing Company)

Ale Municipality

Avesta Municipality

Bergs Hyreshus AB (Berg Väsby Municipal Housing Company)

Bjuvs Municipality

Bromölla Municipality

Eksta Bostads AB (Kungsbacka Municipal Housing Company)

Enköping Municipality

Falkenberg Municipality

Falköping Hyresbostäder AB (Falköping Municipal Housing Company)

Finspång Municipality

Gävle Municipality

Halmstad Rådhus AB (Halmstad Municipal Holding Company)

Hammarö Municipality

Hebygårdar AB (Heby Municipal Housing Company)

Hällefors Bostads AB (Hällefors Municipal Housing Company)

Järfälla Municipality

Jönköpings Rådhus AB (Jönköping Municipal Holding Company)

Kopparstaden AB (Falun Municipal Holding Company)

Kraftstaden Fastigheter Trollhättan AB (Trollhättan Municipal Property Company)

Kristianstad Municipality

Kumla Municipality

Köpings Bostads AB (Köping Municipal Housing Company)

Lidköping Municipality

Lindesbergsbostäder AB (Lindesberg Municipal Housing Company)

Ludvika Municipality

Ludvikahem AB (Ludvika Municipal Housing Company)

Malå Municipality

Mariehus Fastigheter AB (Mariestad Municipal Housing Company)

Mariestad Municipality

Kommunfastigheter i Arboga AB (Arboga Municipal Property Company)

Kommunfastigheter i Knivsta AB (Knivsta Municipal Property Company)

Mönsterås Municipality

Nordmalingshus AB (Nordmaling Municipal Housing Company)

Norra Dalarnas Fastighets AB (Älvdalen Municipal Property Company)

Norra Dalarnas Lokaler AB (Älvdalen Municipal Property Company)

Nyköping Municipality

Ockelbo Municipality

Olofström Municipality

Region Gotland

Region Uppsala

Region Värmland

Region Örebro Län

Robertforsbostäder (Robertsfors Municipal Housing Company)

Rättviks Fastigheter AB (Rättvik Municipal Housing Company)

Skara Municipality

Skellefteå Municipality

Skellefteå Stadshus AB (Skellefteå Municipal Holding Company)

Skövde Municipality

Sollefteå Municipality

Stiftelsen Kindahus (Kinda Municipal Housing Company)

Stiftelsen Östhammarshem (Östhammar Municipal Housing Company)

Strömstadsbyggen AB (Strömstad Municipal Housing Company)

Säffle Municipality

Säters Municipality

Tierps Kommunfastigheter AB (Tierp Municipal Property Company)

Torsby Bostäder AB (Torsby Municipal Housing Company)

Trosabygdens Bostäder AB (Trosa Municipal Housing Company)

Ulricehamn Municipality

Umeå Municipality

Uppsala Municipality

Vaggeryd Skillingaryds Bostads AB (Vaggeryd Skillingaryd Municipal Housing Company)

Vingåkers Kommunfastigheter AB (Vingåker Municipal Property Company)

Vårgårda Bostäder AB (Vårgårda Municipal Housing Company)

Vårgårda Municipality

Vännäs Municipality

Växjö Kommunföretag AB (Växjö Municipal Holding Company)

Årehus AB (Åre Municipal Housing Company)

Älmhult Municipality

Älvkarleby Municipality

Case Kristianstad Green approach guided by below sea level location

Financed projects*: # 39, 42, 90, 326, 327, 349, 351

Project categories: Clean transportation, Climate change adaptation, Green buildings

Disbursed (committed) Green Loans: SEK 246 (742) million

* The complete project-by-project-reporting is available for download in spreadsheet format at kommuninvest.se ==> For investors ==> Green Bonds ==> Impact reporting

Kristianstad (pop. 85,000) is a major hub and geographically one of the larger municipalities of the Skåne region in southern Sweden. Its low-lying location in a wetlands area was originally chosen for strategic defense reasons, however today this is a vulnerability due to expected increased frequency and intensity of extreme weather. Active work and strategic analysis on flood protection have resulted in Kristianstad being recognized as one of Sweden's foremost cities when it comes to climate adaptation preparedness.

Kommuninvest Green Loans are used to finance the construction of a levee to protect the city from flooding (#90), and other projects that support sustainability efforts in the municipality. They include the Kristianstad Link (#42), a public transport thoroughfare connecting the train station with key city destinations.

– Green topics are dealt with in many different parts of the municipal administration, says Roger Zetterqvist, CFO at the municipal management office. Green Loans enables us to blend environmental and economic sustainability, which is really good. The fact that we can reduce funding costs with green financing makes it even better.

According to Roger Zetterqvist, green funding emphasizes and reinforces the already advanced climate and environmental work within the municipality. The municipal housing company has also started to use Green Loans, and Roger Zetterquist looks forward to green funding becoming mandatory in the future, for all investments that meet the criteria.

– My colleagues, who strive to invest and build as ecologically smart as possible, are proud that the funding is also green. When we revise the finance policy next time, green funding will formally be incorporated. But that is how we work already.

kristianstad.se

Water and wastewater management

Construction and upgrading of freshwater and wastewater systems to accommodate population growth and higher precipitation levels and to meet environmental regulations. Project that apply innovative technologies to reduce levels of harmful substances and make good use of the resources contained in wastewater. Examples: water and wastewater networks, water treatment plants, treatment of discharges to watercourses, and investment in energy and heat recovery from water and wastewater networks.

KOMMUNINVEST GREEN LOANS TO WATER AND WASTEWATER MANAGEMENT

Total amounts disbursed and outstanding

3,442 MSEK

Total number of projects

25

ESTIMATED ANNUAL IMPACT OF GREEN LOANS[1]

Increase in capacity

861,685 population equivalents

1) Refers to the overall impact of the financed projects, not the Green Loan share of project impacts. The impact attributable to Green Bond investors is presented on page 3.

Complete project-by-project-reporting in spreadsheet format at kommuninvest.se

For investors · Green Bonds · Impact Reporting

#11 UPGRADING OF WASTEWATER TREATMENT FACILITY

Upgrading of wastewater treatment facility to comply with EU requirements regarding nitrogen purification.

Borrower
Karlskoga Energi & Miljö AB (Karlskoga Energy & Environment Company)

Project completion
2015

KI share of financing
90 %

Expected or Actual impact
Expected

Total investment, SEK
39 million

Disbursed amount, SEK
35 million

Estimated impact attributable to green loan
Other

Nitrogen reduction from 19 mg/l to 10 mg/l. Ammoniacal nitrogen from 15 mg/l to 4 mg/l.

#55 SOBACKEN WASTEWATER TREATMENT PLANT

New wastewater treatment plant with a capacity of 150,000 PE (population equivalents).

Borrower
Borås municipality

Project completion
2019

KI share of financing
61 %

Expected or Actual impact
Expected

Total investment, SEK
1,640 million

Disbursed amount, SEK
1,000 million

Estimated impact attributable to green loan
Other

Expected to meet pollution requirements of BOD (Biochemical Oxygen Demand) 8 mg/l; nitrogen 8 mg/l; phosphorus 0.2 mg/l.

#281 GÄDDVIK FRESHWATER PLANT

Expansion of capacity at the freshwater plant in Luleå, from 65,000 PE to 94,000 PE (population equivalents).

Borrower
Luleå municipality

Project completion
2016

KI share of financing
41 %

Expected or Actual impact
Expected

Total investment, SEK
242 million

Disbursed amount, SEK
100 million

Estimated impact attributable to green loan
Other

Expected increase in capacity from 65,000 PE in 2016 to 94,000 PE in 2050.

#397 MÖRBYLÅNGA WATER TREATMENT PLANT

New water treatment plant, to secure freshwater supply in the face of climate change and a drier climate. Combines desalination and purification of industrial wastewater.

Borrower
Mörbylånga municipality

Project completion
2019

KI share of financing
100 %

Expected or Actual impact
Expected

Total investment, SEK
147 million

Disbursed amount, SEK
147 million

Estimated impact attributable to green loan
Other

Capacity 25,000 PE or 4,000 m²/day.

All borrowers | Water and wastewater management

City of Borås

Falu Energi och Vatten AB (Falun Energy and Water Company)

Karlskoga Energi och Miljö AB (Karlskoga Energy and Environment Company)

Leksands Vatten AB (Leksand Water Management Company)

Lidköping Municipality

Luleå Municipality

Mönsterås Municipality

Mörbylånga Municipality

Nordanstig Vatten AB (Nordanstig Water Management Company)

Nyköping Municipality

Region Gotland

Region Uppsala

Rättvik Vatten och Avfall AB (Nordanstig Water Management Company)

Skellefteå Municipality

Sollentuna Energi och Miljö AB (Sollentuna Energy and Environment Company)

Strömstad Municipality

Syvab (Water Management Company of Southwest Stockholm region)

Vadstena Municipality

Varberg Municipality

Vatten & Avfall i Malung-Sälen AB (Malung-Sälen Water and Waste Management Company)

Värmdö Municipality

Värnamo Municipality

Örnsköldsvik Municipality

Clean transportation

Transport solutions that result in minimal or zero emissions. Project examples may include trains, underground, trams and hybrid buses. Also infrastructure supporting public transportation and other sustainable transportation, such as pedestrian and cycle paths, charging points for electric vehicles and fueling stations for renewable fuels.

KOMMUNINVEST GREEN LOANS TO TO CLEAN TRANSPORTATION

Total amounts disbursed and outstanding

730 MSEK

Total number of projects

8

ESTIMATED ANNUAL IMPACT OF GREEN LOANS[1]

GHG emissions reduced

651 tonnes CO_2e

1) Refers to the Green Loan share of project impacts. The impact attributable to green bond investors is presented on page 3.

Complete project-by-project-reporting in spreadsheet format at kommuninvest.se

For investors · Green Bonds · Impact Reporting

#8 CO-FINANCING OF TRELLEBORG C

Co-financing for regional train network Trelleborg-Malmö, including station and train network upgrades.

Borrower
Trelleborg municipality

Project completion
2015

KI share of financing
70 %

Expected or Actual impact
Expected

Total investment, SEK
284 million

Disbursed amount, SEK
200 million

Estimated impact attributable to green loan

GHG-emissions reduced/avoided

651 tonnes

Other

Reduced car travel: 6 million km/year; in 2016, increased use of public transport between Trelleborg-Malmö by 18% vs 2015.

#16 ELECTRIC BUSES FOR LOCAL PUBLIC TRANSPORT

The city of Umeå is investing in new ultrafast-charging electric buses, replacing buses run on diesel fuel. Thanks to high degree of renewables in local energy mix, the electric buses result in close to zero emissions of greenhouse gases.

Borrower
Umeå municipality

Project completion
2016

KI share of financing
100 %

Expected or Actual impact
Expected

Total investment, SEK
76 million

Disbursed amount, SEK
76 million

Estimated impact attributable to green loan

GHG-emissions reduced/avoided

n/a tonnes

Other

Reduced energy use by 2 MWh/year. Increased use of public transport by 5 % or 5,000 trips per year.

#58 RAILWAY MAINTENANCE DEPOT FREES UP CAPACITY

A new railway maintenance depot is going to reduce transport times compared with previous maintenance locations, freeing up more than 2,000 hours per year, which can be used for other rail traffic on a heavily utilized transport line.

Borrower
Kifab i Kalmar AB (Kalmar Municipal Industrial Property Company AB)

Project completion
2016

KI share of financing
95 %

Expected or Actual impact
Expected

Total investment, SEK
105 million

Disbursed amount, SEK
100 million

Estimated impact attributable to green loan

GHG-emissions reduced/avoided

n/a

Other

Frees up 2,000 hours of capacity per year on the intensely used Southern Main Line.

#404 NEW PUBLIC TRANSPORT BUS DEPOT

Construction of a city bus depot for buses that run on biogas, biodiesel and electricity. The project included construction of a biogas pipeline to enable refueling on site.

Borrower
Region Uppsala

Project completion
2019

KI share of financing
35 %

Expected or Actual impact
Expected

Total investment, SEK
850 million

Disbursed amount, SEK
300 million

Estimated impact attributable to green loan

GHG-emissions reduced/avoided

n/a tonnes

Other

City bus depot with biogas filling system.

All borrowers | Clean transportation

Fastighets AB Mösseberg (Falköping Municipal Property Company)

Kifab i Kalmar AB (Kalmar Municipal Property Company)

Kristianstad Municipality

Osby Municipality

Region Uppsala

Svealandstrafiken AB (Västmanland Region Public Transportation Company)

Trelleborg Municipality

Umeå Municipality

Waste management

Investments are intended to ensure sustainable, energy efficient and resource-saving waste management. Eligible projects include the construction of new waste management facilities, upgrades/expansion of existing ones; waste collection systems that minimise transport requirements and increase recycling scope, etc.

KOMMUNINVEST GREEN LOANS TO WASTE MANAGEMENT

Total amounts disbursed and outstanding

155 MSEK

Total number of projects

4

ESTIMATED ANNUAL IMPACT OF GREEN LOANS[1]

Increase in capacity

7,100 tonnes

GHG emissions [saved/reduced/avoided]

583 tonnes CO_2e

1) Refers to the Green Loan share of project impacts. The impact attributable to green bond investors is presented on page 3.

Complete project-by-project-reporting in spreadsheet format at kommuninvest.se

For investors · Green Bonds · Impact Reporting

#60 OPTICAL WASTE SORTING FACILITY

Optical waste sorting facility at Kristinehed, targeting household waste and up to six fractions. Approval for 75,000 tonnes capacity.

Borrower
Trelleborg municipality

Project completion
2017

KI share of financing
97 %

Expected or Actual impact
Expected

Total investment, SEK
129 million

Disbursed amount, SEK
125 million

Estimated impact attributable to green loan

GHG-emissions reduced/avoided

n/a

Other

Sorting of food waste and other organic waste to result in increased production of biogas and biofertilizer.

#169 FOUR MUNICIPALITIES JOIN FORCES IN WASTE COLLECTION AND RECYCLING

Financing new investments in source-separated waste collection and refinancing of existing recycling stations, following merger of waste management/recycling activities in four neighboring municipalities: Gnosjö, Gislaved, Vaggeryd and Värnamo.

Borrower
Kommunalförbundet Samverkan Återvinning och Miljö (Gislaved, Gnosjö, Vaggeryd and Värnamo Municipal Waste Management Cooperation)

Project completion
2018

KI share of financing
100 %

Expected or Actual impact
Expected

Total investment, SEK
30 million

Disbursed amount, SEK
30 million

Estimated impact attributable to green loan

GHG-emissions reduced/avoided

583 tonnes

Other

Sorting of food waste and other organic waste to result in increased production of biogas and biofertilizer.

All borrowers | Waste management

Halmstad Rådhus AB (Halmstad Municipal Holding Company)	Kommunalförbundet Samverkan Återvinning och Miljö (Gislaved, Gnosjö, Vaggeryd and Värnamo Municipal Waste Management Cooperation)	Region Uppsala

Climate change adaptation

Investments in this category are intended to improve local adaptation to climate change. This includes facilities and installations to manage urban runoff, floods, landslides, avalanches, rising sea levels, and other challenges due to changed weather and climate conditions. Measures undertaken may be related to buildings, infrastructure and sensitive surroundings.

KOMMUNINVEST GREEN LOANS TO CLIMATE CHANGE ADAPTATION

Total amounts disbursed and outstanding

16 MSEK

Total number of projects

1

#90 FLOOD PROTECTION LEVEE

Construction of levee on the western embankment of Kristianstad, to protect the city from flooding.

Borrower
Kristianstad municipality

Project completion
2016

KI share of financing
93 %

Expected or Actual impact
Expected

Total investment, SEK
16 million

Disbursed amount, SEK
16 million

Estimated impact attributable to green loan
Other

Reduced risk of contamination of the Helgeå stream.

All borrowers | Climate change adaptation

Kristianstad Municipality

Environmental management

This category covers a range of projects that intend to ensure sustainable use of land. This may include projects such as restoration of biodiversity, planting forests, cleaning up of harmful substances, developing land into recreational space, facilitating walking, cycling and public transportation solutions. Measures may include nature conservation and improving eco-system services.

KOMMUNINVEST GREEN LOANS TO ENVIRONMENTAL MANAGEMENT

Total amounts disbursed and outstanding

0 MSEK

Total number of projects

0

Impact reporting methodology

Introduction

The purpose of this impact report is to illustrate the climate and environmental impacts that have resulted or are projected to result from projects financed through the Kommuninvest Green Bonds Framework. Kommuninvest is committed to transparent reporting and conservative assessments when reporting these results.

As of 31 December 2018, Kommuninvest had financed Eligible Projects in seven out of eight project categories: Renewable energy; Energy efficiency in energy systems; Green buildings and energy efficiency; Clean transportation; Waste management; Water and wastewater management; and Climate change adaptation.

Investments in these categories, save for adaptation measures, typically lead to direct reductions in greenhouse gas emissions, primarily through energy savings, or reduce energy consumption and thereby indirectly reduce greenhouse gas emissions.

Interpret results with caution

A number of key result indicators including indicators targeting renewable energy generation, energy savings and reduced and avoided GHG emissions have been selected and where possible quantified. However, it is important to consider the following aspects in order to adequately interpret the reported results:

- Uncertainty and comparability: Estimations of impact indicators and projections of impacts are based on certain assumptions. Kommuninvest aims to make sound, conservative and reasonable assumptions based on, inter alia, current information and data provided by its borrowers. Actual results may differ from initial projections as a result of unforeseen project outcomes, behavior and slow start-up periods.
- Qualitative results: The projects listed within this report may have impacts across a wider range of indicators than those included in this report. Where quantitative data is unavailable, qualitative data, to the extent possible have been included to illustrate the type and direction of other beneficial impacts.
- Ex-ante and ex-post: Both impact analysis (ex-ante) and impact reporting (ex-post) will be used to report the impacts of a project. Kommuninvest aims to report actual results where feasible, and has included information to that effect in the project disclosures in this report and online. As required by the Kommuninvest Green Bonds Framework, all Eligible Projects must promote the transition to a low-carbon and climate-resilient society.

Adhering to harmonised guidelines

The impact indicators summarized in this report focus on results deemed relevant to Green Bond investors, and seeks to be aligned with the recommendations outlined in the Nordic Position Paper[1] (see page 13). In many respects, this means alignment also with the IFI Harmonized Framework for Impact Reporting[2], published by a group of international financial institutions, and with impact reporting recommendations as outlined by the Green Bond Principles[3]. The indicators are intended to illustrate the type and scale of expected results in a variety of projects. It is important to note that, because of the wide range of project categories, comparability between projects (and other project portfolios) may be limited.

Calculation of climate impact

The environmental impact of Eligible Projects is calculated using actual or estimated annual impact, compared to an alternative base scenario where the investment has not taken place or where it has been completed solely meeting regulatory requirements.

The impact of reduction in greenhouse gas emissions is measured in CO_2-equivalents (CO_2e) while energy savings are measured in MWh. Other units of measurements may be used when appropriate. All project climate impact calculations are based on the share of financing

1) Nordic Public Sector Issuers: Position Paper on Green Bonds impact reporting, January 2019

2) International Financial Institutions (IFIs): Green Bonds, Working Towards a Harmonized Framework for Impact Reporting, December 2015

2) See Resource Centre for Green & Social Bonds at icmagroup.com

provided by Kommuninvest and the actual disbursements to the project.

We report the impact of investments on an ex-ante basis, i.e. on the basis of estimates. If we have access to ex-post data, i.e. actual outcomes, we will report on these. The project-by-project disclosures indicate whether impact is reported based on estimates or actual outcomes.

Approach

The impact of Eligible Projects funded by Kommuninvest can be calculated in a number of ways:

- by reference to the reduction in energy consumption or added renewable energy capacity, and thus the greenhouse gas emissions avoided as a result of energy savings or crowding out dirtier alternatives (mitigation projects).
- the contribution made to strengthening local adaptation to climate change (adaptation projects).
- the environmental benefits achieved in other ways than through mitigation or adaptation measures (environmental management projects).

Green buildings and Renewable energy

As of 31 December 2018, 52 (49) percent of the disbursements were for Green building projects and 31 (39) percent for Renewable energy projects, project categories which are deemed greenhouse gas mitigation investments.

To calculate the climate and environmental impact, the completed project has to be compared with an alternative scenario. In some cases, it will be appropriate to consider the investment in relation to a baseline scenario – a reference scenario in which the investment does not exist. In such cases the calculation will be as follows:

Annual climate impact = (emissions produced or energy consumed by the project in a baseline scenario) – (emissions produced or energy consumed by the project after the investment has been completed).

In other cases, for example where the project financed is a new building, the approach is to assume that the investment will be undertaken regardless but that the borrower may choose to adhere to less strict climate standards. In such instances the climate impact is calculated on the basis of an alternative scenario in which the investment meets the minimum requirements contained in the applicable building regulations. The calculation will then be as follows:

Annual climate impact = (emissions produced or energy consumed by an equivalent investment if minimum standards were followed)
– (emissions produced or energy consumed by the project after the investment has been completed).

A detailed disclosure of the impact calculations deployed in this report is provided on pages 44–45.

Scope

At this stage, Kommuninvest report impact on Scope 1 and Scope 2 emissions, ie. including all direct GHG emission as well as indirect GHG emissions from consumption of purchased electricity, heat, cooling or steam.

Impact disclosed in relation to financed portion

This report illustrates the expected or realized environmental impact made possible as a result of projects to which Green Bond proceeds have been allocated. When we report impact, we do so in relation to the share of the project's total investment cost that Kommuninvest has financed, and to amounts disbursed and outstanding to the project.

Impact per invested SEK

Measuring the impact of a green investment project in relation to the money that has been invested is a clear and simple metric to evaluate Green Bonds. While this makes it easy to compare Green Bond issues against each other, it may create a false sense of quantitative rigor, as such an approach puts faith in the precision of numbers related to uncertain environmental calculations, which in many cases are performed ex-ante.

Such an approach may also fail to recognize that some Green Bond frameworks are broad in scope, targeting environmental project categories that do not provide impacts measurable in CO_2. This could, for instance, be adaptation and water management projects or sustainable buildings that have other significant environmental values apart from the CO_2 avoided/reduced. For Kommuninvest, this applies to the project categories Water and wastewater management,

Climate change adaptation and Environmental management.

We therefore report impact per invested SEK for investment projects or project categories where the CO_2-impact is quantifiable and relevant. For conservative purposes, we report impact based on amounts disbursed to a project (as opposed to amounts committed). If disbursements are made gradually, environmental impact will also be taken into account gradually. In cases where no disbursements have been made to a project, the environmental benefit for that project will be recognised as zero.

A comparison of impact per invested SEK between the Renewable energy and Green building project categories indicate a considerably higher CO_2e impact for the former vs. the latter. A couple of perspectives are relevant here.

Firstly, the primary purpose of a new building is to provide a specific function as a residential or non-residential building. Energy savings are important, however not the primary objective of the investment. This is in contrast to renewable energy investments, where the energy production is in focus. Secondly, the majority of green buildings financed by Kommuninvest are heated through district heating. This means that the major part of energy savings are calculated against a baseline of 57.5 kg CO_2 per MWh, instead of the 380 kg CO_2 per MWh used for electricity savings.

Baselines for CO_2 emissions

Deciding upon a baseline emission factor against which the environmental impact can be measured is important, since the chosen baseline will determine the calculated environmental benefits. Kommuninvest's choice of baselines and methodology for calculation environmental impact are aligned with the recommendations of the Nordic Position Paper.

Outlined below are the baseline choices for the two largest project categories of the Kommuninvest Green Bonds Framework: Renewable energy and Green buildings and energy efficiency. The full disclosure of baselines used in this report is available on page 42.

For electricity, Kommuninvest uses a mainland European mix, including 26 European Union countries as well as Norway, as the relevant baseline. The rationale is that a non-negligible interconnection between the Nordic countries and European energy markets exist already today and is planned to increase in the coming decades.

The baseline emission factor is constructed using a Combined Margin (CM) for the grid comprised of an existing Operating Margin (OM) and a future Build Margin (BM), as suggested by the IFI Framework for a Harmonized Approach to Greenhouse Gas Reporting[3]. However, Kommuninvest applies the same combination of the OM and BM for all projects, as recommended by the Nordic position paper.

3) International Financial Institution (IFI) Framework for a Harmonized Approach to Greenhouse Gas Accounting, November 2015; Green Bonds, Working Towards a Harmonized Framework for Impact Reporting, December 2015.

4) District heating is a system for distributing heat generated in a centralized location for residential and commercial heating requirements. In the Nordic countries, the heat is often obtained from a cogeneration plant burning principally renewable energy sources, including biomass, but plants also use waste and excess heat, and to a minor extent, fossil fuels. District heating plants may also be used to produce electricity (combined power and heating plants, CHP), and cooling.

5) Profu memorandum (in Swedish only): "Stöd till klimatutvärdering av gröna investeringar inom fjärrvärmeområdet", February 2017. Interested parties can obtain this report by sending a request to: ir@kommuninvest.se

GHG EMISSIONS AND CO_2 IMPACT, BY PROJECT CATEGORIES

Project category	GHG emissions reduced/ avoided, tonnes CO_2e/ year	Disbursements, SEK mn	Impact, tonnes CO_2e per SEK mn
Renewable energy	634,446	7,878	80.5
Energy efficiency	21,796	235	92.7
Green buildings and energy efficiency	4,915	13,295	0.4
Clean transportation	651	730	0.9
Waste management	583	155	3.8
Water management	n/a	3,442	n/a
Adaptation measures	n/a	16	n/a
Environmental management	n/a	0	n/a
Total GHG emissions reduced/avoided, tonnes CO_2e			**662,390**
Total disbursements, SEK million			**25,750**
Disbursements with quantified CO_2 impact, SEK million			**22,293**
% of disbursements with quantified CO_2 impact			**85%**

DEFINITIONS USED IN THIS DOCUMENT

Atemp	All internal area of a building which is heated to more than 10 ºC in sq.m. Atemp is the area which energy consumption in Sweden is calculated.
CO_2e	Carbon dioxide equivalent
kWh, MWh and GWh	Kilowatthour, Megawatthour and Gigawatthour
PE	Population equivalent

For district heating[4] systems, which are fundamentally local/regional and not interconnected on a national or Nordic basis, Kommuninvest has commissioned an external advisor to develop a baseline emission factor for district heating for Sweden, based on avoided mix of best available alternative heating technologies[5].

To calculate the impact and energy efficiency of buildings, the financed building is compared with the requirements of the Swedish national building code (Boverkets Byggregler, BBR).

Energy efficiency in new Green Buildings

As per 31 December 2018, 141 (86) Green Building projects were financed, of which 132 (81) were new buildings (residential, non-residential and other), 5 (5) were energy efficiency projects in existing buildings and 4 (0) were major renovations of existing buildings.

Total energy use in the 57 (33) residential building projects, expected or actual, is 17,187 (11,426) MWh per annum, or on average 57 (60) kWh per sq.m and year. This equates to 40 (41) percent less than building requirements. Had these buildings solely been built to meet national building regulations, total energy consumption would have been 28,503 (19,409) MWh. The total heated surface area for these buildings is 299,750 (190,762) sq.m.

For the 67 (44) non-residential building projects, the total expected or actual energy use is 22,776 (12,964) MWh per annum, or on average 51 (47) kWh per sq.m and year. This equates to 50 (56) percent less than building requirements. Had these buildings solely been built to meet national building regulations, total energy consumption would have been 45,971 (29,598) MWh. The total heated surface area for these buildings is 444,108 (278,410) sq.m. Please note that data above refer to the total for the projects, irrespective of how much has been financed with Green Loans.

For both residential and non-residential building projects the reference to the Swedish building regulation is to the regulation in force upon approval of the project, either Boverket's Building Regulations BBR 21, until March 2018, or Boverket's Building Regulations BBR 25, from March 2018.

Reduced and avoided emissions

Kommuninvest has applied the following approach to define whether a financed investment project results in reduced or avoided emissions. The climate benefit for all Renewable energy projects is regarded as avoided emissions, since the production of renewable energy is considered to displace alternative more carbon-intensive energy production. Also for Waste management projects, the climate benefit is regarded as avoided emissions, as most of the quantifiable climate benefit derives from more efficient waste management leading to increased production of biogas. Regarding Green buildings, Kommuninvest considers the climate benefit from new buildings as avoided emissions, as the alternative is that the building had been constructed in accordance with applicable legal requirements. Climate benefits from energy efficiency projects and major renovations within Green buildings, on the other hand, are regarded as reduced emissions. For the project categories Energy efficiency in energy systems and Clean transportation, the climate benefit is also regarded as reduced emissions, since the projects financed are mainly considered to result in the replacement of more carbon-intensive alternatives.

Joule conversion

In this report we use watt-hours as the energy unit, with 1 Wh being the equivalent of one watt of power expended for one hour of time. The Joule (J) conversion factor is: 1 Wh = 3.6 kJ; 1kWh = 3.6 MJ, 1 MWh = 3.6 GJ.

Baselines for CO_2 emissions

The baseline emission factors (used to calculate emissions for the alternative scenario) and project emission factors (used to calculate emissions from actual projects) are presented on the next page. Below, the considerations for electricity and district heating project are outlined.

Electricity

The highly interconnected regional electricity market is the cornerstone of the Nordic energy system, and it can serve as a key enabler for further emissions reductions in the decades ahead. It can also be expected that European energy markets will be increasingly interconnected, with energy traded cross-border to an increasing degree.

In line with the recommendations of the Nordic Position Paper, Kommuninvest has chosen a mainland European mix, including 26 European Union countries as well as Norway, as the relevant baseline for electricity. The rationale is that a non-negligible interconnection between the Nordic countries and European energy markets exist already today and is planned to increase in the coming decades. Regardless of whether the energy balance is characterised by an export surplus or a need for imported electricity, added renewable energy capacity and reductions in energy use in the Nordic region translate into the crowding out of more carbon-intensive energy production elsewhere. Using a marginal approach for assessing the environmental benefit, rather than an average approach, is in accordance with a consequential perspective for investments.

In line with IFI recommendations[1], the Nordic Position Paper recommends the use of a Combined Margin (CM) for the grid that is comprised of an Operating Margin (OM) and a Build Margin (BM). However, for simplicity and relevance to the Nordic context, we apply a CM of 50 per cent OM and 50 per cent BM for all relevant projects, as opposed to the IFIs which apply different combinations of the OM and BM depending on the type of project financed. This also means adopting a more conservative approach than if the IFI methodology had been applied. The CM used in this report is 380 kg CO_2e per MWh.

District heating

In the Nordic countries, district heating[2] has successfully enabled the transition from fossil fuel based heating systems to heating systems based primarily on renewable energy sources. Remaining fossil fuel use is today being gradually substituted and phased out.

The systems of district heating (and district cooling) are fundamentally local/regional and not interconnected on a national or Nordic basis. Kommuninvest has commissioned an external advisor (Profu) to develop a baseline emission factor for district heating for Sweden, based on avoided mix of alternative heating technologies. This estimated baseline figure for district heating in Sweden amounts to 117 kg/MWh, representing an avoided alternative heating mix of 20 per cent wood pellet boilers, 45 per cent geothermal heat pumps, 28 per cent air/water heat pumps and 7 per cent air to air heat pumps.

Readers are advised that this figure represents a national average for what are essentially locally based energy systems, in order to facilitate calculations. Using national averages is feasible for most investment projects financed by Kommuninvest, but local circumstances and actual changes in production mix are considered for certain projects related to increased interconnection, energy efficiency and other changes in the production mix.

For the calculation of impact, Kommuninvest compares baseline emissions with actual or expected project emissions. For district heating projects in the renewable energy category, Kommuninvest seeks to calculate project emissions based on the national average emission factor for district heating in Sweden. An additional environmental benefit of 41 kg/MWh, as a national average, is ascribed due to avoided alternative waste treatment (land fill and methane leakage). In certain cases, where financed projects target a change in fuel mix, Kommuninvest calculates impact based on local data.

For district heating projects in the energy efficiency category, Kommuninvest calculates project emissions based on local emissions. No additional benefit for avoided alternative waste treatment is applied.

1) International Financial Institution (IFI) Framework for a Harmonized Approach to Greenhouse Gas Accounting, November 2015.

2) District heating is a system for distributing heat generated in a centralized location for residential and commercial heating requirements. In Sweden, the heat is often obtained from a cogeneration plant burning principally renewable energy sources, including biomass, but plants also use waste and excess heat, and to a minor extent, fossil fuels. District heating plants may also be used to produce electricity (combined power and heating plants, CHP), and cooling.

Baseline emission factors (used to calculate alternative emissions scenario), Scope 1 and 2

Type	Emission factor	Comment
Variable electricity generation, e.g. wind and solar power projects	380 kg CO_2e/MWh	EU 26 (mainland) plus Norway, average 2011-2013: Combined Margin (50% Operating Margin (OM) 483 kg CO_2e/MWh + 50% Build Margin (BM) 277 kg CO_2e/MWh)[1]
Firm electricity generation e.g. hydropower projects	380 kg CO_2e/MWh	See above
Electricity consumption from the grid, e.g. green buildings and energy efficiency projects	380 kg CO_2e/MWh	See above
Electricity generation in district heating projects	380 kg CO_2e/MWh	See above
Heat consumption from the grid, e.g. green building and energy efficiency projects	58 kg CO_2e/MWh	Swedish average for heating production from district heating[2]
Heat generation in district heating projects	117 kg CO_2e/MWh	Estimated national Swedish average for avoided alternative heating[3]
Waste incineration in district heating projects	41 kg CO_2e/MWh	Estimated national Swedish average for avoided alternative waste treatment[4]
Biogas generation projects	259 kg CO_2e/MWh	Diesel (fossil)[5]

1) Calculation by Kommuninvest, based on IFI Interim Dataset of Harmonized Grid Factors v 1.0, as provided by Nordic Investment Bank

2) Swedenergy

3) Profu

4) Swedenergy (calculations by Profu)

5) Swedish Petroleum & Biofuels Institute

Project emission factors (used to calculate actual project emissions), Scope 1 and 2

Type	Emission factor	Comment
Variable electricity generation, e.g. wind and solar power projects	0 kg CO_2e/MWh	-
Firm electricity generation, e.g. hydropower projects	0 kg CO_2e/MWh	-
Electricity generation in district heating projects	97 kg CO_2e/MWh	Swedish average for electricity production from district heating[1]
Heating generation in district heating projects	58 kg CO_2e/MWh	Swedish average for heating production from district heating[1]
Biogas generation projects	0 kg CO_2e/MWh	-

1) Swedenergy

Collected data and Climate impact calculation

Collected data represents the information that Kommuninvest asks borrowers to provide in Green Loan applications and annual follow-up reporting. Not all projects have provided all of the information indicated in this section.

RENEWABLE ENERGY

Eligible Projects in the Renewable energy category exploit or intend to exploit various types of renewable energy sources, in order to expand capacity or replace or offset existing or planned fossil fuel-based energy production and supply.

Renewable energy sources that can be approved for Kommuninvest financing include solar and wind power, geothermal energy, bioenergy, bioenergy and biogas from waste, as well as small-scale hydro power. The maximum share of fossil fuels in district heating projects is 10 percent (peat is treated as a fossil energy source). If fossil waste fractions are used for energy extraction the share of fossil energy is a maximum 20 percent.

The table below outlines the data input collected from Eligible Projects as well as the methodology applied when calculating the environmental impact.

Sub-category	Collected data	Climate impact calculation
Bioenergy	• Annual production of bioenergy (biodiesel, bioethanol, biogas, CNG[1] and other biofuels), measured in MWh. • Annual delivery of specific bioenergy measured in MWh.	Annual climate impact (CO_2e) = Annual production of renewable energy in MWh* baseline emissions factor - Annual production of renewable energy (MWh)* project emission factor. Note: Different baseline emission factors and project emission factors are applied to different sub-categories. These are presented on the preceding page.
Wind, wave, solar and geothermal	• Installed capacity, in MW. • Estimated annual production of electricity, in MWh.	See above
District heating	• Estimated or actual annual output of heating and electricity, in MWh.	See above

ENERGY EFFICIENCY IN ENERGY SYSTEMS

Eligible Projects in this category are intended to improve energy efficiency in predominantly fossil-free energy systems, resulting in either a reduction in energy use or the increased delivery of energy to end users.

Sub-category	Collected data	Climate impact calculation
District heating systems	See Renewable energy	See Renewable energy

1) Compressed Natural Gas (Sw:"fordonsgas") from bioenergy plants

GREEN BUILDINGS

Eligible Projects in this category are intended to reduce energy usage in new or existing buildings, resulting in a reduction in net external energy demand and a reduction in CO_2 emissions.

Impact is reported in relation to the building regulation in force upon launch of the Kommuninvest Green Bonds Framework (BBR 21). The regulation has since been revised and the regulation in force upon publication of this document is BBR 25.

Sub-category	Collected data	Climate impact calculation
New buildings	• Heated surface area in square metres (Atemp). • Estimated annual heating consumption of the building, measured in kWh/Atemp in accordance with applicable Swedish regulations. • Estimated annual electricity consumption of the building, measured in kWh/Atemp. • Required maximum energy consumption of the building, measured in kWh/Atemp. • Annual production of installed solar panels, measured in kWh/ Atemp.	Annual climate impact (CO_2e) = ((Heat consumption of reference building in MWh* baseline emissions factor for heat consumption + electricity consumption of reference building in MWh* baseline emissions factor for electricity consumption) - (Heat consumption of project building in MWh* baseline emissions factor for heat consumption + electricity consumption of the project building in MWh* baseline emissions factor for electricity consumption)) Note: The relationship between heat and electricity consumption of the reference building may differ from the project building.
Energy efficiency	• Heated surface area square metres (Atemp), • Annual energy use before the investment, in MWh. • Annual energy use after the investment, in MWh.	Annual climate impact (CO_2e) = ((Heat consumption of building pre investment in MWh* baseline emissions factor for heat consumption + Electricity consumption of building pre investment in MWh* baseline emissions factor for electricity consumption) - (Heat consumption of building post investment in MWh* baseline emissions factor for heat consumption + electricity consumption of building post investment in MWh* baseline emissions factor for electricity consumption)) Note: The relationship between heat and electricity consumption of the building pre investment may differ from that of the building post investment.
Major renovations	• Heated surface area in square metres (Atemp). • Estimated annual heating consumption of the building before/after renovation, measured in kWh/Atemp in accordance with applicable Swedish regulations. • Estimated annual electricity consumption of the building before/after renovation, measured in kWh/Atemp. • Required maximum energy consumption of the building, measured in kWh/Atemp. • Annual production of installed solar panels, measured in kWh/ Atemp.	Annual climate impact (CO_2e) = ((Heat consumption of building pre investment in MWh* baseline emissions factor for heat consumption + Electricity consumption of building pre investment in MWh* baseline emissions factor for electricity consumption) - (Heat consumption of building post investment in MWh* baseline emissions factor for heat consumption + electricity consumption of building post investment in MWh* baseline emissions factor for electricity consumption)) Note: The relationship between heat and electricity consumption of the building pre-investment may differ from that of the building post investment.

OTHER PROJECT CATEGORIES

For project categories outlined below, no generally applicable calculation model is used, Kommuninvest relies on reported data from projects. More elaborate impact analysis is possible to undertake in relation to these projects, and we aim to develop our reporting in the future. The choice of indicators can also be expected to undergo revision as more knowledge is gathered and best practices are developed.

Public transportation

Eligible Projects are intended to increase transportation of goods and passengers while consuming a minimal or zero amount of fossil fuels, resulting in a reduction of of GHG emissions.

Collected data

- Number of people the project will affect each year.
- An estimate of the number of cars/road kilometres the project will replace.
- If feasible: Annual energy savings, reduction in greenhouse gas emissions and/or local emissions, or amount of greenhouse gas emissions and/or local emissions that will be avoided as a result of the investment.

Waste management

Eligible Projects are intended to either increase recycled waste capacity, improve energy efficiency, reduce the amount of release of harmful substances or meet other appropriate conditions set by Kommuninvest.

Collected data

- Number of tonnes of waste expected to be processed by the facility each year.
- An estimate of the reduction in greenhouse gas emissions/the amount of greenhouse gas emissions that will be avoided as a result of the investment, in tonnes of CO_2e.
- If feasible: Estimate annual energy savings attributable to the investment, in kWh.
- Expected improvement in material recovery rate or other target for improved resource use.
- For biogas plants: Expected annual production volume.

Water management

Eligible Projects are intended to reduce leakage or improve filtration of harmful substances in the water purification process, increase output measured in person equivalents (PE) or meet other appropriate conditions set by Kommuninvest.

Collected data

- Number of metres of piping/conduit laid, upgraded or replaced.
- Number of person equivalents (PE) of water or wastewater the plant processes, identifying any increase that can be attributed to the investment.
- Qualitative indicators/targets for adaptation to climate change (managing urban runoff etc.), with a description of weather-related or climate-related problems that will be mitigated by the investment.
- Where relevant, amount of electricity, biogas or other energy carrier expected to be produced each year.

Adaptation measures

This category is dedicated towards adaptation measures to new environmental conditions, due to inter alia anticipated increasing rainfall, rising sea levels, or increased drought. Projects deemed eligible on a case by case basis. Relevant indicators are dependent on the characteristics of the project, and determined by Kommuninvest in consultation with the borrower.

Environmental management

Eligible Projects are intended to promote sustainable environment development in areas other than climate change. Measures include preserving biodiversity, sustainable agriculture and improvement of eco-systems. Projects are deemed eligible on a case by case basis. Relevant indicators are dependent on the characteristics of the project, and determined by Kommuninvest in consultation with the borrower. No project applications by 31 December 2018.

Kommuninvest is a Swedish municipal cooperation set up in 1986 to provide cost-efficient and sustainable financing for local government investments in housing, infrastructure, schools, hospitals etc. The cooperation comprises 289 out of Sweden's 310 local governments, of which 277 municipalities and 12 regions. Kommuninvest is the largest lender to the Swedish local government sector and one of the largest credit institutions in Sweden. At year-end 2018, total assets were SEK 417 billion (USD 46.5 billion), with a loan portfolio of SEK 354 billion (USD 39.5 billion). The head office is located in Örebro.

KOMMUNINVEST

Production: Kommuninvest and Springtime-Intellecta. Photos: Dahrén Arkitekter, Eidar Municipal Housing Company, iStock, Kristianstad municipality, Rättviks Teknik AB/Rättvik municipality, Shutterstock, Skellefteå municipality, Teresa Andersson, Umeå municipality, Wikimedia Commons